



**The Bahamas
Maritime Authority**

THE COMMONWEALTH OF THE BAHAMAS

M.V HARMONY OF THE SEAS

IMO NUMBER: 9682875

OFFICIAL NUMBER: 7000798



**Report of the marine safety investigation into a lifeboat
fall during an abandon ship drill on the 13th September
2016 in Marseille, France**

The Bahamas conducts marine safety or other investigations on ships flying the flag of the Commonwealth of the Bahamas in accordance with the obligations set forth in International Conventions to which The Bahamas is a Party. In accordance with the IMO Casualty Investigation Code, mandated by the International Convention for the Safety of Life at Sea (SOLAS) Regulation XI-1/6, investigations have the objective of preventing marine casualties and marine incidents in the future and do not seek to apportion blame or determine liability.

It should be noted that the Bahamas Merchant Shipping Act, Para 170 (2) requires officers of a ship involved in an accident to answer an Inspector's questions fully and truly. If the contents of a report were subsequently submitted as evidence in court proceedings relating to an accident this could offend the principle that individuals cannot be required to give evidence against themselves. The Bahamas Maritime Authority makes this report available to any interested individuals, organizations, agencies or States on the strict understanding that it will not be used as evidence in any legal proceedings anywhere in the world.

This marine safety investigation was conducted by the coastal State according to the provisions of the Transportation Code and in accordance with the Casualty Investigation Code MSC.255(84). The Bahamas Maritime Authority participated in the marine safety investigation and duly recognized as a substantially interested State. We would like to thank BEAmer for producing this report and for their continued cooperation.

Date of Issue: 24th May 2017
Bahamas Maritime Authority
120 Old Broad Street
LONDON
EC2N 1AR
United Kingdom

Marine investigation report

MARITIME OCCUPATIONAL ACCIDENT

Fall of lifeboat during an abandon ship drill
aboard the cruise ship

HARMONY OF THE SEAS

ON 13 SEPTEMBER 2016

At Marseille (one casualty, two severely injured)

Warning

This report has been drawn up according to the provisions of Transportation Code, specially clauses L.1621-1 to L.1622-2 and R.1621-1 to R.1621-38 relating to technical and safety investigations after marine casualties and terrestrial accidents or incidents and concerning the implementation of directive 2009/18/CE on the investigation of accidents in the maritime transport sector and in compliance with the «°Code for the Investigation of Marine Casualties and Accidents°» laid out in Resolution MSC 255 (84) adopted by the International Maritime Organization (IMO) on 16 May 2008 and published by decree n° 2010-1577 on 16 December 2010.

It sets out the conclusions reached by the investigators of the *BEA*mer on the circumstances and causes of the accident under investigation and proposes safety recommendations.

In compliance with the above mentioned provisions, the analysis of this incident has not been carried out in order to determine or apportion criminal responsibility nor to assess individual or collective liability. **Its sole purpose is to improve maritime safety and the prevention of maritime pollution by ships.** The use of this report for other purposes could therefore lead to erroneous interpretations.

For your information, the official version of the report is written in French language. The translation in English language is to facilitate the reading of this report to those who are not French speakers.

REPORT CONTENT

1	SUMMARY	Page	30
2	FACTUAL INFORMATION		
2.0	Background	Page	30
2.1	Vessel	Page	32
2.2	Officers and crewmembers involved	Page	39
2.3	The accident	Page	40
2.4	The intervention	Page	42
3	NARRATIVE	Page	43
4	ANALYSIS	Page	44
4.1	Unbalance of lifeboat No.14	Page	44
4.2	Fall of the lifeboat	Page	47
5	CONCLUSIONS	Page	48
6	MEASURES TAKEN BY THE SHIOWNER	Page	49
7	LESSONS	Page	50
8	RECOMMENDATION	Page	50
9	APPENDICES		
A.	Abbreviation list	Page	52
B.	Investigation decision	Page	53
C.	Vessel	Page	55
D.	Analysis by the Chief Officer Safety	Page	69

1 SUMMARY

On 13 September 2016 at *Marseille*, an abandon ship drill planned for a part of the crewmembers of the cruise ship *HARMONY OF THE SEAS* was organised with the 9 port lifeboats. When lifeboat 14 was ready to be lowered with five men on board, the operator in position on deck 5 released the lowering winch brake. The lifeboat was then suddenly destabilized and fell into the sea. Soon after, a rescue party intervened and assessed that one of the sailors was unconscious and that the four others were injured.

The accident occurred at the beginning of the procedure of a lifeboat launching drill; only the steps helpful to understanding the accident will be described and analysed.

Within days after the accident, the shipowner recast the procedures for preparing and launching the lifeboats. These measures aim to prevent any risk of recurrent accident. Consequently, *BEA*mer does not issue any recommendation.

Organisation of the investigation: a *BEA*mer investigator went on board on the day of the accident in order to establish initial contact with the vessel's staff. On 20 September, the investigation team attended the hearings, held in the course of the judicial investigation, of the crewmembers involved in the accident. Although *BEA*mer investigators had been offered the opportunity to ask additional questions, it had been taken into consideration that the two sailors responsible for the preparation of the lifeboat were still in shock over the accident. During the following stops at *Marseille*, the investigation team interviewed the officers involved in the accident and were present at lifeboat launching manoeuvres, according to the procedures existing on the day of the accident, and according to the new procedures.

On 19 September, the investigation team participated in a meeting to analyse the findings of the inspectors from CSN of *Marseille* (Centre de Sécurité des Navires), during a Port State Control (PSC). Final report: see appendix D the analysis of the Chief Officer Safety.

2 FACTUAL INFORMATION

2.0 Background

HARMONY OF THE SEAS is owned by Royal Caribbean Cruises Ltd which provides also technical and commercial management.

During the summer period, the vessel is engaged in one week cruises in the Mediterranean Sea. The ports served are Barcelona, Palma de Majorca, Marseille (each Tuesday), La Spezia, Civitavecchia (Roma) and Napoli. The base port is Barcelona.

Regulation

The company applies the rules of the SOLAS convention (Safety Of Life At Sea).

Regarding the training of the crews, the familiarisation of the passengers, and the maintainability of the lifeboats, rules 19, 20 and 30 in chapter III of the convention apply:

Rule	Action/ persons involved	Frequency	Aim
Rule 30 §2	Abandon ship drill Each crewmember Drill before sailing if more than 25% of the crew hadn't participated in a drill for more than 1 month	weekly At least 1 per month	Crew training
Rule 19 §3.3	Launching and manoeuvre. Crewmembers assigned to rescue related duties	Every 2 months	Crew training
Rule 19 §2.2	Counting passengers at abandon ship muster stations. Passengers on an over 24 hours voyage	Before sailing or just after	Familiarization of the passengers
Rule 20 §6.3	Lifeboats moved from their stowed position, with no crew on board	weekly	Inspection
Rule 20 §7.1	Lifeboats turned out from their stowed positions with no crew on board. Check of equipment	Monthly	Inspection

2.1 Vessel

HARMONY OF THE SEAS was delivered in May 2016 by STX France.

- > OMI registration number : 9682875;
- > Flag : Bahamas;
- > Classification society : Det Norske Germanischer Lloyd;
- > Length overall : 362.12 m;
- > Breadth overall : 47.42 m;
- > Gross tonnage : 226 963;
- > Displacement : 106 042 mt;
- > Total electrical power : 96 000 kW;
- > Operating speed : 22.7 knots (at 78%);
- > Passengers capacity : 6780.

Oasis-class vessel; she surpasses her sister ships *OASIS OF THE SEAS* (delivered in 2009) and *ALLURE OF THE SEAS* (delivered in 2010) in size and energetic performances.

Survival craft

The installed capacity is greater than the regulatory capacity:

Survival craft	Regulation SOLAS chapter III rule 21.1	Installed capacity
18 lifeboats (370 persons per unit) 2 rescue boats	At least 75% of the total capacity: 6660 persons	$18 * 370 = 6660$ persons
4 evacuation systems (2 liferafts with 153 persons each) Rack of 4 additional 153 persons rafts Rack of 4 additional 101 persons rafts	Additional means to reach the total capacity: 2220 persons	$(8*153) + (4*153) + (4*101) = 2240$ persons
	8880 persons	8900 persons

Additional equipment

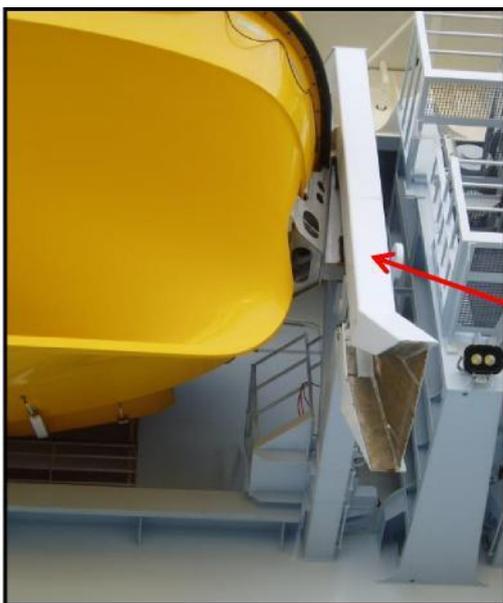
14 rafts with 153 persons	25% of the total capacity:	$(14 \times 153) + (2 \times 51) = \mathbf{2244 \text{ persons}}$
2 rafts with 51 persons	2220 persons	

Lifeboats

The 18 lifeboats are identical. Manufactured by *FASSMER*, they are of a partially enclosed type. The passenger and crew capacity of each lifeboat (370 persons) exceeds the maximum capacity defined by Resolution MSC.48(66) - International Life Saving Appliance code (150 persons); this specificity has been incorporated in the alternative design and approbation (Rule III/38 SOLAS).

Main characteristics:

- Type : SEL 15.5;
- Length of hull : 15.50 m;
- Length overall : 15.80 m;
- Light displacement : 18 mt;
- Gross weight : 45.75 mt;
- Speed : 6 knots.



