



SAFETY INVESTIGATION REPORT

202007/001

REPORT NO.: 16/2021

July 2021

The Merchant Shipping (Accident and Incident Safety Investigation) Regulations, 2011 prescribe that the sole objective of marine safety investigations carried out in accordance with the regulations, including analysis, conclusions, and recommendations, which either result from them or are part of the process thereof, shall be the prevention of future marine accidents and incidents through the ascertainment of causes, contributing factors and circumstances.

Moreover, it is not the purpose of marine safety investigations carried out in accordance with these regulations to apportion blame or determine civil and criminal liabilities.

NOTE

This report is not written with litigation in mind and pursuant to Regulation 13(7) of the Merchant Shipping (Accident and Incident Safety Investigation) Regulations, 2011, shall be inadmissible in any judicial proceedings whose purpose or one of whose purposes is to attribute or apportion liability or blame, unless, under prescribed conditions, a Court determines otherwise.

The report may therefore be misleading if used for purposes other than the promulgation of safety lessons.

© Copyright TM, 2021.

This document/publication (excluding the logos) may be re-used free of charge in any format or medium for education purposes. It may be only re-used accurately and not in a misleading context. The material must be acknowledged as TM copyright.

The document/publication shall be cited and properly referenced. Where the MSIU would have identified any third party copyright, permission must be obtained from the copyright holders concerned.

MT KEY FIGHTER **Grounding** **in position 67° 29.15' N 012° 04.02' E** **01 July 2020**

SUMMARY

On 01 July 2020 at 2130, whilst on passage from Myre to Røst in Norway, the motor vessel

Key Fighter suffered loss of directional control and ran aground, South of Røstlandet, in position 67° 29.15' N 012° 04.02' E.

No injuries and pollution were reported. However, the vessel sustained extensive material damage and ruptured her hull.

A few hours later, with the assistance of a tow, the vessel was refloated. *Key Fighter* then proceeded under its own propulsion power to Røst, where she was safely berthed.

Taking into consideration the safety actions by the Company during the safety investigation, no safety recommendations have been issued by the Marine Safety Investigation Unit.



FACTUAL INFORMATION

Vessel

Key Fighter was a 3,693 gt, Maltese registered oil / chemical tanker owned by Key Shipping AS, and managed by Fjord Shipping AS-Måløy, Norway. The vessel was built in 1989 by Verolme Shipyard in The Netherlands and classed by Registro Italiano Navale (RINA).

Key Fighter had a length overall of 104.25 m and an extreme breadth of 17.02 m. It had a summer draught of 6.14 m, corresponding to a deadweight of 4,999 tonnes.

Propulsive power was provided by a 9-cylinder Wärtsilä 9R32D, medium speed, four-stroke diesel engine producing 3,375 kW at 750 rpm. This drove a single, four-bladed, controllable pitch propeller through a reduction gearbox to reach an estimated speed was 15.0 knots. The vessel was also fitted with a bow thruster.

Crew complement

The manning was in accordance with the Minimum Safe Manning Certificate issued by the flag State Administration. At the time of the accident, *Key Fighter* had a crew complement of 13 from the Philippines, Russia, Ukraine, and Norway.

The working language on board was English.

The master was a Norwegian national. He was 53 years old, in possession of a Master Mariner Class 1 Certificate of Competency (STCW II/2). He had been sailing as a master with the Company for three years. He joined *Key Fighter* in Husøy, Norway on 07 June 2020.

The third officer, who was on the bridge at the time of the accident, was from the Philippines. He was 37 years old. He had obtained his Certificate of Competency as navigational officer (STCW II/1) in 2016 from the Philippines Maritime Authority. He had been serving as a third officer with the Company for the past one and half years.

Navigational console

The navigational main console (Figure 1), installed on the centreline of the wheelhouse, was fitted with the steering wheel, navigational equipment, and controls for the main engine and bow thruster. The vessel's steering could also be controlled via a joystick lever, located on the main console. The navigational equipment consisted of a magnetic and gyro compass, autopilot, X and S band radars, an AIS, a GPS receiver, and an ECDIS.



Figure 1: Navigation main console

Passage planning

A berth-to-berth passage plan was prepared on 30 June and approved by the master. ECDIS was the primary means of navigation. The waypoints and courses to steer were displayed on the ECDIS along with the cross-track distance (XTD). The safety and shallow contour were set at 8.0 m and 6.0 m respectively. The accuracy of data of the chart was COTZAC A1. The navigational watch in the approaches to Røst was set at level 3 *i.e.*, the master or his deputy, one OOW, the pilot (if compulsory), and a look-out.

