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| IALA Model Course |

L2.8.1

AIDS TO NAVIGATION - Technician Training

Level 2 - AIS-AtoN Operations

Edition 1.0

May 2013

Revisions to this IALA Document are to be noted in the table prior to the issue of a revised document.

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| Date | Page / Section Revised | Requirement for Revision |
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FOREWORD

The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) recognises that training in all aspects of Aids to Navigation (AtoN) service delivery, from inception through installation and maintenance to replacement or removal at the end of a planned life-cycle, is critical to the consistent provision of that AtoN service.

Taking into account that under the SOLAS Convention, Chapter 5, Regulation 13, paragraph 2; Contracting Governments, mindful of their obligations published by the International Maritime Organisation, undertake to consider the international recommendations and guidelines when establishing aids to navigation, including recommendations on training and qualification of AtoN technicians, IALA has adopted Recommendation E-141 on Standards for Training and Certification of AtoN personnel.

IALA Committees working closely with the IALA World-Wide Academy have developed a series of model courses for AtoN personnel having E-141 Level 2 technician functions. This model course on AtoN Service Craft and Buoy Tenders should be read in conjunction with the Training Overview Document IALA WWA.L2.0 which contains standard guidance for the conduct of all Level 2 model courses

This model course is intended to provide national members and other appropriate authorities charged with the provision of AtoN services with specific guidance on the training of AtoN technicians in an introduction to service craft and buoy tenders. Assistance in implementing this and other model courses may be obtained from the IALA World Wide Academy at the following address:

The Dean

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1. - COURSE OVERVIEW

# SCOPE

This course is intended to provide technicians with the theoretical training necessary to have a basic understanding of the principles of operation of AIS-AtoN.

This introductory course is intended to be supported by further training modules on theoretical aspects of AIS-AtoN Operations. Details of these supporting model courses can be found in the Level 2 Technician training overview document IALA WWA L2.0.

# OBJECTIVE

Upon successful completion of this course, participants will have acquired sufficient knowledge and skill to understand the principles of operation of AIS within their organisations.

# COURSE OUTLINE

This course is intended to cover the knowledge required for a technician to understand the principles of operation of AIS-AtoN. The complete course comprises 5 classroom modules, each of which deals with a specific subject covering aspects of AIS-AtoN operations. Each module begins by stating its scope and aims, and then provides a teaching syllabus.

# TEACHING MODULES

1. Table of Teaching Modules

|  |  |  |
| --- | --- | --- |
| Module Title | Time in hours | Overview |
| Purpose & Principles of AIS | 6.0 | Description of the purpose of AIS as an aid to navigation and to shipping and how it works |
| AIS-AtoN Base Station and repeaters | 2.0 | This module describes the purpose of an AIS base station and an overview of its operation |
| AIS-AtoN | 2.0 | This module provides an overview of the part of the AIS AtoN functions |
| Installation, configuration, MMSI & Slot Management | 3.0 | This module will provide a satisfactory understanding to enable the technician to install, configure and commission an AIS-AtoN |
| Maintenance and Testing | 2.0 | An overview of the maintenance and testing requirements for an AIS AtoN |
| Evaluation | 1.0 | ?? |
| **Total Hours** | **18.0** | Three-day course |

# SPECIFIC COURSE RELATED TEACHING AIDS

This course involves classroom instruction only. Classrooms should be equipped with blackboards, whiteboards, and overhead projectors to enable presentation of the subject matter.

Examples of AIS units and programming units / PCs should be to hand to enable the student to gain practical application and programming skills during the course.

# ACRONYMS

To assist in the use of this model course, the following acronyms have been used:

AIS Automatic Identification System

AtoN Aid(s) to Navigation

ECDIS Electronic Chart Display and Information System

FATDMA Fixed-Access Time-Division Multiple Access

GNSS Global Navigation Satellite System

GRT Gross register tonnage

IALA International Association of Marine Aids to Navigation and Lighthouse Authorities

ITU International Telecommunication Union

ITU-R International Telecommunications Union – Radiocommunications Bureau

L Level

MKD Minimum Keyboard and Display

MMSI Maritime Mobile Service Identity

RATDMA Random Access Time-Division Multiple Access

SART Search and Rescue Transponder

SOLAS International Convention for the Safety of Life at Sea, 1974 (as amended)

SOTDMA Self-Organising Time-Division Multiple Access

TDMA Time-Division Multiple Access

VHF Very High Frequency (30 MHz to 300 MHz)

WWA World Wide Academy

# DEFINITIONS

The definition of terms used in this Guideline can be found in the International Dictionary of Marine Aids to Navigation (IALA Dictionary) at <http://www.iala-aism.org/wiki/dictionary>.

# REFERENCES

In addition to any specific references required by the Competent Authority, the following material is relevant to this course:

1. IALA NAVGUIDE.
2. IALA Recommendation A-123 The Provision of Shore Based Automatic Identification System (AIS).
3. IALA Recommendation A-124 Automatic Identification System (AIS) Shore Station and Networking Aspect relating to the AIS Service.
4. IALA Recommendation A-126 The Use of the Automatic Identification System (AIS) in Marine Aids to Navigation Services.
5. IALA Guideline 1028 The Automatic Identification System (AIS) Volume 1, Part I Operational Issues.
6. IALA Guideline 1028 The Automatic Identification System (AIS) Volume 1, Part II Technical Issues.
7. IALA Guideline 1050 The Management and Monitoring of AIS Information.
8. IALA Guideline 1062 The Establishment of AIS as an AtoN.
9. IALA Guideline 1082 An Overview of AIS.
10. ITU Recommendation ITU-R M.1371 (latest edition) Technical characteristics for an automatic identification system using time-division multiple access in the VHF maritime mobile band.
11. Technical documentation from AIS manufacturers.
12. – TEACHING MODULES

# MODULE 1 – PURPOSE & PRINCIPLES OF AIS

## Scope

This module describes the purpose of AIS as an aid to navigation and to shipping.

