

**AIRCRAFT ACCIDENT REPORT
OCCURRENCE NUMBER 02/2023**

AUSTER J1B

ZK-APO

LINDIS VALLEY

30 JUNE 2002



Glossary of abbreviations used in this report:

amsl	above mean sea level
ATIS	automatic terminal information service
ATS	air traffic services
C	Celsius
CAA	Civil Aviation Authority
CAR	Civil Aviation Rule(s)
E	east
ELT	emergency locator transmitter
ft	foot or feet
g	acceleration due to gravity
km	kilometre(s)
m	metre(s)
Mogas	motor gasoline
nm	nautical miles
NZST	New Zealand Standard Time
rpm	revolutions per minute
S	south
SAR	search and rescue
T	true
UTC	Coordinated Universal Time
VHF	very high frequency

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Aircraft type, serial number and registration:	Auster J1B, 2212, ZK-APO
Number and type of engines:	One de Havilland Gipsy Major 1
Year of manufacture:	1947
Date and time:	30 June 2002, 1620 hours* (approx)
Location:	Lindis Valley, 7 km south of Lindis Pass Latitude: S 44° 39' Longitude: E 169° 37'
Type of flight:	Private
Persons on board:	Crew: 2
Injuries:	Crew: 2 fatal
Nature of damage:	Aircraft destroyed
Pilot-in-command's licence	Private Pilot Licence (Aeroplane)
Pilot-in-command's age	76 years
Pilot-in-command's total flying experience:	750 hours, 666 on type
Information sources:	Civil Aviation Authority field investigation
Investigator in Charge:	Mr S J Walker

* Times are NZST (UTC + 12 hours)

Synopsis

On Tuesday 2 July 2002 the Civil Aviation Authority was notified that ZK-APO was overdue, having been expected to arrive at Twizel or Alexandra on the afternoon of Sunday 30 June. The Transport Accident Investigation Commission was in turn notified of the missing aircraft and declined to investigate.

The aircraft was en route from Hokitika to Twizel and Alexandra, but failed to arrive at either destination. After an extensive search, the wreckage of the aircraft was found on 6 July 2002, some 7 km south of the Lindis Pass. Both occupants had died in the accident.

1. Factual information

1.1 History of the flight

- 1.1.1 Over the weekend of 29-30 June 2002, the owner of ZK-APO and a pilot friend had been attending an aircraft owners' meeting at Takaka. The two had flown together extensively, and were known to share the flying between them.
- 1.1.2 On the morning of 30 June, one of the pilots refuelled the aeroplane with 91-octane unleaded Mogas, from six plastic fuel containers that he had had filled at a local garage. About 1030 hours, the aeroplane took off from Takaka with both pilots aboard, and landed some 30 minutes later at Motueka, where a luncheon had been organised by the local Aero Club.
- 1.1.3 During this time at Motueka, the fuel containers were replenished, and at 1202 hours one of the pilots made a cellphone call to a friend at Fox Glacier, who advised that the weather there was good. The pilots' intentions were to land later in the afternoon at Twizel, where the owner would join his wife for a road journey to Christchurch. The other pilot would then ferry the aeroplane to home base in Alexandra.
- 1.1.4 Other pilots who were attending the luncheon had received the current general aviation weather briefing from Airways Corporation via fax, however the actual recipient of the fax said that it was unlikely that the pilots of APO saw this. They were reportedly busy preparing the aircraft for flight, and took off from Motueka at approximately 1230 hours. No flight plan was filed or SARWATCH notified to Air Traffic Services for ZK-APO on 30 June.
- 1.1.5 The aircraft landed at Hokitika at 1410 hours. A private pilot there recalled conversing with the two pilots while they were refuelling the aircraft for the next leg of their journey. He saw the pilots top up the fuel tank until fuel was "gurgling" out of the filler. He offered to take them to a local garage to refill the fuel containers, but they declined, saying that they would "get more fuel on the way". A comment to the effect "it's your turn to fly now" was made by one of the pilots to the other.
- 1.1.6 The Hokitika pilot confirmed that at no time during the short stop in Hokitika did either of the two pilots make use of a conventional telephone or fax. There was no conversation about the weather or proposed route to Twizel. The aircraft took off from Hokitika at 1430 hours.

