MAIB
MARINE ACCIDENT INVESTIGATION BRANCH

SAFETY BULLETIN

SB2/2020 OCTOBER 2020

Extracts from The United Kingdom Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 Regulation 5:
"The sole objective of a safety investigation into an accident under these Regulations shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of such an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame."

Regulation 16(1):
"The Chief Inspector may at any time make recommendations as to how future accidents may be prevented."

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NOTE
This bulletin is not written with litigation in mind and, pursuant to Regulation 14(14) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

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Carbon monoxide poisoning on board the motor cruiser *Diversion* on the River Ouse, in York, resulting in two fatalities, on 4 December 2019

MAIB SAFETY BULLETIN 2/2020

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 2012 provides for the Chief Inspector of Marine Accidents to make recommendations or to issue safety lessons at any time during the course of an investigation if, in his opinion, it is necessary or desirable to do so.

The Marine Accident Investigation Branch is carrying out an investigation into into the fatal carbon monoxide poisoning on board the motor cruiser *Diversion*.

The MAIB will publish a full report on completion of the investigation.

Andrew Moll
Chief Inspector of Marine Accidents

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BACKGROUND

On 4 December 2019, the owner of the 9.14m motor cruiser *Diversion*, and a friend, were killed by carbon monoxide poisoning after they returned from an evening out and prepared to sleep on board whilst the boat was moored on the River Ouse in York.

The motor cruiser had been built by the owner over a period of 11 years and was completed in 2001. Since then, the owner had carried out several modifications to the boat, including the installation of a second-hand diesel-fuelled cabin heater in 2018.

It was a cold evening and the cabin heater had been left running while the two casualties were eating and drinking with friends in the city centre.

INITIAL FINDINGS

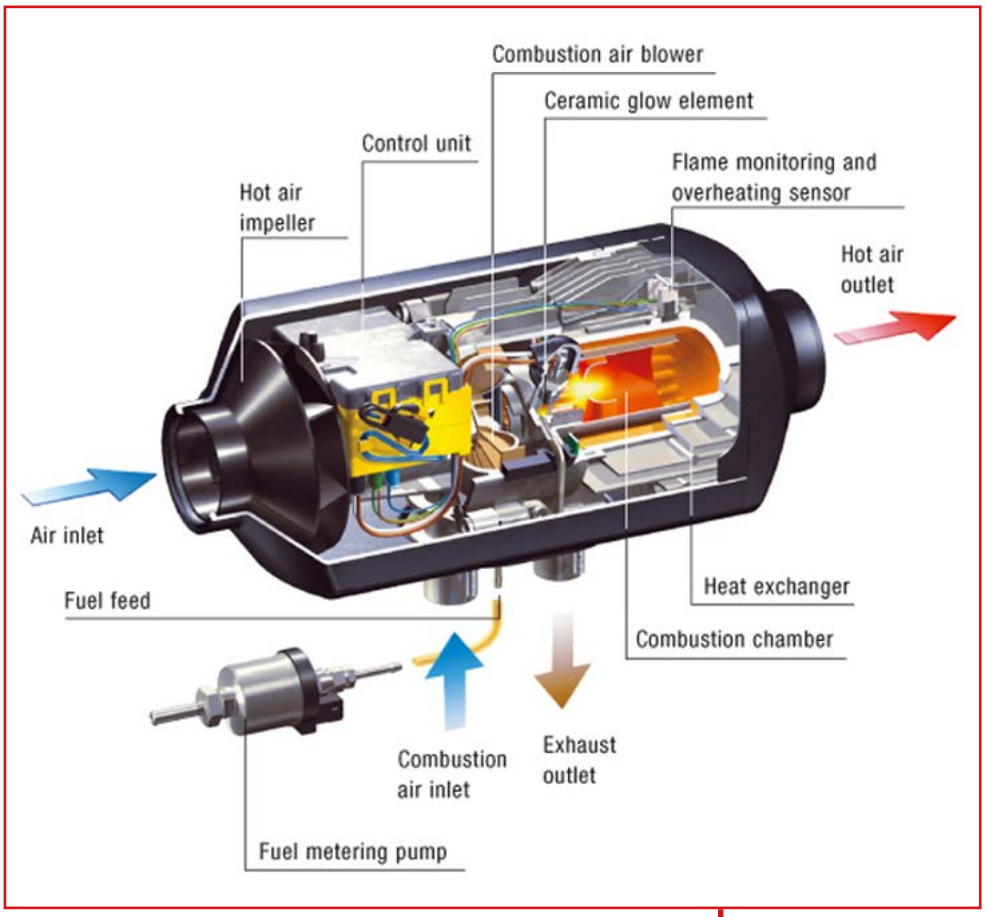
The cabin heater **(Figure 1)** had been installed in a cabinet beneath the boat's control panel and steering position. It drew combustion air from inside the boat and diesel fuel from one of the boat's fuel tanks. The fuel/air mixture was burnt in the heater and the exhaust gas was discharged to outside, via a silencer, through an adjacent hull fitting. Circulating air was drawn from inside the cabinet, warmed by the heater and discharged into the cabin, via a nozzle mounted at deck level next to the steering position **(Figure 2)**.

