ACCIDENT

Aircraft Type and Registration:	Pioneer 300, G-CEEG
No & Type of Engines:	1 Rotax 912ULS piston engine
Year of Manufacture:	2006
Date & Time (UTC):	9 June 2007 at 1431 hrs
Location:	Oban Airport, Strathclyde, Scotland
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - None Passengers - None
Nature of Damage:	Broken propeller, slight damage to engine cowling, landing gear jacks buckled
Commander's Licence:	Private Pilot's Licence
Commander's Age:	56 years
Commander's Flying Experience:	1,450 hours (of which 90 were on type) Last 90 days - 87 hours Last 28 days - 32 hours
Information Source:	AAIB Field Investigation

Synopsis

The landing gear seized in the partially extended position and during the subsequent landing, the nose gear collapsed allowing the propeller to make contact with the runway.

History of the flight

On the day of the accident the pilot flew the aircraft from his private strip to Bute where he made an uneventful landing. The aircraft then departed for Oban and during the subsequent pre-landing checks the pilot lowered the landing gear and noted that the green indicator light had not illuminated and the landing gear Circuit Breaker (CB) had tripped. The pilot reset the CB and the blue indicator light briefly flashed before the CB tripped again. He selected the landing gear UP and reset the CB, but once again the blue flashing light briefly illuminated before the CB tripped. The pilot attempted to reset the CB six times before attempting to manually lower the landing gear using the emergency crank handle; however, the winding handle would not move in either direction. Through the inspection window the pilot could see that that the nose landing gear appeared to be in the DOWN position. He therefore informed Oban Radio of the problem and his intention to land. When the pilot selected full flap, a red warning light illuminated and a buzzer operated. The landing appeared to be normal until the end of the landing run, when the right landing gear partially collapsed, quickly

followed by the collapse of the nose landing gear. This allowed the propeller to strike the ground.

Description of the landing gear

The aircraft is equipped with an electrically operated, retractable, tricycle landing gear. The landing gear electric motor is connected to a gearbox by a belt drive. The gearbox turns three screw jacks, each of which is connected to one of the landing gear leg operating mechanisms. As the screw jacks extend, the operating mechanisms move into the over-centre position, which then locks the landing gear legs in the DOWN position. The system is equipped with microswitches, which isolate the electrical power to the motor when the landing gear legs reach their fully extended or retracted position. The pilot can manually lower the landing gear by the use of an emergency crank handle that can be connected directly into the gearbox. An inspection window in the floor of the cockpit allows the pilot to see the position of the nose landing gear.

The system also contains three cockpit warning lights. A green light illuminates when the 'gear down' microswitch operates and a flashing blue light illuminates when the landing gear moves between the up and down positions. A red warning light and buzzer will operate if the flaps are selected down and the down-lock microswitch has not operated.

The electrical power supply for the landing gear motor and the green and blue indicator lights is protected by circuit breaker CB3. However, the electrical power for the red warning light and buzzer is via a different circuit breaker, CB8. Therefore if CB3 trips, the landing gear motor and the blue and green indicator lights will not operate. However the red warning light and buzzer will still operate and warn the pilot if he selects the flaps fully down without the landing gear being locked in the DOWN position.

Inspection of the aircraft

Photographs taken after the landing and before the aircraft was removed from the runway show that the nose landing gear had collapsed, the right main landing gear was partially retracted and the left main landing gear appeared to be in the extended position. Marks on the runway indicated that the nose landing gear collapsed whilst the aircraft was still moving forwards.

The owner of the aircraft, who was also the pilot on the incident flight, reported that the right main landing gear screw jack and nose leg locking rod had buckled, which had caused the nose and right landing gear to collapse. The owner removed the right landing gear screw jack and retraction mechanism and attempted to rotate the right main leg about the retraction spindle (see Figure 1). However the leg could not be easily rotated about the spindle and remained jammed at an angle of approximately 50°.

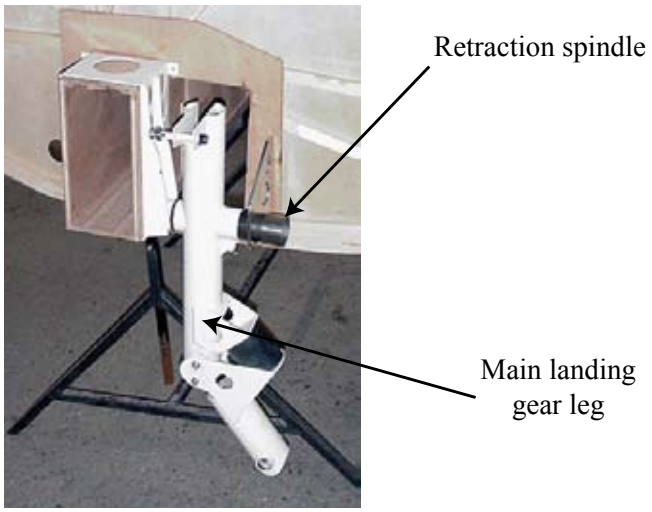

Figure 1

Main landing gear leg

On removing the right leg from the retraction spindle, the owner noticed that there was paint on the inner portion of the spindle and that there did not appear to be much grease on the painted portion of the shaft (see Figure 2). There should not be any paint on the spindle.

