



IALA MODEL COURSE

V-103/1

VESSEL TRAFFIC SERVICES OPERATOR TRAINING

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FOREWORD

The International Association of Marine Aids to Navigation and Lighthouse Authorities has been associated with Vessel Traffic Services since 1955 and recognises the importance of human resources to the development of efficient Vessel Traffic Services worldwide.

Taking into account the International Convention on Standards of Training, Certification and Watchkeeping of Seafarers, 1978, as amended in 1995 (STCW Convention), the Seafarer's Training, Certification and Watchkeeping Code (STCW Code) and STCW 95 Resolution 10, IALA has adopted Recommendation V-103 on Standards of Training and Certification of VTS personnel.

The model training courses developed, or being developed, by IALA for VTS personnel are:

- Model Course V-103/1 - VTS Operator Training
- Model Course V-103/2 - VTS Supervisor Training
- Model Course V-103/3 - VTS On-the-Job Training
- Model Course V-103/4 - VTS On-the-Job Training Instructor

These model courses are intended to provide national members and other appropriate authorities charged with the provision of vessel traffic services with specific guidance on the training of VTS Operators and VTS Supervisors. They may be used by maritime training organisations, and assistance in implementing any course may be obtained through IALA at the following address:

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Saint Germain-en-Laye
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Tel: (+) 33 1 34 51 70 01
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PART A COURSE OVERVIEW

1. OVERVIEW

IALA recommends that training providers utilise accredited training courses as per IALA Guideline 1014 on the Accreditation of VTS Training Courses.

2. PURPOSE OF THE MODEL COURSE

The purpose of the model course is to assist maritime training organisations and their teaching staff in the preparation and introduction of new training courses for VTS Operators, or in enhancing, updating or supplementing existing training material where the quality and effectiveness of the training courses may thereby be improved.

This course provides details of the subject areas for knowledge and practical competence required for a VTS trainee to gain a course certificate as part of the qualification for becoming a VTS Operator.

3. USE OF THE MODEL COURSE

The complete course comprises eight modules, each of which deals with a specific subject representing a requirement or function of a VTS Operator. Each module contains a subject framework stating its scope and aims, a subject outline and a detailed teaching syllabus.

The course also provides participants with the opportunity to exercise the role of a VTS Operator. These exercises should, wherever practicable, use simulation. Where simulation is not practicable, the exercises should be designed to be fully representative of appropriate situations that occur in a VTS.

4. ACRONYMS

| | |
|---------|--|
| AIS | Automatic Identification System(s) |
| APL | Accredited Prior Learning |
| ARPA | Automatic Radar Plotting Aid |
| CCTV | Close circuit television |
| COLREGS | International Regulations for Preventing Collisions at Sea |
| DF | Direction Finding |
| DGNSS | Differential Global Navigation Satellite System(s) |
| DR | Dead reckoning |
| DSC | Digital Selective Calling |
| ECDIS | Electronic Chart Display and Information System(s) |
| ECS | Electronic Chart System(s) |
| EP | Estimated position |
| ETA | Estimated Time of Arrival |
| GMDSS | Global Maritime Distress and Safety System |
| GNSS | Global Navigation Satellite System(s) |
| IALA | International Association of Marine Aids to Navigation and Lighthouse Authorities - AISM |
| ICAO | International Civil Aviation Organization |
| IELTS | International English Language Test System |
| IMO | International Maritime Organization |
| ISBN | International Standard Book Number |
| ISPS | International Ship and Port Facility Security (Code) |
| Lat | Latitude |



| | |
|--------|--|
| LBP | Length between perpendiculars |
| LLTV | Low light television |
| LOA | Length overall |
| LOCODE | United Nations Code for Trade and Transport Locations |
| Long | Longitude |
| LNG | Liquified Nitrogen Gas |
| LOP | Line(s) of position |
| LPG | Liquified Petroleum Gas |
| MAS | Maritime Assistance Service |
| OJT | On-the-Job Training |
| PTT | Press To Talk |
| Racon | Radar beacon(s) |
| Ramark | Radar mark(s) |
| ROC | Restricted Operator's Certificate (GMDSS) |
| Ro-ro | Roll on – roll off |
| RR | Radio Regulations |
| SAR | Search and Rescue |
| SMCP | Standard Marine Communication Phrases (IMO) |
| STCW | Standards of Training, Certification and Watchkeeping of Seafarers, 1978, as amended |
| VHF | Very High Frequency (30 MHz to 300 MHz) |
| VTMIS | Vessel Traffic Management Information System(s) |
| VTS | Vessel Traffic Services |



PART B DELIVERY OF THE MODEL COURSE

1. INTRODUCTION

All training and assessment of personnel for gaining the course certificate as part of the qualification towards becoming a VTS Operator should be:

- 1 Structured in accordance with written programmes, including such methods and means of delivery, procedures and course material as are necessary to achieve the prescribed standard of competence; and,
- 2 Conducted, monitored, assessed and supported by persons qualified in accordance with Part C, section 4 Training Staff Requirements.

Training staff should review the course outline and detailed syllabus in each subject. The actual level of knowledge, skills and prior technical education of the participants in the subject concerned should be kept in mind during this review. Any differences between the level of skills and competencies of the participant and those identified within the detailed training syllabus should be identified. To compensate for such differences, the instructor is expected to delete from the course, or reduce the emphasis on, items dealing with knowledge or skills already attained by the participants. The instructor should also identify any academic knowledge, skills or technical training that the participants may not have acquired.

By analysing the detailed syllabus and the academic knowledge required to allow training in the technical area to proceed, the instructor can design an appropriate pre-entry course in the subjects in which weakness is evident. Alternatively, the elements of academic knowledge required to support the technical training elements concerned may be inserted at appropriate points within the syllabus.

Adjustment of the module objectives, scope and content for each subject may also be necessary if the participants completing the course are to undertake duties which differ from the objectives specified.

2. COURSE MODULES

The modular presentation enables the instructor to adjust the course content to suit the participant intake and provide any revisions of the subject objectives as required. The instructor should draw up lesson plans based on each detailed syllabus and the references in them to the textbooks and teaching material suggested for the course. Where no adjustment has been found necessary in the subjects of a detailed syllabus, the lesson plans may simply consist of the detailed syllabus with keywords or other reminders added to assist the instructor in making his presentation of the material.

To assist in the development of lesson plans, five levels of competence are used in the model courses for VTS personnel. Levels 1 to 4 are used in the model course for the training of VTS Operators and levels 3 to 5 are used in the model course for VTS Supervisor. See Table 1 in Part D, section 3 – Lesson Plans.

Each level of competence is defined in terms of the learning outcome, the instructional objectives and the required skills. The recommended level of competence for each subject is indicated in the Subject Outline of each module.

3. SUBJECT OUTLINE

The subject outline of each module also includes a total recommended number of hours that should be allotted to each module. However, it should be appreciated that these allocations are arbitrary and assume that the participants have met fully all the entry requirements specified for each subject. The instructor should therefore review carefully lesson plan design and consider the need to reallocate the time required to achieve each specific learning objective. In addition, the opportunity to reduce formal training time through recognition of Accredited



Prior Learning (APL) should be taken advantage of whenever documented evidence of prior learning or professional certification can be produced by the course participants.

4. DETAILED TEACHING SYLLABUS

The detailed teaching syllabus, of each module has been written in learning-objective format in which the objective describes what the participant must do to demonstrate that knowledge has been transferred. All objectives are understood to be prefixed by the words:

the expected learning outcome is that the participant has acquired the recommended levels of competence in

In preparing a teaching scheme and lesson plans, the instructor is free to use any teaching method or combination of methods that will ensure participants can meet the stated objectives. However, it is essential that participants complete the subject matter set-out in each module.

5. PRESENTATION

The presentation of concepts and methodologies may be repeated as necessary in various ways until the instructor is satisfied that the participant has attained a good working knowledge in each subject.

6. EVALUATION OR ASSESSMENT OF THE COURSE PARTICIPANTS

The evaluation criteria are contained in column 4 of the VTS Operator competence chart (see ANNEX 1), and provide the means for an assessor to judge whether a participant is competent to perform the related tasks, duties and responsibilities.

7. IMPLEMENTATION

For the course to run smoothly and effectively, considerable attention must be paid to the availability and use of:

- qualified instructors;
- support staff;
- rooms and other spaces;
- equipment;
- textbooks, technical papers;
- other reference material.

Thorough preparation is key to successful implementation of the course.

8. VALIDATION

The information contained in this document has been validated by a group of technical advisers, consultants and experts on training of VTS personnel. These were drawn from the IALA VTS Committee, training organisations of IALA national members and experienced VTS personnel so that the standards implemented may be as uniform as possible. Validation in the context of this document means that the group has found no grounds to object to its contents.



PART C COURSE FRAMEWORK

1. INTRODUCTION

The model course covers the requirements of the IALA Recommendation V-103. On successful completion of the course and assessments, the participants should have been provided with sufficient training and to proceed to the next stage of On-the-Job Training (OJT) at a VTS centre.

2. REQUIREMENTS FOR ATTAINING THE COURSE CERTIFICATE

Every candidate for a VTS Operator course certificate should:

- have achieved the International English Language Testing System (IELTS) level 5, or its equivalent;
- satisfy the competent/VTS authority by passing the appropriate assessments for the accredited course of operator training and that they possess the theoretical and practical knowledge appropriate to the requirements of a VTS Operator.

3. COURSE INTAKE – LIMITATIONS

Class sizes may be limited at the discretion of the Competent Authority to allow the instructor to give adequate attention to individual participants. In general, it is recommended that a maximum of 12-14 participants be the upper limit that a single instructor can be expected to train satisfactorily to the level of competence involved. Larger numbers may be admitted if extra staff and tutorial periods are provided to deal with participants on an individual basis.

During practical sessions and group activities there may be additional restraints on class size. Where the use of a simulator or similar teaching aid is involved, it is recommended that no more than two participants be trained simultaneously on any individual piece of equipment.

4. TRAINING STAFF REQUIREMENTS

All instructors and assessors should be appropriately qualified for the types and levels of training or assessment required for the model course.

The accredited training programme for VTS Operators should ensure that the qualifications and experiences of instructors and assessors are covered in the application of appropriate quality training standards. Such qualifications, experience and application of quality standards should incorporate appropriate training in instructional techniques, and training and assessment methods and practices, and comply with all applicable recommendations set out in the following paragraphs.

As well as instructors and assessors, additional staff may be required for the maintenance of equipment and for the preparations of materials, work areas and supplies for the practical work.

4.1. Course instructors

Any person conducting training of personnel qualifying for certification as VTS Operators should:

- have an appreciation of the training programme and an understanding of the specific training objectives for the type of training being conducted;
- be professionally and academically qualified in the task for which training is being conducted;
- have an appropriate balance of professional and teaching qualifications;
- if conducting training with the use of a simulator:



- have received appropriate guidance in instructional techniques involving the use of simulators;
- have gained practical operational experience on the simulator being used.

Any person responsible for the supervision of training personnel should have a full understanding of the training programme and the specific objectives for each element of training being conducted.

4.2. Course Assessors

Any person conducting assessment of competence of personnel should:

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

5. TEACHING FACILITIES AND EQUIPMENT

Facilities other than an ordinary classroom fitted with a chalkboard or whiteboard, an overhead projector or computer-assisted projector and screen are given in the individual subject frameworks.

