

AIRCRAFT ACCIDENT REPORT
OCCURRENCE NUMBER 12/1417
ZENAIR ZODIAC 601UL
ZK-JFN
LOSS OF CONTROL DURING FORCED LANDING
SOUTH HEAD,
HELENSVILLE
1 APRIL 2012



(Photograph sourced from: <http://nzcivair.blogspot.com>)

FOREWORD

As a signatory to the Convention on International Civil Aviation 1944 (“the Chicago Convention”) New Zealand has international obligations in respect of the investigation of accidents and incidents. Pursuant to Articles 26 and 37 of the Chicago Convention, the International Civil Aviation Organisation (“ICAO”) issued Annex 13 to the Convention setting out International Standards and Recommended Practices in respect of the investigation of aircraft accidents and incidents.

New Zealand’s international obligations are reflected in the Civil Aviation Act 1990 (“the Act”) and the Transport Accident Investigation Commission Act 1990 (“the TAIC Act”).

Section 72B(2)(d) and (e) of the Civil Aviation Act 1990 Act also provides:

72B Functions of Authority

(2) The Authority has the following functions:

- (d) To investigate and review civil aviation accidents and incidents in its capacity as the responsible safety and security authority, subject to the limitations set out in section [14\(3\)](#) of the [Transport Accident Investigation Commission Act 1990](#);
- (e) To notify the Transport Accident Investigation Commission in accordance with section [27](#) of this Act of accidents and incidents notified to the Authority;

In the case of a fatal aviation accident, the final CAA investigation report will generally be highly relevant to an inquiry, and in some circumstances, an inquest, conducted by a Coroner. CAA investigations are not however done for, or on behalf of, a Coroner.

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Glossary of abbreviations

amsl	above mean sea level
°C	Celsius
E	east
GPS	global positioning system
hPa	hectopascal(s)
hp	horsepower
km	kilometre(s)
L/hr	litres per hour
mph	miles per hour
MHz	megahertz
NM	nautical miles
NW	north-west
NZST	New Zealand Standard Time
RNZAF	Royal New Zealand Air Force
S	south
s/n	serial number
UTC	Coordinated Universal Time
WGS 84	World Geodetic System 1984

Data Summary

Aircraft type, serial number and registration:	Zenair Zodiac 601UL, s/n 6-2262, ZK-JFN
Number and type of engines:	1 Rotax 912 (80 hp)
Year of manufacture:	1995
Date and time:	1 April 2012, 1247 hours ¹
Location:	South Head, 13 NM NW of Helensville Latitude ² : S36° 31'52.14" Longitude: E174° 15'20.10" Altitude: 350 feet amsl
Type of flight:	Private
Persons on board:	Crew: 1 Passenger: 1
Injuries:	Crew: 1 Fatal Passenger: 1 Fatal
Nature of damage:	Aircraft destroyed
Pilot's licence:	Advanced Microlight Pilot Certificate (SAC)
Pilot's age:	73 years
Pilot's total flying experience:	629.1 hours total flight time 27.2 hours on type
Information sources:	Civil Aviation Authority Field Investigation
Investigator in Charge:	Mr S J Walker

¹ All times are NZST (UTC + 12 hours).

² World Geodetic System (WGS 84) co-ordinates.

Synopsis

The Civil Aviation Authority (CAA) was notified at 1300 hours by the Rescue Coordination Centre New Zealand (RCCNZ) on Sunday 1 April 2012 that the pilot of an aircraft flying in the vicinity of Kaipara Harbour had declared a MAYDAY and a search was underway to locate the aircraft. At 1400 hours a farmer discovered that an aircraft had crashed on his South Head property and was on fire. Emergency services personnel arrived on scene shortly afterward found the occupants deceased. The aircraft was identified as ZK-JFN, a Zenair Zodiac 601UL microlight aircraft.

The Transport Accident Investigation Commission (TAIC) was notified shortly thereafter. The TAIC declined to investigate. A CAA field investigation was commenced the following day.

