

AAIB Bulletin No: 9/95

Ref: EW/G95/05/19

Category: 1.3

Aircraft Type and Registration: Piper PA-28-161 Cherokee Warrior II, G-BOKK

No & Type of Engines: 1 Lycoming O-320-D3G piston engine

Year of Manufacture: 1981

Date & Time (UTC): 18 May 1995 at 1600 hrs

Location: Ham Green, Redditch, Worcestershire

Type of Flight: Private (Training)

Persons on Board: Crew - 1 Passengers - 1

Injuries: Crew - Minor Passengers - Minor

Nature of Damage: Both wings detached, engine, propeller and landing gear damaged

Commander's Licence: Commercial Pilot's Licence

Commander's Age: 24 years

Commander's Flying Experience: Approx 1,630 hours (of which 100 were on type)
Last 90 days - 142 hours
Last 28 days - 45 hours

Information Source: Aircraft Accident Report Form submitted by the pilot and examination of the engine by the AAIB

The aircraft, with a flying instructor and student on board, was engaged on a navigation training flight from Wellesbourne Mountford Airfield to overhead Kidderminster and Worcester before returning to Wellesbourne. The aircraft had just passed south abeam the town of Redditch when the engine began to run roughly with severe vibration. This condition continued, but with the engine producing sufficient power to maintain flight, whilst the crew attempted to understand and rectify the problem. The instructor informed Birmingham Air Traffic, with whom he was maintaining a radar service, of the urgent nature of their problem and requested a direct track back to Wellesbourne Mountford Airfield. A short time later, the engine began to lose power and, after advising Birmingham of his position, height and intention to shut down the engine, the instructor carried out a forced landing into the most suitable field available. During the landing run, however, the aircraft slid through a hedgerow within which fence posts were embedded and the aircraft was seriously damaged. The occupants, who suffered only minor injuries, carried out shutdown drills and evacuated the aircraft unaided. The local police constable, who was in the area at the time, promptly took charge of the scene.

Subsequent examination of the engine quickly revealed that the No 3 cylinder had detached from the engine, and was lying inside the engine cowling. The detachment had precipitated a failure of the piston across the piston pin holes, the piston itself being found wedged within the cylinder. The cylinder's mounting flange was intact. Close inspection of the mounting pad area on the engine crankcase revealed that four of the eight cylinder attachment studs had failed, at or below the pad surface, whilst the remaining four had not. The associated stud fractures exhibited characteristics consistent with fatigue. The threads on the protruding intact studs were relatively undamaged. Severe abrasion damage was present on the cooling fins of the adjacent faces of No 1 and No 3 cylinders, leaving little doubt that these cylinders had been rubbing against each other for a period of time. The detailed nature of this damage indicated that the No 3 cylinder had 'canted' forward against the securely attached No 1 cylinder. The evidence indicated that either the stud nuts had not been fitted or that they had become loose in service, allowing abnormal loading to be experienced by the remaining studs.

The maintenance records for the engine indicated that it had run 1,170 hours since being overhauled, but that new cylinders had been fitted 608 hours before the accident. The most recent check on the engine was a 150 hours inspection carried out on 1 April 1995.