

Excerpts from the International Convention on Standards of Training,
Certification and Watchkeeping for Seafarers, 1978, as amended

and

Seafarers' Training, Certification and Watchkeeping Code, as amended

Notice: These excerpts are provided for background information. By themselves, they do not constitute Coast Guard policy.

The Manila Amendments to the annex to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978

Chapter I
General provisions

Regulation I/6

Training and assessment

Each party shall ensure that:

- .1 the training and assessment of seafarers, as required under the Convention, are administered, supervised and monitored in accordance with the provisions of section A-I/6 of the STCW Code; and
- .2 those responsible for the training and assessment of competence of seafarers, as required under the Convention, are appropriately qualified in accordance with the provisions of section A-I/6 of the STCW Code for the type and level of training and assessment involved.

Regulation I/12

Use of Simulators

1 The performance standards and other provisions set forth in section A-I/12 and such other requirements as are prescribed in part A of the STCW Code for any certificate concerned shall be complied with in respect of:

- .1 all mandatory simulator-based training;
- .2 any assessment of competency required by part A of the STCW Code which is carried out by means of a simulator; and
- .3 any demonstration, by means of a simulator, of continued proficiency required by part A of the STCW Code.

Chapter II

Standards regarding the master and deck department

Regulation II/2

Mandatory minimum requirements for certification of masters and chief mates on ships of 500 gross tonnage or more

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Master and chief mate on ships of between 500 and 3,000 gross tonnage

3 Every master and chief mate on a seagoing ship of between 500 and 3,000 gross tonnage shall hold a certificate of competency.

- 4 Every candidate for certification shall:
 - .1 for certification as chief mate, meet the requirements of an officer in charge of a navigational watch on ships of 500 gross tonnage or more;
 - .2 for certification as master, meet the requirements of an officer in charge of a navigational watch on ships of 500 gross tonnage or more and have approved seagoing service of not less than 36 months in that capacity; however, this period may be reduced to not less than 24 months if not less than 12 months of such seagoing service has been served as chief mate; and
 - .3 have completed approved training and meet the standard of competence specified in section A-II/2 of the STCW Code for masters and chief mates on ships of between 500 and 3,000 gross tonnage.

Chapter VIII Watchkeeping

Regulation VIII/2

Watchkeeping arrangements and principles to be observed

- 1 Administrations shall direct the attention of companies, masters, chief engineer officers and all watchkeeping personnel to the requirements, principles and guidance set out in the STCW Code which shall be observed to ensure that a safe continuous watch or watches appropriate to the prevailing circumstances and conditions are maintained on all seagoing ships at all times.
- 2 Administrations shall require the master of every ship to ensure that watchkeeping arrangements are adequate for maintaining a safe watch or watches, taking into account the prevailing circumstances and conditions and that, under the master's general direction:
 - .1 officers in charge of the navigational watch are responsible for navigating the ship safely during their periods of duty, when they shall be physically present on the navigating bridge or in a directly associated location such as the chartroom or bridge control room at all times;
 - .2 radio operators are responsible for maintaining a continuous radio watch on appropriate frequencies during their periods of duty;
 - .3 officers in charge of an engineering watch, as defined in the STCW Code, under the direction of the chief engineer officer, shall be immediately available and on call to attend the machinery spaces and, when required, shall be physically present in the machinery space during their periods of responsibility;
 - .4 an appropriate and effective watch or watches are maintained for the purpose of safety at all times, while the ship is at anchor or moored and, if the ship is carrying hazardous cargo, the organization of such watch or watches takes full account of the nature, quantity, packing and stowage of the hazardous cargo and of any special conditions prevailing on board, afloat or ashore; and
 - .5 as applicable, an appropriate and effective watch or watches are maintained for the purposes of security.

**The Manila Amendments to the Seafarers' Training, Certification and Watchkeeping
(STCW) Code**

Chapter I

Standards regarding general provisions

Section A-I/6

Training and assessment

1 Each Party shall ensure that all training and assessment of seafarers for certification under the Convention is:

- .1** structured in accordance with written programmes, including such methods and media of delivery, procedures, and course material as are necessary to achieve the prescribed standard of competence; and
- .2** conducted, monitored, evaluated and supported by persons qualified in accordance with paragraphs 4, 5 and 6.

2 Persons conducting in-service training or assessment on board ship shall only do so when such training or assessment will not adversely affect the normal operation of the ship and they can dedicate their time and attention to training or assessment.

Qualifications of instructors, supervisors and assessors*

3 Each Party shall ensure that instructors, supervisors and assessors are appropriately qualified for the particular types and levels of training or assessment of competence of seafarers either on board or ashore, as required under the Convention, in accordance with the provisions of this section.

In-service training

4 Any person conducting in-service training of a seafarer, either on board or ashore, which is intended to be used in qualifying for certification under the Convention, shall:

- .1** have an appreciation of the training programme and an understanding of the specific training objectives for the particular type of training being conducted;
- .2** be qualified in the task for which training is being conducted; and
- .3** if conducting training using a simulator:
 - .3.1** have received appropriate guidance in instructional techniques involving the use of simulators; and

* The relevant IMO Model Course(s) may be of assistance in the preparation of courses.

- .3.2 have gained practical operational experience on the particular type of simulator being used.

5 Any person responsible for the supervision of in-service training of a seafarer intended to be used in qualifying for certification under the Convention shall have a full understanding of the training programme and the specific objectives for each type of training being conducted.

Assessment of competence

6 Any person conducting in-service assessment of competence of a seafarer, either on board or ashore, which is intended to be used in qualifying for certification under the Convention, shall:

- .1 have an appropriate level of knowledge and understanding of the competence to be assessed;
- .2 be qualified in the task for which the assessment is being made;
- .3 have received appropriate guidance in assessment methods and practice;
- .4 have gained practical assessment experience; and
- .5 if conducting assessment involving the use of simulators, have gained practical assessment experience on the particular type of simulator under the supervision and to the satisfaction of an experienced assessor.

Training and assessment within an institution

7 Each Party which recognizes a course of training, a training institution, or a qualification granted by a training institution, as part of its requirements for the issue of a certificate required under the Convention, shall ensure that the qualifications and experience of instructors and assessors are covered in the application of the quality standard provisions of section A-I/8. Such qualification, experience and application of quality standards shall incorporate appropriate training in instructional techniques, and training and assessment methods and practice, and shall comply with all applicable requirements of paragraphs 4 to 6.

Section A-I/12

Standards governing the use of simulators

Part 1 – Performance standards

General performance standards for simulators used in training

- 1 Each Party shall ensure that any simulator used for mandatory simulator-based training shall:
- .1 be suitable for the selected objectives and training tasks;

- .2 be capable of simulating the operating capabilities of shipboard equipment concerned, to a level of physical realism appropriate to training objectives, and include the capabilities, limitations and possible errors of such equipment;
- .3 have sufficient behavioural realism to allow a trainee to acquire the skills appropriate to the training objectives;
- .4 provide a controlled operating environment, capable of producing a variety of conditions, which may include emergency, hazardous or unusual situations relevant to the training objectives;
- .5 provide an interface through which a trainee can interact with the equipment, the simulated environment and, as appropriate, the instructor; and
- .6 permit an instructor to control, monitor and record exercises for the effective debriefing of trainees.

General performance standards for simulators used in assessment of competence

2 Each Party shall ensure that any simulator used for the assessment of competence required under the Convention or for any demonstration of continued proficiency so required shall:

- .1 be capable of satisfying the specified assessment objectives;
- .2 be capable of simulating the operational capabilities of the shipboard equipment concerned to a level of physical realism appropriate to the assessment objectives, and include the capabilities, limitations and possible errors of such equipment;
- .3 have sufficient behavioural realism to allow a candidate to exhibit the skills appropriate to the assessment objectives;
- .4 provide an interface through which a candidate can interact with the equipment and simulated environment;
- .5 provide a controlled operating environment, capable of producing a variety of conditions, which may include emergency, hazardous or unusual situations relevant to assessment objectives; and
- .6 permit an assessor to control, monitor and record exercises for the effective assessment of the performance of candidates.

Additional performance standards

3 In addition to meeting the basic requirements set out in paragraphs 1 and 2, simulation equipment to which this section applies shall meet the performance standards given hereunder in accordance with their specific type.

Radar simulation

4 Radar simulation equipment shall be capable of simulating the operational capabilities of navigational radar equipment which meets all applicable performance standards adopted by the Organization* and incorporate facilities to:

- .1 operate in the stabilized relative-motion mode and sea- and ground-stabilized true-motion modes;
- .2 model weather, tidal streams, current, shadow sectors, spurious echoes and other propagation effects, and generate coastlines, navigational buoys and search and rescue transponders; and
- .3 create a real-time operating environment incorporating at least two own-ship stations with ability to change own ship's course and speed, and include parameters for at least 20 target ships and appropriate communication facilities.

Automatic Radar Plotting Aid (ARPA) simulation

5 ARPA simulation equipment shall be capable of simulating the operational capabilities of ARPAs which meet all applicable performance standards adopted by the Organization*, and shall incorporate the facilities for:

- .1 manual and automatic target acquisition;
- .2 past track information;
- .3 use of exclusion areas;
- .4 vector/graphic time-scale and data display; and
- .5 trial manoeuvres.

Part 2 – Other provisions

Simulator training objectives

6 Each Party shall ensure that the aims and objectives of simulator-based training are defined within an overall training programme and that specific training objectives and tasks are selected so as to relate as closely as possible to shipboard tasks and practices.

* See relevant/appropriate performance standards adopted by the Organization.

Training procedures

- 7 In conducting mandatory simulator-based training, instructors shall ensure that:
 - .1 trainees are adequately briefed beforehand on the exercise objectives and tasks and are given sufficient planning time before the exercise starts;
 - .2 trainees have adequate familiarization time on the simulator and with its equipment before any training or assessment exercise commences;
 - .3 guidance given and exercise stimuli are appropriate to the selected exercise objectives and tasks and to the level of trainee experience;
 - .4 exercises are effectively monitored, supported as appropriate by audio and visual observation of trainee activity and pre- and post-exercise evaluation reports;
 - .5 trainees are effectively debriefed to ensure that training objectives have been met and that operational skills demonstrated are of an acceptable standard;
 - .6 the use of peer assessment during debriefing is encouraged; and
 - .7 simulator exercises are designed and tested so as to ensure their suitability for the specified training objectives.

Assessment procedures

- 8 Where simulators are used to assess the ability of candidates to demonstrate levels of competency, assessors shall ensure that:
 - .1 performance criteria are identified clearly and explicitly and are valid and available to the candidates;
 - .2 assessment criteria are established clearly and are explicit to ensure reliability and uniformity of assessment and to optimize objective measurement and evaluation, so that subjective judgements are kept to the minimum;
 - .3 candidates are briefed clearly on the tasks and/or skills to be assessed and on the tasks and performance criteria by which their competency will be determined;
 - .4 assessment of performance takes into account normal operating procedures and any behavioural interaction with other candidates on the simulator or with simulator staff;
 - .5 scoring or grading methods to assess performance are used with caution until they have been validated; and
 - .6 the prime criterion is that a candidate demonstrates the ability to carry out a task safely and effectively to the satisfaction of the assessor.

Qualifications of instructors and assessors*

9 Each Party shall ensure that instructors and assessors are appropriately qualified and experienced for the particular types and levels of training and corresponding assessment of competence as specified in regulation I/6 and section A-I/6.

Chapter II

Standards regarding the master and deck department

Section A-II/2

Mandatory minimum requirements for certification of masters and chief mates on ships of 500 gross tonnage or more

Standard of competence

1 Every candidate for certification as master or chief mate of ships of 500 gross tonnage or more shall be required to demonstrate the competence to undertake, at the management level, the tasks, duties and responsibilities listed in column 1 of table A-II/2.

