Jodel D112, G-BCOG

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Aircraft Type and Registration:	Jodel D112, G-BCOG
No & Type of Engines:	1 Continental A65-8F piston engine
Year of Manufacture:	1960
Date & Time (UTC):	26 July 1998 at 1638 hrs
Location:	Bentworth, Hampshire
Type of Flight:	Private
Persons on Board:	Crew - 1 - Passengers - 1
Injuries:	Crew - 1 (Fatal) - Passengers - 1 (Fatal)
Nature of Damage:	Aircraft destroyed
Commander's Licence:	Private Pilot's Licence
Commander's Age:	44 years
Commander's Flying Experience:	388 hours (of which 126 were on type) Last 90 days - 42 hours Last 28 days - 17 hours
Information Source:	AAIB Field Investigation

The pilot had arranged to fly the Jodel to Epinal (France) for a weekend fly-in meeting which was open to all types of homebuilt and privately owned aircraft. His passenger for the journey did not hold a pilot's licence. The pilot had arranged to travel in company with another aircraft, registration G-BXCA.

During the morning of 24 July, the Jodel was flown from its base at Bourne Park, near Andover, to Popham Airfield (a flight of some 15 minutes) to meet with the pilot of the other aircraft. No refuelling of G-BCOG took place at Popham. Both aircraft then departed for Le Touquet Airport, France.

Throughout the weekend, G-BCOG was the lead aircraft of the pair. Both aircraft were equipped with hand held, battery powered Global Positioning System Receivers (GPS), giving current position information and available for the performance of advanced navigation calculations.

A rudimentary paper based flight plan was recovered from the wreckage of G-BCOG. This had been prepared for the outbound flights to Epinal only. No paper flight planning documentation was recovered for the return flight routing. The Jodel was refuelled with 35 litres of fuel at Le Touquet, after a flight of some 1 hour 35 minutes from Popham. Based on total flight time and the assumption that the aircraft was full of fuel prior to departing from Bourne Park, the fuel consumption on these two sectors averaged 19.1 litres per hour.

In order to confirm the average fuel consumption for the aircraft, two previous long flights undertaken in G-BCOG were analysed. These produced average fuel consumption figures of 19.4 and 20.6 litres per hour respectively.

After leaving Le Touquet, the aircraft then flew to Soissons airfield, a flight time of approximately 75 minutes, with no refuelling taking place there. They then continued to Brienne-le-Chateau, where G-BCOG uplifted 40 litres of fuel after a flight time of about 55 minutes. This gave an average fuel consumption of 18.5 litres per hour since the previous refuelling.

The flight then continued to Epinal, about one hour flying time, where the aircraft remained until the morning of Sunday 26 July. No refuelling took place at Epinal.

On the day of the accident, the first flight was from Epinal to Brienne-le-Chateau, which took G-BCOG about 65 minutes to complete. Forty litres of fuel were uplifted there, giving an average consumption of 19.2 litres per hour since the previous refuelling.

The aircraft then flew to Abbeville, near the northern coast of France, which took around two hours flying time. At Abbeville, only 25 litres of fuel were uplifted, a quantity which, given the average fuel consumption calculated so far, would not have been sufficient to fill the fuel tank. It is estimated that the aircraft departed from Abbeville for Lydd (Kent) with a maximum of 45 litres on board (or about three quarters of a full tank, which held 60 litres).

The aircraft arrived at Lydd at 1451 hours, with G-BXCA landing some two minutes later. The flight time from Abbeville was about one hour. No refuelling took place at Lydd. It is estimated that G-BCOG left Lydd with a maximum of 25 litres of fuel on board.

Departure from Lydd was at 1537 hours. The intention was that G-BCOG would route to its base at Bourne Park, while G-BXCA routed to its base at Popham. The initial routings were the same. G-BXCA took off about one minute after G-BCOG and, unusually for this trip, took over as lead aircraft for the loose formation. Post flight analysis from the GPS of G-BXCA showed that it had achieved an average groundspeed of 75 kt, which is consistent with the normal cruise speed of the aircraft in the ambient wind conditions for the route. The GPS from G-BCOG was severely disrupted in the impact and it proved impossible to retrieve any data from the unit.