- 1.1.7 At approximately 1515 hours, a group of people at Bruce Bay saw a light aircraft overhead at a “relatively high” altitude. There was some discussion about the aircraft type; one suggestion was that it was “like a Tiger Moth”. The engine note was described as unusual, “like a Massey-Ferguson tractor”.
- 1.1.8 About 1600 hours a farmer (who was also a private pilot) working outdoors to the south-west of Twizel heard the sound of a throttled-back aircraft engine above a layer of cloud; it approached from the direction of Lake Ohau, passed overhead, and continued in a north-easterly direction towards Pukaki Aerodrome (one mile north-east of Twizel). He thought that the aircraft had not quite reached the aerodrome when the engine power increased and the aircraft turned south.
- 1.1.9 Nothing further was heard or seen of the aircraft, and on Tuesday 2 July, the pilots’ relatives became concerned about its non-arrival and reported it overdue. An extensive search operation was mounted, and on Saturday 6 July, the wreckage of the aircraft was found on snow-covered terrain in the Lindis Valley. Neither occupant had survived.
- 1.1.10 The accident occurred in daylight, on 30 June, at approximately 1620 hours NZST, in the Lindis Valley, 7 km south of the Lindis Pass summit, at an elevation of approximately 4500 feet. Grid reference 260-G40-417122, latitude S 44° 39’, longitude E 169° 37’.

1.2 Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Other</i>
Fatal	2	0	0
Serious	0	0	0
Minor/None	0	0	

1.3 Damage to aircraft

- 1.3.1 The aeroplane was destroyed by impact forces.

1.4 Other damage

- 1.5 Nil.

1.5 Personnel information

- 1.5.1 Although it is not known which of the pilots flew the aeroplane between Takaka and Hokitika, the owner was occupying the left (command pilot) seat at the time of the accident. It is inferred for the purposes of this investigation that he was pilot-in-command at the time.
- 1.5.2 The owner, aged 76, held a Private Pilot Licence (Aeroplane) and a Class 2 medical certificate valid until 23 March 2003.

- 1.5.3 The second pilot, aged 71, held a Private Pilot Licence (Aeroplane) and a Class 2 medical certificate valid until 14 November 2002.

1.6 Aircraft information

- 1.6.1 Auster J1B serial number 2212 was manufactured in January 1947, and was first registered in New Zealand on 18 August 1959. A total restoration was completed in January 1998, and the aeroplane had accrued a total of 255.8 hours since. It had remained in the possession of the same owner since first being registered in New Zealand.
- 1.6.2 The aeroplane had a valid non-terminating airworthiness certificate, issued on 21 January 1998, and was maintained in accordance with the programme detailed in CAR Part 43, Appendix C.
- 1.6.3 The last scheduled maintenance was a 100-hourly inspection carried out on 14 March 2002. An annual review of airworthiness was completed on the same day.
- 1.6.4 Gypsy Major 1 engine, serial number 82885, had been installed in ZK-APO prior to 1980. It was overhauled during the time the aeroplane was being restored, and had accrued 255.8 hours since overhaul.
- 1.6.5 The most recent engine maintenance was also a 100-hourly inspection, performed on 14 March 2002.
- 1.6.6 The aeroplane was of wooden and tubular steel construction, with Ceconite™ 102 fabric covering, and was equipped with dual controls. The left seat was the normal command pilot position. The aircraft was not equipped for instrument flight, although it had a (venturi) suction-driven turn and slip indicator.
- 1.6.7 The approved fuel was 91-octane unleaded Mogas. The single fuel tank of 15 imperial gallon (68 litre) capacity was located in the front fuselage, forward of the instrument panel. Normal cruise endurance, without the 30-minute reserve required by CAR 91.305, was between one hour 45 minutes and two hours, at a cruise speed of about 83 knots.
- 1.6.8 The all-up weight and centre of gravity prior to the accident was not calculated, but there was no evidence to suggest that it was outside the limits specified in the aircraft flight manual.

1.7 Meteorological information

- 1.7.1 On Sunday 30 June 2002, the South Island was under the influence of a broad area of low pressure, with an extensive cover of layer cloud. A light, moist, south-easterly airflow prevailed over the southern half of the island, giving low cloud bases to the east of the main divide.

