



## SAFETY INVESTIGATION REPORT

202005/015

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MAY 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.

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### **MT MED TUNCER** **Electrical fire inside the lifeboat** **in the port of Antwerp, Belgium** **14 May 2020**

### SUMMARY

At 0815 on 14 May 2020, while moored at the Oil Tanking Terminal in Antwerp, Belgium *Med Tuncer's* electrician stepped inside the enclosed, freefall lifeboat to carry out tests on the batteries.

During the tests, a fire broke out inside the lifeboat. The fire alarm was raised, and the crew swiftly extinguished the fire. Fire and smoke damage were largely restricted to the interior of the lifeboat and control panel. No injuries were reported.

Although the exact cause of the fire had not been determined, evidence suggested an inadvertent connection of battery terminals in series, resulting in a sudden spike of voltage when the battery selective switch was operated.

Taking into consideration the safety actions already taken by the Company, no safety recommendations have been issued as a result of the safety investigation.



MT Med Tuncer

## FACTUAL INFORMATION

### Vessel

*Med Tuncer* was a 5,651 gt, IMO type II oil and chemical tanker, built in 2010 and registered in Malta. She was owned by Sea Tankers 8 Limited, managed by YMN Tanker Deniz Isletmeciligi A.S and classed with Bureau Veritas (BV). *Med Tuncer* had an overall length of 123.90 m, a moulded breadth of 17.20 m and a moulded depth of 9.20 m. The vessel had a summer draught of 7.24 m, corresponding to a summer deadweight of 8,227 tonnes.

Propulsive power was provided by an 8-cylinder MAN 8M 32C medium speed diesel engine, producing 4,000 kW at 600 rpm. This drove a single propeller to a reduction gearbox, giving a service speed of 14.0 knots.

### Ship's manning

There were 18 crew on board, which was in excess of the number stipulated in the Minimum Safe Manning Certificate issued by the flag State Administration. All crew members were Turkish nationals.

The 34-year old electro-technical officer, who was tasked to carry out weekly checks on the lifeboat's batteries, held an electro-technical officer certificate of competence (STCW regulation III/6) issued by the Turkish authorities. He had been working at sea for four years and had been in employment with the Company for the last 12 months. The electro-technical officer had

joined the vessel in Finland on 18 February.

### Lifeboat

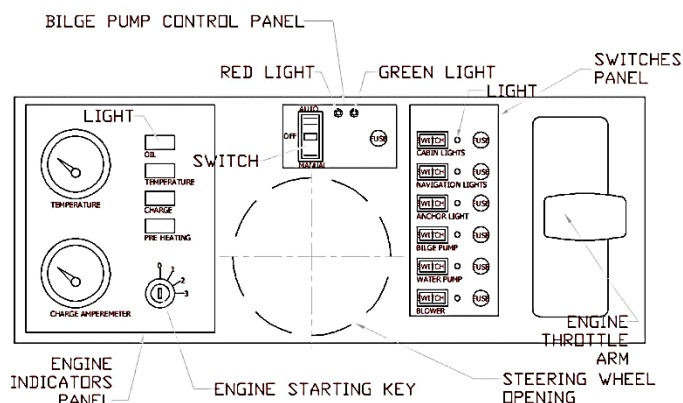
*Med Tuncer* was fitted with one 5.05 m totally enclosed freefall lifeboat, stowed aft on a cradle / ramp (Figure 1). The lifeboat, type BD-FFT505, was manufactured of plastic reinforced fiberglass and fire-retardant polyester by Balden Denizcilik, Turkey.



**Figure 1: *Med Tuncer* lifeboat after the accident**

Source: *Med Tuncer* managers

The lifeboat had buoyancy tanks filled with polyurethane foam, providing enough initial stability to self-right. She was fitted with one 21.7 kW inboard four stroke, water cooled, diesel engine. She also had a water sprinkler pump, fuel oil and freshwater tanks. The battery selective switch, engine starting button, steering wheel and electrical switches to operate ancillary equipment were all located on the lifeboat's control panel (Figure 2).



