ST. VINCENT AND THE GRENADINES

MARITIME ADMINISTRATION

CIRCULAR N° ISM 003

MSC.1/Circ.1253 SHIPBOARD TECHNICAL OPERATING AND MAINTENANCE MANUALS

TO: SHIPOWNERS & SHIPS' OPERATORS & MANAGERS

APPLICABLE TO: ALL SHIPS
ENTRY INTO FORCE: DATE OF CIRCULAR

Monaco, 11th February 2008.

This Administration hereby highlights importance that shipboard technical operating and maintenance manuals are in line with attached MSC.1/Circ.1253 dated 26th October 2007 and with IACS Recommendation 71 " Guide for the development of shipboard technical manuals".

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MSC.1/Circ.1253
26 October 2007

SHIPBOARD TECHNICAL OPERATING AND MAINTENANCE MANUALS

1 The Maritime Safety Committee, at its eighty-third session (3-12 October 2007), considered the recommendation that the attention of all relevant stakeholders needs to be drawn to the importance of ships' crews having access to up-to-date, accurate and user-friendly shipboard technical operating and maintenance manuals, particularly for safety-critical marine equipment.

2 The Committee noted that there exists a global and competitive marketplace for marine equipment and that seafarers were expected to assimilate different equipment fitted on board quickly and operate them efficiently. Also, seafarers were expected to be able to move from ship to ship with few restrictions; this flexibility being essential for the efficient management of human resources. Consequently, seafarers are likely to encounter a wide variety of equipment fitted on board.

3 The Committee also noted that the availability on board ships of up-to-date and accurate operating and maintenance manuals could be enforced via the implementation and enforcement mechanisms of the International Safety Management (ISM) Code.

4 The Committee further noted IACS Recommendation No.71 (dated September 2000) Guide for the development of shipboard technical manuals and agreed that this Guide provided a useful reference for those responsible for developing such manuals.

5 In light of the foregoing, Member Governments are invited to:

.1 recognize the necessity for up-to-date, accurate and user-friendly shipboard technical operating and maintenance manuals to be available on board ships;

.2 recommend that IACS Recommendation No.71 is used as a model for shipboard technical operating and maintenance manuals;

.3 recommend that shipboard technical operating and maintenance manuals should be provided in the working language of the ship and if the working language is not English, French or Spanish, a translation into English, or French, or Spanish should be provided; and

.4 encourage ship designers and shipbuilders to provide diagrams and drawings explaining the operation of integrated ship systems as well as emergency operation of such ship systems, recognizing that ship systems may be composed of several individual pieces of equipment,

and bring the above to the attention of shipowners, ship masters, shipbuilders, recognized organizations and, in particular, manufacturers of equipment for safety-critical marine equipment.

IACS

Recommendation 71

GUIDE FOR THE DEVELOPMENT OF SHIPBOARD TECHNICAL MANUALS

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No.71 (Sept. 2000) Guide for the development of shipboard technical manuals

1. Scope

This guide provides criteria for the development of user friendly technical manuals for operation and maintenance of the ship and her equipment by means of easy retrieval and use of information.

This guide is not extensive but includes essential requirements concerning:
- manual form which is the physical arrangement and appearance of the manual;
- manual contents which is the information included in the manual;
- manual structure which is the logic of contents and how these related and belong together,
- manual presentation which is the layout and graphical appearance of the manual.

2. Background

A shipboard technical manual is a generic term for any document that explains how to use, maintain and operate the ships and its equipment. A technical manual is an essential part of the product and its usability has considerable importance for the ship operators. Accordingly, the provision of suitable shipboard manuals should be recognised as a major responsibility area.

3. Application

The criteria of this guide should be applied for the development of all part manuals covering operation and/or maintenance of the ship and its equipment.
This guide is applicable for both hard copy paper manuals and electron interactive manuals.

