ACCIDENT

Aircraft Type and Registration:	PZL-104 Wilga 80, G-EPZL
No & Type of Engines:	1 Wsk-Pzl Kalisz AI-14RA piston engine
Year of Manufacture:	1980
Date & Time (UTC):	14 June 2008 at 1510 hrs
Location:	Wortham, Suffolk
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 2
Injuries:	Crew - 1 (Minor) Passengers - 2 (Minor)
Nature of Damage:	Aircraft damaged beyond ecomomic repair
Commander's Licence:	Private Pilot's Licence
Commander's Age:	55 years
Commander's Flying Experience:	572 hours (of which 32 were on type) Last 90 days - 19 hours Last 28 days - 8 hours
Information Source:	AAIB Field Investigation

Synopsis

The tailwheel-equipped aircraft overturned on landing following the separation of the lower part of the right main landing gear. The cause of the separation could not be determined.

History of the flight

During the landing the aircraft suddenly pitched forward and became inverted. The rear seat passenger exited the aircraft through the right door, which had opened on impact. The front seat passenger released his seat belt, with assistance from the airfield owner, and also escaped via the right door. The pilot was initially trapped by the structure of the aircraft and was unable to move until helpers lifted the aircraft sufficiently to allow him to crawl out through the right door.

Subsequent examination revealed that the trailing arm of the right landing gear leg had detached during the landing; the upper part of the leg had then dug into the ground, causing the aircraft to pitch forward and become inverted.

Landing gear description

The aircraft type has a tailwheel landing gear. Each main gear comprises a fixed upper leg, to which is attached a pivoting trailing arm carrying the wheel and brake unit. The trailing arm is attached to the upper leg by a spindle with a bearing at its outer end. The spindle locates into the bore of a lateral cylinder attached to the bottom of the upper leg and is retained by a small

diameter bolt and two small welds. The trailing arm is free to pivot about the bearing.

A separate shock absorber strut is attached to the trailing arm and the upper leg. The axis of the shock absorber is not exactly perpendicular to the trailing arm pivot axis, such that compression of the strut results in an axial load component on the bearing and spindle.

Examination

It was evident that the retaining bolt and welds had failed, allowing the spindle to migrate outboard until it and the trailing arm separated from the upper leg. The failure of attachment of the spindle within the cylinder appeared, on first sight, to be consistent with a seizure of the bearing of the trailing arm. However, on dismantling the assembly, adequate lubrication was present and the bearing rotated freely.

The two fracture faces of the sheared retaining bolt had contacted each other following bolt failure, causing smearing of the fracture surfaces that obscured evidence of any pre-existing defect that might have been present. The inner surface of the cylinder and the matching surface of the spindle were corroded, but the small amount of corrosion present was not significant. Closer examination of the welds revealed considerable corrosion of their fracture faces. As this had occurred after weld failure, evidence of any failure mode that might have been present was obscured. The spindle was deformed close to its inboard end in a manner consistent with it having been subjected to diametrically-applied loading as it migrated outboard following the failure of the retaining bolt and welds.

Discussion

The evidence was consistent with the trailing arm assembly becoming detached from the upper leg by displacement of the spindle in an outboard direction. Before relative displacement between spindle and cylinder can occur, the retaining bolt and two welds must fail. To create failure loads in these elements requires either rotational or axial loading of the spindle in the cylinder. The former can only be transmitted by the trailing arm as a result of rotational seizure, but no evidence of this was found.

As the shock absorber axis is not perpendicular to the pivot axis of the trailing arm, shock absorber compression loads will generate axial loading in the spindle which must be reacted by the retaining bolt and welds. It may be possible for the loads generated in a heavy landing to produce axial loading in the spindle high enough to fail the retaining bolt and the welds, but it is more likely that the failure was the result of cumulative damage occurring over a number of landings.