## Learning Objective

To gain a **basic** understanding of the purpose of AIS in shipping safety and as an aid to navigation.

## Syllabus

### Lesson 1 – Purpose of AIS & AIS-AtoN

1. Principles of operation.
2. Overview of an AIS system.
3. Positive identification.
4. Limited Range.
5. Trackable:
   1. Satellite.
   2. Terrestrial.
6. Mandated carriage >300GRT

### Lesson 2 – Principles of Operation

1. Component parts:
   1. VHF Transceiver.
   2. Minimum keyboard display (MKD).
   3. GNSS Receiver.
   4. AIS Processor.
   5. Antennas.
2. User interfaces:
   1. MKD.
   2. ECDIS.
   3. Radar Display.
3. VHF bands:
   1. VHF Channels for AIS use.
   2. Licensing and MMSI.
4. TDMA Principles:
   1. Concepts of Time Slots of Different Stations.
   2. Slot Synchronisation to Avoid Conflict in Messages.
   3. Methods of Access for Stations.
   4. RATDMA.
   5. FATDMA.
   6. SOTDMA.

### Lesson 3 – AIS types

1. AIS AtoN:
   1. Type 1.
   2. Type 2.
   3. Type 3.
2. Class A.
3. Class B.
4. Base Station.
5. Repeaters.
6. AIS SART.

### Lesson 4 - AIS & AIS-AtoN Messages

1. IALA Recommendations A-126 and A-124.
2. Dynamic Voyage Information.
3. Static Voyage Information.
4. AIS AtoN Information.
5. Other Messages.
6. AIS Management Information.

# MODULE 2 – AIS BASE STATION AND REPEATER

## Scope

This module describes the purpose of an AIS base station and an overview of its operation.

## Learning Objective

To gain a **basic** understanding of the purpose and operation of an AIS base station.

## Syllabus

### Lesson 1 – Purpose of an AIS Base Station

1. Collection of AIS data for Vessel Traffic Monitoring.
2. Verification of AIS-AtoN performance.
3. Transmission of Virtual AtoN.

### Lesson 2 - Shore Based Infrastructure

1. Component parts of an AIS Base Station.
2. Slot reservation.
3. The Base Station Network:
   1. Control of network.
   2. Access and authority to access.

### Lesson 3 – Base Station Messages

1. Message 4 – Base Station Report.
2. Message 20 – Data Link Management Message (Slot Reservation).
3. Message 22 – Channel Management.

# MODULE 3 – AIS-AtoN

## Scope

This module provides an overview of the purpose of AIS as an AtoN.

## Learning Objective

To gain a **satisfactory** understanding of the purposes of AIS as and AtoN.

## Syllabus

### Lesson 1 – Purpose of AIS AtoN

1. Electronic display:
   1. ECDIS.
   2. Radar.
2. Remote monitoring of AtoN status.
3. Message 21 – AtoN report.

# MODULE 4 – INSTALLATION, CONFIGURATION, MMSI & SLOT MANAGEMENT

## Scope

This module provides an overview of the installation and configuration of AIS base station, repeaters and AIS-AtoN.

## Learning Objective

To gain a **satisfactory** understanding to enable the technician to install, configure and commission an AIS-AtoN.

## Syllabus

### Lesson 1 – AIS AtoN Installation

1. Antenna location:
   1. GNSS receiver location.
   2. VHF Antenna.
2. Power supply.
3. Watertight integrity.
4. Maintenance accessibility.

### Lesson 2 - AIS Configuration

1. Identification:
   1. MMSI.
   2. Name.
2. AIS AtoN programming:
   1. FATDMA / RATDMA.
   2. Position – Surveyed or GNSS:
      1. Guard radius.
      2. Off position.
   3. AtoN type.
   4. AtoN Status configuration.
3. Base Station Programming:
   1. Surveyed position.
   2. Slot configuration:
      1. For itself.
      2. For other nearby stations.
   3. Transmission interval (for Type 1).

### Lesson 3 – Practical programming

1. Practical programming of a sample AIS AtoN.
2. Tracking of serial numbers, configuration data and software version.

# MODULE 5 – MAINTENANCE AND TESTING

## Scope

This module provides an overview of the maintenance and testing requirements for an AIS AtoN.

## Learning Objective

To gain a **satisfactory** understanding to enable the technician to maintain and test an AIS AtoN.

## Syllabus

### Lesson 1 – AIS Maintenance

1. Visual inspection.
2. Cable and connection security and deterioration.
3. Damage and security of mounting.
4. Power supply.

### Lesson 2 - AIS Testing

1. Enhanced AIS Receiver:
   1. Signal Strength.
   2. Slot usage.
   3. Message content.
2. Base station information.