DUTIES OF DECK OFFICERS

ON BOARD

ΠΤΥΧΙΑΚΗ ΕΡΓΑΣΙΑ ΤΟΥ ΔΕΛΗΓΙΑΝΝΗ ΚΩΝΣΤΑΝΤΙΝΟΥ

ΑΓΜ: 3077

ΑΚΑΔΗΜΙΑ ΕΜΠΟΡΙΚΟΥ ΝΑΥΤΙΚΟΥ ΜΑΚΕΔΟΝΙΑΣ ΣΧΟΛΗ ΠΛΟΙΑΡΧΩΝ

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Α.Ε.Ν ΜΑΚΕΔΟΝΙΑΣ

ΠΤΥΧΙΑΚΗ ΕΡΓΑΣΙΑ

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Ημερομηνία ανάληψης της εργασίας:

Ημερομηνία παράδοσης της εργασίας:

Α/Α	*Ονοματεπώνυμο*	*Ειδικότης*	*Αξιολόγηση*	*Υπογραφή*
1				
2				
3				
ΤΕΛΙΚΗ ΑΞΙΟΛΟΓΗΣΗ				

Ο ΔΙΕΥΘΥΝΤΗΣ `ΣΧΟΛΗΣ : καπ. ΤΣΟΥΛΗΣ ΝΙΚΟΛΑΟΣ

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ABSTRACT

The purpose of this project is to give the reader the essential knowledge about the duties of the deck officers onboard. At the next pages we will see about the electronic equipment that deck officers use. I include certain Bridge Checklists as an appendix which, I refer to in my main text and indicate in detail the duties of deck officers.

In the first chapter I talk about the deck officers. How you can become an officer, what is the bridge team and the master and also, about the master's standing orders. In the second chapter I will saw you about the duties of the OOW, just like how he must make his watch, the navigation, controlling of the ship and the speed, the radio communication that he must carry, the pollution prevention and what he must do in an emergency situation. Then in the next chapter, I will analyze about the operation and the maintenance of the bridge equipment. In this chapter we will deal with the radar, the compass systems, the ECDIS and the integrated bridge systems. Then in the fourth chapter, I talk about the passage plan. What the officer who is in charge does, what he must be careful about, what his responsibilities are, because the passage planning is one of the most important things on board. It's the alpha and omega. And for the last two chapters we will talk about the chief mate and the master, what their duties and responsibilities are, what they must do in to the port or during and before the cargo operations and what authority they have.

Being a deck officer in general is a very difficult job, because they must be alert all the time and especially the Master, because the OOW will call him any time for any reason. They must have good seamanship and know their duties very well, because the navigation is the most important thing on board for the safety of the crew, the environment, the cargo and the ship.

ΕΥΧΑΡΙΣΤΙΕΣ

Στο σημείο αυτό αισθάνομαι την ανάγκη να εκφράσω τις ειλικρινείς και θερμές ευχαριστίες μου σε όσους συνέβαλαν στην ολοκλήρωση αυτής της προσπάθειας και ιδιαίτερα την επιβλέπουσα καθηγήτρια μου Κ. Παπαλεωνίδα Παρασκευή για τη συνεχή καθοδήγηση, την αμέριστη υποστήριξη, τις ουσιώδεις συμβουλές, καθώς και την αδιάκοπη συμπαράσταση και ενθάρρυνση που μου παρείχε σε όλο αυτό το διάστημα.

1. WHAT IS A DECK OFFICER

The owner who has a vessel must man it at least with the safe manning system as per IMO (International Maritime Organization). All these crew-member can be are separated in two categories. The first is the deck department and the second is the engine department. We will discuss the deck department and especially the deck officers and what their duties are.

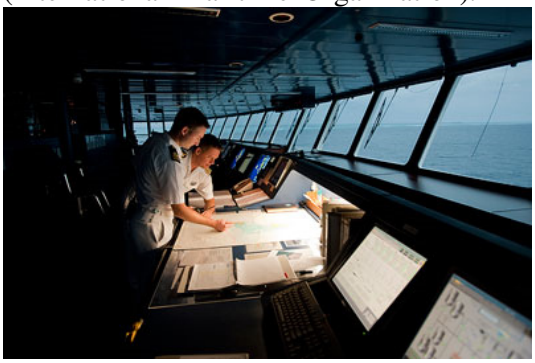


Figure 1 Officers on the bridge

A deck officer first of all is the officer who is responsible to navigate the ship with safety from one place to another, to load and unload the cargo from the ship, to make the proper maintenance of the ship, of the deck and to communicate with the agents, the cargo operation of the company and generally is responsible for the human life, the environment, the cargo and the ship.

To become an officer you must first of all finish the merchant academy which is four years, for more analysis of the studies in the merchant academy (as per Greeks' academies) are:

SEMESTER	PLACE FOR EDUCATION
1ST	In academy (to take the basic knowledge of the ships)
2ND	On a ship (as a deck cadet)
3RD	In academy
4TH	In academy
5TH	On a ship (as a deck cadet)
6TH	In academy
7TH	In academy
8TH	In academy

A student, in order to take his degree must collect a twelve-month experience onboard from two vessels or more. Then he goes at the records, he submits his sea service to them with the license from the academy and then he takes the degree. Then he travels to collect more experience until s/he becomes a master or retires. Until the retirement, he must attend many

seminars. The most important seminars are: G.O.C. (General Operator Certificate), Tanker Safety Basic and Advance, SSO (Ship Security Officer), ECDIS, etc.

1.1 The bridge team

All ship's personnel who have bridge navigational duties will be part of the bridge team. The master and pilot (s), as necessary, will support the team, which will comprise the OOW, a helmsman and look-out (s) as required.

Figure 2 Bridge team

The OOW is in charge of the bridge and the bridge team for that watch, until relieved.

It is important that the bridge team works together closely, both within a particular watch and across watches, since decisions made on one watch may have an impact on another watch.

The bridge team also has an important role in maintaining communications with the engine room and other operating areas on the ship.

1.2 The bridge team and the master

It should be clearly established in the company's safety management system that the master has the overriding authority and responsibility to make decisions with respect to safety a pollution

prevention. The master should not be constrained by a ship owner or charterer from taking any decision which in his professional judgment, is necessary for safe navigation, in particular in severe weather and in heavy seas.

Figure 3 Bridge team and the master

The bridge team should have a clear understanding of the information that should be routinely reported to the master, of the requirements to keep the master fully informed, and of the circumstances under which the master should be called.

When the master has arrived on the bridge, his decision to take over control of the bridge from the OOW must be clear and unambiguous.

1.3 Master's standing orders

Shipboard operational procedures manuals supported by standing instructions based upon the company's navigation policy should form the basis of command and control on board.

Master's standing orders should be written to reflect the master's own particular requirements and circumstances particular to the ship, her trade and the experience of the bridge team employed at that point in time.

Standing orders and instructions should operate without conflict within the ship's safety management system.

Standing orders should be read by all officers before the commencement of the voyage and signed accordingly. A copy of the orders should be available on the bridge for reference.

2. DUTIES OF THE OFFICER OF THE WATCH (OOW)

2.1 Overview

Master's representative

Under the STCW Code, the OOW is the master's representative and is primarily responsible at all times for the safe navigation of the ship and for complying with the COLREGS.

As the master's representative, the OOW is in charge of the bridge and therefore in charge of the bridge team for that watch, until properly relieved. In compliance with shipboard operational procedures and master's standing orders, the OOW should ensure that bridge watch manning levels are at all times safe for the prevailing circumstances and conditions.

Primary duties

In order to maintain a safe navigational watch, the primary duties of the OOW will involve watch keeping, navigation and GMDSS radio watch keeping.

Watch keeping

The watch keeping duties of the OOW include maintaining a lookout and general surveillance of the ship, collision avoidance in compliance with the COLREGS, recording bridge activity and making periodic checks on the navigational equipment in use. Procedures for handing over the watch and calling for support on the bridge should be in place and understood by the OOW.

Figure 4 Watch keeping

Navigation

The navigational duties of the OOW are based upon the need to execute the passage plan safely and monitor the progress of the ship against that plan.

Radio communications

With the introduction of the Global Maritime Distress and Safety System (GMDSS) radio communications have now become an important element in the functions of the OOW, who will be responsible for maintaining a continuous radio watch at sea. During distress incidents, one of the qualified radio personnel should be designated to have primary responsibility for radio communications. On passenger ships that person can have no other duties during a distress situation.

Figure 5 Report of the OOW

In support of primary duties

Controlling the speed and direction of the ship

The OOW will need to be conversant with the means and best practices of controlling the speed and direction of the ship, handling characteristics and stopping distances. The OOW should not hesitate to use helm, engines or sound signaling apparatus at any time.

Pollution prevention, reporting and emergence situations

Figure 6 Pollution

The OOW also needs to be fully conversant with shipboard obligations with regard to pollution prevention, reporting and emergency situations. The OOW should know the location of all the safety equipment on the bridge and how to operate that equipment.

Additional duties

There may also be a number of additional duties for the OOW to undertake while on watch. General communications, cargo monitoring, the monitoring and control of machinery and the supervision and control of ship safety systems are typical examples.

Additional duties should under no circumstances interfere with the exercise of primary duties.

Bridge attendance

The OOW should not leave the bridge unattended. However, in a ship with a separate chartroom the OOW may visit that room for short periods of time to carry out necessary navigational duties after first ensuring that it is safe to do so.

2.2 Watch keeping

Maintaining a look-out

In compliance with the COLREGS, a proper look-out must be maintained at all times to serve the purposes of:

Figure 7 Maintaining a look-out

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

Full attention to look-out duties must be given by the bridge team on watch. A helmsman while steering, except in small ships with an unobstructed all round view at the steering position, should not be considered to be the look-out.

On ships with fully enclosed bridges, sound reception equipment will need to be in operation continuously and correctly adjusted to ensure that all audible sounds on the open deck can be clearly heard on the bridge.

Sole look-out

Under the STCW Code, the OOW may be the sole look-out in daylight provided that on each such occasion:

- The situation has been carefully assessed and it has been established without doubt that it is safe to operate with a sole look-out;

- Full account has been taken of all relevant factors, including, but not limited to:
- State of weather
- Visibility
- Traffic density
- Proximity of dangers to navigation
- The attention necessary when navigating in or near traffic separation schemes;
- Assistance is immediately available to be summoned to the bridge when any change in the situation so requires.

If sole look-out watch keeping practices are to be followed, clear guidance on how they should operate will need to be given in the shipboard operational procedures manual.

General surveillance

The OOW needs to maintain a high level of general awareness about the ship and its day-to-day operations.

This may include maintaining a general watch over the ship's decks to monitor, where possible, people working on deck, and any cargo or cargo handling equipment. Special watch keeping arrangements may be appropriate in waters where there is thought to be a risk of piracy or armed attack.

Whenever work is being carried out on deck in the vicinity of radar antenna, radio aerials and sound signaling apparatus, the OOW should be particularly observant and should post appropriate warning notices on the equipment controls.

Watch keeping and the COLREGS

Lights, shapes and sound signals

The OOW must always comply with the COLREGS. Compliance not only concerns the conduct of vessels under the steering and sailing rules, but displaying the correct lights and shapes and making the correct sound and light signals.

A vessel drifting off a port with her engines deliberately shut down is not, for example, a 'vessel not under command' as defined by rule 3(f) of the COLREGS.

Caution should always be observed when approaching other vessels. Vessels may not be displaying their correct light or shape signals, or indeed their signals could be badly positioned and obscured by the ship's structure when approached from certain directions. In sea areas where traffic flow is regulated, such as port approaches and traffic separation schemes, it may be possible to anticipate movements from certain ship types. In these circumstances it is prudent to allow extra sea room, as long as it is safe to do so.

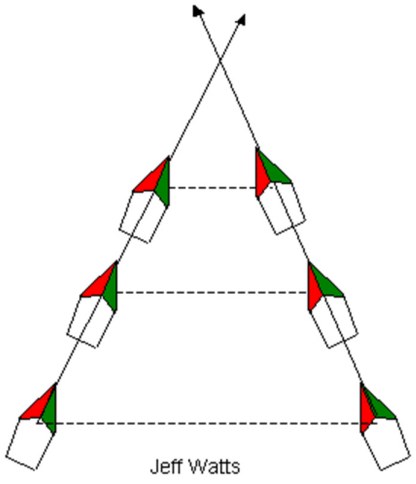


Figure 8 Collision triangle

Collision avoidance action

In general, early and positive action should always be taken when avoiding collisions, and once action has been taken, the OOW should always check to make sure that the action taken is having the desired effect.

VHP radio should not be used for collision avoidance purposes. Valuable time can be wasted attempting to make contact, since positive identification may be difficult, and once contact has been made misunderstandings may arise.

Collision avoidance detection

In clear weather, the risk of collision can be detected early by taking frequent compass bearings of an approaching vessel to ascertain whether or not the bearing is steady and the vessel is on a collision course. Care however must be taken when approaching very large ships,

ships under tow or ships at close range. An appreciable bearing change may be evident under these circumstances but in fact a risk of collision may still remain.

In restricted visibility, conduct of vessels is specifically covered by the COLREGS.

In these conditions, radar and in particular electronic radar plotting can be effectively used for assessing risk of collision. The OOW should take the opportunity to carry out radar practice in clear visibility, whenever it is possible.

Recording bridge activities

Figure 9 Bridge log-book

It is important that a proper, formal record of navigational activities and incidents, which are of importance to safety of navigation, is kept in appropriate logbooks.

Paper records from course recorders, echo sounders, NAVTEX receivers etc. should also be retained at least for the duration of the voyage, suitably date and time marked if practicable. In order to allow the ship's actual track to be reconstructed at a later stage, sufficient information concerning position, course and speed should be recorded in the bridge logbook or using approved electronic means. All positions marked on the navigational charts also need to be retained until the end of the voyage.

Periodic checks on navigational equipment

Operational checks

Operational checks on navigational equipment should be undertaken when preparing for sea (see bridge checklist B2) and prior to port entry (see bridge checklist B3).

After lengthy ocean passages and before entering restricted coastal waters, it is important also to check that full engine and steering maneuverability is available.

Routine tests and checks

The OOW should undertake daily tests and checks on the bridge equipment, including the following:

- Manual steering should be tested at least once a watch when the automatic pilot is in use

- Gyro and magnetic compass errors should be checked once a watch, where possible, and after any major course alteration;
- Compass repeaters should be synchronized, including repeaters mounted off the bridge, such as in the engine control room and at the emergency steering position.

Checks on electronic equipment

Checks on electronic equipment should both confirm that the piece of equipment is functioning properly and that it is successfully communicating to any bridge system to which it is connected.

Built-in test facilities provide a useful health check on the functional state of the piece of equipment and should be used frequently.

