MODEL COURSE

C2001-8
MARINE AIDS TO NAVIGATION – TECHNICIAN TRAINING MAINTENANCE OF STEEL BUOYS

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DOCUMENT REVISION

Revisions to this document are to be noted in the table prior to the issue of a revised document. The latest edition of the Model Course is the only version in force unless the Model Course is explicitly revoked by the Council.

Date	Revision details	Approval
June 2016	Edition 1.0 Entire document, minor textual changes	
December 2021	Edition 2.0 Entire document, review of content	Review of content
June 2026	Edition 3.0 Entire document, minor textual and time in hours changes	Council 04

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FOREWORD

The International Organization for Marine Aids to Navigation (IALA) recognizes that training in all aspects of Marine 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.

Under the SOLAS Convention, Chapter 5, Regulation 13, contracting governments should undertake to take into account existing international recommendations and guidelines when establishing aids to navigation. A footnote is included referencing inter alias recommendations and guidelines of IALA.

IALA has adopted the normative Recommendation R0141 on Training and Certification of AtoN Personnel. In order to help Members of the Organization, AtoN authorities and other stakeholders worldwide to confirm with the provisions of the Recommendation a series of model courses covering elements of training for AtoN personnel have been developed by the Committees and the World-Wide Academy of the Organization (WWA).

It is intended that such courses shall be conducted by a training institute or an organization accredited by a competent authority in a Member State of the Organization or a Non-member State. This model course is intended to provide Members, AtoN authorities, and other appropriate stakeholders with specific guidance on the training of AtoN technicians in shore marks.

PART 1 - COURSE OVERVIEW

1. SCOPE

This course is intended to provide technicians with the practical and theoretical training necessary to have a satisfactory understanding of the maintenance of steel buoys.

This introductory course is intended to be supported by further training modules on theoretical and practical aspects of floating AtoN Details of these supporting model courses can be found in the C2000 Level 2 Technician Training Model Course Overview.

2. OBJECTIVE

Upon successful completion of this course, participants will have acquired sufficient knowledge and skill to maintain steel buoys whilst on the job within their authorities, organizations, or other stakeholders.

3. COURSE OUTLINE

This practical course is intended to cover the knowledge required for a technician to maintain steel buoys under supervision. The complete course comprises five classroom modules, each of which deals with a specific subject covering aspects of steel buoy maintenance. Module six comprises a site visit designed to consolidate theoretical and practical knowledge. Each module begins by stating its scope and aims, and then provides a teaching syllabus.

The required standard of competence is considered to be the level of proficiency that should be achieved for the proper performance of the duties carried out by the technician in their organization.

This Model Course is focused on the satisfactory level of competence.

Table 1 Levels of Competence

Competence Level	Learning Outcome	Instructional Objectives	Required skills
2	The conduct of routine tasks unsupervised and some more complex tasks under guidance	A satisfactory understanding of theoretical concepts and principles so that they can be applied in practice	Correctly acquired responses have become habitual. Actions can be performed confidently and efficiently

4. TEACHING MODULES

Table 2 Table of Teaching Modules

Module Title	Time in hours	Overview
Health and Safety	1	This module identifies the health and safety issues associated with steel buoy maintenance
Types of steel Buoys	0.5	This module describes the types of steel buoys in common use

Afloat Maintenance	1	This module describes maintenance that can be carried out whilst the buoy is on station
Ashore Maintenance – Dismantling/Rebuild	3	This module describes the dismantling and rebuilding of the buoy in the shore facility
Standards	0.5	This module describes the international and local standards pertinent to steel buoys
Site visit	2	To visit a buoy refurbishment facility to consolidate knowledge learned
Total Hours:	**8**	1 day course

5. SPECIFIC COURSE RELATED TEACHING AIDS

This course involves both classroom instruction and a visit to a buoy refurbishment facility. Classrooms should be equipped with appropriate teaching aids to enable the presentation of the subject matter.

6. ACRONYMS

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

AtoN	Marine Aids to Navigation
EN	English
IALA	International Organization for Marine Aids to Navigation
ISO	International Organization for Standardization
MBS	IALA Maritime Buoyage System
SOLAS	International Convention for the Safety of Life at Sea, 1974 (as amended)
WWA	World Wide Academy

7. DEFINITIONS

The definition of terms used in this Model Course can be found in the International Dictionary of Marine Aids to Navigation.

8. REFERENCES

The following material is relevant to this course:

1 IALA NAVGUIDE

2 IALA Recommendation R1001 on the IALA Maritime Buoyage System (MBS)

3 IALA Recommendation R0108 on Surface Colours used as Visual Signals on Aids to Navigation

4 IALA Guideline G1077 on Developing a maintenance strategy for Marine Aids to Navigation

5 Technical documentation from coating suppliers

PART 2 – TEACHING MODULES

1. MODULE 1 – HEALTH AND SAFETY

1.1. SCOPE

This module describes the health and safety issues associated with steel buoy maintenance.

