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AAIB
Air Accidents Investigation Branch

AAIB Bulletin S2/2019 *SPECIAL*

ACCIDENT

Aircraft Type and Registration:	Piper PA-46-310P Malibu, N264DB
No & Type of Engines:	1 Teledyne Continental TSIO-520-BE engine
Year of Manufacture:	1984 (Serial no: 46-8408037)
Date & Time (UTC):	21 January 2019 at 2016 hrs
Location:	22 nm north-north-west of Guernsey
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - 1 (Missing) Passengers - 1 (Fatal)
Nature of Damage:	Aircraft destroyed
Commander's Licence:	Private Pilot's Licence
Commander's Age:	59 years
Commander's Flying Experience:	Approximately 3,500 hours (of which approximately 30 were on type) Last 90 days - approximately 20 hours Last 28 days - approximately 7 hours
Information Source:	AAIB Field Investigation

Introduction

The accident occurred on 21 January 2019 at 2016 hrs. The wreckage was located on 3 February 2019 on the seabed approximately 22 nm north-north-west of Guernsey, within 100 m of the last secondary radar point recorded by the radar at Guernsey and at a depth of 68 m. There was one body present in the wreckage, which was recovered. The body was subsequently identified as that of the passenger.

The AAIB published Special Bulletin S1/2019 on 25 February 2019[1] to give preliminary information on the investigation and general information about how aircraft registered in the USA may be operated between the UK and France.

This Special Bulletin contains medical information relevant to the accident to highlight the implications of that information to the General Aviation community.

Results of toxicology tests

Toxicology tests on the blood of the passenger showed a carboxyhaemoglobin (COHb) saturation level of 58%. COHb is the combination product of carbon monoxide (CO) with haemoglobin, the oxygen-carrying protein molecule contained in red blood cells.

CO is a colourless, odourless gas produced from the incomplete combustion of carbon-containing materials. It readily combines with haemoglobin in the blood, decreasing the carriage of oxygen and causing a direct effect on the performance of those parts of the body which rely on oxygen for proper function. A COHb level of 50% or above in an otherwise healthy individual is generally considered to be potentially fatal.

In this type of aircraft, the cockpit is not separated from the cabin[2] and it is considered likely that the pilot would also have been affected to some extent by exposure to CO.

Symptoms following exposure to carbon monoxide

Exposure to CO can lead to damage to the brain, heart and nervous system. The symptoms of CO poisoning worsen with an increasing percentage of COHb as detailed in Table 1.

COHb level	Symptoms
Less than 10%	None
20 to 30%	Drowsiness, headache, slight increase in respiratory rate, dizziness
30 to 40%	Impaired judgement, difficulty breathing, blurring of vision, bad headache, increasing drowsiness, stomach pain
40 to 50%	Confusion, blurred vision, shortness of breath, pounding headache, vertigo, loss of coordination, chest pain, memory loss
Over 50%	Seizure, unconsciousness, heart attack

Table 1

Symptoms of increasing levels of COHb

It is clear from the symptoms that exposure to CO can reduce or inhibit a pilot's ability to fly an aircraft depending on the level of that exposure.

Footnote

[1] https://www.gov.uk/aaib-reports/aaib-special-bulletin-s1-2019-on-piper-pa-46-310p-malibu-n264db

[2] In this report, the word 'cabin' includes the cockpit.

Mitigation of the risks due to carbon monoxide

Piston engine aircraft produce high concentrations of CO that are conveyed away from the aircraft though the exhaust system. Poor sealing of the cabin, or leaks into the heating and ventilation system from the exhaust can provide pathways for CO to enter the cabin. Whilst piston engines produce the highest concentration of CO, exhausts from turbine engines also contain CO.

The best protection against CO poisoning is to avoid exposure but pilots must be aware of the danger and the possible symptoms in themselves or their passengers. Several devices are available which can alert pilots visually or aurally to the presence of CO. These range from stick-on pads that change colour in the presence of CO to powered detectors, either fitted to the aircraft or portable. These devices are not mandatory in aircraft under the European Union Aviation Safety Agency (EASA) or Federal Aviation Administration (FAA) regulations, but they can alert pilots or passengers to a potentially deadly threat.

Should occupants of an aircraft detect an unusual smell that could be engine exhaust products, or begin to experience illness, the possibility of exposure to CO should be considered. The FAA has produced a leaflet, '*Carbon Monoxide: A Deadly Menace'*[3], which lays out the actions a pilot should take if the presence of CO is suspected:

- *Turn the cabin heat fully off.*
- *Increase the rate of cabin fresh air ventilation to the maximum.*
- *Open windows if the flight profile and aircraft's operating manual permit such an action.*
- *If available (provided it does not represent a safety or fire hazard), consider using supplemental oxygen.*
- *Land as promptly as possible.*
- *Do not hesitate to let Air Traffic Control know of your concerns, and ask for vectors to the nearest airport.*
- *Once on the ground, seek medical attention.*
- *Before continuing the flight, have the aircraft inspected by a certified mechanic*

Ongoing investigation

The AAIB is working with the aircraft and engine manufacturers and the National Transportation Safety Board (NTSB) in the USA to identify possible pathways through which CO might enter the cabin of this type of aircraft. Work is also continuing to investigate pertinent operational, technical, organisational and human factors which might have contributed to the accident. Whilst

Footnote

[3] https://www.faa.gov/pilots/safety/pilotsafetybrochures/media/cobroforweb.pdf

this work is ongoing, this Special Bulletin is issued to raise awareness within the General Aviation community of the dangers of exposure to CO and the measures available to detect its presence in the cabin in order to mitigate this potentially fatal risk. A final report will be published in due course.

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