



Addendum

Report 95-008

Piper PA 28-161, ZK-MBI

missing after departing from Gisborne

21 May 1995

Abstract

The wreckage and occupant were found on 8 April 2001 in forested high terrain, substantially west of the planned track. The aircraft was probably in controlled flight when it collided with terrain, about 42 minutes after departing from Gisborne.

No explanation for the track deviation was found.

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1. Factual Information

- 1.1 On 8 April 2001 the wreckage of ZK-MBI was found by hunters, and confirmed by a local helicopter pilot, in the Urewera National Park 35 nautical miles (nm) west of Gisborne. The aircraft had been missing since departing from Gisborne for Palmerston North, via Napier, on the return leg of a solo training flight on 21 May 1995.
- 1.2 The accident site was at an elevation of 3500 feet in the Huiarau Range, and was in moderately dense sub-alpine native beech forest. The local area sloped down to the south-east at 37°. Nearby mountain tops to the north, north-west and south-west rose to between 3700 and 4350 feet.
- 1.3 The site location was:
- | | |
|------------|-----------------|
| Latitude: | 38° 33.2' south |
| Longitude: | 177° 16.5' east |
- 1.4 The aircraft had collided with substantial tree trunks before coming to rest in several pieces on the forest floor. A scar on one tree was still discernible, and was probably the first impact point. Wreckage was found between this scar and the major fuselage site over a distance of about 20 metres, and along a track of 230° magnetic. The tree scar was level with the major wreckage, and the two separate wings remained suspended in trees in their normal left/right orientation along the wreckage trail. While no ground marks remained after 6 years, the aircraft damage was consistent with several severe tree impacts, followed by a final ground impact with the fuselage probably sideways and inverted, or tumbling. There had been no fire, and all major components of the aircraft were accounted for at the site. Most were substantially overgrown or covered with forest litter.
- 1.5 The principal wreckage consisted of the inverted lower cabin section of the fuselage forward of the wing spar, with the engine and nose undercarriage leg in place on the engine mount. The propeller was embedded in the ground adjacent to its attachment flange. The cabin roof and door were adjacent but separated. The rear fuselage lay behind the forward section, attached by control cables, but with the fin, rudder and horizontal stabiliser separated. The pilot's body was in the left seat, restrained by his lap belt.
- 1.6 The engine control connections remained intact, although seized after 6 years exposure. The throttle was nearly fully open, mixture was rich and the carburettor heat was in the cold position. The primer was locked. The fuel selector was in the right tank position.
- 1.7 The flight control systems could not be verified because of the separation of wings and empennage from the fuselage. The flap lever was in the 0° detent; the elevator trim indicator was slightly forward of neutral and the rudder trim indicator was about half left.

1.8 The instrument panel and instruments were still in place, with some disruption and damage. Switch selections were:

- Master: ON
- Magnetos: ON both, key broken off
- Fuel pump: ON
- Rotating beacon: ON
- Navigation lights, pitot heats: OFF
- Emergency locator transmitter (ELT): ON
- All circuit breaker buttons were missing, probably as a result of corrosion.
- The heater and demister controls were both selected OFF.

1.9 Significant instrument indications were:

- Artificial horizon: 120° left bank, 12° nose up
- Direction indicator (DI): 105°, heading bug 170°
- Altimeter 1: 4100', subscale 1023
- Altimeter 2: 3000', subscale 1022
- NAV 1: 200°, course deviation indicator (CDI) centred
- NAV 2: 025°, CDI centred
- Automatic direction finder (ADF): 010°
- Tachometer: 4129.7 hours
- Other instrument readings were either zero or not trapped.

1.10 Radio panel selections were:

- COMM 1 and 2: ON
- NAV 1: ON
- NAV 2: OFF
- DME: ON, remote selected
- Transponder: ON, mode C, code 1200
- Autopilot: OFF (all buttons out)
- Radio Master switch: OFF
- All radios used electronic displays, and no selected frequencies were able to be determined.

1.11 The emergency locator transmitter (ELT) in the rear fuselage had broken away from its mount, breaking the coaxial aerial cable. It was selected OFF/ARM.