The initial investigation found that the exhaust silencer was not approved for marine use, it was not gas tight and its connection to the exhaust pipework was loose. Consequently, a small but steady flow of carbon monoxide was leaking into the cabinet, which was then drawn into the heater's air inlet and blown into the cabin space. As the carbon monoxide enriched air was drawn into the heater's combustion chamber, and recirculated through the cabin, the cycle repeated itself and the levels of carbon monoxide gradually increased to lethal levels.

The initial installation of the diesel heater was not checked by a professional engineer and it had never been serviced. The heater was one of four potential sources of carbon monoxide on board the motor cruiser, which was not fitted with a carbon monoxide alarm. The other potential sources were the boat's engine, a portable petrol generator and a methylated spirit fuelled cooker. The MAIB has investigated fatal accidents[1] where all three were identified as the source of the deadly toxic gas.

It is a mandatory requirement under the Canal and Rivers Trust's and the Environmental Agency's Boat Safety Scheme (BSS) to fit carbon monoxide alarms on board all boats sailing on most inland waterways. *Diversion* was last surveyed, and its BSS Certificate re-issued in February 2019; the requirement to fit an alarm became mandatory 6 weeks later on 1 April 2019.

[1] MAIB investigations: *Eschol* (report no 24/2014); *Arniston* (report no 2/2015); *Love for Lydia* (report no 9/2017) and *Vasquez* (report no 18/2017).



