

MAIB SAFETY BULLETIN 2/2011

Malfunction of a proximity switch, which resulted
in failure of a fall wire with the loss of one life
on the car carrier *Tombarra*

MAIB

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This document, containing safety lessons, has been produced for marine safety purposes only, on the basis of information available to date.

The Merchant Shipping (Accident Reporting and Investigation) Regulations 2005 provide for the Chief Inspector of Marine Accidents to make recommendations at any time during the course of an investigation if, in his opinion, it is necessary or desirable to do so.

A handwritten signature in black ink that reads 'Steve Clinch'.

Steve Clinch
Chief Inspector of Marine Accidents

NOTE

This bulletin is not written with litigation in mind and, pursuant to Regulation 13(9) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005, shall not be admissible in any judicial proceedings whose purpose, or one of whose purposes, is to apportion liability or blame.

This bulletin is also available on our website: www.maib.gov.uk
Press Enquiries: 020 7944 6433/3387; Out of hours: 020 7944 4292
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BACKGROUND

At approximately 1550 (UTC) on 7 February 2011, the fall wire of the rescue boat on board the UK registered car carrier *Tombarra* parted when the vessel was alongside in Royal Portbury Docks, Bristol, UK. The accident occurred as the rescue boat reached its stowed position on the davit following a monthly drill. Hoisting was not stopped before the davit reached its stowed position. The proximity switch, that should have cut electrical power to the winch motor before the davit reached its stops, failed to function. The rescue boat and its four crew fell nearly 29m (**Figure 1**) into the water below. One of the boat's crew died and two were hospitalised.

Figure 1



Vessel and parted fall wire

The 12mm diameter fall wire had a certified minimum breaking load of 141kN. Its safe working load (SWL) was 23.5kN based on a factor of safety of six. The wire was fitted to a single-arm davit (SA 1.5) (**Figure 2**), manufactured by Umoe Schat-Harding Equipment AS (Schat-Harding). The davit system was powered by a Schat-Harding W50 two-speed electric winch with a nominal pull of 50kN.

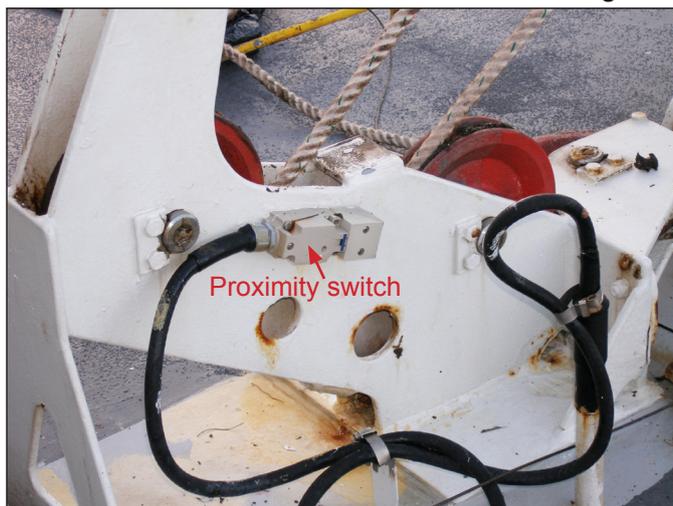
Figure 2



Davit system

Figure 3

The winch was operated by a control panel sited forward of the davit. The boat was hoisted using the buttons on the control panel until the davit was near the stowed position. It was then intended that hoisting be completed manually by the use of a winch handle adjacent to the winch motor. To prevent the inadvertent operation of the winch when the rescue boat was in its stowed position, an inductive proximity sensor/switch (Telemechanique XS7-C40FP260) was fitted on the davit (**Figure 3**). The switch was intended to cut off power to the winch when the davit closed to within approximately 12mm of the sensor.



