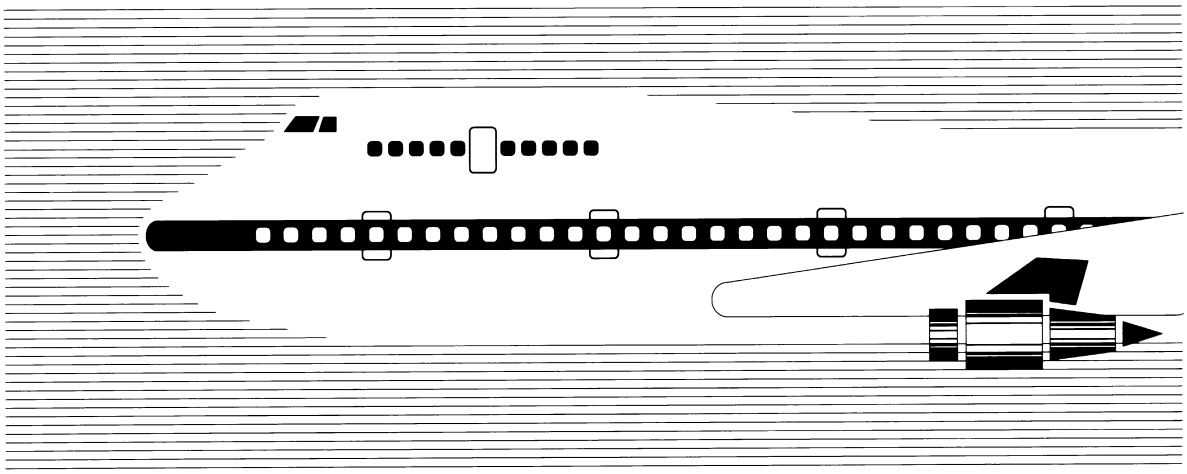
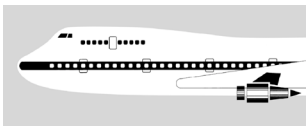
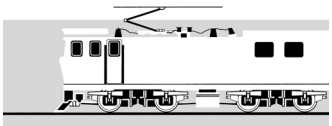


AVIATION OCCURRENCE REPORT

05-002 **Cessna 172, ZK-LLB, collision with terrain while low flying, 7 km south of Gibbston** **29 January 2005**


TRANSPORT ACCIDENT INVESTIGATION COMMISSION
NEW ZEALAND

The Transport Accident Investigation Commission is an independent Crown entity established to determine the circumstances and causes of accidents and incidents with a view to avoiding similar occurrences in the future. Accordingly it is inappropriate that reports should be used to assign fault or blame or determine liability, since neither the investigation nor the reporting process has been undertaken for that purpose.

The Commission may make recommendations to improve transport safety. The cost of implementing any recommendation must always be balanced against its benefits. Such analysis is a matter for the regulator and the industry.

Report 05-002

Cessna 172N
ZK-LLB

collision with terrain while low flying

7 km south of Gibbston

29 January 2005

Abstract

On Saturday 29 January 2005, at 1149, Scott Air Cessna 172 ZK-LLB was on a Police cannabis plantation spotting operation from Queenstown, when it collided with the valley side in Doolans Creek Valley 7 km south of Gibbston. The pilot and Police observer were killed and the aircraft was destroyed.

While circling in a confined mountainous valley the aircraft was briefly descended to a low altitude which did not conserve adequate manoeuvring margins from the valley sides. A further more rapid descent led to the aircraft colliding with the valley side in controlled flight. The cause of this further descent was not determined.

Contents

Figures

Abbreviations

°C	degrees Celsius
ELT	emergency locator transmitter
GPS	global positioning system
IFR	instrument flight rules
KIAS	knots indicated air speed
Km	kilometre
M	metre
mm	millimetre
QNH	altimeter subscale setting to obtain elevation when on the ground
RCC	rescue coordination centre
RPM	revolutions per minute
VFR	visual flight rules

Data Summary

Aircraft registration:	ZK-LLB
Type and serial number:	Cessna 172N, 17272157
Number and type of engines:	one Lycoming O-360-A4M
Year of manufacture:	1979
Operator:	Scott Air Limited
Date and time:	29 January 2005, 1149 NZDT
Location:	7 km south of Gibbston latitude: 45° 05′ south longitude: 168° 57′ east
Type of flight:	Commercial transport - survey
Persons on board:	crew: 2
Injuries:	crew: 2 fatal
Nature of damage:	aircraft destroyed
Pilot's licence:	commercial pilot licence (aeroplane)
Pilot's age:	33
Pilot's total flying experience:	About 3023 hours
Investigator-in-charge:	J J Goddard

ZK-LLB accident site looking southeast

1 Factual Information

1.1 History of the flight

1.1.1 The operator was chartered by the New Zealand Police to provide a low-level aerial survey operation during January and February 2005, searching for illicit cannabis plantations around rural parts of the country. A Police observer from each local Police area was carried, who would make and record observations using a global positioning system (GPS). A similar operation had been carried out in previous years.

1.1.2 The operation commenced on 2 January 2005, and proceeded substantially as planned. On 28 January, after completing the South Canterbury area, the pilot refuelled the aircraft at Timaru before the 57-minute ferry flight to Queenstown Aerodrome for the next phase of operations in that area, arriving about 1900.