- 1.12 The engine remained attached to its mount, which was distorted sideways. The propeller mounting bolts had failed, probably as a result of sideways loads at the final ground impact. One propeller blade, which was embedded in the ground, was folded rearwards; the other had a large radius rearward bend. While the blades showed only spanwise or diagonal scoring, the spinner showed spiral marks indicating rotation during the impact sequence. The engine had not been severely disrupted, and most accessories remained attached. Internal examination of the cabin heater box did not show any evidence of exhaust leakage. The heater ducting was intact.
- 1.13 The few paper documents recovered from the site were protected by plastic sleeves or adhesive sheet. It was probable that unprotected paper would have disintegrated or have been consumed by 6 years of forest floor environment. The pilot's plastic-covered map was found, folded with the Gisborne/Napier area outward. This area had deteriorated most, but did contain some undecipherable marker pen inscriptions along the planned track. It did not record any times, or other marks relating to any diversion from the planned track. Other parts of the map, which had been folded inwards, recorded more clearly details of some of his preceding cross-country exercises. The pilot's navigation log was not found.
- 1.14 When ZK-MBI went missing in 1995, many people reported aircraft sightings to the police, to assist the search. One witness, whose location was subsequently found to be closest, 7 nm south-east of the accident site, was interviewed after the aircraft was found. He was on Waimahu Station, near the Urewera National Park boundary, when he saw a low-wing single-engine aircraft between 1530 and 1600 on 21 May 1995. The aircraft flew past to the north-west, up the Hangaroa River into the National Park, to return a few minutes later. At the edge of the bush it was seen to turn right, back onto a north-west heading whence it flew out of sight and hearing. The aircraft sounded normal and was flying steadily. It may have been climbing as it flew away. The local weather was fine, with good visibility and some sunshine, but a cloudbank was visible to the south-west.
- 1.15 The DI was examined at an approved aircraft instrument shop. Significant internal corrosion had occurred, consistent with its exposure at the accident site. Impact damage had broken the instrument chassis, which separated the gears coupling the gyro to the display card. The inner gimbal bearings were indented, probably by the impact, in a position which indicated that the gyro was erect and in a normal operating position. The gyro was free to rotate, and the lack of indenting of its bearings suggested that it was rotating at impact. The gyro was not caged. The airway providing air to drive the gyro was intact and unobstructed. In summary, the DI was probably operating normally before the accident. There was no evidence to indicate whether abnormal precession was occurring.
- 1.16 Flight time and tachometer records kept by the School of Aviation for ZK-MBI for the 10 days before the accident were reviewed. This established that on cross-country flights the tacho times and logged flight times had corresponded accurately, while on local training exercises the tacho times were 7.2% less than the logged flight times. The last tacho reading had been recorded before the 1.2 hour morning flight on 21 May 1995, and was 4126.3 hours.
- 1.17 At 1600 on 21 May, at Gisborne, the sun angle was 285°M, and 9° above the horizon.