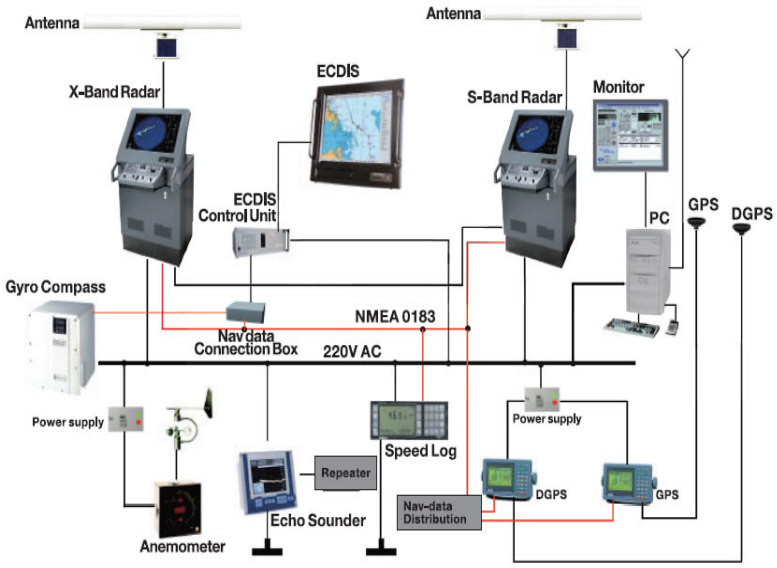


Figure 10 Electronic equipment of the bridge

Electronic equipment systems should be checked to ensure that configuration settings - important for correct interfacing between pieces of equipment – have not changed.

To ensure adequate performance, information from electronic equipment should always be compared and verified against information from different independent sources.

5.2.5.4 Checking orders

Good practice also requires the OOW to check that orders are being correctly followed. Rudder angle and engine rpm indicators, for example, provide the OOW with an immediate check on whether helm and engine movement orders are being followed.

Changing over the watch (see bridge checklist B12 in the appendix)

The OOW should not hand over the watch if there is any reason to believe that the relieving officer is unfit to, or is temporarily unable to, carry out his duties effectively. If in any doubt, the OOW should call the master.

Illness or the effect of drink, drugs or fatigue could be reasons why the relieving officer is unfit for duty.

Before taking over the watch, the relieving officer must be satisfied as to the ship's position and confirm its intended track, course and speed, and engine controls as appropriate, as well as noting any dangers to navigation expected to be encountered during his watch.

The relieving officer should also be satisfied that all other members of the bridge team for the new watch are fit for duty, particularly as regards their adjustment to night vision.

If a maneuver or other action to avoid a hazard is taking place at the moment the OOW is being relieved, handover should be deferred until such action has been completed.

Calling the master

Figure 11 Calling the master

The OOW should notify the master, in accordance with standing orders or special instructions, when in any doubt as to what action to take in the interests of safety.

Guidance on specific circumstances for calling the master or other back-up support should be given in the shipboard operational procedures, supported by standing and bridge orders, as appropriate. Situations where the master should always be called are listed in bridge checklist B13.

The OOW will continue to be responsible for the watch, despite the presence of the master on the bridge, until informed specifically that the master has assumed that responsibility, and this is mutually understood. The fact that the master has taken command on the bridge should be recorded in the log book.

2.3 Navigation

General principles

It is important that the OOW executes the passage plan as prepared and monitors the progress of the ship relative to that plan.

Deviating from or leaving the passage plan

If the OOW has to make a temporary deviation from the passage plan for any reason, the OOW should return to the plan as soon as it is safe to do so.

If the OOW has to leave the

passage plan - a reporting of ice may, for example, require an alteration of course - the OOW should prepare and proceed along a new temporary track clear of any danger. At the first opportunity, the OOW should advise the master of the actions taken. The plan will need to be formally amended and a briefing made to the other members of the bridge team.

Monitoring the progress of the ship

Good navigational practice demands that the OOW:

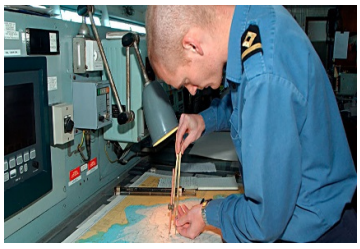


Figure 12 Monitoring the voyage

- understands the capabilities and limitations of the navigational aids and systems being used and continually monitors their performance;
- uses the echo sounder to monitor changes in water depth;
- uses dead reckoning techniques to check position fixes;
- Cross checks position fixes using independent sources of information: this is particularly important when electronic position-fixing systems su

- ch as GPS or Loran-C are used as the primary means of fixing the position of the ship;
- uses visual navigation aids to support electronic position-fixing methods i.e. landmarks in coastal areas and celestial navigation in open waters;
- Does not become over reliant on automated navigational equipment, including electronic chart systems, thereby failing to make proper navigational use of visual information.

Plotting positions from electronic position-fixing systems

Care should also be exercised when taking geographical positions from electronic position-fixing systems like GPS, and plotting these onto charts.

The OOW should bear in mind that:

- If the chart datum differs from the datum (usually WGS84) used by the electronic position-fixing system, a datum shift will have to be applied to the position co-ordinates before they are plotted on the chart: it should be noted that where an appreciable datum shift does exist for a particular chart, a 'satellite-derived position' note providing latitude and longitude datum shift values will appear on the chart;
- on charts whose survey source data is very old, the accuracy of those charts may be poor in certain areas: under these circumstances the OOW should not rely totally on position fixing using electronic systems, and should where possible use visual and radar navigational techniques to maintain safe distances off the land.

Navigation in coastal or restricted waters (see bridge checklist B6 in the appendix)

Figure 13 Coastal navigation

This section should be read in conjunction with section 2.5 - Notes on passage planning in coastal or restricted waters.

As a general rule, navigation should be carried out on the most suitable large scale charts on board, and the position of theship should be fixed at frequent intervals. All relevant navigation marks should be positively identified by the

OOW before they are used. Visual and radar position fixing and monitoring techniques should be used whenever possible.

In coastal waters, the OOW should be aware that ships' routing schemes and ship reporting systems requiring reports to be made to coast radio and vessel traffic stations may exist.

Knowledge of the ship's draught, stability conditions and maneuvering characteristics is also important. As the ship enters shallow water, squat may have a critical effect on the maneuverability of the ship and cause an increase in draught. Squat effect varies in proportion to the square of the ship's speed, and will therefore reduce as speed is reduced.

The importance of all the bridge team fully understanding the coastal waters phase of the passage plan, as well as understanding their individual roles and those of their colleagues, cannot be stressed too strongly.

Navigation with a pilot on board

Responsibilities

Once the pilot has embarked and has arrived on the bridge, the pilot will join the bridge team. The pilot has a specialized knowledge of navigation in local waters. Depending on local pilotage laws the master may delegate the conduct of the ship to the pilot who directs the navigation of the ship in close co-operation with the master and/or the OOW. It is important that the responsibilities of the pilot and the master are agreed and clearly understood.

The presence of a pilot does not relieve the master or the OOW of their duties and obligations for the safety of the ship

. Both should be prepared to exercise their right not to proceed to a point where the ship would not be able to maneuver, or would be in any danger.

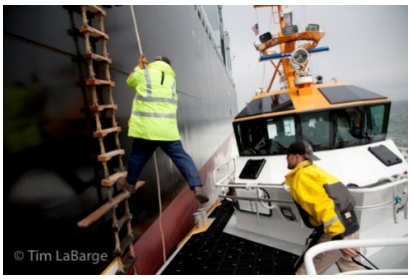


Figure 14 Disembarkation of the pilot

Master/pilot information exchange on boarding

The preliminary pilotage passage plan prepared in advance by the ship should be immediately discussed and agreed with the pilot after boarding. There should be sufficient time and sea room to allow this to happen safely.

Where lack of time or sea room does not allow the plan to be discussed fully, the bare essentials should be covered immediately and the rest of the discussion held as soon as it is safe to do so.

Indeed, on a long pilotage passage, it may be appropriate to review and update the plan in stages.

Monitoring the pilotage

The safe progress of the ship along the planned tracks should be closely monitored at all times. This will include regularly fixing the position of the ship, particularly after each course alteration, and monitoring under keel clearance.

Verbal orders from the pilot also need to be checked to confirm that they have been correctly carried out. This will include monitoring both the rudder angle and rpm indicators when helm and engine orders are given.

It is recommended that communication between the pilot and the bridge team is conducted in the English language.

If the master leaves the bridge, the OOW should always seek clarification from the pilot when in any doubt as to the pilot's actions or intentions. If a satisfactory explanation is not given, the OOW should notify the master immediately, taking whatever action is necessary before the master arrives.

Whenever there is any disagreement with decisions of the pilot, the cause of concern should always be made clear to the pilot and an explanation sought.

The OOW should bear in mind that during pilotage, the ship will need to be properly secured for sea. Excessive use of deck lighting at night may cause visibility interference.

At anchor (see bridge checklist B8 in the appendix)

On anchoring, a fix on the anchor drop position should be made and the ship's swinging circle ascertained, based upon the length of cable in use. Landmarks and transits should be selected for ease of monitoring the position of the ship as it lies at anchor and appropriate light and shape signals should be exhibited according to the COLREGS and any local regulations.

Figure 15 Anchored vessel

While at anchor, the OOW should maintain a check on the ship's position to monitor that the ship does not

drag its anchor or move too close to any other anchored ship.

A proper look-out must be maintained and ship inspection rounds periodically made, particularly if the ship is anchored in waters which might present a risk of attack by pirates or armed robbers.

The master should be immediately notified if the ship drags her anchor, and if sea conditions or visibility deteriorate.

2.4 Controlling the speed and direction of the ship

Use of the engines

In order not to jeopardize the safety of the ship, the OOW should not hesitate to use the engines to change speed on passage if the situation so requires.

Whenever possible, timely notice of intended changes to engine speed should be given to the engine room. If the ship is fitted with UMS engine controls, direct control of the engines will be possible from the bridge.

Safe speed

In compliance with the COLREGS, ships should at all times proceed at a safe speed. In restricted visibility safe speed may require a reduction in service speed to reduce the stopping distance of the ship. Near ice, ships are specifically required to proceed at moderate speeds. Speed changes may be required to avoid a collision in circumstances where the ship is unable to alter course.

Control, and different engine types

To control the main engines effectively, the OOW should be familiar with their operation from the bridge, as well as the operation of the propeller mechanism. The OOW should also be aware of any limitations the system may have, and appreciate that the type and configuration of the ship's engines could have implications when changing speed. Direct-drive diesel, diesel through gearbox/clutch, turbo-electric and gas turbine engines all have relatively quick responses to change, provided the engines are on stand-by. Geared turbines are less responsive.

Figure 16 Controlling the speed

Steering control

Steering control of the ship will comprise manual steering, probably supplemented by an automatic pilot (autopilot) or other track control system.

In areas of high traffic density, in conditions of restricted visibility and in all other potentially hazardous situations a helmsman should be available on the bridge, ready at all times to take over steering control immediately.

When steering the ship under autopilot, it is highly dangerous to allow a situation to develop to a point where the OOW is without assistance and has to break the continuity of the look-out in order to take emergency action and engage manual steering.

Changing between automatic and manual steering should always be made in good time under the supervision of the OOW. Manual steering should be tested after prolonged use of the autopilot.

Figure 17 Controlling the vessel

Use of override controls

Manual steering override controls can be used on those occasions when the autopilot is engaged and the OOW needs to take immediate and direct control of the steering.

Override controls typically have a non-follow-up type of operation and are likely to differ from the main steering control position where follow-up control is usual.

The OOW needs to be familiar with the operation of the steering control systems on the bridge, as well as the method of control at the emergency steering position.

Maneuvering data

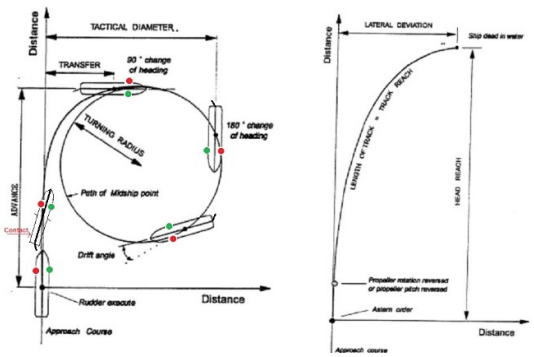


Figure 18 Ships' maneuver data

Ship's maneuvering data is contained on the Pilot Card and Wheelhouse Poster. Some ships also have a maneuvering booklet. The OOW needs to be familiar with this data.

It is important not only to record on the Pilot Card the ship's draught, but also any permanent or temporary ship idiosyncrasies that could affect the maneuverability of the ship. A ship

may, for example, have a tendency to steer to port at full speed, but steer to starboard at slow speed.

2.5 Radio communications

General

The following basic principles apply to all communication carried out by radio:

- Absolute priority should be given to distress, urgency and safety communications;
- Interference with other radio users should be avoided;
- Frequencies should be used for their correct purpose.

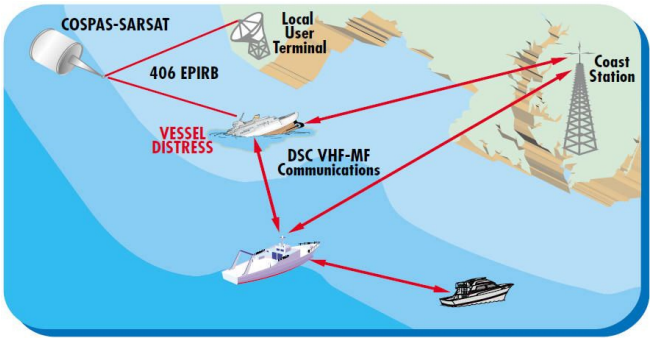


Figure 19 GMDSS system

The ITU publication Manual for Use by the Maritime Mobile and Maritime Mobile-Satellite Services contains relevant extracts from the ITU Radio Regulations, setting out the correct procedures to be followed.

Safety watch keeping on GMDSS ships

The OOW should normally be in possession of a General Operator's Certificate (GOC). For ships

operating only in GMDSS Area A1 a Restricted Operator's Certificate (ROC) is sufficient. The OOW will be responsible for ensuring compliance with the radio watch keeping requirements of SOLAS, the ITU Radio Regulations and any local watch keeping rules.

Figure 20 VHF console

VHF watch keeping

The VHP watch keeping range is 20 to 30 nautical miles, depending upon antenna height. All ships must keep a continuous watch on:

- DSC Channel 70 (1 56.525 MHz ;)
- Channel 16 (1 56.8 MHz) when practicable;
- Channel 13 (156.650 MHz) when practicable.

MF (300 - 3000 kHz) watch keeping

Medium frequency (MF) broadcasts will typically have an R/T range of between 150 and 250 nautical miles by day and a DSC range of 600 to 700 nautical miles.

Reception range will be greater at night. Ships must keep a continuous watch on:

- The NAVTEX frequency 518 kHz, when in an area where the service is provided;
- The DSC frequency 2187.5 kHz;
- The R/T distress frequency 2182 kHz by means of a bridge watch receiver (until 1 February 1999.)