1.2. LEARNING OBJECTIVE

To gain a satisfactory understanding of the health and safety issues associated with the maintenance of steel buoys.

1.3. SYLLABUS

1.3.1. LESSON 1 - HEALTH AND SAFETY

1 Personal Protective Equipment

2 Use of mobile crane

3 Control of heavy items being moved – buoy tipping and rolling

4 Fork lift trucks

5 High-pressure water jet

6 Grit blasting

7 Spray painting

8 Working at heights

9 General hand tools

10 Workplace risk assessment

11 Work hazards in confined spaces and hazardous atmospheres

12 Chemical hazards and Safety Data Sheets (SDS)

13 Biological Risk

14 Ergonomics and Biomechanical Factors

2. MODULE 2 – TYPES OF STEEL BUOYS

2.1. SCOPE

This module describes the types of steel buoys in common use.

2.2. LEARNING OBJECTIVE

To gain a satisfactory understanding of steel buoys in common use.

2.3. SYLLABUS

2.3.1. LESSON 1 - TYPES OF STEEL BUOYS

1 Tail tube buoys

2 Skirted buoys

3 Spar buoys

4 LANBY - Large Automatic Navigation buoys

5 Mooring buoys

6 Other types

7 Ballast weights

3. MODULE 3 – AFLOAT MAINTENANCE (See IALA C2001-5)

3.1. SCOPE

This module describes how steel buoys can be maintained afloat.

3.2. LEARNING OBJECTIVE

To gain a satisfactory understanding of how steel buoys can be maintained afloat.

3.3. SYLLABUS

3.3.1. LESSON 1 - INSPECTION

1 Review of cleaning – high-pressure water/mechanical (scrapers)

2 Coating condition

3 Mooring eye wear and lifting eye inspection

4 Cathodic protection inspection

5 Damage inspection

3.3.2. LESSON 2 – MAINTENANCE

1 Localized painting

2 Marine growth and guano removal

3 Mooring eye wear build-up or mooring eye replacement

4 Paint fade

4. MODULE 4 – ASHORE MAINTENANCE – DISMANTLING AND REBUILD

4.1. SCOPE

This module describes the maintenance of steel buoys at a maintenance facility ashore.

4.2. LEARNING OBJECTIVE

To gain a satisfactory understanding of the maintenance of steel buoys at a shore facility.

4.3. SYLLABUS

4.3.1. LESSON 1 – DISMANTLING AND REPAIR

1 Marine growth and guano removal

2 Tail tube/ballast dismantling

3 Superstructure removal and dismantling

4 Thickness Measurement

5 Non-Destructive Testing (NDT)

6 Mooring eye – inspection and repair

7 Buoy repair (hull or superstructure), welding task.

8 Lifting eye testing

9 Pressure testing

10 Surface preparation:

a Water jet

b Grit blast

4.3.2. LESSON 2 - COATINGS

1 Coating application:

a Wet film thickness

b Dry film thickness

2 Paint composition – pigments, binders, solvents, additives

3 Paint types – alkyds, epoxies, polyurethanes, polysiloxanes, acrylated rubber, antifouling, etc

4 Galvanizing/zinc spray

5 Cathodic protection

4.3.3. LESSON 3 - REASSEMBLY

1 Superstructure assembly

2 Superstructure attachment

3 Dissimilar metals and their isolation

4 Galvanic Insulation Integrity

5 Solar unit attachment

6 Bridle attachment

4.3.4. LESSON 4 – INSPECTION AND TESTING

Final inspection prior to deployment:Pressure testing

a Mooring and/or lifting eye testing

4.3.5. LESSON 5 - END OF LIFE DISPOSAL

1 Disposal plan for end of life

2 Hazardous Waste Treatment

5. MODULE 5 – STANDARDS

5.1. SCOPE

This module describes the standards pertinent to steel buoys.

5.2. LEARNING OBJECTIVE

To gain a satisfactory understanding of the standards pertinent to the maintenance of steel buoys.

5.3. SYLLABUS

5.3.1. LESSON 1 - STANDARDS

1 IALA Recommendation R0108 on Surface Colours used as Visual Signals on Marine Aids to Navigation

2 Welding standards – e.g. BS EN 1011, BS EN ISO 5817

3 Materials standard – e.g. BS EN 10025

4 Spacing between different colours (colour breaks on Cardinal/Safe Water Marks etc.).

5 Surface preparation – e.g. BS EN ISO 8501

6 Local standards

7 Local standard operating procedures and record keeping

6. MODULE 6 – SITE VISIT

6.1. SCOPE

To visit a shore buoy maintenance facility.

6.2. LEARNING OBJECTIVE

To consolidate the knowledge learned from this course.

6.3. SYLLABUS

Visit a buoy maintenance facility or buoy tender to view the maintenance of steel buoys in operation.