

INCIDENT

Aircraft Type and Registration:	Piper PA-32RT-300, G-RHHT	
No & Type of Engines:	1 Lycoming IO-540-K1G5D piston engine	
Year of Manufacture:	1978	
Date & Time (UTC):	25 May 2006 at 1530 hrs	
Location:	Fox Heading Lane, St Johns, Spalding, Lincolnshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 1
Injuries:	Crew - None	Passengers - None
Nature of Damage:	No damage	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	38 years	
Commander's Flying Experience:	304 hours (of which 94 were on type) Last 90 days - 11 hours Last 28 days - 1 hour	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

A land owner reported that an aircraft had landed on part of his property adjoining Fenland Airfield. In his report the pilot considered that the takeoff performance appeared to have been deficient and the aircraft was failing to climb. A decision was taken to land ahead rather than attempt to cross a row of trees. The investigation noted that the perception of reduced performance might be attributed to a newly overhauled engine which had not been fully run in.

Background

The pilot, who was also the owner, reported that the aircraft was fitted with an overhauled engine in May 2006. A number of test flights were reported to have been carried out without incident. During the return

flight from Fenland to the home base of Sywell, however, the pilot noticed that the climb rate was lower than expected and a vibration was being transmitted through the control column. He reported this subsequently to the engineering company who requested that he return the aircraft to enable them to check it over. During the climb-out from Sywell the pilot again noticed the climb rate was not as good as usual.

On discussing the problem with the engineering company, the pilot was assured that some power and vibration anomalies were to be expected with a newly overhauled aero engine. The engine was fully tested on the ground and the pilot was then happy to proceed.

The takeoff attempt

The pilot stated that he calculated the aircraft weight, established to his satisfaction that sufficient takeoff distance was available on Runway 36 at Fenland and proceeded to take off. After a run of approximately 400 metres, the IAS was showing 50-55 kt and the aircraft did not appear to be accelerating normally. By this time he judged that there was insufficient distance available to stop, so two stages of flap were selected, the aircraft was rotated at 55-60 kt and the aircraft was held in ground effect whilst it accelerated to 60-65 kt. Thereafter, the aircraft did not appear to be accelerating. Having been airborne for approximately 300 metres, the occupants realised that the aircraft was not climbing. As they were approaching a row of trees, they decided that the safe course of action was to land immediately in the wheat field over which the aircraft was then flying. The landing was successful, without damage to the aircraft or injury to the occupants.

Subsequent events

The aircraft was recovered from the field and comprehensively examined by the engineering company. Late the same day the aircraft was pronounced fit to fly and a further flight was carried out using Runway 18 for takeoff. The engineer, who was also a well qualified pilot, accompanied the incident pilot on this occasion. Although the takeoff and climb out were successful, the incident pilot still considered that climb performance was not as expected. A number of hours were flown over a few days with the power setting at above 75%. The climb performance seemed to vary and vibration was at various times both present and absent. Another pilot also encountered poor takeoff performance and vibration whilst flying the aircraft. A subsequent flight covering six hours at 75% power seemed to rectify the performance. Once more than 20 hours had been accumulated by the aircraft following fitment of the overhauled engine, the

takeoff and climb performance appeared to the incident pilot to be entirely normal and remained so thereafter.

Behaviour of overhauled engines

It should be noted that new or overhauled engines, which have not been extensively run at high power on test plant before installation must be operated in flight for a significant period at higher than normal cruise power to run in the piston rings and cylinder bores. This process creates a better fit which in turn reduces and stabilises oil consumption as well as reducing friction and consequent power loss. Prior to this, oil consumption is generally high, quantities of oil passing the rings into the combustion chambers. This phenomenon frequently creates plug fouling during ground running and low powered flight. A single cylinder may suffer more from this than other cylinders in the same engine. Should a single plug foul, incomplete combustion in that cylinder and hence loss of peak combustion pressure will occur. The lower torque contribution from that cylinder will be less immediately obvious on a six cylinder unit (as in G-RHHT) than on a four cylinder type. High power operation, provided some plug functioning occurs in the affected cylinder, will raise the combustion temperature and if sustained will tend to burn off the oil fouling, leading to disappearance of vibration in flight. Prolonged reduced power running such as during a descent or during ground operation may allow the fouling to return as a result of reduced combustion temperature.

A lengthy flight at high power creates precisely the conditions required to run in the rings and cylinders, reducing oil passage into the combustion chambers and reducing the chances of plug fouling. These factors may all have conspired to create inconsistent running following overhaul, succeeded by correct behaviour and satisfactory performance once the lengthy high powered flight took place.