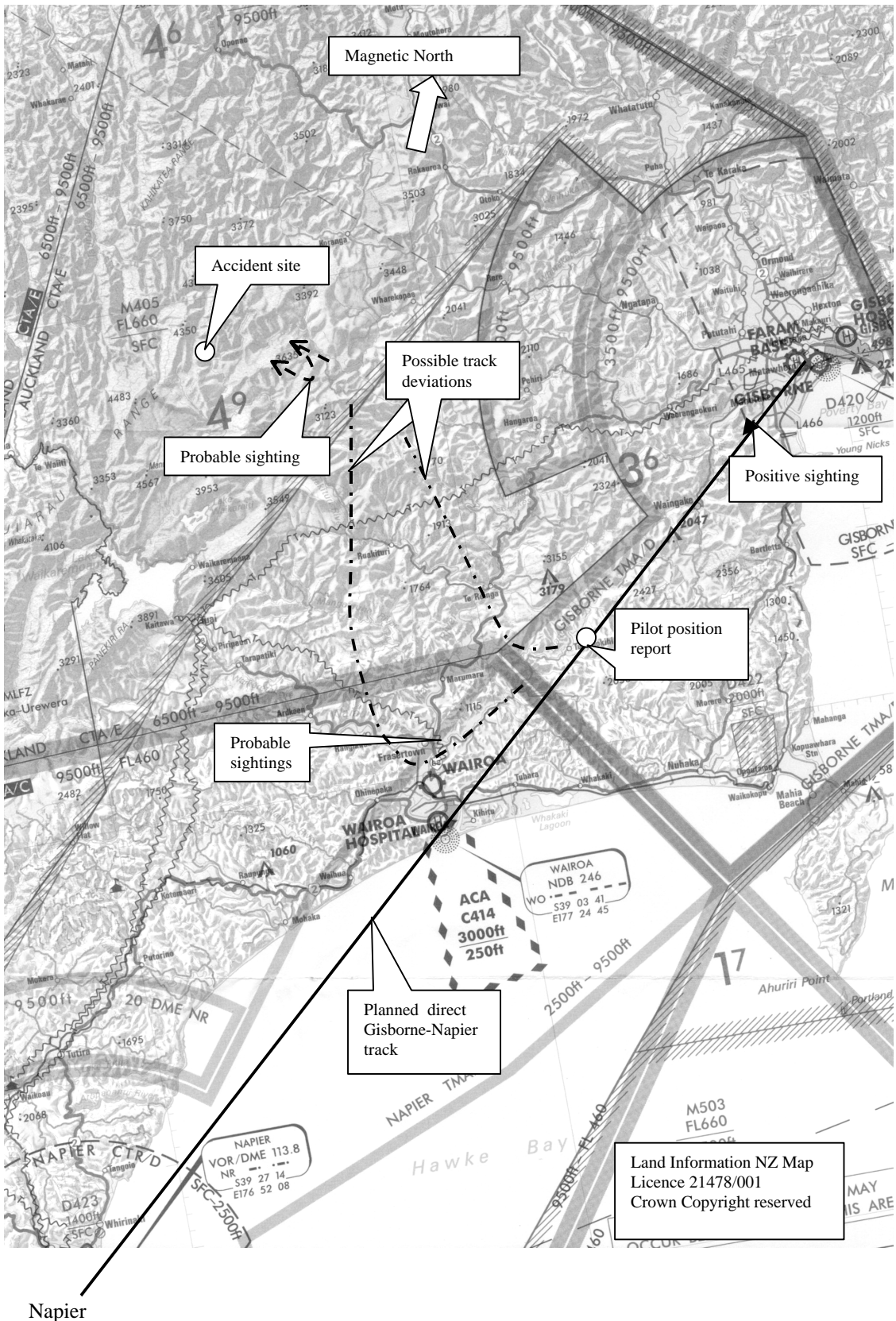


Figure 1
Possible track deviation and accident site ZK-MBI

2. Analysis

- 2.1 The total elapsed flying time of ZK-MBI, as indicated by the tachometer since the last record on 21 May 1995, was 3.4 hours. As this included 1.2 hours on the morning flight, the elapsed flight time of the accident flight was 2.2 hours. The aircraft had departed from Palmerston North at 1347, and then from Gisborne at 1517, giving a flight time at that stage of 1.5 hours. This left 0.7 hours, or 42 minutes, of flight time after the Gisborne departure until the accident. The time of the accident was approximately 1559, on 21 May 1995.
- 2.2 The location of the accident site in relation to the planned track from Gisborne to Napier was not readily explained. ZK-MBI had been seen to depart from Gisborne on track, to the south-west, towards Napier. The pilot's radioed position reports to Gisborne and Napier Towers indicated that he had flown some 25 nm on track, and was at 3500 feet. The witness reports in the vicinity of Wairoa, together with the overheard transmission from Massey 703 referring to Wairoa, did suggest that the aircraft had flown that far, some 33 nm, along the correct track. It would have been possible for ZK-MBI to fly to near Wairoa then to the accident site some 28 nm north-north-west within the 0.7 hours flight time, with some manoeuvring as reported by the witness near the Urewera National Park. If this had happened, a prompt right turn would have been required through 110° onto a heading away from the coast, towards high terrain and bush and the lowering sun, for about 20 minutes.
- 2.3 From 3500 feet near Wairoa, the pilot would have been able to see, without difficulty in the reported weather conditions, the Hawke Bay coastline leading to Napier 35 nm ahead. He had flown the reverse track without incident less than one hour earlier, so he should have been aware that following the coastline would guide him to Napier, without recourse to any other navigational aid.
- 2.4 If the pilot had concentrated on steering a planned heading without much attention to his map reading, he could have been susceptible to some track deviation as a result of following a defective DI. The DI had been recorded as precessing excessively, and the aircraft had been restricted to visual operations pending rectification of the defect. Such a track deviation evidently did not occur initially on departure from Gisborne, because the aircraft maintained the correct track for some 33 nm, or 20 minutes. There was no evidence to indicate that an erroneous heading indication had developed, but the necessary 110° error should have been grossly apparent to the pilot because it entailed a major turn away from the coast, which was a prominent line feature on the ground along his planned track. Use of a DI involves routinely (every few minutes) cross-checking and resetting it against the magnetic compass, so any developing error can be corrected in good time.
- 2.5 Another possible source of heading error could have been the pilot's pre-flight preparation of his navigation log. A slip of one digit could produce a 100° error, for instance 310° instead of 210°, in recording the planned heading for that leg of the flight. However, this was not likely because the initial track from Gisborne had been correct, and also because the pilot's navigation log had been checked by the authorising instructor before his departure from Palmerston North.
