ACCIDENTS INVESTIGATION BRANCH
Department of Trade and Industry

Beagle 206 Series 2 G–AVAM Report on the accident Two miles southwest of Jersey Airport, Channel Isles on 6 August 1970

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11/72	Beagle 206 Series G–AVAM at Jersey Airport, Channel Isles, August 1970	June 1972

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Department of Trade and Industry
Accidents Investigation Branch
Shell Mex House
Strand
London WC2

24 April 1972

The Rt Honourable John Davies MBE MP
Secretary of State for Trade and Industry

Sir

I have the honour to submit the report by Mr N S Head an Inspector of Accidents, on the circumstances of the accident to Beagle 206 Series 2 G–AVAM which occurred two miles southwest of Jersey Airport, Channel Isles on 6 August 1970.

I have the honour to be
Sir
Your obedient Servant

V A M Hunt
Chief Inspector of Accidents

Accidents Investigation Branch

Civil Accident Report No EW/C 354

Aircraft:	Beagle 206 Series 2 G–AVAM
Engines:	Continental GTS10-520-C
Owner and Operator:	Bouley Investments Limited
Pilot:	Mr K W Desmond – Killed
Passengers:	Nil
Place of Accident:	Two miles southwest of Jersey Airport Channel Isles
Date and Time:	6 August 1970 at 1028 hrs.
	All times in this report are GMT.

Summary

During the take-off from Jersey Airport the port engine of the aircraft gave trouble. The pilot shut the engine down, and feathered the propeller but after turning downwind at a height of approximately 250 feet he informed air traffic control that the starboard engine also was losing power. The aircraft lost height to about 50 feet above the ground and then stalled, entered a spin and crashed into the outbuilding of a private house. Examination of the engines revealed no evidence to explain the malfunction of the port engine or a possible power loss from the starboard engine.

It is concluded that after the port engine had failed, adequate flying speed was not maintained. This finally led to loss of control and a stall at a height too low for recovery to be effected.

1. Investigation

1.1 History of the flight

The aircraft left Guernsey on the morning of 6 August 1970 with one passenger and after a normal flight landed at Jersey at 0829 hrs; as the passenger left the aircraft the pilot expressed his intention of returning to Guernsey as soon as possible. However, on checking with the Jersey Meteorological Office the pilot learned that the visibility at Guernsey was very poor so he decided to delay his departure and wait for an improvement. At about 1015 hrs, the pilot learned there had been an improvement in the visibility so he decided to take off immediately. At 1025 hrs he requested taxi clearance and less than two minutes later reported that he was ready for take-off.

The aircraft was airborne from Runway 27 at 1027 hrs and the evidence indicates that the take-off was commenced from the first taxi-way intersection. Almost immediately after it had become airborne the pilot radioed 'Alfa Mike, I'm turning in again I've got an engine go.' During the take-off run, or shortly after it had become airborne, the attention of a number of witnesses on the airport was drawn to the aircraft by the sound of a rough running engine; some saw puffs of black smoke emerging from the port engine. By this time the aircraft had reached a height of approximately 50 feet and the undercarriage was retracted. The aircraft was then seen to yaw and roll slightly to the left, but it recovered and continued climbing away, although less steeply than before.

Shortly after the aircraft had passed the upwind threshold of the runway the port propeller was seen to slow down and finally stop. At this time the aerodrome control officer, who had not heard the original transmission from the aircraft, but had noticed the puffs of smoke, was following the aircraft's progress through binoculars. He transmitted the following message 'Alfa Mike I see you've lost your port engine you're cleared left-hand back to two seven call me on finals the Fox Echo is one zero zero six.' The pilot acknowledged this message, and continued climbing to approximately 250 feet. Just inland of the coastline, about half a mile from the end of the runway, the aircraft then made a turn to the left through about 180° on to the downwind leg. During this turn no further height was gained and towards the end of the turn the aircraft was seen to be slowly losing height. Immediately after completing this turn the aircraft started to turn to the right and at the same time the pilot transmitted 'Alfa Mike I've got the other engine going, I'm going down'.

