

No: 6/84

Ref: EW/G84/04/03

Aircraft type and registration: Bell 47H G-AZYB (light single-engined helicopter)

Year of manufacture: 1956

Date and time (GMT): 21 April 1984 at 1040 hrs

Location: St Mary Bourne, New Andover

Type of flight: Private – pleasure

Persons on board: Crew – 1 Passengers – Nil

Injuries: Crew – Nil Passengers – N/A

Nature of damage: Severe damage to main and tail rotors. Main rotor struck tail boom. Undercarriage distorted

Commander's Licence: Private Pilot's Licence (helicopter and fixed wing)

Commander's Age: 49 years

Commander's total flying experience: 322 hours 281 Fixed Wing
41 Helicopter (on type)

Whilst in cruising flight between Fairoaks and Thrupton, at a height of about 1,000 ft, the pilot heard a rough mechanical noise behind him. He immediately elected to make a precautionary landing, and shortly after initiating the descent the engine stopped completely.

The pilot continued an autorotative descent, transmitted a 'Mayday' call to Thrupton and was obliged to turn downwind to avoid woods and power lines. The landing was heavy and the main rotor struck the tail boom, slewing the aircraft 90°.

Initial examination of the engine (Franklin 6V4200-C32) revealed that the stem of the exhaust valve in No 2 (lower left) cylinder had failed and the valve head had subsequently damaged the piston very severely.

Further investigation revealed that the end of the valve guide nearer the valve head had broken up and fallen away leaving the guide shortened by about 1 inch (40%). The remaining portion of the guide was very heavily worn allowing considerable lateral freedom to the valve. Examination of the valve stem fracture revealed fatigue failure of the stem.

It would appear that the foreshortening of the valve guide gave rise to rapid radial wear in the guide bore. This would subsequently permit eccentric seating of the valve which would induce bending loads in the valve stem leading to fatigue damage.

The fracture face on the broken valve guide was too badly damaged by the effects of exhaust gas over a considerable length of time to be able to determine its cause of failure.