Figure 21GMDSS console

HF (3000 kHz - 30 MHz) watch keeping

High frequency (HF) broadcasts have an unlimited range. Ships fitted with HF must keep a continuous watch on:

- The DSC distress frequency 8414.5 kHz;
- At least one of the frequencies 4207.5, 6312, 12577, 16804.5 kHz, as appropriate to the time of day and the position of the ship.

Satellite watch keeping

Ships fitted with a ship earth station (SES) must keep a continuous watch on the satellite appropriate to the ship's position. The range of satellite broadcasts is unlimited (except Polar Regions).

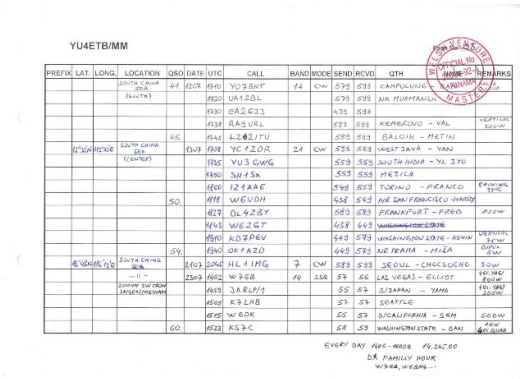
Maritime safety information

Maritime safety information (MSI) is defined as navigational and meteorological warnings, meteorological forecasts and other urgent safety related messages broadcast to ships.

A continuous MSI watch should be kept at sea at all times by all ships. The NAVTEX receiver meets this requirement while the ship is within a NAVTEX coverage area. Beyond such coverage, watch keeping should be undertaken using the appropriate MF, HF or satellite frequencies on which MSI is broadcast.

Log keeping

A radio log must be maintained containing up to date records of all incidents connected with radio communications that appear to be of importance to the safety of life at sea. In particular, the following are normally required:


YU4ETB/MM

PREFIX	LAT.	LONG.	LOCATION	QSO	DATE	UTC	CALL	BAND	MODE	SEND	RCVD	QTH	REMARKS
			SOUTH CHINA SEA	44	12/09	1140	YU3EMT	14	CW	579	599	KANJUWANG	
			(SOUTH)			1920	UA1ZBL			579	599	NR. MURMANSK	
						1930	GA2GJJ			439	588		
						1938	RA9URL			589	599	KEMEROVO - VAL	
				65		1945	LZ4BJITU			599	599	BALGIN - METAN	
	11°30N	112°06E	SOUTH CHINA SEA (CENTER)		13/03	1908	YC4ZDR	21	CW	559	588	WEST JAVA - YAN	
						1935	YU3GWG			559	599	SOUTH INDIA - YL 170	
						1950	SM1SX			589	599	METICA	
						1600	IZ1AAE			549	599	TORINO - PIEMONTE	
				50		1918	W6UOH			438	549	NR SAN FRANCISCO HARBOR	
						1929	DL4ZBY			589	589	FRANKFURT - FRED	
						1945	W6ZGT			458	669		
						1950	KD7PEV			449	579		
				54		1960	OK1AZO			449	579	NR PRAHA - MIZA	
	6°40N	112°E	SOUTH CHINA SEA		21/03	2040	HL4IMG	7	CW	589	599	SEOUL - CHOCSUCHO	
			— " —		23/03	1602	W7GB	14	SSB	57	56	LAS VEGAS - ELLIOT	
						1659	JA8LPI4			55	57	S/JAPAN - YAMA	
						1605	K7LRB			57	57	SEATTLE	
						1615	W6DK			55	57	S/CALIFORNIA - SAN	
				60		1623	K57C			58	59	WASHINGTON STATE - OAK	

EVERY DAY 1600-1800Z 14.260.00
DX FAMILY HOUR
W7GB, W6SWB...

Figure 22 GMDSS log-book

- A summary of communications relating to distress, urgency and safety traffic;
- A reference to important radio service incidents;
- The position of the ship at least once per day.

The log should contain the identities of other stations with which the ship communicates or attempts to communicate, and records of any difficulties experienced owing to congestion, interference, and atmospheric noise or ionosphere disturbances.

Incidents involving obscene language or unnecessary transmissions should be recorded with the identities of the stations concerned, if known. This is particularly relevant to VHF Channel 16.

Testing of equipment and false alerts

Radio equipment should be tested at the intervals stated by the manufacturer and in accordance with flag state requirements. Great care should be taken to avoid the transmission of false alerts when testing equipment.

2.6 Pollution prevention

The OOW should be aware of the serious effects of operational and accidental pollution of the marine environment and should be familiar with MARPOL and the ship's Shipboard Oil Pollution Emergency Plan (SOPEP).

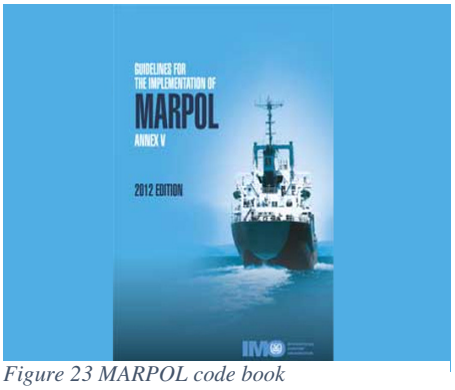


Figure 23 MARPOL code book

Reporting obligations

All ships should make a report to the relevant authorities when an incident involving another ship is observed or an incident on their own ship involves:

- A discharge or probable discharge of oil or of noxious liquid substances above the permitted level for whatever reason, including securing the safety of the ship or saving life; or
- A discharge or probable discharge of harmful substances in packaged form, including those in containers, portable tanks, vehicles and barges; or

Figure 24 Report to the bridge

- A discharge during the operation of the ship of oil or noxious liquid substances in excess of that which is allowed.

A report is also required if the ship suffers damage, failure or a breakdown that affects the safety of the ship or impairs safe navigation, and results in a discharge or probable discharge into the sea of a harmful substance. However, reports are not required simply because there has been a breakdown or failure of machinery or equipment.

Reporting points

The SOPEP should include as an appendix the list of agencies or officials of administrations designated to receive and process reports from ships.

In the absence of a local agency or if there is any delay in contacting a listed reporting point the nearest coastal radio station, designated ship movement reporting station or RCC should be contacted by the fastest available means.

2.7 Emergency situations

General

The OOW should be fully conversant with the emergency checklists contained in Part C of this Guide

Figure 25 Emergency

and should know what initial action to take in response to emergency situations.

A collision or grounding or a man overboard are examples of situations that will require immediate action from the OOW before the master arrives on the bridge.

SOLAS requires emergency training, drills and mustering exercises to be carried out. These drills will involve the OOW on those ships where the bridge is the designated emergency control station. The OOW should be fully conversant with the general emergency alarm signals, the actions to be taken on hearing or instigating an alarm and the ship's emergency plans.

An illustrated table describing the ship's lifesaving appliances should also be kept on the bridge. Ships or persons in distress should use the prescribed signals when communicating with life-saving stations, maritime rescue units and aircraft engaged in search and rescue operations.

Reporting

The OOW should be aware that ships have an obligation under SOLAS to broadcast danger messages to ships in the area and the nearest coast station notifying the following conditions:

- Dangerous ice;
- A dangerous derelict or any other direct danger to navigation;
- A tropical storm;
- Sub-freezing air temperatures associated with gale force winds causing severe ice accretion on superstructures;
- Winds of force 10 or above on the Beaufort. Scale for which no storm warning has been received.

The safety signal should be used when announcing danger messages. Search and rescue (see emergency checklist C7)

The OOW should be aware that ships have search and rescue (SAR) obligations under SOLAS.

Ships that are in a position to provide assistance, on receiving a signal from any source that persons are in distress at sea, are bound to proceed with all speed to their assistance. Ships can also be requisitioned to provide assistance.

During SAR operations, ship-to-ship Satellite channels should be kept free for communications with rescue coordination centers.

Guidance on search and rescue activity can be found in the MERSAR/IAMSAR Manuals, published by IMO

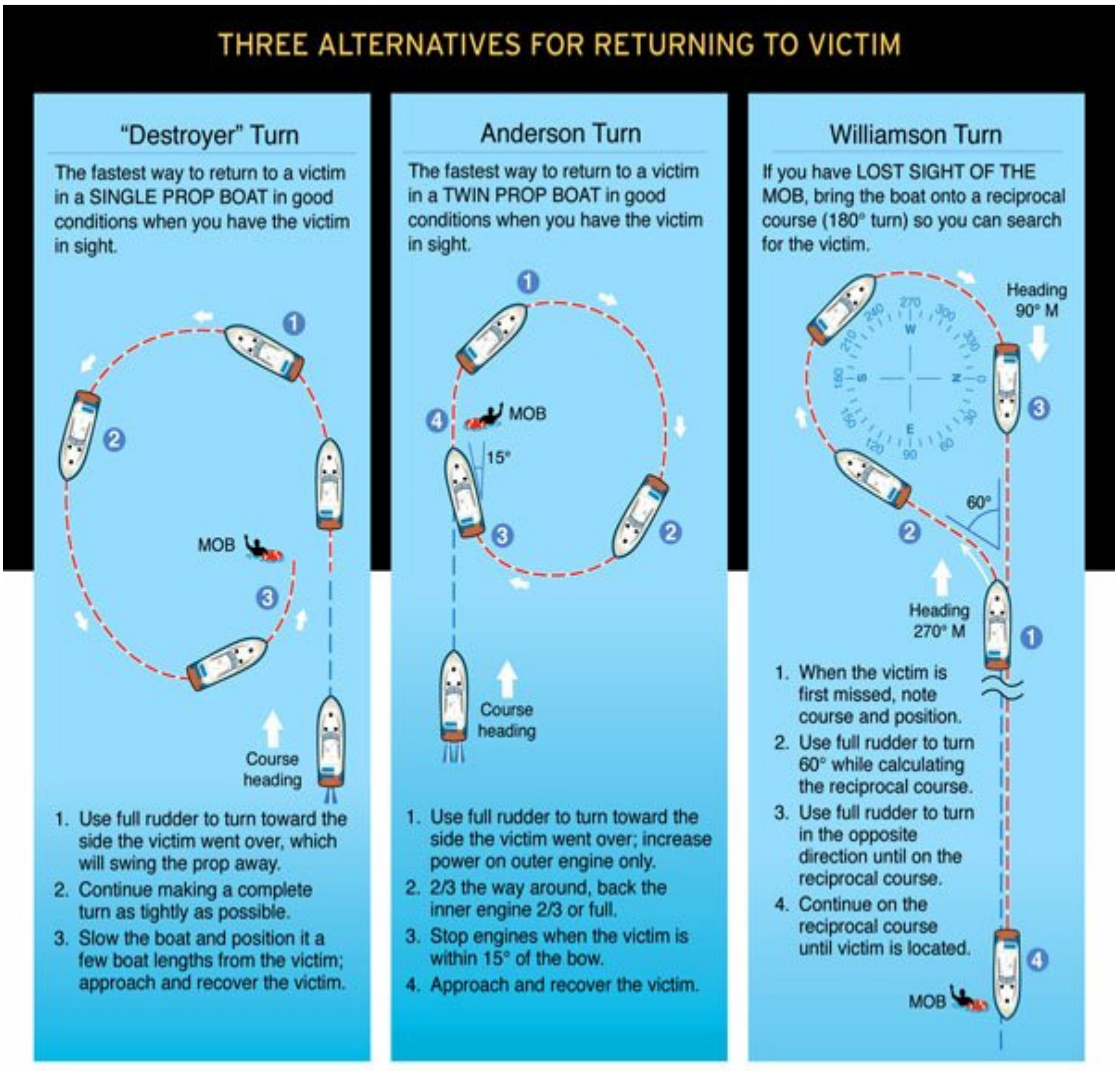


Figure 26 Search and rescue maneuvers

Helicopter operations

The OOW of a ship that is likely to be engaged in the transfer of personnel or stores by helicopter should become familiar with the ICS 'Guide to Helicopter/Ship Operations'.

Figure 27 Helicopter operation

Piracy

The OOW of a ship that is likely to operate in waters that may present a risk of attack by pirates or armed robbers should be familiar with the ISF publication 'Pirates and Armed Robbers: A Master's Guide'.

3. OPERATION AND MAINTAINANCE OF BRIDGE EQUIPMENT

3.1 General

It is important that watch keeping officers are completely familiar with all the navigational and communications equipment, charts and publications on board.

Bridge watch keeping officers should acquaint themselves with the contents of operating manuals for equipment, particularly with regard to the setting up of controls and the procedures to be followed in the event of equipment failure.

Periodic checks on the equipment should be carried out. Equipment found to have operational defects should be brought to the attention of the master and recorded in the logbook and on the Pilot Card.

Regular preventive maintenance of all equipment should be carried out according to instructions set out in the shipboard maintenance procedures manual and manufacturers' manuals.

A full set of charts and publications appropriate for the intended voyage should be available on board and kept up to date.

Figure 28 Maintenance of the deck

3.2 Radar

The OOW should be familiar with the differences between X and S-band radars, and be aware that the X-band radar will be capable of operating in the 9 GHz frequency band for the detection of search and rescue transponder (SART) devices.

Figure 29 X-band & S-band radar antennas

On ships fitted with a radar installation that includes an inter-switching unit to allow radar displays to

change transceivers, the OOW should be familiar with arrangements to by-pass the unit should it fail.

Good radar practice

It is recommended that a radar is kept running and fully operational at all times.

When using radar the OOW should bear in mind the following:

- The quality of performance of the radar needs to be continuously monitored: a performance monitor, if fitted, should be used for this purpose;
- An incorrectly aligned heading marker can give rise
- to misleading interpretations of potential collision situations: heading marker alignment needs periodically checking against both the compass heading and the fore and aft line of the ship;
- Small vessels, ice and other floating objects such as containers may not be detected by the radar;

Figure 30 Radar PPE

- Video processing techniques should be used with care;

- echoes may be obscured by sea or rain clutter: the careful use of clutter controls will assist;

- Masts or other structural features may cause shadow or blind sectors on the display: the OOW should be aware of these sectors.

Clear weather practice

Operating the radar at sea in clear weather will provide an incentive for watch keepers to practice their radar collision avoidance and navigation skills; for example, radar observations and target vectors can be checked visually, and in safe waters parallel index techniques can be perfected.