The port of Røst

The port of Røst is located on the island of Røstlandet, Norway. The port is surrounded by numerous islands, islets, shallows, and a reef. Tidal streams are strong and irregular, and the fairway leading to the port is winding and narrow.

Røst is mainly used by small cargo ships and fishing vessels. The port does not provide pilotage service.

Narrative¹

On the morning of 01 July 2020, *Key Fighter* departed Myre, Norway on drafts of 3.90 m forward and 5.05 m aft. She had on board 1,307 tonnes of fish oil.

During the evening, *Key Fighter* satisfactorily completed her pre-arrival navigational checks. Two steering gear motors were switched on. No steering system faults were detected². The bow thruster was ready, and the X and S band radars were set on three and six nautical mile ranges, respectively. In the approaches to Røst, courses were displayed on the ECDIS (Figure 2). The vessel was steering 260° on autopilot.

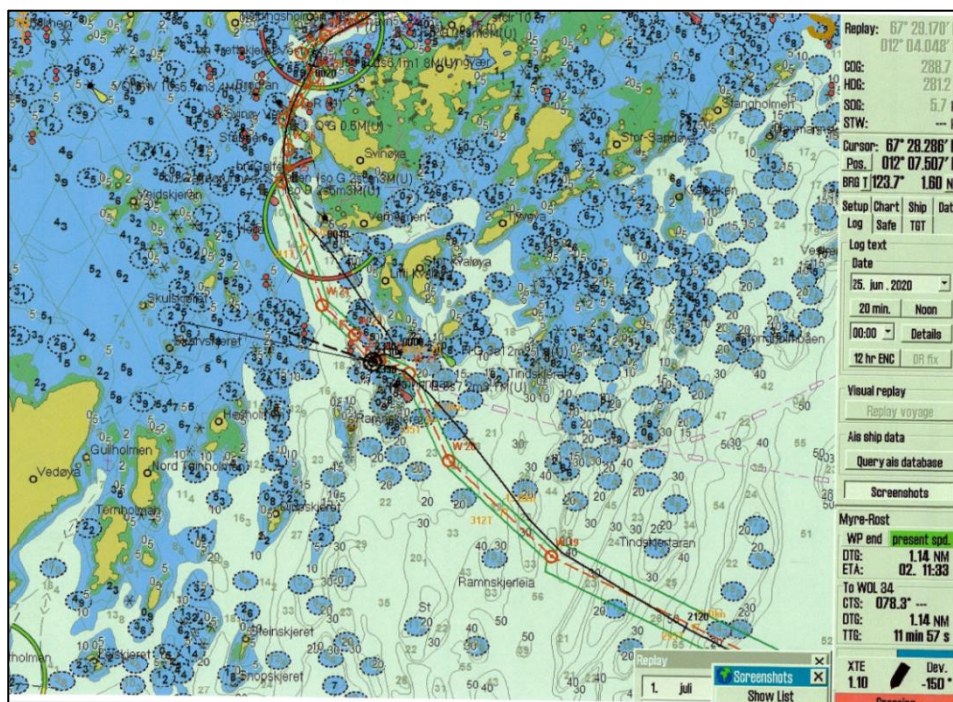


Figure 2: ECDIS image showing navigation route in the approaches to Røst.

¹ Unless otherwise stated, all times are local time (UTC +2).

² A steering anomaly previously noted during the voyage, had been resolved and informally reported to the management.

The master was posted on the starboard side of the main console, where he had access to the propulsion, bow thruster and steering joystick. The third officer was the OOW and was stationed at the port console. At 2100, the master took the con, signalled the end of sea-passage, and eased the speed to eight knots.

About 10 minutes later, the master changed over to hand steering and started to steer the vessel using the joystick. After an outbound ferry passed clear at 2122, the heading was changed to around 320°. Drawing up to waypoint 21 at 2128, the master steered the vessel to port. Less than a minute later, *Key Fighter* reached a position where a swift alteration to starboard was needed to make good a course of 316°.

At this time, the speed was six knots and a patch of shallow water with a rock awash at chart datum³ lay close ahead.

Although he pushed the joystick to starboard, the master sensed poor rudder response and he instantly ordered the engine full astern and bow thruster to starboard. A few seconds later at 2130, *Key Fighter* struck a rock and ran grounded in position 67° 29.15' N 012° 04.02' E (Figure 3).

The vessel sustained structural damage (Figure 4), but neither pollution nor injuries were reported.

Environment

The weather on the night of 01 July 2020 was clear with visibility up to 10 nautical miles. The Westerly wind speed was about three knots and the sea was calm. The air temperature was 10 °C. The height of tide at 2343 was reported to be 1.50 m.

