ACCIDENT

Aircraft Type and Registration:	Glasair II-S RG, G-IIRG	
No & Type of Engines:	1 Lycoming IO-360-B1E piston engine	
Year of Manufacture:	1994 (Serial no: PFA 149-11937)	
Date & Time (UTC):	22 February 2022 at 1710 hrs	
Location:	Near Boreham, Wiltshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Landing gear collapsed, damage to wings, lower surface of the fuselage, propeller and engine shock-loaded	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	70 years	
Commander's Flying Experience:	10,767 hours (of which 52 were on type) Last 90 days - 5 hours Last 28 days - 4 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

The aircraft's engine failed in flight due to fuel starvation, resulting in a forced landing and damage to the aircraft. The cause of the fuel starvation was selection of an empty fuel tank after engine rough running had occurred whilst the main wing fuel tank was selected.

History of the flight

The pilot was returning to RNAS Yeovilton having departed from North Weald Airfield at 1627 hrs. He elected to keep the retractable landing gear selected DOWN for the flight, as he had experienced difficulty lowering the landing gear on arrival at North Weald, which had required the use of the emergency lowering procedure. The pilot stated that on departure from North Weald there were approximately 127 litres of fuel in the wing tank and that the expected fuel burn for the flight to Yeovilton was about 76 litres. He had not checked the fuel level in the aircraft's auxiliary header tank, and the fuel gauges did not display the fuel level in this tank.

The flight initially proceeded uneventfully, apart from the pilot stating that right rudder and left aileron inputs were required to keep the wings level with the landing gear down whilst cruising at the maximum gear extended speed of 140 mph. Whilst the aircraft was in the vicinity of Marlborough, at an altitude of 2,500 ft in moderate turbulence, the engine began to run roughly. Having noted that the fuel contents were sufficient in the wing tank,

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which was the selected tank, the pilot carried out checks on the ignition, mixture, propeller and throttle controls but the engine continued to run roughly. The pilot then changed the fuel selector valve to draw fuel from the header tank. The engine recovered and ran normally for approximately 15 seconds, before then losing all power, leaving the propeller windmilling.

The pilot stated that rather than attempting to further troubleshoot the loss of engine power, he prioritised selecting a suitable landing site and having made a MAYDAY call, carried out preparations for a forced landing. He selected a grass field that was into wind and had an upslope. The aircraft landed heavily in the field, forcing the landing gear to retract and partially push the main landing gear legs through the upper wing skins. The aircraft slid on its belly before striking a post and wire fence, which brought the aircraft to a halt (Figure 1). Neither the pilot nor his passenger were injured in the accident.

Following the accident the header tank was observed to be empty. There was no evidence of a fuel leak from the aircraft prior to the accident.

Figure 1
Accident site

Fuel system information

The standard Glasair II-S RG fuel system has a main tank in the leading edge D-section of the wing and a header tank on the aft surface of the firewall. G-IIRG was also fitted with optional wing tip tanks that gravity-fed into the main wing tank, bringing the wing tank fuel capacity up to 193 litres. The header tank has a capacity of 30 litres. When the wing fuel tank is selected, fuel is drawn from a sump fitted to the low point of the wing tank, on the aircraft centreline. The aircraft was not fitted with an inverted flight fuel system and the engine was fuel-injected.

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A fuel selector valve in the cockpit enables the fuel to be drawn from either the wing or header tanks, or set to OFF. Three other members of the aircraft's ownership group stated that it was their standard practice to leave the header tank full, as a known fuel reserve in flight, and to visually inspect the header tank contents prior to flying the aircraft.

The Pilot's Operating Handbook (POH) for the aircraft contains the following warning, Figure 2:

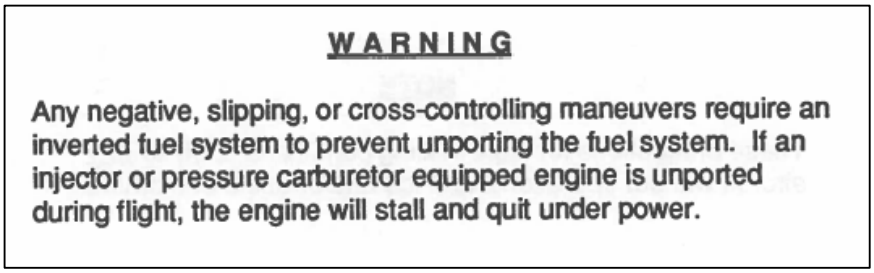

Figure 2

POH warning relating to fuel supply interruptions in flight

The POH also states that:

> *'Slips longer than 30 seconds in duration are prohibited while drawing fuel from the main fuel tank. If less than ten (10) [US] gallons of fuel [37.9 litres] remains in the main tank, slips are prohibited entirely when drawing fuel from the main tank'.*

Analysis

At the point in the flight when the engine began to run roughly there was sufficient fuel available in the wing tank. The most likely reason for the rough running was an interruption to the fuel supply to the engine, since the engine initially ran smoothly again once the header tank had been selected. It is probable that a prolonged sideslip, in combination with turbulence, caused the wing tank sump to be exposed to air inside the wing tank and for air to become entrained within the fuel supply to the engine. Selection of the header tank, which was mostly empty, then caused the complete loss of engine power as the residual fuel in the fuel line between the header tank and the engine was quickly consumed.

The pilot selected a suitable field to land in, however contributory factors in the resulting hard landing may have included the field upslope and difficulty in judging height when landing into a low sun angle.

Conclusion

The aircraft's engine lost power in flight due to fuel starvation following selection of a fuel tank that was empty, after engine rough running had occurred whilst the main wing fuel tank was selected. The cause of the rough running was likely to be due to air being draw into the engine's fuel supply due to fuel movement in flight within the wing tank. The aircraft's

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POH contains warnings of interruption to the engine fuel supply from the wing tank due to flying in a sideslip condition.

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