Report 01-211

passenger and freight ferry

Aratere

lifeboat incident

Wellington

6 August 2001

Abstract

On Monday 6 August 2001 at about 0730, a lifeboat and rescue boat launching drill was conducted on board the passenger and freight ferry *Aratere*. At about 0750, during the recovery of the port lifeboat, the forward hook of the synchronous release equipment opened spontaneously when the lifeboat was about one metre above the water. The bow of the lifeboat fell back into the water. None of the 8 occupants were injured and the lifeboat sustained no damage.

Safety issues identified included:

- the design of the equipment, which allowed the closure of the operating levers while the release mechanism was not properly engaged
- the limited visibility from inside the lifeboat of critical parts of the release equipment, which did not allow the boat crew to adequately check that the release mechanism was properly engaged
- the limited opportunities for maintenance and training, leading to a lack of appreciation by the ship's crew of the proper operation of the release mechanism
- the difficulty of operating the cumbersome and complicated equipment while attempting to recover a lifeboat from a seaway
- the fitting of replacement critical parts that were not made or approved by the manufacturer of the release mechanism
- the lack of appreciation by the ship's crew of warning signs in previous events which, if acted upon, would have increased the crew's knowledge of the equipment.

Safety recommendations were made to the managing director of Tranz Rail, the Spanish maritime administration, Inspeccion General Maritima, Pesbo S.A., the International Association of Classification Societies and the Director of Maritime Safety to address the safety issues.

Photograph courtesy of Interisland Line

Aratere

Contents

Figures

Abbreviations

AB	able-bodied seaman
GRP	glass-reinforced plastic
IMO	International Maritime Organisation
kg	kilogram(s)
LSA Code	Life Saving Appliances Code
m	metre(s)
MSA	Maritime Safety Authority
MSC	Maritime Safety Committee of IMO
SOLAS	International Convention for Safety of Life at Sea
t	tonnes
UTC	universal time (co-ordinated)

Glossary

aft	rear of the vessel
class	category in classification register
coxswain	person who steers a boat
gross tonnage	a measure of the internal capacity of a ship; enclosed spaces are measured in cubic metres and the tonnage derived by formula
net tonnage	derived from gross tonnage by deducting spaces allowed for crew and propelling equipment
port	left-hand side when facing forward
starboard	right-hand side when facing forward

Data Summary

Vessel particulars:

Name:	*Aratere*	
Type:	passenger and freight ferry	
Registered:	Nassau, Bahamas	
Classification:	Det Norske Veritas	
Class:	SOLAS 1A1 car and train ferry A, general cargo carrier, Ro-Ro	
IMO number:	9174828	
Allowable passengers:	365	
Length (overall):	150.00 m	
Breadth:	20.25 m	
Gross tonnage:	12 596 t	
Net tonnage:	3779 t	
Built:	in 1998 by Hijos de J. Barreras S.A. in Vigo, Spain	
Lifeboats:	type:	BS-99M
	manufacturer:	Pesbo, S.A. of Bilbao, Spain
	construction:	glass-reinforced plastic
	configuration:	partially enclosed
	capacity:	112 persons each
	length:	10.68 m
	fully loaded weight:	15.26 t
	number:	one each side
Owner:	Wilmington Trust Company	
Operator:	Interisland Line	

Location: Wellington

Date and time: 6 August 2001 at about 0750[1]

Persons on board lifeboat: Crew: 8

Injuries: nil

Nature of damage: nil

Investigator-in-Charge: Captain John Mockett

[1] All times in this report refer to New Zealand Daylight Time (UTC + 13 hours) and are expressed in the 24-hour mode.

1. Factual information

1.1 History of the incident

1.1.1 On Monday 6 August 2001 the passenger and freight ferry *Aratere* was berthed alongside Aotea Quay in Wellington, having been idle for its routine maintenance lay day the previous day. Before returning to service, a lifeboat and rescue boat launching drill was scheduled for 0730.

1.1.2 The third mate was in charge of the port lifeboat and took with him 4 able-bodied seamen (ABs) as crew and 3 catering ratings for familiarisation. The third mate had not previously seen the lifeboat launched but had studied the operating instructions in the International Safety of Life at Sea (SOLAS) training manual and inspected the boats in their stowed positions. He spent 20 minutes before the drill re-familiarising himself with the instructions and discussing the procedure of the drill with the master.

1.1.3 The SOLAS training manual described 2 launching methods. When operating as a cargo ship, the lifeboat was lowered directly from the davits with its full crew on board using an automatic release wire from the boat. When operating as a passenger ship, there was a more comprehensive procedure that allowed passengers to board the lifeboat from the embarkation deck. The master required that this drill was conducted as if for passenger embarkation.

1.1.4 The bosun and one AB, in contact with the third mate by walkie-talkie, were on the boat deck to control the launching, and lowered the boat from its stowage position to the embarkation deck where the 8 boat crew boarded. The lifeboat was then lowered to the water. The boat's engine was started during lowering and once in the water the falls release mechanism was activated.

1.1.5 Initially the boat did not release. The simultaneous release hooks were controlled by a remote dual lever release locking mechanism inside the boat, and the instructions in the lifeboat manual stated that should the hooks not release when the first lever was pulled then the second lever was to be pushed down hard. The third mate followed this instruction and the falls released.

1.1.6 The third mate took the lifeboat away from the ship's side to give the engine a run and then carried out practice manoeuvres, giving each of the ABs a turn as coxswain. Meanwhile the rescue boat was launched with the master and another third mate as crew. Once the rescue boat was clear of the ship, the third mate in the lifeboat returned to the *Aratere* to practise approaches to the falls.

1.1.7 Before making the final approach for recovery of the lifeboat, the third mate stopped the lifeboat and drifted off the ship. He discussed with the crew how the recovery would be undertaken. He allocated 2 ABs to attach the forward fall block to its release hook, himself and one AB to engage the aft fall to its release hook and one AB to act as coxswain and operate the release locking mechanism. The catering ratings were to remain seated inside the boat.

1.1.8 When the final approach was made to the falls, the crew at each end of the boat had difficulty attaching the fall blocks to the hooks owing to the movement of the lifeboat in the slightly choppy water and the weight of the blocks. The third mate checked the aft hook and called to the ABs at the forward hook. When he received confirmation that the forward hook was in place, he instructed the AB who had been coxswain to activate the release locking levers. The AB engaged and locked the levers, but had to use a degree of force to get them into the correct position.

1.1.9 At this stage all appeared to be in order and recovery of the lifeboat continued. The third mate stopped the lifeboat engine and called the bosun on the walkie-talkie to raise the lifeboat about one metre out of the water and then stop so that the crew could check the hooks before continuing.

1.1.10 The bosun raised the boat out of the water and then stopped the winch. As the lifting winch stopped, the lifeboat bounced a little and the forward hook released, allowing the forward end of the lifeboat to fall back into the water. The lifeboat had not been far out of the water and it came to rest at an angle of about 15 degrees. The impact was not severe and there were no injuries or damage to the boat.