The aircraft was then seen flying south, losing height fairly rapidly to approximately 50 feet above the ground. During this phase of the flight the port propeller was seen to turn slowly, sometimes jerkily, as if, according to a witness who was a pilot, an attempt was being made to restart the engine; at the same time the starboard engine appeared to be running at very high power and was making a 'screaming noise'. The aircraft flew south for approximately half a mile and according to witnesses, was in a pronounced nose up attitude, rocking laterally and with the tail spasmodically dipping down. It then made a fairly steep turn to the right on to a westerly heading; the port propeller was still seen to rotate jerkily as before and the starboard engine continued to make a loud screaming noise. After flying west for about half a mile the aircraft appeared momentarily to gain about 20 feet in height, the port wing then went down very steeply and the aircraft turned abruptly to the left through about 240° and nose-dived onto the roof of an outbuilding of a private house. A severe fire broke out immediately after impact.

The crash site is approximately half a mile east of the south-western tip of the island and is at an elevation of about 145 feet, ie approximately 130 feet lower than the airport elevation.

1.2 Injuries to persons

Injuries	*Crew*	*Passengers*	*Others*
Fatal	1	–	–
Non-fatal	–	–	–
None	–	–	–

1.3 Damage to aircraft

The aircraft was destroyed by impact and fire.

1.4 Other damage

The brick outhouse of a private dwelling, onto which the aircraft crashed was destroyed.

1.5 Crew information

The pilot, Mr Kenneth Wesley Desmond, aged 48, was the holder of a valid commercial pilot's licence endorsed for Beagle 206 aircraft; he also held an instrument rating. His latest medical check was on 21 July 1970 and his last instrument rating check on 8 March 1970. He had a total flying experience as a pilot of fixed wing aircraft of about 4,000 hours, of which approximately 1,380 hours were on Beagle 206 type aircraft.

The pilot who tested Mr Desmond for his last instrument rating renewal and who had conducted previous checks with him, had, from time to time, supervised Mr Desmond's training in asymmetric flight. A simulated engine failure was carried out on the last instrument rating flight, one engine being throttled back immediately on becoming airborne and a climb made straight ahead to 600 feet. According to this pilot Mr Desmond was quite relaxed in dealing with this simulated emergency and flew to a good standard. In his opinion Mr Desmond was a most capable pilot, cautious, well disciplined and dedicated to his job.

1.6 Aircraft information

The aircraft was manufactured by Beagle Aircraft Ltd in 1966. Its total flying time amounted to approximately 1,176 hours. The port engine had run about 296 hours and the starboard 1,124 hours since their last complete overhaul. During the period 9 - 18 June 1970 all cylinders of the port engine were removed, the bores honed and oversize piston rings fitted. The starboard engine had previously been installed in the port position on the aircraft where it had run without any major troubles, for approximately 845 hours. The two McCauley propellers had completed approximately 845 hours (port) and 485 hours (starboard) running time without trouble in either case since their installation on the aircraft. The certificate of airworthiness was valid; although certificated in the Transport Category the aircraft was operated privately and had been maintained in accordance with the manufacturer's maintenance schedule. The weight and centre of gravity of the aircraft were within the prescribed limits. Before departure from Guernsey the tanks were filled to capacity (190 gallons) of 100/130 octane Avgas; approximately 10 gallons of fuel would have been consumed on the flight from Guernsey to Jersey. The fuel release certificate covering the fuel uplifted by the aircraft was satisfactory.

1.7 Meteorological information

The weather conditions at Jersey Airport immediately after the accident were as follows:

Time:	1032 hrs
Surface wind:	270°/13 knots
Visibility:	7 kilometres
Cloud:	2/8 stratus at 300 feet
	5/8 stratus at 400 feet
	6/8 cirrus at 25,000 feet
Temperature:	+17° centigrade

Although fairly extensive low stratus was reported in this special meteorological observation of 1032 hrs, a pilot who took-off from Jersey about 10 minutes after the accident, reported that to the west of the airport there was only about 2/8 cloud at approximately 400 feet and that there was very little cloud to the west and southwest of the island. The Duty Aerodrome Control Officer reported that the flight path of G–AVAM was well below the cloudbase.

1.8 Aids to navigation

Not applicable.

1.9 Communications

Although the Air Traffic Control staff did not read the first transmission from the aircraft to the effect that the port engine had 'gone', and only partly understood the second message that the other engine was also 'going', a reliable transcript of these and other transmissions of a normal nature were obtained from the radio telephony tape recording.

1.10 Aerodrome and ground facilities

Jersey Airport is situated at the southwest corner of Jersey at an elevation of 276 feet. The main Runway 09/27, from which the aircraft departed to the west, has a length of 5,300 feet.

The ground elevation to the south-southwest from the end of Runway 27 is generally lower than the airport elevation. The terrain rises from the west coast when flying east on the downwind leg for a landing on Runway 27.

