

**AIRCRAFT ACCIDENT REPORT**  
**OCCURRENCE NUMBER 03/1902**  
**PIPER PA18-150 SUPER CUB**  
**ZK-SHG**  
**TAURANGA AERODROME**  
**2 JULY 2003**



**Glossary of abbreviations used in this report:**

CAA	Civil Aviation Authority
E	east
m	metre(s)
M	magnetic
NZST	New Zealand Standard Time
S	south
WGS 84	World Geodetic System 1984

## AIRCRAFT ACCIDENT REPORT

### OCCURRENCE No 03/1902

<b>Aircraft type, serial number and registration:</b>	Piper PA18-150, 18-7709098 ZK-SHG
<b>Number and type of engines:</b>	1 Lycoming O-360-A4M
<b>Year of manufacture:</b>	1977
<b>Date and time:</b>	2 July 2003, 1530 hours <sup>1</sup> (approx)
<b>Location:</b>	Tauranga Aerodrome Latitude <sup>2</sup> : S 37° 40.17' Longitude: E 176 11.50'
<b>Type of flight:</b>	Glider towing
<b>Persons on board:</b>	Crew: 1
<b>Injuries:</b>	Crew: 1 fatal
<b>Nature of damage:</b>	Aircraft destroyed
<b>Pilot-in-command's licence:</b>	Commercial Pilot Licence (Aeroplane)
<b>Pilot-in-command's age:</b>	39 years
<b>Pilot-in-command's total flying experience:</b>	431 hours, 28 on type
<b>Information sources:</b>	Civil Aviation Authority field investigation
<b>Investigator in Charge:</b>	Mr J A Daley

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<sup>1</sup> Times are NZST (UTC+12 hours)

<sup>2</sup> WGS 84 co-ordinates

(Cover photo courtesy of Dave Bates)

## Synopsis

The Civil Aviation Authority was notified of the accident at about 1600 hours on Wednesday 2 July 2003. The Transport Accident Investigation Commission was in turn notified shortly thereafter, but declined to investigate. A CAA site investigation was commenced the next day.

Immediately after take-off on a glider tow, the aeroplane climbed abruptly to a steep nose-up attitude, yawed to the left and dived to the ground. The pilot was killed and the aircraft destroyed in the ensuing impact.

## 1. Factual information

### 1.1 History of the flight

- 1.1.1 On 2 July 2003, the pilot and gliding club duty instructor met at Tauranga Aerodrome at about midday to discuss the day's operations. After lunch, the pair pulled the tow aeroplane out of the gliding club hangar, and the pilot completed a pre-flight inspection.
- 1.1.2 There was some discussion between the duty instructor and the tow pilot as to whether the towplane should be parked into wind or downwind, in the moderate south-westerly wind at the time. The duty instructor suggested parking tail into wind and securing the controls "with the straps" to stop the elevators and ailerons "flapping around in the wind". The pilot mentioned using the rear seat belts, giving the duty instructor the impression that if the pilot had used the front belts he would have to readjust them again for each flight.
- 1.1.3 The gliding operation was then set up for grass runway 21, the first glider being towed off at 1321 hours. The second tow, delayed initially because of conflicting traffic, was airborne at 1430, with the duty instructor and a student in the glider. A third tow, with a single-seat glider, commenced at 1448 hours.
- 1.1.4 The final tow involved another single seat glider, and the glider pilot had told the tow pilot that he would like to operate in the Tauranga city area. The pilot's initial radio call to the tower controller indicated that they would be operating in the Matakana area, but this was corrected to Tauranga city in a subsequent call by the glider pilot.
- 1.1.5 The glider pilot (who was also a tow pilot and instructor) described the take-off as routine until about 12 feet above the ground, when the towplane suddenly began to pitch up. The glider pilot initially thought that it may have been the result of a wind gust but noticed that the tow pilot took no corrective action.
- 1.1.6 Two or three seconds later, with the towplane still in a nose-high attitude, the glider pilot did not know what was happening, and prepared to release the tow rope. He also noticed that the elevators on the towplane had a large upward deflection. The tow aircraft continued to pitch up, and the glider pilot, fearing

that the towplane aircraft might fall on his glider, released the tow rope and passed the towplane which was by now above him and to his left.

- 1.1.7 The glider pilot watched the towplane continue its near-vertical climb and then drop to the left. He did not see the towplane strike the ground, as he was concentrating on landing ahead on the remainder of the grass runway.
- 1.1.8 The duty instructor watched the towplane make an apparently normal take-off, but about one third of the way down the runway, he saw it climb very steeply into a near-vertical attitude. The climb continued to 100-200 feet, where the aircraft seemed to “hang on its propeller”, before making a very slight tail slide, pitching down and striking the ground.
- 1.1.9 As soon as the glider pilot had landed, he notified the tower controller of the accident, and then ran over to the towplane with the duty instructor and other witnesses to give assistance. They found the pilot lying halfway out of the cockpit, and the glider pilot (who has medical qualifications) could not detect any signs of life.
- 1.1.10 The accident occurred in daylight, at approximately 1530 hours NZST, at Tauranga Aerodrome, at an elevation of 13 feet. Grid reference: 260-U14-917875; latitude S 37° 40.17', longitude E 176° 11.50'.