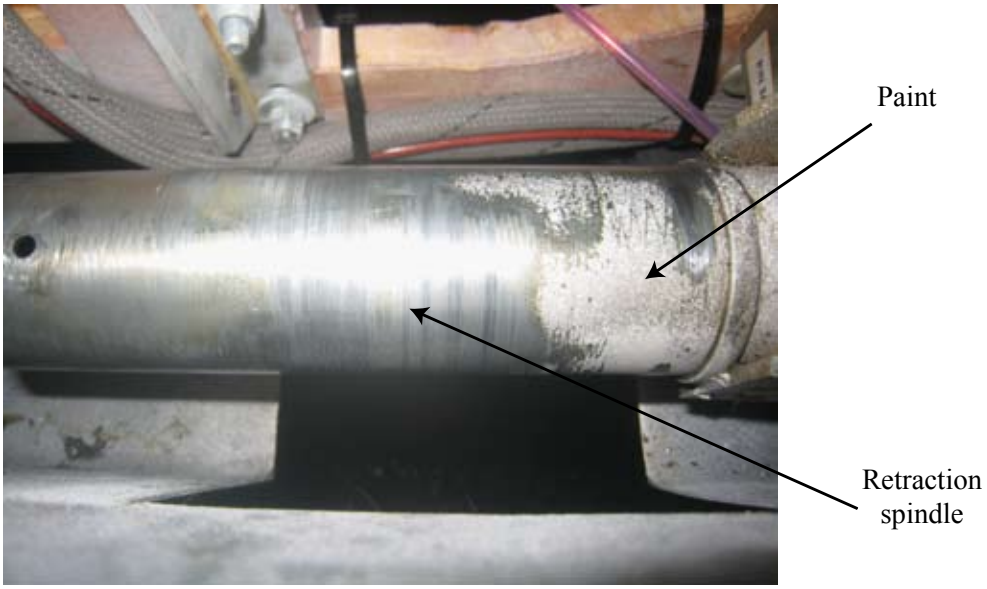

Figure 2

Paint on right spindle

There was no paint on the spindle for the left leg. The owner was of the opinion that the paint might have left insufficient space to allow the grease, which is applied via a nipple on the landing gear leg, to flow along the full length of the right spindle. Consequently he believed that it was the accumulation of the paint debris, as it was rubbed off the spindle, and a partially dry bearing face that caused the leg to seize on the spindle. The owner reported that the leg rotated freely after the paint had been cleaned from the right spindle, though he did comment that when grease was applied through the grease nipple, surplus grease was only seen to come out of the outside edge of the spindle. Following the replacement of all three screw jacks and the nose leg locking rod, the landing gear was cycled satisfactorily using the original gearbox and electrical motor.

Use of circuit breakers

Aircraft CBs are designed to trip (become open circuit) in order to protect the wiring, connectors and electrical components from the effects of excess heat following a serious electrical event. One example was an airborne fire on a Cessna 172, G-BHDZ[1], which occurred as a direct result of the pilot resetting the CB for the alternator. As the repeated resetting of CBs could result in an aircraft fire, a number of major aircraft manufacturers advise that they should only be reset once and then only if the system is essential for the safe operation of the aircraft. The Civil Aviation Authority also gives general advice in Civil Air Publication (CAP) 562 on the resetting of CBs in flight.

> *'In-flight operational use of CBs will usually involve the action of resetting a circuit breaker which has tripped because of an electrical overload or fault. Clearly the reestablishment of electrical power to a circuit which is at fault does involve, however slight, an element of risk. Accordingly, flight crews should be advised not to attempt to reset CBs in flight for other than essential services and, even then, only when there is no clearly associated condition of smoke or fumes. A second reset should not be attempted.'*

Footnote

[1] AAIB report published in Bulletin 7/2007.

As with other sport aviation aircraft, there was no guidance in the aircraft flight manual for this aircraft regarding the resetting of CBs. With the increasing introduction of electrical and electronic equipment on to sport aviation aircraft, both the British Microlight Aircraft Association and the Popular Flying Association have stated that, as a result of this accident, they intend to raise the awareness of the dangers of resetting CBs with their members. Whilst the CAA publishes general advice on the resetting of CBs in CAP 562, General Aviation (GA) pilots might not be aware of the dangers in repeatedly resetting CBs, even those protecting lower power circuits, in flight. In order to ensure that the various GA communities are made aware of these dangers, the following Safety Recommendation is made:

Safety Recommendation 2007-113

It is recommended that the Civil Aviation Authority take appropriate action to increase awareness, in the various General Aviation communities, of the risks involved in resetting circuit breakers in flight.

Comment

The aircraft had been painted 86 flying hours prior to the accident, shortly before delivery to the owner. The landing gear had been greased approximately 20 hours prior to the accident by the owner, and the microswitches had also been adjusted, but no other relevant maintenance had been carried out. The UK importer stated that the landing gear legs had been fitted to the spindles before the aircraft had been spray painted and, therefore, the paint could not have been applied to the spindle at that time. The UK importer also stated that he was unaware of any occasions when the leg had seized on to the spindle and was of the opinion that the single grease nipple was sufficient to ensure the correct lubrication of the bearing face.