1.1.11 The stern of the boat was lowered back into the water. The forward falls block was re-engaged into the release hook but when the boat crew operated the release locking mechanism levers, they were unable to properly lock the hook in place. As a temporary measure the fall block was secured to the hook manually using a marlin spike, and a chain block was fitted between the hook and the falls block. Before lifting the boat up to the boat deck, all of the crew disembarked and either climbed aboard *Aratere* by ladder or were ferried by the rescue boat. The empty lifeboat was recovered without further incident.

Analysis 1

1. In order for the forward hook to release spontaneously, the falls block could not have been properly engaged into the lifeboat lifting hook, despite the actuating levers being in the correct position and the hooks appearing to be in the correct position.

2. Having not previously been involved in a launching drill on the *Aratere*, the third mate in charge of the lifeboat made an appropriate pre-launching preparation by re-familiarising himself with the instructions in the operating manual. His actions were in accordance with the instruction manual.

3. The number of operating crew was sufficient to safely conduct the drill and the ABs selected as crew were familiar with the boat, but neither they nor the third mate were aware that it was possible for the release hooks to be incorrectly engaged and the actuating levers still be locked into position when recovering the lifeboat.

4. Detail of the lifting equipment, its correct operation and the way in which it could be incorrectly engaged follow later in this report.

Figure 1
The port lifeboat

1.2 The lifeboat

1.2.1 The lifeboat was constructed of glass-reinforced plastic (GRP) and manufactured by Pesbo, S.A. of Bilbao in Spain. The boat was a partially enclosed lifeboat, said to be designed to meet the requirements of SOLAS 1974/1978, Chapter III, Regulation 42 and the Life Saving Appliances (LSA) Code.

1.2.2 The lifeboat was a type BS-99M, having a capacity of 112 persons. The boat was 10.68 m long, 3.92 m beam and 1.8 m depth. When fully loaded with equipment and maximum crew and passengers the total weight of the boat was 15.26 t, allowing 75 kg per person.

1.2.3 The lifeboat and its release equipment were approved by the Spanish maritime administration, Inspeccion General Maritima. Release equipment of the same design had been fitted to more than 300 lifeboats, including 24 of the same size to other BS-99M lifeboats. The various nationality ships on which the equipment had been fitted were classed by a variety of Classification Societies, the *Aratere* being classed by Det Norske Veritas and registered in the Bahamas.

1.3 The falls hook securing and simultaneous release mechanism

1.3.1 The lifeboat was attached to the davit falls by a hook secured to each end of the boat. The lifting pins of the fall blocks were engaged with the hooks and there was a securing mechanism within each of the hooks that was activated from a remote control station in the lifeboat and designed to release both hooks simultaneously (see Figure 2).

Figure 2
Lifeboat release hook and davit falls block

1.3.2 Levers at the remote control station were connected to control cables that ran forward and aft to simultaneously activate the release mechanism in each hook. When recovering the lifeboat, the hooks therefore also had to be secured simultaneously. The design of the release mechanism was such that the hooks could be released when there was weight on the falls (on-load) or when the boat was waterborne (off-load).

1.3.3 The release sequence was described in the Pesbo manual, reproduced in the SOLAS training manual and was also shown on a notice at the remote operating station. A security lever (A) had to be unfastened before the on-load release lever (B) could be pulled. That lever was interlocked with the off-load release lever (C), which should naturally disengage when the interlock came free (see Figures 3 and 4). The remote operating station required positive action by the operator and the lifeboat release mechanism could not be accidentally operated once correctly attached.

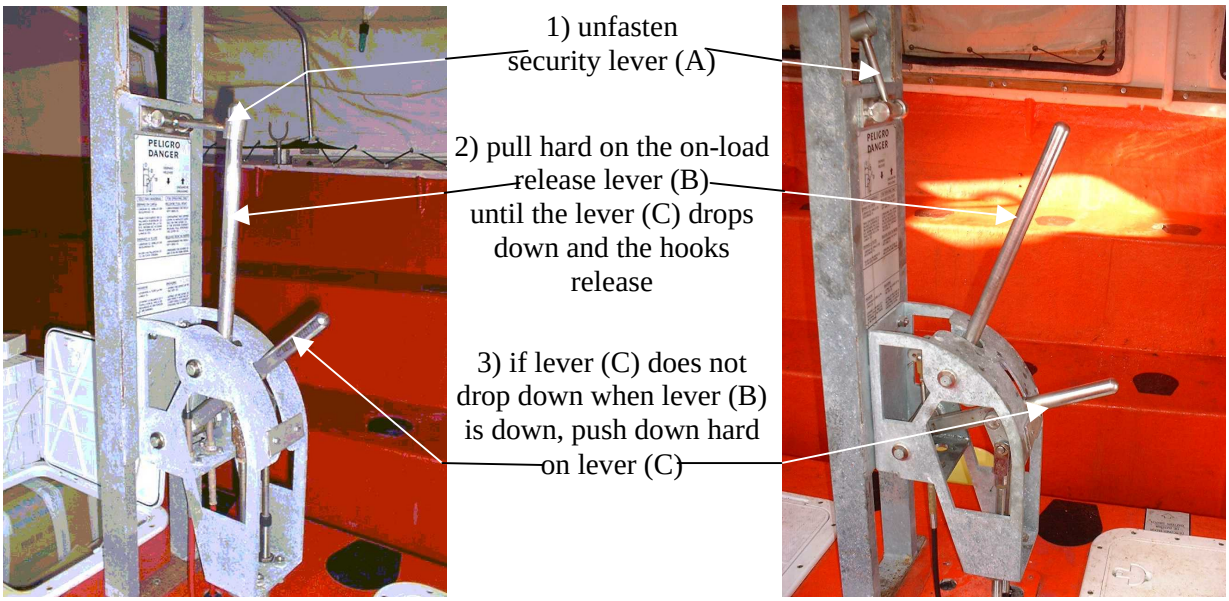


Figure 3
Remote control of release mechanism with operating instructions from SOLAS manual

1.3.4 The action of pulling lever (B) pulled the inner core of the sheathed control cables running to the hook at each end of the boat. Those inner cores were attached to security brake pawls that were set into recesses in the on-load release hooks to keep the hooks in place. Pulling the inner cores withdrew the security brake pawls (see Figure 5).