- 1.7.2 The South Island general aviation weather forecast issued by MetService¹ on Sunday 30 June at 1303 hours, and valid from 1200 to 2400 hours, predicted:
- For Westland and Fiordland: occasional showers; areas of broken² stratus 800 ft (amsl) mainly about the coast; areas of scattered and at times broken towering cumulus, cumulus and stratocumulus above 3-4000 ft; isolated embedded cumulonimbus above 2000 ft north of Hokitika.
 - For Canterbury: isolated patches of mist; areas of rain and drizzle; areas of broken stratus 400 ft; areas of scattered and at times broken towering cumulus, cumulus and stratocumulus above 2000 ft.
 - For Otago and Southland: isolated patches of mist; rain and snow; areas of broken stratus 400 ft; broken layers of cumulus, stratocumulus and altostratus above 2000 ft.
 - Visibility 30 km reducing to 4000 m in showers, 2500 m in thunderstorms/rain/drizzle/snow and 1500 m in mist; occasional moderate icing (in cloud) above 6000 ft; occasional moderate turbulence about and west of the ranges south of a line Wanaka – Oamaru.
 - Wind profile for Hokitika: 3000 ft, 060° T/06 knots; 5000, 035/05; 7000, 020/06. For Dunedin: 3000, 175/18; 5000, 180/14; 7000, 180/09.
- 1.7.3 The Queenstown aerodrome forecast issued on Sunday 30 June at 1112 hours and valid from 1100 to 2400 hours, was for: surface wind 160/05; visibility 25 km; rain and snow showers; cloud - few at 1400 ft (agl), broken at 3000; and temporarily throughout the forecast period, visibility 4000 m in rain and snow showers, and broken at 400 ft. A similar aerodrome forecast was in force for Wanaka.
- 1.7.4 The hourly reports from Queenstown throughout the afternoon indicated light winds from the southerly quarter, drizzle, and broken cloud at 500 ft agl. Temperature and dewpoint were plus 5° C and 3° C respectively.
- 1.7.5 An air transport operator at Lake Tekapo reported that the Southern Alps were very clear in morning but "socked-in" with low cloud later in the day, forcing cancellation of flying operations from Lake Tekapo.
- 1.7.6 Another air transport operator reported that at about 1300 hours on Sunday the weather deteriorated rapidly at Twizel, and anyone wishing to land there "would have had trouble getting in".

¹ Trading name of the Meteorological Service of New Zealand Limited

² 5-7 oktas (eighths of sky cover), "scattered" is 3-4 oktas, "few" is 1-2 oktas

1.8 Aids to navigation

- 1.9 A hand-held Garmin GPS 92 was found at the accident site. The unit was returned to the manufacturer for an attempt at track data retrieval, but it was found that the internal memory battery had been dislocated, resulting in the loss of any stored information.

1.9 Communications

- 1.9.1 The aeroplane was not fitted with a VHF radio or transponder, but the crew carried a hand-held VHF transceiver. This unit gave reasonable reception, but had limited transmission performance. Apart from those mentioned in 1.18.1 and 1.18.2, no relevant transmissions were reported as received from APO during the flight south.
- 1.9.2 Telephone records indicated that after the call made at 1202 hours, no further calls were made on the pilot's cellphone, nor were any site activations recorded.

1.10 Aerodrome information

- 1.11 Not applicable.

1.12 Flight recorders

- 1.13 Not applicable.

1.12 Wreckage and impact information

- 1.12.1 The wreckage was located on a snow-covered spur in the Lindis Valley, 7 km south of the Lindis Pass summit. Ground scars and airframe damage indicated that it had struck the west-facing slope on a northerly heading, while in a slight nose-down and left-wing-low attitude.
- 1.12.2 The initial impact point was four metres below the crest of the spur, but the aeroplane had inverted at impact and slid some 16 m down the 45-degree slope.
- 1.12.3 The entire aeroplane was accounted for at the site and was found to be relatively intact. The wings were still attached to the fuselage. The centre fuselage had suffered deformation about the cabin area; reducing the occupiable space. The aft fuselage and empennage appeared undamaged.
- 1.12.4 The wooden propeller had shattered at the main point of impact and both tips were found within five metres of that point. There were propeller scars on the ground over a distance of about five metres prior to the main impact. The nature of the propeller damage indicated that it had been turning at low rpm at impact.
- 1.12.5 Flight control integrity was verified as far as possible at the site. The flaps were found to be in the fully retracted position. The throttle was fully forward, the mixture knob was set for $\frac{3}{4}$ rich, and the carburettor heat control was set to "off". The aeroplane had a carbon monoxide detector attached to the instrument panel. The detector was indicating positive carbon monoxide contamination.

