No: 4/89 **Ref: EW/C1097** **Category: 1b**

Aircraft Type and Registration:	de Havilland 89A Rapide, G-AJHO	
No & Type of Engines:	2 DH Gipsy Queen 3 piston engines	
Year of Manufacture:	1944	
Date and Time (UTC):	5 February 1989 at 1108 hrs	
Location:	near Kidlington aerodrome, Oxford	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Aircraft destroyed	
Commander's Licence:	Private Pilot's Licence with IMC, and Instructor ratings	
Commander's Age:	46 years	
Commander's Total Flying Experience:	3136 hours (of which 68 were on type)	
Information Source:	AAIB Field Investigation	

At about 1100 hrs the aircraft was taxied out for a VFR departure from Kidlington aerodrome to Shoreham airport. The pilot reports that he carried out the normal pre-flight and engine power checks before taking off from runway 20 at 1104 hrs. All parameters were normal and both engines were delivering take off power during the climb to 1500 feet agl, where the aircraft was levelled and power symmetrically reduced to 2000 rpm. About one minute later the right side engine failed and the pilot informed the Kidlington Aerodrome Flight Information Service (AFIS) controller of the failure, and that it was his intention to return and land. After initiating a left turn back towards the aerodrome, he glanced out to the right and saw that the lower right wing, just outboard of the engine, was on fire. Very soon afterwards he heard a sharp cracking noise and observed both right side wings move upwards, with the upper wing bowing upwards in the centre.

Realising that it was now important to get the aircraft onto the ground as soon as possible the pilot selected the nearest suitable field for a forced landing. By this time the aircraft's airspeed indicator had also failed - the pitot pressure source was situated on the right side outer wing strut - and the approach was flown rather faster than he would have wished. However the aircraft was successfully landed in a cultivated field. Unfortunately as the aircraft decelerated, the wheels sunk into the soft surface eventually to an extent that the aircraft nosed over onto its back. By this time the right side wing was almost completely enveloped in flames and the pilot abandoned the aircraft by crawling rearwards

along the fuselage and exiting through the main left side door. The aircraft had been equipped with full upper torso restraint harness which held throughout the accident sequence and the pilot escaped uninjured. A Thames Valley Police helicopter arrived at the accident site within 4 minutes of the accident, and transferred the pilot back to Kidlington aerodrome.

The airframe was destroyed almost totally in the ground fire following the forced landing. The right side engine was also extensively fire damaged to the extent that it was possible to examine the crankshaft and some of the main bearing shells without dismantling the engine. Many aluminium alloy parts including the two rearmost connecting rods, both carburettors and much of the crankcase, had melted away. The ground fire had not been hot enough to consume steel parts. Some fuel was drained from the remains of the tank feeding the left side engine, this was confirmed as AVGAS 100LL.

Further examination of the right side engine and the remains of pipework found in the ashes showed that that the initial failure was the number four cylinder head gasket. This allowed the release of hot cylinder gases in an area close to the carburettors and fuel interconnection pipe. The type of fuel pipe fitted to the aircraft was made of rubber with an internal steel braid. Deterioration of the rubber due to the escaping cylinder gases allowed fuel to escape and cause an intense fuel fire which was sufficiently hot to locally melt the steel cylinder fins and the steel braid on the hose. A hole 3/8in diameter was eventually made in the steel braid and this allowed large quantities of burning fuel to escape and run back from the engine cowling on to the lower wing, causing the fire to spread very rapidly.

The number 4 cylinder, head and gasket had been fitted less than 10 hours previously, in August 1988, due to another, earlier, head gasket failure at this position. There is no evidence of any error or defect when this work was carried out. Amongst other checks, the area of the number four cylinder was visually inspected shortly before the flight on which the accident occurred, with this earlier rectification work in mind. No defect was noted at that time. Failures of this type of copper/asbestos gasket are fairly common.

The CAA are introducing a modification on all four and six cylinder Gypsy engines to replace the fuel pipes with fire resistant pipes of a standard shortly to be determined. The supply of original pipes for this application will be phased out.