ACCIDENTS INVESTIGATION BRANCH
Department of Trade and Industry

Auster 5 Series JI Autocrat G-AIRB

Report on the accident at English Bicknor, near Coleford, Gloucestershire, on 11 April 1971

LONDON: HER MAJESTY'S STATIONERY OFFICE
1972

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

22 December 1971

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 G M Kelly an Inspector of Accidents on the circumstances of the accident to Auster 5 Series J I Autocrat G–AIRB which occurred at English Bicknor, near Coleford, Gloucestershire on 11 April 1971.

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/C376

Aircraft:	Auster 5 Series J I Autocrat G–AIRB
Engine:	Blackburn Cirrus Minor 2
Registered Owner:	Mr R Davis
Operator:	Knight Flying Group
Pilot:	Mr G S Jones – Killed
Passengers:	Two – Killed
Place of Accident:	English Bicknor, near Coleford, Gloucestershire
Date and Time:	11 April 1971 at approximately 1550 hrs
	All times in this report are GMT.

Summary

Shortly after becoming airborne on a local pleasure flight the aircraft made a steeply banked turn to the left through 180°. On completion of the turn the nose dropped and the aircraft went into a spin from which it did not recover. All three occupants of the aircraft were killed.

No evidence of pre-crash failure or malfunction was found. The report concludes that the accident was the result of a stall which in the circumstances of an aft centre of gravity led to a spin from which there was insufficient height to recover. The evidence was insufficient to establish the cause of the stall.

1. Investigation

1.1 History of the flight

The flight took place from the grass airfield used by the Knight Flying Group on East Bach Farm near English Bicknor. The pilot had previously flown Autocrat G–ARIB on several occasions from the same field, and intended on this occasion to give two of his friends a short pleasure flight over the Ross-on-Wye area. He carried out a thorough pre-flight inspection of the aircraft and ensured that his passengers were secure in their seats before taxying out. At the downwind end of the field there appeared to be some difficulty in turning the aircraft against the slope and both passengers were seen to get out of the cabin and lift the tail of the aircraft round.

The take-off, for which the first segment of flap was selected, was made towards the northwest. Nothing abnormal was observed about it or the initial climb although turbulence caused some rocking of the wings during the climb, which was not, however, excessive. After climbing to approximately 300 feet the aircraft banked steeply to the left and turned sharply through about 180°. At the end of the turn the nose dropped and the aircraft went into what eye witnesses described as a fairly flat spin. After completing about 3 turns it disappeared behind some trees and was heard to strike the ground.

Although fuel was leaking from the ruptured fuel tank when rescuers arrived at the scene of the accident, there was no fire. The three occupants were killed by the impact.

1.2 Injuries to persons

Injuries	*Crew*	*Passengers*	*Others*
Fatal	1	2	-
Non-fatal	-	-	-
None	-	-	-

1.3 Damage to aircraft

Destroyed.

1.4 Other damage

None.

1.5 Crew information

Mr G S Jones, aged 41, began flying training in 1963, in which year he completed about 9 hours flying in Auster 5 and Aiglet aircraft. He did not fly again until May 1966 when he recommenced training on a Beagle Terrier, a type which is basically the same as an Auster Mk.6 and similar to the Autocrat. He obtained a private pilot's licence for Group A (landplanes) on 6 February 1967, which was valid at the time of the accident. His last medical examination took place on 20 July 1970.

In June 1968 he was checked out on a Cherokee 140 and flew 9 hours on that type during the year. In 1969 he made only one flight. He returned to more active flying in March 1970 and alternated between flying Cherokee aircraft and the Autocrat G–AIRB, completing 13 hours 40 minutes flying in the year. Ten of these flights were made in G–AIRB from the airfield at English Bicknor. In 1971 he had flown only twice prior to the accident flight, once in G–AIRB for 30 minutes and once, the week before the accident, for 25 minutes in a Cherokee 140.