When passing to the south west of Oakhanger, around 1633 hours, the Jodel flew ahead of G-BXCA and turned right towards the west of Alton. As G-BXCA passed over the A31 road between Four Marks and Alton at 2,000 feet cruise altitude, the Jodel turned away to the right and commenced a slow descent, turning to take it on a track to the east of Lasham Airfield. The two aircraft had been in radio contact on a discrete frequency during the flight. The last of these transmissions from G-BCOG was just before it left the formation, but this transmission gave no apparent indication of any problem at that time.

Just before 1638 hours, a Mayday call was transmitted from G-BCOG on the Distress frequency 121.5 MHz. The Distress and Diversion Controller at the London Air Traffic Control Centre at West Drayton heard this. The call indicated that the aircraft had an engine failure, that it was about two miles south of Lasham and trying to put down in a field. The controller responded that he was scrambling the Search and Rescue helicopter, which was acknowledged by the pilot. No further transmissions were heard from the aircraft.

Eyewitnesses at Heathcroft Farm, Bentworth, saw the aircraft, with the propeller windmilling only slowly, gliding in a north westerly direction over the farm towards an adjacent crop field. The aircraft was seen to begin a turn to the right, steadily turning through about 45 ° initially, but then the bank angle increased rapidly and the nose dropped towards the ground. The aircraft made about one complete rotation to the right and impacted the ground in a steep nose down attitude.

There was no fire. Both occupants were wearing lap and shoulder harnesses but sustained immediately fatal impact injuries. Eyewitnesses did not notice a strong smell of fuel on arrival at the accident site.

The Mayday call occurred one hour after take off from Lydd. At that time, based upon the fuel calculations detailed earlier, it is estimated that the aircraft would have had no more than 5 litres of fuel on board, assuming that it had been absolutely full to 60 litres capacity on leaving Brienne-le-Chateau earlier that afternoon.

An aftercast was obtained from the Met Office headquarters, Bracknell. This indicated that at the time of the accident, there was a light southerly airstream over southern England, with no significant prevailing weather. The visibility was good at more than 30 km. The lowest cloud base was above 8,000 feet. The surface wind was from 190° at 10 kt, temperature +19°C, dew point +7°C. At 2,000 feet, the wind was from 240° at 15 kt, temperature +14°C, dew point +7°C. The mean sea level pressure was 1012 mb.

From a probability chart of carburettor icing, given the ambient conditions, there was a moderate risk of carburettor icing at cruise power and a serious risk at descent power settings. The aircraft was equipped with a carburettor heat control to remove any icing that may have been experienced in the carburettor. The pilot's notes produced for G-BCOG indicated that the engine was prone to carburettor icing, especially on the ground.

Calculations showed that the aircraft had been operating within its normal range of weight and centre of gravity limitations during this series of flights.

The pilot held a current Class III medical certificate appropriate to his pilot's licence and there were no indications that incapacitation, drugs or alcohol played any part in this accident.

The aircraft had a valid Permit-to-Fly, issued by the Popular Flying Association, which had been renewed on 23 July 1998. During a test flight after its most recent maintenance inspection on 14 July, the pilot recorded that the aircraft exhibited natural buffet at the onset of at stall at 33 kt, with the stall occurring at 30 kt.

From the eyewitness evidence and inspection of the wreckage at the accident site, it would appear that while the aircraft was gliding towards a forced landing location, it suffered a reduction in airspeed towards the stalling speed, to such an extent that it departed from controlled flight into an incipient spin with insufficient altitude in which to recover.

Wreckage examination

The aircraft impacted the ground at relatively low speed but in a steep nose down attitude, banked slightly to the left and with some sideslip to the left at the time of impact, consistent with the aircraft being in an incipient spin or the early phase of recovery from a spin. It was not possible to establish at what height control of the aircraft was lost, but the impact parameters suggest a height of at least 200 feet.

