ACCIDENT

Aircraft Type and Registration:	Cessna F172H Skyhawk, G-AWUX
No & Type of Engines:	1 Continental Motors Corp O-300-D piston engine
Year of Manufacture:	1968 (Serial no: 577)
Date & Time (UTC):	19 April 2018 at 1338 hrs
Location:	3 miles southwest of Perranporth airfield, Cornwall
Type of Flight:	Private
Persons on Board:	Crew -1 Passengers - None
Injuries:	Crew - 1 (Minor) Passengers - N/A
Nature of Damage:	Damage to propeller, nosewheel, cowling, left wing strut and tailplane
Commander's Licence:	Private Pilot's Licence
Commander's Age:	80 years
Commander's Flying Experience:	186 hours (of which 108 were on type) Last 90 days - 0 hours Last 28 days - 0 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB

Synopsis

When applying full power, following a descent at idle power there was a sudden bang and heavy vibration. The vibration eased on reducing power but increased again as power was applied. The pilot declared a MAYDAY and initiated a forced landing. At 50 ft, the pilot realised that his selected field was unsuitable so he veered left and landed in a harrowed field. The wheels dug in and the aircraft flipped inverted. The cause of the engine problem could not be determined.

History of the flight

The pilot carried out power checks and then departed from Perranporth Airfield on a local flight. He levelled off at 2,200 ft and headed west in clear air and VMC conditions. He could see a broken cloud layer 800 ft below him over the coast moving in from the southwest. After reaching the coast north of St Agnes, he tracked southbound along the coastline before deciding to return to Perranporth to avoid needing to fly below the incoming cloud layer. He selected idle power and started a descending left turn onto a south-easterly heading.

When he reached 1,200 ft (QFE) he decided to level off and applied full power. He reported that on applying power there was a "an explosive bang and heavy, violent

vibration and shuddering". He immediately selected idle power and the shuddering eased but the vibration continued at a reduced but still severe level. When he tried to increase the power the vibration worsened to the point where it was difficult to read the flight instruments and hold the yoke, with no perceived benefit in reducing height loss. He re-selected idle power, made a MAYDAY call and started to prepare for a forced landing.

The terrain to his right and behind him was mainly heathland, and ahead of him were many small walled fields. He lined up to land on a long narrow grass field but at about 50 ft he noticed stone hedges across its width, so he veered left towards a harrowed field. On touchdown the wheels dug in, the nosewheel was ripped off, and the aircraft nosed over onto its back. The pilot was able to vacate the aircraft via the passenger door.

The pilot could not recall whether he had selected the carburettor heat on prior to his descent from 2,200 ft, but he stated that he normally did so.

Engine examination

The engine was a Continental O-300-D which has six cylinders and a carburettor. As of 18 December 2017 it had accumulated 1,397 hours since last overhaul. A maintenance engineer examined the engine at the accident site. The was no external damage to the engine apart from the carburettor, which had broken off. The oil level was in the normal operating range and there were no oil leaks. The engineer turned the propeller by hand and felt six compressions; he then activated the starter motor and the engine turned normally. He stated that the Continental O-300 series of engines were prone to carburettor ice due to the carburettor's narrow throat and high gas-speed induction system.

An insurance loss adjustor subsequently examined the engine after the aircraft had been moved from the site. He confirmed the oil level and that the engine turned over on the starter motor with "no abnormal sounds or mechanical interference". The exhaust and exhaust manifold were firmly attached. He removed all six upper spark plugs and they all had a layer of dark soot which is indicative of the engine running over-rich. He stated that he believed it was a short term over-rich condition as the electrode insulators were not completely covered in soot.

Meteorology

About 10 minutes after the accident the temperature and dewpoint at Newquay (8 nm north-east of Perranporth) were 14°C and 11°C respectively. An upper air sounding for Camborne (11 nm south-west of Perranporth) measured a temperature and dewpoint of 9.8°C and 9.2°C respectively at 2,000 ft, and 11°C and 10.5°C at 1,000 ft. These conditions placed the risk of carburettor icing as '*serious icing - any power setting'* according to CAA Safety Sense Leaflet No 14, '*Piston Engine Icing*'.

Analysis

The engine examinations carried out by an engineer and the loss adjustor did not reveal any mechanical defects that would explain the heavy vibration reported by the pilot.

The meteorological conditions were conducive to carburettor icing and according to a maintenance engineer the engine type was prone to carburettor ice. If the pilot had forgotten to select carburettor heat before reducing the engine power to idle prior to the descent, then carburettor ice was more likely to form. Carburettor ice formation results in a restriction of airflow and causes the engine to run rich; there was evidence from the spark plugs that the engine was running rich. A rich-running engine typically leads to rough running and can cause the engine to stop. The symptoms reported by the pilot of severe vibration are not typical of carburettor ice; however, most aircraft engines with carburettors are four-cylinder engines, whereas this was a six-cylinder engine, so it is possible that the symptoms would be different. The sudden bang might have been caused by detonation in the exhaust system due to incomplete combustion in the cylinders from an over-rich mixture. It is also possible that there was a fault with the engine, possibly related to the valves, that only a full engine teardown would reveal.