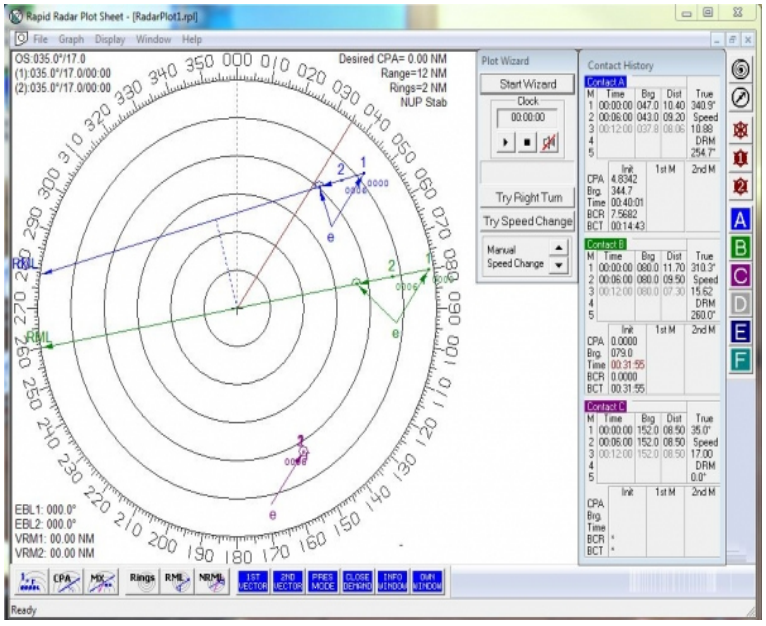


Figure 31 Target plotting

Range scales

The choice of range scales will depend upon factors such as traffic density, speed of own ship and how often the radar is being observed.

Detection of targets, particularly small targets, is generally better at short ranges. However, if the radar is to be used for plotting it is not advisable to use a scale that is too short.

Advance warning of approaching vessels and land is an important factor in deciding upon a safe speed and requires the monitoring of longer range scales.

Radar and collision avoidance

Accuracy of own ship speed and heading inputs

In radar plotting, measurement of the course, speed and aspect of a target is used to determine the closest point of approach of that target and to indicate whether or not there is a risk of collision.

The accuracy of the target plot will depend upon an accurate input of own ship's course and speed during the plotting interval; a yawing ship or inaccurate speed and heading inputs into the radar will reduce the accuracy of calculated target vectors.

Plot inaccuracies will be most apparent in head-on situations and may make a target appear to be passing clear when in fact it is crossing ahead or nearly ahead.

The plotting period

A single observation of the range and bearing of a target cannot give any indication of target course and speed. Multiple observations are required, and the longer the plotting period, the greater will be the accuracy.

Accuracy in the plot will however be lost if either own ship or the target changes course or speed during the plotting period. A change in the course or speed of the target may not be immediately detected.

The estimation of the course and speed of the target and risk of collision is only valid up to the time of the last observation. The situation must therefore be kept closely under review.

Changing target bearing

It should not be assumed that because the relative bearing of a target is changing, there is no risk of collision. An alteration of course and/or speed of own ship may alter the relative bearing, and at close quarters, risk of collision can exist even with a changing compass bearing.

Radar and navigation

When using radar for position fixing and monitoring, the OOW should check:

- The overall performance of the radar;
- The identity of the fixed objects being observed;
- Gyro error and accuracy of the heading line alignment;
- Accuracy of the variable range markers (VRM), electronic bearing lines (EBL) and fixed range rings;
- That the parallel index lines are correctly set.

Parallel indexing

Parallel index techniques can be useful when monitoring the ship's progress in relation to the passage plan.

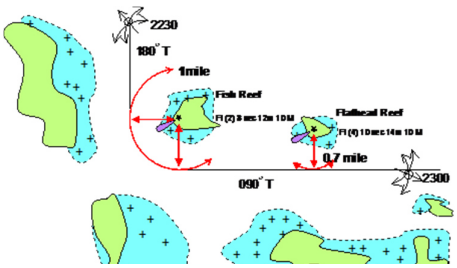


Figure 32 Parallel index

Parallel indexing does not fix the ship's position, but provides a method on the radar of verifying that the ship is maintaining a safe course to pass a fixed object, such as a headland, at the desired passing distance. Parallel

indexing does not therefore replace the need to fix the ship's position on the chart at regular intervals.

The technique requires an index line to be drawn to pass through the radar-echo of a fixed object, tangential to a VRM set to a range equal to the desired passing distance. The index line will line up parallel to the ground track that the ship will need to follow to maintain a safe passing distance.

Parallel indexing can be used on both relative motion and ground stabilized true motion modes of radar operation. With a relative motion display the echo of a fixed object will move in a direction and at a speed which is the reciprocal of own ship's ground track, and the echo should move along the index line. On a ground stabilized true motion display, the echo will remain stationary and the edge of the VRM should move along the index line as the ship passes the echo.

Electronic mapping

Electronic mapping facilities are commonly available for displaying on the radar picture, the passage plan and local area maps. Maps can be drawn to include chart features such as buoys, channel limits, separation zones and anchorages using a number of different lines and symbols. Once complete the map can be stored in the radar.

Any map or passage plan needs to be geographically referenced so that it will appear on the radar correctly orientated and positioned relative to the ship's position.

Any errors in the ship's position used by the radar, errors in the accuracy of the maps or poor radar ground stabilization could cause map interpretation problems.

Maps electronically overlaid on radar pictures should always be used with caution.

Figure 33 Electronic Chart Display and Information System (ECDIS)

Electronic plotting devices

On larger ships, at least one of the radars carried is likely to have automatic radar plotting aid (ARPA) functions. Radars on smaller ships may be fitted with either automatic tracking aid (ATA) or electronic plotting aid (EPA) functions.

ATA uses ARPA hardware but with limited functionality: no trial maneuver, target past position or guard zone features, and manual acquisition limited to 10 targets. EPA offers basic electronic plotting functions that are as good as a reflection plotter.

In comparison with standard radar, ARPA and ATA offer a number of automated collision avoidance features. However, watch keepers should be aware of the dangers of being over-reliant on these devices and:

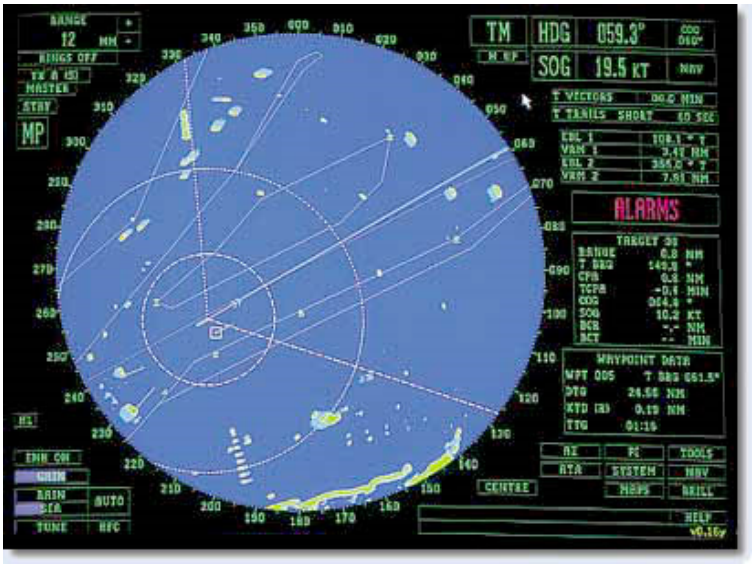


Figure 34 Radar PPE

- Understand the types of errors that are possible and recognize the Operational warnings that appear on the display;
- Understand the limitations of the devices;
- Regularly test the devices using the built-in operational test facilities.

Heading and speed inputs

Correct and reliable speed and heading inputs into the ARPA or ATA are vital if targets are to be processed correctly.

Speed and heading inputs need to be sea stabilized (water tracked) to provide the ARPA or ATA with speed and course through the water. The use of these devices in a ground stabilized

(bottom tracked) mode for assessing risk of collision could be particularly hazardous in sea areas that experience significant tidal streams and currents.

Automatic target acquisition

Features such as guard zones and target acquisition footprints are commonly used for the automatic acquisition of ARPA targets.

Such features should always be used with caution, especially in sea areas where radar inconspicuous targets can be expected.

Steering gear and the automatic pilot

Testing of steering gear

The OOW should ensure that the SOLAS requirements for the operation and testing of the steering gear are observed.

Steering control

Steering control of the ship will comprise manual steering, probably supplemented by an automatic pilot (autopilot) or other track control system. At each steering position there should be a gyro repeater and rudder angle indicator. An emergency back-up steering position, usually in the steering gear flat, is also required.

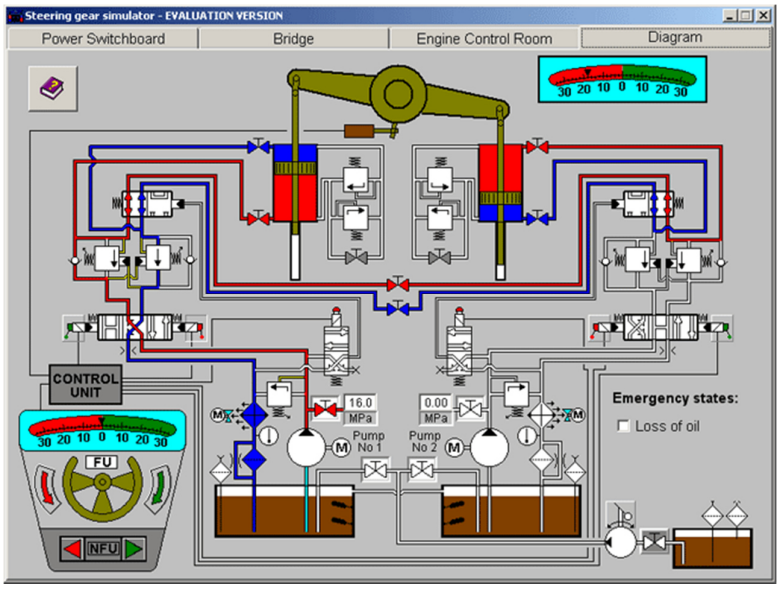


Figure 35 Steering plan

If an autopilot is fitted, a steering mode selector switch for changing between automatic and manual steering, and a manual override control to allow the OOW to gain instant manual control of the steering, will be required.

The autopilot (heading/track controller)

The role of the autopilot is to steer the ship automatically. The autopilot can either be operated independently or, in an integrated bridge, controlled by a navigation system.

When operated as an independent system, the course to steer will need to be manually set on the autopilot and the autopilot will steer that course until a new course is entered. When linked to an integrated system, the autopilot will be able to receive cross track error (XTE) commands and track-keep automatically.

Automatic track-keeping (if fitted)

Track-keeping control allows the ship to maintain its planned track, whereas course-keeping only ensures that the ship is pointing in the right direction. Wind and currents can, for example, move the ship sideways and off its track while the ship's heading remains unchanged.

For a ship to operate an automatic track-keeping system, the autopilot should be adaptive and able to perform turns automatically between track legs, using either pre-set turn radius or rate of turn values.

Figure 36 Auto pilot

Turns are commenced at a wheel over position, only after the OOW has acknowledged the wheel over position alarm and is satisfied that it is safe to execute the turn.

If a malfunction occurs when track-keeping, the system should alarm and revert immediately to course-keeping mode.

If the malfunction occurs while the autopilot is on a track, the autopilot should continue to steer the pre-set course of that track. If the autopilot is performing a turn when the malfunction occurs, the autopilot should complete the turn at the pre-set turn value and take up the course of the next track.

An autopilot performing automatic track-keeping functions and its alarm outputs should always be closely monitored.

The ability of the autopilot closely to follow a planned track will depend upon the accuracy of the XTE information sent to the autopilot from the navigation system.

Off-course alarm

As part of the steering control system there should be an off-course alarm facility to warn the OOW when the ship excessively deviates from its course. The alarm should be in use at all times that the autopilot is in operation.

The use of the off-course alarm does not relieve the OOW from frequently checking the course that is being steered.

Non-activation of the off-course alarm will not always mean that the ship is maintaining its planned track. The ship may be moved off its track by wind and currents even though the heading remains unchanged.

Figure 37 Alarm panel

3.4 Compass system

Magnetic compass

The magnetic compass is generally fitted above the bridge on the centerline with a periscope so that the compass is readable from the helmsman's position.

Where the magnetic compass is needed to provide heading outputs to other bridge systems, a transmitting magnetic compass (TMC) is fitted. TMC outputs should be corrected for compass error and the TMC should be tested once a week, in clear visibility.

A compass deviation card should be maintained and posted on the bridge. The compass will need to be swung at intervals during the ship's life, and particularly after major steel

conversion work to the ship. Caution should be observed when using the magnetic compass on ships that carry magnetic cargoes such as iron and steel.

Compass safe distances are specified on all electrical bridge equipment and provide the minimum distances that equipment can be installed from the magnetic compass.

Figure 38 Magnetic compass

Gyro compass

It is recommended that the gyro compass should be run continuously. Should a gyro compass stop for any reason, it should be restarted and subsequently checked before use to ensure it has 'settled' and is reading correctly.

Speed and latitude corrections need to be applied to the gyro compass. Where the gyro has no direct speed log or position input, manual corrections will have to be made as required.

Figure 39 Gyro compass with repeater

The gyro will support a number of repeaters, including a repeater at the emergency steering position. Gyro repeaters on the bridge should be checked against the main gyro at least once a watch, and after excessive maneuvering. Other repeaters should be checked frequently.

Figure 40 Gyro compass

Compass errors

As a safeguard against the gyro and gyro repeaters wandering, frequent checks should be made between the magnetic and gyro compasses.

Magnetic and gyro compass errors should be checked and recorded each watch, where possible, using either azimuth or transit bearings.

A record of magnetic and gyro compass courses to steer and compass errors should be maintained and available to the helmsman.

Rate of turn

Rate of turn measurement is used by automatic track-keeping systems to perform controlled turns. When ships are maneuvering, particularly large ships where the distance between the bow and the

Figure 41 Rate of turn

pivot point of the ship is considerable, rate of turn indication provides the ship handler with feedback on how quickly the ship is turning.

3.5 Speed and distance measuring log, Echo sounders and EPFS

Speed logs, depending upon their type, will provide either speed through the water or speed over the ground measurements.

Types of speed measurement

In general terms, speed through the water is used for radar collision avoidance, and speed over the ground is used for navigation. Speed made good can also be measured on ships, and represents the speed that the ship has achieved over a period of time. Speed made good can be measured from the chart between position fixes, and is also calculated and transmitted by electronic position-fixing systems.

Direction of speed measurement

Doppler-type logs can both be single-axis and measure speed in the fore and aft direction or dual-axis and measure, fore and aft and athwart ship movement. Coupled with rate of turn measurement, dual-axis logs are also able to calculate the speed and direction of movement of the bow and stern. Electro-magnetic logs provide single-axis measurement only.

Recording of distance travelled

As well as indicating ship's speed, logs record and display distance travelled. It is good navigation practice to initialize the long distance trip at the start of each new track, and record log distances in the logbook at the end of each watch.

Echo sounders

The navigational echo sounder should be expected to operate down to depths of at least 200m (approximately 110 fathoms).

The echo sounder should always be used when making a landfall and kept switched on in coastal waters. If the echo sounder is fitted with a shallow water alarm, the alarm should be set to an appropriate safe depth to warn of approaching shallow water.