His total flying experience in 8 years amounted to 75 hours of which 56 hours 50 minutes were in Auster type aircraft.

1.6 Aircraft information

The aircraft was built by the Auster Aircraft Company and was first registered in January 1947. At the time of the accident it had flown 2,916 hours. The certificate of airworthiness was valid until 26.6.72 and the aircraft had been maintained in accordance with the appropriate Royal Aero Club maintenance schedule.

The exact weight of the passengers was not known, but by using estimated weights, it was possible to determine that the take-off weight was below the maximum authorised all-up weight and that the centre of gravity was probably between 18.56 inches and 19.35 inches aft of the datum position. The specified limits are from 12.5 inches to 22.01 inches aft of the datum position.

The Autocrat does not display any unusual flying characteristics. There is little natural warning of the approach of a stall, and no stall warning device is fitted. The stall is conventional and normally there is little tendency for a wing to drop or for a spin to develop unless the aircraft is heavily laden. When it is stalled in a steep turn the tendency is for the aircraft to roll out of the turn towards level flight. However, there is a marked change in the stalling behaviour when the aircraft is heavily laden and the centre of gravity moves towards the aft limit. This situation manifests itself when there are three people on board and in this configuration unless great care is taken the aircraft will readily go into a spin at the stall and experience indicates that the spin may become violent and difficult to stop.

The certificate of airworthiness does not permit stall turns, loops, spins and tight turns unless aerobatic seats are fitted, the rear seats are unoccupied, and the total weight does not exceed 1,700 lbs. There is an instruction in the aircraft handling notes forbidding the performance of aerobatics and spins unless these conditions are met but the instruction does not include any reference to tight turns.

1.7 Meteorological information

The weather at the time of the accident was good. The visibility was over 10 kilometres for the general area and there was no low cloud. From a weather appreciation subsequently prepared for the accident, the surface wind was estimated to be northeasterly at 5-10 knots. However, local observation suggests that the strength may have been up to 15 knots. Pilots who know the local area report that the hilly nature of the countryside induces areas of turbulence, at times severe, and that either up or down draughts can be produced by the wind rolling off the surrounding hills. On the day of the accident there were no reports of anything other than slight turbulence.

1.8 Aids to navigation

Not applicable.

1.9 Communications

Not applicable.

1.10 Aerodrome and ground facilities

The airfield from which G–AIRB took-off is unlicensed and is operated by the Knight Flying Group. It is grass covered, 600 feet above mean sea level and is undulating in character. Because of the irregular outline of the field, the take-off and landing direction is SE/NW when the wind is in the northern sector. This gives a take-off run of 990 feet and a down hill slope. The boundary of the field has no obstructions that affect the take-off. Outside the boundary the ground falls rapidly away into a small valley. The sides of the hills in this area are tree covered and there are no suitable sites for an emergency landing nearer than the low lying fields beyond the river in the bottom of the valley.

1.11 Flight recorders

Not required, none fitted.

1.12 Wreckage

The aircraft struck the ground in the middle of a grass field approximately 350 feet above mean sea level. Damage to the structure indicated that at the time of impact it was in a nosedown attitude about 15° below the horizontal. This was associated with a high rate of descent but very little forward speed. There was some indication of rotation to the right. Damage to the propeller indicated that the engine was throttled back at impact.

Examination of the flying control systems revealed no evidence of pre-crash malfunction. Both connecting wires to the elevator trim tab were detached but this had been caused by the fuselage distortion during the impact. The flap selector lever was jammed by the impact in the second segment, (38°), position. Since the aircraft was observed to take-off with take-off flap (23°)

set, it is probable that the lever moved into its jammed position during the crash. There was no evidence of any failure which might have produced an asymmetric flap condition.

No evidence of engine failure or malfunction was discovered. Although the fuel selector lever was missing, the valve was found open and there was evidence of satisfactory fuel feed to the carburettor. The ignition switches were both on and the throttle had been closed prior to impact.