2 The minimum knowledge, understanding and proficiency required for certification is listed in column 2 of table A-II/2. This incorporates, expands and extends in depth the subjects listed in column 2 of table A-II/1 for officers in charge of a navigational watch.

3 Bearing in mind that the master has ultimate responsibility for the safety and security of the ship, its passengers, crew and cargo, and for the protection of the marine environment against pollution by the ship, and that a chief mate shall be in a position to assume that responsibility at any time, assessment in these subjects shall be designed to test their ability to assimilate all available information that affects the safety and security of the ship, its passengers, crew or cargo, or the protection of the marine environment.

4 The level of knowledge of the subjects listed in column 2 of table A-II/2 shall be sufficient to enable the candidate to serve in the capacity of master or chief mate* .

5 The level of theoretical knowledge, understanding and proficiency required under the different sections in column 2 of table A-II/2 may be varied according to whether the certificate is to be valid for ships of 3,000 gross tonnage or more or for ships of between 500 gross tonnage and 3,000 gross tonnage.

6 Training and experience to achieve the necessary level of theoretical knowledge, understanding and proficiency shall take into account the relevant requirements of this part and the guidance given in part B of this Code.

* The relevant IMO Model Course(s) and resolution MSC.64(67), *Recommendations on new and amended performance standards*, may be of assistance in the preparation of courses.

* The relevant IMO Model Course(s) may be of assistance in the preparation of courses.

7 Every candidate for certification shall be required to provide evidence of having achieved the required standard of competence in accordance with the methods for demonstrating competence and criteria for evaluating competence tabulated in columns 3 and 4 of table A-II/2.

Near-coastal voyages

8 An Administration may issue a certificate restricted to service on ships engaged exclusively on near-coastal voyages and, for the issue of such a certificate, may exclude such subjects as are not applicable to the waters or ships concerned, bearing in mind the effect on the safety of all ships which may be operating in the same waters.

Table A-II/2

*Specification of minimum standard of competence for masters and chief mates
on ships of 500 gross tonnage or more*

Function: Navigation at the management level

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Plan a voyage and conduct navigation	<p>Voyage planning and navigation for all conditions by acceptable methods of plotting ocean tracks, taking into account, e.g.:</p> <p>.1 restricted waters</p> <p>.2 meteorological conditions</p> <p>.3 ice</p> <p>.4 restricted visibility</p> <p>.5 traffic separation schemes</p> <p>.6 vessel traffic service (VTS) areas</p> <p>.7 areas of extensive tidal effects</p> <p>Routeing in accordance with the General Provisions on Ships' Routeing</p> <p>Reporting in accordance with the General principles for Ship Reporting Systems and with VTS procedures</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved simulator training, where appropriate</p> <p>.3 approved laboratory equipment training</p> <p>using: chart catalogues, charts, nautical publications and ship particulars</p>	<p>The equipment, charts and nautical publications required for the voyage are enumerated and appropriate to the safe conduct of the voyage</p> <p>The reasons for the planned route are supported by facts and statistical data obtained from relevant sources and publications</p> <p>Positions, courses, distances and time calculations are correct within accepted accuracy standards for navigational equipment</p> <p>All potential navigational hazards are accurately identified</p>
Determine position and the accuracy of resultant position fix by any means	<p>Position determination in all conditions:</p> <p>.1 by celestial observations</p> <p>.2 by terrestrial observations, including the ability to use</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p>	<p>The primary method chosen for fixing the ship's position is the most appropriate to the prevailing circumstances and conditions</p> <p>The fix obtained by</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
	<p>appropriate charts, notices to mariners and other publications to assess the accuracy of the resulting position fix</p> <p>.3 using modern electronic navigational aids, with specific knowledge of their operating principles, limitations, sources of error, detection of misrepresentation of information and methods of correction to obtain accurate position fixing</p>	<p>.2 approved simulator training, where appropriate</p> <p>.3 approved laboratory equipment training using:</p> <p>.1 charts, nautical almanac, plotting sheets, chronometer, sextant and a calculator</p> <p>.2 charts, nautical publications and navigational instruments (azimuth mirror, sextant, log, sounding equipment, compass) and manufacturers' manuals</p> <p>.3 radar, terrestrial electronic position-fixing systems, satellite navigation systems and appropriate nautical charts and publications</p>	<p>celestial observations is within accepted accuracy levels</p> <p>The fix obtained by terrestrial observations is within accepted accuracy levels</p> <p>The accuracy of the resulting fix is properly assessed</p> <p>The fix obtained by the use of electronic navigational aids is within the accuracy standards of the systems in use. The possible errors affecting the accuracy of the resulting position are stated and methods of minimizing the effects of system errors on the resulting position are properly applied</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Determine and allow for compass errors	<p>Ability to determine and allow for errors of the magnetic and gyro-compasses</p> <p>Knowledge of the principles of magnetic and gyro-compasses</p> <p>An understanding of systems under the control of the master gyro and a knowledge of the operation and care of the main types of gyro-compass</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved simulator training, where appropriate</p> <p>.3 approved laboratory equipment training</p> <p>using: celestial observations, terrestrial bearings and comparison between magnetic and gyro-compasses</p>	<p>The method and frequency of checks for errors of magnetic and gyro-compasses ensures accuracy of information</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Coordinate search and rescue operations	A thorough knowledge of and ability to apply the procedures contained in the International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ul style="list-style-type: none"> .1 approved in-service experience .2 approved simulator training, where appropriate .3 approved laboratory equipment training <p>using: relevant publications, charts, meteorological data, particulars of ships involved, radiocommunication equipment and other available facilities and one or more of the following:</p> <ul style="list-style-type: none"> .1 approved SAR training course .2 approved simulator training, where appropriate .3 approved laboratory equipment training 	<p>The plan for coordinating search and rescue operations is in accordance with international guidelines and standards</p> <p>Radiocommunications are established and correct communication procedures are followed at all stages of the search and rescue operations</p>
Establish watchkeeping arrangements and procedures	<p>Thorough knowledge of content, application and intent of the International Regulations for Preventing Collisions at Sea, 1972, as amended</p> <p>Thorough knowledge of the content, application and intent of the Principles to be</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ul style="list-style-type: none"> .1 approved in-service experience .2 approved simulator training, where 	<p>Watchkeeping arrangements and procedures are established and maintained in compliance with international regulations and guidelines so as to ensure the safety of navigation, protection of the marine environment</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
	observed in keeping a navigational watch	appropriate	and safety of the ship and persons on board
<p>Maintain safe navigation through the use of information from navigation equipment and systems to assist command decision making</p> <p><i>Note:</i> Training and assessment in the use of ARPA is not required for those who serve exclusively on ships not fitted with ARPA. This limitation shall be reflected in the endorsement issued to the seafarer concerned</p>	<p>An appreciation of system errors and thorough understanding of the operational aspects of navigational systems</p> <p>Blind pilotage planning</p> <p>Evaluation of navigational information derived from all sources, including radar and ARPA, in order to make and implement command decisions for collision avoidance and for directing the safe navigation of the ship</p> <p>The interrelationship and optimum use of all navigational data available for conducting navigation</p>	<p>Examination and assessment of evidence obtained from approved ARPA simulator and one or more of the following:</p> <ul style="list-style-type: none"> .1 approved in-service experience .2 approved simulator training, where appropriate .3 approved laboratory equipment training 	<p>Information obtained from navigation equipment and systems is correctly interpreted and analysed, taking into account the limitations of the equipment and prevailing circumstances and conditions</p> <p>Action taken to avoid a close encounter or collision with another vessel is in accordance with the International Regulations for Preventing Collisions at Sea, 1972, as amended</p>
<p>Maintain the safety of navigation through the use of ECDIS and associated navigation systems to assist command decision making</p> <p><i>Note:</i> Training and assessment in the use of ECDIS is not required for those who serve exclusively on ships not fitted with ECDIS. This limitation shall be reflected in the endorsement issued to the seafarer concerned</p>	<p>Management of operational procedures, system files and data, including:</p> <ul style="list-style-type: none"> .1 manage procurement, licensing and updating of chart data and system software to conform to established procedures .2 system and information updating, including the ability to update ECDIS system version in accordance with vendor's product development .3 create and maintain system configuration and backup files 	<p>Assessment of evidence obtained from one of the following:</p> <ul style="list-style-type: none"> .1 approved in-service experience .2 approved training ship experience .3 approved ECDIS simulator training 	<p>Operational procedures for using ECDIS are established, applied, and monitored</p> <p>Actions taken to minimize risk to safety of navigation</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
	<p>.4 create and maintain log files in accordance with established procedures</p> <p>.5 create and maintain route plan files in accordance with established procedures</p> <p>.6 use ECDIS log-book and track history functions for inspection of system functions, alarm settings and user responses</p> <p>Use ECDIS playback functionality for passage review, route planning and review of system functions</p>		
<p>Forecast weather and oceanographic conditions</p>	<p>Ability to understand and interpret a synoptic chart and to forecast area weather, taking into account local weather conditions and information received by weather fax</p> <p>Knowledge of the characteristics of various weather systems, including tropical revolving storms and avoidance of storm centres and the dangerous quadrants</p> <p>Knowledge of ocean current systems</p> <p>Ability to calculate tidal conditions</p> <p>Use all appropriate nautical publications on tides and currents</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved laboratory equipment training</p>	<p>The likely weather conditions predicted for a determined period are based on all available information</p> <p>Actions taken to maintain safety of navigation minimize any risk to safety of the ship</p> <p>Reasons for intended action are backed by statistical data and observations of the actual weather conditions</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Respond to navigational emergencies	<p>Precautions when beaching a ship</p> <p>Action to be taken if grounding is imminent, and after grounding</p> <p>Refloating a grounded ship with and without assistance</p> <p>Action to be taken if collision is imminent and following a collision or impairment of the watertight integrity of the hull by any cause</p> <p>Assessment of damage control</p> <p>Emergency steering</p> <p>Emergency towing arrangements and towing procedure</p>	Examination and assessment of evidence obtained from practical instruction, in-service experience and practical drills in emergency procedures	<p>The type and scale of any problem is promptly identified and decisions and actions minimize the effects of any malfunction of the ship's systems</p> <p>Communications are effective and comply with established procedures</p> <p>Decisions and actions maximize safety of persons on board</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
<p>Manoeuvre and handle a ship in all conditions</p>	<p>Manoeuvring and handling a ship in all conditions, including:</p> <ul style="list-style-type: none"> .1 manoeuvres when approaching pilot stations and embarking or disembarking pilots, with due regard to weather, tide, headreach and stopping distances .2 handling ship in rivers, estuaries and restricted waters, having regard to the effects of current, wind and restricted water on helm response .3 application of constant-rate-of-turn techniques .4 manoeuvring in shallow water, including the reduction in under-keel clearance caused by squat, rolling and pitching .5 interaction between passing ships and between own ship and nearby banks (canal effect) .6 berthing and unberthing under various conditions of wind, tide and current with and without tugs .7 ship and tug interaction .8 use of propulsion and manoeuvring systems 	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ul style="list-style-type: none"> .1 approved in-service experience .2 approved simulator training, where appropriate .3 approved manned scale ship model, where appropriate 	<p>All decisions concerning berthing and anchoring are based on a proper assessment of the ship's manoeuvring and engine characteristics and the forces to be expected while berthed alongside or lying at anchor</p> <p>While under way, a full assessment is made of possible effects of shallow and restricted waters, ice, banks, tidal conditions, passing ships and own ship's bow and stern wave so that the ship can be safely manoeuvred under various conditions of loading and weather</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Manoeuvre and handle a ship in all conditions <i>(continued)</i>	<p>.9 choice of anchorage; anchoring with one or two anchors in limited anchorages and factors involved in determining the length of anchor cable to be used</p> <p>.10 dragging anchor; clearing fouled anchors</p> <p>.11 dry-docking, both with and without damage</p> <p>.12 management and handling of ships in heavy weather, including assisting a ship or aircraft in distress; towing operations; means of keeping an unmanageable ship out of trough of the sea, lessening drift and use of oil</p> <p>.13 precautions in manoeuvring to launch rescue boats or survival craft in bad weather</p> <p>.14 methods of taking on board survivors from rescue boats and survival craft</p> <p>.15 ability to determine the manoeuvring and propulsion characteristics of common types of ships, with special reference to stopping distances and turning circles at various draughts and speeds</p> <p>.16 importance of navigating at reduced speed to avoid damage caused by own ship's bow wave and stern wave</p>		

