TRANSPORT ACCIDENT INVESTIGATION COMMISSION
TE KOMIHANA TIROTIRO AITUA WAKA

AIRCRAFT ACCIDENT REPORT

No. 89-036

Zenair Zenith CH200

ZK-ESV

250m north of Culverden Aerodrome

30 March 1989

Transport Accident Investigation Commission
Wellington · New Zealand

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Transport Accident Investigation Commission
Wellington

Chief Commissioner
Transport Accident Investigation Commission

The attached report summarises the circumstances surrounding the accident involving Zenair Zenith CH200 aircraft ZK-ESV at 250 m north of Culverden Aerodrome on 30 March 1989 and includes suggested findings.

This report is submitted pursuant to Section 8(2) of the Transport Accident Investigation Commission Act 1990 for the Commission to review the facts and endorse or amend the findings as to the contributing factors and causes of the accident.

24 January 1992

R CHIPPINDALE
Acting Chief Executive

APPROVED FOR RELEASE AS A PUBLIC DOCUMENT

12 March 1992

M F DUNPHY
Chief Commissioner

TRANSPORT ACCIDENT INVESTIGATION COMMISSION

AIRCRAFT ACCIDENT REPORT NO. 89-036

Aircraft Type, Serial Number and Registration:	Zenair Zenith CH200, AACA 469 ZK-ESV
Number and Type of Engines:	One Lycoming O-235-C1B
Year of Manufacture:	1980
Date and Time:	1205 hours 30 March 1989
Location:	250m north of Culverden Aerodrome Latitude: 42° 46.3'S Longitude: 172° 53.4'E
Type of Flight:	Private
Persons on Board:	Crew: 1 Passengers: 1
Injuries:	Crew: 1 Fatal Passengers: 1 Fatal
Nature of Damage:	Substantial
Pilot in Command's Licence:	Private Pilot Licence — Aeroplane
Pilot in Command's Age:	47
Pilot in Command's Total Flying Experience:	457 hours: 266 on type (estimated)
Information Sources:	Office of Air Accidents Investigation field investigation
Investigator in Charge:	Mr J J Goddard

1. NARRATIVE

1.1 The pilot planned to fly his aircraft, which he had constructed, from its normal base at Christchurch Airport to Culverden for a brief business visit and then return to Christchurch. He was to be accompanied by his passenger.

1.2 He probably refuelled the aircraft with the contents of two or three 20 litre containers of Mogas during the pre-flight preparations at his private hangar. Mogas was approved for the aircraft and it had been operated on this fuel for some 6 years without incident.

1.3 An abbreviated flight plan, to be terminated clear of Christchurch Control Zone (CTR), was filed by radio. The aircraft's fuel endurance was given as three hours.

1.4 The aircraft took off at 1104 hours and the flight plan was terminated at 1109 hours. No further radio telephone transmissions were heard from ZK-ESV.

1.5 A normal arrival and landing was made at Culverden at about 1130 hours.

1.6 The pilot was met and driven in to Culverden township while his passenger remained in the aircraft. He returned just before midday, for the return flight.

1.7 A north-westerly surface wind, estimated at ten to fifteen knots was blowing as the aircraft was taxied to the south end of the aerodrome for take-off on vector 36.

1.8 Witnesses heard normal engine sounds as the aircraft took off and made its initial climb, but when it came into view above trees it was heading north-north-west while still tracking north above the runway. It had not climbed as high as some witnesses expected at that stage.

1.9 Shortly afterwards, while the aircraft was still within the aerodrome boundary, its engine was heard to falter and commence misfiring. The sound was variously described as "surging and dying away" and "puttering" or "chugging".

1.10 The aircraft was then at an estimated height of 200 feet agl. At that stage it was seen to pitch down slightly, drop its left wing and enter a spin to the left. It disappeared from view in a steep spiral descent with no engine sound, to collide with the ground just north of the aerodrome.

1.11 People who arrived at the scene about two minutes later found that the occupants had been killed in the accident.

1.12 The accident site was in a large level grass field, 250m beyond the northern boundary of Culverden Aerodrome and just beyond a line of young trees. Damage to the aircraft and ground marks were consistent with a steep nose-down impact while rotating to the left. The cockpit section had collapsed sideways, making the impact unsurvivable.