Care should be taken to check that the units of soundings on the echo sounder are the same as those used on the chart in use. When comparing echo and chart soundings, allowance must be made for the draught of the ship, and any water stand or tidal effects.

Electronic position-fixing systems

Electronic position-fixing systems provide an automatic and continuous position update for ships fitted with a suitable receiver using either a terrestrial hyperbolic radio navigation system such as Loran C, or a global satellite system such as GPS.

A global navigation satellite system (GNSS) is a satellite system that provides ships fitted with suitable receivers with a means of obtaining continuous worldwide position, time and speed information.

The Global Positioning System (GPS) operated by the United States and the Global Navigation Satellite System (GLONASS) operated by the Russian Federation are currently available for civilian use on ships.

GPS offers commercial users a global positioning capability with accuracy of the order of 100 meters.

Differential GPS (DGPS) receivers apply corrections to raw GPS signals determined and

transmitted by terrestrial monitoring stations. Differential signals can be transmitted to ships via satellites or using HF radio links. Within DGPS coverage, positional accuracy of the order of 10 meters at the receiver antenna is possible.

Care should be taken when using electronic position-fixing systems. Watch keepers need to understand the capabilities and limitations of the systems they are using and continually monitor and validate the information given.

When position-fixing systems transmit data to other navigation systems, the integrity and quality of the data transmitted need to be safeguarded.

Techniques used should include:

Figure 42Global Positioning System (GPS)

- Using pre-set quality limits to monitor the fix quality of each position-fixing system connected to the integrated bridge;
- Comparing all positions to identify and reject any rogue positions or positions that are clearly incorrect;
- Comparing electronic positions with the ships estimated position (EP) calculated using direct inputs from the log and gyro;
- Checking the status of the data transmitted and ensuring that only valid data messages are used.

Route monitoring

Route storage and cross track error (XTE) monitoring are common GPS features. By entering the passage plan in the GPS as well as the navigation system, the GPS can provide an integrated bridge system (IBS) with an independent route monitoring capability.

Chart datum and accuracy

Electronic position-fixing systems, and in particular GPS receivers, calculate positions referenced to the global datum WGS84. This may not be the same as the datum of the chart in use, with the result that the position when plotted may be wrong in the context of the chart.

Where the difference or datum shift is known, a 'satellite-derived positions' note on the chart provides the offset to apply to the position before it is plotted.

Many receivers have facilities to transform positions from WGS84 to the datum of the chart internally, so eliminating the need to apply datum offsets manually.

It is nevertheless recommended that the receiver is kept referenced to WGS84 and that position shift values are manually applied. The transformation parameters used in the receiver may differ from those parameters used by the hydrographic office that produced the chart.

The precision of chart features (e.g. dangers) on navigational charts is of the order of 0.3 mm - equivalent to an accuracy of 1 5 meters or more at scales of

1:50,000 or greater. Many coastal charts are of such scales and therefore may not be as precise in displaying dangers as DGPS is. The OOW should therefore always allow a sensible safety margin to take account of any such discrepancies.

3.6 Integrated bridge systems (IBS)

Figure 43 Integrated bridge

An integrated bridge system is a combination of systems which are interconnected to allow the centralized monitoring of sensor information and control of a number of operations such as passage execution, communications, machinery control, safety and security.

There is no single standard IBS design for ships and nor is IBS mandatory. Classification societies do offer optional class notations for ships; the 'NAV1' class from Lloyd's Register (LR), the 'W1-OC class from Det Norske Veritas (DNV), the 'NAV-OC class from Germanischer Lloyd (GL) and 'OMBO' class from the American Bureau of Shipping (ABS) are examples of class notations for IBS arrangements designed to support periodic one man bridge operations.

Factors including the design of the bridge, the type of equipment that is fitted and the layout of that equipment on the bridge will determine the extent to which the IBS design allows certain bridge functions to be automated.

Workstations, bridge design and layout

Centralized control and monitoring requires a workstation design approach. At the main operating position on the bridge, referred to variously as the workstation for navigation and traffic surveillance/maneuvering, the navigation workstation or the conning position, the OOW should be able to undertake all his primary duties unassisted with efficiency and safety.

The design should also allow two bridge team members to work unhindered side by side.

Bridge design and the layout of the workstations, together with the equipment and instrumentation at those workstations, is an important part of IBS design. There should be proper access into and around the bridge, a good working environment and adequate bridge visibility from all the workstations.A detailed review of the principles of IBS design is outside the scope of this Guide but the design should ensure that the failure of one sub-system does not

cause the failure of another, and that any failure is immediately brought to the attention of the OOW.

IBS equipment

To permit centralized monitoring and control of navigational functions on the bridge, the following systems will be required:

Navigation management system

The navigation management system provides the mechanism for planning, executing and monitoring the passage plan and will therefore provide the link between the charts on which the voyage has been planned, the position-fixing systems, the log and gyro and the autopilot.

An electronic chart display system will typically function as the navigation management system within an IBS, supported by a dedicated route planning terminal to allow route planning activities to be undertaken while on passage and without interfering with the OOW.

Alarm system

The IBS has an alarm system to warn the OOW if potentially dangerous situations could arise. Failure of the OOW to acknowledge alarms – usually within 30 seconds - will transfer the alarm to remote alarm units in cabins, offices and messes to call for back-up assistance.

The main navigational sensors, in particular the radar which provides traffic alarms, the gyro and autopilot which provide course-related alarms, and the position-fixing systems which provide position-related alarms, need to be connected to the alarm system. ECDIS, the steering gear, power distribution panels etc. may also be connected.

Included in the alarm system should be a watch safety or fitness alarm to monitor the alertness of the OOW. An interval timer for setting alarm intervals of up to 12 minutes should be part of the system. A number of alarm acknowledgement points, each with a pre-warning alarm to give the OOW notice that the alarm is about to be activated should be available around the bridge. As with the failure of the OOW to acknowledge a navigation alarm, if the fitness time interval expires, an alarm should sound away from the bridge.

Conning display

The display should be available at the conning position to show information summaries of the important navigational sensors used on passage and while docking.

The display also provides the OOW with a central place to monitor sensors and compare actual settings with those ordered.

IBS and the automation of navigation functions

The process of planning a passage through to its execution and monitoring the progress of the ship against the plan is one bridge operation that can be safely automated as long as certain procedures and disciplines are followed:

- The plan needs to be thoroughly prepared on charts;
- The details of the plan, and in particular the waypoints, need to be carefully prepared on or transferred to the navigation system;
- The position of the ship needs to be safely calculated and quality monitored by the navigation system;
- If the position of the ship is accurate and reliable and the passage plan has been safely entered, the XTE deviations off track as calculated by the navigation system and transmitted to the autopilot will be accurate, and allow the autopilot to control the direction of the ship automatically and safely

Using IBS

Where fitted, clear guidance on IBS operations should be contained in the shipboard operational procedures manual. In particular, advice on when to commence and when to suspend automatic track-keeping should be provided.

Over-reliance on automatic systems, coupled with the OOW paying too little attention to visual navigational and watch keeping techniques, can be dangerous.

3.7 Charts, ECDIS and nautical publications

Figure 44 ECDIS console

Carriage of charts and nautical publications

All ships should carry adequate and up-to-date official nautical charts, sailing directions, lists of lights, notices to mariners, tide tables and all other nautical publications necessary for the intended voyage.

An on board chart and publication management system is recommended to ensure that records are kept of what charts and publications are carried, and when they were last corrected.

Official nautical charts

Official nautical charts can be either paper or electronic charts produced by, or on the authority of, a national hydrographic office.

Unlike paper charts, electronic charts need to be displayed on an electronic chart display system. Official nautical charts can be in one of two electronic formats:

- Electronic navigational charts (ENC) are official vector nautical charts. When displayed on ECDIS equipment they are equivalent to paper charts;
- Raster navigational charts (RNC) are official raster nautical charts. British Admiralty ARCS format charts and United States NOAA format charts are examples. However, when displayed on ECDIS (or RCDS) equipment they are not currently equivalent to paper charts.

Use of charts and nautical publications

Only official nautical chart data, which is up-to-date and adequate, should be used for passage planning or navigation. The charts can either be paper charts, or electronic charts that are equivalent to paper charts. All other chart data should only be used as a supplementary navigation tool.

When navigating using electronic charts, care should be taken to ensure that the display shows sufficient 'look-ahead' distance and the next chart can be readily accessed.

Electronic charts and electronic chart display systems (if fitted)

Electronic charts can either be in vector or raster chart format. The mariner using electronic chart systems should be aware of the differences between the two types of chart formats.

Vector chart format electronic charts

Vector charts are compiled by attributing to each and every chart feature a set of values, and each chart feature is stored in a layered digital database. Storage in a database allows the chart data to be displayed as a seamless chart, while layering enables fields of data that are not required at the time to be removed from display to reduce chart clutter.

Chart features can be interrogated to display additional information about charted objects.

The inherent 'intelligence' of vectorised charts allows three dimensional route safety zone monitoring. Chart depth contours and air draught clearances around the ship can be automatically monitored, both while the route is being planned and while the ship is on passage. Alarms will automatically be triggered if a safety zone around a ship is breached.

An international standard for vector charts has been finalized by IHO (S-57 Edition 3) and vector charts complying with this standard produced by, or on the authority of, a national hydrographic office are known as electronic navigational charts (ENC).

Raster chart format electronic charts

Raster charts are exact copies of paper charts and are produced by digital scanning techniques. Information on raster charts cannot be layered, and the move from one chart to another will not be seamless. Raster charts have to be individually selected and displayed.

Raster charts have no inherent 'intelligence'. The chart data itself cannot trigger automatic alarms without the addition of user-inserted information that has been entered manually during route planning.

Without selecting different scale charts, the look-ahead capability using raster charts may be limited, causing some inconvenience when determining the identity of distant objects. Datum's

and projections may differ between raster charts, and care must be taken to take account of such differences.

A facsimile of a paper chart originated by or distributed on the authority of a national hydrographic office is known as a raster navigational chart (RNC).

Electronic chart display systems

Standard features of electronic chart display systems include the display of electronic vector and/or raster charts overlaid with the position of the ship and its track, and facilities to route plan and automatically update charts using digital notices to mariners. Navigation sensors such as GPS, log and gyro will be connected to provide positional information. An autopilot may also be connected when the electronic chart display system is installed as part of an integrated bridge system.

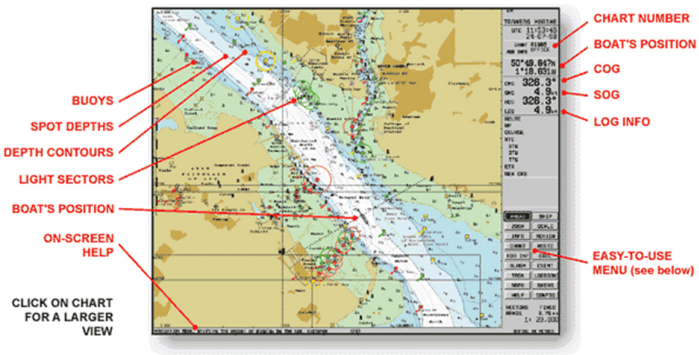


Figure 45 ECDIS display

Some electronic chart display systems offer the capability to display radar data overlaid on the chart. This can be either selected targets or a full radar picture that can be independently controlled. Caution should always be exercised where target vectors based on the ship's speed through the water are overlaid on an electronic chart that is displaying speed over the ground.

Factors that will determine to what extent an electronic chart display system can be used will include the type of system that has been fitted, the ability of that system to display official nautical charts, and whether or not the flag state administration allows its use for navigational purposes.

Electronic chart displays systems can be categorized as ECDIS, RCDS or ECS.

Electronic Chart Display and Information System (ECDIS):

- ECDIS, with adequate back-up arrangements, may be accepted as complying with the SOLAS requirement for ships to carry up-to-date charts, when displaying ENC chart data. A performance standard exists for ECDIS.Raster Chart Display System (RCDS):
- RCDS, or an ECDIS used in a RCDS mode of operation, displaying RNC chart data should at the present time only be used as a supplementary navigation tool together with

a complete folio of up-to-date paper charts. No performance standard currently exists for RCDS. A review is currently underway in IMO as to whether or not RCDS, supported by a reduced folio of small scale paper charts and adequate back-up arrangements, will be acceptable as complying with the SOLAS requirement for the carriage of charts.

Electronic Chart System (ECS):

- ECS should only be used as a supplementary navigation tool together with a complete folio of up-to-date paper charts.

3.8 Radio communications

GMDSS radio communication functions

Only qualified radio personnel should operate equipment for GMDSS purposes. GMDSS equipped ships are required to be able to do the following wherever they operate:

- Transmit ship-to-shore distress alerts by two independent means;
- Receive shore-to-ship alerts (usually relayed by RCCs);
- Transmit and receive:
- Ship-to-ship alerts
- SAR coordinating communications
- On-scene communications
- locating signals
- Maritime safety information
- Routine or general communications to and from shore
- Bridge-to-bridge communications.

GMDSS equipment

Ships operating GMDSS are equipped according to carriage requirements that relate to trading areas i.e. Areas A1, A2, A3 and A4 as stipulated in SOLAS. All ships operating GMDSS can be expected

Figure 46 GMDSS equipment

to have at least the following equipment:

- VHP radiotelephone (Channels 6, 13 and 16):
- Channel 6 may be used ship-to-ship for SAR operations
- Channel 13 is used for safety of navigation ship-to-ship
- Channel 16 is used for distress and urgency traffic, and may be used by aircraft for safety purposes;
- VHP DSC (Channel 70) transmitter and watch receiver:
- Digital selective calling (DSC) is used for calling and replying, and for transmitting, acknowledging and relaying distress alerts. It allows a specific station to be contacted and made aware that the calling station wishes to communicate with it, and to indicate.
- How to reply, or which station to listen to for subsequent distress traffic. Calls can also be addressed to 'all ships' or 'all stations';
- Search and rescue transponder (SART) used for providing homing signals from survival craft for detection by 9 GHz radar;
- NAVTEX receiver used for receiving maritime safety information which is automatically printed by the receiver. Enhanced group call (EGC) facilities will also be required for ships operating outside NAVTEX range for the receipt of Safety NET broadcasts;
- Emergency position indicating radio beacon (EPIRB) used in SAR for alerting and for providing homing signals for use by aircraft.

Ships sailing beyond range of a VHP DSC coast station must also have an MF DSC transmitter and watch receiver. If sailing beyond MF DSC range, they must have a ship earth

station or an HF DSC transmitter and watch receiver including a radio telex system. Ships operating in Polar Regions will not have Inmarsat satellite coverage.

Emergency communications

Emergency communications include distress, urgency and safety messages.

Distress alert, distress message and distress relay

The distress alert is an automated form of distress signal and indicates that a ship, aircraft or other vehicle, or a person, is in grave and imminent danger and requires immediate assistance. It may contain all or some of the information contained in the distress message.