To assist instructors, references are shown against the subjects in the modules to indicate references and publications, additional technical material and teaching aids that the instructor may wish to use when preparing and presenting the course (see ANNEX 2). The material listed in the subject frameworks has been used to structure the detailed teaching syllabuses:

- 1 Teaching aids (indicated by A).
- 2 Equipment needed by participants (indicated by E).
- 3 References (indicated by R).



PART D GUIDELINES FOR INSTRUCTORS

1. INTRODUCTION

VTS Operators are appropriately qualified persons performing one or more tasks contributing to the services of a VTS centre. It is essential that education and training be aimed at minimising incidents due to mistakes or errors of judgement. This model course is designed to meet the requirements for trainee VTS Operators to obtain a course certificate leading to on-the-job training.

It is important to keep in mind the close relationship of all subjects in the VTS Operators course. Instructors should continuously monitor the additional personal attributes of participants and, when appropriate, draw their attention to the need to meet the subjects of that module.

In Vessel Traffic Services, new techniques and equipment are developed very quickly. This makes it necessary for instructors to keep up to date in new techniques and in national and international rules and regulations. Instructors should also be encouraged to teach relevant new developments and techniques not mentioned in this syllabus.

2. CURRICULUM

The subject modules into which the course is divided reflect the competence headings of the VTS Operator competence chart (see ANNEX 1). The syllabuses are presented this way to show clearly the relationship of the syllabus with the recommendations of the IALA.

The subjects shown in the detailed syllabus are not listed in order of priority. Instructors should treat them in the order, which they consider to be the most effective for their course participants and circumstances.

Great care should be taken when using the levels of competence in Table 1. They have been phrased in a precise form to indicate exactly what the participant should be capable of doing. This then becomes the means of demonstrating that the intended level of knowledge or skill has been attained.

The recommended hours given in the syllabi are intended to be used as approximate guidelines for planning purposes. The hours should be adjusted as necessary to suit local circumstances in the light of experience with previous courses. If possible, the course should be implemented with some flexibility to allow for adjustments during its running. It is normal for different participants to require different lengths of time to cover the same work. For practical reasons some minor adjustments will probably be needed when drawing up the timetable to fit the work to be covered into fixed teaching periods and term times.

The success of the course will depend, to a large extent, upon detailed co-ordination of the individual subjects into a coherent teaching scheme. It is important that an experienced instructor acts as course co-ordinator to plan and supervise the implementation of the course.

Using the time estimates, modified as appropriate, a timetable should be drawn up to suit the normal working day and terms of the training organisation. Teaching schemes should be prepared by the teaching staff outlining the subject areas to be covered week by week. All members of the teaching team should have a copy of the proposed schemes so that they are aware of what is being done in subjects other than their own.

The teaching schemes should be scrutinised carefully to ensure that all of the listed subjects are covered, that repetition is avoided and that essential pre-requisite knowledge at any stage has already been covered. Only those additional requirements set by the Competent Authority should be introduced.

The course co-ordinator should monitor the running of the course. There should be regular discussions with the teaching staff involved concerning the progress of participants and any problems that have become apparent. Modifications of the teaching scheme should be made where necessary to ensure that participants are attaining the objectives laid down. If necessary, extra tuition should be arranged to enable weaker participants to reach



the required standard. At the conclusion of the course a discussion should be held to determine whether changes should be made to improve future courses.

Procedures should be in place to follow the On-the-Job Training (OJT) of participants, using comments from both participants and OJT Instructors to help ensure relevancy and validity of future courses. The transition from advanced training to OJT should appear as continuous as possible.

3. LESSON PLANS

The modular presentation enables the instructor to adjust the course content and provide any revisions of the subject objectives as required. The instructor should draw up lesson plans based on each detailed syllabus and the references in them to the textbooks and teaching material suggested for the course. Where no adjustment has been found necessary in the learning objectives of a detailed syllabus, the lesson plans may simply consist of the detailed syllabus with keywords or other reminders added to assist the instructor in making his presentation of the material.

To assist in the development of lesson plans five levels of competence are used in the model courses for VTS personnel. Levels 1 to 4 are used in the model course for the training of VTS Operators and levels 3 to 5 are used in the model course for advancement to VTS Supervisor.

Each level of competence is defined in terms of the learning outcome, the instructional objectives and the required skills. The recommended level of competence for each subject is indicated in section 3, Subject Outline, of each module.

Section 3, Subject Outline, of each module also includes a recommended assessment of the time that should be allotted to each subject. However, it should be appreciated that these allocations are arbitrary and assume that the trainees have met fully all of the entry requirements specified for each subject. The instructor should therefore review carefully these assessments during course and lesson plan design and consider the need to reallocate the time required to achieve each specific learning objective.

Section 4, Detailed Teaching Syllabus, of each module has been written in learning-objective format in which the objective describes what the trainee must do to demonstrate that knowledge has been transferred. All objectives are understood to be prefixed by the words:

the expected learning outcome is that the trainee has acquired the recommended levels of competence in
.....

In preparing a teaching scheme and lesson plans, the instructor is free to use any teaching method or combination of methods that will ensure trainees can meet the stated objectives. However, it is essential that trainees attain all objectives set out in each syllabus.



Table 1 *Levels of Competence*

| Level | Knowledge and/or Attitude | Skill |
|--|--|---|
| <p>Level 1 Work of a routine and predictable nature generally requiring supervision</p> | <p>Comprehension Understands facts and principles; interprets verbal/written material; interprets charts, graphs and illustrations; estimates future consequences implied in data; justifies methods and procedures</p> | <p>Guided response The early stages in learning a complex skill and includes imitation by repeating a demonstrated action using a multi-response approach (trial and error method) to identify an appropriate response</p> |
| <p>Level 2 More demanding range of work involving greater individual responsibility. Some complex/non-routine activities</p> | <p>Application Applies concepts and principles to new situations; applies laws and theories to practical situations; demonstrates correct usage of methods or procedures</p> | <p>Autonomous response The learned responses have become habitual and the movement is performed with confidence and proficiency</p> |
| <p>Level 3 Skilled work involving a broad range of work activities. Mostly complex and non-routine</p> | <p>Analysis Recognises un-stated assumptions; recognises logical inconsistencies in reasoning; distinguishes between facts and inferences; evaluates the relevancy of data; analyses the organisational structure of work</p> | <p>Complex observable response The skilful performance of acts that involve complex movement patterns. Proficiency is demonstrated by quick, smooth, accurate performance. The accomplishment of acts at this level includes a highly co-ordinated automatic performance</p> |
| <p>Level 4 Work that is often complex, technical and professional with a substantial degree of personal responsibility and autonomy</p> | <p>Synthesis Integrates learning from different areas into a plan for solving a problem; formulates a new scheme for classifying objects or events</p> | <p>Adaptation Skills are so well developed that individuals can adapt rapidly to special requirements or problem situations</p> |
| <p>Level 5 Complex techniques across wide and often unpredicted variety of contexts. Professional/senior managerial work</p> | <p>Evaluation Judges the adequacy with which conclusions are supported by data; judges the value of a work by use of internal criteria; judges the value of a work by use of external standards of excellence</p> | <p>Creation The creation of new practices or procedures to fit a particular situation or specific problem and emphasizes creativity based upon highly developed skills</p> |

4. EVALUATION OR ASSESSMENT

Continual assessment of participants should be undertaken. In many cases the assessment can be based on the marks given to participants' course work, providing a proper record of it is kept. That can be supplemented by occasional short test papers. These assessments are additional to any examination required for the purposes of certification.



Assessments should use the following five levels to indicate the progressive learning attained by participants. It is recommended that, for the VTS Operator, an average level of one to four should be considered as being satisfactory.

Table 2 Assessment Levels

| Level | Description |
|--------------|--|
| LEVEL 1 | The participant demonstrates a willingness to learn. |
| LEVEL 2 | The participant demonstrates active participation in the learning process. |
| LEVEL 3 | The training positively influences the participant's behaviour and attitude, and there is a measurable increase in knowledge and skills. |
| LEVEL 4 | The participant demonstrates the ability to adapt existing knowledge, skills and attitude when dealing with new and unplanned situations. |
| LEVEL 5 | The participant demonstrates a permanent positive change in knowledge, skills and attitude and is ready to positively influence others. The participant may exhibit some positive changes in co-related behaviours. |

The form and timing of examinations for endorsement as a VTS Operator is a matter for the Competent Authority concerned.

An adequate period should be allowed at the end of the course for revision and review of the course content. That period and the time occupied by any examinations would be additional to the times shown in the syllabuses.

The Competent Authority may recognize documented evidence including assessments completed for the attainment of related certificates as equivalencies for parts or all specific VTS modules.

5. PRACTICAL TRAINING

In addition to subject modules; the following are recommended simulated exercises included assessment criteria and recommended duration in hours.

Table 3 *Simulation Exercises*

| Subject | Assessment criteria | Hours |
|---|---|-------|
| Basic skills <ul style="list-style-type: none"> • Monitoring and identification • Communication co-ordination • Evaluation and interpretation of the traffic situation • Log keeping, recording and reporting | Ability to identify, correctly interpret and handle reports from five simulated vessels. | 20 |
| Traffic interaction and conflict resolution <ul style="list-style-type: none"> • Waterway management in multi-ship scenarios • Anticipation and projection of traffic patterns • Critical areas • Vessels overtaking and approaching each other • VTS sailing/route plans, including those for deep draught vessels | Ability to identify, correctly interpret and deal with up to five simulated vessels in complex situations. Ability to prepare VTS sailing or route plans, to monitor their execution and amend them due to unforeseen circumstances. | 60 |
| Emergencies and special situations <ul style="list-style-type: none"> • Contingency plans • Adverse weather conditions • Special vessels and those with restricted manoeuvrability • Internal and external emergencies | Ability to identify, correctly interpret data and handle reports from 20 simulated vessels during emergencies and special situations. | 20 |



PART E COURSE MODULES

The complete course comprises eight modules, each of which deals with a specific subject representing a requirement or function of a VTS Operator, followed by simulated exercises and assessment intended to be representative of events and incidents likely to be experienced in a VTS centre. The recommended duration in hours do not include the time necessary for examinations or tests of proficiency.