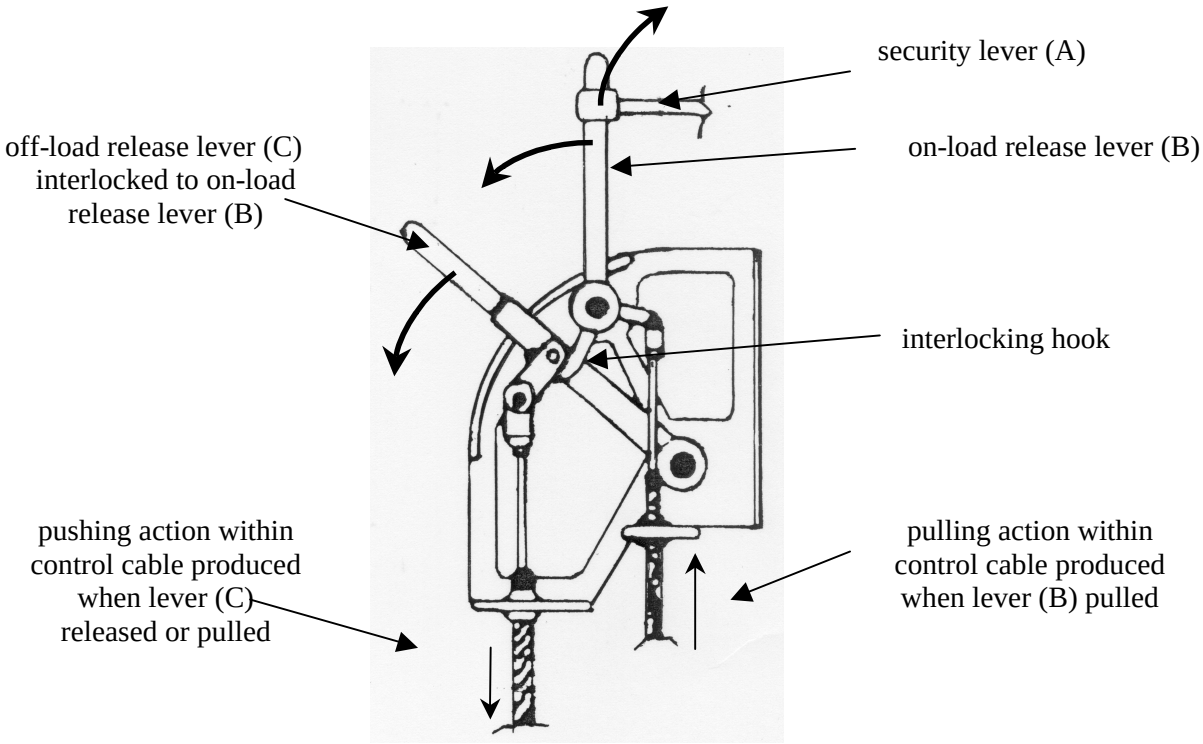


Figure 4
Internal mechanism of the remote operating station

1.3.5 When lever (B) was pulled down, the interlocking hook that held lever (C) in place was released and lever (C) was supposed to fall under its own weight, thus pushing the inner cores of control cables running to the lifting hooks at each end of the boat. Those inner cores were attached to the on-load release locking cams, which held the bell cranks in place. Pushing the inner cores rotated the cams and released the bell cranks, which in turn released the hooks (see Figure 5).

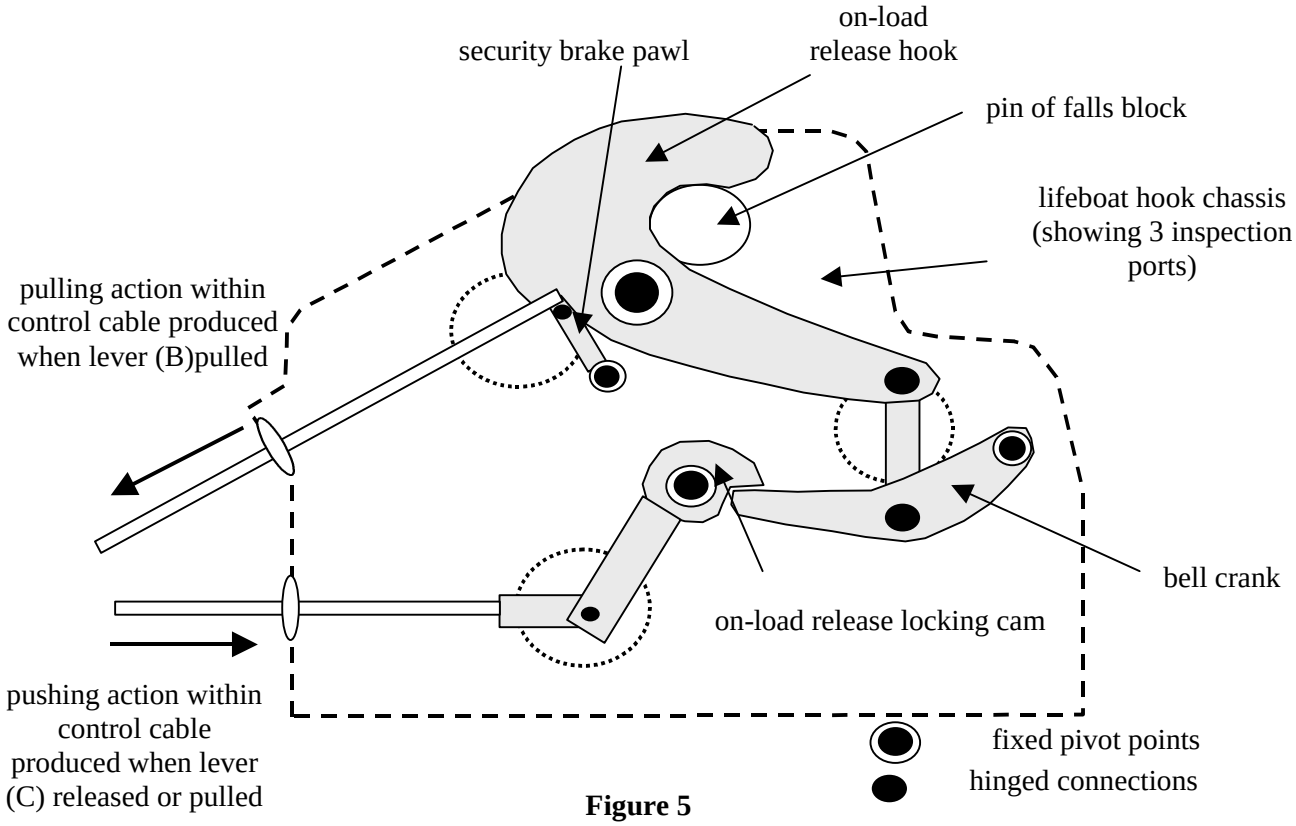


Figure 5
Correctly secured hook

1.4 Post-incident inspection

1.4.1 Once the port lifeboat was recovered and stowed in the davits, the release equipment was inspected. At the remote operating station, the control cable for the forward security brake pawl was found strained. Part of the cable sheathing at the crimped joint between the cable and the adjustment threads was exposed and several strands of the sheathing reinforcement were protruding. The multi-strand wire within the sheathing appeared to be intact.