Each lifeboat is fitted, forward and aft, with a guide block in the davit guide. The connexion lifeboat - davit is made by two hooks secured on two long links.

Trim preventer

Davits

The davits are fixed and allow lifeboat launching and hoisting operations.

Their special feature is that they are fitted with trim preventers, in order to guide the forward and aft of the lifeboat during the first metres of the lowering (or the last metres of the hoisting, after a drill).

At her stowed position, the lifeboat is secured forward and aft by two lashing gripes (cam-shaped removable parts). To allow the lowering (or hoisting) of the lifeboat in the forward and aft guides, both lashing gripes have to be retracted. They are controlled by two control arms (lashing levers -one forward, one aft) which can be manoeuvred only after the release of a sea lashing slip hook (one forward, one aft).

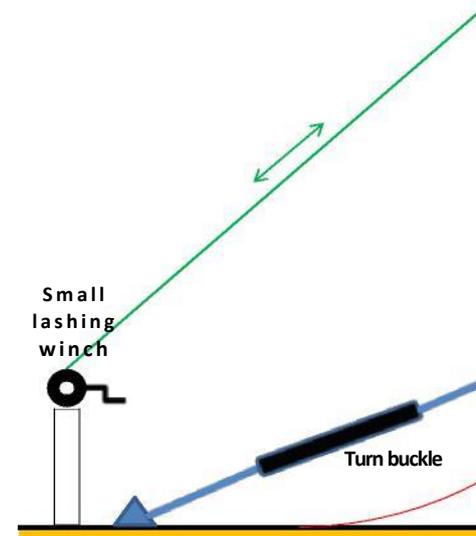
When one lashing gripe is retracted, it activates a limit switch which authorizes the running of the winch to lower or hoist the lifeboat. This mechanism does not, however, prevent the brake used to control the lifeboat gravity launching to be released (i.e. without using the winch).

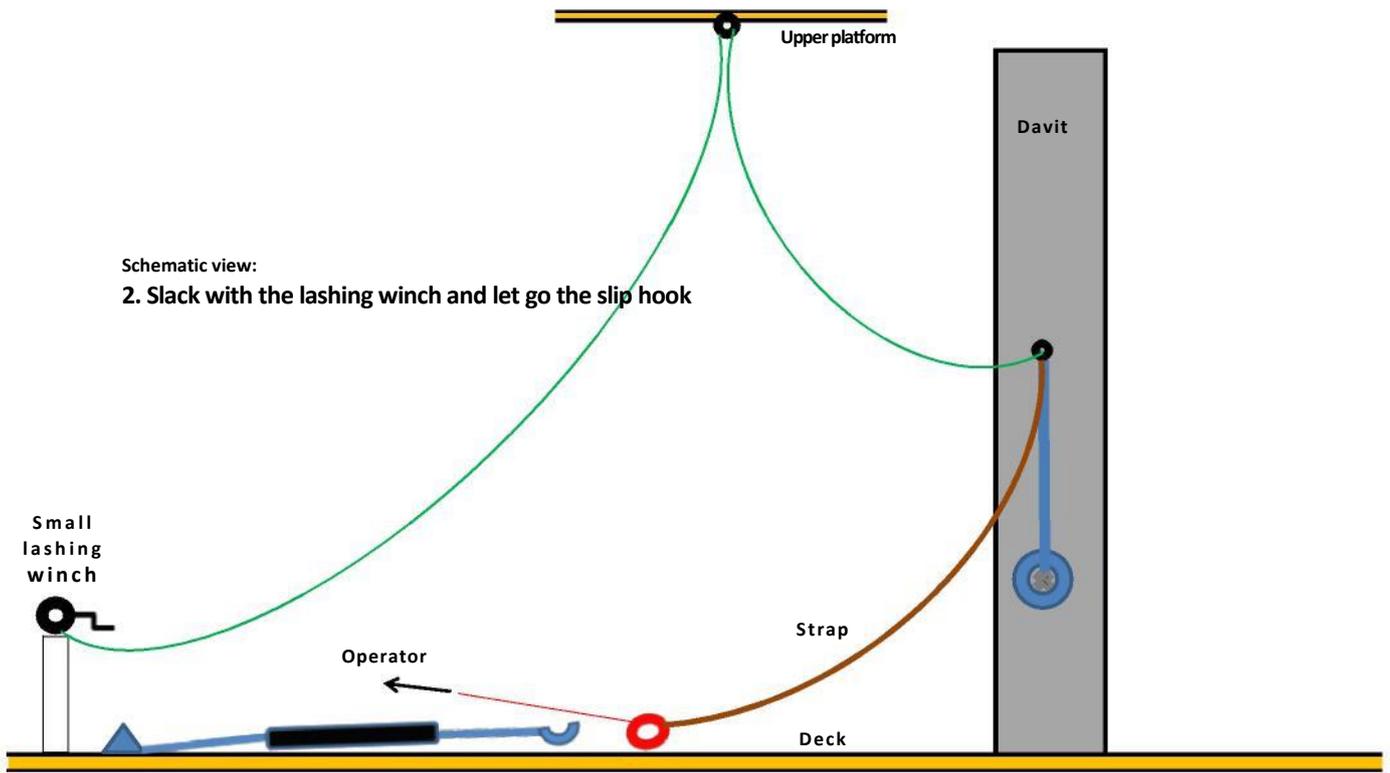
To launch the lifeboat, the winch can be used only if a maximum of 10 persons are on board. It can thus be used only for exercises.

In case of emergency evacuation of the vessel, lifeboat will be imperatively launched by gravity.

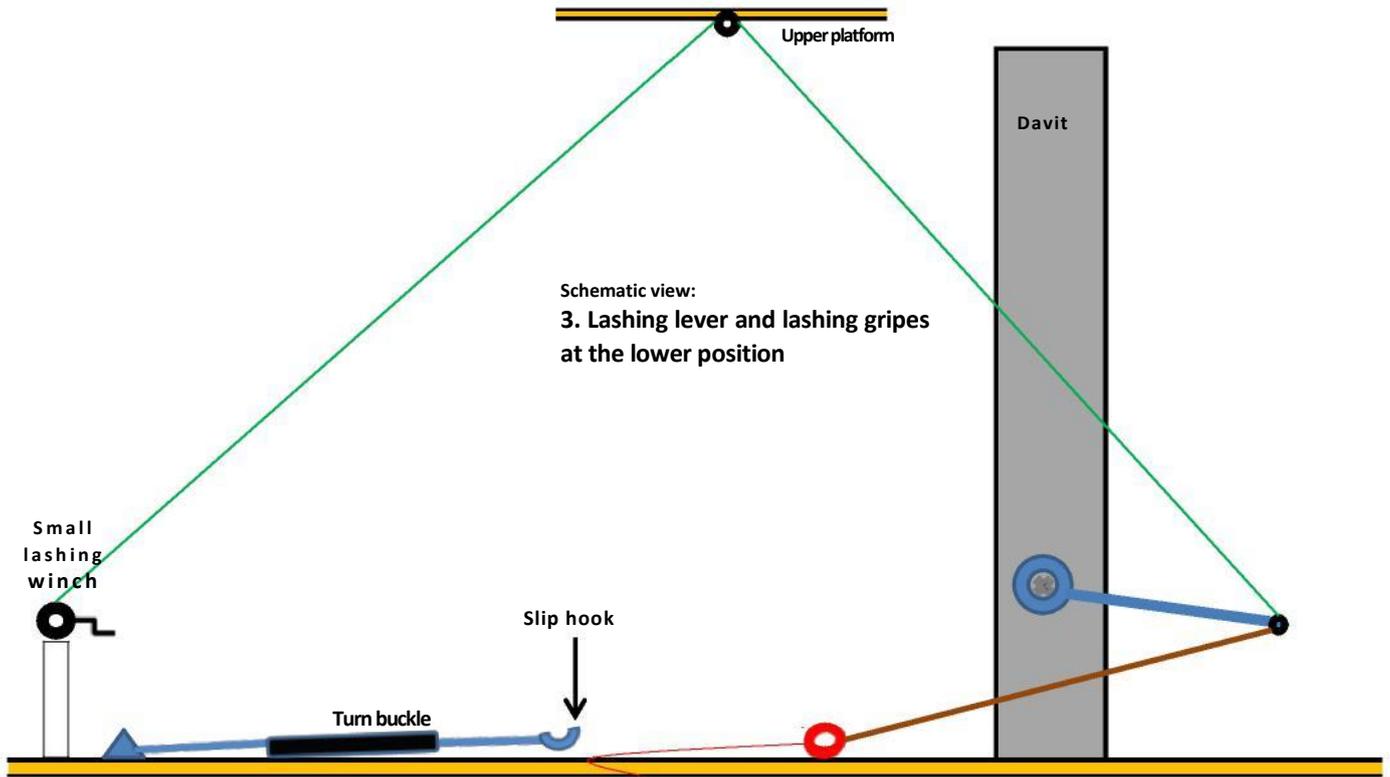
Schematic view:

