ACCIDENT

Aircraft Type and Registration:	Pioneer 300, G-OPFA
No & Type of Engines:	1 Rotax 912 ULS piston engine
Year of Manufacture:	2004
Date & Time (UTC):	20 December 2005 at 1213 hrs
Location:	Gloucester Airport, Gloucestershire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - None Passengers - None
Nature of Damage:	Minor damage to left landing gear, left wing tip and tail
Commander's Licence:	Private Pilot's Licence
Commander's Age:	43 years
Commander's Flying Experience:	660 hours (of which 65 were on type) Last 90 days - 60 hours Last 28 days - 25 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

Following an uneventful landing, the left landing gear collapsed during the taxi back to the parking area. The accident is believed to have been caused by a microswitch being knocked out of adjustment with the result that the left landing gear operating mechanism did not move into the over-centre position.

History of the flight

Shortly after departing from Gloucester Airport the pilot and his passenger both felt some airframe vibration, which the pilot identified as coming from the retracted nose wheel. He continued the flight in the local area and following an uneventful landing decided to undertake some further fault diagnosis during the taxi back to the parking area. The pilot stated that whilst carrying out several sharp turns to right and left, with a ground speed of approximately 12 kt, the left wing and tail of the aircraft sank to the ground. The propeller, which was still rotating under power, did not contact the ground. The pilot immediately shut down the engine, turned off the fuel and contacted Gloucester Tower, on 122.9 MHz, who dispatched the Aerodrome Fire Service.

Description of 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 screwjacks, which are connected to each of the landing gear leg operating mechanisms. As the screwjacks 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 down-lock and up-lock microswitches, which isolate the electrical power to the motor when the landing gear legs reach their extended or retracted position. However, the down-lock microswitch is triggered by a plunger connected to the body on the right landing gear screwjack. Operation of this microswitch signifies that this jack has extended by a certain amount but does not directly indicate that the operating mechanisms have moved into their over-centre positions.

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

Engineering investigation

The owner, who was the pilot on the accident flight, reported that the left screwjack failed approximately two thirds of the way along its length; there was also some distortion to the nose and right screwjacks. The part of the jack connected to the landing gear leg had then fallen downwards under gravity preventing the left landing gear leg from fully retracting into the wheel well, thus limiting the damage to the aircraft. On checking the operation of the down-lock microswitch the owner discovered that the microswitch would operate before the landing gear leg operating mechanism had moved into the over-centre position. The owner stated that on this aircraft it was occasionally necessary to remove the seat base in order to adjust the seat belts and it is possible that whilst adjusting the belts he had inadvertently knocked the down-lock microswitch. The owner believes that the accident occurred because the landing gear leg operating mechanism had not moved into the over-centre position and hence the landing load was taken on the screw jack, which subsequently failed during the sharp turns. The initial airframe vibration was believed to have been caused by the retracted nose wheel transferring engine vibration into the airframe, which only occurred when the landing gear was retracted and full right rudder applied.

Action by manufacturer and UK agent

The UK agent stated that neither they nor the manufacturer were aware of any instances of the landing gear collapsing, or the microswitches being knocked out of adjustment. However, the UK agent did confirm that the microswitch is very sensitive and that 1 mm movement of the microswitch could make the difference between the landing gear being locked and not locked down.

Following the accident, the UK agent wrote to all the owners in the UK, warning them of the potential problem and reminding them of the importance of adhering to the instructions in the maintenance manual. On 14 March 2006 the manufacturer issued Service Letter 2006/02, which introduced a transparent guard to prevent the landing gear microswitches from being accidentally knocked out of adjustment. The manufacturer is also working on a second modification to introduce additional microswitches that will only allow the landing gear cockpit warning light to illuminate once all the landing gear leg mechanisms have moved to the over-centre position. The PFA has been in discussion with both the UK agent and the aircraft manufacturer and intends to classify these upgrades as PFA mandatory modifications.

Comment

The accident appears to have been caused by the down-lock microswitch being out of adjustment, with the result that the left landing leg operating mechanism did not move into the over-centre position. It is possible that the sharp turns played no part in the failure of the screwjack and collapse of the landing gear leg. However, manoeuvring aircraft on the ground at relatively high speeds can place high loads on the landing gear and should, therefore, be avoided whenever possible.

The introduction of the modifications should increase the robustness of the system and provide the pilot with a positive indication that the landing gear is down and locked.