Table 4 Recommended Course Hours

| Module / Subject | Recommended Duration in Hours | | Remarks ² | |
|--|-------------------------------|-------------------------------------|---|---|
| | Presentations / Lectures | Exercises / Simulation ¹ | | |
| 1 – Language³ | 91 | 75 | <ul style="list-style-type: none"> • Language structure • Specific VTS messages construction | <ul style="list-style-type: none"> • Standard phrases • Collecting information |
| 2 – Traffic Management | 52 | 54 | <ul style="list-style-type: none"> • Regulatory requirements • Roles and responsibilities • VTS environment | <ul style="list-style-type: none"> • Principles of waterway and traffic management • Traffic monitoring and organisation |
| 3 – Equipment | 39 | 6 | <ul style="list-style-type: none"> • Telecommunications • Radar, audio, video and other sensors • VHF/Direction finding (VHF/DF) • Tracking systems | <ul style="list-style-type: none"> • Information management • Equipment performance monitoring • Evolving technologies |
| 4 – Nautical Knowledge | 85 | 38 | <ul style="list-style-type: none"> • Chart work • Collision regulations • Aids to navigation | <ul style="list-style-type: none"> • Navigational aids (ship borne) • Shipboard knowledge • Port operations and other allied services |
| 5 – Communication Co-ordination | 7 | 11 | <ul style="list-style-type: none"> • General communication skills • Communications | <ul style="list-style-type: none"> • Log and record keeping |
| 6 – VHF Radio | 15 | 42 | <ul style="list-style-type: none"> • Radio operator practices and procedures • VHF radio systems and their use in VTS | <ul style="list-style-type: none"> • Operation of radio equipment • Communication procedures, including SAR |
| 7 – Personal Attributes | 6 | 4 | <ul style="list-style-type: none"> • Interaction with others • Human relation skills | <ul style="list-style-type: none"> • Responsibility and reliability |
| 8 – Emergency Situations | 12 | 10 | <ul style="list-style-type: none"> • International, national, regional, local regulations • Contingency plans • Prioritise and respond to situations | <ul style="list-style-type: none"> • Record activities concerning emergencies • Maintain a safe waterway throughout emergency situations • Internal/external emergencies |
| Total | 307 | 240 | | |

- Notes:
- 1 In addition to the above mentioned recommended duration in hours, see table 3 Simulation exercises in Part D, section 5 Practical training.
 - 2 The recommended times are, except for Module 1, based on the assumption that trainees have no or little previous knowledge of the subject. The actual time required for each module will vary, depending on previous experience and the entrance level of the trainee.
 - 3 The recommended hours for Module 1 assume that trainees have achieved, IELTS level 5, or the equivalent.



MODULE 1 LANGUAGE

1.1 INTRODUCTION

Instructors for this module should be skilled in the use of English and the IMO Standard Marine Communication Phrases (SMCP).

1.1.1 Background

English is the accepted language of international business, trade and diplomacy. Subsequently there is a very high demand for education in the language as well as a high demand for other academic qualifications taught in English. This has led to the establishment of reliable tests to demonstrate that trainees have attained a sufficient level of the language to follow their chosen course or profession (see ANNEX 3, Example of English language tests).

1.2 SUBJECT FRAMEWORK

1.2.1 Scope

This syllabus covers the requirement for VTS Operators to have a sufficient knowledge of the English language to be able to use VTS equipment, charts and other nautical publications, understand meteorological and oceanographic information and communicate with ships and allied services for VTS purposes, including the operation of contingency plans.

1.2.2 Aims of Module 1

On completion of the course trainees will have knowledge of the English language and its composition and structure in respect of maritime terminology and the IMO Standard Marine Communication Phrases to enable them to carry out the duties of a VTS Operator using the English language.

It is emphasized that, by the regular employment of standardized marine vocabulary, VTS Operators will clearly communicate in routine and emergency situations at their VTS centre.



1.3 SUBJECT OUTLINE OF MODULE 1

Table 5 Subject outline – Language

| Subject Area | Recommended Competence Level | Recommended Hours ¹ | |
|--|------------------------------|--------------------------------|-----------------------|
| | | Presentations / Lectures | Exercises/ Simulation |
| Language structure Message construction in English English for special purposes, redundancy and precision Elimination of ambiguity by choice of words Elimination of ambiguity by special techniques Status of a message | Level 3 | | |
| Specific VTS message construction Construction of messages Speech devices to imply higher message status | Level 4 | | |
| Standard phrases The advantages, disadvantages and application of standard phrases The IMO SMCP in general The IMO SMCP, part 3, section 6, VTS | Level 2 Level 3 | | |
| Collecting information Questioning techniques | Level 2 | | |
| | | Total 91 hours | Total 75 hours |

Notes: 1. *The time required for module 1 above will vary with the entrance level of the trainee.
The recommended hours are set on the assumption that the trainee has achieved IELTS level 5 or the equivalent.*



1.4 DETAILED TEACHING SYLLABUS FOR MODULE 1 – LANGUAGE

Table 6 *Detailed Teaching Syllabus – Language*

| Subjects / Learning Objectives | Reference | Teaching Aid |
|--|------------------------|--------------------|
| <i>Have a sufficient knowledge of the English language to be able to use charts and other nautical publications, understand meteorological and oceanographic information and communicate with vessels and allied services for VTS mission purposes.</i> | | |
| Language structure | | |
| Explain the use of English for special purposes, redundancy and precision The exclusion of all items, except those directly applicable to the subject Legal and engineering terminology and their different structures Advantages and disadvantages of redundancy The choice of precise words to express meaning | R6, R19, R32 | A1 or A8 A1 |
| Describe the techniques to eliminate ambiguity 'Conditional' words and their elimination in VTS messages Consequences of misuse of 'conditional' words | R19 (VTS section) | A1 or A8 |
| Describe the use of message markers and the meaning they imply Legal implications of using message markers, particularly "Warning", "Information", "Advice" and "Instruction" Legal and psychological relationship between master, pilot and VTS, and the use of message markers Examples from operational VTS | R19 (VTS section), R13 | A1 |
| Specific VTS message construction | | |
| Construct VTS messages Practical communications Examples from 'Basic English' and 'ICAO English' | R19 | A1 |
| <i>Explain speech techniques to imply higher message status</i> | | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|---|-----------|--------------|
| Standard phrases | R19 | A1 |
| State the advantages, disadvantages and application of SMCP Use of standard phrases to trigger predictable actions Limiting the number of standard phrases to ensure recognition and memory retention When standard phrases are not the best method available | | |
| Demonstrate the use of IMO Standard Marine Communication Phrases (SMCP). Introduction to the SMCP - Its overall construction and origins The use of the SMCP on ships, particularly during emergency situations and distress When and how to use the SMCP in response to ships using the system Exercise: Use of SMCP in simulation and in actual recorded events | | |
| Explain when and how to use the SMCP within a VTS (Part 3, section 6 of the SMCP). General layout Exercise: Use of SMCP by a VTS in simulation and recorded VTS events | | |
| Collecting information | R19 | A1 |
| Describe information collection and questioning techniques. Direct questioning using message markers Linguistic problems in using voice tone to pose a question Rejection of abstract questions and double questions Sarcasm in questioning. | | |



MODULE 2 TRAFFIC MANAGEMENT

2.1 INTRODUCTION

Instructors for this module should have experience in traffic routing and traffic management as well as in the general VTS and maritime fields. If this cannot be achieved then an appropriate expert should cover certain sections of the module. Every instructor should have full access to simulated VTS. In addition, arrangements should be made, if practicable, for trainees to visit operations VTS centres.

2.2 SUBJECT FRAMEWORK

2.2.1 Scope

This syllabus covers the theory and practice of managing traffic in a VTS area, including area limits, shipping lanes, safety zones, traffic separation schemes and geographical constraints.

It also deals with the theory and practice of monitoring and organising traffic, as well as providing knowledge of applicable international and national regulations and ships' safety certificates.

2.2.2 Aims

On completion of the course the trainee will possess a thorough knowledge of the principles of traffic management and the skills to analyse and apply the knowledge. In addition, the trainee will have a good understanding of national and international regulations as pertaining to the provision and conduct of vessel traffic services.

The understanding by trainees of the subject and knowledge and skills gained in other areas, including on-the-job training, will enable the routine day-to-day duties of a VTS Operator to be carried out in an efficient and safe manner.

They will also have sufficient knowledge, comprehension and skills in the subject to serve as the basis for further training to the level of VTS Supervisor.

Every effort should be made to give the trainees realistic exercises on the role of VTS in assisting a ship to navigate safely and expeditiously through a VTS area. Integrated exercises on handling emergency situations should also be carried out.

2.3 SUBJECT OUTLINE OF MODULE 2

Table 7 Subject outline – Traffic management

| Subject Area | Recommended Competence Level | Recommended Hours | |
|---|--|----------------------------|--------------------------|
| | | Presentations/ Lectures | Exercises/ Simulation |
| Regulatory requirements International regulations National regulations including local bye laws Legal liabilities of VTS functions Safety related ship certificates | Level 2 Level 1 Level 1 Level 1 | | |
| Roles and responsibilities Ship masters Marine pilots VTS Allied services | Level 1 Level 1 Level 3 Level 1 | | |
| VTS environment Area limits, boundaries, separation zones, shipping lanes and channels Prohibited or dangerous areas, safety zones, anchorages and restricted areas Traffic separation schemes Traffic separation criteria Geographical constraints | Level 2 | | |
| Principles of waterway and traffic management Planning Risk management Allocation of space Criteria which determines the parameters for the safe passage of shipping Aids to navigation | Level 4 | | |
| Traffic monitoring and organisation Traffic patterns VTS sailing or route plans Situation analysis | Level 4 | | |
| | | Total 26 hours | Total 52 hours |



2.4 DETAILED TEACHING SYLLABUS OF MODULE 2

Table 8 Detailed teaching syllabus – Traffic management

| Subjects / Learning Objectives | Reference | Teaching Aid |
|--|---|--------------|
| Regulatory requirements | R1, R2, R3, R7, R12, R14, R16, R17, R35, R36, R37 | |
| <i>Identify the legislative requirements relating to the VTS area and protection of the marine environment</i> | | |
| International regulations Sources of literature on international legislative requirements (IMO Resolution 857(20); Ship reporting systems; carriage of dangerous goods; World VTS Guide; etc. | | |
| National regulations, including local bye laws Sources of national legislation and promulgation Bye laws Notices to Mariners and other nautical publications | | |
| Legal liabilities of VTS functions Extent of competence, authority and responsibility Competent authority VTS authority Personnel | | |
| Carriage of relevant ship certificates | | |
| Roles and responsibilities | | |
| <i>Explain the roles, responsibilities of and relationships between ship masters, marine pilots, VTS and allied services</i> | | |
| Ship masters Responsibility of the ship master Responsibility of the ship master to VTS | | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|--|-----------|--------------|
| Marine pilots Responsibility of the pilot to the ship master Responsibility of the pilot to VTS | | |
| VTS Responsibility to the master and pilot Responsibility of VTS to allied services | | |
| Allied services Knowledge of allied services (i.e. harbour master, port authority) Roles of allied services | | |
| VTS environment | R35, R37 | A1,A2 |
| <i>Demonstrate a knowledge of the VTS operational area, including geographical features, traffic routing measures and aids to navigation</i> | | |
| Area limits, boundaries, separation zones, shipping lanes and channels | | |
| Prohibited or dangerous areas, safety zones, anchorages and restricted areas | | |
| Traffic separation schemes | | |
| Traffic separation criteria | | |
| Geographical constraints | | |
| Aids to navigation (e-navigation, virtual aids to navigation) | | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|---|--|--|
| Principles of waterway and traffic management | R1 to R7 inclusive, R17, R35, R41, R58, R59 | A1, A2, A3, A5, A6, A7 E2 during simulated exercises |
| <i>Demonstrate a knowledge of the procedures for maintaining a safe and efficient waterway</i> | | |
| Planning Routeing Channel geography Traffic restriction areas Anchorage areas Obstructions Type of traffic Ship characteristics Cargo characteristics Information Traffic Waterway (Notice to shipping, regattas) Environmental (visibility, waterspouts, dust storms, pollution) | | |
| Risk management Controllable risks Experience of VTS Operators Utilisation of equipment Contingency plans/pollution Uncontrollable risks Geography Meteorological factors Hydrographic factors Traffic congestion Procedures to mitigate risks | | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|---|---------------|---|
| Allocation of space Ships domain Authorising ship movements Allocation of priorities | | |
| Criteria which determine the parameters for the safe passage of shipping Water reference level Tide gauges Correlation between predicted and actual water levels Allowance for delayed manoeuvres Safe underkeel clearance Draught measurements vertical ship movements, allowance for squat and swell Safety margins in rock and soft sea-bed conditions Net underkeel clearance Gross underkeel clearance, including allowance for weather; exposure and topography Safe air draft Factors affecting and sources of information for calculating air draft Safe channel width Principles of devising a safe width under calm and adverse conditions Limiting factors in precise navigation Adequacy of safe underkeel clearance across channel width Calculation of safe channel or fairway width Shipping movements Movements authorised only when safe criteria have been determined and conditions satisfactorily met | | |
| Traffic monitoring and organisation | R17, R37, R41 | A1, A2, A3, A5, A6, A7 E2 during simulated exercises |
| <i>Demonstrate a knowledge of traffic patterns, sailing/route plans and perform situational analysis required to maintain a safe and efficient waterway</i> | | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|---|-------------------|--------------|
| Traffic patterns Normal traffic patterns Non-routine items affecting traffic patterns (rogue vessels, weather) | | |
| VTS sailing or route plan Developing a plan to ensure safe and efficient movement of vessel traffic | | |
| Situation analysis Conflict assessment Spatial separation Determination of relevant traffic Participating/non-participating traffic National and international regulations Local procedures Tools for determining relevant traffic - risk of collision, unclear intentions, non-routine action, blind corner etc | R7, R41, R35, R36 | |



MODULE 3 EQUIPMENT

3.1 INTRODUCTION

Instructors for this module should have experience in the installation and operation of equipment and systems used in vessel traffic services as well as in the general VTS and maritime fields. If this cannot be achieved then an appropriate instructor should cover certain sections of the module. Every instructor should have full access to simulated VTS. In addition, arrangements should be made, if practicable, for trainees to visit operational VTS centres.