1.1.3 On the morning of 29 January the pilot and Police observer completed plans for the day's operation, and boarded the aircraft. The pilot sat in the normal left pilot seat, with the observer in the left rear seat. At 1046 the pilot contacted Queenstown Tower by radio and requested departure clearance from the control zone. The flight detail given by the pilot was "low level to Rastus (Burn)". The aircraft was cleared for a Bungy Bridge departure from runway 05. After taxiing and receiving take-off clearance, the aircraft took off from runway 05 at 1052.

1.1.4 At 1056 the pilot reported "established at the mouth of the Rastus Burn", and Queenstown Tower responded "roger, and just call again clear of Bungy Bridge". The next radio call recorded was at 1117, when the pilot reported "Bungy Bridge, 1900 feet". Nothing further was heard from the aircraft.

1.1.5 Several witnesses in the Kawerau Valley between Queenstown Airport and Gibbston, 17 km to the east, reported seeing the aircraft. It was quite low above the terrain and in slow circling flight, proceeding to the east, then southwest from Gibbston over Coal Pit Saddle, gaining height as it went from view.

1.1.6 At 1213 the national Rescue Coordination Centre (RCC) received advice of a satellite-detected emergency locator transmitter (ELT), with one initial position 9 km southwest of Cromwell. At 1237 a Queenstown-based helicopter pilot reported an ELT signal between Cromwell and Queenstown, and at 1240 the RCC initiated a search by tasking a local helicopter company.

1.1.7 The search helicopter departed from Queenstown at 1322, with a paramedic and a spotter as crew, and was flown towards the position near Cromwell advised by the RCC. The ELT signal was used to assist the search, and the wreckage of ZK-LLB was found at 1412 on the south side of Doolans Creek Valley, about 3 km south of Coal Pit Saddle, at an altitude of about 2600 feet. The helicopter was landed nearby. The paramedic promptly checked the occupants of ZK-LLB, and found that they were both dead.

1.2 Injuries to persons

1.2.1

Injuries	Crew	Passengers	Others
Fatal	2	-	-
Serious	-	-	-
Minor/nil	-	-	

1.3 Damage to aircraft

1.3.1 ZK-LLB was destroyed by collision with the ground.

1.4 Other damage

1.4.1 Nil.

1.5 Personnel information

1.5.1

pilot:	male, aged 33 years.	
licence and ratings:	commercial pilot licence (aeroplane), instrument rating, C and D category instructor ratings.	
aircraft type ratings:	Cessna 152, 172, 182; Grumman AA-5; Partenavia P 68; Piper PA31, PA34, PA38.	
medical certificate:	class 1, valid to 29 June 2005.	
last IFR competency assessment:	29 October 2004.	
last VFR competency assessment:	17 December 2004	
last biennial flight review:	17 December 2004	
flying experience:	total, aeroplane	about 3023 hours
	total, last 90 days	about 178 hours (all C 172)
duty time:	about 4 hours	
rest before duty:	about 12 hours	
last rostered day off:	24 January 2005	

1.5.2 The pilot was the proprietor and chief pilot of Scott Air, a flight training and charter company based in Whakatane operating 2 Cessna 172 and one Piper PA 34 aircraft.

1.5.3 The pilot's flying was predominantly on charter operations, both VFR and IFR, with a few hours of instructing. Over the last year he had flown about 650 hours, shared between the Piper PA 34 and Cessna 172 aircraft. An appreciable amount of the VFR charter flying was on low-level survey operations.

1.5.4 The pilot was on the 5th day of flying after a rostered day off on the previous Monday, while the aircraft was having maintenance and rectification work done. The day before, Sunday 23 January, was an unplanned extra day off flying, as a result of an engine problem.

1.5.5 The pilot had flown the Police cannabis survey operation the previous year in the same aircraft, and Police observers from both years reported favourably on his careful flying and professional operation of the aircraft. He normally flew the aircraft on these surveys at low speed, about 60 knots, with a flap setting of about 10°, and in a series of left-hand circles for optimum view for both occupants seated on the left side of the aircraft. Normal operating height was at about 500 feet.

1.5.6 The last entry in the pilot's logbook was made on 1 November 2004. His total flying time has been estimated from diary notes after this date, but may be incomplete.

1.6 Aircraft information

1.6.1 ZK-LLB was a Cessna 172N single-engine high-wing 4-seat aeroplane, serial number 17272157, manufactured in 1979. An approved modification had been carried out in February 1994 which replaced the Lycoming O-320 engine with an O-360 engine of 180 horsepower. The aircraft was imported from Australia to New Zealand in December 1994. At the time of the accident it had flown about 9466 hours. The standard category Certificate of Airworthiness, issued in 1994, was non-terminating. The Certificate of Maintenance Review was valid to 31 December 2005, and the next periodic maintenance was due at 9534 hours or 24 July 2005, whichever came first. No defects were recorded on the aircraft technical log. The aircraft recently had been completely stripped and repainted, being returned to service on 5 November 2004.

1.6.2 The Lycoming O-360-A4M engine, serial number L33675-36A had run a total time of 3002 hours, and 1069 hours since major overhaul.

