

Aircraft type and registration: Bell 47G—5 G-BGIV (Light single engined helicopter)

Year of manufacture: 1969

Date and time (GMT): 26 June 1984 at approximately 1050 hrs

Location: Tilney All Saints, near Kings Lynn

Type of flight: Aerial application

Persons on board: Crew — 1 Passengers — Nil

Injuries: Crew — Nil Passengers — N/A

Nature of damage: Main and tail rotors destroyed; substantial damage to canopy, skids, tail assembly and spraying rig.

Commander's Licence: Air Transport Pilot's Licence (Helicopters)

Commander's Age: 36 years

Commander's total flying experience: 2770 hours (of which 650 were on type)

Information Source: AIB Field Investigation

The aircraft was engaged on spraying crops west of Kings Lynn. The spray compound in use was Patafol, a potato fungicide. At approximately 0945 hrs the aircraft was refuelled with rotors turning until the cockpit fuel gauge read between 30 and 40 gallons, which the pilot considered to be sufficient for at least 1½ hours flying. The aircraft then flew for about an hour, during which time the pilot landed four times to refill the tanks with spray compound. During the fourth refill, at approximately 1040 hrs, he noted that the cockpit fuel gauge read just below the 14 gallons graduation mark. He only had two more runs, requiring about 2 minutes flying time, to complete the field he was working on, and so he decided to complete this field before flying to the refuelling rig some 3 miles away.

He completed one run along the field, turned for the second run and, as he was descending to spray height, the aircraft began to vibrate severely. At this stage the aircraft was about 30 feet above the ground. The pilot noted that engine and rotor rpm appeared to be normal and decided to land straight ahead. The vibration became more severe and, at about 6 feet above the ground, despite application of full right pedal, the aircraft yawed to the left. It landed heavily in a tail down attitude and the main rotor struck the tail, separating the tail rotor assembly at the base of the pylon. After the accident the carburettor float chamber was found to be empty. The fuel tanks held a total of only 3 pints of fuel but no fuel leak was apparent. When electrical power was switched on, the cockpit fuel gauge read approximately 6 gallons.

The aircraft was recovered to its maintenance base for further examination. No fault was found other than the error in the fuel gauging system. This system consisted of a potentiometer float sender unit in each tank and a single ratiometer type gauge unit. Two gallons of fuel were put into the aircraft's tanks and the gauge was found to read 10 gallons. This reading did not change when the tanks were drained. A gauge from a similar helicopter was then substituted and found to read 5 to 6 gallons with the tanks empty. The sender units were checked and found to have zero ohms resistance on their bottom limit of movement, which should have given a gauge reading of zero.

The fuel gauge was then subjected to the manufacturer's test schedule and found to read high throughout its range. In particular, for zero ohms resistance, when the gauge should have read zero with no tolerance permitted, the gauge actually read 3 to 4 gallons. Although outside tolerance, the gauge was not defective and was capable of adjustment to within specified tolerance.

The maintenance organisation had certified that the aircraft fuel gauging system had been checked on the aircraft's annual inspection one month and 95 flying hours prior to the accident, when the gauge had been found to read zero with two gallons of fuel in the tanks. However, as tested, the gauge could never read less than 3 to 4 gallons with electrical power applied. No explanation could be offered to explain how the instrument settings had drifted away from calibration values.

In the last two years in the UK, there have been 8 reported accidents and occurrences when light helicopters have run out of fuel in the air.