3.2 SUBJECT FRAMEWORK

3.2.1 Scope

This syllabus covers the requirement for VTS Operators to be able to understand the functionalities and operational principles of the basic equipment used in VTS centres.

This course covers the theory and practice of using the basic equipment including the equipment used for data collection and data analysis, audio and video recording and ship identification.

3.2.2 Aims

On completion of the course trainees will possess knowledge of the basic application of VTS equipment and the skills to use the equipment to provide shipping with the service required by the VTS authority.

The trainees will also have been sufficiently trained to use ship identification systems and will be familiar with methods of recording and displaying information. They will also have the skills to operate VT-MIS and other computer systems for the purpose of assisting the development of VTS traffic images.

If a simulator is available it is possible to give the trainees realistic exercises on the use of basic VTS equipment and its use in assisting a ship to navigate safely and expeditiously through a VTS area. Integrated exercises on handling emergency situations could also be carried out.



3.3 SUBJECT OUTLINE OF MODULE 3

Table 9 Subject outline - Equipment

| Subject Area | Recommended Competence Level | Recommended Hours | |
|--|--|--------------------------|-----------------------|
| | | Presentation s/ Lectures | Exercises/ Simulation |
| Telecommunications Fax Telephone Telex E-mail Electronic Messaging | Level 2 | | |
| Radar, audio, video and other sensors Basics of coastal radar and its applications to VTS Generic VTS radar display features Audio equipment Video equipment Recording/replay equipment Meteorological and hydrological sensors | Level 1 Level 3 | | |
| VHF/Direction finding (VHF/DF) Purpose and basic principles of VHF/DF Accuracies of VHF/DF bearings | Level 1 | | |
| Tracking systems Introduction to radar tracking systems and ARPA Introduction to manual tracking systems Introduction to use of Automatic Identification Systems (AIS) for tracking | Level 3 Level 1 Level 1 | | |
| Information management VTMISS Vessel information Allied services | Level 1 | | |
| Equipment performance monitoring Normal operation expectations Troubleshooting | Level 2 | | |
| Evolving technologies New technologies as appropriate | Understanding | | |
| | | Total 39 hours | Total 6 hours |



3.4 DETAILED TEACHING SYLLABUS OF MODULE 3

Table 10 Detailed teaching syllabus – Equipment

| Subjects / Learning Objectives | Reference | Teaching Aid |
|--|-----------|--------------|
| Telecommunications | R34 | |
| Fax Explain and demonstrate the transmission and reception of facsimile message | | |
| Telephone Describe the operation of different telephone systems/technologies and their functionalities State the necessity of prioritisation | | |
| Telex Explain the fundamental operation of telex Describe how to transmit/receive telex messages | | |
| E-mail Explain the fundamentals electronic mail Demonstrate how to transmit/receive E-mail | | |
| Electronic messaging Discuss and explain the evolving electronic messaging system | | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|---|--------------------|--------------|
| Radar, audio, video and other sensors | R34, R41, R49, R57 | |
| Radar Describe the basics of coastal radar and its applications to VTS Coastal radar concepts Application of coastal radar to VTS Sensor fusion System warnings List the features of generic VTS radar display Detection, acquisition and tracking VTS traffic image warnings | | |
| Describe the function and different types of audio equipment VHF radio Telephone system | | |
| Describe the function and different types of video equipment Close circuit (CCTV) Low light (LLTV) Infra-red | | |
| Describe the function of and different types recording/replay equipment Audio recording Video recording Data recording Synchronization for replay | | |
| Describe the application of meteorological and hydrological equipment Tide gauges - remote height of tide indicators Tidal stream indicator - remote indications Barometer Temperature/humidity indicators Anemometers Visibility | | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|---|--------------------------------------|--------------|
| VHF/Direction finding (VHF/DF) | R34, R49 | |
| Describe the purpose and basic principles of VHF/Direction finding | | |
| State the accuracies of VHF/DF bearings | | |
| Tracking systems | R49 | |
| Explain the principles of radar tracking and Automatic Radar Plotting Aid (ARPA) ARPA theory Vector analysis Limitations and capabilities Tracking tags Information available Limitations/dangers | | |
| Explain the application of manual tracking systems Strips Cards Electronic strips and information management Ship movement reports | | E2 |
| Describe the application of Automatic Identification Systems (AIS) for tracking Modes of operation of AIS | R18, R25, R31, R34, R51, R53, R56 | |
| Information management | R41 | |
| Explain and demonstrate the use Vessel Traffic Management Information Systems (VTMIS) Introduction to VTMIS Co-ordination of information with users/allied services | | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|---|-----------|--------------|
| List and describe the relevance of vessel information Prioritising of participating vessels Anticipating calls using radar images Information from ships - name, call sign, type, position, speed, destination, ETA, special reports Information to ships - content, timely, relevant | | |
| Identify and describe the different allied services within a VTS area Information from allied services Information to allied services - content, timely, relevant | | |
| Equipment performance monitoring | R34 | |
| Describe the expected normal operating parameters of equipment Describe and demonstrate the different troubleshooting methods | | |
| Evolving technologies | | |
| Describe new technologies, as appropriate | | |



MODULE 4 NAUTICAL KNOWLEDGE

4.1 INTRODUCTION

Instructors for this module should have a good knowledge of ship bridge activities as well as a recognised marine qualification. If this cannot be achieved, then the appropriate expert should cover certain sections of this module. Every instructor should have full access to simulation equipment. In addition, if possible, arrangements should be made for trainees to visit operational VTS centres.

4.2 SUBJECT FRAMEWORK

4.2.1 Scope

This syllabus covers the requirement for VTS Operators to be able to carry out certain navigational functions and to have sufficient knowledge of ships to understand limitations of manoeuvrability or the need for special treatment caused by malfunction of shipboard systems or the type of cargo being carried.

This course covers the theory and practice of chartwork, provides knowledge of the collision regulations, buoyage and electronic aids to navigation systems as well as shipboard navigational equipment. It also provides an understanding of ship design matters, certain shipboard systems and some circumstances external to a ship which might influence its behaviour.

This course also provides knowledge of port operations as well as other services provided to shipping by ports, harbours and offshore installations.

4.2.2 Aims

On completion of the course trainees will be able to

- read information from a chart;
- fix the position of ships on a chart;
- read information from tide tables; and
- carry out course, speed and distance calculations, taking into account any set, drift or leeway.

The trainees will also have a sufficient understanding of ships and their systems to enable them to appreciate situations on board and to discuss matters and problems relating to the navigation of a ship through a VTS area with its master, pilot or navigating officer.

The course will also enable trainees to have knowledge of port operations and the ability to co-ordinate information relating to other services provided by port and harbour authorities including offshore installations.

If a simulator is available, it is possible to give the trainees realistic exercises on navigating a vessel and the role of VTS in giving assistance to navigate safely and expeditiously through a VTS area. Consideration should be given to running simulated exercises to demonstrate the manoeuvrability of different types of vessel. Integrated exercises on handling emergency situations could also be carried out.



4.3 SUBJECT OUTLINE OF MODULE 4

Table 11 *Subject outline – Nautical knowledge*

| Subject Area | Recommended Competence Level | Recommended Hours | |
|--|------------------------------|----------------------------|--------------------------|
| | | Presentations/ Lectures | Exercises/ Simulation |
| Chartwork Chart information and terminology Plotting positions on paper charts Course/speed/distance/time calculations True and magnetic courses Passage planning Tides and tidal streams Correcting paper charts and publications | Level 1 | | |
| Collision regulations International Regulations for Preventing Collisions at Sea (COLREGS) | Level 3 | | |
| Aids to Navigation International Maritime Buoyage Radar beacons Satellite and differential satellite position fixing Terrestrial position fixing systems Virtual aids to navigation | Level 2 | | |
| Navigational Aids (Shipborne) Radar Gyro and magnetic compasses Other navigational aids | Level 2 | | |
| Shipboard Knowledge Ship terminology - Technical Ship terminology - Nautical phrases Types of vessels Types of cargo Ship stability Propulsion systems External forces Vessel bridge procedures | Level 2 | | |
| Port Operations and other allied services Pilotage operations Port operations, including contingency plans Security Tugs and towing Ships agents | Level 3 | | |
| | | Total 85 hours | Total 38 hours |



