

The development of teaching material on life-saving appliances

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Abstract

Accidents involving lifeboats and launching appliances during periodic drills on board have increased in number. It is reported that these accidents are attributable to the crew's "lack of knowledge," "lack of experience," and "poor maintenance" of the device. The authors, in cooperation with several companies and MET organizations, have created a DVD program on life-saving appliances, aiming to educate both in-service and pre-service seafarers. While this DVD program focuses on the operation and maintenance of life-saving appliances, it also aims to provide seafarers with basic knowledge about life-saving appliances in general.

1 Introduction

Although maintaining the safety of life-saving appliances is crucial, there have been frequent reports of accidents taking place with lifeboats in the past years (Gibson 2008). Typical causes of accidents include an erroneous reset of the release device of the lifeboat, inadvertent operation of the release handle, and the malfunction of the On-load/Off-load release gear system (Sandberg 2007). The need to improve the status quo is already widely recognized, and the Paris and Tokyo MOUs, for instance, have a plan to launch a concentrated inspection campaign on lifeboats in 2009 (in Trade Winds 2007). According to the analyses of accidents with lifeboats, the accidents are attributable mainly to two factors: lack of maintenance and poor training. So far, measures have been taken to establish a better maintenance and inspection system (MSC.1/Circ.1206), and training of service engineers for the lifeboat system is being promoted by the lifeboat and launching appliances makers worldwide. As for the second factor of the accident, providing seafarers with knowledge and skills on life-saving appliances, in conjunction with periodical drills, is supposedly the most effective solution to reduce the number of accidents.

In response to this need, the authors, collaborating with several manufacturers, shipping companies and MET organizations in Japan, have created a DVD program on life-saving appliances. The program covers the fundamentals on the operation procedures of lifeboats, rescue boats, and liferafts, as well as directions on how to use personal life-saving appliances and visual signals, with abundant visual information.

In this article, the summary and features of the developed material will be given first. Next, we will focus on the release gear and review how it is treated in the DVD program, since quite a few accidents involving failing of a lifeboat at the time of maintenance and inspection have been reported, and one of the major causes of these accidents is said to be a mishandling of the lifeboat release gear.

2 Features of the DVD program

The DVD program is titled “Life Saving Appliances,” and the subtitle is “Operation and Maintenance Fundamentals.” It is approximately 60 minutes long. The photo of the DVD cover is shown in Figure 1.

The DVD program consists of the Prologue and eight chapters. Following the Prologue, which provides general information about life saving appliances and contents of the program, the viewers may select one of the following chapters from the chapter list: “Totally-Enclosed Lifeboats,” “Free-fall Lifeboats,” “Rescue Boats,” “Inflatable Liferrafts,” “Accessories for Lifeboats and Liferrafts,” “Immersion Suits and Lifejackets,” and “Maintenance and Inspection of Life-Saving Appliances.” Alternatively, it is possible to view them all. The program is meant to allow viewers to acquire the necessary knowledge and fundamental skills in handling life-saving appliances through self-study. In chapters dealing with rescue boats and liferafts, the launching appliances are dealt with as well. The contents of the DVD and the summary of each life-saving appliances included in the program are available in the Appendix.

For a mastery of safe handling of life-saving appliances, especially of lifeboat and rescue boat systems, it is essential that seafarers have a full understanding of the structure of the system as well as of the functions and movements of each component. However, there are certain systems, e.g., the On-load/Off-load release gear system, the water spray system, and the air spray system, which are built inside the boat hull and are usually invisible. With this type of device, it is not easy to grasp the whole structure. Furthermore, with such equipment as free-fall lifeboats, it is neither easy nor practicable to conduct frequent on-board lowering and recovery drills. It is therefore difficult for seafarers to accurately master the operation procedure for this type of equipment.

We believe that our DVD program is useful and beneficial, in that it offers prospective solutions to the difficulties mentioned above. For instance, one section is devoted to the On-load/Off-load release system, in which the structure and movements of the system are introduced and described in a comprehensive

way. Not only videos but also mock-ups and animation are employed for a better understanding.

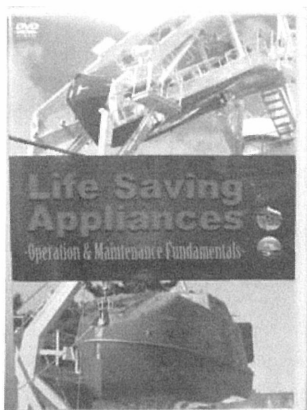


Fig. 1 Cover of the DVD

As for the operation of life-saving appliances, lowering and recovery operation procedures of the lifeboat, implemented in the orders given in Figure 2, are explained step by step, along with precautions required at each step. For the purpose of warning against mishandling, operations that are considered dangerous, such as inching operation at the time of gravity lowering, are demonstrated and presented using real video clips as well. In the case of the free-fall lifeboat, thorough descriptions and demonstrations of lowering and recovering are provided by video and animation.