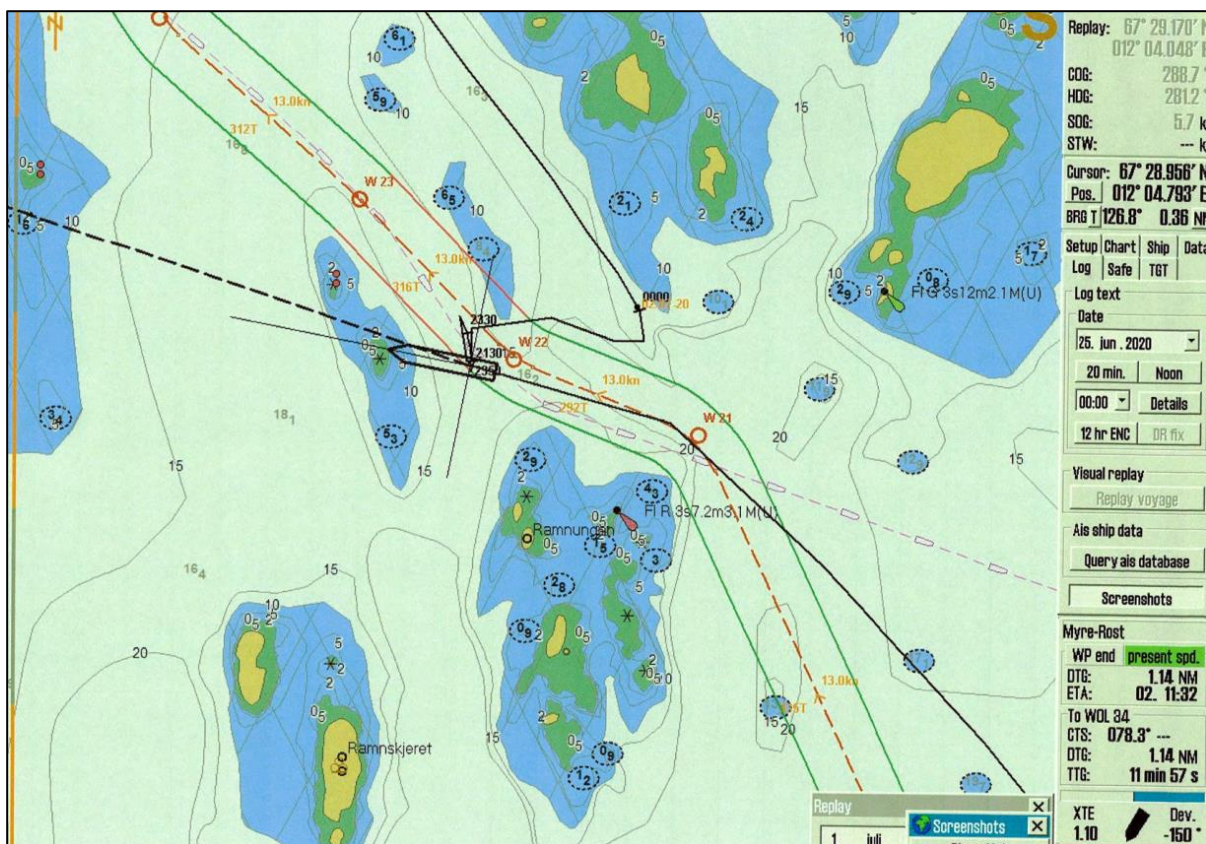


Figure 3: ECDIS Image showing vessel's track and position of grounding

³ Chart datum is approximately the level of Lowest Astronomical Tide.



Figure 4: Structural damage to the vessel's stem and hull

ANALYSIS

Aim

The purpose of a marine safety investigation is to determine the circumstances and safety factors of the accident as a basis for making recommendations, and to prevent further marine casualties or incidents from occurring in the future.

Drugs, alcohol, and rest hours

The MSIU was informed that Fjord Shipping implemented a 'Zero Alcohol Policy'⁴ on board its fleet vessels. Thus, no crew members were tested for alcohol. Examination of the 'Hours of Rest' records of the master and third officer showed that their rest period in the seven days and 24 hours preceding the grounding were in excess of the hours stipulated in the Maritime Labour Convention (MLC) regulations. Considering also that no fatigue related behaviour had been observed and reported, fatigue and alcohol were not considered as contributing factors to the grounding.

Bridge manning

It did not appear that the absence of a look-out had affected the master in maintaining an overall view of the vessel's navigation. Moreover, the absence of a helmsman suggested that the master was comfortable enough to personally control the vessel's movement⁵. The fact that the vessel was fitted with joystick control on the main navigation console, would have facilitated the control of the vessel's movements.