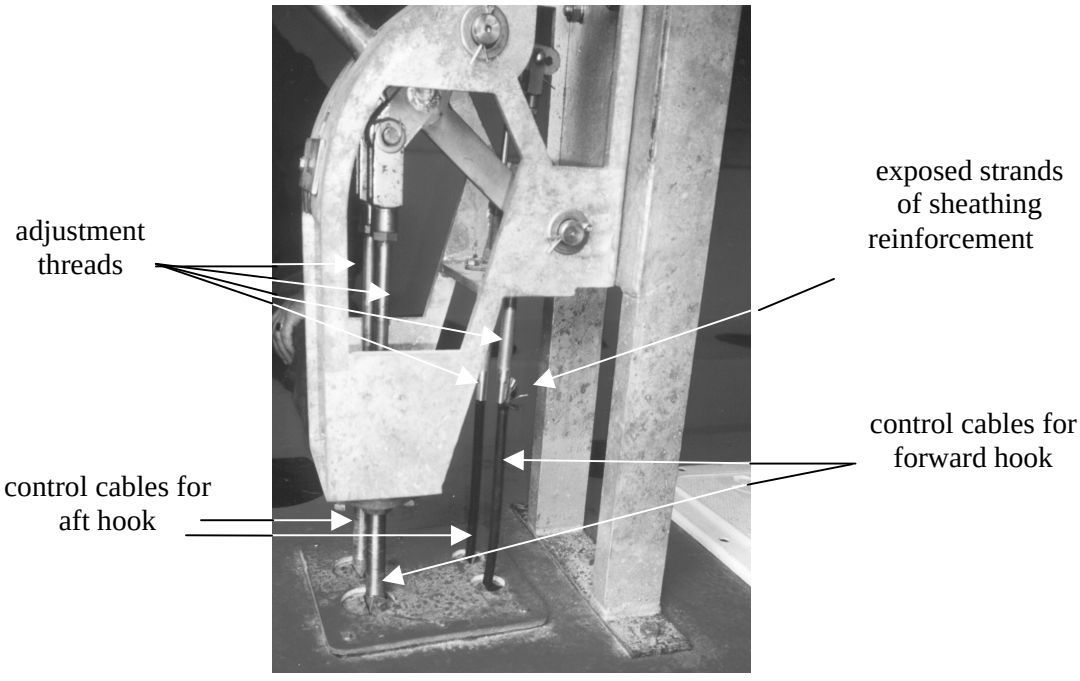


Figure 6
View of remote control cables as found after the incident

1.4.2 The forward hook could not be fully inspected while the boat was in the davits because of the temporary securing arrangement that had been fitted to recover the boat. The Pesbo operating manual also stipulated that when making any repairs, the lifeboat had to be lowered to the water.

1.4.3 The lifeboat was removed from the *Aratere* and the ship continued in service with a reduced passenger carrying capacity.

1.4.4 Once the boat was free of the davits and the fall hooks, a thorough inspection of the release mechanism was possible. No excessive wear was found in any parts of the mechanism and both the forward and aft hooks operated freely and could be correctly closed and locked in place.

1.4.5 With the hook held in place as if engaged with the lifting pin of the falls block, but not quite fully closed, the remote operating levers could be pushed into position and secured, giving the impression from within the boat that the release locking mechanism was correctly locked. However, the on-load release locking cam was under the bell crank so not holding it, and the security brake pawl was not fully engaged with the recess in the on-load release hook.

1.4.6 The release locking mechanism was operated several times with the release hook in various positions other than fully closed. Little deviation from the closed position was necessary to allow the remote operating station to be locked but the release mechanism not properly engaged. In all cases the on-load release locking cam was under the bell crank but the security brake pawl was in various positions, either pushing on the outside of the hook recess or just engaged into the recess.

1.4.7 In order to lock the remote operating station, the handles required more applied force when the hook was not in the fully closed position. The control cables were designed to operate either a pawl or a cam, which rotated easily when in the correct position, and no force should have been necessary.

1.4.8 When the operating handles were locked in place but the release hook was not fully closed, the on-load release locking cam did not prevent movement of the bell crank. However, the security brake pawl was also incorrectly positioned but held against the release hook with sufficient force to hold the hook in position under light loading.

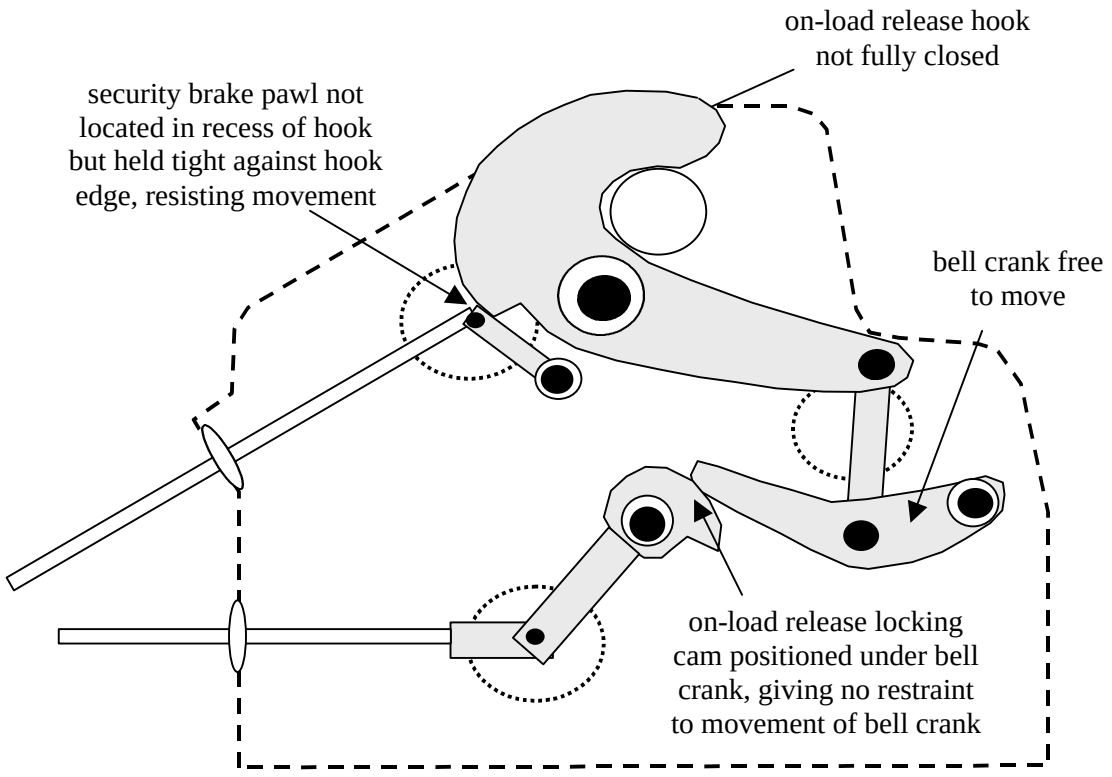


Figure 7
Incorrectly secured hook

1.4.9 The strained control cable for the forward security brake pawl was removed from the lifeboat. The sheathing had separated from the crimped joint with several of the reinforcing strands exposed. The inner core moved freely within the sheathing and was not damaged. The core was steel multi-stranded wire but was not of original specification. The inner core was designed to push or pull on freely moving parts of the release mechanism and, while it had to be rigid within the sheathing, was not required to be particularly strong.

1.4.10 With the control cable removed, the release locking mechanism was worked by hand and again when the lifting hook was not in the fully closed position, it was possible to engage the security pawl into the recess of the lifting hook while the on-load release locking cam was under the bell crank.

Analysis 2

1. Although the remote operating levers for the release mechanisms were in the correct position and locked in place, some force had been necessary to do so and it became apparent that the forward release hook was not correctly engaged.