4.4 DETAILED TEACHING SYLLABUS OF MODULE 4

Table 12 Detailed teaching syllabus – Nautical knowledge

| Subjects / Learning Objectives | Reference | Teaching Aid |
|--|-----------|--------------------|
| Chartwork | R4, R27 | A1, A2, A3, A6, A7 |
| Chart information and terminology Demonstrate knowledge of charts and the information contained thereon Finding positions on the globe - lat/long, great circle Chart projections and geodetic datums Use of charts in VTS Identify and describe chart symbols Symbols associated with VTS Importance of symbols in a VTS area Importance of symbols to the mariner | | |
| Plotting positions on paper charts Demonstrate the basic plotting instruments Parallel rulers Compass/dividers Loran-C interpolations, if applicable Demonstrate the ability to plotting on charts (using various projections as appropriate) Using parallel rulers Using parallel rulers and compass/dividers Measuring distances on charts Explain the use of Lines of Positions (LOPs) Bearings Ranges Loran-C, if applicable Combination of LOPs Definition of “cocked hat” LOPs given from ships and calculated from shore positions | | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|--|-----------|--------------|
| <p>Perform exercises on speed/distance/time calculations</p> <ul style="list-style-type: none">Introduction of S, D, T formula ($S \times T = D$)Use of formula in simple situationsUse of formula in complex situations | | |
| <p>Explain the theory and practice use of true and magnetic courses</p> <ul style="list-style-type: none">Perform exercise in laying of a true course<ul style="list-style-type: none">Using parallel rulers to compass roseUsing parallel rulers to line of longitude on Mercator chartsReading courses off chartsPerform exercise in Dead Reckoning (DR) positions<ul style="list-style-type: none">Accepted symbology used on chartsCalculating and measuring for DR positionsPerform exercise in compass and magnetic courses<ul style="list-style-type: none">Definition of variation, deviation and compass errorProblems associated with using magnetic compass or true courses from shore-based position | | |
| <p>Describe the importance of passage planning</p> <ul style="list-style-type: none">The requirement for a vessel to create and use a passage planThe four key elements of a passage plan – appraisal, planning, execution and monitoringAscertaining waterway information using charts and symbolsFormulating plans of action using information provided, chart information, tidal information, etc.Contingency planning | | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|---|-----------|--------------|
| <p>Describe the effect of tides and tidal streams</p> <p>Introduction to tides and tidal stream</p> <ul style="list-style-type: none">Explain the definition of terms relating to tides and tidal streams<ul style="list-style-type: none">Chart datumSpring/neap tidesEbb/flow/slack/eddiesSet/drift/rateDiurnal/semi-diurnalDemonstrate the use of tide and current tables<ul style="list-style-type: none">Information contained in tide tablesReading tide tablesReading current tablesOverview of calculating intermediate heights and timesOverview of primary and secondary portsDemonstrate the method of using of tidal streams in calculating an Estimated Position (EP)<ul style="list-style-type: none">Review of Dead Reckoning Position (DR)Explanation of EPEffect of tides and currentsEffect of wind/leeway | | |
| <p>Correcting paper charts and publications</p> <ul style="list-style-type: none">Introduction to Notices to Mariners<ul style="list-style-type: none">Introduction to written Notices to MarinersIntroduction to broadcast notices to shipping, including fishing vesselsMethods of correcting publications<ul style="list-style-type: none">Procedures for correctionsRecording correctionsMethods of correcting paper charts<ul style="list-style-type: none">Procedures for correctionsRecording correctionsTemporary and preliminary corrections | | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|---|-----------|------------------------|
| Collision regulations Cite and explain the International Regulations for Preventing Collisions at Sea Definitions of specific terms in the Collision Regulations Application of the Collision Regulations Application for ships Application as pertains to VTS Enforcement of regulations Basic steering and sailing rules International regulations National specifications and variances Conduct of vessels in specific conditions Conduct in narrow channels Conduct in Traffic Separation Schemes International Distress Signals Annex IV to the Collision Regulations Basic lights, shapes and sounds as described in the Regulations Description of the contents of Annexes I and III, and parts E and F | R7 | A1, A2 Case studies |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|--|---------------|--------------|
| Explain the theory and use of satellite and differential satellite position fixing systems Introduction to global navigation satellite systems (GNSS) Purpose of GNSS and DGNSS Types of GNSS and DGNSS Implications to VTS Limitations | R42 | |
| Explain the theory and use of virtual aids to navigation Introduction to and purpose of virtual aids to navigation | | |
| Navigational aids (shipborne) | | |
| Explain the theory of radar and demonstrate its operation Use of radars on board ships Fundamentals of RADAR theory Radar controls Factors affecting radar detection Limitations of ships radars Head up/North up display Relative/true motion Factors affecting interpretation Introduction to tracking systems and ARPA ARPA features and use of radar for collision avoidance Regulations and acts governing performance and carriage of radar | R42, R49, R57 | |
| Explain the theory and use of gyro and magnetic compasses Use of magnetic compass on board vessels Sources of error Corrections Reliability Use of gyro compass on board vessels Accuracy Corrections Reliability | | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|---|-----------|--------------|
| Explain the theory and use of other navigational aids Introduction to echo sounders Introduction to speed logs Principles of speed logs Accuracy of speed logs Introduction to ECDIS and ECS Means of displaying information Symbology Uses and limitations Chart datums | R22 | |
| Shipboard knowledge | | |
| List and explain the ship terminology - technical Ship construction terms Ship dimensions - i.e. LOA, LBP, beam, draught, air draught Hull structure - i.e. types of bows, sterns Loadlines draught marks | | |
| List and explain the ship terminology - nautical phrases Directions/relative bearings Numbers Mooring/anchoring terms | | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|---|-----------|--------------|
| <p>List and describe the types of vessels</p> <ul style="list-style-type: none">General cargo shipsTankersBulk carriersCombination carriersContainer shipsPassenger shipsRo-ro shipsFishing vesselsOffshore vesselsRigsOffshore supplyOffshore tugsTugsPilot boatsSAR vesselsSeaplanesWIGShips operated by allied services | | |
| <p>List and describe the types of cargo</p> <ul style="list-style-type: none">General cargoRefrigeratedLiquidLPG/LNGBulkContainersRo-roFishLivestockDangerous goods | | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|---|-----------|--------------|
| <p>List and ship stability</p> <ul style="list-style-type: none">Introduction to ship stabilityDefinitions of heel, list and trimFactors influencing ship stabilityRecognising dangerous situations regarding ship stability | | |
| <p>Explain the theory and practice of ship handling</p> <ul style="list-style-type: none">Effect of pivot point on ship handlingLine of approachStopping characteristicsTurning characteristicsExternal forces on ship handling – winds and tidesEffect of interaction and squatVessel manoeuvrabilityDifferent types of rudderDifferent types of propellerThrustersUse of tugs | | |
| <p>List and describe different propulsion systems</p> <ul style="list-style-type: none">Introduction to propulsion systemsDiesel, diesel electricGas turbineSteamJet | | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|---|--|--------------|
| <p>Explain the list of external forces on vessels</p> <ul style="list-style-type: none">Meteorological elements<ul style="list-style-type: none">Effects of wind on safety of waterway and ship manoeuvrabilityEffects of reduced visibility on safety of waterwayEffects of high and low pressure systems on water height and depthOceanographic factors<ul style="list-style-type: none">Effects of tides and currents on safety of waterway and ship manoeuvrabilityApplication of COLREGS with regards to tides and currentsPlanning waterway movements taking into account tides and currents | | |
| <p>Describe vessel bridge procedures</p> <ul style="list-style-type: none">Maintaining a navigational watch<ul style="list-style-type: none">Under routine circumstancesIn pilotage watersIn non-pilotage restricted watersResponse to emergencies which arise in a VTS area<ul style="list-style-type: none">Regulations governing transit of vessels with regard to special circumstancesExpected actions on board vessels during special circumstancesBridge operations (arrival & departure)<ul style="list-style-type: none">Berthing and unberthingAnchoring | <p>R10</p> <p>R11, R13, R10, R35, R37R39</p> | |
| <p>Port operations and other allied services</p> | | |
| <p>Explain pilotage operations</p> <ul style="list-style-type: none">Introduction to pilotage operationsPilotage watersResponsibilities of pilotsMaster/pilot/VTS relationship | <p>R35, R36, R37</p> | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|--|--------------------------|--------------|
| <p>Describe port operations including contingency plans</p> <ul style="list-style-type: none">Overview of port operationsInteraction of all agencies within a portResponsibilities of harbour masters and berthing mastersClearance proceduresIntermodal transport <p>Regulations and acts in effect within harbour limits</p> <ul style="list-style-type: none">Contingency plans<ul style="list-style-type: none">PollutionSARGroundingSalvageFireSecurityHealth | | |
| <p>Cite and explain the ISPS code with relation to ship and port security</p> <ul style="list-style-type: none">Overview of ISPS codePort policingInteraction with municipal, national and international securityGeneral overview of security of VTS centres and outstations | | |
| <p>Explain the organisation of tugs and towing</p> <ul style="list-style-type: none">The organisation of tugs within a port | See also “Ship handling” | |
| <p>Explain the role of ships agents</p> <ul style="list-style-type: none">General duties of ships agentsThe role of ships agents | | |

MODULE 5 COMMUNICATION CO-ORDINATION

5.1 INTRODUCTION

Instructors for this module should have knowledge, comprehension and the ability to apply communication techniques as well as qualifications in the VTS/Maritime fields. If this cannot be achieved, then the appropriate expert should cover certain sections of this module. Every instructor should have full access to simulated VTS. In addition, arrangements should be made, if practicable, for trainees to visit operational VTS centres.

5.2 SUBJECT FRAMEWORK

5.2.1 Scope

This syllabus covers the requirement for VTS Operators to be able to co-ordinate communications between the VTS centre, participating shipping, allied services and other marine related agencies.

This course covers the theory and practice of co-ordinating communications in a VTS area, including the requirements for and means of providing communications to support an information service, navigational assistance service or traffic organisation service. It also provides an understanding of communication co-ordination requirements in emergency situations.

5.2.2 Aims

On completion of the course trainees will possess a thorough knowledge of the basic principles of communication co-ordination and a good knowledge of international and national regulations relating to communication co-ordination requirements for VTS areas in the country concerned.

The trainees will also have a sufficient understanding and practice of the subject to enable them to prioritise, relay and co-ordinate various types of communication between marine and marine related agencies both on board ships and in shore facilities. These communications follow IALA's list of situations and their associated responses using SMCP in VTS areas.

If a simulator is available it is possible to give the trainees realistic exercises on the role of VTS in co-ordinating communications within a VTS area. Integrated exercises on handling emergency situations could also be carried out.

5.3 SUBJECT OUTLINE OF MODULE 5

Table 13 *Subject outline – Communication co-ordination*

| Subject Area | Recommended Competence Level | Recommended Hours | |
|--|------------------------------|----------------------------|--------------------------|
| | | Presentations/ Lectures | Exercises/ Simulation |
| General communication skills Inter personal communication Procedures to enhance effective communication Verbal and non-verbal communications Cultural aspects and common understanding of messages communicated | Level 3 | | |
| Communications Collection Evaluation Dissemination | Level 3 | | |
| Log and record keeping Objective Manual log keeping Electronic log keeping Statement and report writing | Level 3 | | |
| | | Total 7 hours | Total 11 hours |