1.6.3 On 23 January 2005, the pilot had contacted the chief engineer of a local aircraft maintenance company in Timaru, where the aircraft was operating at the time, and reported that the engine was running roughly on start up that morning. They arranged for the engine problem to be attended to the next day, in addition to a routine 100-hour inspection which had been planned.

1.6.4 The engine problem was identified as a stuck exhaust valve on number 2 cylinder. The cylinder was removed and rectified by the local approved engine overhaul shop. The cause was reported as a build-up of carbon on the exhaust valve. The carbon was removed, the valve guide was honed to the correct clearance and both valves lapped to their seats. The cylinder was reassembled to the engine with a replacement pushrod and shroud tube. A replacement exhaust system was fitted because of a crack found in the muffler.

1.6.5 The engine performed normally on test, and the pilot had made no report of abnormal running over the next 4 days, which included 32 hours of flying operations.

1.6.6 After being refuelled at Timaru, the aircraft had flown for just under 2 hours. Fuel endurance at the power settings used on this operation was approximately 5 hours.

1.6.7 The Cessna 172 N flight manual gave power-off stalling speeds, at a weight 1043 kg and with 10° flap, as 44 KIAS (knots indicated air speed) with 0° bank, and 47 KIAS with 30° bank. At the weight of ZK-LLB, about 932 kg, these stalling speeds reduce to 42 KIAS with 0° bank and 45 KIAS with 30° bank. Power-on stalling speeds would be 1-3 knots slower, depending on the power set.

1.7 Meteorological information

1.7.1 A slow-moving high-pressure area centred east of New Zealand extended a ridge across South Island, giving fine settled weather to areas away from the east coast. Winds were generally light.

1.7.2 The Queenstown Aerodrome weather report at midday 29 January 2005 was: surface wind 240° at 5 knots, visibility 70 km, no significant cloud, temperature 19°C, dewpoint 14°C, barometric pressure (QNH) 1019 hectopascals.

1.7.3 Shortly after 1300 a group of 5 paraglider pilots launched from Mount Rosa, some 2 km north of the accident site. They reported good thermal lift on the north side of Mount Rosa of 600 to 1000 feet per minute up to an inversion layer at about 4600 feet. A northwest wind of 10 to 15 knots was reported at Coal Pit Saddle, but was lighter at higher altitude. They attributed this to the inversion layer channelling the airflow over Coal Pit Saddle, and expected that it would have caused the wind to flow down into Doolans Creek Valley.

1.7.4 The first people at the accident site reported that temperatures were hot and the wind mostly calm, with occasional gusts which they associated with thermal convection activity in the valley.

1.8 Aids to navigation

1.8.1 Not applicable.

1.9 Communication

1.9.1 Normal radio communications were carried out between the pilot and Queenstown air traffic control. Recordings of these are reported in section 1.1.

1.9.2 No communications were recorded from the Police radio fitted to the aircraft.

1.10 Aerodrome information

1.10.1 Not applicable.

1.11 Flight recorders

1.11.1 The aircraft was not fitted with flight recorders, nor was it required to be.

1.11.2 A portable Garmin 295 GPS was carried on the aircraft. A track log was recovered from the damaged GPS, and this provided a record of the aircraft's flight path, altitude and ground speed from take-off to the accident site. The data sampling frequency varied with the flight path, but averaged about one fix every 4 seconds during circling flight.

1.11.3 The recovered GPS data confirmed the reported flight path. After take-off the aircraft flew 18 left-hand circles over Rastus Burn until 1109, at GPS altitudes between 1700 and 3400 feet. The ground speed while circling averaged about 60 knots. It then flew east along the Kawerau River, with occasional circles, maintaining about 1800 feet, to arrive near Gibbston at 1123. After 7 circles near Gibbston it flew southwest in a series of left-hand circles, climbing up Coal Pit Road to cross Coal Pit Saddle at 3800 feet, at 1142. The aircraft descended to the south from the saddle into Doolans Creek, a confined valley running east between local peaks some 4500 feet high. At 1143, 8 more left-hand circles were flown, descending to the southeast along Doolans Creek from 3700 to 2700 feet at 1149. The last 4 circles of this series were essentially over the same area of the valley. The last GPS position was at 1149, at 2617 feet, and was close to the accident site.

1.11.4 Figures 1 and 2 show the overall track and the last track segment, while figure 3 shows a table of the last GPS data.

