ACCIDENT

Aircraft Type and Registration:	Reims Cessna F152, G-BHDR	
No & type of Engines:	1 Lycoming O-235-L2C piston engine	
Year of Manufacture:	1980	
Date & Time (UTC):	1 August 2006 at 0905 hrs	
Location:	1.7 nm north of Tillicoultry, Clackmannanshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Propeller hub separated, nose leg bent aft, wings bent, tail section separated from fuselage	
Commander's Licence:	Commercial Pilot's Licence with Instructor Rating	
Commander's Age:	35 years	
Commander's Flying Experience:	1,625 hours (of which 1,050 were on type) Last 90 days - 97 hours Last 28 days - 40 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB	

Synopsis

During a cross-country flight below cloud level the engine began to run rough and then lost all power. A forced landing was carried out on a hillside, which resulted in the aircraft turning upside down. Carburettor ice formation was considered a potential cause of the engine failure.

History of the flight

The pilot was carrying out a cross-country flight from Cumbernauld Airport to Perth. He had been cruising at 1,700 feet just below the cloud base while approaching the Ochil Hills, when he decided to initiate a climb as the clouds over the hills were higher than over the valley. While climbing through 2,400 feet the engine began to run rough and lose power. The pilot applied carburettor heat, confirmed that the fuel cock was ON, the mixture was set to RICH and that the master switch was ON. However, very shortly afterwards the engine lost all power. He attempted to restart the engine, without success, so he prepared for a forced landing on the ridge of a hill. While manoeuvring for the landing he continued to try to restart the engine. Eventually the engine started but it ran rough and produced insufficient power for the aircraft to climb. The pilot extended full flap, shut off the fuel, turned off the master switch and then reduced the aircraft's speed towards the stall; he then successfully 'stalled' the aircraft onto the upward slope of the valley. The left wheel touched down first, followed by the nosewheel, and then the aircraft flipped upside down within 5 to 8 metres of the touchdown point. The pilot was able to exit the aircraft through the window unassisted.

Weather

An aftercast issued by the Meteorological Office estimated that the temperature and dewpoint in the area at the time of the accident were 14ºC and 12ºC respectively (relative humidity of 87%) at ground level. At 1,700 to 2,400 feet the temperature would have been slightly lower and the humidity slightly higher. The chart of carburettor induction system icing probability in Safety Sense Leaflet 14 of LASORS[1] indicated that, in these conditions, there was a serious risk of icing at any power setting for a typical light aircraft piston engine without carburettor hot air selected.

Aircraft examination

Before the aircraft was recovered from the hill side the aircraft was heavily vandalised. The propeller and wheels were taken and all the flight instruments were stripped. No examination of the engine, induction system or fuel system was carried out by the operator.

Pilot's assessment of the cause

The pilot reported that he had applied carburettor heat as part of his cruise checks approximately 5 minutes before the engine started to run rough, but he believes that carburettor ice could still be the cause. He reported that his application of carburettor heat after the engine started to run rough might have dislodged a build-up of ice, causing the engine to ingest water, resulting in the sudden engine failure.

Analysis

A problem with the engine, induction system, fuel system or fuel could not be ruled out as potential factors in the engine failure because no examination was carried out. However, the atmospheric conditions at the time and the symptoms experienced by the pilot indicated that carburettor ice could have been a factor. In AAIB Bulletin 5/2004, the AAIB published Safety Recommendation 2004-01 recommending that the CAA sponsor or conduct research on the effects of carburettor ice. Since then the CAA has carried out carburettor ice research and a report on the results is pending. The CAA Safety Regulation Group Safety Plan 2006 stated the following with regards to carburettor icing:

> *'Since 1976 Carburettor Icing has been a contributory factor in 14 fatal accidents and in over 250 other occurrences in the UK with numerous AAIB recommendations to SRG. Progress has repeatedly been hampered by the lack of data on where ice forms, how quickly and how much heat is effective in removing it. There has also been some doubt that the level of carburettor heat required by the Airworthiness Requirements (e.g. EASA CS-23) is adequate to mitigate the risk. CAA has conducted research using a specially designed carburettor test rig in conjunction with Loughborough University and an industry partner for systematic data collection. The CAA will publish a report on carburettor icing, including potential mitigation.'*

Footnote

[1] LASORS (Licensing Administration Standardisation Operating Requirements Safety) is an annual publication by the CAA containing '*essential licensing requirements and safety information for pilots of all aircraft*'.