Both seats were fitted with lap and diagonal *inertia* type seat harnesses. Each of the harnesses was buckled up, and the webbing and attachment points of each had survived. However, the nature of the impact and the extreme disruption of the cockpit during the accident was such as to render the harnesses ineffective.

Detailed examination of the aircraft at the scene showed that it was intact and complete at the time of impact, and there was no evidence of any pre-impact defect or failure of the primary structure or flying controls. The elevator trim tab was at a neutral setting. The pattern of impact damage on the propeller was consistent with either a stopped engine, or an engine turning over at very low power at the time of impact.

The magneto ignition switch was selected to BOTH, the fuel selector was in the ON position, and impact damage to both the carburettor heat selector in the cockpit and to the air box on the carburettor showed that carburettor heat was selected to COLD at impact.

There was no discernible smell of fuel upon arrival at the scene, and no fuel residues were present in the fuel tank, consistent with an empty fuel tank at impact. (It is usual for creases and folds in the tank walls, made during the impact, to create pockets which retain residual quantities of any fuel present in the tank.) The fuel quantity indicator was a direct reading type comprising a cork float mounted on the end of a thin brass rod, marked at intervals along its length, which passed vertically into the tank through a short sleeve in the filler cap. Approximately 80 mm (3") had broken from the top of the top end of the rod at some time in the aircraft's past, and the remaining end had been bent at right angles to prevent it from dropping right down into the tank. As a consequence, the *bottom* 25% of float's original travel was unavailable, and the indicator would have ceased to read correctly at fuel levels of 5 litres and less. It is not known whether the owner-pilot had re-bent the rod in this case; or whether he was even aware that it had been done, or that the indicator would provide a false *high* reading at fuel levels below 5 litres. The fuel indicator rod had been heavily deformed during the impact at a position consistent with it being at the *bottom* limit of its travel, ie indicating 5 litres, and with 5 litres or less of fuel actually in the tank at the time of impact.

The flexible fuel hoses connecting the fuel tank to the fuel cock in the cockpit, and the corresponding hose running from the fuel valve to the fuel strainer housing, were intact. When disconnected, they were found to contain only a very small quantity of fuel (approximately 22 cc), which contained a dark coloured solid material in suspension. This material was submitted for examination by fuel system specialists at DERA, who established that it was not consistent with any of the known algae which can sometimes be found in aircraft fuel systems, and it is probable that the material was a general sediment from the fuel tank.

No fuel was recovered from the remaining pipes in the fuel system, or from the carburettor. The pipework was intact but had suffered accident damage which had slightly loosened some of the

pipe connections, potentially allowing fuel to escape, and the water drain may also have been disturbed in the accident, allowing fuel to leak from the strainer bowl. However, no fuel residues were found in the carburettor bowl or the accelerator pump, and it is significant that there was very little scope for leakage or evaporation of fuel from these areas prior to inspection after the accident. The carburettor was dismantled and examined in detail, with no defects being found capable of stopping the engine.

The engine was subject to a limited strip examination, from which it was determined that the principle mechanical components were intact, and that the accessory drives to the magnetos and valve gear functioned normally. All spark plug electrodes were of normal appearance, with no evidence of rich running or of excessive carbon or oiling, and the internal appearance of the exhaust stacks was normal.

The right magneto had suffered only superficial impact damage and functioned satisfactorily when bench tested, producing a healthy spark at all four plug lead outlets. The left magneto suffered impact damage which prevented it from functioning normally when bench tested. After temporary repairs had been effected, and the damaged cover removed, the unit produced a healthy spark; however, heavy electrical tracking was evident between the high tension rotor and the drive gear which could not be attributed entirely to the accident. It is therefore possible that the plugs served by this magneto were producing slightly weaker sparks than normal, but given the good performance of the other magneto it is highly unlikely that this would have resulted in any significant power loss, much less a total stoppage. The magneto switch was tested in its *as found* state and both switch contacts were found to be *open circuit*, ie the correct condition for both magnetos ON. The switch operation was also checked at other positions, and found to be serviceable.