2. The crew at each end of the lifeboat had some difficulty in engaging the lifting pins of the fall blocks in the release hooks and maintaining them in position while the mechanism was locked. When they reported that the hooks were in position it was possible that they were correct, but the movement of the lifeboat in the choppy water caused the forward release hook to move slightly without the crew realising and before the release locking mechanism was fully operated.

3. Any movement of the release hook created corresponding movements of the other components of the release mechanism.

4. The forward bell crank was not in its correct position and the on-load release locking cam was able to slip underneath it rather than into its correct locking position on top.

5. The final movement of the operating levers should have pushed the security pawls into the recesses in the release hooks, but the forward pawl was caught against the recess in the hook and could move no further. The crew pushed on the operating lever, which would have caused an amount of flexing in the inner core while straining the outer, more rigid, sheathing. The straining of the outer sheathing resulted from the additional applied force.

6. When the lifeboat was lifted from the water, the aft release hook was correctly engaged and locked in place, but in order to have spontaneously released the forward release hook could not have been.

7. Inspection of the forward mechanism after the incident showed that the locking cam was not performing any holding function at all. The boat was able to be lifted because the security pawl was pushed firmly against the release hook and providing sufficient friction to prevent it opening.

8. When the lifting winch was stopped when the lifeboat was about a metre above the water, the boat would have “bounced” fractionally, causing the weight to firstly come off the release mechanism before jerking back. The extra loading caused by the jerk was sufficient to turn the release hook to the open position against the small holding pressure of the incorrectly positioned pawl.

9. It was fortuitous that the third mate stopped the lifeboat when it was only about one metre above the water. Had the stop for checking not been made, the forward release hook could have opened at a much higher position, resulting in a far more serious accident with the probability of serious injuries and significant damage.

1.5 Vessel information

1.5.1 The *Aratere* was a passenger and freight ferry operated by Interisland Line, Tranz Rail. The ship was approved for a total complement of 400 persons and was capable of carrying both rail and vehicular cargo. The *Aratere* was in class with Det Norske Veritas and had been built in Spain in 1998. The ship traded on a scheduled service between Wellington and Picton.

1.5.2 The *Aratere* was fitted on each side with one 112-person partially enclosed lifeboat and six 25-person liferafts. The ship also carried a fast rescue boat. The certificates and surveys applicable to the life-saving equipment were valid and up to date.

1.6 Maintenance history

1.6.1 The crew had discovered after several previous launching drills through the life of the ship, that each of the lifeboats had been recovered with the bell cranks not engaged but the security pawl engaged sufficiently to lift the unloaded boat. As the release mechanism could not be reset while the lifeboat was in the davits, the crew had to return the lifeboat to the water before being able to set the mechanism correctly.

1.6.2 In September 2000 the inner cores of the control cables for the forward and aft security pawls on the port lifeboat were renewed after the originals were found to be broken. The locally made replacements were of multi-strand construction steel wire whereas the originals were made of a single length of small section flat steel bar. The replacements were of stronger construction and more flexible than the originals.

1.6.3 In October 2000 similar inner cores were fitted to the starboard lifeboat. Although the originals in the starboard boat were not broken, they were replaced as a precautionary measure after the breakages in the port lifeboat.

1.6.4 In January 2001, repairs were made to the forward control cable for the security pawl in the port lifeboat where the sheathing was separating from the crimped joint.

1.6.5 During dry-docking in March 2001 the release mechanism on both boats was overhauled in line with the manufacturer's recommendations.

1.6.6 During the same dry-docking, the hatches at the forward and aft ends of both boats were enlarged and platforms constructed inside the boats to give the crew better access to the hooks.

Analysis 3

1. There were several warning events prior to this incident that should have made the crew and the company management aware of a potential problem, but these were either ignored or not appreciated for what they were.

2. When the crew previously discovered that the lifeboats had been lifted with the release mechanisms incorrectly set, they should have investigated the cause rather than simply resetting the mechanisms.

3. When the flat bar inner cores of the control cables on the port lifeboat broke, they were replaced with multi-strand wires of a stronger specification as it was considered that the originals must not have been strong enough. In fact, particular strength was not required and the cause of the breakage should have been investigated and discussed with the manufacturer. The replacements should have been to the manufacturer's specifications or any change from original approved by the manufacturer.

4. The original inner cores of the control cables were of a flat bar construction and would not flex much within the outer sheathing. However, the operating levers probably could be locked if the release hook was only slightly misplaced from the fully closed position and the security brake pawl partly entered into the recess in the hook. The inner cores probably broke when the release hooks were incorrectly set to such a degree that the security pawls were outside the recess in the release hooks, resulting in greater additional force being applied when attempting to lock the operating levers.

5. The renewed inner cores were more flexible than the original, allowing them to flex within the rigid sheathing should additional force be applied. On one previous occasion the sheathing of the port lifeboat forward control cable needed repair, indicating that it had been strained in a similar way to that in this incident.

6. From the maintenance history it would appear that whenever one of the boats had been lifted with incorrectly engaged release mechanisms, additional force had been applied to put it in place. The amount of force required to lock the operating levers thus became variable but did not alert operating crew to a problem. Given that the instructions for releasing the lifeboat recognised the potential need to "push down hard on lever (C)", it would be a reasonable assumption by the crew that a similar need might exist during recovery of the boat.

7. The number of warning signs that were missed indicated that the crew of the *Aratere* did not fully appreciate how the complex release mechanism operated and were lulled into believing that if the operating levers were in place and locked, then the releases were correctly engaged.

8. Engaging the fall blocks to the hooks in a seaway was difficult and required good co-ordination between the forward and aft crews and the person at the remote operating station. The construction of internal platforms and the enlarging of the hatchways made the task easier but the internal mechanism of the releases was still not fully visible from inside the boat.

1.7 Legislation

1.7.1 The *Aratere* was required to carry lifesaving appliances that complied with both the SOLAS Convention and the LSA Code, as adopted by the International Maritime Organisation (IMO).

1.7.2 The LSA Code was adopted by the Maritime Safety Committee (MSC) of IMO in June 1966 by resolution MSC.48(66) in order to provide international standards for the life-saving appliances required by chapter III of the 1974 SOLAS Convention. The Code was made mandatory under SOLAS by amendments to the Convention adopted by the MSC in June 1996 under resolution MSC.47(66). The Code entered into force on 1 July 1998.