1. Factual information

1.1 History of the flight

- 1.1.1 The pilot of ZK-JFN and his passenger, who were partners in the ownership of the aircraft, had flown from Dargaville Aerodrome to Paraparaumu Aerodrome two days prior to the accident to attend the RNZAF Ohakea Airshow. The accident occurred on the return flight.
- 1.1.2 On the morning of the accident, friends, with whom the pilot and passenger had been staying over the weekend of the airshow, noted that both were well rested and in good spirits. They observed the pilot refuel the aircraft with automotive fuel obtained from a nearby petrol station. At approximately 0845 hours they witnessed the pilot of ZK-JFN take off from Paraparaumu Aerodrome, with his passenger onboard. During the take-off the aircraft became airborne prematurely, pitching to an excessive angle.
- 1.1.3 At approximately midday, ZK-JFN was seen to orbit above the pilot's house at Waiuku, which entailed a slight detour from the intended track.
- 1.1.4 At 1245 hours a number of pilots operating in the vicinity of Kaipara Harbour heard a MAYDAY call from the pilot of ZK-JFN on the Kaipara local area frequency of 119.1 MHz, containing the information "MAYDAY, ZK-JFN, engine out, 1500 feet, precautionary landing, South Head". This call was made in a calm manner. The message was relayed to Airways Flight Information Service who contacted RCCNZ. A search and rescue operation was initiated immediately.
- 1.1.5 At 1400 hours a farmer discovered that an aircraft had crashed on his South Head property and was on fire. Emergency services personnel who arrived on scene shortly afterward found the occupants deceased.
- 1.1.6 Two hand held GPS units were ejected during the accident sequence. Both held identical data which revealed track information from the flight.
- 1.1.7 From the GPS data it could be seen that, during cruise flight while tracking seaward of the west coast of South Head, the groundspeed reduced and the aircraft commenced a turn to the right, immediately followed by a turn to the left, heading in an easterly direction. A north-easterly heading was then maintained over a distance of 1.5 NM at approximately 44 mph groundspeed until a point where the aircraft

performed a tight left turn toward the north-west. This final turn was in close proximity to where the aircraft struck the ground.

1.1.8 The groundspeed recorded by the GPS unit immediately prior to the impact was 50.6 mph.

1.1.9 The accident occurred at 1247 hours, at South Head, 13 NM north-west of Helensville at 350 feet amsl, Latitude S36° 31'52.14" and Longitude E174° 15'20.10".

1.2 Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Other</i>
Fatal	1	1	0
Serious	0	0	0
Minor/None	0	0	

1.3 Damage to aircraft

1.3.1. The aircraft was destroyed.

1.4 Other damage

1.4.1 Nil.

1.5 Personnel information

1.5.1 The pilot held an Advanced Pilot Certificate issued by the Sports Aviation Corp of New Zealand (SAC) on 24 January 2007, with his conversion for ZK-JFN being completed on 24 February 2012. His last microlight Biennial Flight Review was completed on 8 April 2010. The pilot held a valid Medical Certificate for microlight aircraft issued on 3 February 2012.

1.5.2 He also held a lifetime New Zealand Private Pilot Licence PPL(A) issued on 2 March 1996. However the pilot was not able to obtain the Class II medical certification required to support his PPL.

1.5.3 The records contained in the Pilot's Logbook and the information gathered from the GPS data for the subsequent flights revealed that the pilot had a total of 629.1 hours flight experience. His flight experience on type was 27.1 hours, which was the total hours flown by the pilot within the 90 days preceding the accident. In the two years preceding the accident the pilot had flown a total of 43.8 hours.

1.6 Aircraft information

1.6.1 Zenair Zodiac 601UL, ZK-JFN, serial number 6-2262, was manufactured in 1995. It was a low wing, twin seat, microlight aircraft, the structure being of mainly aluminium construction. It was first registered in New Zealand on 6 July 1995, and issued with a Flight Permit on 8 December 1995. It had accrued a total of 1036.7 hours flight time at the time of the accident. The most recent scheduled maintenance

activity was an Annual Aircraft Condition Inspection carried out on 18 November 2011. No significant discrepancies were detected.

