

# Piper PA-28-140 Cherokee, G-AXJV, 2 March 1996

**AAIB Bulletin No: 6/96 Ref: EW/G96/03/01 Category: 1.3**

**Aircraft Type and Registration:**Piper PA-28-140 Cherokee, G-AXJV

**No & Type of Engines:**1 Lycoming O-320-E2A piston engine

**Year of Manufacture:**1969

**Date & Time (UTC):**2 March 1996 at 1930 hrs

**Location:**RAF Mona, Gwynedd, Wales

**Type of Flight:**Private

**Persons on Board:**Crew - 2 Passengers - 1

**Injuries:**Crew - None Passengers - None

**Nature of Damage:**Engine severely disrupted, very minor damage to the airframe

**Commander's Licence:**Basic Commercial Pilot's Licence with IMC and Night Ratings

**Commander's Age:**29 years

**Commander's Flying Experience:**661 hours (of which 299 were on type)

Last 90 days - 32 hours

Last 28 days - 20 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot, detailed metallurgical examination and inquiries with the engine manufacturer

The aircraft crew were conducting night flying circuit training. On the base leg of the second circuit the instructor reduced engine power and the engine then began to run very roughly. Carburettor heat was applied but the engine continued to run very roughly for a further 5 seconds before sparks/flames were seen coming from the left side of the aircraft's nose, near the propeller spinner. The throttle and mixture levers were closed and the sparks/flames stopped after a further 2 seconds as the propeller stopped in the vertical position. At this time the aircraft was at approximately 700 feet agl with an airspeed of about 80kt. The instructor retracted the flap to 0° in an attempt to extend the glide in order to reach the runway. When he realised that the distance was too great to reach the runway he transmitted a Mayday call twice on the airfield's frequency. The airspeed was reduced to 70 kt but the pilot decided not to lower the nose as he could not see the ground and wanted to protect the nose gear when the aircraft landed. The descent continued for a further 15 to 20 seconds before the pilot saw a green blur ahead of the starboard wing which was almost immediately

followed by a soft touchdown in a slightly nose up attitude in the field that was just outside the airfield boundary. During the ground roll then on handling pilot, who was operating the brakes shouted 'fence' and the handling pilot managed to steer the aircraft towards a gap in the fence that was to the right of the aircraft. When the aircraft came to a halt the aircraft systems were switched off and the crew and passenger successfully evacuated. After ensuring that everyone was safe and clear of the aircraft and that there was no indication of fuel leaking the handling pilot returned to the aircraft and radioed the airfield that they had landed safely and that they would be walking back to the airfield. Later examination of the aircraft revealed that the No.1 cylinder had become detached from the engine and that the engine crankcase was severely broken-up.

The engine was removed from the aircraft and shipped to AAIB for a detailed examination. After a thorough metallurgical examination of all the engine pieces recovered and a number of detailed inquiries with the engine's manufacturers it was concluded that the initiation of the engine failure was due to a strap separation across the little end of the No.1 piston connecting rod. The fracture mechanism which caused this separation could not be positively identified due to the fact that the majority of the material from this area was not recovered, but it is considered that it was most probably fatigue. It is considered probable that a metallurgical discontinuity in the connecting rod material or a fault introduced during manufacture may have been responsible for the initiation of a fatigue fracture in the little end. No other similar connecting rod fractures have been reported or are known to the engine's manufacturer. It was noted during the engine strip examination that there were extremely heavy deposits of fine metal debris from the connecting rod little end within the oil sump and canister oil filter and that the condition of all the bearing and wear surfaces were extremely good considering the engine's high hours.

In September 1995, approximately 31 engine hours before the accident the following entry was made in the aircraft's Technical Log; 'Metallic rattling sound on ground from engine cowl/exhaust area (engine running) (seems to be right side)'. During a 50 hour maintenance check by an approved maintenance organisation in November 1995, approximately 27 hours before the accident the Technical Log entry was signed off by an engineer with the following rectification detail; 'Noise consistent with piston wear. Noise due to high engine hours. No other faults found otherwise satisfactory'. The metallic rattling sound continued to be noticed by pilots up to and including the accident flight. The engine log book showed that the engine was fitted to the aircraft in 1988 and at the time of the accident it had achieved about 1924 hours since overhaul. The engine was manufactured in 1965 but no record could be found of its history prior to being fitted to this aircraft.