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Manoeuvre and handle a ship in all conditions (continued)	.17 practical measures to be taken when navigating in or near ice or in conditions of ice accumulation on board .18 use of, and manoeuvring in and near, traffic separation schemes and in vessel traffic service (VTS) areas		
Operate remote controls of propulsion plant and engineering systems and services	Operating principles of marine power plants Ships' auxiliary machinery General knowledge of marine engineering terms	Examination and assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved simulator training, where appropriate	Plant, auxiliary machinery and equipment is operated in accordance with technical specifications and within safe operating limits at all times

Function: Cargo handling and stowage at the management level

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Plan and ensure safe loading, stowage, securing, care during the voyage and unloading of cargoes	Knowledge of and ability to apply relevant international regulations, codes and standards concerning the safe handling, stowage, securing and transport of cargoes Knowledge of the effect on trim and stability of cargoes and cargo operations Use of stability and trim diagrams and	Examination and assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved simulator training, where appropriate using: stability, trim and	The frequency and extent of cargo condition monitoring is appropriate to its nature and prevailing conditions Unacceptable or unforeseen variations in the condition or specification of the cargo are promptly recognized and remedial action is immediately taken and designed to safeguard the

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
<p>Plan and ensure safe loading, stowage, securing, care during the voyage and unloading of cargoes (continued)</p>	<p>stress-calculating equipment, including automatic data-based (ADB) equipment, and knowledge of loading cargoes and ballasting in order to keep hull stress within acceptable limits</p> <p>Stowage and securing of cargoes on board ships, including cargo-handling gear and securing and lashing equipment</p> <p>Loading and unloading operations, with special regard to the transport of cargoes identified in the Code of Safe Practice for Cargo Stowage and Securing</p> <p>General knowledge of tankers and tanker operations</p> <p>Knowledge of the operational and design limitations of bulk carriers</p> <p>Ability to use all available shipboard data related to loading, care and unloading of bulk cargoes</p> <p>Ability to establish procedures for safe cargo handling in accordance with the provisions of the relevant instruments such as IMDG Code, IMSBC Code, MARPOL 73/78 Annexes III and V and other relevant information</p> <p>Ability to explain the basic principles for establishing effective communications and</p>	<p>stress tables, diagrams and stress-calculating equipment</p>	<p>safety of the ship and those on board</p> <p>Cargo operations are planned and executed in accordance with established procedures and legislative requirements</p> <p>Stowage and securing of cargoes ensures that stability and stress conditions remain within safe limits at all times during the voyage</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
	improving working relationship between ship and terminal personnel		
Assess reported defects and damage to cargo spaces, hatch covers and ballast tanks and take appropriate action	<p>Knowledge of the limitations on strength of the vital constructional parts of a standard bulk carrier and ability to interpret given figures for bending moments and shear forces</p> <p>Ability to explain how to avoid the detrimental effects on bulk carriers of corrosion, fatigue and inadequate cargo handling</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved simulator training, where appropriate</p> <p>using: stability, trim and stress tables, diagrams and stress-calculating equipment</p>	<p>Evaluations are based on accepted principles, well-founded arguments and correctly carried out. The decisions taken are acceptable, taking into consideration the safety of the ship and the prevailing conditions</p>
Carriage of dangerous goods	<p>International regulations, standards, codes and recommendations on the carriage of dangerous cargoes, including the International Maritime Dangerous Goods (IMDG) Code and the International Maritime Solid Bulk Cargoes (IMSBC) Code</p> <p>Carriage of dangerous, hazardous and harmful cargoes; precautions during loading and unloading and care during the voyage</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved simulator training, where appropriate</p> <p>.3 approved specialist training</p>	<p>Planned distribution of cargo is based on reliable information and is in accordance with established guidelines and legislative requirements</p> <p>Information on dangers, hazards and special requirements is recorded in a format suitable for easy reference in the event of an incident</p>

Function: Controlling the operation of the ship and care for persons on board at the management level

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Control trim, stability and stress	<p>Understanding of fundamental principles of ship construction and the theories and factors affecting trim and stability and measures necessary to preserve trim and stability</p> <p>Knowledge of the effect on trim and stability of a ship in the event of damage to and consequent flooding of a compartment and countermeasures to be taken</p> <p>Knowledge of IMO recommendations concerning ship stability</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ul style="list-style-type: none"> .1 approved in-service experience .2 approved training ship experience .3 approved simulator training, where appropriate 	<p>Stability and stress conditions are maintained within safe limits at all times</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
<p>Monitor and control compliance with legislative requirements and measures to ensure safety of life at sea, security and the protection of the marine environment</p>	<p>Knowledge of international maritime law embodied in international agreements and conventions</p> <p>Regard shall be paid especially to the following subjects:</p> <ul style="list-style-type: none"> .1 certificates and other documents required to be carried on board ships by international conventions, how they may be obtained and their period of validity .2 responsibilities under the relevant requirements of the International Convention on Load Lines, 1966, as amended .3 responsibilities under the relevant requirements of the International Convention for the Safety of Life at Sea, 1974, as amended .4 responsibilities under the International Convention for the Prevention of Pollution from Ships, as amended 	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ul style="list-style-type: none"> .1 approved in-service experience .2 approved training ship experience .3 approved simulator training, where appropriate 	<p>Procedures for monitoring operations and maintenance comply with legislative requirements</p> <p>Potential non-compliance is promptly and fully identified</p> <p>Planned renewal and extension of certificates ensures continued validity of surveyed items and equipment</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
	<p>.5 maritime declarations of health and the requirements of the International Health Regulations</p> <p>.6 responsibilities under international instruments affecting the safety of the ship, passengers, crew and cargo</p> <p>.7 methods and aids to prevent pollution of the marine environment by ships</p> <p>.8 national legislation for implementing international agreements and conventions</p>		
<p>Maintain safety and security of the ship's crew and passengers and the operational condition of life-saving, fire-fighting and other safety systems</p>	<p>Thorough knowledge of life-saving appliance regulations (International Convention for the Safety of Life at Sea)</p> <p>Organization of fire drills and abandon ship drills</p> <p>Maintenance of operational condition of life-saving, fire-fighting and other safety systems</p> <p>Actions to be taken to protect and safeguard all persons on board in emergencies</p> <p>Actions to limit damage and salve the ship following a fire, explosion, collision or grounding</p>	<p>Examination and assessment of evidence obtained from practical instruction and approved in-service training and experience</p>	<p>Procedures for monitoring fire-detection and safety systems ensure that all alarms are detected promptly and acted upon in accordance with established emergency procedures</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Develop emergency and damage control plans and handle emergency situations	<p>Preparation of contingency plans for response to emergencies</p> <p>Ship construction, including damage control</p> <p>Methods and aids for fire prevention, detection and extinction</p> <p>Functions and use of life-saving appliances</p>	Examination and assessment of evidence obtained from approved in-service training and experience	Emergency procedures are in accordance with the established plans for emergency situations
Use of leadership and managerial skill	<p>Knowledge of shipboard personnel management and training</p> <p>A knowledge of related international maritime conventions and recommendations, and national legislation</p> <p>Ability to apply task and workload management, including:</p> <ul style="list-style-type: none"> .1 planning and co-ordination .2 personnel assignment .3 time and resource constraints .4 prioritization <p>Knowledge and ability to apply effective resource management:</p> <ul style="list-style-type: none"> .1 allocation, assignment, and prioritization of resources .2 effective communication on board and ashore 	<p>Assessment of evidence obtained from one or more of the following:</p> <ul style="list-style-type: none"> .1 approved training .2 approved in-service experience .3 approved simulator training 	<p>The crew are allocated duties and informed of expected standards of work and behaviour in a manner appropriate to the individuals concerned</p> <p>Training objectives and activities are based on assessment of current competence and capabilities and operational requirements</p> <p>Operations are demonstrated to be in accordance with applicable rules</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Use of leadership and managerial skill <i>(continued)</i>	.3 decisions reflect consideration of team experiences .4 assertiveness and leadership, including motivation .5 obtaining and maintaining situation awareness Knowledge and ability to apply decision-making techniques: .1 situation and risk assessment .2 identify and generate options .3 selecting course of action .4 evaluation of outcome effectiveness Development, implementation, and oversight of standard operating procedures		Operations are planned and resources are allocated as needed in correct priority to perform necessary tasks Communication is clearly and unambiguously given and received Effective leadership behaviours are demonstrated Necessary team member(s) share accurate understanding of current and predicted vessel state and operational status and external environment Decisions are most effective for the situation Operations are demonstrated to be effective and in accordance with applicable rules

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Organize and manage the provision of medical care on board	<p>A thorough knowledge* of the use and contents of the following publications:</p> <ul style="list-style-type: none"> .1 International Medical Guide for Ships or equivalent national publications .2 medical section of the International Code of Signals .3 Medical First Aid Guide for Use in Accidents Involving Dangerous Goods 	Examination and assessment of evidence obtained from approved training	Actions taken and procedures followed correctly apply and make full use of advice available

* The relevant IMO Model Course(s) may be of assistance in the preparation of courses.

Chapter VIII
Standards regarding watchkeeping

Section A-VIII/2

Watchkeeping arrangements and principles to be observed

Part 1 – Certification

1 The officer in charge of the navigational or deck watch shall be duly qualified in accordance with the provisions of chapter II or chapter VII appropriate to the duties related to navigational or deck watchkeeping.

2 The officer in charge of the engineering watch shall be duly qualified in accordance with the provisions of chapter III or chapter VII appropriate to the duties related to engineering watchkeeping.

Part 2 – Voyage Planning

General requirements

3 The intended voyage shall be planned in advance, taking into consideration all pertinent information, and any course laid down shall be checked before the voyage commences.

4 The chief engineer officer shall, in consultation with the master, determine in advance the needs of the intended voyage, taking into consideration the requirements for fuel, water, lubricants, chemicals, expendable and other spare parts, tools, supplies and any other requirements.

Planning prior to each voyage

5 Prior to each voyage, the master of every ship shall ensure that the intended route from the port of departure to the first port of call is planned using adequate and appropriate charts and other nautical publications necessary for the intended voyage, containing accurate, complete and up-to-date information regarding those navigational limitations and hazards which are of a permanent or predictable nature and which are relevant to the safe navigation of the ship.

Verification and display of planned route

6 When the route planning is verified, taking into consideration all pertinent information, the planned route shall be clearly displayed on appropriate charts and shall be continuously available to the officer in charge of the watch, who shall verify each course to be followed prior to using it during the voyage.

Deviation from planned route

7 If a decision is made, during a voyage, to change the next port of call of the planned route, or if it is necessary for the ship to deviate substantially from the planned route for other reasons, then an amended route shall be planned prior to deviating substantially from the route originally planned.

Part 3 – Watchkeeping principles in general

8 Watches shall be carried out based on the following bridge and engine-room resource management principles:

- .1** proper arrangements for watchkeeping personnel shall be ensured in accordance with the situations;
- .2** any limitation in qualifications or fitness of individuals shall be taken into account when deploying watchkeeping personnel;
- .3** understanding of watchkeeping personnel regarding their individual roles, responsibility and team roles shall be established;
- .4** the master, chief engineer officer and officer in charge of watch duties shall maintain a proper watch, making the most effective use of the resources available, such as information, installations/equipment and other personnel;
- .5** watchkeeping personnel shall understand functions and operation of installations/equipment, and be familiar with handling them;
- .6** watchkeeping personnel shall understand information and how to respond to information from each station/installation/equipment;
- .7** information from the stations/installations/equipment shall be appropriately shared by all the watchkeeping personnel;
- .8** watchkeeping personnel shall maintain an exchange of appropriate communication in any situation; and
- .9** watchkeeping personnel shall notify the master/chief engineer officer/officer in charge of watch duties without any hesitation when in any doubt as to what action to take in the interest of safety.