**Figure 2: Lifeboat control panel**

### Lifeboat batteries

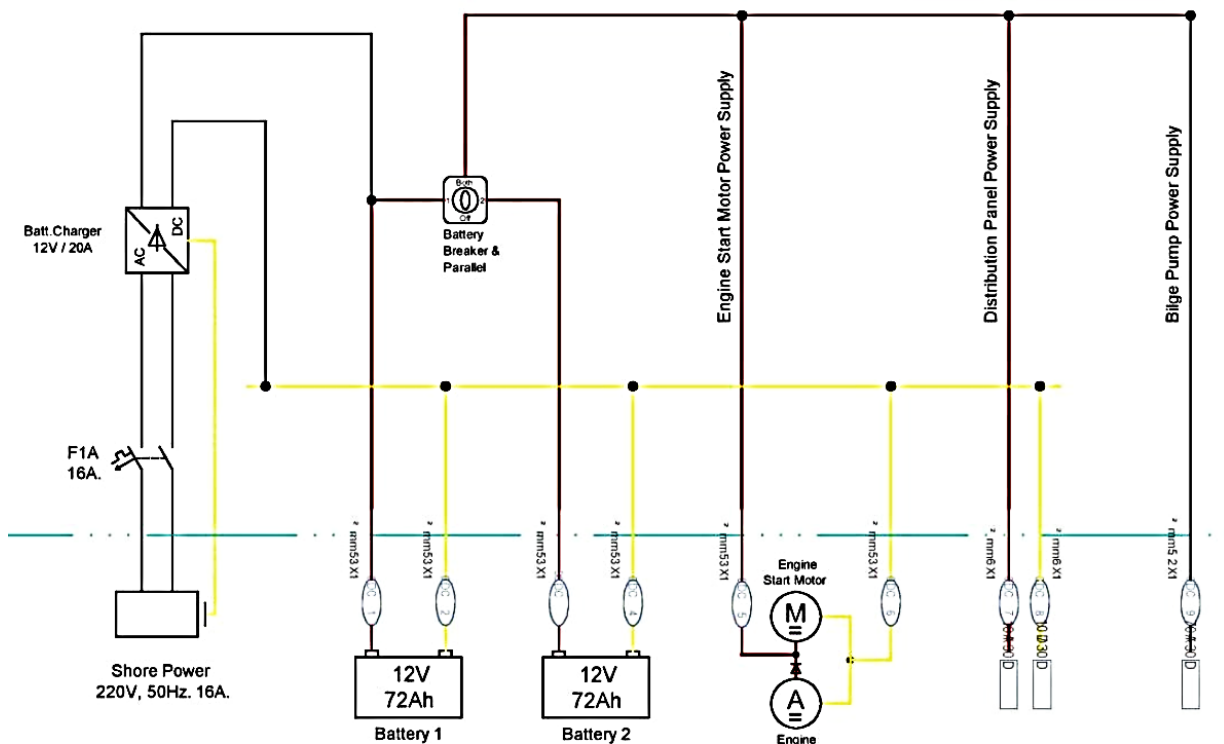
The lifeboat's electrical system was designed for 12V DC power. It had two sets of 12V batteries, secured in an insulated, fibreglass chest under the lifeboat's central corridor. The batteries, which were used to start the engine and power the lights, were connected in parallel. The two batteries were generally kept charged either through the vessel's charging system, or by the alternator when the engine is running.

The battery changeover switch on the control panel had three marked positions: 1, 2 and both (Figure 3). This provided the flexibility to use either battery separately or use them both in parallel. The lifeboat's circuit diagram is shown in Figure 4. The electrical circuit and the ship's power supply to the battery charging system was protected by a 16A fuse and a double pole, 12V DC circuit breaker.



**Figure 3: Battery changeover switch**

Source: Med Tuncer managers



**Figure 4: 12 V DC circuit diagram**

Source: Med Tuncer managers



## Lifeboat maintenance

Comprehensive lifeboat maintenance schedules were provided in the vessel's SMS. Accordingly, lifeboat batteries were checked and logged in the ship's battery check log. The log entries over a period of one month preceding the fire pointed to regular weekly tests on the 12V DC, 90 Ah batteries. The log entries for May, however, showed that tests were being done on 12V DC 75 Ah. Although, the documentary information suggested recent replacement of the 12V DC 90 Ah batteries<sup>1</sup>, this was not recorded in the ship's battery check log.