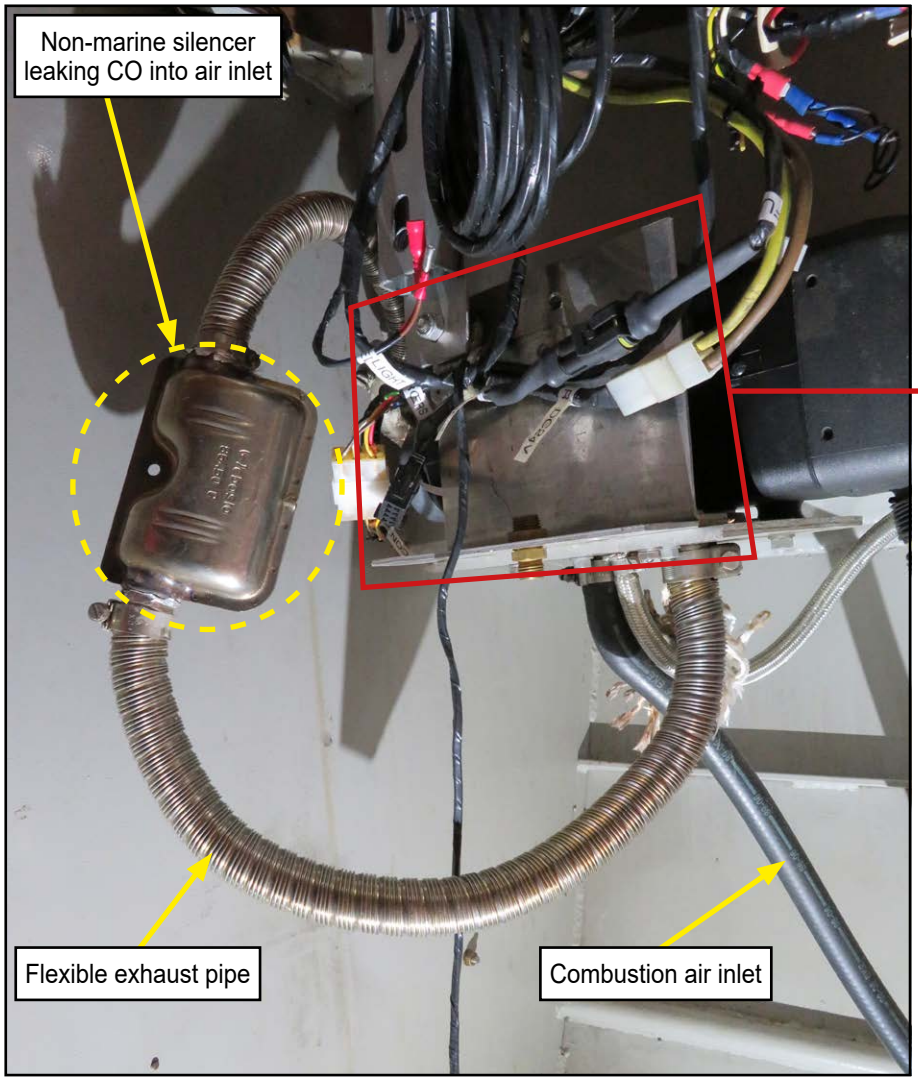


Figure 1: Heater installation with exhaust insulation removed

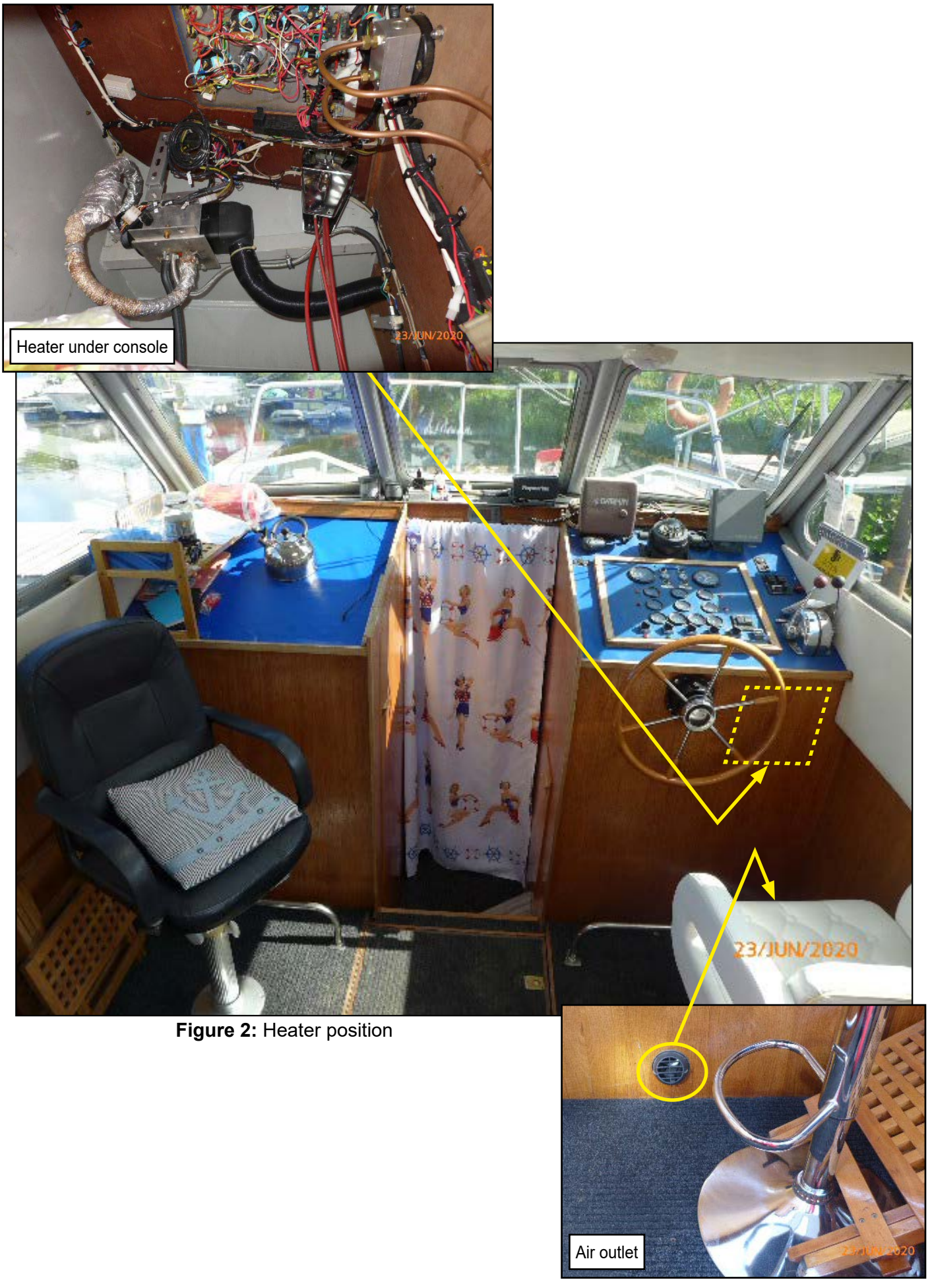


Figure 2: Heater position

SAFETY LESSONS

- Diesel-fuelled cabin heaters are frequently installed in boats, trucks, caravans and motor homes. They are readily available to purchase both new and second-hand and may not necessarily be installed by a professional installation engineer. However, it is essential that they are installed in accordance with the manufacturer's instructions and all components, used in a marine environment, should be approved for marine use. They should also be inspected by a suitably qualified engineer after installation and be regularly serviced and tested for leaks.
- Carbon monoxide is a by-product of combustion appliances fuelled by oils, solid fuel or gas. It has no smell, no taste, is colourless and is extremely difficult for human senses to detect. Therefore, it is essential that carbon monoxide alarms are fitted in areas where carbon monoxide could accumulate and pose a risk to health (such as the accommodation areas of boats). When selecting a carbon monoxide alarm, preference should be given to those marked as meeting safety standard EN 50291-2:2010, which are intended for use in a marine environment. It is essential to fit alarms following the manufacturer's guidance, to test them routinely using the test button and not to ignore them.
- Carbon monoxide is a silent killer. Its symptoms can be similar to colds, flu, hangovers or even Covid-19; headaches, dizziness, nausea, vomiting, tiredness, confusion, stomach pain and shortness of breath. If carbon monoxide poisoning is suspected, stop the source, get to the open air and seek medical attention.