Part 4 – Watchkeeping at sea

Principles applying to watchkeeping generally

9 Parties shall direct the attention of companies, masters, chief engineer officers and watchkeeping personnel to the following principles, which shall be observed to ensure that safe watches are maintained at all times.

10 The master of every ship is bound to ensure that watchkeeping arrangements are adequate for maintaining a safe navigational or cargo watch. Under the master's general direction, the officers of the navigational watch are responsible for navigating the ship safely during their periods of duty, when they will be particularly concerned with avoiding collision and stranding.

11 The chief engineer officer of every ship is bound, in consultation with the master, to ensure that watchkeeping arrangements are adequate to maintain a safe engineering watch.

Protection of marine environment

12 The master, officers and ratings shall be aware of the serious effects of operational or accidental pollution of the marine environment and shall take all possible precautions to prevent such pollution, particularly within the framework of relevant international and port regulations.

Part 4-1 – Principles to be observed in keeping a navigational watch

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

Lookout

14 A proper lookout shall be maintained at all times in compliance with rule 5 of the International Regulations for Preventing Collisions at Sea, 1972, as amended and shall serve the purpose of:

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

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

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

- .1** the situation has been carefully assessed and it has been established without doubt that it is safe to do so;
- .2** 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; and
 - the attention necessary when navigating in or near traffic separation schemes; and
- .3** assistance is immediately available to be summoned to the bridge when any change in the situation so requires.

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

- .1** visibility, state of weather and sea;
- .2** traffic density, and other activities occurring in the area in which the vessel is navigating;
- .3** the attention necessary when navigating in or near traffic separation schemes or other routeing measures;
- .4** the additional workload caused by the nature of the ship's functions, immediate operating requirements and anticipated manoeuvres;
- .5** the fitness for duty of any crew members on call who are assigned as members of the watch;
- .6** knowledge of, and confidence in, the professional competence of the ship's officers and crew;
- .7** the experience of each officer of the navigational watch, and the familiarity of that officer with the ship's equipment, procedures, and manoeuvring capability;
- .8** activities taking place on board the ship at any particular time, including radiocommunication activities, and the availability of assistance to be summoned immediately to the bridge when necessary;
- .9** the operational status of bridge instrumentation and controls, including alarm systems;
- .10** rudder and propeller control and ship manoeuvring characteristics;
- .11** the size of the ship and the field of vision available from the conning position;
- .12** the configuration of the bridge, to the extent such configuration might inhibit a member of the watch from detecting by sight or hearing any external development; and

- .13 any other relevant standard, procedure or guidance relating to watchkeeping arrangements and fitness for duty which has been adopted by the Organization.

Watch arrangements

18 When deciding the composition of the watch on the bridge, which may include appropriately qualified ratings, the following factors, *inter alia*, shall be taken into account:

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

Taking over the watch

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

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

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

22 Relieving officers shall personally satisfy themselves regarding the:

- .1 standing orders and other special instructions of the master relating to navigation of the ship;

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

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

Performing the navigational watch

24 The officer in charge of the navigational watch shall:

- .1 keep the watch on the bridge;
- .2 in no circumstances leave the bridge until properly relieved; and
- .3 continue to be responsible for the safe navigation of the ship, despite the presence of the master on the bridge, until informed specifically that the master has assumed that responsibility and this is mutually understood.

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

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

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

28 When using radar, the officer in charge of the navigational watch shall bear in mind the necessity to comply at all times with the provisions on the use of radar contained in the International Regulations for Preventing Collisions at Sea, 1972, as amended in force.

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

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

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

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

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

34 The officer in charge of the navigational watch shall make regular checks to ensure that:

- .1** the person steering the ship or the automatic pilot is steering the correct course;
- .2** the standard compass error is determined at least once a watch and, when possible, after any major alteration of course; the standard and gyro-compasses are frequently compared and repeaters are synchronized with their master compass;
- .3** the automatic pilot is tested manually at least once a watch;
- .4** the navigation and signal lights and other navigational equipment are functioning properly;
- .5** the radio equipment is functioning properly in accordance with paragraph 86 of this section; and
- .6** the UMS controls, alarms and indicators are functioning properly.

35 The officer in charge of the navigational watch shall bear in mind the necessity to comply at all times with the requirements in force of the International Convention for the Safety of Life at Sea (SOLAS), 1974*. The officer of the navigational watch shall take into account:

- .1** the need to station a person to steer the ship and to put the steering into manual control in good time to allow any potentially hazardous situation to be dealt with in a safe manner; and
- .2** that, with a ship under automatic steering, it is highly dangerous to allow a situation to develop to the point where the officer in charge of the navigational watch is without assistance and has to break the continuity of the lookout in order to take emergency action.

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

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

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

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

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

- .1** if restricted visibility is encountered or expected;
- .2** if the traffic conditions or the movements of other ships are causing concern;
- .3** if difficulty is experienced in maintaining course;
- .4** on failure to sight land, or a navigation mark or to obtain soundings by the expected time;
- .5** if, unexpectedly, land or a navigation mark is sighted or a change in soundings occurs;
- .6** on breakdown of the engines, propulsion machinery remote control, steering gear or any essential navigational equipment, alarm or indicator;

* See SOLAS regulations V/24, V/25 and V/26.

- .7 if the radio equipment malfunctions;
- .8 in heavy weather, if in any doubt about the possibility of weather damage;
- .9 if the ship meets any hazard to navigation, such as ice or a derelict; and
- .10 in any other emergency or if in any doubt.

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

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

Watchkeeping under different conditions and in different areas

Clear weather

43 The officer in charge of the navigational watch shall take frequent and accurate compass bearings of approaching ships as a means of early detection of risk of collision and shall bear in mind that such risk may sometimes exist even when an appreciable bearing change is evident, particularly when approaching a very large ship or a tow or when approaching a ship at close range. The officer in charge of the navigational watch shall also take early and positive action in compliance with the applicable International Regulations for Preventing Collisions at Sea, 1972, as amended and subsequently check that such action is having the desired effect.

44 In clear weather, whenever possible, the officer in charge of the navigational watch shall carry out radar practice.

Restricted visibility

45 When restricted visibility is encountered or expected, the first responsibility of the officer in charge of the navigational watch is to comply with the relevant rules of the International Regulations for Preventing Collisions at Sea, 1972, as amended with particular regard to the sounding of fog signals, proceeding at a safe speed and having the engines ready for immediate manoeuvre. In addition, the officer in charge of the navigational watch shall:

- .1 inform the master;
- .2 post a proper lookout;
- .3 exhibit navigation lights; and
- .4 operate and use the radar.

In hours of darkness

46 The master and the officer in charge of the navigational watch, when arranging lookout duty, shall have due regard to the bridge equipment and navigational aids available for use, their limitations, procedures and safeguards implemented.

Coastal and congested waters

47 The largest scale chart on board, suitable for the area and corrected with the latest available information, shall be used. Fixes shall be taken at frequent intervals, and shall be carried out by more than one method whenever circumstances allow. When using ECDIS, appropriate usage code (scale) electronic navigational charts shall be used and the ship's position shall be checked by an independent means of position fixing at appropriate intervals.

48 The officer in charge of the navigational watch shall positively identify all relevant navigation marks.

Navigation with pilot on board

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

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

Ship at anchor

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

- .1** determine and plot the ship's position on the appropriate chart as soon as practicable;
- .2** 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;
- .3** ensure that proper lookout is maintained;
- .4** ensure that inspection rounds of the ship are made periodically;

- .5 observe meteorological and tidal conditions and the state of the sea;
- .6 notify the master and undertake all necessary measures if the ship drags anchor;
- .7 ensure that the state of readiness of the main engines and other machinery is in accordance with the master's instructions;
- .8 if visibility deteriorates, notify the master;
- .9 ensure that the ship exhibits the appropriate lights and shapes and that appropriate sound signals are made in accordance with all applicable regulations; and
- .10 take measures to protect the environment from pollution by the ship and comply with applicable pollution regulations.

* * * * *

Part 5 – Watchkeeping in port

Principles applying to all watchkeeping

General

90 On any ship safely moored or safely at anchor under normal circumstances in port, the master shall arrange for an appropriate and effective watch to be maintained for the purpose of safety. Special requirements may be necessary for special types of ships' propulsion systems or ancillary equipment and for ships carrying hazardous, dangerous, toxic or highly flammable materials or other special types of cargo.

Watch arrangements

91 Arrangements for keeping a deck watch when the ship is in port shall at all times be adequate to:

- .1 ensure the safety of life, of the ship, the port and the environment, and the safe operation of all machinery related to cargo operation;
- .2 observe international, national and local rules; and
- .3 maintain order and the normal routine of the ship.

92 The master shall decide the composition and duration of the deck watch depending on the conditions of mooring, type of the ship and character of duties.

93 If the master considers it necessary, a qualified officer shall be in charge of the deck watch.

94 The necessary equipment shall be so arranged as to provide for efficient watchkeeping.

95 The chief engineer officer, in consultation with the master, shall ensure that engineering watchkeeping arrangements are adequate to maintain a safe engineering watch while in port. When deciding the composition of the engineering watch, which may include appropriate engine-room ratings, the following points are among those to be taken into account:

- .1** on all ships of 3,000 kW propulsion power and over there shall always be an officer in charge of the engineering watch;
- .2** on ships of less than 3,000 kW propulsion power there may be, at the master's discretion and in consultation with the chief engineer officer, no officer in charge of the engineering watch; and
- .3** officers, while in charge of an engineering watch, shall not be assigned or undertake any task or duty which would interfere with their supervisory duty in respect of the ship's machinery system.

Taking over the watch

96 Officers in charge of the deck or engineering watch shall not hand over the watch to their relieving officer if they have any reason to believe that the latter is obviously not capable of carrying out watchkeeping duties effectively, in which case the master or chief engineer shall be notified accordingly. Relieving officers of the deck or engineering watch shall ensure that all members of their watch are apparently fully capable of performing their duties effectively.

97 If, at the moment of handing over the deck or engineering watch, an important operation is being performed, it shall be concluded by the officer being relieved, except when ordered otherwise by the master or chief engineer officer.

Part 5-1 – Taking over the deck watch

98 Prior to taking over the deck watch, the relieving officer shall be informed by the officer in charge of the deck watch as to the following:

- .1** the depth of the water at the berth, the ship's draught, the level and time of high and low waters; the securing of the moorings, the arrangement of anchors and the scope of the anchor chain, and other mooring features important to the safety of the ship; the state of main engines and their availability for emergency use;
- .2** all work to be performed on board the ship; the nature, amount and disposition of cargo loaded or remaining, and any residue on board after unloading the ship;
- .3** the level of water in bilges and ballast tanks;
- .4** the signals or lights being exhibited or sounded;
- .5** the number of crew members required to be on board and the presence of any other persons on board;

- .6 the state of fire-fighting appliances;
 - .7 any special port regulations;
 - .8 the master's standing and special orders;
 - .9 the lines of communication available between the ship and shore personnel, including port authorities, in the event of an emergency arising or assistance being required;
 - .10 any other circumstances of importance to the safety of the ship, its crew, cargo or protection of the environment from pollution; and
 - .11 the procedures for notifying the appropriate authority of any environmental pollution resulting from ship activities.
- 99 Relieving officers, before assuming charge of the deck watch, shall verify that:
- .1 the securing of moorings and anchor chain is adequate;
 - .2 the appropriate signals or lights are properly exhibited or sounded;
 - .3 safety measures and fire-protection regulations are being maintained;
 - .4 they are aware of the nature of any hazardous or dangerous cargo being loaded or discharged and the appropriate action to be taken in the event of any spillage or fire; and
 - .5 no external conditions or circumstances imperil the ship and that it does not imperil others.