## Narrative<sup>2</sup>

*Med Tuncer* was moored at the oil tanking terminal in the port of Antwerp, Belgium. She had on board 2,698 tonnes of para-xylene<sup>3</sup>. All cargo tanks were inert.

On the morning of 14 May 2020, the enclosed freefall lifeboat was secured on a cradle and the battery charging system was connected to the ship's power supply. The ship's electro-technical officer was tasked to check the lifeboat batteries. At about 0815, he turned the battery changeover switch to position 1 and started the engine.

He then turned off the engine and shifted the switch to position 2 to restart the engine on the second set of batteries. The electro-technical officer stated that at mid position (position 'both'), the switch was stuck, and the fire started. He recalled being overcome by intense heat and heavy smoke and rushed to the bridge to sound the fire alarm. The officer on duty called the oil tanking officials and reported the issue.

Crew members assembled and the lifeboat fire was soon contained and brought under

<sup>1</sup> Managers reported that new 75 Ah batteries had been supplied on 27 November 2019.

<sup>2</sup> Unless otherwise stated, all times are local times (UTC + 2).

<sup>3</sup> Para-xylene is a colourless and highly flammable aromatic hydrocarbon product.

control with portable dry powder extinguishers and water from the fire-hydrant. After extinguishing the fire and cooling of the space, the battery cable to the control panel was cut by the electro-technical officer to prevent re-ignition. At about 0845, two portable CO<sub>2</sub> fire extinguishers were released inside and the hatch access to the lifeboat was sealed.

The fire was eventually brought under control and extinguished in about 12 minutes. No injuries were reported.

## Sustained damages

The intensity of the heat, fire and smoke caused damage to the interior of the lifeboat. The control panel, power cables, hydraulic pump at bilge level, battery casing and pipes were damaged to different extents. The helmsman's seat was gutted and several of the crew seat cushions had melted or smoke affected (Figures 5, 6 and 7).



**Figure 5: Control panel damage**

Source: *Med Tuncer* managers



**Figure 6: Damaged power cables under control panel**

Source: *Med Tuncer* managers



**Figure 7: Fire / smoke damage to the seat cushions**

Source: Med Tuncer managers

### Environmental conditions

The weather was clear with visibility about six nautical miles. The wind was Southwesterly, four knots. The sea was calm, and the air temperature was 18 °C.

## 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.

### Post-accident assessment

The enclosed lifeboat was landed ashore and transported to the manufacturer's yard in Turkey, where technical experts had the opportunity to examine the lifeboat's fire-damaged electrical system.

Both batteries were checked and found in good condition and free of any electrical damage. As the cable leads connecting the two battery terminals had been found detached, it was not possible to establish the exact battery connection prior to the fire.

### Cause of the fire

The safety investigation could not establish whether main power supply to the lifeboat charging system (which had remained plugged during the battery tests) had contributed to the fire. However, post-accident inspections of the scorched electrical cables suggest an inadvertent connection of battery terminals in series<sup>4</sup>, resulting in sudden spike in circuit current as soon as the battery changeover switch was turned through position marked both to access position 2 (Figure 8).



**Figure 8: Cable in the suspecting short-circuit loop position**

Source: Med Tuncer managers

At that point, a short-circuit loop was created within the wiring system, generating extremely high short circuit currents, overheating the electrical cable, insulation and associated components beyond its designed rating<sup>5</sup>. Figures 9a and 9b represent two schematic circuit drawings, showing the system cables as designed and as reconnected, respectively.

<sup>4</sup> Managers reported that on the accident date, the ship's electro-technical officer had disconnected and reconnected the batteries.

<sup>5</sup> Assuming an internal resistance of 0.33 m Ω per cell and an overall circuit resistance of 0.50 m Ω, the generated short-circuit current would be in the region of 4,800 A. These figures are indicative and only intended to make the reader aware of the hazards of short-circuits when batteries and battery banks are involved.

The high (short-circuit) currents, which had been generated must have also welded the internal contactors of the changeover switch, to an extent that the electro-technical officer would have been unable to turn to the 'off' position.