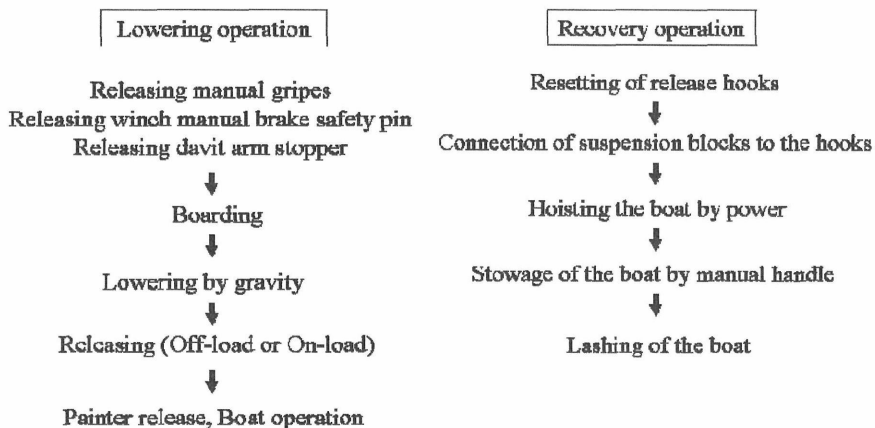


Fig. 2 Lowering and Recovery operation of a lifeboat

3 On-load/Off-load release gear system

In this section, we will focus on the On-load/Off-load release gear system of lifeboats, since this is the area where a large number of accidents have been reported. The structure of the system, the structure of each component, its functions and movements, on-load release operation, off-load release operation, and resetting operation, all of which are dealt with in the DVD program, will be succinctly explained and reviewed.

3.1 On-load/Off-load release gear arrangement

The release gear is composed of a hook unit, a release handle unit, a control cable, hydrostatic interlock unit, and an interlock cable. Since each component is assembled inside the boat hull, a computer graphic as in Figure 3 is utilized so that the viewer can obtain a clear image on how the units and components are connected and related to one another.

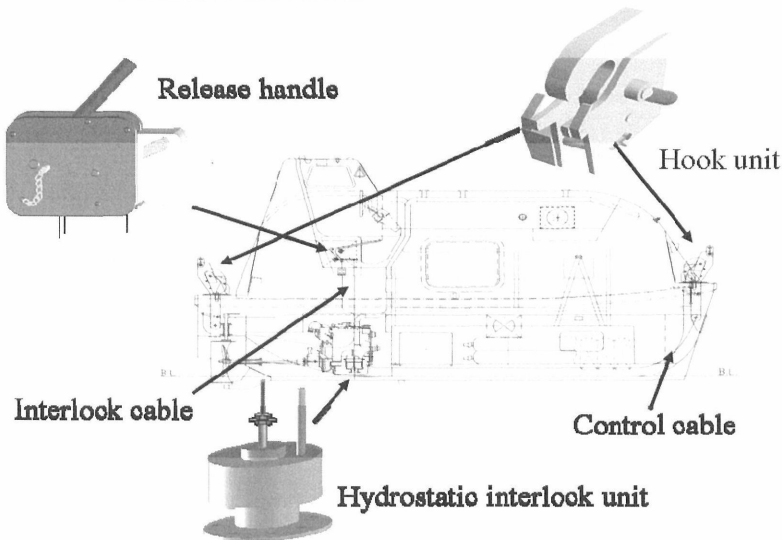


Fig. 3 On-load/Off-load release gear arrangement

The hydrostatic interlock unit, which prevents lifeboat falling that can take place due to erroneous operation, is usually installed inside the boat hull and is invisible. Thus, the structure and movements are explained by employing video clips and computer graphics as in Figure 4. In addition, two types of hydrostatic interlock unit are introduced in the following way:

There are two types of hydrostatic interlock unit: one is the “direct system,” which controls the detected water pressure directly through an interlock cable, and the other is the “electric type,” which electrically controls the interlock lever with pressure signals to operate the relay and the solenoid.