* * * * *

Part 5-3 – Performing the deck watch

- 102 The officer in charge of the deck watch shall:
- .1 make rounds to inspect the ship at appropriate intervals;
 - .2 pay particular attention to:
 - .2.1 the condition and securing of the gangway, anchor chain and moorings, especially at the turn of the tide and in berths with a large rise and fall, if necessary, taking measures to ensure that they are in normal working condition;
 - .2.2 the draught, under-keel clearance and the general state of the ship, to avoid dangerous listing or trim during cargo handling or ballasting;
 - .2.3 the weather and sea state;
 - .2.4 the observance of all regulations concerning safety and fire protection;
 - .2.5 the water level in bilges and tanks;

- .2.6 all persons on board and their location, especially those in remote or enclosed spaces; and
- .2.7 the exhibition and sounding, where appropriate, of lights and signals;
- .3 in bad weather, or on receiving a storm warning, take the necessary measures to protect the ship, persons on board and cargo;
- .4 take every precaution to prevent pollution of the environment by the ship;
- .5 in an emergency threatening the safety of the ship, raise the alarm, inform the master, take all possible measures to prevent any damage to the ship, its cargo and persons on board, and, if necessary, request assistance from the shore authorities or neighbouring ships;
- .6 be aware of the ship's stability condition so that, in the event of fire, the shore fire-fighting authority may be advised of the approximate quantity of water that can be pumped on board without endangering the ship;
- .7 offer assistance to ships or persons in distress;
- .8 take necessary precautions to prevent accidents or damage when propellers are to be turned; and
- .9 enter, in the appropriate log-book, all important events affecting the ship.

* * * * *

Part 5-5 – Watch in port on ships carrying hazardous cargo

General

105 The master of every ship carrying cargo that is hazardous, whether explosive, flammable, toxic, health-threatening or environment-polluting, shall ensure that safe watchkeeping arrangements are maintained. On ships carrying hazardous cargo in bulk, this will be achieved by the ready availability on board of a duly qualified officer or officers, and ratings where appropriate, even when the ship is safely moored or safely at anchor in port.

106 On ships carrying hazardous cargo other than in bulk, the master shall take full account of the nature, quantity, packing and stowage of the hazardous cargo and of any special conditions on board, afloat and ashore.

Part 5-6 – Cargo watch

107 Officers with responsibility for the planning and conduct of cargo operations shall ensure that such operations are conducted safely through the control of the specific risks, including when non-ship's personnel are involved."

**GUIDANCE REGARDING PROVISIONS OF THE ANNEX TO
THE STCW CONVENTION
PART B**

Chapter I

Guidance regarding general provisions

Section B-I/6

Guidance regarding training and assessment

Qualifications of instructors and assessors

1 Each Party should ensure that instructors and assessors are appropriately qualified and experienced for the particular types and levels of training or assessment of competence of seafarers, as required under the Convention, in accordance with the guidelines in this section.

In-service training and assessment

2 Any person, on board or ashore, conducting in-service training of a seafarer intended to be used in qualifying for certification under the Convention should have received appropriate guidance in instructional techniques*.

3 Any person responsible for the supervision of in-service training of a seafarer intended to be used in qualifying for certification under the Convention should have appropriate knowledge of instructional techniques and of training methods and practice.

4 Any person, on board or ashore, conducting an in-service assessment of the competence of a seafarer intended to be used in qualifying for certification under the Convention should have:

- .1** received appropriate guidance in assessment methods and practice*; and
- .2** gained practical assessment experience under the supervision and to the satisfaction of an experienced assessor.

5 Any person responsible for the supervision of the in-service assessment of competence of a seafarer intended to be used in qualifying for certification under the Convention should have a full understanding of the assessment system, assessment methods and practice*.

* * * * *

Section B-I/12

Guidance regarding the use of simulators

1 When simulators are being used for training or assessment of competency, the following guidelines should be taken into consideration in conducting any such training or assessment.

* The relevant IMO Model Course(s) may be of assistance in the preparation of courses.

Training and assessment in radar observation and plotting*

2 Training and assessment in radar observation and plotting should:

- .1** incorporate the use of radar simulation equipment; and
- .2** conform to standards not inferior to those given in paragraphs 3 to 17 below.

3 Demonstrations of and practice in radar observation should be undertaken, where appropriate, on live marine radar equipment, including the use of simulators. Plotting exercises should preferably be undertaken in real time, in order to increase trainees' awareness of the hazards of the improper use of radar data and improve their plotting techniques to a standard of radar plotting commensurate with that necessary for the safe execution of collision-avoidance manoeuvring under actual seagoing conditions.

General

Factors affecting performance and accuracy

4 An elementary understanding should be attained of the principles of radar, together with a full practical knowledge of:

- .1** range and bearing measurement, characteristics of the radar set which determine the quality of the radar display, radar antennae, polar diagrams, the effects of power radiated in directions outside the main beam, a non-technical description of the radar system, including variations in the features encountered in different types of radar set, performance monitors and equipment factors which affect maximum and minimum detection ranges and accuracy of information;
- .2** the current marine radar performance specification adopted by the Organization**;
- .3** the effects of the siting of the radar antenna, shadow sectors and arcs of reduced sensitivity, false echoes, effects of antenna height on detection ranges and of siting radar units and storing spares near magnetic compasses, including magnetic safe distances; and
- .4** radiation hazards and safety precautions to be taken in the vicinity of antennae and open waveguides.

Detection of misrepresentation of information, including false echoes and sea returns

5 A knowledge of the limitations to target detection is essential, to enable the observer to estimate the dangers of failure to detect targets. The following factors should be emphasized:

- .1** performance standard of the equipment;
- .2** brilliance, gain and video processor control settings;

** See relevant/appropriate performance standards adopted by the Organization.

- .3 radar horizon;
- .4 size, shape, aspect and composition of targets;
- .5 effects of the motion of the ship in a seaway;
- .6 propagation conditions;
- .7 meteorological conditions; sea clutter and rain clutter;
- .8 anti-clutter control settings;
- .9 shadow sectors; and
- .10 radar-to-radar interference.

6 A knowledge should be attained of factors which might lead to faulty interpretation, including false echoes, effects of nearby pylons and large structures, effects of power lines crossing rivers and estuaries, echoes from distant targets occurring on second or later traces.

7 A knowledge should be attained of aids to interpretation, including corner reflectors and radar beacons; detection and recognition of land targets; the effects of topographical features; effects of pulse length and beam width; radar-conspicuous and -inconspicuous targets; factors which affect the echo strength from targets.

Practice

Setting up and maintaining displays

- 8 A knowledge should be attained of:
- .1 the various types of radar display mode; unstabilized ship's-head-up relative motion; ship's-head-up, course-up and north-up stabilized relative motion and true motion;
 - .2 the effects of errors on the accuracy of information displayed; effects of transmitting compass errors on stabilized and true-motion displays; effects of transmitting log errors on a true-motion display; and the effects of inaccurate manual speed settings on a true-motion display;
 - .3 methods of detecting inaccurate speed settings on true-motion controls; the effects of receiver noise limiting the ability to display weak echo returns, and the effects of saturation by receiver noise, etc.; the adjustment of operational controls; criteria which indicate optimum points of adjustment; the importance of proper adjustment sequence, and the effects of maladjusted controls; the detection of maladjustments and corrections of:
 - .3.1 controls affecting detection ranges; and
 - .3.2 controls affecting accuracy;
 - .4 the dangers of using radar equipment with maladjusted controls; and
 - .5 the need for frequent regular checking of performance, and the relationship of the performance indicator to the range performance of the radar set.

Range and bearing

- 9** A knowledge should be attained of:
- .1** the methods of measuring ranges; fixed range markers and variable range markers;
 - .2** the accuracy of each method and the relative accuracy of the different methods;
 - .3** how range data are displayed; ranges at stated intervals, digital counter and graduated scale;
 - .4** the methods of measuring bearings; rotatable cursor on transparent disc covering the display, electronic bearing cursor and other methods;
 - .5** bearing accuracy and inaccuracies caused by parallax, heading marker displacement, centre maladjustment;
 - .6** how bearing data are displayed; graduated scale and digital counter; and
 - .7** the need for regular checking of the accuracy of ranges and bearings, methods of checking for inaccuracies and correcting or allowing for inaccuracies.

Plotting techniques and relative-motion concepts

10 Practice should be provided in manual plotting techniques, including the use of reflection plotters, with the objective of establishing a thorough understanding of the interrelated motion between own ship and other ships, including the effects of manoeuvring to avoid collision. At the preliminary stages of this training, simple plotting exercises should be designed to establish a sound appreciation of plotting geometry and relative-motion concepts. The degree of complexity of exercises should increase throughout the training course until the trainee has mastered all aspects of the subject. Competence can best be enhanced by exposing the trainee to real-time exercises performed on a simulator or using other effective means.

Identification of critical echoes

- 11** A thorough understanding should be attained of:
- .1** position fixing by radar from land targets and sea marks;
 - .2** the accuracy of position fixing by ranges and by bearings;
 - .3** the importance of cross-checking the accuracy of radar against other navigational aids; and
 - .4** the value of recording ranges and bearings at frequent, regular intervals when using radar as an aid to collision avoidance.

Course and speed of other ships

- 12** A thorough understanding should be attained of:
- .1** the different methods by which course and speed of other ships can be obtained from recorded ranges and bearings, including:
 - .1.1** the unstabilized relative plot;
 - .1.2** the stabilized relative plot; and
 - .1.3** the true plot; and

- .2 the relationship between visual and radar observations, including detail and the accuracy of estimates of course and speed of other ships, and the detection of changes in movements of other ships.

Time and distance of closest approach of crossing, meeting or overtaking ships

13 A thorough understanding should be attained of:

- .1 the use of recorded data to obtain:
 - .1.1 measurement of closest approach distance and bearing;
 - .1.2 time to closest approach; and
- .2 the importance of frequent, regular observations.

Detecting course and speed changes of other ships

14 A thorough understanding should be attained of:

- .1 the effects of changes of course and/or speed by other ships on their tracks across the display;
- .2 the delay between change of course or speed and detection of that change; and
- .3 the hazards of small changes as compared with substantial changes of course or speed in relation to rate and accuracy of detection.

Effects of changes in own ship's course or speed or both

15 A thorough understanding of the effects on a relative-motion display of own ship's movements, and the effects of other ships' movements and the advantages of compass stabilization of a relative display.

16 In respect of true-motion displays, a thorough understanding should be attained of:

- .1 the effects of inaccuracies of:
 - .1.1 speed and course settings; and
 - .1.2 compass stabilization data driving a stabilized relative-motion display;
- .2 the effects of changes in course or speed or both by own ship on tracks of other ships on the display; and
- .3 the relationship of speed to frequency of observations.

Application of the International Regulations for Preventing Collisions at Sea, 1972, as amended

17 A thorough understanding should be attained of the relationship of the International Regulations for Preventing Collisions at Sea, 1972, as amended to the use of radar, including:

- .1 action to avoid collision, dangers of assumptions made on inadequate information and the hazards of small alterations of course or speed;
- .2 the advantages of safe speed when using radar to avoid collision;
- .3 the relationship of speed to closest approach distance and time and to the manoeuvring characteristics of various types of ships;
- .4 the importance of radar observation reports and radar reporting procedures being well defined;
- .5 the use of radar in clear weather, to obtain an appreciation of its capabilities and limitations, compare radar and visual observations and obtain an assessment of the relative accuracy of information;
- .6 the need for early use of radar in clear weather at night and when there are indications that visibility may deteriorate;
- .7 comparison of features displayed by radar with charted features; and
- .8 comparison of the effects of differences between range scales.