1.11 Flight recorders

No flight recorder was required or fitted.

1.12 Wreckage

The aircraft had crashed in a flat but slightly nose-down attitude onto a brick walled corrugated iron roofed outhouse. Fire occurred immediately and consumed most of the aircraft with the exception of the tail unit. Examination of part of the flaps mechanism showed a precrash flaps position of 20° (take-off setting). Due to the wing structure being burnt away no remains of the booster pumps were found; the booster pump switches, fitted in the cockpit roof panel, were also destroyed by fire. Both engines were extensively burnt; the starboard propeller had broken away whilst rotating under high power, but the condition of the port propeller indicated that it was stationary at the time of the impact. Both engines and propellers were removed for detailed examination. The results were as follows:

Port engine: the strip inspection did not reveal any feature that could have affected engine performance. As far as could be ascertained, all parts of the fuel system were capable of correct operation.

Starboard engine: the engine was running under power on impact. The strip inspection did not reveal any feature indicative of a pre-impact condition that would affect engine operation. The inlet valves had not stretched and therefore it is unlikely that overspeeding had occurred.

Port propeller: strip examination showed the pitch change mechanism to be unlatched and in the fine pitch operating position; there was no evidence of any precrash mechanical failure. The propeller governor was rig tested and found to be within the specified requirements; strip examination showed the components were in good condition.

Starboard propeller: strip examination showed the propeller had been in the normal operating condition and there was no evidence of any precrash mechanical failure. Due to crash damage it was not possible to rig test the propeller but strip examination showed no signs of precrash failure or malfunction.

1.13 Fire

After impact an immediate intense fuel fire occurred which consumed a large part of the fuselage and wing structure; an outhouse on which the aircraft crashed was also badly burned.

The following fire fighting appliances from Jersey Airport were at the accident site within ten minutes of the accident:

one Dennis/Bedford heavy rescue tender
one Thorneycroft/Pyrene foam tender
one Bedford/Miles foam tender
one Leyland water tender

The ten members of the fire service had the fire under control in approximately one minute but fire fighting continued for about five minutes due to fuel dripping into the outbuilding and flashing back. During fire fighting operations 120 gallons of foam liquid were consumed.

Three appliances manned by ten men from the Jersey State Fire Service were also in attendance and assisted in the later damping down operation.

1.14 Survival aspects

A post mortem examination showed that the accident was not survivable and the pilot was killed instantly on impact.

1.15 Tests and research

No tests or research were carried out.

1.16 Other information

1.16.1 The Beagle 206, Series 2, aircraft is certificated in Performance Group C. Group C aircraft although having positive en-route performance with one power unit inoperative, may not necessarily have such a performance in the take-off configuration.

According to the aircraft's Flight Manual, in order to satisfy the take-off performance requirements, engine failure is assumed not to occur until a minimum height of 200 feet above aerodrome elevation is reached. In the event of engine failure occurring below this height the decision to re-land or attempt to complete the take-off should be based on the pilot's assessment of:

(a) The distance available to complete re-landing

(b) the probable level of performance available

(c) the ability to clear or avoid all obstacles.

1.16.2 Calculations show that in the meteorological conditions that obtained at the time of the accident, with one propeller feathered, flaps at the take-off setting, the undercarriage up and the operating engine producing take-off power, the aircraft should have been able to achieve a rate of climb of approximately 200 feet per minute. This performance would apply at a height of 2-300 feet above the airport elevation providing the take-off safety speed of 80 knots had been achieved and maintained with the aircraft being flown accurately, ie without yaw.

1.16.3 According to the aircraft's operating handbook, the procedure for unfeathering a propeller is as follows:

(a) Turn the fuel on, booster pump off and switch ignition on

(b) Set the throttle level approximately ½ inch open and move the mixture control lever fully forward

(c) Move the propeller pitch control lever smartly fully forward

(d) When the propeller unfeathers and commences to windmill, the engine should readily re-start; pull the propeller back to minimum rev/min to prevent excessive surge after re-starting.

Note: If speed is low or the propeller is reluctant to windmill, it should be helped by pressing the starter button.

1.16.4 According to the operating handbook erratic engine running and fluctuating fuel pressure may be caused by vapour locking in the fuel system. In these circumstances the booster pumps should be switched on for a short period until these symptoms disappear.