## 1.2 Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Other</i>
Fatal	1	0	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 aged 39 held a Commercial Pilot Licence (Aeroplane) and a Class 1 medical certificate valid until 17 November 2003.
- 1.5.2 The pilot had completed his PA-18 type rating on 26 March 2003, and his glider tow rating on 30 April 2003.
- 1.5.3 He had a total of 28 hours on type, of which 14.5 were on glider towing operations.

## **1.6 Aircraft information**

- 1.6.1 Piper PA-18-150 “Super Cub” serial number 18-7709098 was manufactured in 1977, and was first registered in New Zealand as ZK-SHG in 1996. At the time of the accident the aircraft had accrued 1579.1 hours in service.
- 1.6.2 The engine, Lycoming 0-360-A4M serial number RL-34967-36A, was installed in the airframe on 7 October 1997 and at the time of the accident had run 1031.08 hours since new.
- 1.6.3 The most recent scheduled maintenance was a 100-hourly check performed on 8 May 2003 at 1575.3 airframe hours. An annual review of airworthiness was carried out on 20 December 2002.
- 1.6.4 The aircraft had approved performance modifications which included: a 180-horsepower engine, increased wingspan, turned down wingtips as well as larger tail and elevator surfaces. The aircraft had a tandem seating arrangement and was fitted with dual controls. The optional integral control lock, normally installed in the front seating position in PA-18 aircraft had been removed from this aeroplane at some stage in its life, apparently to make room for additional radio equipment.

## **1.7 Meteorological information**

- 1.7.1 Conditions at Tauranga Aerodrome at the time of the accident were: scattered cloud at 2500 feet, and a surface wind of 230° M, 15 knots gusting to 25.

## **1.8 Aids to navigation**

- 1.8.1 Not applicable.

## **1.9 Communications**

- 1.9.1 Not applicable.

## **1.10 Aerodrome information**

- 1.10.1 Tauranga Aerodrome has a sealed main runway 07/25, a grass parallel runway 07/25, a grass cross runway 16/34 and an additional grass runway 03/21<sup>3</sup>. Grass runway 03/21 is 640 m long and 60 m wide, with no slope, and is the runway exclusively used for gliding operations.
- 1.10.2 An aerodrome control service is provided by Tauranga Tower.

## **1.11 Flight recorders**

- 1.11.1 Not applicable.

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<sup>3</sup> The runway designator has subsequently changed to 04/22, because of changing magnetic variation.

## **1.12 Wreckage and impact information**

- 1.12.1 The aeroplane struck the grassed area between runways 21 and 16, approximately 380 m from the threshold of runway 21, and 80 m to the left of centreline. It struck the ground in an almost-vertical dive, bounced approximately two metres to the left after impact and came to rest inverted, on a heading approximately parallel to the direction of take-off.
- 1.12.2 The engine was forced rearwards such that a propeller tip struck the inboard leading edge of the left wing, the leading edges of both wings were deformed from ground impact, and there was severe longitudinal compression of the cabin area and fuselage.
- 1.12.3 All of the aircraft was accounted for at the accident site and during subsequent salvage. The wreckage examination for pre-impact control integrity found that the elevators were in the full-up position and would not move freely. Further investigation to determine the reason for the immovable elevator revealed that the rear control column was held back against the rear seat by the rear seat harness.
- 1.12.4 Engine control positions were not considered significant because of the displacement of the engine at impact. The magneto switches were found in the “both on” position, but the master switch was damaged such that its pre-impact position could not be determined.
- 1.12.5 The tow rope was located, undamaged, on runway 21 approximately 65 m to the north of the impact point, clear of both the glider and tow aircraft.

## **1.13 Medical and pathological information**

- 1.13.1 Post-mortem examination showed that the pilot died of traumatic injuries sustained at the time of impact.
- 1.13.2 No evidence was found of any pre-existing condition which may have led to in-flight incapacitation of the pilot.
- 1.13.3 Toxicological tests revealed nothing of significance.

## **1.14 Fire**

- 1.14.1 Fire did not occur, despite the rupturing of both fuel tanks at impact.

## **1.15 Survival aspects**

- 1.15.1 Although the pilot was restrained by a lap belt and harness, impact forces and the loss of occupiable space combined to render the accident unsurvivable.
- 1.15.2 A Narco ELT 10 emergency locator transmitter was installed, and operated as intended on impact. An aircraft engineer who came to give assistance immediately after the accident switched it off.