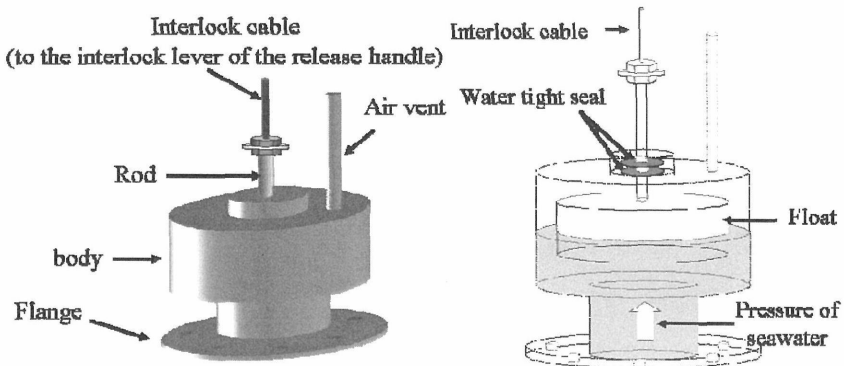


Fig. 4 Structure of the hydrostatic interlock unit

3.2 Off-load release operation

Off-load release operation is a normal way of release which is carried out when the lifeboat is waterborne and there is no load on the release hooks.

When the lifeboat is touching the water surface, the hydrostatic interlock unit described in 3.1 is activated. Thus, the release handle interlock is unlocked, and it becomes possible to operate the release handle. In the program, computer graphics as in Figure 5 were used to explain the mechanism, since the movement of the release handle unit is not visible from outside.

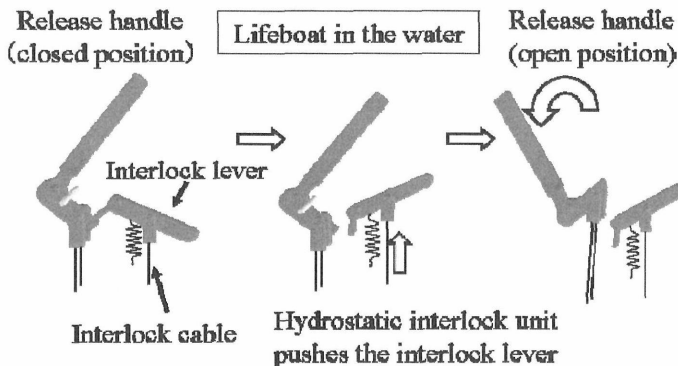


Fig. 5 Action of the release handle unit during off-load release operation

It is also necessary to understand the movements of the components after the release handle has been pulled down to the point where the release hooks are released. As is shown in Figure 6, by pulling the release handle, the cam lever pin is turned by the control cable and the lock piece is then made free, allowing the hook to be turned and released. In demonstrating this, a mock-up of the actual device is used.

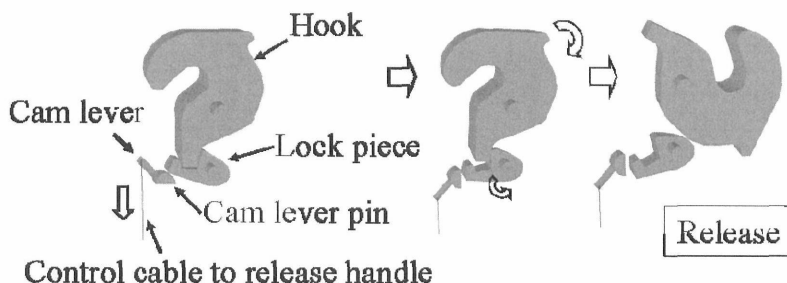


Fig.6 Release process of the hook unit

3.3 On-load release operation

“On-load release” is an operation which is performed when the hooks are not released due to malfunction of the hydrostatic unit, or when the sea is rough and a normal off-load release operation is difficult.

The seafarers should, therefore, fully understand that this operation is to be reserved for emergency use only, and they also need to acquire a good knowledge of how the device functions at the time of this operation. They must perform the operation under the command of an officer in charge and only after safety is confirmed, keeping in mind that a failure to do so may lead to a serious accident, such as falling of the lifeboat.

The general procedure of the on-load release is explained as follows, using a mock-up:

In conducting an on-load release, first, open the cover of the interlock device. Lift the hydrostatic interlock lever fully, and while holding it, insert the securing pin to release the interlock. Then, pull out the safety pin of the release handle, and pull the release handle to the fully open position by one action.

Movements of the release handle unit at the time of on-load release operation shown in Figure 7 are also demonstrated by making use of a mock-up.

