ACCIDENT

Aircraft Type and Registration:	Piper PA-28R-200 Cherokee Arrow II, G-AXCA
No & Type of Engines:	1 Lycoming IO-360-C1C piston engine
Year of Manufacture:	1969
Date & Time (UTC):	4 October 2008 at 1215 hrs
Location:	North Weald Airfield, Essex
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Damage to nose leg, cowling and propeller
Commander's Licence:	Private Pilot's Licence
Commander's Age:	43 years
Commander's Flying Experience:	649 hours (of which 178 were on type) Last 90 days - 2 hours Last 28 days - 1 hour
Information Source:	Aircraft Accident Report Form submitted by the pilot and engineering investigation conducted by the repair agency

Synopsis

On landing the aircraft's nose gear collapsed. The pilot reports he had confirmed three green lights during gear extension and no gear unsafe warnings had been observed prior to touchdown. No failure of the gear could be identified by the repair agency after the incident.

History of the flight

The pilot was conducting a short flight from Southend Airport to North Weald airfield. The weather was fine, but with a wind of 18 kt from the southwest. The aircraft joined the circuit on the downwind leg and the pilot reported that he carried out his usual landing checks including lowering the gear and checking for three green lights to indicate the legs were down and locked. He had experienced turbulence throughout the flight, but it became quite severe during the base leg of the circuit, to the extent that he hit his head on the roof of the aircraft. The pilot then continued to final approach and executed what he recalled as being "an exceptionally good landing" on the main gear, whilst maintaining a nose-up attitude with power and aft elevator. Shortly after the nosewheel contacted the runway the nose landing gear leg collapsed, bringing the propeller and front cowling into contact with the ground and slowing the aircraft quickly to a halt. The pilot then shut down the aircraft and exited normally. When the nose of the aircraft was

lifted during the recovery process, the nose gear leg extended without assistance.

Engineering examination

The aircraft was removed from the airfield and sent to a local repair agency. They reported that no failure could be identified on the gear or its retraction/extension system. A small amount of hydraulic fluid was found to be bypassing the hydraulic piston which actuates the gear up or down. This may have affected the time taken for the gear to extend and lock, but should not have prevented it from happening. The piston was replaced as a precaution. The three green landing gear indication lights were confirmed to be operating, though it had not been identified in the course of the repair work whether these or the gear red and amber warning lights were functioning correctly through a full retraction and extension cycle.

Nose gear description

The nose gear leg is hydraulically moved by a piston attached to an over-centre hinge. When fully extended this prevents the gear from retracting, until the piston is operated backwards again to the retracted position. A downlock hook also retains the gear in the down and locked position. The leg is braced by a drag strut which, when fully extended, prevents the nose leg from collapsing backwards when weight is applied. The gear is protected from inadvertent retraction on the ground by a 'squat' switch which isolates the hydraulic pump until the main gear leg is fully extended. In the cockpit there are three green lights which illuminate when the gear down limit microswitches are 'made'. There is an amber GEAR IN TRANS light and a red WARN GEAR UP light which illuminates when the engine manifold pressure drops below 14 in Hg and the gear is not in the down and locked position. There is also an associated configuration warning horn which sounds when the WARN GEAR UP light is illuminated.

Discussion

The pilot reported that he had observed three green lights when extending the gear on the downwind leg, but could not be certain that they were still illuminated on final approach. The down position microswitches, if correctly rigged, should not illuminate the green gear lights until the gear is down and locked. Once down and locked, the failsafe design of the nose gear should prevent it unlocking prior to a retraction command. Had the nose gear switch not 'made', a variety of warnings should have been seen and heard before the aircraft finally landed, which the pilot reports he did not experience during the accident.

Given the reported lack of a confirmed failure within the gear itself and the mechanical features which prevent the nose gear collapsing after it has locked, it is probable that the nose gear was not fully locked in the down position prior to the aircraft touching down on the runway. This may have been related to the minor fault identified in the hydraulic piston, although the severe turbulence experienced cannot be ruled out as a contributory factor. It could also have been associated with a late selection of the landing gear.

It is conceivable that the down limit microswitch on the nose gear may have been out of alignment, resulting in contact being made before the nose leg was fully extended. If the main gear switches had also 'made' at this point, then the hydraulic pump would have shut off, all three green gear lights would have illuminated and the gear unsafe warnings not activated, despite the nose leg not reaching its locked position. The repair agency has not, however reported finding any evidence of a misalignment of the microswitch during their repair work on the aircraft.