4. General

A manual should preferably apply to one equipment model or variant only; if more models or variants are included they should be dealt with in separate sections and it should be clearly stated which section apply to each model or variant and how each model or variant can be identified.

5. Form and Format

The manual form is the physical arrangement and appearance of the manual.

Specification of the manuals form and format should be based on a thorough assessment of the operators' need. The need depends on type of ship and equipment, operational characteristics and maintenance schemes.

5.1 Form

The manual form may include:
- reference books (hard copies and/or electronic versions);
- wall charts,
- label information.

Essential operating instructions and warnings should be repeated as labels or charts to be located on, or in the immediate vicinity of, the operating stand.

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5.2 Format - Hard copies

The manual format should be Standard A4 (or A5 for pocket versions).

5.2.1 Manual updating
Document control is essential. Manuals must be kept updated to reflect amendments and modifications. The manual bindings should be adapted to support efficient updating of information.

5.3 Format - Electronic version

5.3.1 Data format
Electronic manuals should be delivered in open standard format. Production of manuals should not be based on conversions between formats. Conversions between text editors or different versions of the same editor may often lead to loss in functionality and content.

5.3.2 Updating
The information should be arranged for easy updating. On-line connection will allow for direct updating (downloading) of information from manufacturer to ship operators' and onboard terminals.

6. Contents

The manual content is the information included in the manual.

6.1 General

Information should be accurate and complete. Text should be clear and concise. Sentences should be as short and simple as the subject allows. Paragraphs should be short.
Technical descriptions should be system or function based. Instructions should be procedure based. The information should be organised in a hierarchical and consistent manner by use of headings. Step numbering should be used to support the structuring into levels of information.
Illustrations (photo, drawings, and graphs) should be used to support information and instruction text.

6.2 Categories of information

The information should be arranged in categories according to their use. The following categories of information may be applicable:

a) Purpose and planning	(what is the system/equipment for);
b) Handling, installation, storage and transit	(how to prepare it for use);
c) Technical description	(how it works);
d) Operating Instructions	(how to use it);
e) Fault action list	(how to restore operating condition)
f) Maintenance instructions	(how to keep it working);
g) Maintenance schedules	(what is done when);
h) Parts list	(what it consist of);
i) Modification instructions	(how to change it),
j) Disposal instruction	(how to dispose of it).

Applicable sections depend of the complexity of equipment. Technical manuals should as a minimum include the information categories (c) – (h) arranged in a sequence according to the list above.

6.3 Technical description

The purpose is to provide shipboard personnel with appropriate understanding (familiarisation) of the build up and function of components and systems. The technical

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description should support the personnel in applying operational and maintenance instruction correctly and efficiently.

6.3.1 The content should explain how the various components are built, their individual function and how they interact with other components in a system. Drawings and graphic presentations should support written text.

Information should include:
- technical data, preferably in summary or tabular form, such as dimensions, weights, clearances, capacities, environmental requirements;
- means of verifying technical data, such as measurement and testing equipment,
- recommended tests, limits;

6.3.2 Technical descriptions should be system or function based. Illustrative presentation should preferably be used. The information should be logically arranged by break down of systems in a hierarchy of levels. The upper levels should provide a clear descriptive overview of the main system and its sub-systems. Reference should be given to detailed sub-system information in lower levels (step numbering).

6.4 Operating instructions

The purpose of operating instructions is to provide complete information and procedures for safe operations under normal, special and emergency conditions.
They should normally include:
- Background information;
- operating instructions;
- treatment of malfunctions.

Operating instructions should be suitable for use as training aids and provide basis for development of further training manuals.

6.4.1 Background information should provide the necessary background for the user to operate correctly under all conditions. Depending on the complexity of a system the information should include:
- the purpose, location and effect of operating controls and instruments described in logical order according to operating sequences;
- rules to be observed and tasks to be performed before, under and after operation;
- details of tests the operator should carry out to verify functional performance;
- limits and methods for assessing malfunction;
- hazardous condition which could arise from errors or malfunction identified,
- any team action or drill required.