1.13 Examination of the wreckage disclosed no evidence of structural or control system failure. The flaps were up and the elevator trim was at "neutral". The propeller damage was consistent with the engine delivering low power to it at impact. The wreckage was complete and with no evidence of a bird strike.

1.14 The positions of the controls could not be determined. Neither was it established whether the offset nose wheel was locked in the flight position. The fuel selector was "ON" but all of the fuel had escaped from broken components. Significant damage to the local grass areas from spilt fuel was evident.

1.15 The engine was disassembled in an approved engine shop. No mechanical failure had occurred and it showed evidence of normal operation in service. The magneto and starting vibrator ignition systems functioned normally. The fuel pumps functioned normally and other fuel system components appeared normal. Because of carburettor damage, the possibility of fuel contamination could not be eliminated. All fuel system "B" nuts had been installed with plumbers' PTFE tape. Although the use of this material could allow slivers of tape to enter the fuel systems, the filters were clean.

1.16 The loss of engine power which evidently occurred was probably associated with an undetermined fuel problem such as contamination or vapour locking.

1.17 The large field north of the aerodrome was suitable for a forced landing in the event of an engine failure after take-off. The accident site in the field, after a spiral descent, indicated that the field was within easy gliding range of ZK-ESV. The pilot should have been able to make a forced landing provided he took prompt action to lower his aircraft's nose into a glide when the power loss occurred.

1.18 The stalling and spinning behaviour of ZK-ESV had been explored by an experienced test pilot during flight tests for the Permit to Fly and for aerobatic approval. It was generally unremarkable, with adequate warning of an impending stall. An average tendency to drop either wing at the stall was made more abrupt if the nosewheel was unlocked.

1.19 Several unverified reports stated that the aircraft had been built with asymmetrical washout on the wings i.e. the upward twist of the trailing edge of each wing towards the tips was unequal. This was not confirmed from the wreckage or from the construction records. The flight tests however, had disclosed no asymmetry in the stalling or other flight behaviour.

1.20 A similar aircraft was flown to evaluate the effects of the nosewheel becoming unlocked in flight. The nosewheel became unlocked on each take-off from the grass runway used, with resulting deflections in both directions. No difficulty was found in controlling the aircraft with rudder, but it was a minor nuisance. Re-engaging the nosewheel lock, however, did require a reduction of airspeed and power, then large rudder inputs. This action involved yawing motions while close to the stall and could have been a significant distraction if the pilot chose to perform it at an unsuitable time such as during the initial climb after take-off. Overall, the aircraft handling was straightforward and predictable, with the nosewheel lock system an idiosyncrasy of the type.

1.21 The pilot could have been expected to be familiar with his aircraft, having built it and flown it for 266 hours. His previous flight was six weeks before the accident flight. It was considered unlikely that he would have allowed an unlocked nosewheel to distract him at a low height after take-off.

1.22 The aircraft's mass and centre of gravity were within the approved limits. The stalling and spinning characteristics would have been normal, as a result.

1.23 The north-westerly surface wind, while not strong had commenced about 30 minutes before the accident.

1.24 The observed drift while the aircraft was climbing suggested that the wind aloft was significantly stronger than on the ground. As a result, moderate mechanical turbulence may have been present up to a few hundred feet above ground level. Such turbulence could have exacerbated the stall behaviour of the aircraft before the pilot responded to the loss of engine power by lowering the aircraft's nose.

2. FINDINGS

2.1 The pilot was suitably licensed and experienced to conduct the flight.

2.2 The aircraft had a valid Permit to Fly and Maintenance Release.

2.3 The aircraft was properly loaded.

2.4 A loss of engine power occurred shortly after take-off.

2.5 The loss of power was probably associated with an undetermined fuel problem.

2.6 After the power loss the aircraft stalled and spun to the ground.

2.7 The height at which this loss of control occurred precluded recovery.

2.8 When the power loss occurred the aircraft was in a suitable position to make a forced landing.

2.9 Turbulence associated with the north-west wind may have exacerbated the stall behaviour of the aircraft.

2.10 The pilot probably did not respond to the power loss in time to prevent the stall occurring.

12 March 1992

M F DUNPHY
Chief Commissioner