5.4 DETAILED TEACHING SYLLABUS OF MODULE 5

Table 14 Detailed teaching syllabus – Communication co-ordination

| Subjects / Learning Objectives | Reference | Teaching Aid |
|---|-----------|---------------------------------------|
| General communication skills | | |
| <i>Possess the knowledge of the basic principles of communication and coordination.</i> | | |
| Describe active listening skills The process of interpersonal communication Effective team communications Empathy | | A6 and A7 for documented case studies |
| State the importance of clear, concise, accurate, timely and meaningful communications Reading-back received message Breaking message into smaller components Rephrasing message | | |
| Demonstrate verbal and non-verbal communications Voice inflection Non-verbal signals or symbols – internal Non-verbal signals or symbols – external | | |
| Identify words that have multiple interpretations and could negatively impact communications Language differences, both cultural and regionally Alternative meanings of words Cultural aspects in decision making processes – potential impacts Cultural aspects in understanding of messages – potential impacts | | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|--|------------------------------------|--|
| Communications | | |
| Demonstrate and explain data collection Formal messages - ship reporting Ship-ship Ship-shore Shore-ship Shore-shore Electronic data exchange Ship-ship Ship-shore Shore-ship Shore-shore | R2, R3, R16, R28, R35, R37, R41 | A6 and A7 for documented case studies. |
| Explain the use of a communications plan of action Define as routine / non-routine Define emergencies – incidents / accidents Identify objectives Define resources Formulate plan in accordance with contingency plan Consider “worst case” / “what if” scenario Modify plan or objectives as necessary | R19, R28, R37, R41 | A6 and A7 for documented case studies and scenarios of maritime disasters Exercises |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|---|-----------|--------------|
| <p>Demonstrate the use of messages and reports</p> <ul style="list-style-type: none">Formal messages to vessels: information/warning/advice/instruction<ul style="list-style-type: none">PhrasingTimingContentFormal messages - waterway information: information/warning/advice/instruction<ul style="list-style-type: none">PhrasingTimingContentFormal messages - allied services: information/warning/advice/instruction<ul style="list-style-type: none">PhrasingTimingContent | R19, R58 | |
| <p>Special reports</p> <ul style="list-style-type: none">PhrasingTimingContent <p>Informal messages</p> <ul style="list-style-type: none">PhrasingTimingContent | | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|---|--------------------|--------------|
| Log and record keeping | | |
| List and describe logs and records used by VTS Accuracy of logs & records Factual Complete Chronological Legible Standardised Retention of logs & records Manual: as per national statutory requirements Electronic: as per national statutory requirements Legal implications Statistical process control Local/national/international database for accident investigation | R28, R37, R41, R44 | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|---|-----------|--------------|
| <p>Describe the methods of keeping a log</p> <p>Manual log keeping</p> <ul style="list-style-type: none">Introduction to manual logs<ul style="list-style-type: none">PurposeBenefitsDifficultiesMethods of recording<ul style="list-style-type: none">Hand writtenPrinted copyFiling<ul style="list-style-type: none">PurposeStorageAccess <p>Electronic log keeping</p> <ul style="list-style-type: none">Introduction to electronic logs<ul style="list-style-type: none">PurposeBenefitsDifficultiesMethods of recording<ul style="list-style-type: none">VoiceRadar/videoElectronic data input devices | | |
| <p>State the purposes and requirements for statement and report writing</p> <ul style="list-style-type: none">StatutoryElectronic and manualLegal implications | | |



MODULE 6 VHF RADIO

6.1 INTRODUCTION

Instructors for this module should have the knowledge, comprehension and the ability to apply VHF radio communication techniques in a VTS environment. If this cannot be achieved, then the appropriate expert should cover certain sections of this module. Every instructor should have full access to simulation equipment. In addition, arrangements should be made, if practicable, for trainees to visit operational VTS centres.

6.2 SUBJECT FRAMEWORK

6.2.1 Scope

This syllabus covers the requirement for VTS Operators to be able to transmit voice and data messages using radio sub-systems and equipment for the purpose of fulfilling the functional requirements of VTS centres.

This course covers the theory and practice of using basic VHF radio equipment to transmit and receive calls, messages and information by radiotelephony, the Digital Selective Calling (DSC) system and VHF Automatic Identification System (AIS).

6.2.2 Aims

On completion of the course the trainees will have the ability to transmit and receive, efficiently and effectively, voice and data radio communications by all radio sub-systems used in VTS provided by the Competent Authority concerned, in accordance with international regulations and procedures.

They will also know the procedures used in radiotelephone and radio data communications and be able to use radiotelephones and radio data equipment, particularly with respect to VTS, distress, safety and navigational messages.

Trainees will also have the skills to ensure that English language messages (SMCP) relevant to VTS are correctly handled.

If suitable facilities are available it is possible to give the trainees realistic exercises on the transmission and reception of radio traffic within a VTS area. Integrated exercises involving several radio stations could also be carried out.



6.3 SUBJECT OUTLINE OF MODULE 6

Table 15 Subject outline – VHF radio

| Subject Area | Recommended Competence Level | Recommended Hours | |
|--|------------------------------|--------------------------|-----------------------|
| | | Presentation s/ Lectures | Exercises/ Simulation |
| Radio operator practices and procedures GMDSS Restricted Operator’s Certificate (ROC) or internationally recognised radio certification | Level 4 | | |
| VHF radio systems and their use in VTS Frequencies in the VHF maritime mobile band (ITU RR Appendix S18) National frequency assignments to VTS | Level 3 | | |
| Operation of radio equipment Introduction to basic VTS VHF radiotelephone, DSC and AIS equipment Controls and operation of VHF radiotelephone equipment Controls and operation of VHF DSC equipment Controls and operation of VHF AIS equipment | Level 4 | | |
| Communication procedures, including SAR VHF radiotelephone procedures VHF DSC communication procedures VHF AIS communication procedures Equipment failure and channel saturation | Level 3 | | |
| | | Total 15 hours | Total 42 hours |



6.4 DETAILED TEACHING SYLLABUS OF MODULE 6

Table 16 Detailed teaching syllabus – VHF radio

| Subjects / Learning Objectives | Reference | Teaching Aid |
|--|---------------------------------|-----------------------|
| Radio operator practices and procedures | | |
| <i>Describe and perform exercises on radio operator practices and procedures</i> | | |
| GMDSS Restricted Operator’s Certificate (ROC) Internationally recognised radio certification | R10, R33, R28, R29, R30, R31 | A12 or A13, E1, E5 |
| VHF radio systems and their use in VTS | | |
| <i>Describe VHF radio systems and their use in VTS</i> | | |
| Frequencies in the international VHF maritime mobile band Single frequency and two frequency channels Simplex working Semi duplex Duplex working Port operation and ship movement frequencies Distress, safety and calling frequencies Radiotelephone DSC Automatic Identification Systems (AIS) Introduction to AIS | R10, Appendix S18 | |
| Restrictions on the use of Radio Regulations (RR) Appendix S18 frequencies | R10, Appendix S18 | |
| National frequencies assigned to VTS Assignment and use of single and two frequency channels for VTS purposes National restrictions on the use of RR Appendix S18 frequencies | R37 | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|--|--|-----------------------|
| Operation of radio equipment | | |
| <i>Describe and demonstrate the operation of radio equipment</i> | | |
| Introduction to basic VTS VHF radiotelephone, DSC and AIS equipment Principles, controls and operation of VHF Channel spacing Modulation Range | R35 | A12 or A13, E1, E5 |
| Principles, controls and operation of DSC Format of a transmission sequence Message composition Error checks Principles, controls and operation of AIS Format of a transmission sequence Message composition Automatic and manual modes | R34 R29 R30 R18, R25, R34, R31, R47, R51, R53 | |
| Communication procedures, including SAR | | |
| <i>Describe and demonstrate the communication procedures, including SAR</i> | | |
| VHF Radiotelephone procedures Distress, urgency, safety and calling DSC communication procedures using VHF Distress, urgency, safety and calling AIS communication procedures using VHF Distress, urgency, safety and calling Equipment failure and channel saturation | R13, R21, R28, R29, R34 R29, R30 R18, R25, R34, R31, R47, R51, R53 R34 | A12 or A13, E1, E5 |



MODULE 7 PERSONAL ATTRIBUTES

7.1 INTRODUCTION

Instructors for this module should have experience of human relationships in the VTS field. If this cannot be achieved, then an appropriate expert should cover certain sections of this module.

In addition, instructors of other modules should continuously monitor the personal attributes of trainees and, when appropriate, draw their attention to the need to meet the learning objectives of this module.

7.2 SUBJECT FRAMEWORK

7.2.1 Scope

This syllabus addresses the requirement for VTS Operators to perform their duties properly under all conditions including emergencies and stressful situations. It is recommended that the contents of this module be presented to the trainees in the early stages of the course.

7.2.2 Aims

On completion of the course trainees will have the knowledge and ability to conduct their duties in a manner which conforms to accepted principles and procedures established by the Competent Authority concerned.

7.3 SUBJECT OUTLINE OF MODULE 7

Table 17 Subject outline – Personal attributes

| Subject Area | Recommended Competence Level | Recommended Hours | |
|--|------------------------------|--------------------------|-----------------------|
| | | Presentation s/ Lectures | Exercises/ Simulation |
| Interaction with others and human relation skills Public relations Establishing and sustaining a good working relationship with VTS stakeholders Negotiations with VTS stakeholders Successful conflict resolution Team working skills | Level 2 | | |
| Responsibility and reliability Safety awareness Health awareness Punctuality Attentiveness Importance of maintaining the trust of all VTS stakeholders | Level 4 | | |
| | | Total 6 hours | Total 4 hours |



7.4 DETAILED TEACHING SYLLABUS OF MODULE 7

Table 18 *Detailed teaching syllabus – Personal attributes*

| Subjects / Learning Objectives | Reference | Teaching Aid |
|--|-----------|--------------|
| Interaction with others and human relation skills | | |
| <i>Have the knowledge and ability to conduct their duties in a manner which conforms to accepted principles and procedures.</i> | | |
| Describe public relations policy General introduction to the maintenance of good public relations. The media and press and their requirements. Information that can be provided to others and the manner of its release. Dealing with traumatised individuals. | | |
| Describe how to establish and sustain working relationships Internal External Importance of maintaining the trust of all VTS stakeholders Ship masters Pilots Other authorities and organisations Allied services | | |
| Identify methods of conflict resolution When and how to intervene Internal External | | |
| Describe the benefits of team working skills Characteristics of leaders and followers Adaptability/ flexibility Diplomacy | | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|---|-----------|--------------|
| Ability to analyse the role of VTS Decision making process Taking initiative Prioritising tasks Thinking critically Communicating with team members Assertiveness | | |
| Responsibility and reliability | | |
| Explain the role of health and safety performing the VTS mission Personal safety Safety of VTS stakeholders Personal health Causes of stress Managing work related stress Managing personal stress Substance abuse | | |
| Cite the reasons for time management Relief of watch Planning Reducing fatigue | | |
| Describe how professionalism and mission focus is important Working climate Team spirit Awareness of personal circumstances | | |



MODULE 8 EMERGENCY SITUATIONS

8.1 INTRODUCTION

Instructors for this module should have the knowledge, comprehension and the ability to apply emergency practices and procedures in a VTS environment. If this cannot be achieved, then the appropriate expert should cover certain sections of this module. Every instructor should have full access to simulated VTS. In addition, arrangements should be made for trainees to visit operational VTS centres and Rescue co-ordination centres, if conditions allow it.

8.2 SUBJECT FRAMEWORK

8.2.1 Scope

This syllabus covers the requirement for VTS Operators to be able to respond rapidly and effectively to emergency situations that may arise within a VTS area.

This course covers the theory and practice of responding to emergency situations and wherever practicable, maintaining an efficient flow of marine traffic while the emergency situation is being dealt with. It also provides knowledge and comprehension of the co-ordination necessary to minimise the effect of any emergency situation.

8.2.2 Aims

On completion of the course trainees should have knowledge of related national and international regulations and procedures relating to emergency situations, security alerts, pollution response and other special circumstances. They should also have the ability to identify properly the type and scale of an emergency, activate the relevant contingency plan, ensure the protection of the VTS area and, as far as practicable, maintain a safe flow of marine traffic.

The trainees should also have sufficient understanding and practice to be able to co-ordinate effectively with allied services, particularly search and rescue authorities.

Trainees should be given realistic exercises on the role of VTS during emergency situations within a VTS area. Integrated exercises on handling emergency situations should also be carried out.

