

ACCIDENT

Aircraft Type and Registration:	Pioneer 300, G-LEAH	
No & Type of Engines:	1 Rotax 912 ULS piston engine	
Year of Manufacture:	2007 (Serial no: PFA 330-14497)	
Date & Time (UTC):	19 June 2022 at 0954 hrs	
Location:	Ludham Airfield, Norfolk	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Twisted wing box, damaged engine mounting, propeller, landing gear and left wing	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	64 years	
Commander's Flying Experience:	1,846 hours (of which 7 were on type) Last 90 days - 7 hours Last 28 days - 7 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB	

Synopsis

Shortly after takeoff the aircraft developed a rough running engine and suffered a reduction in engine power. The aircraft was unable to maintain height to allow a return to the airfield and the pilot landed in a field during which the aircraft was extensively damaged. The pilot had recently refuelled the aircraft with E10 Mogas, which the LAA does not approve for use on their Permit to Fly aircraft.

History of the flight

After a normal takeoff, at a height of 300 ft, the engine started to run rough with a reduction in engine power. The pilot turned left directly downwind with the intention of landing back at the airfield. He adjusted the throttle and applied carburettor heat but there was no discernible effect on the engine. After selecting landing gear down and first stage of flap, the pilot commenced a turn onto final. The pilot realised that he would not be able to complete the turn and landed the aircraft in a field approximately 30 m short of the runway threshold.

While the aircraft was extensively damaged, the pilot and passenger were uninjured.

Use of E10 Mogas

The Aircraft Flight Manual approves the use of unleaded Mogas (98¹ Octane or greater) and 100LL Avgas. The pilot last refuelled the aircraft with E10 Mogas² which had been purchased from a local garage forecourt a week before the accident.

The introduction of E10 Mogas prompted the LAA to issue the following warning on their website: '*E10 unleaded fuel - Not approved for LAA aircraft use*³.' The LAA have also produced Technical Leaflet (TL) 2.26 – '*Procedures for use of E5 unleaded and E5 super unleaded Mogas*', which provides more details of the range of problems related to the increase in ethanol content in Mogas.

The LAA states that carburettor icing is more likely with Mogas and requires a placard to be fitted on the instrument panel to warn the pilot. Ethanol is a powerful chemical solvent which can attack components such as rubberised gaskets, fuel pipes, old-lacquered carburettor floats and composite or plastic components. The doubling of ethanol concentration from 5% (E5) to 10% (E10) in Mogas increases the risk of problems for parts not designed to be ethanol proof. Ethanol also tends to absorb water which, over time, can become acidic and corrode metal components in fuel and engine systems.

TL 2.26 also states that Mogas has a much higher vapour pressure than Avgas 100LL, with the initial boiling point of the fuel only slightly above ambient temperature. It only takes a slight raise in temperature or drop in pressure to make it vaporise. This makes vaporisation more likely for an aircraft fitted with an engine-driven mechanical fuel pump bolted to the engine crankcase, where heat from the engine will raise the temperature of the pump body considerably. Open vented tanks, with the fuel-pump several feet away from the tank and the fuel routed through a convoluted pipe system, filter and fuel selector encourages vapour lock. There is a requirement to check that full engine power is available before committing to takeoff to ensure that vapour lock is not present.

Although some manufacturers state their engines may be able to use E10, the aircraft's fuel system may not be compatible with this fuel, particularly with vintage aircraft types.

Comment

The pilot commented that vapour lock or carburettor icing may have been factors in the aircraft's rough running engine. He was aware of the LAA limitation on the use of E10 Mogas, but decided to mitigate the effects of E10 Mogas by mixing it with Avgas which he believed was an acceptable practice.

Footnote

- ¹ E10 is 95 octane and E5 is 97 + octane. Reference www.gov.uk/guidance/e-10-petrol-explained accessed 21 October 2022
- ² E10 Mogas is a reference to motor gasoline with a 10% ethanol content, which was introduced in the UK on 1 September 2021.
- ³ <http://www.lightaircraftassociation.co.uk/engineering/Mogas/e10mogas.html> [accessed July 2022].