1. Position at sea. Lashing lever and gripes at the upper position

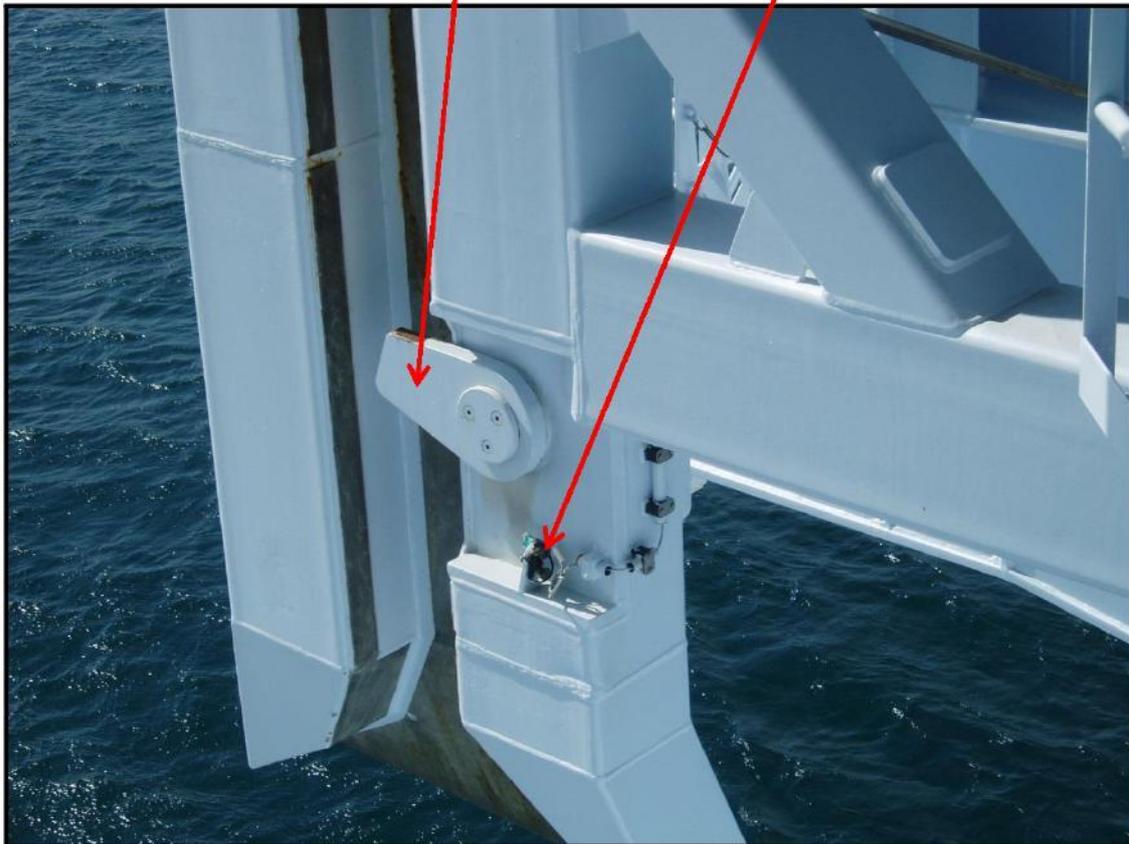




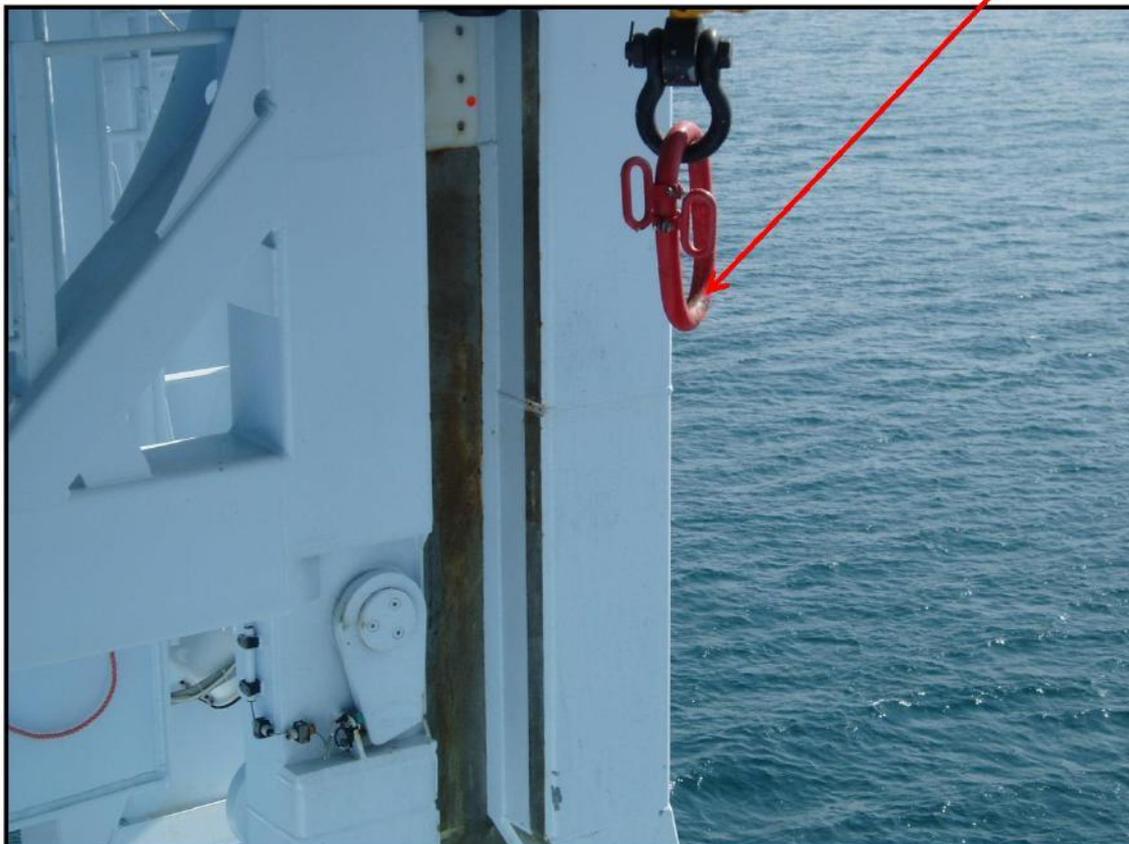
Davit. View from the lashing lever side



Davit, lashing gripe and limit switch



Long-link





Abandon ship list

The 18 lifeboat stowed positions are at deck 5; crewmembers and passengers board at the same level.

Preparing the lifeboats (**special procedure for abandon ship drills**)

The whole of the operations is monitored by the Safety Command Center (SCC) which in turn gives or denies permission to lower and launch lifeboats. The SCC is kept informed of the various key stages by the 1st Officer (via UHF communications).

Monitoring the preparation of the lifeboats : the 1st Officer - Team leader and the 2nd Bosun - Assistant team leader stand at deck 5 and share the monitoring of the 9 lifeboats (the first 5 by the officer, numbered from 2 to 10 - even numbers on the portside -, the 4 others, numbered from 12 to 18, by his assistant).

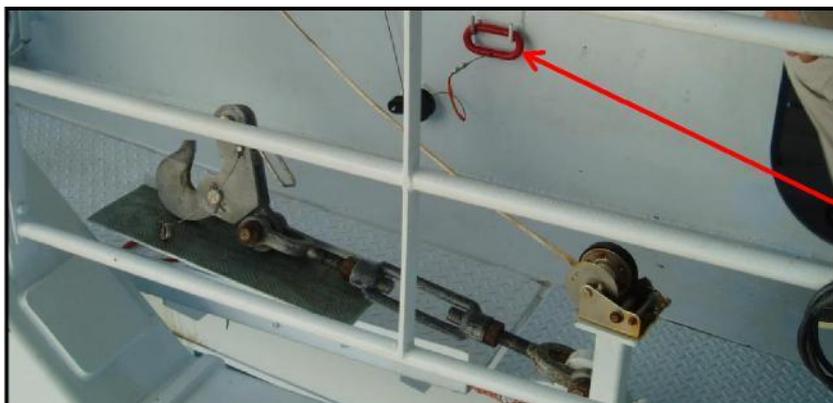
Existing procedure: each lifeboat is prepared by two ABs from deck or engine department appointed to a single lifeboat.

1. Opening of the lifeboat doors.
2. Under the authority of the 1st Officer (or of his assistant), one of the two ABs boards the lifeboat and takes the two red locking pins which are located on the control panel close to the helm. The locking pins are inserted in the dedicated slots of the forward and aft hook release mechanism.



is slightly lifted from its stowed position by one of the two ABs who operates the hoisting winch by means of a hand lever.

1. The two ABs carry out the release of the fastening of the forward and aft lashing levers.
2. When the lashing gripe forward and aft lashing levers are freed from their fastening, the 1st Officer (or his assistant) is informed.
3. The first AB embarks the lifeboat and takes on the 2nd Commander's function. The second AB stays on the deck in order to manoeuvre, when he will be ordered to, the lifeboat launching brake.



Handle of the launching brake

7. At this moment, the 1st Commander and the three other lifeboat crewmembers have joined deck 5 and prepare to embark. The lifeboat is ready for launching, under the 1st Commander's authority, in coordination with the 1st Officer (or his assistant) and the Safety Control Centre.

Tasks on board in case of lifeboat launching drill

The 1st Commander is in charge of the operation of the lifeboat. When the lifeboat is afloat, both hooks are released from the lifeboat commander's conning position. The 2nd commander, besides the operation of the boat in case of weakness of the 1st Commander, acts as the aft hookman.

The two assistant hookmen will assist the forward and aft hookmen to recover the hanging rings (red coated long-links), at the end of the drill, this operation could be hazardous because of the movements of the lifeboat and of the weight of the rings.

Recording the participation in training

An « e-plan » code with 1 to 4 figures is assigned to each post aboard and to each crewmember. When a crewmember is paid off, his replacement takes the same code (the Master's code is 1). The database thus constituted (2183 lines on the date of the accident) enables, among other recordings, to guarantee the reliability of the supervision of attendance in trainings.

Crewmembers who wear a blue badge are required to participate in weekly trainings. Recent failures

A defect of the control of the lashing release unit (lifeboat No.2) and the blocking of a winch brake (lifeboat No.5) had been observed, respectively in July and in August 2016.

These defects are not linked to the accident occurred on 13 September.

2.2 Officers and crewmembers involved in the accident

Chief Officer Safety, 39 years old, Panamanian. Joined the ship on 1st September 2016. The Chief Officer Safety is responsible to plan and prepare drills in order to comply with SOLAS requirements. He is usually in charge of the Mobile Fire Groups and their training during the weekly fire drills.

1st Officer, Team leader, 29 years old, Argentinian. Joined the ship on 26 June 2016. Participated in 12 abandon ship drills before the day of the accident.

2nd Bosun - Assistant team leader, 46 years old, Filipino. Joined the ship on 26 March 2016. Participated in 14 abandon ship drills before the day of the accident.