8.3 SUBJECT OUTLINE OF MODULE 8

Table 19 Subject outline – Emergency situations

| Subject Area | Recommended Competence Level | Recommended Hours | |
|---|------------------------------|--------------------------|-----------------------|
| | | Presentation s/ Lectures | Exercises/ Simulation |
| International, national, regional and local regulations Scope of responsibility and authority to act Local regulations, bye laws | Level 2 | | |
| Contingency plans Introduction, preparation and implementation of contingency planning Preparation and use of checklists | Level 2 | | |
| Prioritise and respond to situations Ascertain nature of incident Commence alerting procedures Navigational warnings Co-ordination with, and support to, allied services Maintaining communications Updating of situation reports | Level 3 | | |
| Record activities concerning emergencies Objective of recording activities during emergency situations Introduction to methods of recording activities during emergency situations Information which should be recorded security of recorded information | Level 3 | | |
| Maintain a safe waterway throughout emergency situations Maintaining traffic management and monitoring procedures | Level 3 | | |
| Internal/external emergencies Procedures for individual emergencies Maintenance of VTS Operations | Level 3 | | |
| | | Total 12 hours | Total 10 hours |



8.4 DETAILED TEACHING SYLLABUS OF MODULE 8

Table 20 *Detailed teaching syllabus – Emergency situations*

| Subjects / Learning Objectives | Reference | Teaching Aid |
|--|--|--------------|
| International, regional and local regulations | | |
| <i>Explain national and international regulations and procedures relating to emergency situations, security alerts, pollution response and special circumstances</i> | | |
| Scope of responsibilities and authority to act in emergency situations (local/regional/national/international) | R5, R6, R7, R13, R24, R28, R35, R38, R39, R40 | |
| Local regulations, bye laws Supporting and allied services Define the supporting and allied services which are available Define the assets which are available for deployment | R35 | |
| Contingency plans | | |
| <i>Describe the preparation and implementation of contingency plans</i> | | |
| Introduction, preparation and implementation of contingency plans Collisions Groundings Marine pollution (air/water) Fire Hazardous cargoes SAR incidents, including man overboard Other contingency plans including, but not limited to the following: medical, casualty evacuation, special weather conditions Organisations to be alerted Simultaneous emergencies | R13, R35, R36, R38, R39, R40, R41 | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|--|--|--------------|
| Describe the preparation and use of checklists Introduction and use of checklists Description of a checklist Authority to prepare, implement, issue and update checklists | R37 | |
| Prioritise and respond to incidents | R13, R41, R58 | A14 |
| <i>Explain the steps in classification of an emergency situation and explain the activation of the relevant contingency plans</i> | | |
| Prioritise incident: - Data collection - Evaluation - Classification of incident Response planning and action: - Commence alerting procedures - Maintaining safe and efficient flow of traffic - Co-ordination with, and support to, allied services - Updating of situation reports - Navigational warnings (if required) May include but not be limited to: - Collisions - Groundings - Marine Pollution - Fire - Hazardous cargoes - SAR incidents - Other special circumstances | R13, R23, R28, R35, R37, R41, R53, R55, R58 | |



| Subjects / Learning Objectives | Reference | Teaching Aid |
|---|--------------------|--------------|
| Record activities concerning emergencies | | |
| <i>Describe objectives and procedures for recording activities during emergency situations, including methods, the information recorded and security of information</i> | | |
| Objective of recording activities during emergency situations Introduction to methods of recording activities during emergency situations Information which should be recorded Security of recorded information | R17, R53, R55 | |
| Maintain a safe waterway throughout emergency situations | R35, R37, R41, R58 | A14 |
| <i>Describe the actions required to ensure the protection of the VTS area and, as far as practicable, maintain a safe and efficient flow of traffic</i> | | |
| Maintaining traffic management and monitoring procedures Alternative routing arrangements Diversionary procedures (traffic in immediate incident area) Anchorage areas Introduction of emergency speed restrictions Emergency alterations to VTS sailing/route plans and passage plans | | |
| Internal/external emergencies | R35, R37, R41, R58 | |
| <i>Describe the procedures for dealing with internal/external emergencies affecting normal operations of a VTS centre</i> | | |
| Procedures for individual emergencies Checklists Maintenance of VTS Operations Communications Traffic image | | |



ANNEX 1 VTS OPERATOR COMPETENCE CHART

| Competence Area | Knowledge, understanding and proficiency | Methods for demonstrating competence | Criteria for evaluating competence |
|---------------------------------------|---|--|--|
| Module 1 Language | <p><i>English Language and language authorised by the Government</i></p> <p>Adequate knowledge of the English language and the language authorised by the Government to enable the operator to use charts, nautical publications and regulations; to understand meteorological, waterway, port management and safety information and to communicate with other ships, shore facilities and agencies.</p> <p>Ability to use and understand the IMO Standard Marine Communication Phrases</p> | <p>Examination and assessment of evidence obtained from practical instruction.</p> <p>Standard language assessment as used by the Government, see Annex 3 – Example of English language tests.</p> | <p>English language publications, regulations and messages relevant to the safety of the VTS area are correctly interpreted or drafted.</p> <p>Written and verbal reports regarding vessels and shore facilities relating to the VTS area are correctly interpreted or drafted.</p> <p>Communications by any means are clear and understood.</p> <p>Written reports</p> <p>Oral communication (articulation and enunciation)</p> <p>Reading skills</p> |
| Module 2 Traffic management | <p><i>Regulatory requirements</i></p> <ol style="list-style-type: none">1. relevant national and international regulations;2. implications of legal liabilities related to VTS functions;3. safety related ship certificates. | <p>Examination and assessment of evidence obtained from practical instruction and on the job training</p> | <p>Legislative requirements relating to the VTS area and the protection of the marine environment are correctly identified</p> |
| | <p><i>VTS environment</i></p> <ol style="list-style-type: none">1. traffic patterns;2. VTS area. | <p>Examination and assessment of evidence obtained from practical instruction and approved simulator and on the job training</p> | <p>Demonstrate the ability to carry out the task safely and effectively</p> |



| Competence Area | Knowledge, understanding and proficiency | Methods for demonstrating competence | Criteria for evaluating competence |
|-----------------|--|---|---|
| | <p><i>Traffic monitoring and organisation</i></p> <p>Thorough knowledge of relevant national and international regulations, procedures, equipment, skills and techniques involved in monitoring and organising vessel traffic.</p> | <p>Examination and assessment of evidence obtained from simulated and on the job training for the following traffic configurations</p> <ol style="list-style-type: none">1. off-shore;2. coastal;3. harbour approach and ports;4. inland waterway. | <p>Demonstrate a knowledge of the VTS operational area, including geographical features, traffic routing measures and aids to navigation</p> <p>Demonstrate a knowledge of the procedures for maintaining a safe and efficient waterway</p> |



| Competence Area | Knowledge, understanding and proficiency | Methods for demonstrating competence | Criteria for evaluating competence |
|------------------------------|--|---|---|
| Module 3 Equipment | <i>Basic equipment</i> 1. Telecommunications; 2. Radar; 3. Audio/video; 4. VHF/DF; 5. Performance monitoring. | Examination and assessment of evidence obtained from practical instruction and approved simulator and on the job training | Demonstrate the ability to operate the equipment safely and effectively and to monitor its performance. Information obtained from the equipment and associated features is correctly interpreted and analysed taking into account the limitations of the equipment and prevailing circumstances and conditions |
| | <i>Basic systems</i> 1. Computerised; 2. Management information; 3. Manual tracking; 4. Radar tracking. | Assessment of evidence obtained from approved simulated and on the job training. | Demonstrate the ability to operate the systems safely and effectively. Information obtained from the systems and associated features is correctly interpreted and analysed taking into account the limitations of the system and prevailing circumstances and conditions |
| | <i>Evolving technologies</i> 1. ECS; 2. VTMIS; 3. AIS. | Assessment of evidence obtained from approved simulated and on the job training. | Demonstrate the ability to understand the techniques and to operate the equipment safely and effectively |



| Competence Area | Knowledge, understanding and proficiency | Methods for demonstrating competence | Criteria for evaluating competence |
|---------------------------------------|--|---|--|
| Module 4 Nautical knowledge | <i>Carry out chartwork</i> Knowledge of and ability to use navigational charts and related publications 1. Chart information and terminology; 2. Plotting positions on charts; 3. True and magnetic courses; 4. Course/speed/distance/time calculations; 5. Tides and currents; 6. Traffic patterns; 7. Charts and publications corrections. | Examination and assessment of evidence obtained from practical instructions and approved simulated and on the job training using chart catalogues, charts and navigational publications | The information obtained from navigational charts and publications is relevant, interpreted correctly and properly applied. Tools associated with chart work are properly manipulated, work carried out on the chart is easily interpreted and adheres to indicated standards. Calculations and measurements of navigation information are accurate. |
| | <i>Collision regulations</i> Understanding of the content, application and intent of the International Regulations for Preventing Collisions at Sea (COLREGS). | Examination and assessment of evidence obtained from practical instruction and approved simulated and on the job training | Demonstrate the ability to interpret the application of the regulations relevant to a VTS area. |
| | <i>Aids to Navigation</i> Knowledge of various buoyage systems and electronic aids to navigation systems. | Examination and assessment of evidence obtained from practical instruction and approved simulated and on the job training. | Demonstrate the ability to interpret the effect of aids to navigation on the traffic flow in a VTS area. |
| | <i>Navigational aids</i> Basic understanding of Shipboard Navigational Equipment and electronic means of navigation (Radar, Compasses, ECDIS, ECS, etc.) | Assessment of evidence obtained from approved simulated and on the job training. | Demonstrate the ability to interpret the effect of aids to navigation on the traffic flow in a VTS area. |



| Competence Area | Knowledge, understanding and proficiency | Methods for demonstrating competence | Criteria for evaluating competence |
|-----------------|---|---|---|
| | <p><i>Shipboard Knowledge</i></p> <p>Basic understanding of:</p> <ol style="list-style-type: none">1. Ship terminology;2. Different types of ships and cargo, including dangerous goods codes;3. Ship stability;4. Propulsion systems;5. External forces;6. Vessel bridge procedures. | <p>Examination and assessment of evidence obtained from practical instruction and approved simulated and on the job training.</p> | <p>Demonstrate the ability to assimilate all available information relevant to ship design, meteorological and hydrographic conditions that may influence the flow of traffic within a VTS area</p> |
| | <p><i>Port operations</i></p> <p>Knowledge of port operations.</p> <p>Knowledge of and ability to coordinate information relating to:</p> <ol style="list-style-type: none">1. Pilotage;2. harbour operations (including contingency plans);3. security;4. tugs and towing;5. ships agents;6. other allied services. | <p>Examination and assessment of evidence obtained from practical instruction and approved simulated and on the job training</p> | <p>Demonstrate the ability to assimilate all available information relevant to port operations and allied services that may influence the flow of traffic within a VTS area</p> |



| Competence Area | Knowledge, understanding and proficiency | Methods for demonstrating competence | Criteria for evaluating competence |
|--|--|--|---|
| Module 5 Communication co-ordination | <i>General communication skills</i> Knowledge of: <ol style="list-style-type: none"> 1. aspects of inter personal communication; 2. problems which can block or hinder the communication process; 3. the difference between verbal and non-verbal aspects of communication; 4. cultural aspects that can hinder the acquisition of a common understanding of messages communicated. | Assessment of skills in overcoming communication problems intentionally introduced in a simulated environment | Demonstrate the ability to avoid the introduction of communication problems and to overcome such problems when they are experienced |
| | <i>Co-ordinate various communications between marine and marine related agencies.</i> <ol style="list-style-type: none"> 1. Routine; 2. Emergency; 3. Support functions. | Assessment of evidence obtained from approved simulated and on the job training | Demonstrate the ability to prioritise, relay and co-ordinate various communications between marine and marine related agencies, both on board participating vessels and in shore facilities |
| | <i>Log keeping</i> <ol style="list-style-type: none"> 1. Manual; 2. Electronic. | Assessment of evidence obtained from approved simulated and on the job training | Demonstrate the ability to accurately maintain Logs |
| Module 6 VHF Radio | <i>Transmit and receive information using VHF radio equipment</i> <ol style="list-style-type: none"> 1. Radio operator practices and procedures; 2. VHF radio systems and their use in VTS; 3. Operation of radio equipment; 4. Communication procedures, including SAR. | Examination and assessment of evidence obtained from practical demonstration of operational procedures using: <ol style="list-style-type: none"> 1. approved equipment; 2. communication simulator; where appropriate 3. radio communication laboratory equipment, where appropriate. | Transmission and reception of communications comply with international regulations and procedures and are carried out efficiently and effectively. English language messages relevant to the VTS area are correctly handled. |



