ACCIDENT

Aircraft Type and Registration:	Piper PA-28R-201T, G-BEOH	
No & Type of Engines:	1 Continental TSIO-360-FB3B piston engine	
Year of Manufacture:	1977 (Serial no:28R-7703038)	
Date & Time (UTC):	21 July 2014 at 0651 hrs	
Location:	Gloucestershire Airport	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 2
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Light damage to leading edges of wing, heavy damage to leading edges of tail plane	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	68 years	
Commander's Flying Experience:	3,267 hours (of which 444 were on type) Last 90 days - 9 hours Last 28 days - 4 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot, a report from the airport operator and a technical report from the aircraft's maintenance organisation	

Synopsis

Shortly after takeoff, the pilot reduced to a climb power setting, but sensed a much greater reduction in actual power. The aircraft began to sink and the pilot selected full power. He also changed fuel tanks. The aircraft struck tree tops in two locations before the pilot was able to climb away. The aircraft joined the visual circuit and landed without further incident. A technical investigation identified a distorted fuel gascolator upper housing, which was believed to have had the effect of allowing air to be ingested into the fuel system during takeoff.

History of the flight

The pilot prepared for a flight from Gloucester to Cherbourg. He supervised refuelling of the aircraft, during which both tanks were filled almost to full. Pre-flight checks were normal, and included a change of fuel tank before takeoff, in accordance with normal procedures. The aircraft taxied for Runway 27 with the pilot and two passengers on board. Based on figures supplied by the pilot, the aircraft's takeoff mass was 2,836 lb, just below the maximum weight of 2,900 lb. The weather conditions were fine and calm.

The takeoff appeared normal, with the aircraft accelerating and lifting off as expected. Takeoff power was 38" manifold pressure (MP). After raising the landing gear, the pilot

moved the throttles to select climb power of 33" MP. However, he sensed a much greater actual power reduction and the aircraft started to sink. He moved the throttles fully forward and the aircraft responded with increasing airspeed and climb rate, although the turbo overboost light illuminated for two to three seconds. Responding to this, the pilot reset 38" MP, but again sensed a power loss.

The pilot selected full power again as the aircraft flew at slow speed towards trees at the edge of a golf course, about 550 m from the departure end of the runway. The pilot again tried reducing to climb power, but again felt there was a greater loss of power. He selected the other fuel tank with the selector valve, and felt that the power being produced started to increase. As he did so, the aircraft clipped the tree tops. The aircraft continued across an open area and clipped another tree top about 150 m further on, but then began a climb away to circuit height. The aircraft was turned downwind and landed without further incident.

The pilot reported that the apparent loss of power was not accompanied by any unusual engine noises or rough running, and that the engine appeared to run normally and produce normal power levels after the fuel tank selector was changed to the other tank.

Airport operator's report

The airport operator provided a report on its own investigation, which was confined to the operational aspects of the accident. In the report, the duty Air Traffic Control Officer (ATCO) described the takeoff roll as "sluggish", after which the aircraft was seen to climb only slowly until it disappeared from view behind trees, at which point the ATCO sounded the crash alarm. Shortly afterwards, the aircraft reappeared back in view, climbing on a south-westerly heading. A weather observation made at the time gave a surface wind of 2 kt from 280° and an OAT of 17°C. From eye-witness accounts and debris from the trees found on the ground, the investigation confirmed the pilot's report that the aircraft had struck trees in two locations.

Technical investigation

The aircraft's maintenance organisation conducted a technical investigation, the findings of which were made available to the AAIB on request. The investigation centred on the fuel gascolator. Although the unit appeared in satisfactory condition and was correctly installed, it was found that, using hand pressure, the gascolator bowl would rock in the fore and aft direction, relative to the filter housing. With the unit static, when the fuel supply was turned on there were no fuel leaks and the fuel drain valve operated normally. However, when the bowl was then rocked slightly fore and aft, the fuel leaked freely down the outside of the bowl, indicating an unsatisfactory seal.

When the gascolator was dismantled, it was found that the upper housing was distorted. This was thought to have been caused by forces exerted over time by the bail wire assembly (the assembly held the gascolator bowl in place). The distortion had the effect of pulling the sealing face for the square section seal out of flat. Examination of the seal itself showed an uneven 'footprint', confirming the uneven sealing. It was assessed that mechanical loads on the gascolator arising from pre-flight fuel sampling and vibrations during aircraft

operation would have been sufficient to produce fuel leakage, which only an excessive seal preload force could have prevented.

The technical investigation concluded that a combination of the distorted upper housing, vibrations during the takeoff roll, and a high fuel flow produced a situation whereby air was ingested into the fuel system with consequential fuel starvation. It was observed that power checks at a nominal 2,000 rpm prior to flight would not have highlighted the problem as fuel flow would be relatively low at that power setting.