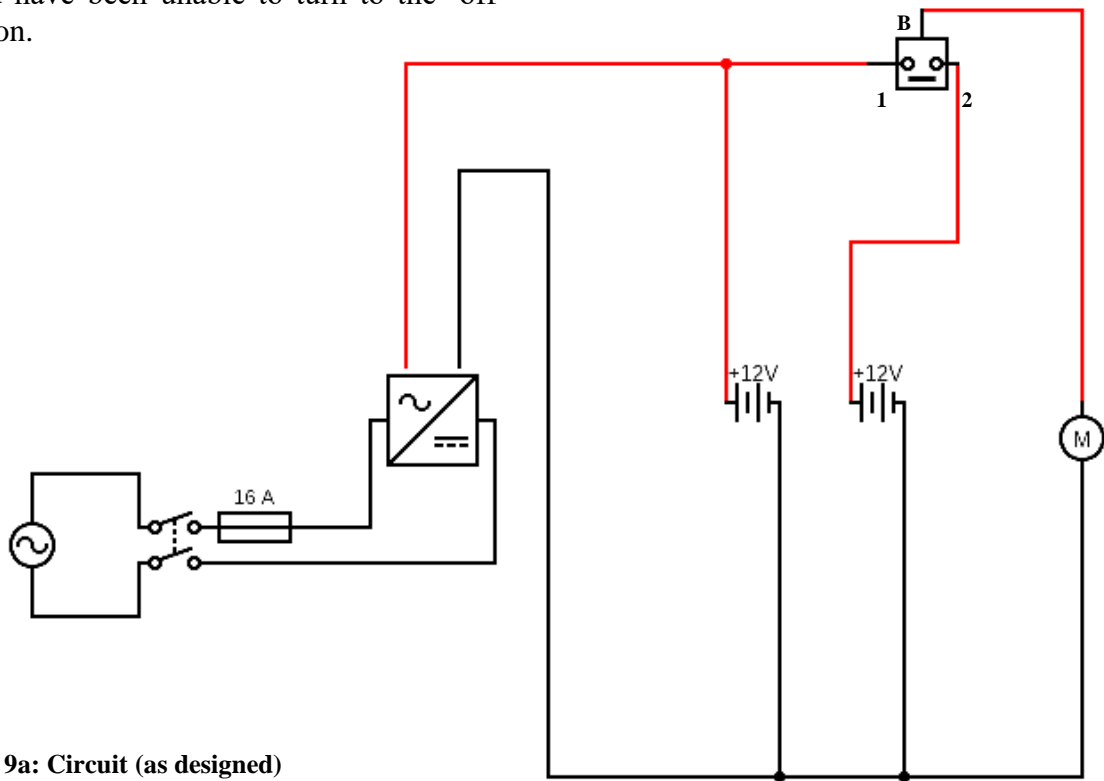


Figure 9a: Circuit (as designed)