6.4.2 Operating instructions should provide full details of the procedures to be followed in preparing, starting, running and shutting down a system under normal and emergency conditions.

Operating instructions should be procedure based and organised into hierarchical levels. Headings and step numbering should be used to support the sequence of application.

6.4.3 Higher level operating instructions should be limited to the essentials of the procedures and their effects. Flow charts, graphic or tabular forms should preferably be used to show the sequence of events. Further details should be referred to next level instructions or to background information.

6.4.4 The operating procedures should:
- appear in the order they are to be carried out;
- be set out in a step-by-step sequence;
- on graphic illustrations and associated text, use the same names as those used on labelled components and controls,
- use present tense for descriptions and imperative for instructions.

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6.4.5 Each operating procedure should include, as applicable:

- brief description, explaining the purpose of the procedure;
- list of major components involved;
- checks required to ascertain availability of safe function;
- step-by-step instruction for start up of the system ;
- operating limitations, checks and adjustments for safe and efficient operation;
- warnings and cautions with the identification of the hazards and hazard consequences to which they refer as well as any critical time constraints. Warnings and cautions should be placed on the same page and immediately before the step to which they apply.
- emergency actions to be taken in response to alarms and warnings.

6.5 Fault action list

Potential malfunctions that can be foreseen should be listed and appropriate corrective actions specified.

6.5.1 Malfunctions and faults should be listed in logical order according to the systems and functions in which they appear. Faults should be identified by their resulting characteristics (alarms, readings, abnormal sound, smoke or other detectable effects).

6.5.2 The list should include, as applicable, reference to relevant procedures for restoring normal condition.

6.6 Fault actions procedures

Procedures for treatment of malfunction should include:

- actions by the operator;
- actions by the maintenance team;
- actions requiring specialistic treatment

6.6.1 Operators' treatment of malfunction should include brief instructions for immediate actions and guidance and procedures to be followed in detecting, correcting and reporting any malfunction or failure that occurs, including:

- **Alarms**: their purpose, function, location of detectors and indicators, settings, automatic actions and manual actions to be taken;
- **Fault diagnosis** should be limited to those tasks the operator could be expected to do, such as noting malfunctions, abnormal symptoms or indications and recording alarms and trips,
- **Corrective procedures** should be limited to those tasks the operator could be expected to do, such as accepting alarms and resetting of trips, starting-up standby auxiliary plants and shut-down of malfunctioning components.

6.6.2 First level procedures for immediate actions should be available at the operating position. They should be brief, preferably in flow charts.

6.7 Maintenance instructions

The purpose is to provide the user with the information necessary to enable him to ensure that the ship and equipment is correctly maintained.

6.7.1 The content of maintenance instructions should include all tasks required to keep the ship and equipment operating to the intended performance and lifetime. Information should include the skills, materials and tools required for typical groups and levels of maintenance.

6.7.2 Instructions should include identification of potential hazardous conditions, which could occur, and necessary precautions such as permits, warnings and monitoring.

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6.7.3 The information should be divided into sections applicable to:
- tasks within the capability of onboard personnel during normal operation;
- tasks within the capability of expert maintainers attending on board,
- tasks carried out by expert personnel in a well equipped repair yard

First level instructions for onboard personnel should be limited to essential instructions for condition monitoring and periodical maintenance. First level instructions should refer to underlying levels for more detailed information.

6.7.4 The instructions should be grouped into routine maintenance, inspections and tests, overhaul and fault diagnosis. They should be arranged in logical relation to the maintenance schedules and presented step-by-step in the order they are to be applied.

6.8 Maintenance schedules

The purpose is to provide the user with the complete cycle of maintenance operations.

6.8.1 The content should include lists for all maintenance tasks to be carried out at specified intervals. Recommended condition monitoring or inspection should be incorporated. The listed tasks and the associated skills required should be compatible with the those indicated in the maintenance instructions.

