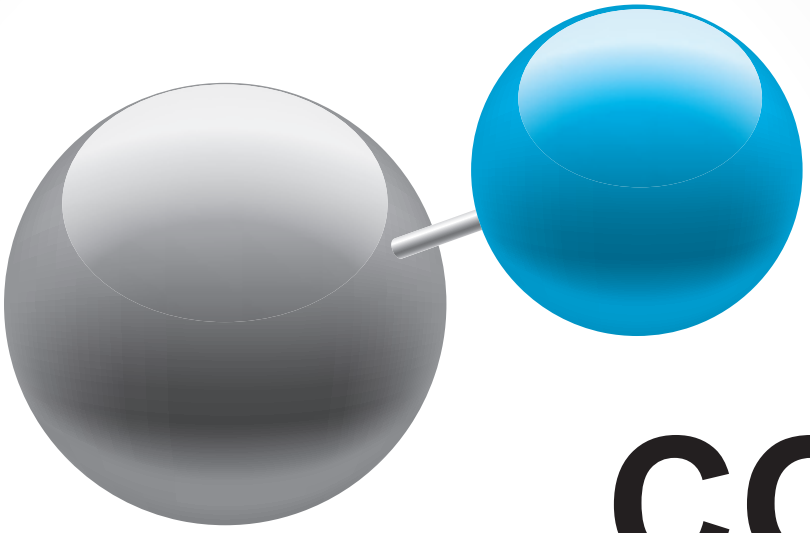
Clued up

GA Update

July 2021

CARBON MONOXIDE

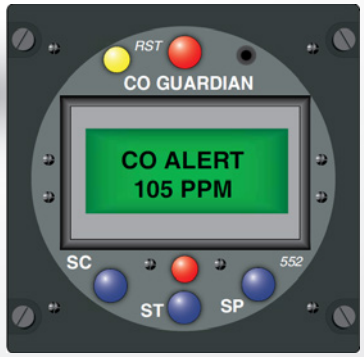
UK Civil Aviation Authority



CO

Carbon monoxide

PASSIVE OR ACTIVE?



For many years pilots have been using 'passive' carbon monoxide detectors in the cockpit, but 'active' electronic sensors are becoming less expensive and more available

As most people are probably aware, the trouble with carbon monoxide (CO) is that you can't smell or taste it and it affects people quite quickly. When breathed in it enters the bloodstream and mixes with haemoglobin (the part of red blood cells that carry oxygen around your body) to form carboxyhaemoglobin (COHb).

The trouble is that it's so good at binding to the cells — up to 240 times better than oxygen — that the blood carries less oxygen, causing cells to fail and die, effectively producing the effects of hypoxia — mainly a headache, drowsiness, or dizziness. Other symptoms include impaired vision, feeling or being sick, tiredness and confusion, stomach pain, shortness of breath and difficulty breathing. Recovery can take up to 24 hours or longer.

If you've been around flying for a while you might know the intriguing story of American GP Dr Robert Frayser — he's the chap who Lady Luck devoted her biggest smile to one day. It happened when he was flying a Comanche 400. Just after switching to the auxiliary fuel tank and setting up the navigation system for his destination he, in his own words "lost about an hour and a half of my life".

He'd passed out from CO poisoning but the Comanche continued to fly a straight course on autopilot until it ran out of fuel. Miraculously, it then glided down with Dr Frayser still unconscious until it 'came to rest' in a field.

The good doctor woke up 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 his landing preparations. As he became less confused, he realised he was on the ground in a hayfield. The engine was silent, the right wing had been almost torn off after hitting a small tree, but the Comanche was, fortunately, otherwise more or less still 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 said he "just went to sleep". The cause of the carbon monoxide was a cracked exhaust that couldn't be seen on the pre-flight inspection and allowed the gas to seep into the cabin via the heater. There was no CO detector in the cockpit.

While most, if not all, pilots do their best to monitor and address the condition of their aircraft, such as checking their engine(s) and exhausts before flight, it is worth remembering that degradation can take place during periods of storage as well as operation. Thorough checks should be made when the aircraft is in for maintenance. Carrying an active carbon monoxide detector may alert you when carbon monoxide levels reach a threshold level.

Carbon monoxide is produced by incomplete combustion of fuel and while it's 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 action is to shut off the heater, open the air vents and land as soon as possible. If the symptoms are severe, or continue after landing, it's best to seek medical treatment.

SO WHICH TO GO FOR?

Over the years, early warning of carbon monoxide in the cockpit has often been a case of using passive devices such as the orange or yellow spot detectors which turn dark if CO is present and they're a straightforward solution costing only a few pounds.

They do have their limitations, though. Being 'passive' they lack attention-getting capability and need to be actively looked at from time to time while flying. Some need to be replaced fairly frequently, quite often every three months, which means keeping an eye on any expiry date(s) for continued effectiveness. Some also tend only to show that carbon monoxide is present in the cockpit rather than exactly how much there actually is. Another downside to these detectors is that some can revert back to their original colour when exposed to fresh air again, so if you had an intermittent CO problem and didn't notice the temporary colour change you'd be none the wiser.

Advanced 'active' electronic sensors, on the other hand, are becoming much more common, whether panel-mounted or portable 'carry-on' types, and have a clear advantage over passive ones by actively engaging a pilot's attention via audible/vibration alarms and/or digital readouts if there's a carbon monoxide leak. Most 'installed' active detectors will usually be able to be fitted to UK-registered aircraft as 'standard changes' under the provisions of CS-STAN, CS-SC107a (for EASA aircraft) and through CAP 1419 (for non-EASA aircraft), avoiding the cost and time associated with applying for a formal modification. For 'carry-on' examples, no airworthiness approval is required.

With all 'active' detectors their effectiveness is dependent to an extent on variables such as the trigger level for the alarm and its position in the aircraft. Ensuring these devices are present and functioning prior to a flight will maximise the likelihood of effective operation in an emergency.

You can read some further articles about carbon monoxide detectors at these links.

- **CAA Safety Notice SN-2020/003 Version 2**
- **LAA 'Light Aviation' magazine article 'The Canary & the Silent Killer', July 2017.**
- **Four carbon monoxide digital monitors tested — FLYER Magazine**
- **How a precautionary measure helped to potentially save two lives — Pilot Magazine**