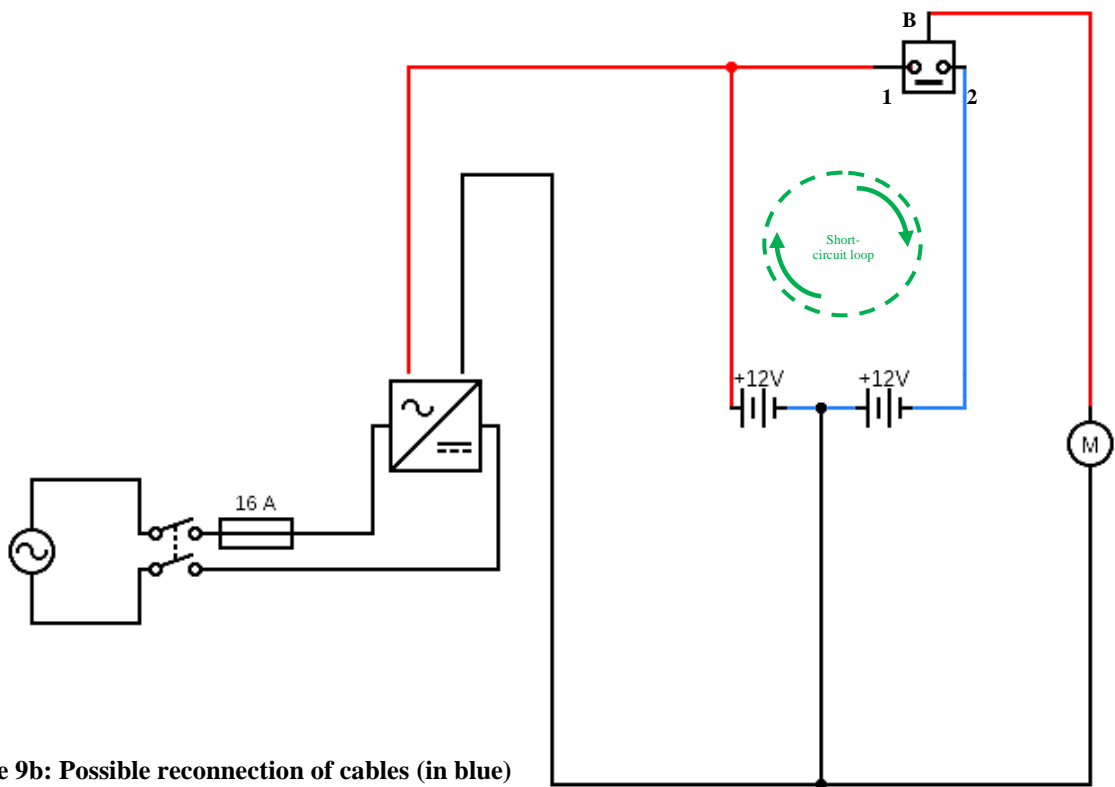


Figure 9b: Possible reconnection of cables (in blue)

## CONCLUSIONS

1. In all probability, the cause of the fire was a very high short circuit current within the batteries;
2. Post-accident inspections revealed that the cables may have not been reconnected as designed;
3. The battery changeover switch in the 'both' position created a short circuit loop, overheated the wires and welded the switch in mid-position;
4. The actual cables had not been marked prior to disconnection and therefore may have been confused during reconnection.

- A wiring diagram will be posted inside the lifeboat's battery chest.

## RECOMMENDATIONS

Considering the safety actions taken by the Company, no safety recommendations have been made,

## SAFETY ACTIONS TAKEN DURING THE COURSE OF THE SAFETY INVESTIGATION<sup>6</sup>

During the safety investigation, the Company took the following safety actions to avoid similar, future accidents:

- Testing of the lifeboat engine will be carried out by two crew members;
- Battery charging cables will be disconnected when not in use and all cable connections checked during every lifeboat inspection;
- An IR thermometer will be used during the testing to monitor the temperature of the cable;
- Testing will be suspended immediately should an increase in temperature be detected;
- An additional portable CO<sub>2</sub> fire extinguisher will be kept readily available during the testing of the lifeboat engine;

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<sup>6</sup> **Safety actions shall not create a presumption of blame and / or liability.**

**SHIP PARTICULARS**

Vessel Name:	<i>Med Tuncer</i>
Flag:	Malta
Classification Society:	Bureau Veritas
IMO Number:	9830599
Type:	Oil and Chemical Tanker
Registered Owner:	Sea Tankers 8 Ltd.
Managers:	YMN Tanker Deniz Isletmeciligi A. S., Turkey
Construction:	Steel
Length Overall:	123.90 m
Registered Length:	116.40 m
Gross Tonnage:	5651
Minimum Safe Manning:	13
Authorised Cargo:	Liquid in bulk

**VOYAGE PARTICULARS**

Port of Departure:	Antwerp, Belgium
Port of Arrival:	Montreal, Canada
Type of Voyage:	International
Cargo Information:	Para-xylene
Manning:	18

**MARINE OCCURRENCE INFORMATION**

Date and Time:	14 May 2020 at 0830 (LT)
Classification of Occurrence:	Less Serious Marine Casualty
Location of Occurrence:	Oil Tanking Terminal, Antwerp
Place on Board	Boat deck
Injuries / Fatalities:	None
Damage / Environmental Impact:	Fire damage to the lifeboat / None
Ship Operation:	Moored / alongside
Voyage Segment:	Arrival
External & Internal Environment:	The weather was clear with visibility about 6.5 nautical miles. The wind was Southwesterly 4 knots. The sea was calm, and the air temperature was 18 °C.
Persons on board:	18