2. Analysis and Conclusions

2.1 Analysis

2.1.1 Malfunction of the port engine

The sequence of events which led to the accident started with the malfunction of the port engine. Consequently, this engine and its propeller were stripped and examined. No evidence of precrash mechanical failure was found but there is no doubt that malfunctioning did occur as the black smoke seen by some witnesses is indicative of a fault which had caused an over rich fuel to air mixture. It is likely that any evidence of this which may have existed was destroyed in the crash and subsequent fire.

It was not possible to establish whether the fuel booster pumps were on, therefore there is a possibility that the malfunction was due to a fuel vapour lock, although this is normally associated with a higher ambient temperature than that which applied at the time of the accident.

2.1.2 Possible malfunction of the starboard engine

Whilst the failure and consequent shutting down of the port engine started the sequence, the final loss of control followed the pilot's belief that the starboard engine was failing and also from his attempt to restart the port engine. Although the possibility of a loss of power from the starboard engine cannot be completely discounted, the strip examination revealed no evidence that this had occurred. The evidence of witnesses and the damage to the starboard propeller indicates that this engine was at high power up to the moment of the impact. Therefore, if the pilot was mistaken as to the loss of power it is relevant to examine how this could have occurred.

From the data in para 1.16.1 it can be seen that the climb performance of aircraft certificated in Performance Group C can be critical if an engine fails on take-off, at or just after the point of lift-off. In some circumstances it would be better to abandon the take-off but on this occasion it seems likely that the pilot was not aware of the failure until the aircraft had reached a height of about 50 feet. By this time it is doubtful whether there was sufficient runway remaining to permit a landing without over-running the up-wind end. In deciding to continue with the climb out he may also have been influenced by the successful completion of the simulated single engine flying which he had carried out earlier in the year. In the event, the feathering of the propeller of the port engine and climb out appeared normal but calculations show that for the aircraft to have reached between 200 and 300 feet

within a distance of half a mile from the end of the runway, there must have been some excess speed after lift-off which was used to gain height initially. At a height of 250 feet the climb capability of the aircraft in the associated conditions would have been about 200 feet per minute, but to obtain even this, the aircraft would have to be flown accurately, without yaw and close to the required safety speed of 80 knots. A reduction in speed below 80 knots would seriously reduce the climb performance.

After reaching a height of about 250 feet the aircraft turned to the left through 180° to start its downwind leg. During this turn there would be some loss of climb performance. In addition, the aircraft was now flying with a tail wind and towards rising ground. Because of the tail wind its gradient of climb in relation to the terrain would be less than it was just after take-off and if the pilot had assessed the progress of the flight by external visual reference, he could well have been misled into thinking that an apparent loss of climb performance was due to a loss of power from the remaining engine. From the evidence of witnesses it appears that the aircraft then assumed an increasing nose-up attitude which indicates that its speed had fallen well below the optimum single engine climb speed of 80 knots. Soon after turning downwind the pilot called 'I've got the other engine going, I'm going down'. Following this the aircraft turned to the right towards lower ground and an attempt was made to restart the port engine. During the attempt to restart the engine the propeller was unfeathered and the aircraft descended, still in a pronounced nose-up attitude, to about 50 feet above the ground. From this moment the crash became almost inevitable. With the resulting increase in drag from the unfeathered propeller, even with full power from the starboard engine, airspeed could not be maintained and there was insufficient height to dive the aircraft to regain safety speed. The aircraft finally stalled from a height too low for recovery to be effected.

2. Conclusions

(a) *Findings*

(i) The documentation of the aircraft was in order.

(ii) The pilot was properly licensed.

(iii) A malfunction of the port engine occurred during the take-off.

(iv) The pilot shut down the port engine and feathered its propeller.

(v) After turning downwind for a landing back on the aerodrome the pilot believed the starboard engine was losing power.

(vi) Examination of the engines revealed no physical evidence to explain the malfunction of the port engine or a possible power loss from the starboard engine.

(vii) Whilst the possibility of a partial loss of power from the starboard engine cannot be completely discounted, the evidence indicates this to be unlikely.

(viii) After turning downwind the airspeed fell below the safety speed for single engine flight and the aircraft lost height.

(ix) While attempting to maintain height at a speed below the single engine safety speed the pilot tried to restart the port engine.

(b) *Cause*

After an engine had failed on take-off, adequate flying speed was not maintained. This finally led to loss of control and a stall at a height too low for recovery to be effected.

N S Head
Inspector of Accidents

Accidents Investigation Branch
Department of Trade and Industry
April 1972

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