- 2.6 A deliberate detour by the pilot was unlikely because he was aware of the School requirement to return by 45 minutes before twilight, and his ETA was close to this time, allowing little latitude for extra flight time. Such a detour would also have been out of character from his demonstrated behaviour on previous cross-country flights.
- 2.7 The possibility of pilot incapacitation could not be excluded, but was not supported by evidence from the accident site. Carbon monoxide ingress to the cabin was made less likely by the heater and demister controls being selected OFF, and by the absence of exhaust leakage evidence within

the heater box. In addition, the manoeuvring reported by the witness near the Urewera National Park was not consistent with the behaviour of a significantly incapacitated pilot.

- 2.8 The overall evidence from the site indicated that the aircraft was flying normally on a heading of 230°M, probably straight and level or turning, and probably at about cruising speed when it collided with the trees. It was not consistent with a departure from controlled flight. While the autopilot could have been engaged to maintain controlled flight, there was no evidence of this. The elevation of the site, 3500 feet, was the same as the pilot's reported cruising altitude.
- 2.9 Although the available weather reports had indicated that conditions were suitable along the route of the planned flight, scattered cloud was reported at 3500 to 4000 feet, chiefly about the ranges. The only weather report near to the accident site was from the witness near the Urewera National Park, where the weather was fine with good visibility and some sunshine, and a cloudbank to the south-west. The aircraft he witnessed had flown out of sight to the north-west, so he was unable to observe whether the ranges ahead of it were clear or cloud-covered. It was not possible to determine whether local cloud obscured the mountainside in the vicinity of the accident site when the accident occurred.
- 2.10 The late afternoon sun would have been low to the west-north-west, and in otherwise clear conditions could have made the shaded tree-clad mountainside ahead of the aircraft difficult for the pilot to discern. The pilot's low experience would not have prepared him for flying in mountainous terrain in conditions of difficult lighting, so he may have been unaware of the sort of hazard presented. The witnessed aircraft was seen to fly away headed north-west, say 290°M, while the site evidence indicated a final heading of 230°M. The pilot may have initiated a turn to the left, away from the mountainside, before the collision.

3. Findings

- 3.1 During the return flight from Gisborne towards Napier the aircraft had deviated off track by a large amount, to fly inland for some 20 minutes.
- 3.2 No explanation for the track deviation was found.
- 3.3 The aircraft was probably capable of normal operation.
- 3.4 There was no evidence of pilot incapacitation.
- 3.5 The aircraft was probably in controlled flight when it collided with high terrain.
- 3.6 The pilot's view of the mountainside ahead may have been compromised either by the low sun or by local cloud.