1.13 Fire

There was no fire. The engine was sprayed with foam by the local fire brigade as a precaution in case fire subsequently broke out.

1.14 Survival aspects

The accident was non-survivable.

1.15 Tests and research

Not applicable.

2. Analysis and Conclusions

2.1 Analysis

The evidence derived from the wreckage is consistent with the aircraft having been in a spin prior to the impact. Since there was no evidence of any part of the aircraft becoming detached in flight or of any pre-impact malfunction it is most probable that the spin originated in an inadvertent stall. The evidence of the eye witnesses indicates two possible sequences of events. The aircraft could have stalled either in a steep turn or during the climb after take-off.

2.1.1 Steep turn leading to a stall

This possibility assumes that the pilot intentionally started a turn after climbing to approximately 300 feet. The bank may have been steeper than he intended, for bank angle can easily build up in a high wing aircraft if the pilot's attention is directed outside the aircraft on to the surrounding terrain. The stalling speed in a 60^{o} banked turn increased by about 40 per cent and at the same time the increase in the induced drag resulting from the higher lift required in the turn will decrease the airspeed unless additional engine power is applied or the nose of the aircraft lowered. Since the aircraft was climbing after take-off, the engine was likely to have been at full power, leaving only the second course of action – lowering the aircraft's nose – open to the pilot. The pilot would not be alerted to an imminent stall brought on by the failure to compensate for these factors since the Autocrat has neither a natural nor a mechanical stall warning. With the aircraft loaded with three people resulting in a rearward movement of the centre of gravity, it would readily go from the stall into a spin that could be difficult to stop.

No reason has been found for a steep turn at this point in the flight. The most likely reason would be that the pilot had decided to attempt an emergency or precautionary landing in the fields that lay behind him. However, no evidence was found of an in-flight failure or malfunction that could have led to such a decision.

2.1.2 Stall due to loss of airspeed on the climb

This possibility assumes that the aircraft stalled in the climb and that the 'steep turn' was in fact the initial rotation of the spin prior to the aircraft's nose dropping. Of the various reasons that would have led to a stall the most likely are that there was sufficient turbulence to cause a stall or, alternatively, that the airspeed was unknowingly allowed to decrease to the stalling point. In the first case, although there were reports of turbulence in the area from

time to time, on the day of the accident only slight turbulence was reported. In considering the second alternative the circumstance has to be taken into account that it is not unusual for a pilot who is relatively inexperienced and out of current flying practice to allow the airspeed to wander. This is usually the result of trying to maintain the aircraft's attitude in relation to the horizon with insufficient reference to the instruments or because of some distraction which preoccupies the pilot's attention.

However the evidence is insufficient to establish either of these hypotheses as the reason for the stall. But the abrupt development of a spin follows the pattern of behaviour for this type of aircraft when the centre of gravity is towards the aft limit, as it is when there are three people on board. The absence of any stall warning on the aircraft, either natural buffet or a mechanical device, denied to the pilot the pre-warning that might have alerted him to the imminence of a hazardous condition.

2.2 Conclusions

(a) *Findings*

(i) The pilot was properly licenced.

(ii) The documentation of the aircraft was in order and it had been properly maintained.

(iii) The centre of gravity was within the specified limits but near the aft end of the range.

(iv) With an aft centre of gravity the aircraft can readily get into a violent spin following a stall.

(v) There was no evidence of pre-crash failure or malfunction of the aircraft or engine.

(vi) The aircraft went into a spin at a height of approximately 300 feet shortly after take-off and did not recover before it struck the ground.

(b) *Cause*

The accident was caused by the aircraft stalling and entering a spin at a height too low for recovery to be affected. The evidence was insufficient to establish the reason for the stall but the abrupt development of a spin follows the pattern of behaviour for this type of aircraft when the centre of gravity moves towards the aft limit as is the case when there are three people on board.

G M Kelly
Inspector of Accidents

Accidents Investigation Branch
Department of Trade and Industry
December 1971