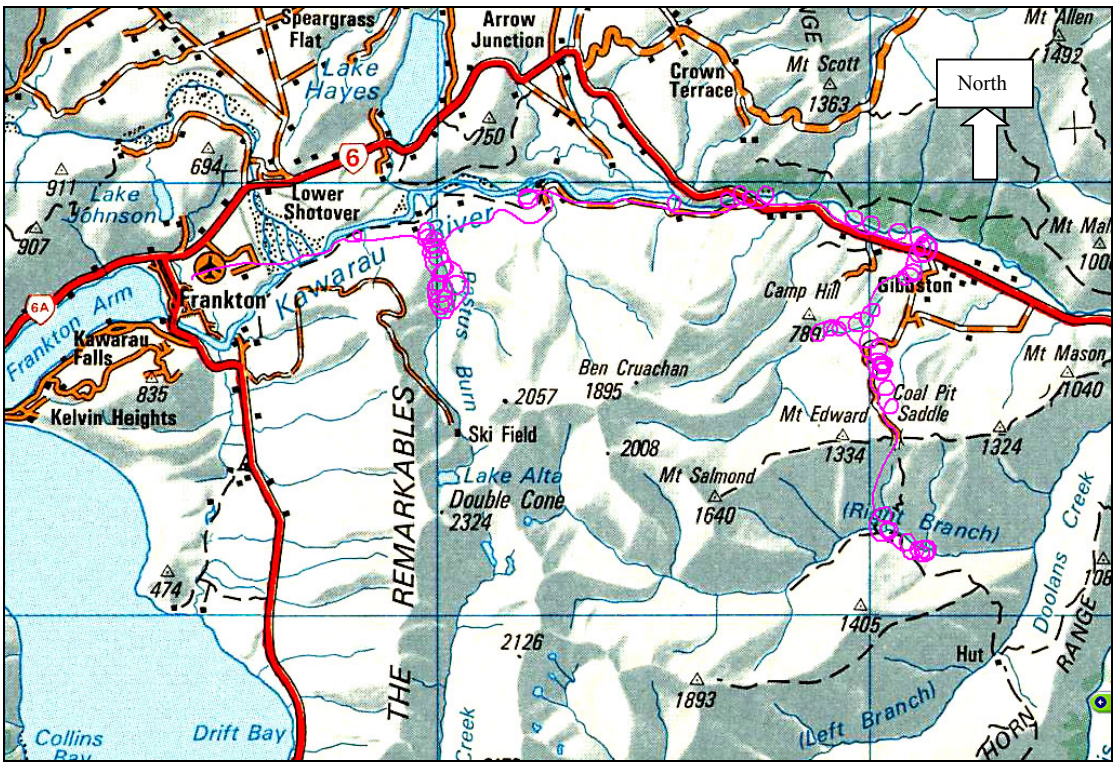


Figure 1
GPS track of the flight

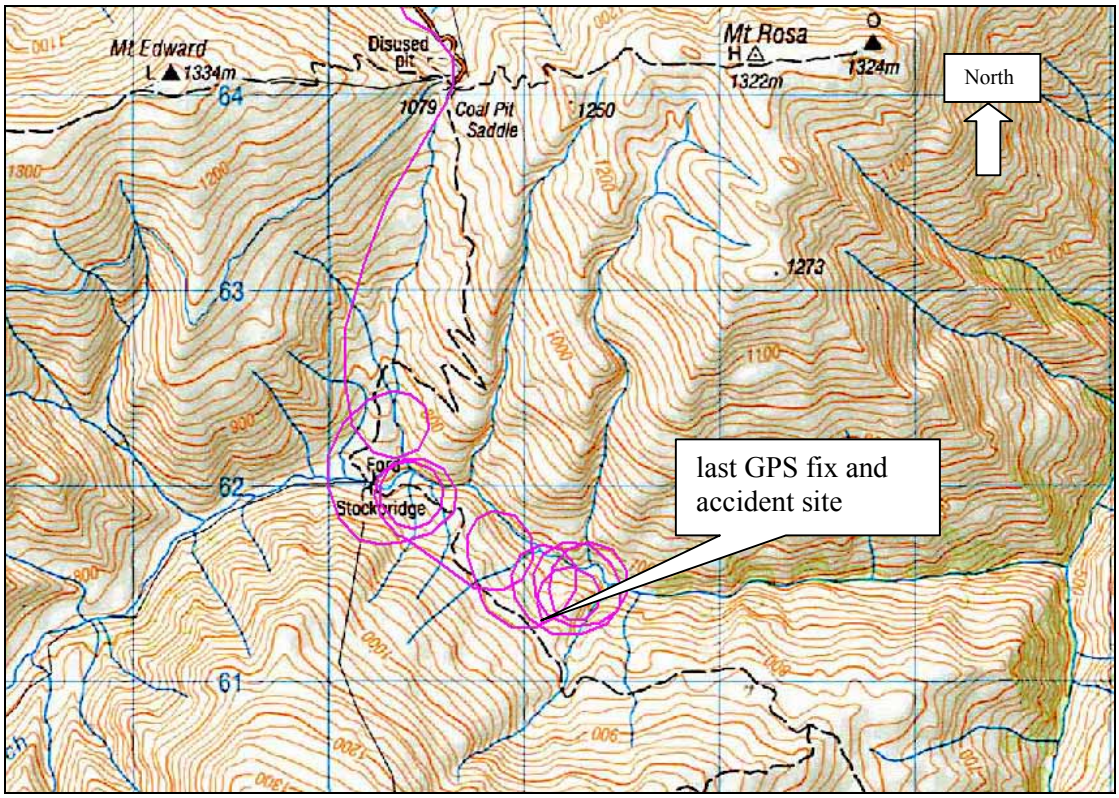
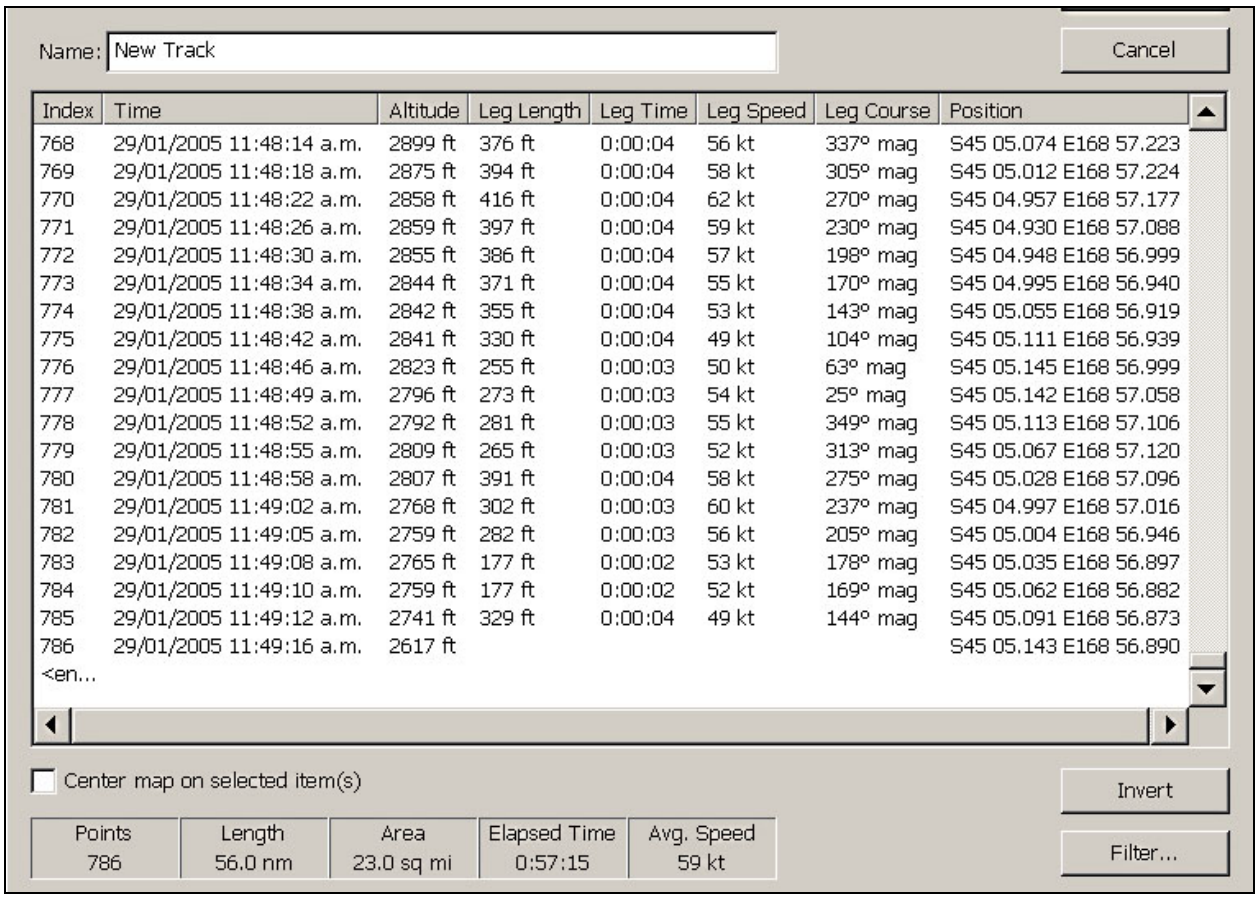


Figure 2
GPS track of the last part of the flight in Doolans Creek Valley



Name: New Track

Cancel

Index	Time	Altitude	Leg Length	Leg Time	Leg Speed	Leg Course	Position
768	29/01/2005 11:48:14 a.m.	2899 ft	376 ft	0:00:04	56 kt	337° mag	S45 05.074 E168 57.223
769	29/01/2005 11:48:18 a.m.	2875 ft	394 ft	0:00:04	58 kt	305° mag	S45 05.012 E168 57.224
770	29/01/2005 11:48:22 a.m.	2858 ft	416 ft	0:00:04	62 kt	270° mag	S45 04.957 E168 57.177
771	29/01/2005 11:48:26 a.m.	2859 ft	397 ft	0:00:04	59 kt	230° mag	S45 04.930 E168 57.088
772	29/01/2005 11:48:30 a.m.	2855 ft	386 ft	0:00:04	57 kt	198° mag	S45 04.948 E168 56.999
773	29/01/2005 11:48:34 a.m.	2844 ft	371 ft	0:00:04	55 kt	170° mag	S45 04.995 E168 56.940
774	29/01/2005 11:48:38 a.m.	2842 ft	355 ft	0:00:04	53 kt	143° mag	S45 05.055 E168 56.919
775	29/01/2005 11:48:42 a.m.	2841 ft	330 ft	0:00:04	49 kt	104° mag	S45 05.111 E168 56.939
