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Carbon monoxide poisoning continues to be a risk in flying

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Are you breathing easily?

If you've been around flying for a while you might know the story of Dr Robert Frayser — and if you don't, he's the chap who Lady Luck devoted her biggest smile to one day...

It was a clear, beautiful morning with the sun just coming up as he flew in his Comanche 400 at 5,500ft. Just after he switched the fuel selector to the auxiliary tank and set up the navigation system for his destination he, in his own words, "lost about an hour and a half of my life".

Dr Frayser had passed out from carbon monoxide poisoning but his Comanche continued to fly a straight course on autopilot until it ran out of fuel. Miraculously, it then glided down until it came to rest in a field. When Dr Frayser awoke he was confused, disoriented, and groggy with a severe headache — so groggy in fact that he thought he was still in the air and started to go through landing preparations. As he became more aware he realised he was actually on the ground in a hayfield. The engine was silent, the right wing had been nearly torn off from an impact with a small tree, but the Comanche was otherwise more or less intact.

Apart from suffering minor cuts and bruises Dr Frayser was relatively uninjured and had no memory of what happened. There were no early warnings or symptoms, he reported that he "just went to sleep".

The trouble with carbon monoxide (CO) as many will know is that you can't smell or taste it so, you really don't know if it's entering the cockpit; in Dr Frayser's case it came from a cracked exhaust that couldn't be seen on the pre-flight inspection and it had seeped into the cabin through the heater. So how does it actually affect the body and brain so quickly?

Carbon monoxide (CO) is produced by incomplete combustion of fuel and when breathed it enters the bloodstream and mixes with haemoglobin (the part of red blood cells that carry oxygen around your body) to form carboxyhaemoglobin. When this happens, the blood loses its ability to carry oxygen, causing cells to fail and die, effectively producing the effects of hypoxia — mainly a headache, drowsiness, or dizziness. Other symptoms can include impaired vision, feeling and being sick, tiredness and confusion, stomach pain, shortness of breath and difficulty breathing and recovery can take up to 24 hours.

With many light aircraft heaters utilising air flowing over the exhaust manifold to provide cabin warmth, as with Dr Frayser's incident fumes escaping through manifold cracks and seals is one of the main sources of such poisoning. While most, if not all, pilots check their engine(s) and exhausts before flight for just such an issue, it's worth remembering that if the aircraft heater hasn't been used for many months the whole heating system

should be checked even more thoroughly before a flight where it's likely to be used. Unsurprisingly, data from the FAA in the US has shown that occurrences of CO contamination increase with the age of the aircraft, so asking your maintainer to conduct more in-depth checks of the continued integrity of your exhaust and heat exchanger (muffler) systems and engine compartment to cabin seals on a periodic basis, particularly if your aircraft is getting on a bit, is a very wise precaution. Many designs of muffler rely on a number of small welded elements in the airflow transferring the heat and cracking around these numerous welds can only be spotted by disassembly and careful inspection, or even more effectively by a pressure test (using a compressor and soap solution to seek out any leaks). Most aircraft manufacturers have such inspections as recommendations, if not requirements in your maintenance manuals.

While carbon monoxide itself is odourless and tasteless, the smell of exhaust fumes in the cockpit, or experiencing any of the above symptoms, is a pretty good warning of potential CO poisoning. The immediate remedial action is to shut off the heater, open the air vents and, if necessary, land. If the symptoms are severe, or continue after landing, it's best to seek medical treatment.



Over the years, early warning of carbon monoxide in the cockpit has mainly been a case of sticking passive devices such as the straightforward orange or yellow spot detectors to the panel which turn dark if the gas is present. These are one solution and only cost a few pounds, but they only have a stated useable life of months, rather than years, and being passive, their effectiveness is reliant on good discipline from users. If you are exposed to early CO poisoning, your scan discipline is likely to be an early casualty. For this reason, the CAA strongly recommends the use of active CO detectors. Nowadays there's an increasing range of advanced electronic devices available, both portable and fixed. These provide audible alarms and/or digital readouts and cost anything from a few tens of pounds to several hundreds, all of which should, if properly set up effectively mitigate the risk.

Thankfully, serious incidents of carbon monoxide poisoning such as Dr Frayser's are rare, but the risks remain ever present, and increase with the passage of time.