1.7.3 The requirements for lifeboat release equipment were mostly unchanged from those in Chapter III, Regulation 41 of the 1974 SOLAS Convention, and were contained in the LSA Code Chapter IV, which states:

> 4.4.7.6
>
> Every lifeboat to be launched by a fall or falls, except a free-fall lifeboat, shall be fitted with a release mechanism complying with the following requirements subject to paragraph .5 below:
>
> .1 the mechanism shall be so arranged that all hooks are released simultaneously;
>
> .2 the mechanism shall have two release capabilities as follows:

.2.1 a normal release capability which will release the lifeboat when it is waterborne or when there is no load on the hooks and;

.2.2 an on-load release capability which will release the lifeboat with a load on the hooks. This release shall be so arranged as to release the lifeboat under any conditions of loading from no load with the lifeboat waterborne to a load of 1.1 times the total mass of the lifeboat when loaded with its full complement of persons and equipment. This release capability shall be adequately protected against accidental or premature use. Adequate protection shall include special mechanical protection not normally required for off-load release, in addition to a danger sign. To prevent an accidental release during recovery of the boat, the mechanical protection (interlock) should only engage when the release mechanism is properly and completely reset. To prevent a premature on-load release, on load operation of the release mechanism should require a deliberate and sustained action by the operator. The release mechanism shall be so designed that crew members in the lifeboat can clearly observe when the release mechanism is properly and completely reset and ready for lifting. Clear operating instructions should be provided with a suitably worded warning notice;

.3 the release control shall be clearly marked in a colour that contrasts with its surroundings;

.4 the fixed structural connections of the release mechanism in the lifeboat shall be designed with a calculated factor of safety of 6 based on the ultimate strength of the materials used, assuming the mass of the lifeboat is equally distributed between the falls; and

.5 where a single fall and hook system is used for launching a lifeboat or rescue boat in combination with a suitable painter, the requirements of paragraph 4.4.7.6.2 need not be applicable; in such an arrangement a single capability to release the lifeboat or rescue boat, only when it is fully waterborne, will be adequate.

1.7.4 The LSA Code requirements incorporated the phrase “The release mechanism shall be so designed that crew members in the lifeboat can clearly observe when the release mechanism is properly and completely reset and ready for lifting.” This phrase had not been included in the SOLAS requirements.

1.7.5 The requirements for abandon ship training and drills were contained in Chapter III of SOLAS. Regulation 18 contained the following clauses regarding drills:

3.1 Each member of the crew shall participate in at least one abandon ship drill and one fire drill every month.

3.4.5 Each abandon ship drill shall include the lowering of at least one lifeboat after any necessary preparation for launching.

3.7 Each lifeboat shall be launched with its assigned operating crew aboard and manoeuvred in the water at least once every three months during an abandon ship drill.

Analysis 4

1. While the lifeboats on the *Aratere* complied with the regulation for the simultaneous release of the forward and aft hooks, there were several aspects of the design and construction that did not fully comply with the regulations.

2. The legislation required that there be separate release capabilities for on-load and off-load situations. As designed and described in the operating manual, the required different capabilities were essentially achieved by the same operation of the same equipment.

3. The remote operating station had mechanical protection against accidental or premature use and did require deliberate and sustained action by the operator. However, the protection measure "should only engage when the release mechanism is properly and completely reset", which was not the case with the release mechanism as fitted to the lifeboats on the *Aratere*.

4. The design of the lifeboat was such that the crew were not able to clearly observe when the release mechanism was properly and completely reset and ready for lifting. Even with the enlargement of the hatchways, it was necessary for a crew member to exit the boat and go onto the extreme bow or stern sections to see the proper engagement of the mechanism. This would clearly be a dangerous situation if the boat was in any significant seaway.

5. The LSA Code came into force on 1 July 1998, after the keel of the *Aratere* was laid but before the ship was completed and delivered. The Code was adopted in 1996 and should have been known to the manufacturer and the approving authority of the release equipment. Given that the ship was to be delivered after the Code was in force, it would be reasonable to expect that the live-saving appliances would all comply with the provisions of the Code.

Summary analysis

1. Life-saving appliances and safety equipment should be reliable, simple and safe to operate and designed in such a way that, in the absence of trained operating crew, they can be used with confidence by anyone on board.

2. The release mechanism and its attachment to the falls block as fitted to the lifeboats on the *Aratere* were cumbersome and difficult to operate, particularly if a lifeboat was being recovered from a choppy seaway.

3. When recovering a lifeboat, the release mechanisms had to be reset at the same time as the falls hooks were attached. The dual operation being performed simultaneously at both ends of the lifeboat was difficult to co-ordinate and had a high potential for error and also for injury to crew members attempting to hold the heavy components in place.

4. Had the design been such that the release mechanism could be reset and locked before the lifeboat approached the falls, there would have been the advantages of the mechanism being set and checked under more controlled conditions and attachment of the boat to the falls being simplified. This was not possible with the release system as fitted.

5. The manufacturer's stipulation that the lifeboat must be waterborne for any maintenance or repairs to be carried out, limited the opportunity for crew training and familiarisation with the correct operation of the release mechanism.

6. A training model of the release mechanism made by Interisland Line after this incident was a commendable reaction, but such a training tool should not be necessary and demonstrated that the mechanism was overly complicated. The model is fully depicted in the Safety Actions section of this report.

7. Likewise, a feeler gauge made to check the correct position of the security brake pawls should not be necessary and demonstrated that the visibility of critical parts of the mechanism was not adequate. The gauge is fully depicted in the Safety Actions section of this report.

8. The Commission investigated an occurrence involving the premature release of a rescue boat during a drill on board the ferry *Arahura* in May 1999. Interisland Line operated the ship and among the safety recommendations made to the managing director of Tranz Rail was the following:

> conduct a review of the emergency muster lists on board each vessel and implement a programme of familiarisation and training that ensures each survival craft is crewed with personnel that have the skills commensurate with the function of the craft.

In response to the recommendation, the managing director stated:

> This training and familiarisation is continuing with drills and practices. It is ongoing.

This incident also involved crew training and familiarisation, but in light of the above response and the safety actions taken as a result of this incident, no further safety recommendations in that regard were made.

9. The Commission investigated an occurrence during a lifeboat drill on board the container vessel *Nicolai Maersk* in February 2001. A safety recommendation was made to and accepted by the Director of Maritime Safety that the Commission's report into that accident and its concerns be submitted to the Maritime Safety Committee of the IMO. Those concerns are applicable to this incident and the recommendation has been repeated with respect to this incident.

10. The prime function of a lifeboat is the evacuation of crew from a distressed ship. Traditionally the focus of lifeboat design has been on the launching system with lesser importance placed on the procedure to recover the boat. To achieve the legislative requirement for simultaneous release of both hooks, the design of modern equipment has become more complicated, resulting in increased difficulty in the recovery process.

11. Legislation concentrates on launching capabilities although the LSA Code does state that "to prevent an accidental release during recovery of the boat, the mechanical protection (interlock) should only engage when the release mechanism is properly and completely reset". All lifeboats must be launched, and therefore recovered, every three months. Drills would be carried out under controlled circumstances and boats usually launched only inside a harbour. Nevertheless, the recovery of a boat is a more hazardous operation than its launching, particularly where the design of the equipment dictates that the falls must be attached simultaneously.

2. Findings

2.1 The forward fall hook of the port lifeboat spontaneously and prematurely released because the release mechanism had been incorrectly engaged.

2.2 Contrary to the SOLAS Convention and the LSA Code, the design and operation of the release mechanism allowed the operating levers to be set and locked in the correct position while the components of the release mechanism were not correctly engaged.

2.3 Contrary to the LSA Code, the boat crew could not clearly observe when the release mechanism was properly and completely engaged.

2.4 With the operating levers locked in the correct position, the boat crew were given the impression that the release hooks were fully and properly engaged and the boat ready to lift safely.