Training and assessment in the operational use of

Automatic Radar Plotting Aids (ARPA)

18 Training and assessment in the operational use of automatic radar plotting aids (ARPA) should:

- .1 require prior completion of the training in radar observation and plotting or combine that training with the training given in paragraphs 19 to 35 below;*
- .2 incorporate the use of ARPA simulation equipment; and
- .3 conform to standards not inferior to those given in paragraphs 19 to 35 below.

19 Where ARPA training is provided as part of the general training under the 1978 STCW Convention, masters, chief mates and officers in charge of a navigational watch should understand the factors involved in decision-making based on the information supplied by ARPA

* The relevant IMO Model Course(s) and resolution MSC.64(67), as amended, may be of assistance in the preparation of courses.

in association with other navigational data inputs, having a similar appreciation of the operational aspects and of system errors of modern electronic navigational systems, including ECDIS. This training should be progressive in nature, commensurate with the responsibilities of the individual and the certificates issued by Parties under the 1978 STCW Convention.

Theory and demonstration

Possible risks of over-reliance on ARPA

- 20** Appreciation that ARPA is only a navigational aid and:
- .1** that its limitations, including those of its sensors, make over-reliance on ARPA dangerous, in particular for keeping a look-out; and
 - .2** the need to observe at all times the Principles to be observed in keeping a navigational watch and the Guidance on keeping a navigational watch.

Principal types of ARPA systems and their display characteristics

21 Knowledge of the principal types of ARPA systems in use; their various display characteristics and an understanding of when to use ground- or sea-stabilized modes and north-up, course-up or head-up presentations.

IMO performance standards for ARPA

22 An appreciation of the IMO performance standards for ARPA, in particular the standards relating to accuracy.*

Factors affecting system performance and accuracy

23 Knowledge of ARPA sensor input performance parameters – radar, compass and speed inputs and the effects of sensor malfunction on the accuracy of ARPA data.

- 24** Knowledge of:
- .1** the effects of the limitations of radar range and bearing discrimination and accuracy and the limitations of compass and speed input accuracies on the accuracy of ARPA data; and
 - .2** factors which influence vector accuracy.

Tracking capabilities and limitations

- 25** Knowledge of:
- .1** the criteria for the selection of targets by automatic acquisition;

* See relevant/appropriate performance standards adopted by the Organization.

- .2 the factors leading to the correct choice of targets for manual acquisition;
- .3 the effects on tracking of “lost” targets and target fading; and
- .4 the circumstances causing “target swap” and its effects on displayed data.

Processing delays

26 Knowledge of the delays inherent in the display of processed ARPA information, particularly on acquisition and re-acquisition or when a tracked target manoeuvres.

Operational warnings, their benefits and limitations

27 Appreciation of the uses, benefits and limitations of ARPA operational warnings and their correct setting, where applicable, to avoid spurious interference.

System operational tests

28 Knowledge of:

- .1 methods of testing for malfunctions of ARPA systems, including functional self-testing; and
- .2 precautions to be taken after a malfunction occurs.

Manual and automatic acquisition of targets and their respective limitations

29 Knowledge of the limits imposed on both types of acquisition in multi-target scenarios, and the effects on acquisition of target fading and target swap.

True and relative vectors and typical graphic representation of target information and danger areas

30 Thorough knowledge of true and relative vectors; derivation of targets’ true courses and speeds, including:

- .1 threat assessment, derivation of predicted closest point of approach and predicted time to closest point of approach from forward extrapolation of vectors, the use of graphic representation of danger areas;
- .2 the effects of alterations of course and/or speed of own ship and/or targets on predicted closest point of approach and predicted time to closest point of approach and danger areas;
- .3 the effects of incorrect vectors and danger areas; and
- .4 the benefit of switching between true and relative vectors.

Information on past positions of targets being tracked

31 Knowledge of the derivation of past positions of targets being tracked, recognition of historic data as a means of indicating recent manoeuvring of targets and as a method of checking the validity of the ARPA's tracking.

Practice

Setting up and maintaining displays

32 Ability to demonstrate:

- .1 the correct starting procedure to obtain the optimum display of ARPA information;
- .2 the selection of display presentation; stabilized relative-motion displays and true-motion displays;
- .3 the correct adjustment of all variable radar display controls for optimum display of data;
- .4 the selection, as appropriate, of required speed input to ARPA;
- .5 the selection of ARPA plotting controls, manual/automatic acquisition, vector/graphic display of data;
- .6 the selection of the timescale of vectors/graphics;
- .7 the use of exclusion areas when automatic acquisition is employed by ARPA; and
- .8 performance checks of radar, compass, speed input sensors and ARPA.

System operational tests

33 Ability to perform system checks and determine data accuracy of ARPA, including the trial manoeuvre facility, by checking against basic radar plot.

Obtaining information from the ARPA display

34 Demonstrate the ability to obtain information in both relative- and true-motion modes of display, including:

- .1 the identification of critical echoes;
- .2 the speed and direction of target's relative movement;
- .3 the time to, and predicted range at, target's closest point of approach;
- .4 the courses and speeds of targets;

- .5 detecting course and speed changes of targets and the limitations of such information;
- .6 the effect of changes in own ship's course or speed or both; and
- .7 the operation of the trial manoeuvre facility.

Application of the International Regulations for Preventing Collisions at Sea, 1972, as amended

35 Analysis of potential collision situations from displayed information, determination and execution of action to avoid close-quarters situations in accordance with the International Regulations for Preventing Collisions at Sea, 1972, as amended, in force.

Training and assessment in the operational use of Electronic Chart Display and Information Systems (ECDIS)

Introduction

36 When simulators are being used for training or assessment in the operational use of Electronic Chart Display and Information Systems (ECDIS), the following interim guidance should be taken into consideration in any such training or assessment.

37 Training and assessment in the operational use of the ECDIS should:

- .1 incorporate the use of ECDIS simulation equipment; and
- .2 conform to standards not inferior to those given in paragraphs 38 to 65 below.

38 ECDIS simulation equipment should, in addition to meeting all applicable performance standards set out in section A-I/12 of the STCW Code, as amended, be capable of simulating navigational equipment and bridge operational controls which meet all applicable performance standards adopted by the Organization, incorporate facilities to generate soundings and:

- .1 create a real-time operating environment, including navigation control and communications instruments and equipment appropriate to the navigation and watchkeeping tasks to be carried out and the manoeuvring skills to be assessed; and
- .2 realistically simulate "own ship" characteristics in open-water conditions, as well as the effects of weather, tidal stream and currents.

39 Demonstrations of, and practice in, ECDIS use should be undertaken, where appropriate, through the use of simulators. Training exercises should preferably be undertaken in real time, in order to increase trainees' awareness of the hazards of the improper use of ECDIS. Accelerated timescale may be used only for demonstrations.

General

Goals of an ECDIS training programme

40 The ECDIS trainee should be able to:

- .1** operate the ECDIS equipment, use the navigational functions of ECDIS, select and assess all relevant information and take proper action in the case of a malfunction;
- .2** state the potential errors of displayed data and the usual errors of interpretation; and
- .3** explain why ECDIS should not be relied upon as the sole reliable aid to navigation.

Theory and demonstration

41 As the safe use of ECDIS requires knowledge and understanding of the basic principles governing ECDIS data and their presentation rules as well as potential errors in displayed data and ECDIS-related limitations and potential dangers, a number of lectures covering the theoretical explanation should be provided. As far as possible, such lessons should be presented within a familiar context and make use of practical examples. They should be reinforced during simulator exercises.

42 For safe operation of ECDIS equipment and ECDIS-related information (use of the navigational functions of ECDIS, selection and assessment of all relevant information, becoming familiar with ECDIS man-machine interfacing), practical exercises and training on the ECDIS simulators should constitute the main content of the course.

43 For the definition of training objectives, a structure of activities should be defined. A detailed specification of learning objectives should be developed for each topic of this structure.

Simulator exercises

44 Exercises should be carried out on individual ECDIS simulators, or full-mission navigation simulators including ECDIS, to enable trainees to acquire the necessary practical skills. For real-time navigation exercises, navigation simulators are recommended to cover the complex navigation situation. The exercises should provide training in the use of the various scales, navigational modes, and display modes which are available, so that the trainees will be able to adapt the use of the equipment to the particular situation concerned.

45 The choice of exercises and scenarios is governed by the simulator facilities available. If one or more ECDIS workstations and a full-mission simulator are available, the workstations may primarily be used for basic exercises in the use of ECDIS facilities and for passage-planning exercises, whereas full-mission simulators may primarily be used for exercises related to passage-monitoring functions in real time, as realistic as possible in connection with the total workload of a navigational watch. The degree of complexity of exercises should increase throughout the training programme until the trainee has mastered all aspects of the learning subject.

46 Exercises should produce the greatest impression of realism. To achieve this, the scenarios should be located in a fictitious sea area. Situations, functions and actions for different learning objectives which occur in different sea areas can be integrated into one exercise and experienced in real time.

47 The main objective of simulator exercises is to ensure that trainees understand their responsibilities in the operational use of ECDIS in all safety-relevant aspects and are thoroughly familiar with the system and equipment used.

Principal types of ECDIS systems and their display characteristics

48 The trainee should gain knowledge of the principal types of ECDIS in use; their various display characteristics, data structure and an understanding of:

- .1 differences between vector and raster charts;
- .2 differences between ECDIS and ECS;
- .3 differences between ECDIS and RCDS* ;
- .4 characteristics of ECDIS and their different solutions; and
- .5 characteristics of systems for special purposes (unusual situations/emergencies).

Risks of over-reliance on ECDIS

49 The training in ECDIS operational use should address:

- .1 the limitations of ECDIS as a navigational tool;
- .2 potential risk of improper functioning of the system;
- .3 system limitations, including those of its sensors;
- .4 hydrographic data inaccuracy; limitations of vector and raster electronic charts (ECDIS *vs* RCDS and ENC *vs* RNC); and
- .5 potential risk of human errors.

Emphasis should be placed on the need to keep a proper look-out and to perform periodical checking, especially of the ship's position, by ECDIS-independent methods.

Detection of misrepresentation of information

50 Knowledge of the limitations of the equipment and detection of misrepresentation of information is essential for the safe use of ECDIS. The following factors should be emphasized during training:

- .1 performance standards of the equipment;
- .2 radar data representation on an electronic chart, elimination of discrepancy between the radar image and the electronic chart;
- .3 possible projection discrepancies between an electronic and paper charts;
- .4 possible scale discrepancies (overscaling and underscaling) in displaying an electronic chart and its original scale;

* SN/Circ.207/Rev.1 – Differences between RCDS and ECDIS.

- .5 effects of using different reference systems for positioning;
- .6 effects of using different horizontal and vertical datums;
- .7 effects of the motion of the ship in a seaway;
- .8 ECDIS limitations in raster chart display mode;
- .9 potential errors in the display of:
 - .9.1 the own ship's position;
 - .9.2 radar data and ARPA and AIS information;
 - .9.3 different geodetic coordinate systems; and
- .10 verification of the results of manual or automatic data correction:
 - .10.1 comparison of chart data and radar picture; and
 - .10.2 checking the own ship's position by using the other independent position-fixing systems.

51 False interpretation of the data and proper action taken to avoid errors of interpretation should be explained. The implications of the following should be emphasized:

- .1 ignoring overscaling of the display;
- .2 uncritical acceptance of the own ship's position;
- .3 confusion of display mode;
- .4 confusion of chart scale;
- .5 confusion of reference systems;
- .6 different modes of presentation;
- .7 different modes of vector stabilization;
- .8 differences between true north and gyro north (radar);
- .9 using the same data reference system;
- .10 using the appropriate chart scale;
- .11 using the best-suited sensor to the given situation and circumstances;
- .12 entering the correct values of safety data:
 - .12.1 the own ship's safety contour,
 - .12.2 safety depth (safe water), and
 - .12.3 events; and
- .13 proper use of all available data.