776	29/01/2005 11:48:46 a.m.	2823 ft	255 ft	0:00:03	50 kt	63° mag	S45 05.145 E168 56.999
777	29/01/2005 11:48:49 a.m.	2796 ft	273 ft	0:00:03	54 kt	25° mag	S45 05.142 E168 57.058
778	29/01/2005 11:48:52 a.m.	2792 ft	281 ft	0:00:03	55 kt	349° mag	S45 05.113 E168 57.106
779	29/01/2005 11:48:55 a.m.	2809 ft	265 ft	0:00:03	52 kt	313° mag	S45 05.067 E168 57.120
780	29/01/2005 11:48:58 a.m.	2807 ft	391 ft	0:00:04	58 kt	275° mag	S45 05.028 E168 57.096
781	29/01/2005 11:49:02 a.m.	2768 ft	302 ft	0:00:03	60 kt	237° mag	S45 04.997 E168 57.016
782	29/01/2005 11:49:05 a.m.	2759 ft	282 ft	0:00:03	56 kt	205° mag	S45 05.004 E168 56.946
783	29/01/2005 11:49:08 a.m.	2765 ft	177 ft	0:00:02	53 kt	178° mag	S45 05.035 E168 56.897
784	29/01/2005 11:49:10 a.m.	2759 ft	177 ft	0:00:02	52 kt	169° mag	S45 05.062 E168 56.882
785	29/01/2005 11:49:12 a.m.	2741 ft	329 ft	0:00:04	49 kt	144° mag	S45 05.091 E168 56.873
786	29/01/2005 11:49:16 a.m.	2617 ft					S45 05.143 E168 56.890
<en...							