2.5 The regular crews of the *Aratere* did not have a full and thorough appreciation of the correct operation of the complicated release hooks.

2.6 The need for the lifeboats to be lowered to the water before the hooks could be operated, inspected or any work carried out meant that familiarisation with the operation was infrequent and not sufficient for all potential operating crew to learn the correct procedures.

2.7 Previous warning events were either not appreciated or ignored. Had these events been investigated and acted upon, valuable lessons could have been learned and a greater knowledge of the correct operation of the hooks acquired by the operating crews of the *Aratere*.

2.8 The broken inner cores of the control cables were replaced with non-standard cores of more flexible specification, which allowed incorrect engagement of the release mechanisms to continue. Had original specification cables been used as replacements, they would probably have broken again and alerted the crew to the problem.

3. Safety Actions

3.1 Immediately after the incident, on 6 August 2001 the Maritime Safety Authority (MSA) imposed a condition limiting the total complement of the *Aratere* to 270 persons until a system was devised to allow lifeboat operating crews to positively identify whether or not the lifeboat lifting hooks were properly engaged.

3.2 Interisland Line modified its SOLAS training manual to increase the crew's awareness of the correct procedures and safety precautions that were required during launching drills, in particular during the lifeboat recovery process.

3.3 Interisland Line painted witness marks on the back of the release hooks and on the hook chassis. When setting the hook before locking in place, the marks on the hook and chassis had to be in line, indicating that the hook was in the correct position. The markings were visible to a crew member standing in the lifeboat hatchway.

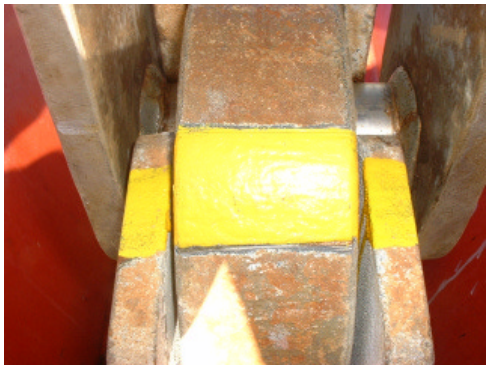
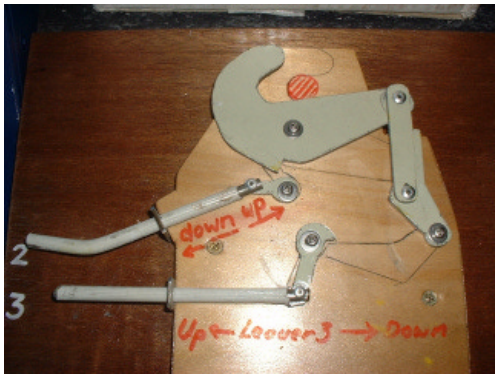


Figure 8
Markings on hook and chassis

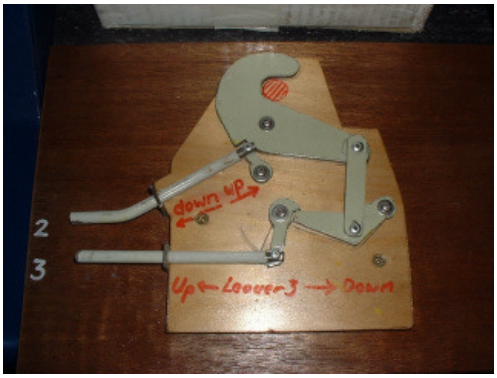
3.4 Interisland Line made a feeler gauge which was to be inserted between the top of the security pawl and the socket in the release hook, further ensuring that the hook was properly engaged and the bell crank in position below the release cam.

3.5 The Interisland Line shipwright constructed a working model of the hook assembly as a training tool. This model was used in lieu of the need to launch the lifeboat in order for crew to see the workings of the release mechanism. The model was able to graphically show how the hook could be set in an unsafe manner with the release hook only minimally displaced from its proper position.

Figure 9
Feeler gauge inserted into hook assembly



Open position



Closed position

Figure 10
Working model of hook in the correct open and closed positions

3.6 With the completion of the above actions, the MSA lifted the condition imposed on the *Aratere* on 21 August 2001.

3.7 Interisland Line acquired replacement control cables of the original specifications from the manufacturer and replaced the locally made cables that had been fitted to both lifeboats in September and October 2000.

3.8 The MSA also investigated this incident. Its findings, concerns and subsequent recommendations were comparable with those of the Commission.

3.9 The MSA reports were forwarded to the equipment manufacturer, the operator, Det Norske Veritas, the Spanish maritime administration, the Bahamian administration, the IMO and the Oil Companies International Marine Forum in addition to the master and other crew members. The MSA made recommendations to the operator and the equipment manufacturer.

3.10 In response to the incident, the internal and external investigations and the MSA report and recommendations, the operator carried out the procedural changes and training described earlier in this section.