- 1.6.2 The Rotax 912 engine was fitted with a three bladed, electrically controlled, variable pitch, Airmaster AP308 propeller with a diameter of 68 inches. The pitch of the propeller was controlled by an Airmaster AC200 'Smart Pitch' electronic controller mounted on the instrument panel.
- 1.6.3 The propeller controller incorporated normal automatic control and manual over-ride (refer to figure 1). When the 'auto/manual' switch was in the 'auto' position the desired governing speed of the propeller was selected using a rotary selector switch on the controller. The rotary selector switch had positions marked 'T.O., Climb, Cruise, Hold, and Feather'. When the 'auto/manual' toggle switch was in the 'manual' position the rotary selector switch had no functionality, and the pitch of the propeller was selected directly using a separate manual control switch mounted on the instrument panel near to the controller. The toggle switch moved the propeller pitch toward fine or coarse. Three tri colour LED indicator lights reflected the current status of the propeller and control system.



Figure 1. Airmaster AC200 Propeller Controller

- 1.6.4 The 110 litre fuel capacity comprised of 25 litres in each of the two wing tanks, and a 60 litre main tank located forward of the instrument panel. The contents of the main fuel tank were visible on a direct reading sight gauge tube in the centre of the instrument panel. The two wing tanks were interconnected and their contents were supplied to the main tank via an electric fuel pump. There was an auxiliary electric

fuel pump as a back-up to supply fuel directly to the carburettors in the case of the engine mechanical fuel pump failure.

- 1.6.5 The aircraft manufacturer specifies the stall speed as 39 mph for single pilot and 44 mph with two occupants.

1.7 Meteorological information

- 1.7.1 The METAR³ for Auckland Aerodrome issued at 0100 hours UTC on 1 April 2012 reported a light easterly wind of 10 knots. The visibility was in excess of 10 kilometres. The cloud was scattered (3-4 Oktas⁴) at 3000 feet. The temperature was 21°C and the dewpoint was 15°C. The sea-level pressure was 1019 hPa.

1.8 Aids to navigation

- 1.8.1 Nil.

1.9 Communications

- 1.9.1 The aircraft was fitted with a VHF radio. A MAYDAY call was made by the pilot of ZK-JFN on the Kaipara Harbour local area frequency 119.1 MHz which was received by aircraft operating in the vicinity and relayed to Airways Christchurch Flight Information Service.

1.10 Aerodrome information

- 1.10.1 Not applicable.

1.11 Flight recorders

- 1.11.1 Not applicable.

1.12 Wreckage and impact information

- 1.12.1 The aircraft struck terrain on open farmland, in a flat left spin. The engine was not producing power at the time of the ground impact. Fire consumed the centre fuselage and engine compartment and appeared to have been predominantly fed by fuel from the main fuel tank. The relatively undamaged right wing tank contained a small amount of residual fuel after the contents had been lost from the severed outlet pipe.

- 1.12.2 The majority of evidence was destroyed owing to the consumption of the aircraft by fire. However, as far as could be determined, control system integrity was established at the accident site.

1.13 Medical and pathological information

- 1.13.1 The Post Mortem Reports revealed that the occupants died of injuries consistent with a high energy impact.

³ Coded weather report detailing conditions at an aerodrome, predominantly used by pilots for flight planning purposes.

⁴ The fraction of the sky that is obscured by clouds, expressed in eighths.

1.14 Fire

- 1.14.1 A considerable post-impact fire consumed the engine compartment and centre fuselage. The source of ignition could not be determined.

1.15 Survival aspects

- 1.15.1 The accident was not survivable.

1.16 Tests and research

- 1.16.1 The engine and propeller were removed from the wreckage and disassembled. They were found to have no pre-existing mechanical defects. It was noted that the propeller was in 'course' pitch at the time the aircraft struck the ground

1.17 Organisational and management information

- 1.17.1 Not applicable.