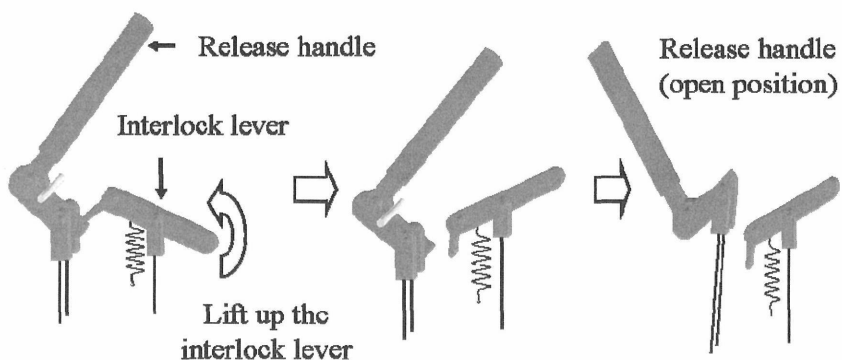


Fig.7 Action of the release handle unit during on-load release operation

3.4 Resetting procedure

Many accidents involving lifeboats take place at the time of recovery, 70% of which are said to be attributable to the inadvertent resetting of the release gear. Accordingly, it is essential to have the seafarers master the resetting operation, which is to be carried out by three operators in the procedure presented in Figure 8. It is also important to clear up the confusion of the users often caused by the existence of so many different types of release gear in use.

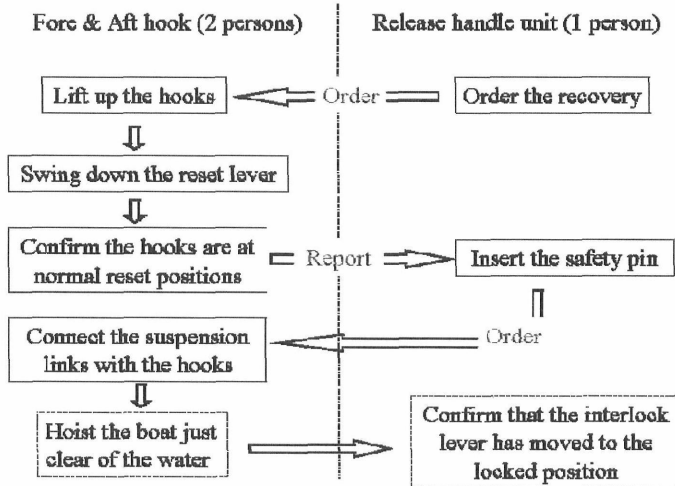


Fig. 8 Resetting procedure of release gear

As a solution to these problems, two different types of release gear were prepared, and while giving step-by-step instructions on the operation procedures, we clarified the following three points:

- (1) Complete reset of the release hook is essential in recovery operation. Incomplete reset may lead to suspension by a single hook or falling of the lifeboat, resulting in a fatal accident.
- (2) There are various types of release hooks. Regardless of the type, incomplete reset is suspected when the safety pin cannot be smoothly inserted or when an extra force is required in putting back the release handle.
- (3) Ensure that the reset hooks have been reset normally, and insert the safety pin. If resetting is found incomplete, go back to the beginning of the procedure and redo each step.

4 Conclusion

In this article, we reported on the contents and features of our new DVD program on life-saving appliances aimed at educating seafarers. The DVD deals with all sorts of life-saving appliances, with a special emphasis on lifeboat systems and On-load/Off-load release gear system of lifeboat, their operation, inspection and maintenance. This teaching material contains abundant visual information that cannot be always fully covered in ordinary training such as boat drills. By viewing the program, we expect that both in-service and pre-service

seafarers will find something new. It is hoped that every seafarer will obtain basic knowledge and skills on life-saving appliances essential in an emergency situation and that they can be further applied to specific life-saving appliances on ships they will get onboard.

References

- [1] D A Gibson; Operating lifeboats, Seaways, March 2008, pp 3-4
- [2] Alf Martin Sandberg; Lifeboat accidents with “on load” release hooks, Gard conference on lifeboat hooks, Oct. 18, 2007, Arendal, Norway
- [3] MOUs to launch lifeboat campaign; Trade Winds, Nov. 9, 2007, p43

Appendix

Contents and Summary of *Life Saving Appliances: Operation & Maintenance Fundamentals*

I	Prologue: General Introduction
	By giving the number of accidents involving lifeboats and launching appliances, the significance and necessity to acquire operation and maintenance fundamentals is emphasized for accident prevention. This is followed by the overview of the contents.
1	Lifeboat standards/specifications/functions regulated by SOLAS Convention and LSA Code
2	Types of lifeboat: totally-enclosed, partially-enclosed, and fire-protected
3	Types of launching appliances: gravity-type and free-fall type
II	Totally-Enclosed Lifeboats
1	Outline of lifeboat system: Explains the structure of launching appliance and lowering mechanism of lifeboat.
2	Lowering & launching operation: Shows step-by-step procedures to be followed on the ship's deck prior to embarkation.
3	Post-boarding preparations: Deals with operations necessary inside the lifeboat for swing-out and lowering.
4	Off-load release & on-load release: Indicates when to use which release, and how. Structure and mechanism of release gear system is also provided.
5	Off-load release: Demonstrates step-by-step operations.