52 Appreciation that RCDS is only a navigational aid and that, when operating in the RCDS mode, the ECDIS equipment should be used together with an appropriate portfolio of up-to-date paper charts:

- .1 appreciation of the differences in operation of RCDS mode as described in SN.1/Circ.207/Rev.1 “Differences between RCDS and ECDIS”; and
- .2 ECDIS, in any mode, should be used in training with an appropriate portfolio of up-to-date charts.

Factors affecting system performance and accuracy

53 An elementary understanding should be attained of the principles of ECDIS, together with a full practical knowledge of:

- .1 starting and setting up ECDIS; connecting data sensors: satellite and radio navigation system receivers, radar, gyro-compass, log, echo-sounder; accuracy and limitations of these sensors, including effects of measurement errors and ship’s position accuracy, manoeuvring on the accuracy of course indicator’s performance, compass error on the accuracy of course indication, shallow water on the accuracy of log performance, log correction on the accuracy of speed calculation, disturbance (sea state) on the accuracy of an echo-sounder performance; and
- .2 the current performance standards for electronic chart display and information systems adopted by the Organization*.

Practice

Setting up and maintaining display

54 Knowledge and skills should be attained in:

- .1 the correct starting procedure to obtain the optimum display of ECDIS information;
- .2 the selection of display presentation (standard display, display base, all other information displayed individually on demand);
- .3 the correct adjustment of all variable radar/ARPA display controls for optimum display of data;
- .4 the selection of convenient configuration;
- .5 the selection, as appropriate, of required speed input to ECDIS;
- .6 the selection of the timescale of vectors; and
- .7 performance checks of position, radar/ARPA, compass, speed input sensors and ECDIS.

* See relevant/appropriate performance standards adopted by the Organization.

Operational use of electronic charts

55 Knowledge and skills should be attained in:

- .1** the main characteristics of the display of ECDIS data and selecting proper information for navigational tasks;
- .2** the automatic functions required for monitoring ship's safety, such as display of position, heading/gyro course, speed, safety values and time;
- .3** the manual functions (by the cursor, electronic bearing line, range rings);
- .4** selecting and modification of electronic chart content;
- .5** scaling (including underscaling and overscaling);
- .6** zooming;
- .7** setting of the own ship's safety data;
- .8** using a daytime or night-time display mode;
- .9** reading all chart symbols and abbreviations;
- .10** using different kinds of cursors and electronic bars for obtaining navigational data;
- .11** viewing an area in different directions and returning to the ship's position;
- .12** finding the necessary area, using geographical coordinates;
- .13** displaying indispensable data layers appropriate to a navigational situation;
- .14** selecting appropriate and unambiguous data (position, course, speed, etc.);
- .15** entering the mariner's notes;
- .16** using north-up orientation presentation and other kinds of orientation; and
- .17** using true- and relative-motion modes.

Route planning

56 Knowledge and skills should be attained in:

- .1** loading the ship's characteristics into ECDIS;
- .2** selection of a sea area for route planning:
 - .2.1** reviewing required waters for the sea passage, and

- .5.12 connecting several routes.

Route monitoring

57 Knowledge and skills should be attained in:

- .1 using independent data to control ship's position or using alternative systems within ECDIS;
- .2 using the look-ahead function:
 - .2.1 changing charts and their scales;
 - .2.2 reviewing navigational charts;
 - .2.3 vector time selecting;
 - .2.4 predicting the ship's position for some time interval;
 - .2.5 changing the pre-planned route (route modification);
 - .2.6 entering independent data for the calculation of wind drift and current allowance;
 - .2.7 reacting properly to the alarm;
 - .2.8 entering corrections for discrepancies of the geodetic datum;
 - .2.9 displaying time markers on a ship's route;
 - .2.10 entering ship's position manually; and
 - .2.11 measuring coordinates, course, bearings and distances on a chart.

Alarm handling

58 Knowledge and ability to interpret and react properly to all kinds of systems, such as navigational sensors, indicators, data and charts alarms and indicator warnings, including, switching the sound and visual alarm signalling system, should be attained in case of:

- .1 absence of the next chart in the ECDIS database;
- .2 crossing a safety contour;
- .3 exceeding cross-track limits;
- .4 deviation from planned route;
- .5 approaching a waypoint;

- .6 approaching a critical point;
- .7 discrepancy between calculated and actual time of arrival to a waypoint;
- .8 information on under-scaling or over-scaling;
- .9 approaching an isolated navigational danger or danger area;
- .10 crossing a specified area;
- .11 selecting a different geodetic datum;
- .12 approaching other ships;
- .13 watch termination;
- .14 switching timer;
- .15 system test failure;
- .16 malfunctioning of the positioning system used in ECDIS;
- .17 failure of dead-reckoning; and
- .18 inability to fix vessel's position using the navigational system.

Manual correction of a ship's position and motion parameters

- 59** Knowledge and skills should be attained in manually correcting:
- .1 the ship's position in dead-reckoning mode, when the satellite and radio navigation system receiver is switched off;
 - .2 the ship's position, when automatically obtained coordinates are inaccurate; and
 - .3 course and speed values.

Records in the ship's log

- 60** Knowledge and skills should be attained in:
- .1 automatic voyage recording;
 - .2 reconstruction of past track, taking into account:
 - .2.1 recording media;
 - .2.2 recording intervals;
 - .2.3 verification of database in use;

- .3 viewing records in the electronic ship's log;
- .4 instant recording in the electronic ship's log;
- .5 changing ship's time;
- .6 entering the additional data;
- .7 printing the content of the electronic ship's log;
- .8 setting up the automatic record time intervals;
- .9 composition of voyage data and reporting; and
- .10 interface with a voyage data recorder (VDR).

Chart updating

61 Knowledge and skills should be attained in:

- .1 performing manual updating of electronic charts. Special attention should be paid to reference-ellipsoid conformity and to conformity of the measurement units used on a chart and in the correction text;
- .2 performing semi-automatic updating of electronic charts, using the data obtained on electronic media in the electronic chart format; and
- .3 performing automatic updating of electronic charts, using update files obtained via electronic data communication lines.

In the scenarios where non-updated data are employed to create a critical situation, trainees should be required to perform *ad hoc* updating of the chart.

Operational use of ECDIS where radar/ARPA is connected

62 Knowledge and skills should be attained in:

- .1 connecting ARPA to ECDIS;
- .2 indicating target's speed vectors;
- .3 indicating target's tracks;
- .4 archiving target's tracks;
- .5 viewing the table of the targets;
- .6 checking alignment of radar overlay with charted geographic features;

- .7 simulating one or more manoeuvres;
- .8 corrections to own ship's position, using a reference point captured by ARPA; and
- .9 corrections using the ARPA's cursor and electronic bar.

See also section B-I/12, Guidance regarding the use of simulators (pertaining to radar and ARPA), especially paragraphs 17 to 19 and 36 to 38.

Operational use of ECDIS where AIS is connected

63 Knowledge and skills should be attained in:

- .1 interface with AIS;
- .2 interpretation of AIS data;
- .3 indicating target's speed vectors;
- .4 indicating target's tracks; and
- .5 archiving target's tracks.

Operational warnings, their benefits and limitations

64 Trainees should gain an appreciation of the uses, benefits and limitations of ECDIS operational warnings and their correct setting, where applicable, to avoid spurious interference.

System operational tests

65 Knowledge and skills should be attained in:

- .1 methods of testing for malfunctions of ECDIS, including functional self-testing;
- .2 precautions to be taken after a malfunction occurs; and
- .3 adequate back-up arrangements (take over and navigate using the back-up system).

Debriefing exercise

66 The instructor should analyze the results of all exercises completed by all trainees and print them out. The time spent on the debriefing should occupy between 10% and 15% of the total time used for simulator exercises.

Recommended performance standards for non-mandatory types of simulation

67 Performance standards for non-mandatory simulation equipment used for training and/or assessment of competence or demonstration of skills are set out hereunder. Such forms of simulation include, but are not limited to, the following types:

- .1 navigation and watchkeeping;
- .2 ship handling and manoeuvring;
- .3 cargo handling and stowage;
- .4 reporting and radiocommunications; and
- .5 main and auxiliary machinery operation.

Navigation and watchkeeping simulation

68 Navigation and watchkeeping simulation equipment should, in addition to meeting all applicable performance standards set out in section A-I/12, be capable of simulating navigational equipment and bridge operational controls which meet all applicable performance standards adopted by the Organization,* incorporate facilities to generate soundings and:

- .1 create a real-time operating environment, including navigation control and communications instruments and equipment appropriate to the navigation and watchkeeping tasks to be carried out and the manoeuvring skills to be assessed;
- .2 provide a realistic visual scenario by day or by night, including variable visibility, or by night only as seen from the bridge, with a minimum horizontal field of view available to the trainee in viewing sectors appropriate to the navigation and watchkeeping tasks and objectives;
- .3 realistically simulate “own ship” dynamics in open-water conditions, including the effects of weather, tidal stream, currents and interaction with other ships; and
- .4 realistically simulate VTS communication procedures between ship and shore.

Ship handling and manoeuvring simulation

69 In addition to meeting the performance standards set out in paragraph 37, ship handling simulation equipment should:

- .1 provide a realistic visual scenario as seen from the bridge, by day and by night, with variable visibility throughout a minimum horizontal field of view available to the trainee in viewing sectors appropriate to the ship handling and manoeuvring training tasks and objectives;** and
- .2 realistically simulate “own ship” dynamics in restricted waterways, including shallow-water and bank effects.

* See relevant/appropriate performance standards adopted by the Organization.

** The relevant IMO Model Course(s) may be of assistance in the preparation of courses.

70 Where manned scale models are used to provide ship handling and manoeuvring simulation, in addition to the performance standards set out in paragraphs 68.3 and 69.2, such equipment should:

- .1 incorporate scaling factors which present accurately the dimensions, areas, volume and displacement, speed, time and rate of turn of a real ship; and
- .2 incorporate controls for the rudder and engines, to the correct timescale.

Cargo handling and stowage simulation

71 Cargo handling simulation equipment should be capable of simulating cargo handling and control equipment which meets all applicable performance standards adopted by the Organization^{***} and incorporate facilities to:

- .1 create an effective operational environment, including a cargo-control station with such instrumentation as may be appropriate to the particular type of cargo system modelled;
- .2 model loading and unloading functions and stability and stress data appropriate to the cargo-handling tasks to be carried out and the skills to be assessed; and
- .3 simulate loading, unloading, ballasting and deballasting operations and appropriate associated calculations for stability, trim, list, longitudinal strength, torsional stress and damage stability*.

GMDSS communication simulation

72 GMDSS communication simulation equipment should be capable of simulating GMDSS communication equipment which meets all applicable performance standards adopted by the Organization^{**} and incorporate facilities to:

- .1 simulate the operation of VHF, VHF-DSC, NAVTEX, EPIRB and watch receiver equipment as required for the Restricted Operator's Certificate (ROC);
- .2 simulate the operation of INMARSAT-A, -B and -C ship earth stations, MF/HF NBDP, MF/HF-DSC, VHF, VHF-DSC, NAVTEX, EPIRB and watch receiver equipment as required for the General Operator's Certificate (GOC);
- .3 provide voice communication with background noise;
- .4 provide a printed text communication facility; and

*** No standards have as yet been adopted by the Organization.

* The relevant IMO Model Course(s) may be of assistance in the preparation of courses.

** See relevant/appropriate performance standards adopted by the Organization.

- .5** create a real-time operating environment, consisting of an integrated system, incorporating at least one instructor/assessor station and at least two GMDSS ship or shore stations.

* * * * *

Chapter II

Guidance regarding the master and the deck department

Section B-II/2

Guidance regarding the certification of masters and chief mates on ships of 500 gross tonnage or more

(See section B-II/1 for guidance.)

