ACCIDENT

Aircraft Type and Registration:	Pitts S-2A, G-PTTS
No & Type of Engines:	1 Lycoming AEIO-360-A1A piston engine
Year of Manufacture:	1978
Date & Time (UTC):	14 May 2007 at 1900 hrs
Location:	Leicester Airport, Leicestershire
Type of Flight:	Private
Persons on Board:	Crew - 2 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Both wheel spats destroyed, both brake calipers and tail wheel detached, damage to rudder, right lower mainplane and aileron
Commander's Licence:	National Private Pilot's Licence
Commander's Age:	62 years
Commander's Flying Experience:	13,357 hours (of which 104 were on type) Last 90 days - 7 hours Last 28 days - 5 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and additional AAIB enquiries

Synopsis

Shortly after taking off from Leicester Airport, all thrust was lost from the propeller. A forced landing was made on to the disused section of the runway, where the aircraft sustained some damage. After coming to a halt, the engine continued to run, but at idle speed. It was established that a failure had occurred in the propeller control unit, leading to a loss of controlling oil pressure to the propeller hub. This resulted in the propeller blades moving to the coarse pitch angle stops. The pilot was unaware of this characteristic of the propeller, as this had not been covered in his training. Also, no reference to this was in the aircraft's Flight Manual. One Safety Recommendation is made.

History of the flight

The Pilot in Command (PIC) occupied the rear seat for the flight, the purpose of which was to be part of type conversion training on the Pitts S-2A for the front seat pilot, who held an Instructor's Rating. After two uneventful circuits from Runway 28, the aircraft was climbing away from its third 'touch-and-go' when, at a height of 50 ft to 100 ft and without any warning, it suffered a complete loss of thrust. The PIC immediately took control and executed a forced landing on the disused extension of the runway. This had a rough surface, was littered with debris and contained a number of tree saplings. The aircraft nevertheless remained upright and came to rest with relatively little damage and with the engine running at idle speed.

Examination of the aircraft

Subsequent investigation revealed that there had been no disconnect in any of the engine or propeller controls. Since the propeller had escaped damage in the accident, it was decided to run the engine. Whilst it started readily, it would not run above approximately 1,400 rpm: it was then realised that the propeller blades would not move away from the fully coarse setting. The propeller control unit (PCU) was removed from the engine and subsequently bench-tested. The licensed engineer who conducted the test reported that there had been a failure of the internal relief valve spring, resulting in a loss of controlling oil pressure to the propeller hub.

Discussion

In most single piston engine aircraft fitted with constant speed propellers, the propeller is designed such that in the event of a failure of the oil supply, the blades will move to the fully fine position. However, in aerobatic aircraft such as the Pitts, manoeuvres involving the use of full power and reduced or negative g, carry a risk of a temporary interruption of the oil supply to the PCU, even with engine oil systems modified for inverted flight. Such an occurrence would result in an instant engine overspeed with an attendant possibility of severe damage. Accordingly, many aerobatic aircraft have propeller systems that are designed so that the propeller blades will move to the coarse pitch stop in the event of a loss of controlling oil pressure.

In the case of G-PTTS, the pilot had little time in which to conduct any diagnosis of what appeared to be an engine problem, and thus had no option but to land ahead. He was unaware of the behaviour of the propeller following a PCU failure, as this had not been covered in his training; furthermore, there was no information on this subject in the FAA approved aircraft Flight Manual, which contained UK CAA Supplements.

This type of aircraft has a typical landing speed of 90 kt to 100 kt, rendering it particularly vulnerable to severe damage in the event of a forced landing away from an airfield. In the event of a PCU failure occurring in the cruise, an experienced pilot, even if he were unaware of the propeller characteristics, would have a chance of diagnosing the problem. Engine speed would not respond to movement of the propeller speed lever but would change with throttle movement, assuming the airspeed was sufficiently high. There would thus be a reasonable chance of flying to an airfield, as opposed to a forced landing elsewhere. However, it is considered that some knowledge of the characteristics of the propeller control system type fitted to G-PTTS would be of benefit, particularly to less experienced pilots. The following Safety Recommendation is therefore made:

Safety Recommendation 2007-054

It is recommended that the Civil Aviation Authority consider that information on the specific propeller behaviour following a propeller control unit failure, or other malfunctions, which result in a loss of control of the propeller blade angle on piston engine aerobatic aircraft, should be made readily available to all pilots of such aircraft on the UK register.