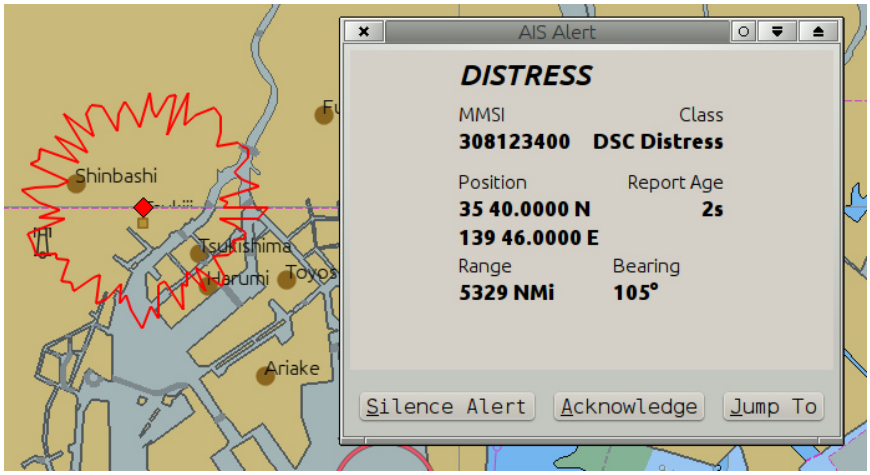


Figure 47 Distress information

The distress alert may be sent using DSC on one or more of the frequencies dedicated exclusively to the purpose, or by satellite.

Messages concerning safety of life and navigation should be transmitted in a standard form containing the following information, whichever mode of transmission is used:

- Name of ship;
- Call sign of ship;
- Maritime mobile service identity (MMSI) of ship;
- Position of ship;
- Nature of distress (or other emergency);
- Type of assistance required (if appropriate);
- Any other information that may help those whose assistance is required.

The master should order the relaying of a distress message whenever it is clear that the ship in distress cannot transmit the message itself, or if further help is thought to be necessary. The

master should make clear in the relay message that his own ship is not in distress by using the prefix 'MAYDAY RELAY'.

Urgency messages

An urgency message is one containing urgent information relating to a ship, aircraft or person. For example:

- Man overboard
- Lost propeller;
- Permanent loss of power;
- Announcing and identifying medical transports;
- Communications concerning medical advice.

The urgency signal should only be sent on the authority of the master.

If using terrestrial communications, the urgency announcement should be made on one or more of the DSC distress frequencies.

The actual urgency message which follows should be sent on one or more of the radio telephony/telex frequencies for follow-up distress traffic.

If using satellite communications, it should be noted that ship earth stations only have 'distress' and 'routine' priority levels. Inmarsat has therefore devised a system of two-digit codes for urgency and safety communications. Not all coast earth stations accept all the codes.

Safety messages

A safety message is one containing an important navigational or meteorological warning. As well as the items listed, information reports concerning the position of buoys and the working of lighthouses and other aids to navigation can be made.

When transmitting safety messages, the safety message format should be used using the same frequencies and procedures as for urgency messages.

Emergency over

Whenever the emergency is clearly over, it should be cancelled by a broadcast to 'all stations'.

Routine or general communications

Routine or general communications include ship-to-ship communication, pilotage messages, port operations, ship movements, ship's business messages and other public correspondence.

The frequencies used by coast stations, port stations etc. can be ascertained from the ITU List of Coast Stations.

Routine communications using DSC

When transmitting on DSC the OOW should listen on the ship's transmission frequency and when it is free, make the call. The call should contain information on:

• The mode of transmission to be used for the follow-up message (i.e. telephony, telex);

• The frequency to be used to transmit the message.

Coast stations usually monitor two DSC channels - national and international.

The national channel should be tried first. The acknowledgement to the call will normally be on the frequency that is paired with the frequency on which the call was made. The station that is called should either confirm the frequency for' the follow-up traffic or indicate another frequency.

On receiving a DSC call that gives no indication of follow-up frequency to use, the receiving ship should indicate a suitable frequency in its acknowledgement.

Routine communications using radio telephony

Before commencing any transmission, check whether the frequency is already occupied.

A simplex call in which both stations use the same frequency involves listening on that frequency. A duplex call in which separate frequencies are used involves listening on the ship's transmit frequency; when the channel is free the receiver should be returned to the coast station reply frequency and the call made in the normal way.

When calling, speak clearly. First give the name of the station being called followed by own ship's name (and call sign if necessary). If it is necessary to spell the name of the ship the phonetic alphabet should be used. Give the other station time to answer; it may have heard you but be unable to reply immediately.

Routine communications using radio telex

Before transmitting to a coast station, listen on its answering frequency for the 'channel free' signal. This is interspersed with the coast station call sign in Morse Emergency navigation lights and signaling equipment

The OOW is responsible for ensuring that the emergency navigation lights and signaling equipment are in working order and ready for immediate use at all times.

The condition of flags and shapes should be checked at regular intervals.

Sound signaling equipment must be checked daily and maintained in an operational condition. Where roller guides and wires operate the whistle, these should be examined frequently to ensure easy operation. Electric and automatic whistles should be maintained according to manufacturers' instructions.

4. PASSAGE PLAN

4.1 Overview

Passage planning is necessary to support the bridge team and ensure that the ship can be navigated safely between ports from berth to berth. The passage plan should cover ocean, coastal and pilotage waters.

The plan may need to be changed during the voyage; for example, the destination port may not have been known or may alter, or it may be necessary to amend the plan following consultation with the pilot.

If the plan is changed during the voyage, the bridge team on each watch should be consulted and briefed to ensure that the revised plan is understood.

The passage plan should aim to establish the most favorable route while maintaining appropriate margins of safety and safe passing distances offshore.

When deciding upon the route, the following factors are amongst those that should be taken into account:

- The marine environment;
- The adequacy and reliability of charted hydrographic data along the route;
- The availability and reliability of navigation aids, coastal marks, lights and radar conspicuous targets for fixing the ship along the route;
- Any routing constraints imposed by the ship e.g. draught, type of cargo;
- Areas of high traffic density;
- Weather forecasts and expected current, tidal, wind, swell and visibility conditions;
- Areas where onshore set could occur;
- Ship operations that may require additional sea room e.g. tank cleaning or pilot embarkation;
- Regulations such as ships' routing schemes and ship reporting systems;
- The reliability of the propulsion and steering systems on board.

The intended voyage should be planned prior to departure using appropriate and available corrected charts and publications. The master should check that the tracks laid down are safe,

and the chief engineer should verify that the ship has sufficient fuel, water and lubricants for the intended voyage.

In addition, the duty of the master to exercise professional judgment in the light of changing circumstances remains a basic requirement for safe navigation.

4.2 Responsibility for passage planning

In most deep sea ships it is customary for the master to delegate the initial responsibility for preparing the passage plan to the officer responsible for navigational equipment and publications.

In small ships the master may plan the voyage himself.

While responsibility for the plan in pilotage waters rests with the ship, the pilot on boarding, or before if practicable, should advise the master of any local circumstances so that the plan can be updated.

4.3 Notes on passage planning

Plan appraisal

Before planning can commence, the charts, publications and other information appropriate for the voyage will need to be gathered together and studied. A passage appraisal checklist is included in this Guide as bridge checklist B5.

Charts and publications

Only official nautical charts and publications should be used for passage planning, and they should be fully corrected to the latest available notices to mariners and radio navigation warnings. Any missing charts and publications needed for the intended voyage should be identified from the chart catalogue and obtained before the ship sails.

For coastal and pilotage planning and for plotting each course alteration point (or waypoint) large scale charts should be used. For ocean passage planning and open water legs smaller scale charts should be used.

The route plan

The route plan should incorporate the following details:

- Planned track showing the true course of each leg;
- Leg distances;
- Any speed changes required en route;
- Wheel over positions for each course alteration, where appropriate;
- Turn radius for each course alteration, where appropriate;
- Maximum allowable off-track margins for each leg.

At any time during the voyage, the ship may need to leave the planned route temporarily at short notice. Marking on the chart relatively shallow waters and minimum clearing distances in critical sea areas is but one technique which will assist the OOW when having to decide quickly to what extent to deviate without jeopardizing safety and the marine environment. However, in using this technique, care should be taken not to obscure chart features. On paper charts, only pencil should be used.

The route plan should also take into account the need to monitor the ship's position along the route, identify contingency actions at waypoints, and allow for collision avoidance in line with the COLREGS.

The main details of the route plan should be recorded using sketches, if appropriate, so that the plan can be readily referred to as the main conning position.

Passage planning and electronic navigation systems

Planning using electronic chart display systems

Passage planning can be undertaken either on paper charts or using an electronic chart display and information system (ECDIS) displaying electronic navigational charts (ENC), subject to the approval of the flag state administration. Raster chart display systems (RCDS) displaying raster navigational charts (RNC) can be used for passage planning in conjunction with paper charts.

When passage planning using ECDIS, the navigating officer should be aware that a safety contour can be established around the ship. The crossing of a safety contour, by attempting to enter water which is too shallow or attempting to cross the boundary of a prohibited or specially defined area such as a traffic separation zone, will be automatically indicated by the ECDIS while the route is both being planned and executed.

When passage planning using a combination of electronic and paper charts, particular care

needs to be taken at transition points between areas of electronic and paper chart coverage. The voyage involves distinct pilotage, coastal and ocean water phases. Planning within any one phase of the voyage should be undertaken using either all electronic or all paper charts rather than a mix of chart types.

Where a passage is planned using paper charts, care should be taken when transferring the details of the plan to an electronic chart display system. In particular, the navigating officer should ensure that:

• Positions are transferred to, and are verified on, electronic charts of an equivalent scale to that of the paper chart on which the position was originally plotted;

• Any known difference in chart datum between that used by the paper chart and that used by the electronic chart display system is applied to the transferred positions;

• The complete passage plan as displayed on the electronic chart display system is checked for accuracy and completeness before it is used.

Transferring route plans to other navigation aids

Care must be taken when transferring route plans to electronic navigation aids such as GPS, since the ship's position that is computed by the navaid is likely to be in WGS84 datum. Route plans sent to the GPS for monitoring cross track errors must therefore be of the same datum.

Similarly in the case of radars, routes and maps displayed on the radar will be referenced to the position of the ship. Care must therefore be taken to ensure that maps and plans transferred to, or prepared on, the radar are created in the same datum as the navaid (typically a GPS) which is connected to, and transmitting positions to, the radar.

4.4 Notes on passage planning in ocean waters

In open waters, the route selected will be either a great circle, composite great circle or rhumb line route.

When planning ocean passages, the following should be consulted:

- Small scale ocean planning and routing charts providing information on ocean currents, winds, ice limits etc.

- Gnomonic projection ocean charts for plotting great circle routes;
- The load line zone chart to ensure that the Load Line (LL) Rules are complied with;
- Charts showing any relevant ships' routing schemes.

Anticipated meteorological conditions may have an impact on the ocean route that is selected. For example:

- Favorable ocean currents may offer improved overall passage speeds offsetting any extra distance travelled;
- Ice or poor visibility may limit northerly or southerly advance;
- The presence of seasonal tropical storm activity may call for certain waters to be avoided and an allowance made for sea room.

Details of weather routing services for ships are contained in lists of radio signals and in Volume D of the World Meteorological Organization (WMO) Publication No. 9. Long-range weather warnings are broadcast on the Safety NET Service along with NAVAREA navigational warnings as part of the World-Wide Navigational Warning Service (WWNWS). Landfall targets need to be considered and identified as to their likely radar and visual ranges and, in respect of lights, their rising and dipping ranges and arcs/colors of sectored lights.

4.5 Notes on passage planning in coastal or restricted waters

By comparison with open waters, margins of safety in coastal or restricted waters can be critical, as the time available to take corrective action is likely to be limited.

The maneuvering characteristics of the ship and any limitations or peculiarities that the ship may have, including reliability problems with its propulsion and steering systems, may influence the route selected through coastal waters. In shallow water, particularly if the ship is operated at speed, ship squat can reduce under keel clearances.

Ships' routing schemes and reporting systems along the route, as well as vessel traffic services, should be taken into account.

Coastal weather bulletins, including gale warnings and coastal navigational warnings broadcast by coast radio stations and NAVTEX, may require changes to be made to the route plan.

Monitoring the route plan

It is important that when a route is planned through coastal or restricted waters, due consideration is given to ensuring that the progress of the ship can be effectively monitored.

Of particular importance is the need to monitor the position of the ship approaching the wheel over position at the end of a track, and checking that the ship is safely on the new track after the alteration of course.

Distinctive chart features should be used for monitoring the ship's position visually, by radar and by echo sounder, and therefore need to be an integral part of the route plan.

Visual monitoring techniques

Ahead, transits can provide a leading line along which a ship can safely steer. Abeam, transits provide a ready check for use when altering course. At anchor, several transits can be used to monitor the ship's position.

Bearing lines can also be effectively used. A head mark, or a bearing line of a conspicuous object lying ahead on the track line, can be used to steer the ship, while clearing bearings can be used to check that a ship is remaining within a safe area.

4.6 Passage planning and pilotage

Pre-arrival planning

A preliminary plan should be prepared covering pilotage waters and the roles of the bridge team personnel.

A plan should still be prepared even if the master of the ship has a Pilotage Exemption Certificate for the port.

Planning for anchoring off the port or aborting port entry in the event of problems arising should feature as part of the plan. The plan should also identify charted features that will assist

monitoring progress and include contingency measures in the event of primary equipment failure, poor visibility etc.

The Pilot Card should also be updated. The Card contains information on draught and ship's speed that is liable to change as the loading condition of the ship changes, as well as a checklist of equipment available and working.

Pre-arrival information exchange with the pilot

Particularly where the master has limited local knowledge of the pilotage waters, it is recommended that a pre-arrival exchange of information take place with the pilot before boarding.

An information exchange initiated by the ship approximately 24 hours before the pilot's ETA will allow sufficient time for more detailed planning to take place both on the ship and ashore. The exchange will also allow communications between the ship and the pilot to be firmly established before embarkation.

In certain pilotage areas, the passage can last for several hours, in which time circumstances can alter significantly necessitating changes to the plan. The preferred way of working within any pilotage area can also vary between pilots.

Detailed exchanges can take place when the pilot arrives on board, as indeed can discussions on berthing.

4.7 Passage planning and ships' routing

Ships' routing measures have been introduced in a number of coastal waters to:

- Reduce the risk of collision between ships in areas of high traffic densities;
- Keep shipping away from environmentally sensitive sea areas;
- Reduce the risk of grounding in shallow waters.

The use of ships' routing measures should form part of the passage plan.

Ships' routing measures can be adopted internationally by IMO. Such schemes are recommended for use by, and may be made mandatory for, all ships, certain categories of ships or ships carrying certain cargoes. Mandatory ships' routing schemes should always be used unless the ship has compelling safety reasons for not following them.

IMO routing schemes will be shown on charts with a note of any pertinent provisions as to their use. Fuller details may be described in Sailing Directions.