6	On-load release: Demonstrates step-by-step operations.
7	Recovery operation: Starts with reset procedure of release gear system, followed by operations for hoisting and stowage of the lifeboat.
8	Recovery strap: Shows how to use recovery strap in rough seas.
9	Fire-protected lifeboats: Describes operation with a focus on water spray system and air supply system.
III	Free-Fall Lifeboats
	Plenty of visual information on launching and recovery operations enables the viewers to obtain a clear image on the handling of free-fall lifeboats.
1	Outline of free-fall lifeboat: Mentions the requirements of bulk carriers of 500 gross tonnage and upwards to be equipped with a free-fall lifeboats. A schematic of the davit and winch is provided.
2	Launching operation of free-fall lifeboat: Describes general procedure on how to launch a free-fall lifeboat. Includes warnings peculiar to free-fall lifeboats as well, e.g., prohibiting the use of lifejackets by the crew onboard.
3	Launching by davit arm: Shows an alternative way to launch, i.e., to launch by use of davit arm.
4	Recovery operation of free-fall lifeboat: Serves as a precious visual aid to understand the operations which are usually reserved for boat drills.
IV	Rescue Boats
1	Succinctly describes the outline of rescue boat: Three types of rescue boats, their specifications and capacity, the outfit of the operator, well as the structure of the winch and the hook.
2	Lowering operation of rescue boat: Explains typical operations, as well as how to handle difficult situations e.g., when the power supply is cut off.
3	Recovery of rescue boat: Shows the operations to be followed one by one.
4	Recovery operation of rescue boat under bad weather: Describes how to use recovery strap in bad weather.
V	Inflatable Liferrafts
1	Inflatable liferafts in accordance with 96 SOLAS: Explains general information, such as materials used, how they are stored, and what kinds of accessories are stored or attached and when they are to be used.
2	Dropping type liferafts: Describes the structure of dropping type liferafts with both weak-link type and older type, and provides in detail two ways of release, manual and automatic, along with their mechanism, and how the release is completed in various situations.
3	Automatic release device & weak link: Shows how the painter and the weak link are connected to the body or the cradle. Also gives cautions to be taken prior to drop launch.

4	Liferaft Embarkation: Explains ways and cautions at the time of embarking a liferaft, and what to do after the crew embark e.g., to cut the painter and read and follow "Instructions for Immediate Action." Describes items in the accessories bags and its usage. Also provides righting method of liferaft in an inverted position and a technique to adjust boat position with a use of sea anchor.
5	Launching of liferaft using davit: Shows the davit launching method. Describes when the raft inflates, how the crew get onboard and the liferaft is launched.
6	Launching of carry & drop type liferaft: First briefly gives the requirement of installation of carry & drop type liferaft, followed by showing operation peculiar to this type.
VI	Accessories for Lifeboats and Liferafts
	First shows common accessories for lifeboats and liferafts one by one. Also mentions kinds of distress signals and visual signals and their uses.
1	Accessories common to lifeboats & liferafts
2	Special accessories for lifeboats
3	Special accessories for liferafts
4	Optional accessory
5	Distress signals: EPIRB and SART
6	Visual signals: Self-activating smoke signal, buoyant smoke signal, self-igniting light, rocket parachute signal, rocket star signal, hand flare, lifebuoy, and line-throwing appliance.
VII	Immersion Suits and Lifejackets
	Specifications and performance of immersion suits and lifejackets, as well as how to don them, are given.
1	Immersion Suit: Discusses performances of immersion suits with inherent insulation and non-inherent insulation, as well as their required specifications. Those with buoyant type and non-buoyant type, as well as anti-exposure suit, are also dealt with.
2	Lifejacket: Describes lifejacket of rigid type and inflatable type. Also mentions the requirement of a buddy-line and a lifting loop from 2010 following the revised SOLAS.
VIII	Inspection and Maintenance
	Weekly and monthly inspection and maintenance to be carried out by the crew onboard a ship is covered. Checkpoints for components of the lifeboat/liferaft systems are listed.