Deck hand (preparation of the lifeboat and launching brake), 22 years old, Filipino. Joined the ship on 24 July 2016. Participated in 4 abandon ship drills before the day of the accident.

Aboard the lifeboat:

1st Commander, 34 years old, Filipino. Participated in 12 abandon ship drills before the day of the accident.

2nd Commander (preparation of the lifeboat and aft hookman), 61 years old, Filipino. Joined the ship on 29 March 2016. Participated in 12 abandon ship drills before the day of the accident.

Forward hookman, 43 years old, Filipino. Deceased in the course of the accident. Had joined the ship on 27 May 2016. Participated in 6 abandon ship drills before the day of the accident.

Two assistant hookmen, employees in the hotel department (a chef de partie and a commis-chef).

All the officers and crewmembers hold regulatory STCW qualifications and are physically fit for duty. English is the working language.

2.3 The accident

The accident occurred on **13 September 2016** at Marseille at berth MPCT (Marseille Provence Cruise Terminal), pier Léon Gourret, the vessel was starboard side alongside (42°20'.6 north - 005°19'.8 east).

Around **9.30 am**, crewmembers preparatory meeting before the nine port lifeboat launching drill, led by the 1st Officer. He was supported by the 2nd Bosun in charge of the monitoring of lifeboats No.12, 14, 16 and 18 preparation. The 1st Officer recalled the importance to put the locking pins in place on the forward and aft hook release units, before executing any lifeboat movement.

The Master, the Staff Captain and the Chief Officer Deck were at the Safety Control Centre, in UHF radio contact with the Chief Officer Safety and the 1st officer.

The 1st Officer was on deck 5 to monitor the preparation of lifeboats No.2, 4, 6, 8 and 10. The rescue boat was launched.

Around **10.00 am**, the two ABs in charge of the preparation of lifeboat No.14 joined their positions. The first one was an engineer, assigned as the 2nd Commander of the boat, the second one was a deck hand.

The lifeboat's doors were opened and the two locking pins were introduced by the 2nd Commander in the dedicated slots.

The lifeboat was slightly lifted from her stowed position, in order to retract the forward and aft lashing gripes.

The aft lashing lever fastening was released by the deck-hand and the aft lashing gripe retracted normally.

The engineer was working at the preparation of the lifeboat (disconnect battery charging supply cables and check that the engine was ready to start) but did not release the fastening of the forward lashing lever. That one remained in position and secured thus the bow of the boat.

Around **10.30 am**, 2nd Bosun - Assistant team leader arrived in the vicinity of the stern of lifeboat N°14. The deck-hand was standing by him and informed him that after part was ready. The 2nd Bosun understood that the lifeboat was ready, but did not visually check the fore part.

At this moment, the 1st Officer was at the stowed position of lifeboats No.2 and 4 that would be launched.

Around **10.40 am**, the 1st Commander of the lifeboat, the forward hookman and the two assistant hookmen arrived at deck 5 and prepared to embark.

From **10.50 am** to **10.55 am**, the Chief Officer Safety arrived on the boat deck and met with the 1st Officer; he asked him if he received permission from the SCC to lower the lifeboats. He assumed that all lifeboats were ready and did not visually check any lifeboat lashing gear. Then he proceeded to interview the launching team N°22. The five crewmembers were aboard the boat N°14 and the deck-hand stood ready to release the winch brake, to lower the lifeboat. The 2nd Bosun ordered to lower.

As soon as the deck-hand actuated the control releasing the winch brake, the stern of the boat started to descend, while the bow was locked in the guide by the davit forward lashing gripe. The lifeboat was destabilized and tilted heavily backwards. Under the combined effects of the excessive inclination and the weight, the bow of the boat freed itself from the guide and the forward long-link « slipped out » from its release hook. The lifeboat tilted heavily forward and a new unbalance was created; the aft long-link was in turn « slipped out » from its hook, tearing its stop pawl (cf. appendix C4).

At **10.56 am**, the lifeboat fell into the sea with a heavy forward tilt angle, without the brake operator being able to stop the movement.

Due to the force of the impact, the forward hookman had been fatally injured. Two hands had been seriously injured, the two others sustained minor injuries.

Drugs and alcohol tests, carried out by the vessel's doctor, in the presence of the Chief Officer Safety, were negative.

2.4 The intervention

As soon as he was informed of the accident, the agent of the vessel called the Navy firefighters, according to *GPMM* procedure.

At **11.10 am**, the Navy firefighters called the control tower (Harbour Master) for additional information. The Navy firefighters' launch and a shore team were operated.

At **11.16 am**, lifeboat No.14 was towed to *HARMONY OF THE SEAS*' stern with the assistance of the rescue boat.

At **11.17 am**, the vessel's medical team provided first aid on board the lifeboat. Resuscitation attempt of the forward hookman who was unconscious.

At **11.20 am**, the ambulance arrived on the quay.

At **11.25 am**, the first injured was taken ashore from the lifeboat.

At **11.46 am**, death of the forward hookman.

From **0.20 pm** to **0.35 pm**, the injured were evacuated by ambulance.

3 NARRATIVE

Hours UTC + 2

On **12 September 2016**, the vessel's agent transmitted to the harbour master a request for authorisation to conduct a lifeboat launching drill during the stop at Marseille.

On **13 September**,

Weather conditions (source: logbook):

At **10.00 am**, south-easterly wind force 1 to 2. The water surface was flat.

At **8.40 am**, vessel secured alongside at berth MPCT 183.

From **10.00 am** to **10.30 am**, preparation and launching of the rescue boat and of lifeboats No.2 and No.4. Preparation of lifeboat No.14.

At **10.56 am**, fall of lifeboat No.14 with five crewmembers on board.

At **11.01 am**, code Alpha triggered by the Public Announce circuit.

At **11.05 am**, the vessel's agent was informed.

At **11.07 am**, the Harbour Master was informed by VHF channel 12.

At **11.15 am**, the Fleet Captain was informed of the accident.

French authorities were informed by the harbour master, in accordance with the emergency instructions.

The harbour master went on-site, where he met the admiral in command of the Marine firefighter battalion, the COMAR and the port duty officer.

At **11.28 am**, the shipowner's head office and the class society were informed of the development of the situation.

At **0.30 pm**, lifeboats No.2, 4 and 14 were secured alongside. The davit of lifeboat No.14 was secured.

At **1.32 pm**, DNV - GL inspectors arrived on board.

At **1.38 pm**, the harbour authority gave the vessel the authorisation to extend the call overnight.

At **4.30 pm**, the Master made an announcement to crewmembers and passengers.

4 ANALYSIS

The method selected for this analysis is the method recommended by IMO resolution A.1075(28) « Guidelines to assist investigators in the implementation of the Casualty Investigation Code (resolution MSC.255(84)) ».

Firstly *BEA*mer determined the sequence of events leading up to the accident.

Out of this sequence, so called disruptive events (causal events leading up to the accident and considered significant and inappropriate) had been identified.

These events had been analysed considering natural, material, human and procedural factors in order to identify the factors that contributed to their outbreak or that contributed to worsen their consequences.

Among these factors, those that revealed safety issues presenting risks for which actual defences are considered inadequate or missing had been pointed out ([contributing factors](#)).

Factors without influence on the course of events had been discarded, and only those which could, to an appreciable degree, have weighed on the course of facts had been retained.

cf. diagram of events in appendix C1.

4.1 Unbalance of lifeboat No.14

4.1.1 Preparation of the lifeboat

Lifeboat No.14 was prepared by two ABs, a deckhand and an engineer, also acting as 2nd commander.

The lashing levers used to retract the lifeboat securing lashing gripes can be actuated only when their fastening has been released. While the operation had been correctly carried out for the aft arm by the deckhand, it had been omitted forward. This omission had been the first of the events leading to the accident. It can be explained by the 2nd Commander's focus on another task, in this case inserting the locking pins preventing the untimely release of the forward and aft hooks. As he was also in charge of the disconnection of the battery supply cables and of starting the engine, he « forgot » one of the main operations to be completed at the beginning of the

preparation. It has to be noted that the division of roles, between preparation of fore and after parts, was not explicitly stated by the procedure that both sailors had in mind.

The relatively unclear division of roles is the **first contributing factor** to the accident.

BEAMer observes that crewmembers' hours of work and hours of rest do not reveal any risk of fatigue that could have contributed to the accident.

4.1.2 Prevention of the lifeboat descent

Contrary to the aft lashing gripe, the lifeboat's securing forward lashing gripe remained in raised position. Thus its limit switch was not activated; in these conditions, it's only the descent of the lifeboat with the electric winch that is prevented. A contrario, gravity launching is possible.

The procedure is applied by the deckhand (gravity launching of the lifeboat) who released the winch brake, without this action being prevented by any mechanical safety, while the system « lifeboat - davit » was not ready.

The absence of a lifeboat gravity launching mechanical prevention device, while one of the lashing gripes is not retracted, was the **second contributing factor** to the accident.

4.1.3 Cross-checking

The unclear division of roles, between the two sailors in charge of the preparation, could be compensated by a visual verification of the forward lashing gripe position by the AB who released the aft fastening, and vice versa.

The absence of cross-checking, during the preparation of the lifeboat, was the **third contributing factor** to the accident.

4.1.4 Order to launch the lifeboat

The launching order was given by the 2nd Bosun, after verbal confirmation by the preparation team that the lifeboat was ready. At this moment the 2nd Commander was inside the lifeboat and the deckhand stood on the deck, at the aft of the lifeboat, close to the winch brake control. He had been joined by the 2nd Bosun. From this position, the two men cannot see either the forward

lashing gripe or the forward lashing lever fastening which had not been released. The lifeboat launching order had thus been given without a visual check that the installation was ready.

The high level of confidence given to an oral information, for an operation for which the crewmembers had a priori a good command, results from the application of the principle of subsidiarity⁽¹⁾, by officers and bosuns, for tasks for which the AB's skill was not in doubt. This management approach is opposed, to some extent, to the precautionary principle which should prevail in the field of safety.