Post-accident steering system inspection

On 03 July, following the grounding, a service technician inspected the steering control system. The technician reported that the spring to prevent activation of micro switches in the wheel assembly unit, on starboard side was defective (Figure 5), "resulting in activation of micro switches on SB side by accident or by itself as there is nothing to stop it." The technician explained that when activated, the vessel would turn to starboard and at the same time, disabling the joystick, autopilot and one steering gear pump.

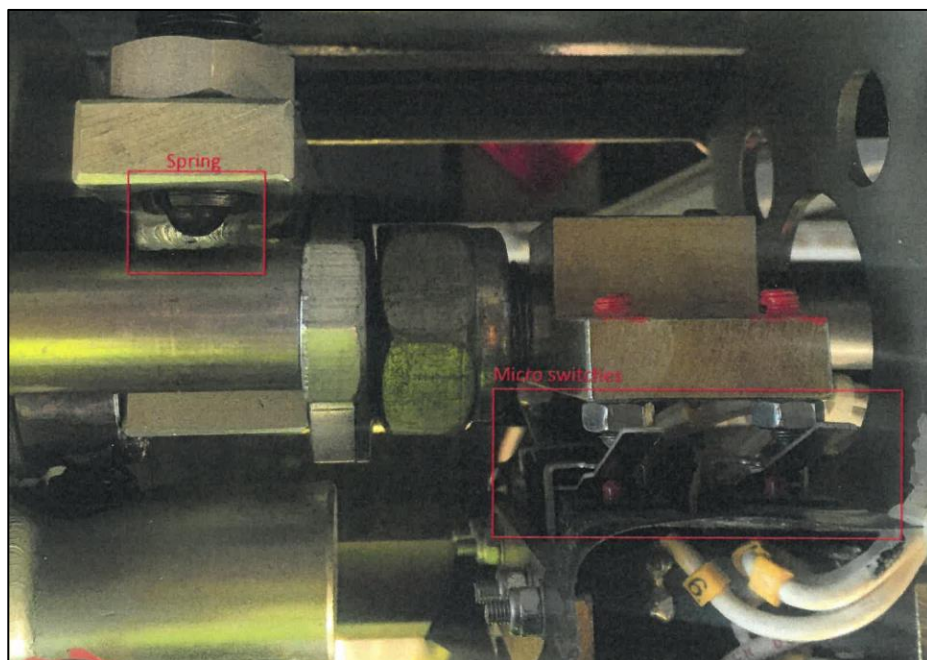


Figure 5: Spring and micro switches on wheel assembly unit

⁴ Maximum permissible blood alcohol content of crew serving on board is 0.00% by volume. Thus, alcohol is neither carried nor consumed on board.

⁵ Management Standing Order required a helmsman present on the bridge.

He further noted that the design of the steering gear system was such that the activation of the steering wheel would disable the autopilot and joystick function. In Esbjerg Shipyard, the steering system was further examined by service engineers, the defective spring was replaced. Tests on the rudder movement indicated that they were within the prescribed limits.

VDR data and interpretation of the events

Key Fighter was fitted with an sVDR, which recorded X-band radar images, ship's heading, geographical position, water depths and speed over ground. The rudder angle indicator was not interfaced, thus data from the rate of turn (ROTI) was analysed instead. Track information between 2100 and 2130, extracted from the VDR is reproduced in Table 1.

Table 1: Navigational information

<i>Local Time (UTC+2)</i>	<i>Rate of turn indicator (ROTI)</i>	<i>HDG °</i>	<i>SPD Knots</i>	<i>Observations</i>
21 00 00		260	13.0	Master on the bridge. End of sea passage in position 67° 27.91' N 012° 13.83' E
21 10 00		282	7.6	Manual steering engaged Master using joystick to steer the vessel
21 22 00		301	9.6	Passed ferry on vessel's starboard side
21 23 00		315	9.1	Vessel gently turning to starboard
21 27 00		320	7.3	Passed WP 20
21 28 00	ROTI - Port 60°/min ⁻¹	315	7.2	Vessel turning to port
21 29 00	ROTI - Port 15°/min ⁻¹	284	6.4	Passed WP 21.
21 29 20	ROTI - Starboard			Next charted course 316°. Master pushed the joystick to starboard.
21 29 30	ROTI - Starboard 30°/min ⁻¹	288	6.4	WP 22. Master reported poor rudder response.
21 29 40				ROTI turning to port.
21 29 55	ROTI - Port 30°/min dropping to 10°/min ⁻¹	282	6.4	
21 30 00			5.0	Vessel aground in position
21 30 15		281	0.5	67° 29.15' N 012° 04.02' E

From the information provided by the vessel, it is apparent that in proximity to waypoint 22, the master executed a starboard helm on the joystick, tracing the course displayed on the ECDIS. Following a sluggish alteration to starboard, the vessel veered to port. The sVDR captured a rate of turn of $30^{\circ} \text{ min}^{-1}$ (to port) before dropping to $10^{\circ} \text{ min}^{-1}$. The precise cause of the vessel turning to port, contrary to the master's joystick command, could not be established. It is unlikely that the turn to port side was the result of a defective spring, activating the micro switches in the steering wheel unit⁶.