Center map on selected item(s)

Invert

Points	Length	Area	Elapsed Time	Avg. Speed
786	56.0 nm	23.0 sq mi	0:57:15	59 kt

Filter...

Figure 3
GPS data table

1.12 Wreckage and impact information

1.12.1 ZK-LLB was lying on its right side on the southern side of Doolans Creek Valley, facing uphill on a southerly heading, at an altitude of 2580 feet. The matagouri and tussock-covered valley sloped locally down at about 35° to Doolans Creek about 400 feet below. Some 20 feet above the aircraft the valley side flattened to a small terrace about 150 m wide, which carried a farm track around the hillside.

1.12.2 The first impact mark on the valley side was from the right wing tip, 7 m northwest of the aircraft. The final position of the aircraft was consistent with it having cartwheeled and rolled to the right about this wing tip to collide nose-first with the valley side. An impact mark containing the red lens from the left navigation light indicated that the left wing had collided with the valley side with the aircraft banked some 50° to the right. While the right wing tip mark did not directly indicate the flight path or attitude of the aircraft, its position in relation to the shape of the valley inferred that the aircraft was in a left turn, and probably nearly parallel to the valley when the right wing struck the terrain. The main undercarriage had not struck the valley side during the initial collision with the right wing tip, indicating that the angle of bank in the left turn was less than about 25°.

1.12.3 The nose-first collision had pushed the engine back, and had caused the cabin to collapse forward and down before springing back to some extent. The right wing was almost separated rearwards, while the left wing leading edge was substantially crushed back. Both propeller blades showed substantial chord-wise damage, consistent with rotation under power at ground impact.

1.12.4 The pre-impact integrity of the aircraft and engine control systems was established. Control positions at impact could not be established. The flaps appeared to be extended about 20°, but were free to move because of impact damage. In the cockpit the magnetos were on "both", throttle was full, carburettor heat was off, mixture was leaned about 15 mm, fuel selector was on "both", rudder trim position was central, elevator trim position was not determined. The instrument panel was badly damaged; available trapped instrument readings were: air speed 67 knots, altimeter subscale 1021, direction indicator 150°, engine tachometer 2200 RPM and 9459.3 hours, flap indicator 10°.

1.12.5 Little fuel was found in the ruptured wing tanks, but there was evidence of significant fuel spill around the aircraft.

1.12.6 Because of the nature of the Police operation being undertaken, the aircraft was examined for any evidence of criminal interference. No such evidence was found.

1.13 Medical and pathological information

1.13.1 The post-mortem and toxicological examinations of the pilot did not disclose any abnormalities that might have affected his ability to conduct the flight. A left wrist fracture was consistent with his holding the control wheel at impact.

1.13.2 The pilot's medical records indicated that he had a recurrent special medical assessment since 1998 for his class 1 medical certificate for a heart valve abnormality, resulting in a reduced period of currency. The post-mortem examination did not disclose any findings inconsistent with the diagnosis.

1.14 Fire

1.14.1 Fire did not occur.

1.15 Survival aspects

1.15.1 The severe deceleration forces, and the collapse of the cabin structure in the ground collision made this accident unsurvivable for either occupant.

1.16 Tests and research

1.16.1 The engine was taken to an approved engine overhaul facility (not the one which rectified the engine fault on 24 January 2005), for a complete strip and inspection. This included measuring the valve-to-valve guide clearances, because a reduced clearance can lead to a stuck valve. All valve clearances were within specified limits. The left magneto could not be tested because of impact damage, but the right magneto performed normally on test. Some spalling was noted on 2 camshaft lobes and one tappet body, but overall the engine was in normal mid-life condition.

1.16.2 The inspection found no evidence of mechanical failure, and no evidence of anything that would prevent the engine from delivering power.

1.17 Additional information

1.17.1 ZK-LLB was being operated with covert registration letters displayed, and with a false radio callsign. This was to enhance security during the Police operation to discover illicit cannabis plantations.