(1) *The **subsidiarity principle** aims to leave the decision to the subordinate level as long as the senior level is not able to act in a more efficient manner.*

4.1.5 Familiarisation of lifeboat No.14 preparation team

In addition to the STCW general training related to lifeboat operations, crewmembers are trained in the use of the vessel's specific equipment. This instruction is provided by the staff (principally by the Chief Officer Safety and the 1st Officer in charge of drill supervision) which relies on the company procedure in force.

However, the sailors in charge of the preparation of lifeboat No.14 stated that their understanding of the actions to be done was more the result of information passed between crewmembers, than of the teaching provided by the vessel's staff.

The « a minima » understanding of the actions to be carried out in order to prepare the lifeboat, would not allow thus to move safely to the crewmembers embarking step without an additional control.

As a result of this first chain of events an unbalance of lifeboat No.14 occurred as soon as the descent started (first accident, cf. chain of event diagram, appendix C1).

4.2 Fall of the lifeboat

The fall of the lifeboat (second accident, cf. chain of event diagram) was caused by the release of the forward and aft long links, disruptive event without action by the crew.

Hook, aft long link and stop pawl - the forward mechanism is the same



4.2.1 Release of the forward long link

From the first metres of descent, the lifeboat tilted heavily backward, which resulted in the (red) long link catch point being moved to the end of the hook, the curve of which is low (in order not to hamper the release when the lifeboat is upright).

The stop pawl (or long link engagement arm) is a light part (to make easier the handling of the hook), which was raised as a result of the relatively brutal movement of the lifeboat and did not prevent the long link to be released from the hook; the forward hook « released » the long link. At this moment, the lifeboat's bow was still secured by the removable lashing gripe.

4.2.2 Release of the aft long link

The lifeboat continued her descent, tilted backwards, until the after part of the lifeboat get off its guide. The tilt angle increased and caused the fore part of the lifeboat to get off being thus freed from the removable lashing gripe, then from the forward guide. The lifeboat that was no more

secured by the forward long link tumbled then forward. The brutal movement caused the release of the long link from the aft hook with kinematics similar to the release of the fore part (moving of the catch hold as a result of the heavy tilt angle, shape of the hook end and lightness of the stop pawl). Releasing itself, the long link tore off the aft stop pawl (cf. appendix C1).

The lifeboat was no more secured to the vessel and fell into the sea with a heavy forward tilt angle.

The inefficiency of the forward and aft stop pawl, when the lifeboat is subjected to brutal movements, while she has a heavy tilt angle, is the **fourth contributing factor** to the accident. *BEA*mer emphasizes however that this part is not designed to withstand such stresses.

5 CONCLUSIONS

Similar accident subjected to a *BEA*mer report:

On 15 April 2011, on board *CMA CGM CHRISTOPHE COLOMB*, fall of a lifeboat during drill with three men on board (two casualties, one seriously injured). The accident was caused by a hardware failure, which origin was attributable to the shipyard having built the vessel.

Reminder on circular MSC1206 issued on 11 June 2009

Extract from annex 2, § 1.5.1: *The 1974 SOLAS Convention requires that drills shall, as far as practicable, be conducted as if there was an actual emergency. This means that the entire drill should, as far as possible, be carried out. The point is that, at the same time, it should be ensured that the drill can be carried out in such a way that it is safe in every respect. Consequently, elements of the drill that may involve unnecessary risks need special attention or may be excluded from the drill.*

§1.5.4 : *The lowering of a boat with its full complement of persons is an example of an element of a drill that may, depending on the circumstances, involve an unnecessary risk. Such drills should only be carried out if special precautions are observed.*

HARMONY OF THE SEAS accident:

It emerges from this analysis that the lifeboat preparation procedure which was applicable before the accident did not constitute any unnecessary risk-taking, within the meaning of MSC1206.

However four factors contributed to the accident:

1. Unclear division of roles in the mind of the preparation team sailors;
2. Absence of a cross-check step allowing to identify an omission;
3. Absence of a lifeboat gravity launching mechanical prevention device while the removable lashing gripe is not in vertical position;
4. Inefficiency of the forward and aft stop pawls, when the lifeboat is subjected to brutal movements and to a heavy trip angle.

Port State Control (PSC)

Two deficiencies, resulting from the vessel's inspection carried out by the CSN of Marseille, had been notified:

5. Crew familiarisation with lifeboat preparation and strengthening of control of the chain of responsibility before launching the lifeboat;
6. Improve the risk analysis of this operation.

6 MEASURES TAKEN BY THE SHIPOWNER

Within days after the accident, the shipowner carried out a review of the lifeboat preparation and launching procedure (cf. appendix C2). The new procedure led to strengthen the complement, to carry out additional controls and to add several steps:

- the unlashng of each lashing lever is carried out by the two hands in charge of the preparation;
- the lashing gripe position is checked (low position);
- a lifeboat lowering test is carried out, with no crew on board, to one metre above the waterline. At first, lowering is carried out by electric winch, until the lifeboat is clear from the trim preventer, then using gravity by releasing the winch brake;
- the lifeboat is then hoisted to the crew embarkation position, after the officer in charge of the exercise supervision had checked again the key points. The launching of the lifeboat is carried out using only the winch brake.

These measures help to overcome contributing factors 1 and 2. Contributing factor 3 is compensated by the off-load lowering test of the revised procedure.

To overcome the contributing factor 4, the vessel's staff suggests to weight the stop pawl down with a counter-weight. This solution should be preferred to the use of a pin which would mean an additional intervention.

7 LESSONS

1. [2017-E-13](#) : due to the recent commissioning of the vessel, the familiarisation of the crew (or in any case of lifeboat No.14 preparation team) with an innovative equipment was less than optimal.
2. [2017-E-14](#) : the lifeboat lowering position does not provide adequate visibility on the whole of the lifeboat-davit system to the sailor in charge of the operation.

8 RECOMMENDATION

Taking into account the measures taken by the shipowner and the proposal for modifications to the equipment from the vessel's staff, *BEA*mer does not issue any recommendation.

LISTE DES ANNEXES
LIST OF APPENDICES

- A. Liste des abréviations**
Abbreviation list

- B. Décision d'enquête**
Investigation decision

- C. Navire**
Vessel

- D. Analyse de l'officier chargé de la sécurité**
Analysis by the Chief Officer Safety

Liste des abréviations

Abbreviation list

AB	: Able seaman
BEAmer	: Bureau d'enquêtes sur les évènements de mer French marine investigation bureau
CSN	: Centre de Sécurité des Navires Vessel's survey centre (French marine admin.)
COMAR	: Commandement de la Marine
DNV/GL	: Det Norske Veritas Germanischer Lloyd
GPMM	: Grand Port Maritime de Marseille
MPCT	: Marseille Provence Cruise Terminal
MSC	: Maritime Safety Committee
mt	: metric ton
PSC	: Port State Control - Contrôle par l'État du port
RCCL	: Royal Caribbean Cruise Limited
STCW	: Convention internationale sur les normes de formation des gens de mer, de délivrance des brevets et de veille Standards of Training, Certification and Watchkeeping
STX	: Chantier naval STX France
UHF	: Ultra High Frequency
VHF	: Very High Frequency

Décision d'enquête
Investigation decision



Liberto - Egaliti - Praternitt
Rteueugus FRANCAISE

Bureau d'enquetes sur
les evenements de mer

Paris, le **14 SEP.** 2016

N/ref. : SEAmer **0007**



D E C I S I O N

Le Directeur du Bureau d'enquetes sur les evenements de mer (*wamer*) ;

Vu le Code des transports, notamment ses articles L1621-1 a L1622-2 et R1621-1 a R1621-38 relatifs aux enquetes techniques et aux enquetes de securite apres un evenement de mer ;

D E C I D E

Article 1 : En application des articles L1621-1 a L1622-2 et R1621-1 a R1621-38 du Code des transports, une enquete technique est ouverte concernant ('accident grave survenu le 13 septembre 2016 a bord du paquebot *HARMONY OF THE SEAS*, sous pavilion Bahamas, lors d'un essai d'embarcation de sauvetage, dans le Grand Port Maritime de Marseille.

Article 2 : Elle aura pour but de rechercher les causes et de tirer les enseignements que cet evenement comporte pour la securite maritime, et sera menee dans le respect des textes applicables, notamment les articles du Code des transports susvises et la resolution MSC 255 (84) de ('Organisation Maritime Internationale.

Ministere de l'Environnement,
de l'Energie et de la Mer

BEAMS!

Tour Pascal B
92055 LA DEFENSE CEDEX
telephone 33 (0) 1 40 81 38 24
bea-mer@developpement-durable.gouv.fr
enne.bea-merdeveloppement-durable.gouv.fr

L'Administrateur General des Affaires Maritimes
Jean-Luc LE Lisoux
Directeur du BEAmCL