Section B-II/1

Guidance regarding the certification of officers in charge of a navigational watch on ships of 500 gross tonnage or more

Training

- 1** Every candidate for certification as officer in charge of a navigational watch should have completed a planned and structured programme of training designed to assist a prospective officer to achieve the standard of competence in accordance with table A-II/1.
- 2** The structure of the programme of training should be set out in a training plan which clearly expresses, for all parties involved, the objectives of each stage of training on board and ashore. It is important that the prospective officer, tutors, ships' staff and company personnel are clear about the competences which are to be achieved at the end of the programme and how they are to be achieved through a combination of education, training and practical experience on board and ashore.
- 3** The mandatory periods of seagoing service are of prime importance in learning the job of being a ship's officer and in achieving the overall standard of competence required. Properly planned and structured, the periods of seagoing service will enable prospective officers to acquire and practice skills and will offer opportunities for competences achieved to be demonstrated and assessed.
- 4** Where the seagoing service forms part of an approved training programme, the following principles should be observed:
 - .1** The programme of onboard training should be an integral part of the overall training plan.
 - .2** The programme of onboard training should be managed and coordinated by the company which manages the ship on which the seagoing service is to be performed.
 - .3** The prospective officer should be provided with a training record book* to enable a comprehensive record of practical training and experience at sea to be maintained. The training record book should be laid out in such a way that it can provide detailed information about the tasks and duties which should be undertaken and the progress

* The relevant IMO Model Course(s) and a similar document produced by the International Shipping Federation may be of assistance in the preparation of training record books.

towards their completion. Duly completed, the record book will provide unique evidence that a structured programme of onboard training has been completed which can be taken into account in the process of evaluating competence for the issue of a certificate.

- .4 At all times, the prospective officer should be aware of two identifiable individuals who are immediately responsible for the management of the programme of onboard training. The first of these is a qualified seagoing officer, referred to as the “shipboard training officer”, who, under the authority of the master, should organize and supervise the programme of training for the duration of each voyage. The second should be a person nominated by the company, referred to as the “company training officer”, who should have an overall responsibility for the training programme and for coordination with colleges and training institutions.
- .5 The company should ensure that appropriate periods are set aside for completion of the programme of onboard training within the normal operational requirements of the ship.

Roles and responsibilities

5 The following section summarizes the roles and responsibilities of those individuals involved in organizing and conducting onboard training:

- .1 The company training officer should be responsible for:
 - .1.1 overall administration of the programme of training;
 - .1.2 monitoring the progress of the prospective officer throughout; and
 - .1.3 issuing guidance as required and ensuring that all concerned with the training programme play their parts.
- .2 The shipboard training officer should be responsible for:
 - .2.1 organizing the programme of practical training at sea;
 - .2.2 ensuring, in a supervisory capacity, that the training record book is properly maintained and that all other requirements are fulfilled; and
 - .2.3 making sure, so far as is practicable, that the time the prospective officer spends on board is as useful as possible in terms of training and experience, and is consistent with the objectives of the training programme, the progress of training and the operational constraints of the ship.
- .3 The master’s responsibilities should be to:
 - .3.1 provide the link between the shipboard training officer and the company training officer ashore;

- .3.2 fulfil the role of continuity if the shipboard training officer is relieved during the voyage; and
- .3.3 ensure that all concerned are effectively carrying out the onboard training programme.
- .4 The prospective officer's responsibilities should be to:
 - .4.1 follow diligently the programme of training as laid down;
 - .4.2 make the most of the opportunities presented, be they in or outside working hours; and
 - .4.3 keep the training record book up to date and ensure that it is available at all times for scrutiny.

Induction

6 At the beginning of the programme and at the start of each voyage on a different ship, prospective officers should be given full information and guidance as to what is expected of them and how the training programme is to be organized. Induction presents the opportunity to brief prospective officers about important aspects of the tasks they will be undertaking, with particular regard to safe working practices and protection of the marine environment.

Shipboard programme of training

7 The training record book should contain, amongst other things, a number of training tasks or duties which should be undertaken as part of the approved programme of onboard training. Such tasks and duties should relate to at least the following areas:

- .1 steering systems;
- .2 general seamanship;
- .3 mooring, anchoring and port operations;
- .4 life-saving and fire-fighting appliances;
- .5 systems and equipment;
- .6 cargo work;
- .7 bridge work and watchkeeping; and
- .8 engine-room familiarization.

8 It is extremely important that the prospective officer is given adequate opportunity for supervised bridge watchkeeping experience, particularly in the later stages of the onboard training programme.

9 The performance of the prospective officers in each of the tasks and duties itemized in the training record book should be initialled by a qualified officer when, in the opinion of the officer concerned, a prospective officer has achieved a satisfactory standard of proficiency. It is important to appreciate that a prospective officer may need to demonstrate ability on several occasions before a qualified officer is confident that a satisfactory standard has been achieved.

Monitoring and reviewing

10 Guidance and reviewing are essential to ensure that prospective officers are fully aware of the progress they are making and to enable them to join in decisions about their future programme. To be effective, reviews should be linked to information gained through the training record book and other sources as appropriate. The training record book should be scrutinized and endorsed formally by the master and the shipboard training officer at the beginning, during and at the end of each voyage. The training record book should also be examined and endorsed by the company training officer between voyages.

Assessment of abilities and skills in navigational watchkeeping

11 A candidate for certification who is required to have received special training and assessment of abilities and skills in navigational watchkeeping duties should be required to provide evidence, through demonstration either on a simulator or on board ship as part of an approved programme of shipboard training, that the skills and ability to perform as officer in charge of a navigational watch in at least the following areas have been acquired, namely to:

- .1** prepare for and conduct a passage, including:
 - .1.1** interpreting and applying information obtained from charts;
 - .1.2** fixing position in coastal waters;
 - .1.3** applying basic information obtained from tide tables and other nautical publications;
 - .1.4** checking and operating bridge equipment;
 - .1.5** checking magnetic and gyro-compasses;
 - .1.6** assessing available meteorological information;
 - .1.7** using celestial bodies to fix position;
 - .1.8** determining the compass error by celestial and terrestrial means; and
 - .1.9** performing calculations for sailings of up to 24 hours;
- .2** operate and apply information obtained from electronic navigation systems;
- .3** operate radar, ARPA and ECDIS and apply radar information for navigation and collision avoidance;
- .4** operate propulsion and steering systems to control heading and speed;
- .5** implement navigational watch routines and procedures;
- .6** implement the manoeuvres required for rescue of persons overboard;

- .7 initiate action to be taken in the event of an imminent emergency situation (e.g., fire, collision, stranding) and action in the immediate aftermath of an emergency;
 - .8 initiate action to be taken in event of malfunction or failure of major items of equipment or plant (e.g., steering gear, power, navigation systems);
 - .9 conduct radiocommunications and visual and sound signalling in normal and emergency situations; and
 - .10 monitor and operate safety and alarm systems, including internal communications.
- 12** Assessment of abilities and skills in navigational watchkeeping should:
- .1 be made against the criteria for evaluating competence for the function of navigation set out in table A-II/1;
 - .2 ensure that the candidate performs navigational watchkeeping duties in accordance with the Principles to be observed in keeping a safe navigational watch (section A-VIII/2, part 4-1) and the Guidance on keeping a navigational watch (section B-VIII/2, part 4-1).

Evaluation of competence

13 The standard of competence to be achieved for certification as officer in charge of a navigational watch is set out in table A-II/1. The standard specifies the knowledge and skill required and the application of that knowledge and skill to the standard of performance required on board ship.

14 Scope of knowledge is implicit in the concept of competence. Assessment of competence should, therefore, encompass more than the immediate technical requirements of the job, the skills and tasks to be performed, and should reflect the broader aspects needed to meet the full expectations of competent performance as a ship's officer. This includes relevant knowledge, theory, principles and cognitive skills which, to varying degrees, underpin all levels of competence. It also encompasses proficiency in what to do, how and when to do it, and why it should be done. Properly applied, this will help to ensure that a candidate can:

- .1 work competently in different ships and across a range of circumstances;
- .2 anticipate, prepare for and deal with contingencies; and
- .3 adapt to new and changing requirements.

15 The criteria for evaluating competence (column 4 of table A-II/1) identify, primarily in outcome terms, the essential aspects of competent performance. They are expressed so that assessment of a candidate's performance can be made against them and should be adequately documented in the training record book.

16 Evaluation of competence is the process of:

- .1 collecting sufficient valid and reliable evidence about the candidate's knowledge, understanding and proficiency to accomplish the tasks, duties and responsibilities listed in column 1 of table A-II/1; and
- .2 judging that evidence against the criteria specified in the standard.

17 The arrangements for evaluating competence should be designed to take account of different methods of assessment which can provide different types of evidence about candidates' competence, e.g.:

- .1 direct observation of work activities (including seagoing service);
- .2 skills/proficiency/competency tests;
- .3 projects and assignments;
- .4 evidence from previous experience; and
- .5 written, oral and computer-based questioning techniques* .

18 One or more of the first four methods listed should almost invariably be used to provide evidence of ability, in addition to appropriate questioning techniques to provide evidence of supporting knowledge and understanding.

Training in celestial navigation

19 The following areas summarize the recommended training in celestial navigation:

- .1 correctly adjust sextant for adjustable errors;
- .2 determine corrected reading of the sextant altitude of celestial bodies;
- .3 accurate sight reduction computation, using a preferred method;
- .4 calculate the time of meridian altitude of the sun;
- .5 calculate latitude by Polaris or by meridian altitude of the sun;
- .6 accurate plotting of position line(s) and position fixing;
- .7 determine time of visible rising/setting sun by a preferred method;
- .8 identify and select the most suitable celestial bodies in the twilight period;
- .9 determine compass error by azimuth or by amplitude, using a preferred method;

* The relevant IMO Model Course(s) may be of assistance in the preparation of courses.

- .10 nautical astronomy as required to support the required competence in paragraphs 19.1 to 19.9 above.

20 Training in celestial navigation may include the use of electronic nautical almanac and celestial navigation calculation software.

Chapter VIII

Guidance regarding watchkeeping

Section B-VIII/2

Guidance regarding watchkeeping arrangements and principles to be observed

1 The following operational guidance should be taken into account by companies, masters and watchkeeping officers.

* * * * *

Part 4 – Guidance on watchkeeping at sea

Part 4-1 – Guidance on keeping a navigational watch

Introduction

2 Particular guidance may be necessary for special types of ships as well as for ships carrying hazardous, dangerous, toxic or highly flammable cargoes. The master should provide this operational guidance as appropriate.

3 It is essential that officers in charge of the navigational watch appreciate that the efficient performance of their duties is necessary in the interests of the safety of life, security and property at sea and of preventing pollution of the marine environment.

Anchor watch

4 The master of every ship at an unsheltered anchorage, at an open roadstead or any other virtually “at sea” conditions in accordance with chapter VIII, section A-VIII/2, part 4-1, paragraph 51 of the STCW Code, should ensure that watchkeeping arrangements are adequate for maintaining a safe watch at all times. A deck officer should at all times maintain responsibility for a safe anchor watch.

5 In determining the watchkeeping arrangements, and commensurate with maintaining the ship’s safety and security and the protection of the marine environment, the master should take into account all pertinent circumstances and conditions such as:

- .1 maintaining a continuous state of vigilance by sight and hearing as well as by all other available means;
- .2 ship-to-ship and ship-to-shore communication requirements;

- .3** the prevailing weather, sea, ice and current conditions;
- .4** the need to continuously monitor the ship's position;
- .5** the nature, size and characteristics of anchorage;
- .6** traffic conditions;
- .7** situations which might affect the security of the ship;
- .8** loading and discharging operations;
- .9** the designation of stand-by crew members; and
- .10** the procedure to alert the master and maintain engine readiness.