

## Robinson R22, G-OTYA

**AAIB Bulletin No:** 10/98      **Ref:** EW/G98/06/14      **Category:** 2.3

**Aircraft Type and Registration:** Robinson R22, G-OTYA

**No & Type of Engines:** 1 Lycoming O-320-B2C piston engine

**Year of Manufacture:** 1989

**Date & Time (UTC):** 12 June 1998 at 1830 hrs

**Location:** Field near Luton, Bedfordshire

**Type of Flight:** Private

**Persons on Board:** Crew - 1 - Passengers - None

**Injuries:** Crew - None - Passengers - N/K

**Nature of Damage:** Substantial

**Commander's Licence:** Private Pilot's Licence (Helicopters)

**Commander's Age:** 53 years

**Commander's Flying Experience:** 256 hours (of which 226 were on type)  
Last 90 days - 28 hours  
Last 28 days - 10 hours

**Information Source:** Aircraft Accident Report Form submitted by the pilot

The pilot reported that during normal cruise flight he noticed that the fuel quantity gauges indicated a very low fuel quantity in the aircraft auxiliary fuel tank, but the aircraft main fuel tank indication remained at or nearly full. Two or three minutes later, when the auxiliary fuel tank reached empty, the engine misfired and then stopped. Following autorotation and a heavy landing the pilot removed the fuel filler caps and heard a 'whooshing' intake of air to the main fuel tank. The auxiliary tank appeared to contain minimum fuel, whereas there was a significant quantity of fuel remaining in the main tank.

An inspection carried out the next day by an experienced R22 engineer revealed that the main fuel (left hand) tank vent was closed by a kink in the plastic pipe. The aircraft was not fitted with an intertank vent. The fuel tank vent system had been upgraded to its present state by the UK agent, using kit K1-118-2, during an annual inspection which was completed on 2 June 1998.

The UK agent has stated that the vent was installed with good smooth radii at the interface between the rigid tubes; there was no evidence of kinking and there was no contact with the control rods. It would appear that, following correct installation, the left hand plastic pipe kinked as a result of heat, or for some other reason. A check by the UK Agent on other aircraft, including new or overhauled ones, show that a constant cross sectional diameter is not retained in the plastic vent pipes in this area. (See report of accident to G-OSEE in this bulletin).

The original standard of fuel vent pipes for R22s fitted with both main and auxiliary fuel tanks consisted of two vertical aluminium pipes connected to each tank by short (3 ins and 2.25 ins) lengths of plastic tubing. This arrangement proved to be unsatisfactory, and SB-83 introduced revised aluminium pipes connected to the tanks by longer (9 ins and 6.75 ins) plastic tubes. The service bulletin documentation did not give a clear indication of which tube length was to be fitted to which tank. A further change introduced another plastic tube connecting the vent systems of the two tanks, this allowed either tank to vent through the other tank; this modification was not fitted to either G-OTYA or G-OSEE.

All three vent systems described above used single walled general purpose plastic tubing. The tubing had little resistance to kinking and was easily softened by the heat encountered in its location between the fuel tanks and above the engine heat shield.

At the end of July 1998 the UK agent made a recommendation to the manufacturer that he carry out an engineering review of the fuel tank vent system, with particular consideration being given to the choice of material for the flexible hoses, the introduction of vented fuel filler caps and the addition of a Flight Manual warning, describing the actions to be taken in the event of unbalanced fuel consumption between the two tanks.

### **Safety recommendation**

**98-57** Loss of engine power on Robinson Helicopters has on previous occasions resulted in a loss of rotor RPM with catastrophic consequences. It is therefore recommended that:-

The Federal Aviation Administration should monitor the manufacturers response to the UK agents proposals and ensure that Robinson helicopter fuel tank vent systems are modified to ensure adequate tank venting under all operational circumstances.