- 1.12.6 The fuel tank had been breached during the impact sequence. Although the breach was located at the lowest point of the tank in respect of the final aircraft attitude, there was no evidence of spilt fuel at the accident site.
- 1.12.7 The engine fuel filter bowl was removed and inspected. This was found to be dry of fuel, with no fuel residue visible in the mesh of the filter screen or bowl, and no fuel pooling in the inverted housing. The position of the fuel filter with the aircraft inverted was low in respect of the other fuel system components.
- 1.12.8 Six plastic fuel containers were found in the aeroplane. The total capacity of these was 9.7 imperial gallons (43.8 litres). There was half a gallon (2.5 litres) of fuel remaining in one container.
- 1.12.9 Current aeronautical charts were found in the aeroplane in a folded and closed condition, with no track information pencilled onto them.
- 1.12.10 On completion of the site examination, the aircraft was removed to a workshop where further examination was carried out. No pre-accident discrepancies or defects were discovered either at the site or subsequently.

1.13 Medical and pathological information

- 1.13.1 Post-mortem examination of the pilots concluded that death in both cases was due to multiple injuries.
- 1.13.2 Toxicological tests disclosed no evidence of alcohol, or medicinal or recreational drugs. Blood carbon monoxide levels were found to be negligible which eliminates the possibility of carbon monoxide poisoning indicated by the carbon monoxide detector referred to in 1.12.5.

1.14 Fire

- 1.14.1 Fire did not occur.

1.15 Survival aspects

- 1.15.1 Both occupants had been restrained by lap belts, no shoulder harnesses being fitted to this aeroplane. The left-seat belt withstood the impact forces and had restrained the occupant within the cockpit; however the right-seat belt inboard attachment had failed in tensile overload where it was welded to the airframe. This resulted in the ejection of the right-seat occupant from the aircraft as a result of the ground impact. The weld quality appeared to be substandard for the application and may have failed even in the event of a potentially survivable accident. This accident was not survivable because of the impact forces involved.
- 1.15.3 The aeroplane was fitted with an ACK Technologies model E-01 ELT, which is designed to activate on impact, provided that the switch is preset to the “armed” position. The ELT had not operated despite the impact. The unit requires an acceleration of 9g or more to operate automatically. The lack of an ELT signal from the aeroplane was a limiting factor in the SAR operation subsequent to the accident.

1.15.4 The ELT had been installed during the aircraft restoration referred to in 1.6.1. It was located in the rear cabin floor structure, and was restrained by two light stainless steel bands. During the impact sequence, the right main landing gear support structure deformed in such a way that the ELT came into contact with centre fuselage tubular steel cross members. The ELT case was broken in the vicinity of the arming switch, and the circuit board to which the switch was attached was also broken. It could not be determined in which position the switch had been selected prior to the accident.

1.15.5 The pilots had filed no ATS flight plan or SARWATCH for any stage of the intended journey from Takaka to Alexandra. This again was a major limiting factor during the SAR operation, the commencement of which was delayed for up to two days, until it was known that the aircraft was missing. This could have had survival implications had the aircraft occupants been injured in the accident.

1.16 Tests and research

1.16.1 Nil.

1.17 Organisational and management information

1.17.1 Not applicable.

1.18 Additional information.

1.18.1 During the afternoon the pilot of a Cessna 206 was flying from Nelson to Queenstown. He was aware that he was ahead of APO between Hokitika and Haast, and while southbound along the coast, made four radio calls to APO with updates on the weather that he was encountering. Each time he made a transmission, there appeared to be an acknowledgment indicated by a burst of static.

1.18.2 The Cessna pilot followed the Haast River as far as the Burke River junction, some 20 nm upriver from Haast. After encountering poor flying conditions, he listened out on the Queenstown ATIS frequency, and learned that Queenstown Airport was closed because of weather. He turned back, and landed at the Haast airstrip at 1503 hours, having in the meantime attempted to call APO and relay the Queenstown situation. There was no apparent acknowledgment of this last call.

1.19 Useful or effective investigation techniques

1.19.1 Nil.

2. Analysis

2.1 It is not known by what route or intermediate stops the aeroplane was flown to Hokitika, but the observations of a pilot witness at Hokitika confirm the departure time from Hokitika and that the fuel tank was filled to capacity prior to departure. Neither of the aircraft occupants mentioned the proposed route or where they intended to land for more fuel.