Thus, taking account of the technical reports, the vessel management's subsequent findings⁷ and given the proximity of navigational controls relative to the operator console position, it appeared probable to the MSIU that the unintended port rudder movement may have been caused by an inadvertent physical contact with the wheel⁸; overriding the joystick control function and invalidating the master's starboard helm command. This would have initiated an uncontrolled course alteration to port towards the shallow water, as evidenced by the ROTI data. The steering wheel had no protective or locking features to prevent unintended or accidental movement of the wheel.

At that moment, the vessel's speed was six knots. In that situation, the master would have had time neither to analyse the source of inappropriate rudder response, nor for his subsequent actions on the main engine and bow thruster to avert the (developing) dangerous situation.

⁶ According to the Nord/Kontakt technician, defective spring activating microswitches would cause the vessel to turn to starboard.

⁷ On board investigation by management established that considerable force was required to turn the steering wheel. Only an intentional movement (by hand) would have activated the steering wheel and disable autopilot / joystick function.

⁸ The chief engineer reported that no alarms sounded in the engine control room.

CONCLUSIONS

1. The grounding was caused by the vessel's deviation from the planned route because of loss of directional control;
2. The spring for preventing activation of microswitches on starboard side in the steering wheel unit was found to be defective;
3. It is likely that the unintended rudder movement to port may have been caused by an inadvertent physical contact of the steering wheel, overriding the joystick function and the master's starboard helm command;
4. Activation of the steering wheel disables joystick and autopilot function, and one steering gear pump;
5. The steering wheel had no protective or locking features to prevent unintended or accidental movement of the wheel.
6. The master did not have time to analyse the source of inappropriate rudder response;
7. The master's subsequent actions to avert the dangerous situation could not stop the vessel from running aground;
8. Fatigue and alcohol were not considered to be a contributing factor to this accident.

SAFETY ACTIONS TAKEN DURING THE COURSE OF THE SAFETY INVESTIGATION⁹

During the safety investigation, the Company took the following actions:

- the steering gear system, including electronics and hydraulics were inspected by service engineers and the worn-out parts were replaced;

⁹ **Safety actions shall not create a presumption of blame and / or liability.**

- management standing orders were amended to include instructions to masters on ports offering no pilotage service;
- agreed that the navigational procedures are reviewed and a new procedure on navigation in confined waters is issued;
- navigational watch manning levels to be revised and include a helmsman in watch condition no. 2¹⁰;
- masters were required to attend a Bridge Resource Management course and simulation training.

RECOMMENDATIONS

Taking into consideration the safety actions taken by the Company, no safety recommendations have been issued.

¹⁰ Watch condition no. 2 was designed to ensure additional resources to the bridge team.

SHIP PARTICULARS

Vessel Name:	<i>Key Fighter</i>
Flag:	Malta
Classification Society:	Registro Italiano Navale (RINA)
IMO Number:	8712166
Type:	Oil / Chemical Tanker
Registered Owner:	Key Shipping AS
Managers:	Fjord Shipping AS Måløy, Norway
Construction:	Steel
Length Overall:	104.25 m
Registered Length:	98.10 m
Gross Tonnage:	3,693
Minimum Safe Manning:	11
Authorised Cargo:	Liquid in bulk

VOYAGE PARTICULARS

Port of Departure:	Myre, Norway
Port of Arrival:	Røst, Norway
Type of Voyage:	Coastal
Cargo Information:	1,307 tonnes of fish oil
Manning:	13

MARINE OCCURRENCE INFORMATION

Date and Time:	01 July 2020 at 21:30 (LT)
Classification of Occurrence:	Serious Marine Casualty
Location of Occurrence:	67° 29.15' N 012° 04.02' E
Place on Board	Steering gear flat
Injuries / Fatalities:	None
Damage / Environmental Impact:	None
Ship Operation:	In passage
Voyage Segment:	Arrival
External & Internal Environment:	Wind westerly 3 knots, calm seas and visibility of 10 miles. The air temperature was 10 °C.
Persons on board:	13