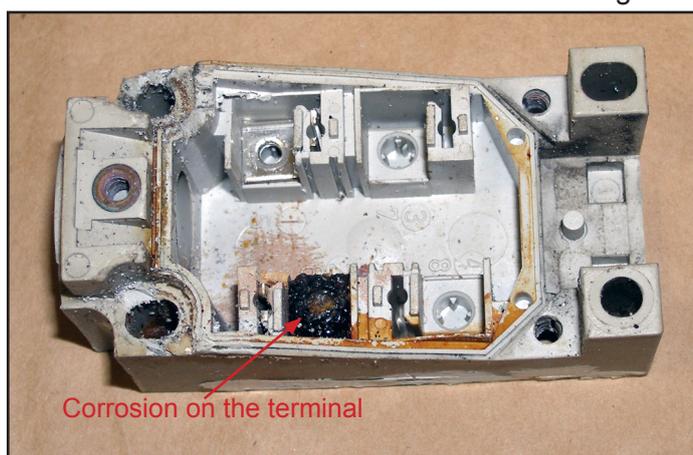
Proximity switch on davit

Annual inspections of the davit system had been conducted by Schat-Harding service engineers since the vessel was built in 2006. The last service was conducted in September 2010.

INITIAL FINDINGS

The fall wire was observed to be in good condition and when tested after the accident it achieved a breaking load of 137kN. The wire parted near the lower most davit sheave as the rescue boat reached its stowed position and the winch was still hoisting under power. Although the winch motor was rated with a nominal pull of 50kN, the maximum pull that it was capable of exerting when trying to overcome the increased resistance in the system during the final stages of hoisting would have rapidly exceeded the breaking load of the wire. The proximity switch, which should have prevented this situation from occurring, was tested in situ and was found to be defective.

Figure 4



Corrosion on the terminal

Water ingress into proximity switch

The switch was installed in 2006, and prior to the accident it was not tested before hoisting was commenced. Inspection identified that the switch body had been penetrated by water (**Figure 4**). However, detailed analysis highlighted that the switch malfunctioned due to an unrelated electronic fault. The MAIB is aware of both inductive proximity and mechanical limit switches fitted on other vessels that have also failed to operate correctly. However, none are known to have resulted in a similar accident.

The rescue boat was weighed and was approximately 450kg overweight (see [MAIB Safety Bulletin 1/2011](#) for further details). Although the additional weight caused the davit's SWL to be exceeded, by itself it would not have caused the wire to fail.

SAFETY ISSUES

- The maximum pull of a hoist winch can exceed its nominal pull several-fold, and therefore is likely to exceed the breaking loads of other system components unless this is prevented by a properly functioning 'final stop' or safety device.
- The proximity switch fitted to the Schat-Harding SA 1.5 davit, and also known to be fitted to the SA 1.75 davit, is considered by its manufacturer to be inappropriate for use as a 'final stop' or safety device.
- The fitting of the proximity switch was not compliant with its manufacturer's instructions. As a result, the gland and cable entry were higher than the switch body and its susceptibility to water ingress was increased.
- Given the potential catastrophic consequences of the failure of the proximity switch fitted to the SA 1.5 and SA 1.75 davits, it is essential that owners of vessels fitted with these davits (over 320 vessels) are made aware of the potential limitations of the switches and the precautions to be taken.
- All devices (inductive and mechanical) fitted to davits to prevent overload must be maintained, tested and replaced in accordance with manufacturers' recommendations.

ACTION TAKEN

Schat-Harding has issued a Product Awareness Notice (PAN) to its customers highlighting the need to test the proximity switches fitted on its SA 1.5 and SA 1.75 davits on each occasion before hoisting operations commence, and recommends that the proximity switch is replaced every 2 years; it also highlights the need for caution when using pressure washers on deck.

RECOMMENDATION

S117/2011 Owners and operators of vessels equipped with boat davits should:

- In the case of vessels fitted with the Schat-Harding SA 1.5 and SA 1.75 davits, follow the advice contained in the PAN recently issued by the manufacturer or urgently contact Schat-Harding¹ if a PAN has not been received.
- Ensure that all devices (inductive or mechanical) fitted to boat davit systems to prevent overload are tested on each occasion before a boat is hoisted and that such devices are not relied upon during operation.
- Follow manufacturers' recommendations regarding the maintenance and periodic testing, examination and replacement of safety devices, seeking clarification from manufacturers where ambiguity exists.
- Verify the effectiveness of watertight seals on electrical equipment fitted to boat davit systems on weatherdecks.

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