- 2.2 The expected total endurance from a full tank was normally between one hour 45 minutes and two hours at the normal cruise speed of about 83 knots. However, when the 30-minute reserve required by CAR 91.305 is taken into account, the safe endurance is then in the range of one hour 15 minutes and one hour 30 minutes. This translates to a safe still-air range between 103 and 124 nm.
- 2.3 The straight-line track distance between Hokitika and the southern extremity of Bruce Bay is 82 nm. From there to the southern end of Lake Ohau, thence to Pukaki Aerodrome (at Twizel) is a further 55 nm. On distance alone, this is achievable in still air, but at the expense of much of the required reserve. However, the effects of possible head winds east of the divide, and any extra fuel required to climb to a suitable altitude for the crossing still need to be taken into account.
- 2.4 For the aircraft to have reached Bruce Bay at 1515 hours would have required a groundspeed of about 109 knots, which is unlikely considering the forecast winds. It is more likely that the estimate of the sighting time has an element of flexibility. The aural witness account of an aircraft approaching Twizel around 1600 hours is consistent with the known performance of APO, but at this time the remaining fuel endurance could have been as low as 15 minutes.
- 2.5 There was no information available to indicate the exact route followed by the aircraft between Bruce Bay and the Twizel area, nor was there any indication of the weather conditions encountered before arrival over Twizel.
- 2.6 It is likely that once the aircraft crossed the divide, the pilot was committed to continuing towards Twizel in the hope of landing there, but found that on arrival in the area, the ground was obscured by a layer of low cloud. Omarama, a suitable alternate aerodrome, was only 16 nm to the south, but the fact that the aeroplane did not land there suggests that the weather was unsuitable there also.
- 2.7 For reasons unknown, but quite possibly that there was simply no other choice, the pilot elected to continue south into the Lindis Valley, by which time the fuel state was critical. Where the aircraft wreckage was later found is about where the fuel would have been exhausted.
- 2.8 There was no sign of fuel at the accident site, either spilled from the damaged tank, or left in the fuel filter bowl. In the attitude in which the aircraft came to rest, the latter would have retained at least some fuel had there been any in the system. The propeller damage was consistent with its having been turning but not under power.
- 2.9 The lack of a flight plan or SARWATCH resulted in a delay of two days before the aircraft was reported missing. Even then there was no indication of its likely whereabouts, resulting in a lengthy and wide-ranging search effort. Had the occupants survived the ground impact, their continued survival in the prevailing weather conditions at the site would have been very doubtful without prompt rescue.

- 2.10 Other than a telephone call to a friend at Fox Glacier, there was no evidence that either pilot had obtained a weather briefing before or during the flight south. It is not known if they received the last transmission to them from the Cessna 206, indicating that the weather in the Haast Pass and at Queenstown was unsuitable.
- 2.11 On the West Coast, southbound from Hokitika, the pilot had the option of landing and obtaining more fuel at Fox Glacier or Haast, or possibly also at other (private) locations. A detailed examination of the available weather at any time before departure from Hokitika may have persuaded him to do so, or even not to have attempted the Hokitika – Twizel leg at all. In the event, the flight appears to have been conducted on a progressive “look and see” basis, which, once the main divide was crossed, left the pilot no option but to continue.
- 2.12 The topics of weather services and flight planning have had recent prominence in the Civil Aviation Authority’s industry education process. Several articles on flight planning have appeared in 2001 and 2002 issues of *Vector*, the CAA safety magazine, and a number of pilot seminars on aviation weather have been held at various locations.
- 2.13 Of particular relevance was an article in the May/June 2002 issue of *Vector*, entitled “*Going far? Then file a flight plan*”. This issue of the magazine had been sent to both pilots (being current licence holders) some five weeks before the accident.
- 2.14 In light of the ongoing education on weather and flight planning, no further safety recommendations on these topics were made as a result of this investigation.

3. Conclusions

- 3.1 The pilots were appropriately licensed and rated for the flight being conducted.
- 3.2 The aircraft was airworthy and properly maintained in accordance with the rules currently in force.
- 3.3 There was no evidence to suggest that a mechanical malfunction of the aircraft contributed to the accident.
- 3.4 The aircraft engine probably stopped after total fuel exhaustion and after the pilot had pressed on into adverse weather conditions to an extent that left him no safe options.
- 3.5 The terrain beneath was not conducive to achieving a safe forced landing.
- 3.6 The resulting ground impact was not survivable; however the inboard seat belt attachments may not have restrained the occupants in a lesser ground impact.
- 3.7 There was no evidence that either pilot had obtained a weather briefing before flight.

- 3.8 No flight plan or SARWATCH had been lodged, which would have reduced the pilots' chances of survival had they not died on impact, and were further factors in the length and cost of the search operation in addition to the lack of an ELT signal.

4. Safety Actions

- 4.1 The Director will review the specifications relating to the Auster seat belt attachments and the use of ACK Technologies ELT units for this type of aircraft and consider any improvements that may be required.

(Signed)

Steve Walker
Safety Investigator
13 February 2003

(Signed)

Richard White
Manager Safety Investigation