Nat
7",

Intertek

Navire

Vessel



© Royal Caribbean Cruises Ltd

Annexe C1

Appendix C1

Synoptique des événements

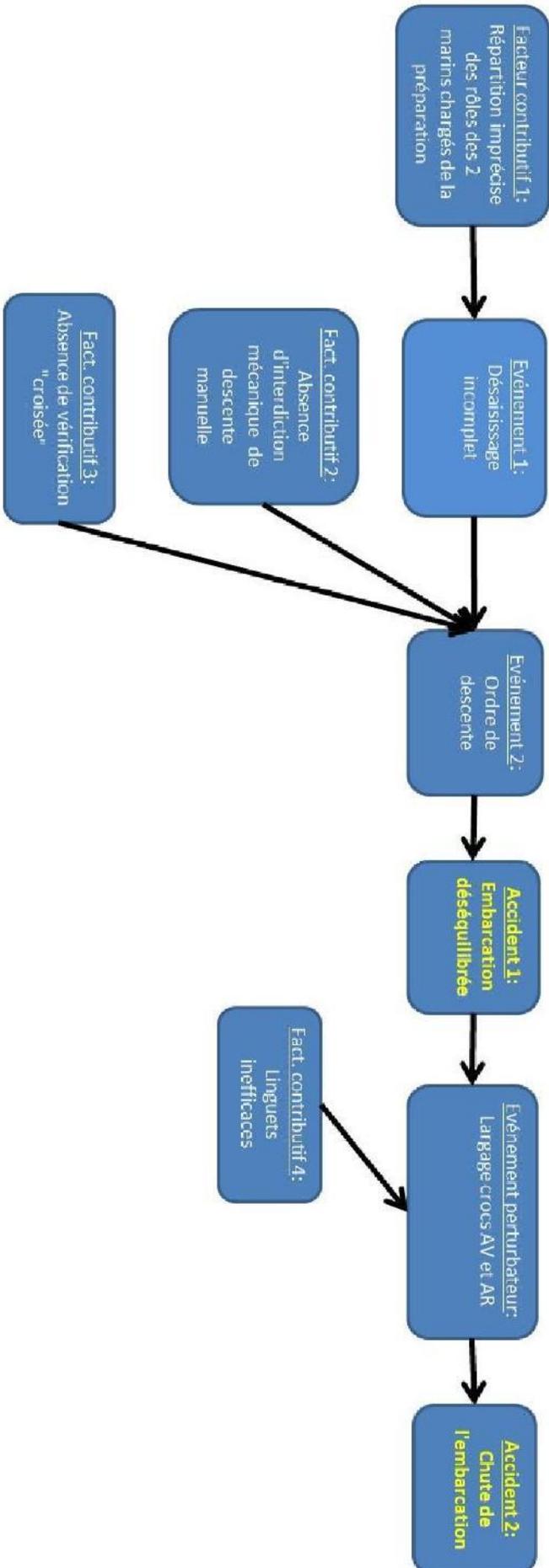
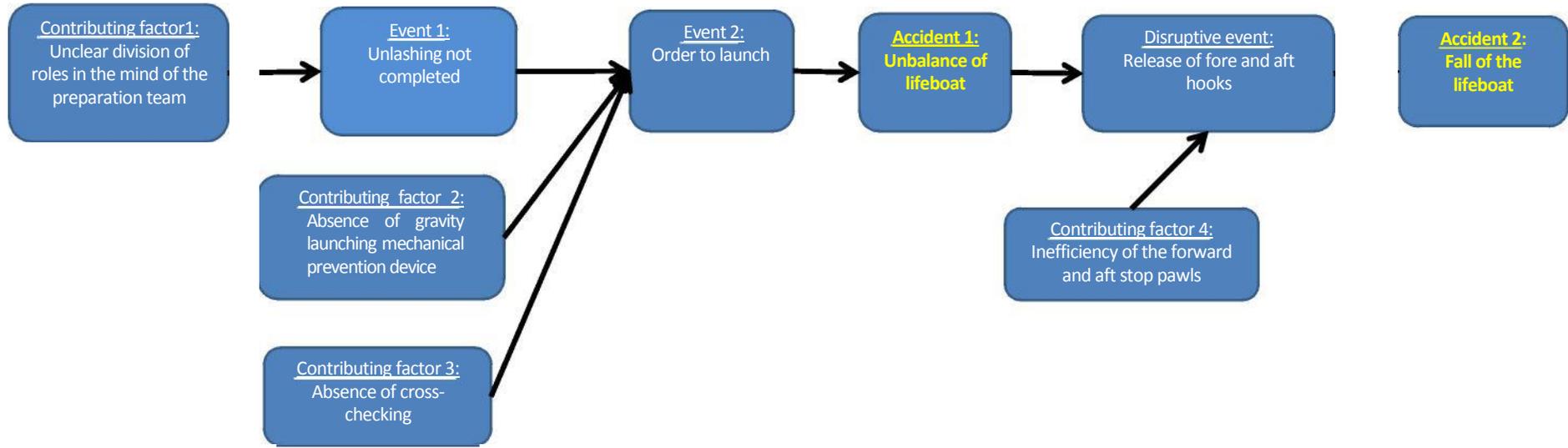


Diagram of events



Nouvelle Procédure exercice d'abandon

HM
Drill Procedures
Life Boat
Preparation &
Launching
Team
Emergency Instruction 16

Instructor's Lesson Plan: Detail.

Contents

1. Introduction	Page 3
2. Purpose of the Lifeboat Preparation and Launching Team	Page 3
3. The Duties of the Teams	Page 3
4. Emergency Procedures & Required knowledge	Page 3
5. Components Names	Page 4
6. Lifeboat Launching / Hoisting / Securing	Page 5

**1. Introduction I
Preparation for the
Training**

Introduce yourself to the group and describe the training about to be carried out Inform the group of the duration of the training_

Time Not less than 40 minutes

As part of this team, your role in the preparation and launching of the Lifeboats is very important In an emergency situation you will need to be confident and knowledgeable about your duties, in order for the ship to carry out a quick and safe evacuation_

Equipment

Hard hats; gloves, life jackets or work vests. Training **will** take place at the station_

**2. Purpose of the Lifeboat
Preparation and
Launching Team**

The purpose of this team is to prepare the lifeboats for launch, move them to the embarkation deck, readying them for embarkation when order is given by Command, safely launch **all** the lifeboats

1. The Duties of the Team

Team Leader and Assistant Leader and Team Members:
At the signal of BRAVO x 3 or 7 SHORT + 1 LONG, meet with the Survival Craft Preparation Control Team Instruction* 15 on Deck 5 MFZ 5 on their respective side and await further instructions
If the command gives the order to prepare the lifeboats, they will be divided in smaller groups (2 crewmembers per boat).
to their respective lifeboat

4. Emergency
Procedures & **Required
knowledge**

Team Leader and Assistant Leader and Team Members:

At the signal of BRAVO x3 or 7 SHORT+ 1 LONG, meet with the Survival Craft Preparation Control Team Instruction* 15 on Deck 5 MFZ 5 on their respective side_

Be prepared to rig ladders and descent units once the order is received from the Officer in Charge_

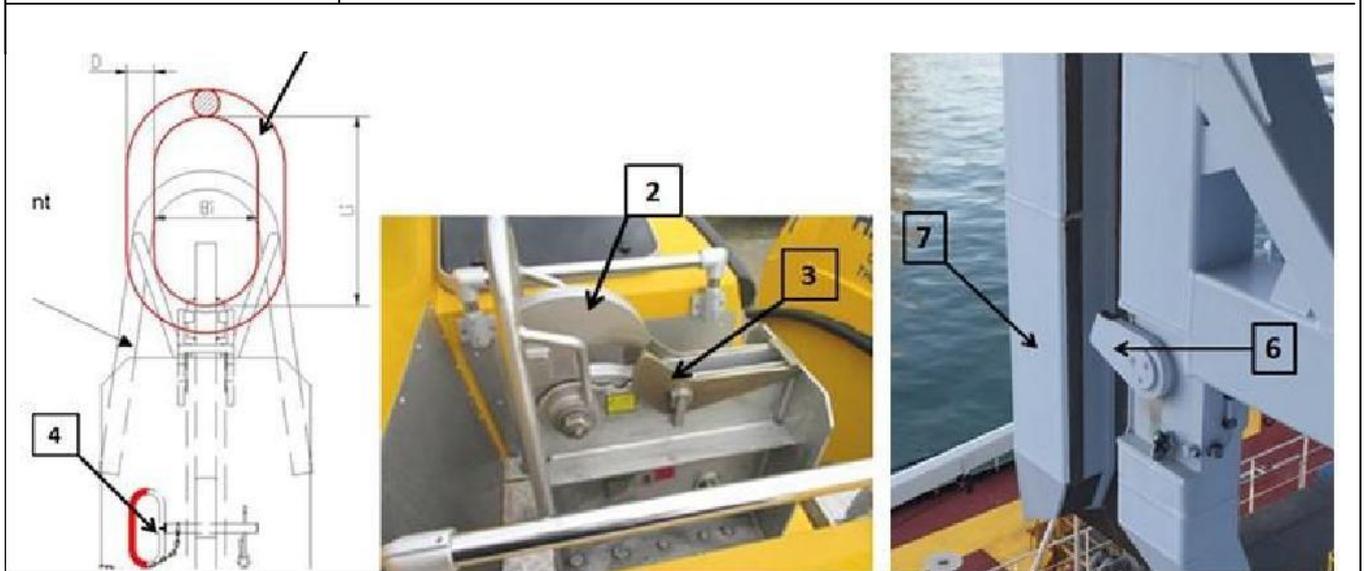
Rig the floodlights if necessary

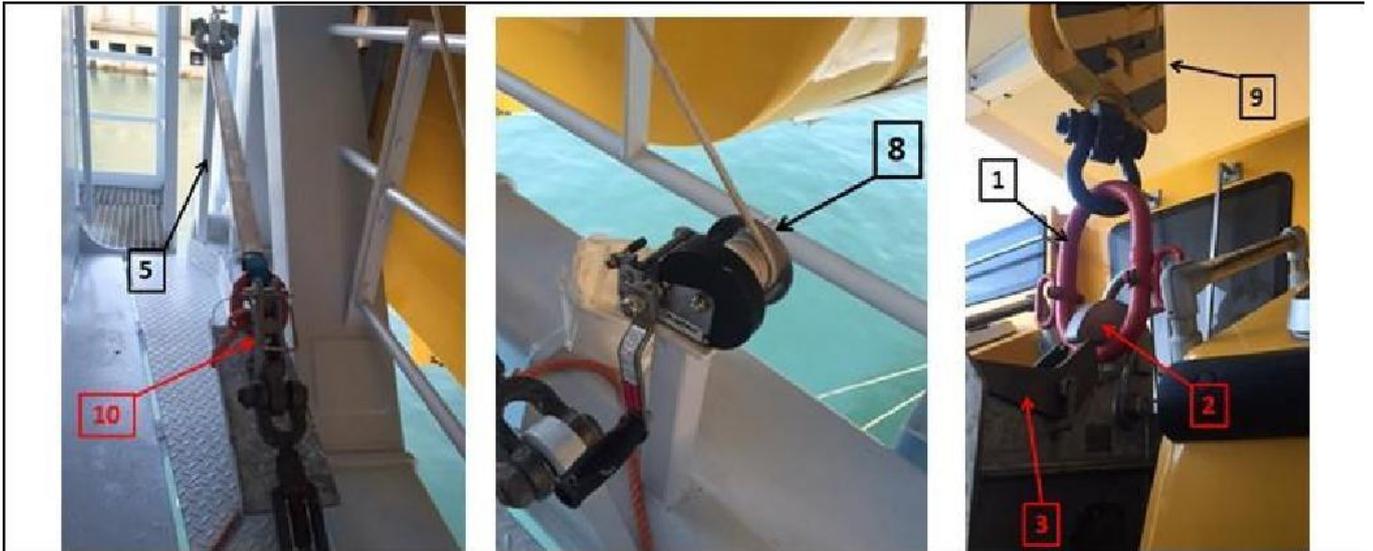
All team members are to be trained in the below procedures for launching hoisting and securing the Lifeboats for Drill Scenarios.