1.17.2 The area in the valley over which the aircraft had made the last 4 circles was examined during the investigation for any feature which might have engaged the pilot's or observer's interest. Nothing significant, which might relate to a cannabis plantation, was found.

2 Analysis

2.1 This collision with terrain occurred while the aircraft was being flown at low level within a confined mountainous valley. The pilot was flying the aircraft in the usual left hand circles, and at the customary low speed and flap configuration to achieve the search objectives. The pilot was well familiar and current with the operation, including those areas within mountainous terrain. He had been flying the search operation for the previous 3 weeks, and had flown the search in the same valley the previous year.

2.2 The GPS track plot showed that the aircraft was being flown in a series of 4 circles over approximately the same area when the collision occurred. The GPS data table showed that the series of circles was initially level, then slowly decreasing in altitude, from 3000 to 2800 feet over about 90 seconds. Then, over about 18 seconds, the altitude decreased by about 190 feet, during the last half-turn, to the final GPS fix at 2617 feet. This last circle was tighter than the previous ones, taking 36 seconds, compared with about 48 seconds. Most circles during the flight took 40 to 50 seconds.

2.3 A circle at 60 knots in 48 seconds would require about 20° of bank, while a circle in 36 seconds would require about 30° of bank. While either turn would be regarded as a gentle to moderate manoeuvre, and well within normal operational parameters, a turn with 30° of bank at 60 knots would require a deliberate increase of engine power to maintain both altitude and airspeed. The theoretical increase in induced drag while turning, compared with straight flight at the same slow speed, is 13% at 20° bank, and 33% at 30° bank. From a pilot's perspective an increase in engine speed of about 100 to 200 RPM would be required and should be applied by increasing the throttle as the bank was increased. The pilot was experienced in low-level low-speed circling, and would be expected to coordinate power changes with manoeuvres as a matter of course.

2.4 Whether the pilot did increase the engine power for this last tighter turn cannot be established, but the more rapid descent appears to have been accompanied by an unsteady but decreasing GPS-derived groundspeed. This GPS-derived speed is subject to some inaccuracy while the aircraft is turning, because the computed distance between successive GPS fixes at about every 4 seconds will be a straight line, whereas the true distance will be along the circumference of the circle, thus causing the GPS speed to be under stated. The groundspeed will vary anyway, from the wind speed affecting the aircraft as it turns. In this case the wind speed was probably light and variable, because no consistent variations in GPS speed with aircraft headings were evident while the aircraft was circling earlier in the flight.

2.5 The stalling speed of 45 KIAS in a 30° bank allowed a small margin of control provided the airspeed was maintained near to 60 knots. The wreckage evidence of a trapped airspeed indicator reading of 67 knots was probably reliable, and infers that the aircraft had not been slowed in the last turn to an airspeed where a stall and loss of control was likely.

2.6 A random downdraught associated with thermal activity could have led the aircraft to descend more rapidly during the last half-turn. The rate of descent, 190 feet in 18 seconds, or about 600 feet per minute, was similar to updraught strengths reported nearby by paraglider pilots that day. Such thermal turbulence should have been within the experience of the pilot, and any such downdraught should have been countered by his promptly increasing engine power, up to full power if needed. However there is no evidence of a downdraught, and this remains a hypothesis only.

2.7 A partial loss of engine power could have led to an accelerated descent. A complete loss of power obviously did not occur, because the descent with no power would have been more rapid, and the evidence from the propeller showed that power was being developed at ground impact. The strip and inspection of the engine showed no evidence of mechanical failure, or anything to prevent the engine from delivering power. In particular, a recurrence of the stuck valve problem encountered earlier in the week was considered unlikely. The aircraft should have had about

3 hours fuel remaining, and considerable fuel had spilled at the site, so fuel exhaustion was unlikely. It was concluded that a partial loss of engine power probably did not occur.

2.8 Whatever the cause of the accelerated descent in the last turn was, it could not be established. However, it did appear that the pilot may not have taken all possible steps to avoid the valley side. These steps could have included applying full power, and tightening the turn to the extent possible without stalling the aircraft. This may have been because he could not easily see how close he would be to the valley side if the aircraft descended, because of its particular shape just above the accident site.

2.9 The terrace just above the accident site did represent a discontinuity in the slope of the valley side, which in effect made the valley narrow down, should the aircraft descend to the level of the terrace, by a greater amount than might be expected from the general slope above. This should have been visible to the pilot as he circled the aircraft at 3000 feet, some 400 feet above the terrace, but it may not have been prominent or obviously relevant to his flight path at that stage. During the last half-turn, as the aircraft descended more rapidly towards the level of the terrace, the pilot's view of it ahead and to his right would have been obscured to some extent by the left bank attitude. His view in that direction from the left front seat would have been masked by the instrument panel and the aircraft nose. As a result, he may not have seen that the collision with the valley side was imminent, so did not take avoiding action.

2.10 The pilot's action during the last 4 circles in descending the aircraft below 3000 feet did substantially reduce the available space for the aircraft, and brought it unnecessarily low and close to the valley side. Even if the area of interest were in the creek bed some 800 feet below them at about 2200 feet, it would have been prudent to maintain altitude to conserve manoeuvring margins from the valley sides.