The IMO publications Ships' Routing and Amendments to Ships' Routing contain full descriptions of each scheme and any rules applying, but this publication is produced primarily for the benefit of administrations. It is not kept up to date as regularly as nautical publications, which should always be consulted for the latest information.

Elements used in routing systems include:

- Traffic separation scheme - a routing measure aimed at the separation of opposing streams of traffic by establishing traffic lanes;
- Traffic lane - areas within defined limits in which one-way traffic flows are established;
- Separation zone or line - a means to separate traffic lanes in which ships are proceeding in opposite or nearly opposite directions in order to separate traffic lanes from adjacent sea areas or to separate different traffic lanes;
- Roundabout - a separation point or circular zone and a circular traffic lane within defined limits;
- Inshore traffic zone - a designated sea area between the landward boundary of a traffic separation scheme and an adjacent coast;
- Recommended route - a route of undefined width, for the convenience of ships in transit, which is often marked by centerline buoys;
- Deep water route - a route which has been accurately surveyed for clearance of sea bottom and submerged articles;
- Archipelagic sea lane - sea lanes designated for the continuous and expeditious passage of ships through archipelagic waters;
- Precautionary area - an area where ships must navigate with particular caution and within which the direction of flow of traffic may be recommended;
- Area to be avoided - an area in which either navigation is particularly hazardous or it is exceptionally important to avoid casualties and which should be avoided by all ships, or by certain classes of ships.

3. CHIEF MATE

5.1 General

A Chief Mate (C/M) or Chief Officer, usually also synonymous with the First Mate or First Officer (except on passenger liners, which often carry both), is a licensed member with a certification of competency, including validity and authenticity, complying with the relevant Flag State and STCW requirement with minimum three (3) years of seagoing experience in the position of OOW navigational. He is the head of the deck department of a merchant ship and one of the four management level officers on the ship and is second in command after the master of the ship. The chief mate is customarily a watch stander and is in charge of the ship's cargo and deck crew. The actual title used will vary by ship's employment, by type of ship, by nationality, and by trade. Informally, the Chief Mate will often simply be called "The Mate." The term "Chief Mate" is not usually used in the Commonwealth, although Chief Officer and First Mate are.

The chief mate is responsible to the Captain for the safety and security of the. Responsibilities include the crew's welfare and training in areas such as safety, firefighting, search and rescue. Also the chief mate has to be always ready to replace captain and take the command of the vessel. In captain’s absence can do mooring and vessel’s navigation in port waters, when necessary call pilot or port tugs.

5.1 Senior on board operations manager

The Chief Mate, who is the second in command of the vessel, is often equated, in corporate terms, to a senior manager for the operations on board, as the Mate is in charge of a number of departmental functions. In modern cargo vessels, the Mate holds appointments like Head of Deck Department, Head of Cargo/ Stowage Operations, Head of Safety/ Fire Fighting, Head of On-Board Security (Ship Security Officer), Head of Environment and Quality, and so forth.

5.2 Cargo officer

As cargo officer, a chief mate oversees the loading, stowage, securing and unloading of cargoes. Moreover the chief mate is accountable for the care of cargo during the voyage. This

includes a general responsibility for the ship's stability and special care for cargoes that are dangerous, hazardous or harmful.

Even under the best of conditions, a ship is balanced precariously upon the water and is subject to a number of forces, such as wind, swells, and storms, which could capsize it. The cargo officer uses tools like ballasting and load balancing to optimize the ship's performance for the expected type of environment.

Traditionally, the chief mate stands a "4-8" watch: from 4 AM until 8 AM and 4 PM until 8 PM., in port and at sea, the chief mate is responsible to the captain for keeping the ship, crew, and cargo safe. On watch, the mate must enforce all applicable regulations, such as the International Convention for the Safety of Life at Sea and pollution regulations. In port, the watch focuses on duties such as cargo operations, fire and security watches, monitoring communications and the anchor or mooring lines.

IMO regulations require the officer be fluent in English. This is required for a number of reasons, such as ability to use nautical charts and nautical publications, to understand weather and safety messages, communicate with other ships and coast stations, and to be able to work with a multi-lingual crew.

5.3 Emergencies

Emergencies can happen at any time. The officer must be equipped to safeguard passengers and crew. The officer must be able to take initial action after a collision or a grounding. Responsibilities include performing damage assessment and control, understanding the procedures for rescuing persons from the sea, assisting ships in distress, and responding to any emergency which may arise in port.

The Chief Mate is in charge of the firefighting and damage control teams. He is scene leader and reports via radio to the Captain who is in command and coordinates the larger response from the bridge.

The officer must understand distress signals and know the IMO Merchant Ship Search and Rescue Manual.

5.4 Controlling ship operations

Understanding ship's stability, trim, stress, and the basics of ship's construction is a key to keeping a ship seaworthy. The mate must know what to do in cases of flooding and loss of

buoyancy. Fire is also a constant concern. Knowing the classes and chemistry of fire, fire-fighting appliances, and systems prepares the officer to act fast in case of fire.

An officer must be expert in the use of survival craft and rescue boats. Expertise includes the vessels' launching appliances and arrangements, and their equipment including radio life-saving appliances, satellite EPIRBs, SARTs, immersion suits and thermal protective aids. It's important to be expert in the techniques for survival at sea techniques in case it's necessary to abandon ship.

Officers are trained to perform medical tasks, and follow instructions given by radio or obtained from guides. This training includes what to do in case of common shipboard accidents and illnesses.

5.5 Job responsibilities of Chief Officer

The most important duties of the chief officer are:

1. Chief Officer is responsible for performing vessel navigation watch duties.
2. He is responsible for the entire cargo operation in ports which includes loading, unloading and cargo planning.
3. He is the in-charge for maintenance of cargo gears and cargo carried on board.
4. One of the critical tasks performed by chief officer is the accountability of the stability of the ship.
5. He is responsible for maintenance of ship's hull and accommodation.
6. All the life saving and fire-fighting appliances of the vessel comes under the responsibility of the chief officer.
7. His duties includes administration task of scheduling and distributing work to deck crew.
8. He has to build up the co-ordination with other departments and take part in conflict resolution.
9. He is responsible for garbage management for the deck and accommodation part of the ship.
10. He is in charge of the ballast and de-ballasting operation done on board.
11. He has to make sure all the crew members are complying with latest rules of MARPOL, SOLAS and STCW.
12. ISPS code is another responsibility that the chief officer has to look over.

13. Trainings in all the above regulations and conventions are to be carried out by chief officer as per company policy.
14. To look after supply, overtime, cost control records, purchase order, requisition, and other paper work on behalf of shore management.
15. He also acts as SSO- ship security officer, responsible for the security of the ship both in port and at sea.
16. He is the overall safety in charge for the deck crew.
17. He is responsible for the welfare of the crew on board ship.
18. Prepares and corrects vessel's schedules
19. Organizes and holds vessel safety training for crew members, life-saving equipment use, people, cargo, vessel property rescue, controls emergency teams and groups, directly manages crew member's actions in vessel damage control
20. Provides permanent readiness of life-safety equipment for immediate use, checks their integrity
21. Provides appropriate storage of irreducible stock of food on board
22. Controls water quantity in ballast and potable tanks, its expenditure
23. Together with Service Manager places crew members and persons being on board on a temporary basis to living compartments
24. Provides appropriate technical exploitation and keeping in order hull, decks, superstructure, vessel compartments and modules, potable tanks, collective safe compartment, medical aid and food stocks, survey instruments, personal protection equipment, darkening, sparring, rigging, cargo, anchor, mooring, tug equipment, life-saving equipment of the vessel, fire protection, emergency equipment, volumetrically, air and receiver pipes; draw off and welded ventilation channels,

clinket doors and their drives (except machinery department), ladders, jacob's ladder and fenders

25. Together with Chief Engineer checks water-resistant compartments and closings conditions
26. Plans and controls vessel operations, checks the quality of prepared food
27. Dispatches deck duties
28. Provides in time receiving, storage, expenditure and control of emergency and fire prevention and special equipment and property, provision and consumed materials among vessel services
29. Keeps records of technical conditions under his supervision, prepares maintenance registers; provides trainings, drills, surveys and checks conducting
30. Maintenance and updating of all navigation charts
31. Ensure all newly arrived crew members attend a Safety Orientation Induction
32. Determine that requisitions are in line with departmental requirements
33. Report and log all accidents/incidents in accordance with CSG and Client's policies
34. Ensure proper use of PPE assigned to crew
35. Exercise prudent control and management of junior staff
36. Compliance with the implementation of the Company HSE policies, as well as those of our Clients and Local authorities

One cannot think about operating a ship without considering the position of chief officer. He is a key position on the ship, one who assists master and shore management and helps in training crew and juniors.

5.6 What must a chief mate know?

The things that the chief mate must know are:

1. Resolutions International Marine Organization Convention
2. Marine Shipping Register rules
3. Ship's manual
4. Marine Shipping Code of RK
5. Marine regulation on vessel impact at sea prevention, 1972
6. Regulations on survival at sea
7. ISN Code
8. ISPS Code

9. Job Descriptions of all crew members
10. The company QHSE-MS and policies
11. Written and Verbal English language
12. STCW requirements, including radio and GMDSS qualification requirements
13. Possess valid Medical First Aid Training Certificate

5.7 Before and during cargo operations

The chief mate before and during the cargo operations have some preparations. These preparations are:

- He must provide the preparations of loading and compartments. He checks the readiness with crew and Chief Engineer.
- Personally directs loading (unloading) operations, bulky and heavy loads fastening, placement and fastening of deck loads.
- Personally directs the vessel preparation for hazardous cargo transportations and ensures the regulations of the transportation are followed.

5.8 Before putting to sea

The chief mate before putting to sea he must:

- Ensures the vessel is ready to leave, takes measures to proper fastening of the deck machinery and loads
- Checks the steering, anchor gear, boat-handling gear, distinctive lights, light alarm, audio alarm, emergency alarm facilities, internal vessel communications, engine telegraph and main engine remote control; ensures bilge, hatches, illuminators, capes and other deck and board openings are locked
- In two hours before departure reports to Captain that all services are set and in 15 minutes that the vessel is all set

5.9 During voyage

The chief mate must also to check some things during the voyage. These things are:

- Controls proper fastening of the deck machinery and loads; provides cargo water impermeability; controls containment of external outline of the vessel; ensures all the

measures with this regard are taken; directs preparation of the vessel for navigation in storm area and for ice formation fight

- In case of abandonment of the vessel by crew, checks all compartments and ensures that none is left on board
- Keeps 6-hour watch in 6 hours in turns with Captain according to approved schedule

5.10 Certification of second mate

To become a second mate (unlimited) in the United States, one must have been a third mate and have at least 365 days of service while holding that certificate of competency. Third mates who attained their licenses after the implementation of STCW 95 have passed all the examination topics required for the second mate's license and can automatically claim the second mate's license after documenting the required service. Third mates who attained their licenses before STCW 95 must meet additional requirements.

There are two methods to attain an unlimited third mate's license the United State: to attend a specialized training institution or to accumulate "sea time" and take a series of training classes and examinations.

To become a second mate (second mate of a foreign-going ship) in India on ships of 500 gross tonnage or more:

1. Every officer in charge of a navigational watch serving on a sea-going ship of 500 gross tonnage or more shall hold an appropriate certificate of competency.
2. Every candidate for the certification shall:
    I. Be not less than 18 years of age on the last date prescribed for receipt of application
    II. Have approved sea-going service for a period of one year or more as part of an approved training and assessment program which includes on-board training in accordance with the requirements of section A-II/1 of the STCW Code and is documented in an approved training record book for assessment or otherwise have approved sea-going service for a period of not less than three years
    III. Have performed, bridge watch-keeping duties for a period of not less than six months during the required sea-going service under the

supervision of the Master or an officer of the Deck Department holding certificate of competency under rule 5;

IV. Meet the requirements of rule 29 for performing designated radio duties as a Radio Operator and

V. Have completed approved education, training, examination and assessment and meet the standard for competency as specified in section A-II/1 of the STCW Code.

5.11 Certification of third mate

There are two (2) methods to attain an unlimited third mate's license in the United States: to attend a specialized training institution or to accumulate "sea time" and take a series of training. (In this point I must mention that in Greece a cadet takes his license after he graduates as a second officer. The position of the third officer does not exist in Greek ranks, apart from the other nationalities that man Greek vessels).

Minimum requirement for certification of officer in charge of a navigational watch (Navigational Watch-keeping Officer) on ships of 500 gross tonnage or more operating in Near-Coastal Voyages.

1. Every officer in charge of a navigational watch serving on a sea-going ship of between 500 gross tonnage and 3000 tonnage operating in Near-Coastal Voyages shall hold an appropriate certificate of competency in.

2. Every candidate for the certification shall:

   I. Be not less than 18 years of age on the last date prescribed for receipt of application

   II. Have approved sea-going service of not less than eighteen months as part of an approved training and assessment programmer which includes on-board training and meets the requirements of the Tables of competence for the certification as contained in section A-II/2 of the STCW Code as applicable to ships engaged in Near-Coastal Voyages and is documented in an approved training record book or otherwise have approved sea-going service of not less than three years. A candidate who has performed approved sea-going service on a ship of

less than 500 gross tonnage shall be assessed at two-thirds of the actual sea-going service claimed;

III. Have performed, bridge watch-keeping duties for a period of not less than six months during the required sea-going service under the supervision of the Master or an officer of the Deck Department holding certificate of competency under rule 5;

IV. The requirements of rule 29 for performing designated radio duties; and

Have completed approved education, training examination and assessment and meet the standard for competency as specified in the approved training and assessment program.

4. MASTER

6.1 General

A sea captain (also called a captain or a master or a shipmaster) is a licensed mariner in ultimate command of the vessel. The captain is responsible for its safe and efficient operation, including cargo operations, navigation, crew management and ensuring that the vessel complies with local and international laws, as well as company and flag state policies. All persons on board, including officers and crew, other shipboard staff members, passengers, guests and pilots, are under the captain's authority and are his ultimate responsibility.

A ship's captain commands and manages all ship's personnel, and is typically in charge of the ship's accounting, payrolls, and inventories. The captain is responsible for compliance with immigration and customs regulations, maintaining the ship's certificates and documentation, compliance with the vessel's security plan, as mandated by the International Maritime Organization. The captain is responsible for responding to and reporting in case of accidents and incidents, and in case of injuries and illness among the ship's crew and passengers.

A ship's captain must have a master's license or certificate, issued by' the ship's flag state. Various types of licenses exist, specifying the maximum vessel size indicated in gross tonnage and in what geographic areas the captain can operate. An unlimited master's license or certificate (usually known as a master mariner's certificate) allows the captain to operate any vessel worldwide. Restricted tonnage licenses include vessel categories down to 100 tons gross tonnage and below. A candidate for an unlimited master's license requires several years of seagoing experience as a deck officer and must have completed various nautical studies at a maritime college or academy.