All Launching/Preparation Teams and Lifeboat Crew are to be reminded that the Procedures for Drill Launching, differ from Emergency Launching.

Regular theory for Emergency Launching is to take place.

<p>Components Names</p>	<p>1. Long Link: Lifting Ring on bottom of Blocks that attaches to Lifeboat Release Hook.</p> <p>2_ Boat Release Hook: On-Load Release Hooks fitted to the lifeboats on the bow and the stem.</p> <p>3. Stop Pawl: Weighted Lever at open end of Release Hook preventing Long Link from slipping out from the Release Hook</p> <p>4_ Red Locking Pin: Metal rod (pin) that when inserted into the Release Hook acts as a Fall Preventer Device (FPD) and prevents any accidental opening of the Release Hooks.</p> <p>5_ Lashing Lever: Steel Arm connected to Soft Lashing that opens the Lashing Gripes.</p> <p>6. Lathing Gripes: Steel Cam in Trim Preventer that supports the Lifeboat when dosed_</p> <p>7 Trim Preventer: Guide Fwd & Aft of Davits that Guides the Lifeboat into Boarding position</p> <p>c. Small Sea Lashing Winch: Ratchet winch used to control the position of the movement of the Lashing Lever.</p> <p>9_ Block: Large block pulley that connects the Long, Link to the Boat Falls_</p> <p>10. Sea Lashing Slip Hook: Quick release hook that secures the Lashing Lever and Lashing Gripe to the ship's structure when in the close position.</p>
-------------------------	--





6. Lifeboat Launching / Hoisting / Securing

Launching Operation •

Positions.

Officer in Charge = Preparation Control Leader
Preparation Control Assistant Leader

Commander = Lifeboat Commander (Coxn) for each Lifeboat

Lifeboat Launch Team Leader = Commander for LB 411 & *12

2nd Commander = 2nd Commander/Aft Hook for each Lifeboat

IA:20. RTANT NOTE: ALL ACTIONS DESCRIBED BELOW ARE TO BE CARRIED OUT EV PAIRS LAT ORDER TO HAVE A "TWO PERSON CHECK" OF THE EXECUION OF SAID ACTION

Actions:

- 1) Commander/2nd Commander is to visually confirm Lashing Gripes are closed (Horizontal) and that Lashing Straps are tight and secure_
- 2) Check that the boat hooks are connected correctly to the davit suspension (**Refer to Fassmer Sel 15.5 Operations Manual for more details**)
- 3) Disconnect battery charging supply cables_ (Note: *in the event of a real emergency, DO NOT disconnect the cable since the SCC PA System is connected to the LB's PA System through this cable. Also, it will self-disconnect when lowering*)
- 4) .2nd Commander and Launcher enter the Lifeboat and INSERT the Red Locking Pins into the Boat. Release Hooks (FWD and AFT)

5) **After** inserting the Red Locking Pins: 2^{na} Commander and Launcher EXIT the Lifeboat and close **the embarkation gates.**

1) Tighten the fall wires by means of the handle placed on upper platform near the winch.

Commander and Pla Commander are to Visually Confirm weight is taken on the Fwd & Aft Release Hooks and Fall wires [Lashing Gear is slack and Slip Hook is resting on the support plate]

2) Open the Slip Hooks: Acting on small sea lashing winch, rotate lashing Gripe for approx. 90'. **Lashing Gripe must be brought in vertical position. Otherwise electric lowering/hoisting will not be possible**

Lashing Gripes:

Forward; 2nd Commander is to visually confirm that Lashing Gripe is released (vertical)

Aft; 2nd Commander is to visually confirm that Lashing Gripe is released (vertical)

On confirming both Fwd & Aft Lashing Gripes are released (Vertical) 2.nd Commander is to report to Commander & Officer in Charge that Lashing Gripes are released (Vertical).

Commander & Officer in Charge is to check visually both Fwd & Aft Lashing Gripes are released (Vertical).

When confirmed that Lashing Gripes Fwd and Aft are released,

Officer in Charge is to order the Brake/Winch Operator to Lower the Lifeboat by Electric Winch until lowered clear of the Trim Preventer. (nb. Limit switch in Lashing Gripes will prevent Electric Winch Operation unless Lashing Gripes are released)

Once clear of the Trim Preventer, using Brake (gravity) continue to Lower Lifeboat to confirm all systems are functioning correctly.

Recover Lifeboat using Electric Winch to the Embarkation Position. The Lifeboat is now ready to Embark Minimum Operational Crew for Drill.

S) Close the ball valve on top of hydraulic unit to activate automatic retraction

**Officer in Charge reconfirm with Lifeboat Commander on readiness of the Lifeboat.
Lashing Gripes description released (vertical),
Red Locking Pins Inserted in Boat Release Hooks
Lifeboat lowered by Winch Motor,
Lifeboat lowered by Brake (gravity),
Lifeboat Hoisted by Winch Motor**

Commander is now ready to Enter Lifeboat with the minimal 5 person Operating Crew:

Commander

2nd Commander & Aft Hookman

2 x Fwd Hookmen

1 x Aft Hookman

9) Lifeboat Commander is now in charge of Lifeboat Operations and can now embark his Crew.

1) **Officer in Charge from Deck and Crew from the Lifeboat check that the area below is clear of obstructions and report to the Lifeboat Commander "clear below":**

Note; There is limited visibility to see under the Lifeboats

The 2nd Commander will now enter the Lifeboat and confirm to Lifeboat Commander once aboard.

2) **LB Commander starts engines and gives the order to lower in coordination with the Officer in Charge on Deck.**

3) **Officer in Charge orders Brake/Winch Man to "Open the Brake"
Officer in Charge orders Brake/Winch Man "Stop Lowering" when Lifeboat is 1 metre above waterline.**

4) **Lifeboat Commander orders to remove the Red Locking Pins and confirms they are in the stowage rack at the Helmsman Position. When completed, Lifeboat Commander signals to Officer in Charge to continue lowering to waterborne.**

5) **Brake can be operated from 2 Positions for Drills always use lower platform Wire release. (Note: Keep the winch brake open when the craft is waterborne to ensure automatic retraction function!)**

- ❖ **From the lower platform position:** Pull firmly on the remote control grip (red handle). This actuates the brake handle and the lowering commences, stop 1 metre above waterline when ordered. Lowering stops as soon as actuation is discontinued
- ❖ **From the upper platform position:** Lift the brake handle by hand. By actuating the Gripe the lowering commences, stop 1 metre above waterline when ordered. The lowering stops as soon as the actuation is discontinued.

15) **The LB Commander releases the hooks when the boat is waterborne (Refer to Fassmer Sel 15.5 Operations Manual for more details) The automatic retraction system will immediately hoist the suspension blocks for approximately 2 meters by hydraulic stored power. The hoisting stops as soon as actuation of winch brake Gripe is discontinued, therefore the Launcher must keep the winch brake open until the suspension blocks are clear from the LB canopy!**

6) **The boat can now clear the Ships side.**

Retrieval Operation:

NOTE: the recovery of any Survival Craft is only allowed with a crew of maximum ten (10) persons

Automatic refraction system is to be de-actfrated!

- 1) **On top of the winch platform: Open ball valve** on top hydraulic unit to de-activate automatic retraction function_
- 2) **LB Commander: Reset** the release hooks (Shortly after the boat is released closing of the hooks is to be carried out as a preparation for hoisting the **boat This action is not be left until the boat is under the falls and the floating blocks ready to hook on.**)
- 3) Check each hook's position: **No part of the hook should be seen through the locking pin hole.**
 - Ensure that the shackle bolt of the release handle is closed.
 - + Ensure that release handle is returned to resting position **and secured** with safety pin. When inserting the safety pin the green LED light will switch off and the locking device VIII lock the shackle of release Gripe.
 - Check the position of the release bolt. The green padlock must be in line with the green padlock shackle.
- 4) **From the launching platform: Make sure the wire rope falls contain slack so** the LB crew can connect the floating blocks in the LB Release **Gear. Automatic refraction system is to be de-activated?**
- 4) LB hoolcmen catch the long link and push it into the stop pawl of the release hook The stop pawl will open during this procedure_
Long Link is to be secured in the Back (BEND) of the Hook until under tension. This is to be confirmed by 2" Commander (Aft) Commander (FWD) above the waterline when inserting the Red Locking Pins.
- 5) Start hoisting from the push button box near the outboard railing_ Ensure that each wire rope turn remaining permanently on the winch drum to be kept close to the adjacent one until rope slack is eliminated by rope tautening_ **STOP HOISTING WHIN BOAT IS I MT ABOVE WATER.**
- 6) When the boat is hangiis g on the fall wires one (1) mtr above the water. LB hookinen take Red Locking Pins from stowage rack at helmsman position and insert them into red-marked holes on the Boat Release Hooks (FWD & AFT).
- 7) LB Commander **stops engines** and confirms with the Officer on Deck that the **LB COMMANDER RECOVERY CHECKLIST** has been completed_ The Officer on Deck will now recover the **La**
- 8) When lowering blocks approaching davit head the electric driven hoisting procedure is automatically stopped by one of the limit switches placed on each davit head_

Lifeboat Crew Disembarks

- 9) Check that the hoisting wires have been spooled up as appropriate
- 10) Use the Small Winch to bring the Lashing Lever back to upper position_ Re-connect the Slip Book to the white strap_

Lashing Gripes.