2.11 The Police cannabis spotting operation did require moderately low-level flying to be effective. The normal operating height of about 500 feet was probably near to optimum over open terrain, and provided moderate margins of space for safe manoeuvring in case of contingencies. In mountainous terrain, however, the margins did vary dynamically with local elevated terrain, as in this case, and the need to maintain safe margins could sometimes conflict with the desire to fly lower for better observation. A pilot must be experienced and skilled to make dynamic safety decisions about where and how low to fly to maintain adequate safety margins without compromising the ability to do the job.

2.12 The pilot of ZK-LLB was experienced in this operation, and Police observers had reported favourably on his flying. In this accident he had briefly flown lower than normal, thus reducing safety margins, and then some undetermined cause had made the aircraft descend further to collide with the valley side. Whether he had descended deliberately, or allowed it to happen because of temporary inattention or distraction, was not established.

2.13 The aircraft type, a Cessna 172 with a 180 horsepower engine, was generally suitable for the task. It had adequate performance at reduced weight with 2 occupants to provide a good reserve of manoeuvrability and rate of climb; it had a good downward field of view when circling for ground observation. It did have some horizontal field of view restrictions, but these were common to most aeroplane types not specially designed for observation. It was capable of flying at low speed with adequate controllability and margin above the stall.

3 Findings

Findings are listed in order of development and not in order of priority.

3.1 The pilot was appropriately licensed, experienced and fit to conduct the flight.

3.2 The aircraft had a valid Airworthiness Certificate, and had been appropriately maintained.

3.3 The aircraft type was suitable for the low-level survey task.

3.4 The aircraft was capable of normal flight when the collision occurred.

3.5 While circling in a confined mountainous valley the aircraft was briefly descended to a low altitude which did not conserve adequate manoeuvring margins from the valley sides.

3.6 A further more rapid descent led to the aircraft colliding with the valley side in controlled flight.

3.7 The cause of this latter descent was not determined, but engine failure probably did not occur.

3.8 The pilot may not have seen the valley side where the collision occurred because of his limited field of view.

4 Safety Actions

4.1 The New Zealand Police advised that the following changes have been implemented to the National Cannabis Crime Operation to improve safety:

- Fixed Wing Spotter training. This training includes: Spotting Techniques, Safety when working with Fixed Wing Aircraft, Flight following, Omnirover training and a Fixed Wing practical training flight - ensuring the spotter knows what to look for when spotting including Cannabis and hazards e.g. wires, other aircraft etc.
- Mandatory Flight Following for all aircraft involved in F/W spotting.
- Purchase of Personal ELTs for spotters.
- Computer purchases to assist with Flight following - data transmission from Aircraft to HQ vehicle.
- Re-written all standard operational procedures for the operation including both Fixed Wing and Helicopter.
- Conducted training and assessments for all new pilots (Mandatory) with Police approved trainer (old contractor).
- Ensured that the operator is now maintaining aircraft to Part 135 standard.
- Establishment of an Aerial Advisory group made up of lead Police personnel and external experts in their field of aviation operations.

Recent Aviation Occurrence Reports published by the Transport Accident Investigation Commission (most recent at top of list)

05-002	Cessna 172, ZK-LLB, collision with terrain while low flying, 7 km south of Gibbston, 29 January 2005
05-009	Eurocopter AS350 BA Squirrel, ZK-HGI, roll over on landing, Franz Josef Glacier, 17 August 2005
05-001	Gulfstream G-IV ZK-KFB and Piper PA 28 ZK-FTR , loss of separation, near Taupo 7 January 2005
04-009	Hughes 360D, ZK-HHT, heavy landing, Wanganui River, South Westland, 21 December 2004
04-007	PA-34-200T Sceneca 11, ZK-JAN, collision with terrain, Mount Taranaki, 20 November 2004
04-008	Cessna 172, ZK-JES, ditching Cable Bay, Northland, 15 December 2004
04-003	Bell/Garlick UH1B Iroquois helicopter, ZK-HSF, in-flight break-up, near Mokoreta, Southland, 23 April 2004
04-006	Boeing 777, HL 7497, landed short of displaced threshold, Auckland International Airport, 16 November 2004
04-001	Piper PA23-250E Axtec, ZK-DGS, landing gear collapse during taxi, Paraparaumu Aerodrome, 9 January 2004
03-007	Hughes 369HS, ZK-HCC, in-flight power loss and emergency landing, Fox Glacier, 30 November 2003.
03-006	Convair 580, ZK-KFU, loss of control and in-flight break-up, Kapiti Coast, 3 October 2003
03-004	Piper PA 31-350 Navajo Chieftain ZK-NCA, controlled flight into terrain, near Christchurch Aerodrome, 6 June 2003
03-003	Boeing 747-412 9V-SMT, flight SQ286, tail strike during take-off, Auckland International Airport, , 12 March 2003
03-002	Cessna U206G ZK-EJG, engine failure after take-off, Ardmore Aerodrome, 2 February 2003

Transport Accident Investigation Commission
P O Box 10-323, Wellington, New Zealand
Phone +64 4 473 3112 Fax +64 4 499 1510
E-mail: reports@taic.org.nz Website: www.taic.org.nz

Price $20.00 ISSN 0112-6962