6.8.2 Schedules should list maintenance tasks according to type of skills and be arranged according to the frequency of tasks. Each task should refer to the applicable maintenance instruction.

6.8.3 The individual maintenance schedules for components and systems should be consolidated into master schedules covering maintenance of complete systems, preferably the ship with all equipment in one schedule.

6.9 Parts Lists

The purpose is to provide the user with a means of identifying any part that may be referred to in the operation or maintenance of a component or system.

6.9.1 The contents of the parts list should contain the information necessary to identify and locate all parts, options and accessories, whether renewable or not, with detail of sources and mode of supply.

6.9.2 The parts list should include an illustration of the part and its position, preferably in exploded view. The part reference name should be used consistently throughout the manual.

7. Structure and Presentation

7.1 Structure

The manuals structure represents the logic of contents and how these relate and belong together.
The structure is expressed through the arrangement and organisation of information in the manuals. The operator, having learned the logic of the structure, should find it easy to locate and retrieve the correct information.

7.1.1 Encoding structure in text can be done using styles as known from common word processors or by using standard *document mark-up languages* like SGML [ISO 8779] or XML [W3C XML recommendation]. Mark-up languages also have the important advantage of separating structure from layout and presentation.

7.1.2 User categories
The need for information depends on the users' tasks, their competence and skill, operational characteristics and maintenance schemes. Ship builders, shipboard personnel

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and land-based personnel may need different type and level of information. This may require a split into levels of information to suit the various user categories.

If the manuals have to cover several categories of users the information should be arranged and identified in separate sections to meet each user category's need (ref. 5.2). Accordingly, information in each section should be expressed in a way that is easily comprehensible to the intended users (e.g. an expert engineer may need level of information that is not comprehensible for the average onboard personnel).

7.1.3 Levels of information
The manual content should be organised in a hierarchy of levels, supporting the presentation of content at different levels of detail. The top level should provide an overview of components, systems and connected essential instructions or data. The top level should brief and refer further details of information to the following levels.

7.2 Presentation

The manual presentation is the layout and graphical appearance of the manuals.
Presentation reflects the structure of the content. The primary purpose is to support information availability (content semantics and structure), e.g. using numbered lists or easing comprehension with illustrations.

7.2.1 Text
The legibility should be optimised by composing the text in accordance with the users' need under the circumstances in which it will be used. Brief sentences should be used. Each statement should be limited to a single task.

7.2.2 Illustrations
Illustrations are excellent means of providing the user with a visual introduction to the systems or components.
Photos or graphic drawings should be used for describing equipment details.

Graphics should be used to provide a view of:
- internals (exploded view);
- arrangements (location of components and their connection in a system),
- wiring diagrams.

7.2.3 Balance text and illustrations
The users' need should be the first consideration when deciding the mix of text and illustrations. Use of illustrations is recommended where they will convey information more quickly or clearly than text.
Illustrations should be used to create an overview and support the text in the upper level information. Text and illustrations should be entirely complementary to shorten and simplify the presentation.
The overview illustration may have references to next level information (more detailed illustration and text).

7.2.4 Technical terms
Terms and their definitions should also be given in a glossary including applicability and presentation of:
- units;
- terminology;
- signs and symbols,
- abbreviations.

Technical terms, which are not common to the onboard personnel, should be explained in the text when they are first used. In the text a component should be referred to by its name.

7.2.5 Cross-references
Any references to information in another part of the manual should include the number

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of the paragraph, page, figure or table.

7.2.6 Warnings and cautions

The treatment of warnings and cautions should be explained in the preliminary pages of the manuals. Details should be given of the treatment of general warnings and cautions that apply throughout the text and of specific warnings and cautions that apply at particular points in the text.
Warnings and cautions should be in order of priority, the most important appearing first.

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