1.18 Additional information

- 1.18.1 While at Paraparaumu Aerodrome the pilot mentioned to his friends that he was concerned that the rate of fuel usage was excessive during the previous flight. He reported that the aircraft had used fuel at a rate of 25 L/hr compared with the usual rate of 14 L/hr. This anomaly was investigated during the weekend by the group of friends.
- 1.18.2 The pilot mentioned that the gauge marked 'manifold pressure' had indicated zero for the duration of the flight, which the pilot thought was normal. The pilot thought that another gauge marked 'boost' was an indication of engine power. There was some confusion regarding the purpose of the gauges. It was determined the pilot did not know how to operate the propeller controller correctly, using the automatic rotary selector to attempt to control the propeller speed while the controller was selected to 'manual' over-ride. The group thought that the manifold air pressure gauge reading zero reflected that the propeller had remained in 'fine' pitch for the duration of the flight, resulting in the excessive fuel usage. The friends believed that the pilot appeared to have learned how to correctly operate the propeller controller prior and read the engine instruments prior to the take-off, on the accident flight.
- 1.18.3 Additionally, it was noted that grass and earth was attached to the underside of the tail section, as if the tail of the aircraft had struck the ground at some stage. The pilot explained to their friends that he had elected to land at Stratford Aerodrome to take on more fuel and, during the take-off from Stratford Aerodrome; the aircraft suffered a tail strike. Another pilot, who was flying locally in the vicinity of Stratford Aerodrome at the time, said that he saw the aircraft make a very steep approach to land after flying in the wrong direction around the circuit. He noted that the pilot of ZK-JFN did not make radio calls in response to his transmissions and observed that ZK-JFN took off too steeply, getting airborne prematurely and settling back down onto the grass runway.

1.19 Useful or effective investigation techniques

- 1.19.1 Nil.

2. Analysis

- 2.1 The nature of the cause of the 'engine failure' as reported by the pilot in his radio transmission could not be determined due to the destruction of the centre fuselage and engine compartment by fire. However mechanical failure of the engine or propeller and fuel exhaustion were eliminated as possible factors.
- 2.2 It appears that the pilot made a decision to conduct a forced landing, indicated by the turn away from the intended track almost immediately after passing over the west coast of South Head. The aircraft headed into wind throughout the 1.5 NM of flight prior to the accident until the final tight turn to the north-west. The tight turn was probably associated with the pilot making a final approach toward a suitable paddock.
- 2.3 The final tight turn placed the aircraft 'out of wind'. A groundspeed of 50.6 mph was recorded by the GPS unit immediately prior to the impact. The wind conditions reported at the time of the accident would have resulted in an estimated airspeed of approximately 40 mph, four mph below the specified stall speed for the aircraft.
- 2.4 It is highly likely that the pilot inadvertently allowed the airspeed to decrease to a value where an aerodynamic stall occurred. The stall developed into a spin with insufficient altitude available to recover control.
- 2.5 It is evident that the pilot had exhibited inadequate knowledge of the propeller control system and engine indications, and appears to have demonstrated poor handling of the aircraft at times during the flight, causing concern to other pilots. This was probably an indication that the pilot may not have been competent with the operation and handling of his aircraft at the time of the accident. The apparent lack of competency may explain the pilot's difficulty in conducting a successful forced landing.

3. Conclusions

- 3.1 The aircraft had a valid Permit to Fly and had been maintained in accordance with the SAC requirements.
- 3.2 The pilot was appropriately licenced and rated for the flight.
- 3.3 While in the cruise the pilot reported an engine problem.
- 3.4 During the attempted forced landing the pilot lost control of the aircraft.
- 3.5 The aircraft entered a stall, followed by a flat spin to the left with insufficient height to recover.
- 3.6 No reason for the engine power loss could be determined.
- 3.7 The accident was not survivable.

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