ACCIDENTS INVESTIGATION BRANCH
Department of Trade

Chipmunk DH C1 Series 22A G-ARCR
Report on the accident at Windlesham, Surrey on 2 September 1973

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Department of Trade
Accidents Investigation Branch
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13 August 1974

The Rt Honourable Peter Shore MP
Secretary of State for Trade

Sir,

I have the honour to submit the report by Mr R D Westlake, an Inspector of Accidents, on the circumstances of the accident to Chipmunk DH C1 Series 22A G-ARCR which occured at Windlesham, Surrey on 2 September 1973.

I have the honour to be
Sir
Your obedient Servant

W H Tench
Chief Inspector of Accidents

Accidents Investigation Branch
Civil Aircraft Accident Report No 19/74
(EW/C464)

Aircraft:	Chipmunk DH C1 Series 22A G-ARCR
Engine:	DH Gipsy Major 10 Mk 2
Registered Owner and Operator:	Mr C S L Moore
Pilot:	Mr C S L Moore – Killed
Passenger:	One – Seriously Injured
Place of Accident:	Windlesham, Surrey
Date and Time:	2 September 1973 at approximately 1422 hrs
	All times in this report are GMT

Summary

The aircraft was on a local pleasure flight. Following a low-level run across a field it pulled up into a very steeply banked climbing turn and then pitched down into a dive back towards the field. Although the aircraft attained an approximately level attitude during recovery from the dive it retained sufficient downward inertia to hit the ground with considerable force. It came to rest, upright, 40 yards away from the initial point of impact. The pilot died in the accident; his passenger was seriously injured.

There is evidence that the pilot was under the influence of alcohol during the flight. It is concluded that this impaired his judgement and that the accident was the result of a flying error during an attempt to execute a semi-aerobatic manoeuvre at too low a height for recovery to be completed.

1. Investigation

1.1 History of the flight

Mr Moore arrived at Fairoaks Aerodrome at about 1045 hrs and spent the next two hours or so talking to a number of friends in the bar of the local flying club. During this time he drank about five pints of beer. In the course of the conversation he mentioned that he might fly across to the village of Windlesham in the afternoon to see if he could locate the house in which one of these friends lived.

Shortly after 1300 hrs Mr Moore arranged for his aircraft to be brought out of the hangar and he then went to the control tower where he booked out for a local, non-radio flight. On returning to his aircraft, he carried out a pre-flight check and then he and his passenger, a friend who had been with him in the flying club bar, climbed into the aircraft and strapped themselves in. The engine was then started and, after the appropriate checks had been completed, the aircraft taxied out and at 1407 hrs took-off from Runway 24.

According to the passenger, the aircraft turned right after take-off and flew towards Windlesham at 1,000 feet above ground level. On arrival it circled the village until the pilot's attention was attracted by a flashing mirror and he identified his friends standing in a large cornfield at the back of their house. After losing height the aircraft made a low-level run across the field at a height of about 40 feet rocking its wings as it passed the people on the ground. On reaching the boundary of the field it pulled up into a climbing turn during which, according to eye-witnesses, the bank became progressively steeper until the wings were nearly vertical; according to the passenger, considerable airframe buffet was experienced during this turn. After reaching a height of 200-300 feet the aircraft began to dive back towards the field. During the recovery from the dive the aircraft achieved a horizontal attitude but the pilot was apparently unable to overcome its downward inertia and it struck the ground with considerable force. The aircraft bounded forward after the initial impact for 40 yards and came to rest, upright, having turned 90° to the right. The aircraft was very severely damaged but there was no fire. The pilot died before he could be released from the wreckage; the passenger was seriously injured.

1.2 Injuries to persons

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

1.3 Damage to aircraft

The aircraft was destroyed.

1.4 Other damage

A short length of a low barbed wire fence was displaced.

1.5 Crew information

Mr Claude Samuel Leonard Moore, aged 34, held a valid Private Pilot's Licence first issued in 1958; he was last medically examined on 11 October 1971. He had accumulated about 400 flying hours over a period of about 16 years, having allowed his licence to lapse between 1959 and 1964. There was evidence from flying instructors and others that he was a capable pilot.

1.6 Aircraft information

G-ARCR, a Chipmunk 22A, was a low-wing, single-engined, two-seater monoplane with a fixed undercarriage of the tail wheel type. It was built in 1951 by the de Havilland Aircraft Company as a Chipmunk T10 trainer for the Royal Air Force. It was entered on the British civil register in July 1960 after having spent some time on the Irish register. The aircraft was dismantled following a check 4 in May 1970 and after a period in store was reassembled in the beginning of 1972. On April 4 1972 it was issued with a two year certificate of airworthiness in the general purpose category following a 50 hour inspection and about this time was bought by Mr C S L Moore. The starboard mainplane and main undercarriage leg were replaced in May 1972 following a minor accident.

The aircraft's airframe and engine log books have not been recovered and therefore nothing is known about its recent flying and maintenance history. It had flown 6032 hours at the time of the last renewal of the certificate of airworthiness and is believed to have flown a further 50-100 hours since then. The aircraft was refuelled the week before the accident and is believed to have had full tanks when it took off from Fairoaks.

1.7 Meteorological information

The weather was fine with a light westerly wind and was not a factor in the accident.

1.8 Aids to navigation

Not applicable.

1.9 Communications

There was no communication between the aircraft and the ground. The aircraft did not carry a serviceable radio and the pilot had received clearance to make a 'non-radio' flight.

1.10 Aerodrome and ground facilities

Not applicable.

1.11 Flight recorder

Not required, none fitted.