The master has overriding authority on hoard. Also, the master is supposed to have an independent position and the opportunity to make decisions on his own, without having to consult the ship owner first. The question has been raised if international legislation should be used to strengthen the master’s position in relation to the ship owner. If the master is supposed to make independent decisions, then he needs to be sure that he will not be given notice simply for not obeying the ship owner. The following information relates to European machine legislation on the Master’s authority and responsibilities.

The master has a reasonable employment protection. As long as a master performs his duties properly, he should have no legal reason to fear losing his employment or his salary. He is

however not guaranteed the right to perform certain duties, for instance to command a certain vessel.

A master who performs his duties according to the law should have nothing to fear from a financial standpoint. He should be able to speak his mind and make the decisions which he feels are necessary. If he however is jealous of his prestige, then he could be in trouble since it is the right of the shipping company to dismiss him from his position if they for some reason are unsatisfied with his performance. A master who is keen on maintaining command over a prestigious vessel might therefore be in a more vulnerable position.

6.2 Administrative and Economics Authorities

The master is first and foremost the ship owner's representative. The master shall be appointed by the ship owner or at least tolerated by him. The legal relationship between the ship owner and the master is a power of attorney. The master has by virtue of his position of the vessel a power of attorney to act on behalf of the ship owner. This power of attorney is limited to the single vessel he is commanding. If it is possible to contact the ship owner or his deputy this is what shall be done when it comes to major decisions. If this is not possible the master has authority to take the measures necessary to carry out the voyage and maintain the vessel.

Most people have heard that masters can perform marriage ceremonies on board. Masters who wish to have this right therefore have to apply and be appointed.

If the vessel is transporting goods or passengers the master has the right to enter agreements on the transportation of more goods or passengers. He can also commission someone to salvage the vessel. He must however obtain these funds in the way most favorable to the ship owner. He must also keep the ship owner informed of matters concerning the vessel which might be useful to him.

The master has the right to represent the vessel in court. It is however important to emphasize that the master only has this authority when he is in command of a vessel. On the way to or from a command he does not have this authority.

The master has got wide authorities to act on behalf of the ship owner (and in practice the shipping company) as well as on behalf of the owner of the cargo. The master does not need wider authorities than he has today in order to perform his duties according to the law and in an independent fashion. The master has a power of attorney to act on behalf of the ship owner.

He can make decisions on both administrative and economic issues of great importance. He has more or less got the same authorities as the ship owner himself. But he is obliged to contact

the ship owner if possible, before making major decisions. The owner of the cargo might be even more difficult to contact and the authority of the master to act on his behalf is therefore also valuable.

The master is obliged to contact the ship owner before making major decisions, and he is also obliged to have his best interests at hand. Therefore the fact that his authorities are quite wide is not a problem. The master is only supposed to use these powers in situations when it is impossible to contact the ship owner. This will typically only be in emergencies, when the master would have to make these decisions anyway, regardless of his authorities. A major change in the organization of shipping companies in general might make it necessary to reconsider the authorities of the master, but not necessarily towards reducing them.

In conclusion, the authorities of the master are wide enough for him to perform his duties according to the law and in an independent manner. They should not be reduced since they are mainly supposed to be used in emergencies, when they undoubtedly are needed.

6.3 The Chain of Command and assignment

Traditionally the master has held the highest position aboard the vessel. As early as in the Middle Ages he got this position since he usually could not contact the ship owner but had to make the decisions concerning the operation himself. This however is not explicitly stated in today's legislation. Instead it is an indirect consequence. Though there are advanced rules regarding the order of succession on board the vessel. The starting point is that the master is in charge. Is he not aboard then the first officer shall make all decisions which cannot be postponed. The master shall leave the instructions necessary to run the vessel. Regarding the succession on board the vessel, for instance if the master should pass away or be unable to perform his duties because of an accident or intoxication, the first officer shall step in until a new permanent replacement can be appointed or the master is able to perform again. There can never be two masters in charge of a vessel at the same time. The master will still be responsible for the vessel during his incapacity.

An interesting question is what happens in case a master should turn out to be clearly unable to perform his duties for some other reason, such as incompetence. The conclusion must be that

it is up to the first officer to relieve the master of his command and then face the consequences ashore if this measure was uncalled for.

The Master is responsible for the vessels:

- Navigation
- Seaworthiness
- Goof seamanship
- Documentation
- Personnel management
- Working condition

Navigation

The first responsibility that comes to mind when one thinks of the master is usually the navigation of the vessel. In practice other officers are performing the navigation under the supervision of the master. The reason for the lack of explicit navigation duties in law is probably because it is an old principle that the master is ultimately responsible for it. In my opinion one should consider navigation a general responsibility of the master in terms of seaworthiness and safety. If navigation is not part of the term safety, what is?

Seaworthiness

It is the master's responsibility to make the vessel ready for sailing before the commencement of a voyage. This for example means that sufficient supplies of adequate food and water are brought on board. The master can be fined if he deliberately or by gross negligence fails to perform this obligation.

The master is responsible for the seaworthiness of the vessel when the voyage commences and that the vessel continues to be seaworthy during the voyage. If the vessel is seaworthy or not is decided by the master. If there is a deficiency in the seaworthiness which cannot be taken care of, the ship owner or his deputy shall be contacted. (As far as I can see this could very well be the designated person.) This rule is the starting point when it comes to the liability of the master. The duty of the master to supervise the seaworthiness of the vessel also means that he is obligated to refuse to carry out the orders of the charterer or ship owner, in case their

assessment of the seaworthiness is not compatible with his. If the charterer or the ship owner does not respect this it is possible to prosecute each of them as an instigator or accessory.

Good Seamanship

Good seamanship is demanded when operating a vessel. The meaning of good seamanship is not all that clear. One thing is certain, the master shall know the rules which apply to the ship, the route and the ports they call. It is also the master's responsibility to see to that all aboard whose conduct effects the seaworthiness show good seamanship. Good seamanship is for example to use a pilot in waters which the master is unfamiliar with. This does however not render the pilot liable for the vessel, the master is ultimately responsible for the vessel. Also, a master may not serve if he is sick, exhausted or under the influence of drugs and this has an effect on safety.

The master can be held criminally liable for sailing in spite of having an insufficient crew. If he has done so deliberately or by gross negligence he can be fined or sent to prison.

Maritime Legislation states that the master also shall supervise the loading and the discharging of the vessel. (The actual supervision is often carried out by the first officer.) It is also his responsibility to make sure the voyage is performed as swiftly as possible without time loss.

Documentation

One generally recognized obligation of the master is the keeping of the log. There are different types of logs and usually a ship's log and an engine room log are required, all logs are to be kept under the supervision of the master.

Personnel Management

A great deal of the tasks of the master are also those of an employer even though the ship owner or the shipping company usually is the formal employer. The master shall make sure the crew has the education and training necessary to perform their tasks. This is inter alia the case regarding rules on safety and environment, acquaintance with the vessel, survival and rescue, and relevant language skills in order to pass on information, for example in emergency situations. The master is obligated to give a new member of the crew a relevant orientation of the vessel and inform him of basic safety regulations and measures in the event of an accident. Pursuant to paragraph one of the same provision it is also his responsibility to make sure that

he himself is familiar enough with the vessel to be able to perform his duties in the event of an accident. For example he has to acquaint himself with the vessels maneuvering capabilities.

The master can dismiss a mariner from his service for a number of reasons. Refusal to obey orders, striking an officer, assault and battery, late arrival, incompetence, drunkenness, drug abuse, theft, smuggling of goods or people or other breaches of duties are grounds for dismissal.

The Working Conditions

The master shall together with the ship owner take all necessary precautions to prevent that anyone working on board the vessel is exposed to unhealthy conditions or accidents. This applies to the working environment on the whole as well. The master shall also make sure that the living quarters and the state of the health on board is satisfactory. The master has the right to dismiss a mariner if he due to injury or sickness is unable to perform his service during a longer period of time or if he has become a safety hazard. The master has at his disposal the right to order an examination by a doctor of the mariner in question. Pregnancy is compared with sickness if it will impede the execution of the service. However, this does not mean the mariner will lose his employment. It is also the responsibility of the master to make sure that an injured or sick mariner receives proper medical care on board or ashore. If the mariner should pass away the master is responsible for the funeral, the recording of his belongings and accounting for it to the family of the deceased.

APPENDIX: BRIDGE CHECKLISTS

B1 Familiarisation with bridge equipment

Has the operation of the following equipment been studied and fully understood?

- ☐ bridge and deck lighting
- ☐ emergency arrangements in the event of main power failure
- ☐ navigation and signal lights, *including*
- ☐ searchlights, signalling lamp, morse light
- ☐ sound signalling apparatus, *including*
- ☐ whistles
- ☐ fog bell and gong system
- ☐ safety equipment, *including*
- ☐ LSA equipment including pyrotechnics, EPIRB and SART
- ☐ *bridge fire detection panel*
- ☐ general and fire alarm signalling arrangements
- ☐ emergency pump, ventilation and water-tight door controls
- ☐ internal ship communications facilities, *including*
- ☐ portable radios
- ☐ emergency 'batteryless' phone system
- ☐ public address system
- ☐ *external communication equipment, including*
- ☐ VHF and GMDSS equipment
- ☐ alarm systems on bridge
- ☐ echo sounder
- ☐ electronic navigational position fixing systems
- ☐ gyro compass/repeaters
- ☐ magnetic compass
- ☐ off-course alarm
- ☐ radar including ARPA
- ☐ speed/distance recorder
- ☐ engine and thruster controls
- ☐ *steering gear, including manual, auto-pilot and emergency changeover and testing* arrangements (see annex A7)
- ☐ automatic track-keeping system, if fitted
- ☐ ECDIS and electronic charts, if fitted
- ☐ IBS functions, if fitted
- ☐ Location and operation of ancillary bridge equipment (e.g. binoculars, signalling flags, meteorological equipment)?
- ☐ Stowage of chart and hydrographic publications?

Other checks:

- ☐
- ☐
- ☐

B2 Preparation for sea

- ☐ Has a passage plan for the intended voyage been prepared? (see section 2)

Has the following equipment been checked and found ready for use?

- ☐ anchors
- ☐ bridge movement book/course and engine movement recorder
- ☐ echo sounder
- ☐ electronic navigational position fixing systems
- ☐ gyro/magnetic compass and repeaters
- ☐ radar(s)
- ☐ speed/distance recorder
- ☐ clocks

Has the following equipment been tested, synchronised and found ready for use?

- ☐ bridge and engineroom telegraphs, *including*
- ☐ rpm indicators
- ☐ emergency engine stops
- ☐ thruster controls and indicators, if fitted
- ☐ controllable pitch propeller controls and indicators, if fitted
- ☐ communications facilities, *including*
- ☐ bridge to engineroom/mooring station communications
- ☐ portable radios
- ☐ VHF radio communications with port authority
- ☐ navigation and signal lights, *including*
- ☐ searchlights, signalling lamp, morse light
- ☐ sound signalling apparatus, *including*
- ☐ whistles
- ☐ fog bell and gong system
- ☐ steering gear, including manual, auto-pilot and emergency changeover arrangements and rudder indicators (see annex A7)
- ☐ window wiper/clearview screen arrangements

Is the ship secure for sea?

- ☐ cargo and cargo handling equipment secure
- ☐ all hull openings secure and watertight
- ☐ cargo/passenger details available
- ☐ stability and draught information available
- ☐ Are all the crew on board and all shore personnel ashore?
- ☐ Are the pilot disembarkation arrangements in place? (see annex A5)

Other checks:

- ☐
- ☐
- ☐

B6 Navigation in coastal waters

Have the following factors been taken into consideration in preparing the passage plan?

- ☐ advice/recommendations in sailing directions
- ☐ ship's draught in relation to available water depths
- ☐ effect of 'squat' on underkeel clearance in shallow water
- ☐ tides and currents
- ☐ weather, particularly in areas prone to poor visibility
- ☐ available navigational aids and their accuracy
- ☐ position-fixing methods to be used
- ☐ daylight/night-time passing of danger points
- ☐ traffic likely to be encountered – flow, type, volume
- ☐ any requirements for traffic separation/routeing schemes

☐ **Are local/coastal warning broadcasts being monitored?**

☐ **Is participation in area reporting systems recommended including VTS?**

☐ **Is the ship's position being fixed at regular intervals?**

Has equipment been regular checked/tested, *including*

- ☐ gyro/magnetic compass errors
- ☐ manual steering before entering coastal waters if automatic steering has been engaged for a prolonged period
- ☐ radar performance and radar heading line marker alignment?
- ☐ echo sounder

☐ **Is the OOW prepared to use the engines and call a look-out or a helmsman to the bridge?**

☐ **Have measures been taken to protect the environment from pollution by the ship and to comply with applicable pollution regulations?**

Other checks:

- ☐
- ☐
- ☐

B8 Anchoring and anchor watch

Has an anchoring plan been prepared taking into account

- ☐ speed reduction in ample time
- ☐ direction/strength of wind and current
- ☐ tidal stream when manoeuvring at low speeds
- ☐ need for adequate sea room particularly to seaward
- ☐ depth of water, type of seabed and the scope of anchor cable required

☐ Have the engineroom and anchor party been informed of the time of 'stand-by' for anchoring?

☐ Are the anchors, lights/shapes and sound signalling apparatus ready for use?

☐ Has the anchor position of the ship been reported to the port authority?

While at anchor, the OOW should

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

Other checks:

- ☐
- ☐
- ☐

B12 Changing over the watch

When changing over the watch relieving officers should personally satisfy themselves regarding the following:

- ☐ standing orders and other special instructions of the master relating to navigation of the ship
- ☐ position, course, speed and draught of the ship
- ☐ prevailing and predicted tides, currents, weather, visibility and the effect of these factors upon course and speed
- ☐ procedures for the use of main engines to manoeuvre when the main engines are on bridge control and the status of the watchkeeping arrangements in the engine room

navigational situation, including but not limited to:

- ☐ the operational condition of all navigational and safety equipment being used or likely to be used during the watch
- ☐ the errors of gyro and magnetic compasses
- ☐ the presence and movements of ships in sight or known to be in the vicinity
- ☐ the conditions and hazards likely to be encountered during the watch
- ☐ the possible effects of heel, trim, water density and squat on underkeel clearance
- ☐ any special deck work in progress

Other points:

- ☐
- ☐
- ☐

B13 Calling the master

The OOW should notify the master immediately:

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

Other points:

- ☐
- ☐
- ☐

C7 Search and rescue

Actions to be carried out:

- ☐ Take bearing of distress message if radio direction finder fitted
- ☐ Re-transmit distress message
- ☐ Maintain continuous listening watch on all distress frequencies
- ☐ Consult MERSAR/IAMSAR manuals
- ☐ *Establish communications with all other surface units and SAR aircraft involved* in the SAR operation
- ☐ Plot position, courses and speeds of other assisting units
- ☐ Monitor X-band radar for locating survival craft transponder (SART) signal using 6 or 12 nautical mile range scales
- ☐ Post extra look-outs for sighting flares and other pyrotechnic signals

Other actions:

- ☐
- ☐
- ☐

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