## **1.16 Tests and research**

- 1.16.1 The witness mark left by the rear control column on the back cushion of the rear seat was subject to specialist examination by a materials engineer. The investigation report stated that “the damage to the seat cover and underlying foam cushion was considered to be consistent with the application of a localised high impact load, such as could occur in an accident situation”.
- 1.16.2 The engine was examined by engineers, and it was determined that it had been operating normally, and was not a factor in the accident.
- 1.16.3 A police forensic team carried out fingerprint checks on the rear seat belts but no usable prints could be found.

## **1.17 Organisational and management information**

- 1.17.1 Not applicable.

## **1.18 Additional information**

- 1.18.1 Nil.

## **1.19 Useful or effective investigation techniques**

- 1.19.1 Nil.

## **2. Analysis**

- 2.1 From the witness evidence, technical investigation, and performance on the previous glider tow sorties, the aeroplane was determined to have been operating normally.
- 2.2 Because of the prevailing wind, with gusts up to 25 knots, the pilot elected to park the towplane downwind between flights, and secure the controls by restraining the rear control column with the rear seat belt and harness.
- 2.3 On the final tow, the pilot took off with the controls still secured, with the ailerons neutral and elevators full up. In the early stages of the take-off, this could go unnoticed, as the glider normally becomes airborne first, lifting the towplane’s tail clear of the ground in the process. As airspeed increased, however, the towplane’s control surfaces would become progressively more effective, resulting in the rapid pitch-up observed.
- 2.4 With the pilot restrained by his own harness in the front seat he would not be in a position to release the rear harness from the controls, and this difficulty would have been compounded by the aircraft’s attitude rapidly becoming extreme. The aeroplane was fundamentally out of the pilot’s control, and there was nothing he could do to prevent the steep climb, stall and near-vertical dive.



- 2.5 The glider pilot realised that there was a problem with the towplane, and released his end of the tow rope, landing ahead on the remaining available runway. The location of the tow rope, undamaged, some 65 metres from the accident site indicates that the tow pilot, on realising his critical situation, released the rope as well.
- 2.6 The pilot may well have been distracted by something. This was suggested by his request for operations in the Matakana area, as opposed to the Tauranga city area which both he and the glider pilot had discussed minutes earlier. This error was subsequently corrected by the glider pilot's radio transmission.
- 2.7 Furthermore, the pilot omitted to complete his drill of vital actions/pre-take-off checks, where the final check is: "Controls - full, free, and correct movement". Performance of this check would have alerted him immediately to the fact that the controls were restrained. It could not be determined why the pilot did not, firstly, release the controls and, secondly, check for normal operation before take-off.

### **3. Conclusions**

- 3.1 The pilot was appropriately qualified and experienced to carry out the series of flights.
- 3.2 The pilot held a valid medical certificate and was fit for flight.
- 3.3 The aircraft had a valid Airworthiness Certificate and had been maintained in accordance with relevant requirements.
- 3.4 In the prevailing wind conditions, the pilot had restrained the flight controls by securing the rear control column with the rear lap and shoulder harness system.
- 3.5 The pilot failed to complete his pre-take-off checks to confirm that the flight controls had full and free movement in the correct sense.
- 3.6 The pilot commenced take-off with the elevators effectively locked in the full-up position, resulting in a steep, uncontrollable climb.
- 3.7 The aircraft subsequently stalled, yawed to the left and struck the ground in a near-vertical dive.
- 3.8 The impact was not survivable.
- 3.9 No reason for the pilot's failure to release the controls before flight, or to check for correct operation, could be determined.

## 4. Safety action

4.1 In August 2003, Gliding New Zealand issued the following Safety Alert (reproduced verbatim) to gliding club Chief Flying Instructors for dissemination to all pilots:

*“A recent occurrence involving a Tow Plane indicates it is timely to emphasise the importance of fully completing the Drill of Vital Checks (Pre-Take off checks) before takeoff.*

*Other incident reports, both formal and informal, suggest we are seeing deficiencies in completion of checks; pre takeoff and pre landing. A number of glider incidents involve canopy open in flight or gear up landings. It would seem checks may not be carried out or not completely and correctly completed, contributing to occurrences.*

*Key to the successful completion of a check is;*

- *Start Again - if a pilot is interrupted during checks.*
- *Full and free movement of controls - requires special attention.*
- *Secure controls with the harness in the seat from which the aircraft is flown solo - if it is necessary to secure the controls of training gliders or two place tow planes employing the seat harness, do so with caution.*
- *Check unoccupied seats - Pilots should check unoccupied seats prior to take off for security and loose objects, particularly after breaks in flying.*

*Standard checks have been developed over years of experience and failure to complete is a latent defect that will contribute to incidents and accidents.”*

Report written by:

Authorised by:

(Signed)

(Signed)

J. Alan Daley  
Investigator in Charge  
28 April 2005

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