1.12 Wreckage

The accident occurred in a 23 acre field of corn stubble which had a slight uphill slope in the direction of the aircraft's final track. Initial examination at the accident site showed that after striking the ground in a slightly tail down attitude, the aircraft had bounced over a distance of about 40 yards and came to rest upright having turned 90° to the right. Damage to the main undercarriage legs had raptured both wing fuel tanks and most of the petrol they contained had been released into the atmosphere before the aircraft came to rest.

Subsequent examination of the wreckage indicated that the aircraft had struck the ground at a low forward speed but with a high rate of descent and that the engine had been operating under low power at impact. There was no evidence of any pre-crash failure or malfunction in the engine, the airframe of the flying control systems. There was evidence that 20° up-elevator was being applied at impact and that the ailerons had been approximately neutral and the flaps up.

1.13 Medical and pathological information

A full post mortem and toxicological analysis was performed on the pilot. This revealed that his blood ethanol level was 109 milligrams (mg) per 100 millilitres (ml) and his urine ethanol level was 164 mg per 100 ml. The ethanol level is consistent with evidence that he had drunk about 5 pints of draught beer between 1100 and 1300 hrs.

1.14 Fire

There was no fire.

1.15 Survival aspects

The pilot died from inhalation of blood following facial injuries received when his head hit the instrument panel probably rendering him unconscious. Although rescuers were on the scene immediately they were unable to free the pilot from the wreckage in time to save him.

The pilot was wearing a full shoulder harness and tests on another Chipmunk with a man of similar build showed that the subject's head could not reach the instrument panel when the harness was fastened tightly. However it is possible that there may have been some slackness in the harness's adjustment in G-ARCR and there may also have been some compression of the aircraft's fuselage during the main impact with the gound; this could have reduced the distance between the panel and the pilot and therefore negated the effectiveness of the harness to some extent. The accident was survivable as demonstrated by the passenger's experience; the wearing of a protective helmet might have reduced the severity of the pilot's injuries and improved his chances of survival.

1.16 Tests and research

1.16.1 *Physiological effects of alcohol*

Research carried out in the United Kingdom and the United States of America has shown that a blood alcohol level as low as 40 mg per 100 ml causes deterioration in piloting ability and leads to a significant increase in the number of errors

during the flight. These errors further increase in frequency and importance as the alcohol level is increased. The established consequential effects of alcohol include the following:

(a) Dulling of critical judgement.

(b) Decreased sense of responsibility.

(c) Decrease of reasoning ability.

(d) Increased self-confidence with decreased insight into immediate capabilities.

(e) Diminished skill, reactions and co-ordination.

(f) Decreased muscular reflexes.

2. Analysis and Conclusions

2.1 Analysis

Examination of the wreckage did not reveal evidence of any pre-crash failure or malfunction nor was any malfunction reported by the survivor or by eye-witnesses. The pilot gave no indication either before or during the flight that he intended to land near his friends' house and the nature of the pre-accident manoeuvre was in no way appropriate as the initial stage of a landing procedure. There is therefore no evidence to suggest that either a normal or emergency landing was being attempted and the manoeuvre must be seen as a display of exuberance on the part of the pilot.

After making one low-level run at about 40 feet above ground level the aircraft make a climbing turn which became progressively more steeply banked and was intended, presumably, as a preliminary to a second run across the field. Such a manoeuvre is commonly used to reverse the direction of flight quickly and is well within the capabilities of the Chipmunk aircraft. In view of the pilot's reputation as a capable pilot it may be assumed that, in normal circumstances, it would also have been well within his competence. However, in attempting the manoeuvre at such a low height, he left himself no margin for error.

The passenger's comments on the severe airframe buffeting during the turn suggest that the pilot made an error by allowing the aircraft to come very close to the stall when very steeply banked at 200 to 300 feet; the ensuing degree of dive may therefore have been beyond his intentions and control. This is borne out by the fact that although he succeeded in achieving a longitudinally level flight attitude he was apparently unable to overcome the high sink rate in time to avoid hitting the ground with considerable force.

There can be no doubt that the accident resulted from a flying error during a semi-aerobatic manoeuvre which was being made at too low a height to allow any margin for error. Both the error itself and the over-confidence implicit in attempting the manoeuvre at such a low level are fully explicable in terms of the proven effects of alcohol in the quantity the pilot is known to have consumed. There is no evidence whatever of any other reason for this accident which is therefore attributed to an error of judgement by the pilot whilst he was to some extent under the influence of alcohol.

2.2 Conclusions

(a) *Findings*

(i) The pilot was properly licensed and qualified to carry out the flight.

(ii) The aircraft had a valid certificate of airworthiness but it was not possible to establish its recent maintenance history.

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

(iv) The aircraft made a very steeply banked climbing turn manoeuvre which was initiated at about 40 feet above ground level. The surviving passenger reported severe airframe buffeting during this turn.

(v) In the ensuing dive from between 200 and 300 feet the aircraft achieved a longitudinally level attitude but hit the ground and was severely damaged. The pilot was killed; his passenger was seriously injured.

(vi) The pilot had drunk about 5 pints of beer before the flight. Post mortem examination revealed that he had a blood alcohol level of 109 mg per 100 ml at the time of the accident.

(b) *Cause*

The accident resulted from a flying error during a very steeply banked climbing turn manoeuvre which was being made at too low a height to permit recovery from the ensuing dive. The pilot's skill and judgement were impaired by alcohol.

R D Westlake
Inspector of Accidents

Accidents Investigation Branch
Department of Trade

August 1974

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