| Competence Area | Knowledge, understanding and proficiency | Methods for demonstrating competence | Criteria for evaluating competence |
|--|--|--|--|
| Module 7 Personal attributes | <i>Diplomacy</i> Knowledge of, and ability to perform: <ol style="list-style-type: none">1. public relations;2. operational telephone conversations;3. negotiations with other interested parties. | Assessment of evidence obtained from approved simulated and on the job training. | Conduct conforms to acceptable principles, including confidentiality, and procedures established by the Competent Authority concerned. |
| | <i>Time management</i> Demonstrate skills required to perform and prioritise multiple and varying tasks Demonstrate initiative and critical thinking skills in dealing with unexpected circumstances | Assessment of evidence obtained from approved simulated and on the job training. | Conduct conforms to acceptable principles and procedures established by the Competent Authority concerned. |
| | <i>Reliability</i> Demonstrate <ol style="list-style-type: none">1. punctuality;2. thoroughness;3. decisiveness. | Assessment of evidence obtained from approved simulated and on the job training | Conduct conforms to acceptable principles and procedures established by the Competent Authority concerned. |
| | <i>Stress management</i> Demonstrate decision making skills when dealing with routine situations, emergency situations, panic stricken people and other unexpected circumstances. | Assessment of evidence obtained from approved simulated and on the job training | Conduct conforms with acceptable principles and procedures established by the Competent Authority concerned. |



| Competence Area | Knowledge, understanding and proficiency | Methods for demonstrating competence | Criteria for evaluating competence |
|---|--|--|--|
| Module 8 Emergency situations | <i>Response to contingency plans</i> Knowledge of related national and international regulations concerning distress, pollution prevention and special circumstances and demonstrate the ability to: <ol style="list-style-type: none">1. prioritise and respond to situations;2. commence alerting procedures;3. co-ordinate with allied services; and4. record activities. while continuing to maintain a safe waterway in all aspects. | Assessment of evidence obtained from approved simulated and on the job training. | Type and scale of emergency properly identified. Activate the relevant contingency plan appropriate. Actions undertaken ensure the protection of the VTS area and, as far as practicable, maintain a safe flow of marine traffic |



ANNEX 2 TEACHING AIDS AND REFERENCES

Teaching aids that the participants ideally should have access to:

- A1 Simulated VTS environment capable of meeting the training objectives
- A2 Briefing/debriefing area for simulations, including facilities for modelling performance and reviewing recorded exercises
- A3 Charts and associated publications
- A4 Examples of Notices to Mariners applicable to a VTS area
- A5 Ship models
- A6 Video recording and playing facilities
- A7 Audio recording and playing facilities
- A8 Interactive language laboratory
- A9 Personal computer
- A10 Simulator exercises to practice operational maritime English
- A11 Examples of equipment and systems capable of being manipulated in a manner similar to the equipment and systems used in VTS centres
- A12 Interactive VTS simulator, including VHF facilities
- A13 Simulated VHF DF system including digital selective calling facilities
- A14 Appropriate video films;
- A15 Manuals, strip cards and other facilities for use with the monitoring systems being taught
- A16 Appropriate interactive video
- A17 Guest speakers
- A18 Case studies

Equipment recommended for each participant:

- E1 Headset/microphone with press to talk (PTT) facilities
- E2 Logging system
- E3 For chartwork exercises, desks approximately 1 metre long by 0.7 metres width, with drawers for chart stowage
- E4 Protractor, parallel ruler, dividers, nautical almanac, charts of a VTS area, calculator, chart correcting facilities
- E5 Audio tapes of recorded VTS communications



References relevant to the planning of VTS training:

- R1* SOLAS '74 Regulation V/10 – Ships' routing
- R2* SOLAS '74 Regulation V/11 - Ship reporting systems
- R3* SOLAS '74 Regulation V/12 - Vessel traffic services
- R4* SOLAS '74 Regulation V/27 - Nautical charts and nautical publications
- R5* SOLAS '74 Regulation V/7 – Search and rescue services
- R6* United Nations Convention on the Law of the Sea (UNCLOS)
- R7* International Regulations for Preventing Collisions at Sea, 1972 (COLREGS)
- R8* International Maritime Dangerous Goods Code (IMDG Code)
- R9* International Convention on Standards of Training, Certification and Watchkeeping of Seafarers, 1978, as amended in 1995 (STCW Convention)
- R10* Seafarer's Training, Certification and Watchkeeping Code (STCW 95 Code)
- R11* IMO GMDSS Manual
- R12* IMO publication on Ships' Routing
- R13* IMO/ICAO Publication "International Aeronautical and Maritime Search and Rescue (IAMSAR) manual" - in three volumes:
 - Vol 1 – Organization and management (IMO 960)
 - Vol 2 – Mission co-ordination (IMO 961)
 - Vol 3 – Mobile facilities (IMO 962)
- R14* IMO Assembly resolution A.705(17), Promulgation of Maritime Safety Information (MSI)
- R15* IMO Assembly resolution A.772(18), Fatigue factors in manning and safety
- R16* IMO Assembly resolution A.851(20), General principles for ship reporting systems and ship reporting requirements, including guidelines for reporting incidents involving dangerous goods, harmful substances and/or marine pollutants
- R17* IMO Assembly resolution A.857(20), Guidelines for Vessel Traffic Services
- R18* IMO Assembly resolution A.917(22), as amended by resolution A.956(23) on Guidelines for the onboard operational use of shipborne automatic identification systems (AIS)
- R19* IMO Assembly resolution A.918(22), Standard Marine Communication Phrases
- R20* IMO Assembly resolution A.950(23), Maritime Assistance Service (MAS)
- R21* IMO Assembly resolution A.954(23), Proper use of VHF channels at sea
- R22* IMO Maritime Safety Committee resolution MSC.232(82), Revised performance standards for Electronic Chart Display and Information Systems (ECDIS)
- R23* IMO COMSAR/Circ.15 - Joint IMO/IHO/WMO Manual on Maritime Safety Information (MSI)
- R24* IMO MSC/Circ.1014, Guidelines on fatigue mitigation and management
- R25* IMO SN/Circ.244, Guidance on the use of the UN/Locode in the destination field in AIS messages
- R26* International Code of Signals
- R27 IHO approved documents of charts and publications
- R28 ITU Radio Regulations, including Appendices



- R29 ITU-R Recommendation M.493, DSC for use in the maritime mobile services
- R30 ITU-R Recommendation M.541, Operational procedures for the use of DSC equipment in the maritime mobile services
- R31 ITU-R Recommendation M.1371, Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile band
- R32 IELTS Handbook - British Council, or equivalent.
- R33 Marine Communications Handbook - Lloyds of London
- R34 Equipment and system operating manuals
- R35 National, regional and local legislation and regulations on VTS, ports, harbours, pilotage and allied services
- R36 National Notices to Mariners pertaining to VTS
- R37 National procedures and standards for operation of VTS
- R38 National procedures and standards for operation of International Convention for the Prevention of Pollution from Ships (MARPOL)
- R39 National arrangements for intervention, pollution and salvage
- R40 Local/regional contingency and emergency requirements
- R41 IALA Vessel Traffic Services Manual
- R42 IALA Aids to Navigation Guide (NAVGUIDE)
- R43 International Maritime Buoyage System (MBS), published by IALA
- R44 IALA Recommendation V-103, Standards of training and certification of VTS Personnel
- R45 IALA Recommendation V-119, Implementation of Vessel Traffic Services
- R46 IALA Recommendation V-120, Vessel Traffic Services in Inland Waters
- R47 IALA Recommendation V-125, The Use and Presentation of Symbology at a VTS Centre (including AIS)
- R48 IALA Recommendation V-127, Operational procedures for Vessel Traffic Services
- R49 IALA Recommendation V-128, Operational and technical performance requirements for VTS equipment
- R50 IALA Guideline 1017, Assessment of Training Requirements for Existing VTS Personnel, Candidate VTS Operators and Revalidation of VTS Operator Certificates
- R51 IALA Guideline 1026, AIS as a VTS tool
- R52 IALA Guideline 1027, Designing and implementing simulation in VTS Training at Training Institutes/VTS Centres
- R53 IALA Guidelines 1028, The Automatic Identification System (AIS) Volume 1, Part I Operational Issues
- R54 IALA Guideline 1032, Aspects of Training of VTS Personnel relevant to the introduction of the Automatic Identification System
- R55 IALA Guideline 1045, Staffing levels at VTS centres
- R56 IALA Guideline 1050, Management and Monitoring of AIS Information
- R57 IALA Guideline 1056, Establishment of VTS Radar Services (Ed 1)
- R58 IALA Guideline 1068, Provision of a Navigational Assistance Service by Vessel Traffic Services



- R59 IALA Guideline 1070, VTS role in managing Restricted or Limited Access Areas
- R60 IALA Guideline 1071, Establishment of a Vessel Traffic Service beyond territorial seas

*There is an annual catalogue of IMO Publications, many of which are printed in languages other than English. The catalogue provides ISBN and IMO references to these publications and the price, together with order forms which may be faxed. Additionally, training organisations and course co-ordinators should note that groups of publications are also made available online, and may be a more convenient method of obtaining some of the data that they require.

The catalogue contains a list of national distributors who maintain stocks of IMO Publications.

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ANNEX 3 EXAMPLE OF ENGLISH LANGUAGE TESTS

In the United States of America the Test of English as a Foreign Language (TOEFL) is used and in the United Kingdom the International English Language Testing System (IELTS) is used. Other countries also have similar testing systems.

IELTS, which is jointly managed by the University of Cambridge Local Examinations Syndicate, the British Council and IDP Education Australia, provides an assessment of whether candidates are ready to study or train in the medium of English. It is recognised widely as a language requirement for entry to courses in teaching of English further and higher education. It is readily available at test centres around the world, which arrange test administration according to local demand.

The IELTS system uses band scores that are recorded on a test report form showing overall ability as well as performance in listening, reading, writing and speaking. There are 9 bands ranging from:

Band 1 - “Non-user” For a person who essentially has no ability to use the language beyond possibly a few isolated words; to,

Band 9 - “Expert user” For a person with full operational command of the language; with complete understanding, and who uses the language appropriately, accurately and fluently.

IELTS is a test for general English and the nearest test considered applicable for trainee VTS Operators is that for General Training. It is recommended that the overall ability level be IELTS Band 5, Modest User, or the equivalent in similar testing systems.

Modest User is defined as:

Has partial command of the language, coping with overall meaning in most situations, though is likely to make many mistakes. Is not able to use complex language.