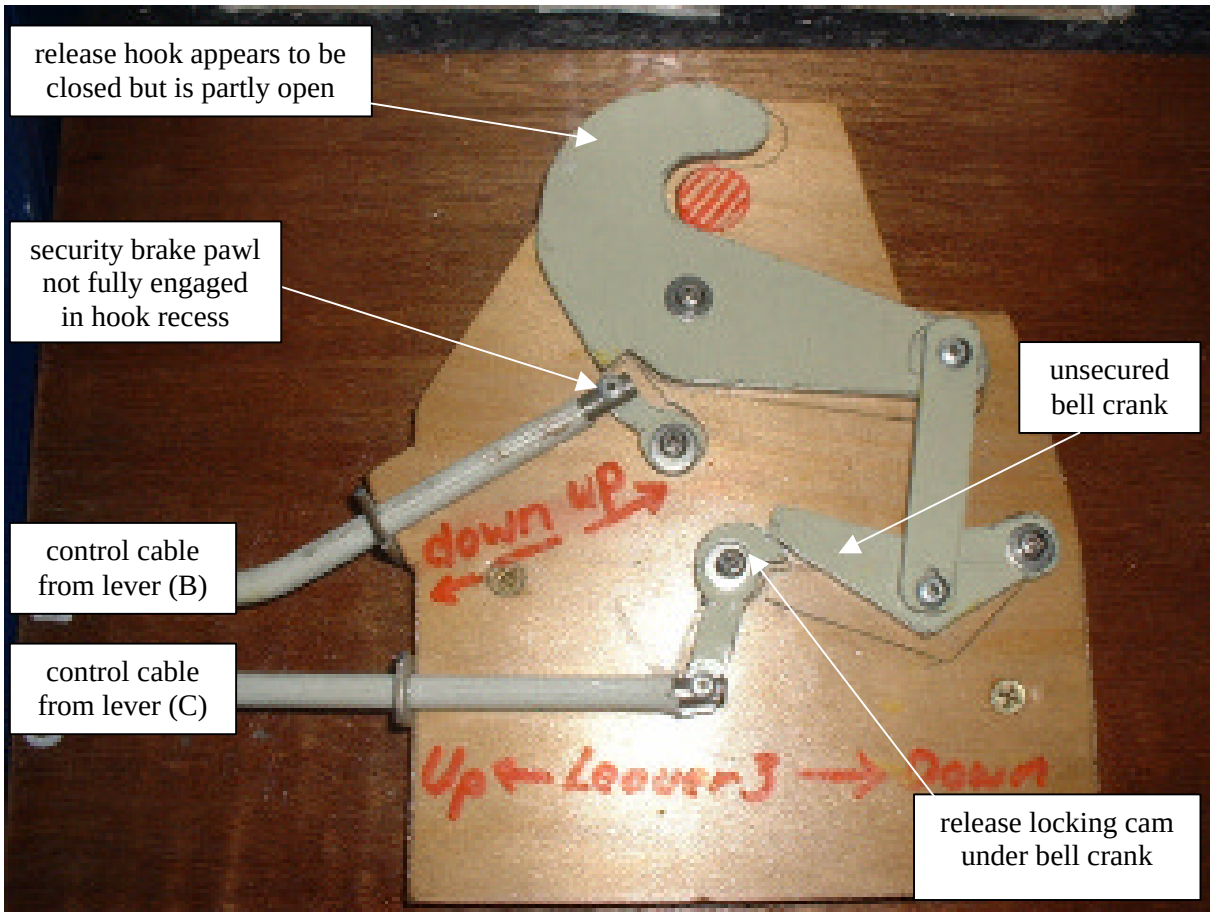


Figure 11
Working model of hook in incorrect position
(note correct position of components etched onto model base)

3.11 In response to the MSA report the Spanish maritime administration stated that, although no similar incidents involving the same type of hook were known about, it has required the manufacturer to study the improvement of the system. It also intended to carry out an extraordinary control and testing of those systems fitted to ships registered by the Spanish administration. At the time of publication of this report, the control and testing were not complete and the results not known.

3.12 In response to the Commission's preliminary report, Pesbo S.A., the manufacturer of the release equipment, disputed that it was possible to wrongly engage the release mechanism but nevertheless undertook that future design will include the following changes:

- an additional inspection port on each side of the hook chassis to provide better vision of the on-load release locking cam and the bell crank
- the position of the release mechanism to be raised so that there will be no hindrance to the visibility of the mechanism
- an eyebolt to be incorporated into the hook chassis to enable the lifeboat to be secured in the davits to allow maintenance, training and familiarisation to be carried out without the need to launch the boat
- manuals will include an instruction that for any repair or replacement, only parts made or approved by the manufacturer are to be used.

3.13 Pesbo S.A. also undertook to notify all owners of ships fitted with the same release equipment about this incident, and to invite them to make contact to check the status of the equipment and receive appropriate instructions to reinstate the equipment should it not be as originally designed.

4. Safety Recommendations

4.1 On 10 April 2002 the Commission recommended to the managing director of Tranz Rail Limited that he:

4.1.1 Introduce a policy that when replacement parts are required for any life-saving appliances or safety equipment, only parts made or approved by the manufacturer are used. (001/02)

4.2 On 3 May 2002 the Technical Manager of The Interisland Line replied in part:

4.2.1 Your final safety recommendation number 001/02 is already included in our Safety Manual, and has been since 1st November 2001 as we realised that this would be required.

Chapter 9 Maintenance states that Manufacturers' instructions and original manufacturers parts are to be used for the maintenance of "Critical Equipment" and critical equipment includes all LSA.

4.3 On 10 April 2002 the Commission recommended to the Spanish maritime administration, Inspeccion General Maritima that it:

4.3.1 Require Pesbo S.A. to re-design its future synchronous lifeboat release equipment so that it fully complies with the provisions of the LSA Code, and is able to be engaged and checked before the lifeboat is attached to the davit falls. (002/02)

4.3.2 Require Pesbo S.A. to provide a modification for existing synchronous lifeboat release equipment to address the deficiencies identified in this report. (003/02)

4.4 On 10 April 2002 the Commission recommended to Pesbo S.A. that it:

4.4.1 Advise all recipients of its synchronous lifeboat release equipment of the type supplied to the *Aratere*, of this incident and of the potential for the equipment to be incorrectly engaged when recovering a lifeboat. (004/02)

4.4.2 When available, provide all recipients of its synchronous lifeboat release equipment of the type supplied to the *Aratere* with a modification to prevent incorrect engagement of the equipment. (005/02)

4.5 On 25 April 2002 Pesbo SA responded in part:

4.5.1 We have decided to carry out the following actions:

1. To communicate to all our clients of the danger that it supposes to manage the lifting system with no qualified personnel.
2. To send to each ship a new instructions book.
3. To notify them the absolute prohibition of substituting any [component] for another that is not identical to the original.
4. To send precise documentation so that each owner equips his system with:
   (a) A ring to suspend the boat [off] the davit to carry out maintenance operations without lowering the boat to the water.
   (b) A [placard] with instructions to check [that] the [components within] the system [are] correctly engaged.
   (c) A security pin that impedes the opening of the hook [if attempts are made to lift the boat] with the system incorrectly engaged.

   We will also send the necessary data to install another [placard] in the vicinity of the control box with instructions so that the use of the security pin doesn't hinder the manoeuvre of the hooks.

We want to leave clear that all these instructions will be given to the owners so that they carry them out themselves.

4.6 On 10 April 2002 the Commission recommended to the International Association of Classification Societies that it:

4.6.1 Advise all member Classification Societies of this incident in order that where synchronous release equipment of the same type is fitted on ships classed by them, their surveyors and all relevant ship operators are made aware of the potential for improper engagement of the equipment. (006/02)

4.7 On 12 March 2002, the Senior Technical Officer of the International Association of Classification Societies Permanent Secretariat replied to the Commission's preliminary safety recommendation, which remained unchanged and became final:

4.7.1 On receipt of the final report, I will send it to the IACS Correspondence Group on Life Saving Appliances to include in their work on the subject in conjunction with IMO (DE).

4.8 On 10 April 2002 the Commission recommended to the Director of Maritime Safety that he:

4.8.1 Submit a copy of Commission's report 01-211, together with the Maritime Safety Authority final report into the same incident, to the Maritime Safety Committee of IMO to support the work and initiatives now being conducted by both the Marine Accident Investigation Branch and the Maritime and Coastguard Agency of the United Kingdom, regarding the safety of lifeboats and lifeboat drills.

Any review conducted by IMO should consider reported accidents worldwide, with particular emphasis on lifeboat/rescue boat launch and recovery systems.

In addition, the review should consider standardised and integrated systems which:

- have effectively common operating systems and procedures independent of the manufacturer
- can be readily understood by non-technical persons
- will reliably perform the tasks required, including routine testing, with maximised safety
- can be operated safely under the control of operators with minimum experience and training. (007/02)

4.9 On 25 March 2002 the Director of Maritime Safety replied to the Commission's preliminary safety recommendation, which remained unchanged and became final:

4.9.1 MSA has no formal comment to make on either the report or preliminary safety recommendations to the Director or other parties. These are acceptable and we will action them when the report is finalised.

Approved for publication 10 April 2002

Hon. W P Jeffries
Chief Commissioner