

ACCIDENT

Aircraft Type and Registration:	Piper PA-28-181 Cherokee Archer II, G-BVOA	
No & Type of Engines:	1 Lycoming O-360-A4M piston engine	
Year of Manufacture:	1979	
Date & Time (UTC):	31 July 2007 at 1302 hrs	
Location:	Rochester Airport, Kent	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 2
Injuries:	Crew - 1 (Minor)	Passengers - 2 (Minor)
Nature of Damage:	Right wing detached, damage to forward fuselage and left wing	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	71 years	
Commander's Flying Experience:	262 hours (of which 74 were on type) Last 90 days - 3 hours Last 28 days - 0.5 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

The pilot had intended to carry out a local VFR flight from Rochester. During the takeoff run, vibration was experienced, which stopped when the nosewheel lifted clear of the ground. After takeoff, the stall warning sounded and the aircraft's wing was then seen to drop, recover, and then drop again, after which the aircraft landed back on the grass runway. Heavy vibration was again experienced and the pilot became concerned that the aircraft would 'nose over' and so modulated his braking. The aircraft failed to stop before leaving the runway and ran down an embankment, coming to rest next to a public road. The occupants received minor injuries.

History of the flight

The pilot had intended to carry out a local VFR flight, with two passengers, from Rochester Airport. The initial phase of the takeoff was uneventful; the pilot checked that the engine was operating at its maximum speed and that all other indications were normal. He reported that he experienced some vibration from the front of the aircraft during the takeoff run, which he attributed to the nose landing gear, as it stopped when the nose of the aircraft was raised. The aircraft lifted off at approximately 55 kt and was beginning to accelerate when the stall warning horn sounded. The pilot reportedly lowered the aircraft's nose and landed back on the runway. Heavy vibration from the nose landing gear caused the pilot to believe that there was

a danger of the aircraft 'nosing over' and, in an attempt to prevent this, he did not continually use maximum braking. The takeoff had been observed by ATC who reported that, after lifting off approximately one third of the way down the runway, the aircraft's right wing dropped, recovered momentarily, and then dropped again; the ATC officer activated the crash alarm. The aircraft ran off the end of the runway, coming to rest in bushes at the bottom of an embankment adjacent to a public road. The right wing detached during the impact sequence and the occupants, who suffered minor injuries, were assisted from the aircraft by the Airport Fire and Rescue Service. There was no fire.

Investigation

An external examination of the engine showed no evidence of any major failure, and the pilot did not report any loss of engine power during the takeoff run. Examination of the aircraft by the organisation which recovered the aircraft back to the airfield found no obvious reason for the vibration thought to have come from the nose landing gear.

A review of the weight and balance calculations completed by the pilot confirmed that the aircraft's Centre of Gravity position was within limits and that it was approximately 170 lb below its maximum takeoff weight. Photographs of the aircraft immediately after the incident, showed that the flaps were set at the Flap 25 position, which corresponded to the setting detailed in the PA-28-181 Pilots Operating Handbook (POH) for

a short or soft field takeoff. The power-off stall speed, at the aircraft's estimated weight in this configuration, would have been approximately 48 kt. The reported weather conditions at Rochester at the time of the accident were a temperature of 23°C with a light and variable wind of 5 kt.

The PA 28 wing is designed to allow the inner sections of the wing to stall before the outer sections, which allows the ailerons to remain effective at the stall. At high power, the propeller slipstream increases the effective airspeed of the inner portion of the wing, allowing it to produce lift below the 'power-off' stall airspeed. However the airspeed at which the sections of wing outside the propeller slipstream stall remain unaltered. Given the reported lift off speed of 55 kt, a variation in either the wind speed or direction immediately after takeoff may have reduced the aircraft's airspeed below its power-off stall speed, causing sections of the wing outside the propeller slipstream to stall.

Conclusions

The reported speed at which the aircraft lifted from the runway, 55 kt, was close to the POH figure of 48 kt for the stall in its takeoff configuration. In the wind conditions, therefore, it is likely that the wing drops seen by ATC resulted from the wing partially stalling. Once back on the runway, the heavy vibration experienced by the pilot led him to moderate his braking effort, and this may have prevented the aircraft from stopping before the end of the runway.