Forward; Commander & 2nd Commander is to visually confirm that Lashing Gripe is closed (horizontal) and slip hook is secured closed safety pin inserted

Aft; Commander & 2nd Commander is to visually confirm that Lashing Gripe is closed (horizontal) and slip hook is secured closed safety pin inserted

On confirming both Fwd & Aft Lashing Gripes are closed (horizontal) 2nd Commander is to report to Commander & Officer in Charge that Lashing Gripes are closed (horizontal).

Commander & Officer in Charge is to check visually both Fwd & Aft Lashing Gripes are closed (horizontal).

- 12) From the **upper platform**, de-load the lifeboat fall wires to a hand taut extend by **slightly and slowly opening** the winch brake handle. **The Fall Wires are to remain under tension but maximum load is held on Lashing Gripes.**
- 13) Close the ball valve on top of the hydraulic unit to activate the automatic retraction function.
- 14) Commander orders 2nd Commander to remove Red Locking Pins and place in the storage rack at the Helmsman Position. 2nd Commander reports back when locking Pins removed and stowed.
- 15) Commander reports to Officer in Charge "Lifeboat Secured for Sea".
Lashing Gripes closed (Horizontal)
Red Locking Pins Removed
Fall Wires under minimum tension
- 16) Connect the Battery Charging Cables

Complete closing Lifeboat Doors, and Embarkation Gates.

- END -

Annexe C3 Appendix C3



41^{en} noitacrabmE

Annexe C4

Appendix C4



Linguet / Stop pawl

Analyse de l'officier chargé de la sécurité

Analysis by the Chief Officer Safety

Analyse de l'officier chargé de la sécurité :

Du fait de l'inclinaison de l'embarcation, le linguet a basculé en position d'ouverture ; l'anneau d'accrochage (ou maille longue) s'est « échappé » du croc de largage, bien que la goupille de verrouillage était en place.

L'enregistrement de la caméra de surveillance ne suffit pas pour valider cette hypothèse, mais il montre que lorsque l'avant de l'embarcation se libère de sa glissière, il n'y a pas de « secousse », ce qui tend à prouver que la maille longue était déjà, sinon larguée, du moins presque larguée.

Le fait que les poulies volantes ne soient pas suffisamment lourdes pour entraîner les garants vers le bas (au cours des exercices précédents, durant la phase de récupération des embarcations, il a été constaté qu'il est nécessaire de choquer le garant avec le treuil électrique pour amener les mailles longues) explique que la poulie volante de l'avant soit restée proche de sa position haute, alors que le garant avait pris du mou entre les réas. Ceci explique les différences de hauteur entre les poulies volantes avant et arrière (voir photos).

Au cours des interviews conduites à bord en septembre, il a été suggéré de vérifier cette hypothèse avec un croc de largage indépendant de type Duplex E2 23 tonnes, de manière à constater que le linguet s'ouvre avec facilité lorsque l'embarcation est inclinée.

Il est évident que le linguet n'est pas prévu pour supporter le poids de l'embarcation mais pour prévenir le largage intempestif de la maille longue.

Vraisemblablement, si l'ouverture du linguet n'avait pas été si facile, il aurait dû (en théorie) empêcher la maille longue d'être larguée et celle-ci aurait repris sa position d'elle-même.

Nota : grâce aux capteurs hydrostatiques, aux goupilles de sécurité et aux contacts de fin de course, etc., le mécanisme de largage Fassmer est étudié pour prévenir une erreur humaine, en ne permettant le largage des crocs qu'après avoir respecté certaines étapes et conditions. L'installation ne prend pas en compte une erreur humaine telle celle constatée à bord de l'Harmony of the Seas où un des deux systèmes de saisissage a été laissé dans la position « embarcation au poste de mer ».

Si le croc de largage était monté à 180° de la position actuelle (ouverture tournée vers l'intérieur de l'embarcation au lieu de l'extérieur) la maille longue de l'avant aurait croché sur la partie verticale du croc et l'embarcation aurait été retenue par l'avant.

Analysis by the Chief Officer Safety:

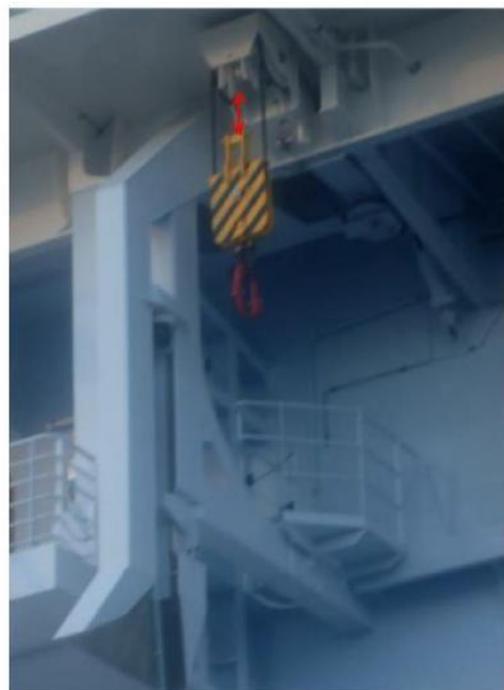
The long link “slipped out” from the release hook even though the **Red Locking Pins** were in place because due to the inclination of the lifeboat, the **Stop Pawl** tilted open.

CCTV footage is not enough to prove this theory, but it shows that when the bow of the Lifeboat slips back and out from the forward lashing gear, there is no jerking motion, therefore the long link was already out (or almost out) of the Release Hook.

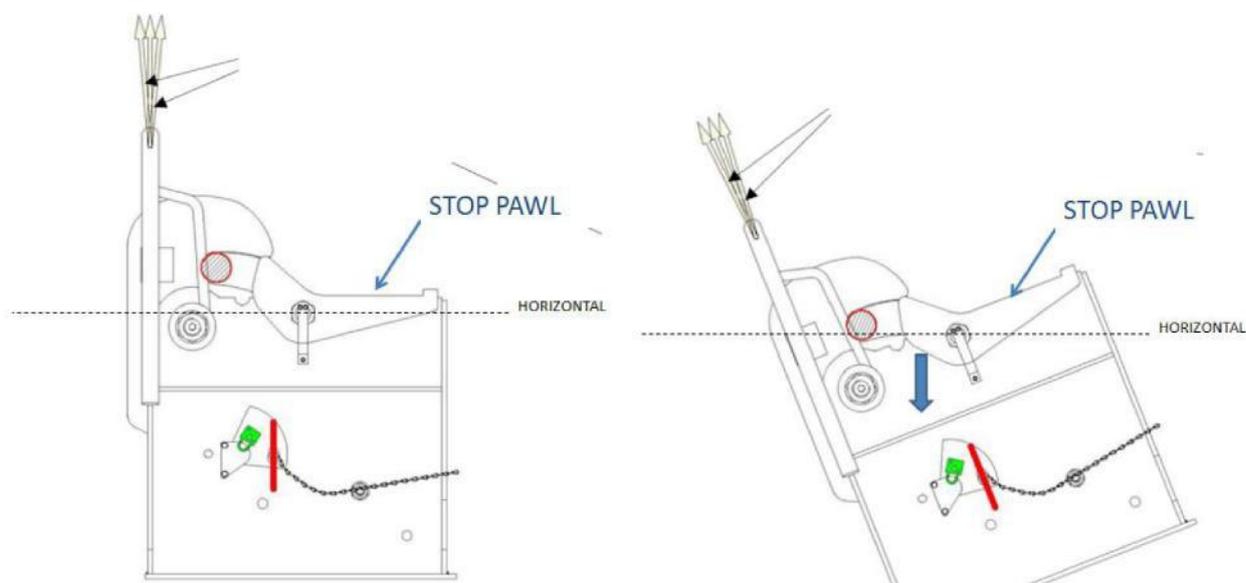
The fact that the Suspension Blocks are not heavy enough to pull the Fall Wires down (this has been proven during previous lifeboat drills, when recovering the lifeboats, it is necessary to pay out the fall wires via the electric winch in order for the long links to be lowered) means that the Forward Suspension Block remained very closed to its original position, while the Forward Fall Wire was getting slacked between the sheaves. This explains the different positions of the Suspension Blocks (see pics below).



AFT SUSPENSION BLOCK



FORWARD SUSPENSION BLOCK



LIFEBOAT IN NORMAL STOWED POSITION

WITH A SMALL INCLINATION, THE STOP PAWL
WOULD OPEN DUE TO LACK OF COUNTERWEIGHT.

During interviews on board Harmony on September 2016, it was suggested to test this theory with a stand alone Fassmer Release Hook System Type Duplex E2 23 tons in order to appreciate how easily the Stop Pawl will open when the Lifeboat is inclined.

Obviously, the Stop Pawl is not designed to withstand the weight of the Lifeboat (full or empty), but to assist in preventing the Long Link to slip out.

Perhaps, if the Stop Pawl had not opened so easily (in theory), it would have prevented the Long Link from slipping out and the latter would have jerked itself back into position.

Note: The whole installation of Fassmer Release Hook mechanism is designed to prevent human error via Hydrostatic Sensors, Safety Pins, Proximity Switches etc, which allow releasing of the hooks only after several steps have been taken and conditions met. This installation didn't take into account the type of human error experienced on Harmony of the Seas, when one of the lashings was forgotten in the secured position. If the Release Hooks were installed rotated 180 degrees (with the opening towards the Lifeboat instead of towards the outside) the forward long link would have hung on the neck of the Hook and the boat would've hang by the bow.



Ministère de la Transition écologique et solidaire

Bureau d'enquêtes sur les événements de mer

Arche sud - 92055 La Défense cedex
téléphone : +33 (0) 1 40 81 38 24
bea-mer@developpement-durable.gouv.fr
www.bea-mer.developpement-durable.gouv.fr

