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ALBERTA ACCIDENT REPORT

No. 90-045

**GARDAN GY20 MINICAB
ZK-CZQ**

GOLDEN HILLS, NGAMATEA STATION

2 MARCH 1990

**Transport Accident Investigation Commission
Wellington • New Zealand**

TRANSPORT ACCIDENT INVESTIGATION COMMISSION

AIRCRAFT ACCIDENT REPORT NO. 90-045

1. NARRATIVE

Aircraft Type, Serial Number and Registration: Gardan GY20 Minitcab AACCA/80/1 ZK-CZQ

1.1 Friends of the pilot had arranged to go pony trekking on the Ngamatea Station, which was approximately equidistant from Taupo, Taihape and Napier, to the north of the Napier-Taihape road. The pilot, accompanied by a friend, intended to meet the pony trekkers at Golden Hills airstrip, but unknown to the pilot the pony trekkers had progressed well to the south of the airstrip before he arrived there.

Number and Type of Engines: One Rolls Royce Continental O-200-A

1.2 The aircraft was seen circling over the Boyd airstrip, to the north of Golden Hills, at about 1400 hours. It flew into adjacent valleys.

Year of Manufacture: Completed in 1977

1.3 Wheelmarks on the punniece dust surface of Golden Hills airstrip, 5 km south of the accident site, showed where the aircraft had landed, turned and taxied back and taken off again. The landing and take-off had been towards the south; the take-off distance was about 200 metres. The surface of the strip was undulating in places, but there were no stones, fences or other obstructions. The wheelmarks did not indicate any untoward occurrence. There were hoofmarks, presumably made by the pony trekkers, on the surface of the strip. It was evident that the crew had dismounted from ZK-CZQ to lift the tail while turning the aircraft. This would have given them the opportunity to see the hoofmarks.

Date and Time: 2 March 1990, 1425 NZDT

Location: Golden Hills, Ngamatea Station

Type of Flight: Pleasure

1.4 The take-off direction and length of take-off roll of ZK-CZQ at Golden Hills airstrip were consistent with a southerly breeze which was a normal feature of the valley in which the accident occurred when there was a light westerly aloft. Such a breeze would be blowing lower down the valley earlier than it would in the upper reaches. On the day after the accident, in similar meteorological conditions, it was calm at the accident site while the southerly was blowing at the airstrip; the southerly reached the accident site at about 1430 hours. The temperature at the Boyd airstrip was 23 to 24°C and the temperature at the accident site was likely to have been similar. It was reported that there was little turbulence over the hillslops on the day of the accident.

Persons on Board: Crew: 1 Passengers: 1

Injuries: Crew: 1 Fatal Passengers: 1 Fatal

Nature of Damage: Destroyed by impact and fire

Pilot in Command's Licence: PPL-(A)

Pilot in Command's Age: 24 years

Pilot in Command's Total Flying Experience: 145 hours (approx 90 hours on type)

Information Sources: Office of Air Accidents
Investigation field investigation

1.5 The burnt-out wreckage was discovered by firefighters who were extinguishing a large scrub fire which extended to adjacent bush. The accident site was at 3,300 feet amsl near the head of a valley, surrounded by bush-covered hills, which extended north from the airstrip. The wreckage lay beside a track running north up the western side of the valley. The valley sloped gently down to a riverbed to the east; to the south there was a gentle descent (about 100 feet per mile) but to the north the head of the valley rose steeply (about 600 feet per mile). To the south and in the vicinity of the accident site the valley was covered in tussock and small scrub, about knee-high, but dense bush extended from a line across the valley about 300 metres north of the accident site.

Investigator in Charge: Mr D V Zolov

1.6 The engine was embedded in the ground to about 400 mm, at an angle of about 60° to the horizontal. Its axis was on a magnetic heading of 020°. One blade of the wooden propeller was buried beneath the engine. It had broken back at impact and there was little indication of power at impact. The protective metal sheath from the leading edge of the other blade was also found. The bodies of the occupants and the metal canopy frame, lay about 1.5 m to the right of the engine. Behind these, and approximately square to the engine axis, lay the wing controls and main undercarriage legs.

1.7 Almost all of the wooden structure had been burnt away, but from the positions of the metal components such as aileron hinges it was established that the wings were essentially complete and all parts were in their normal orientation at impact.

1.8 The tailwheel, and rudder and elevator control horns, lay in the vicinity of the right wing tip. The rudder cables were continuous to the rudder pedals, which were undistorted and functioned normally. The elevators had been actuated via a pushrod at the base of the control column, to a bellcrank from which cables led aft. The bellcrank had disappeared and was presumed to have melted in the fire; the pushrod was intact and the control column universal joint was unobstructed; the cables were continuous.

1.9 The flap selector mechanism comprised a square dog, which could be disengaged by a button on the end of the flap lever and which engaged in one of a series of notches in a quadrant at the base of the lever. As found the dog was in the notch corresponding to the fully down position. There was no sign of distress on any of the notches.

1.10 The main undercarriage legs complete with wheel hubs lay on the ground in their natural orientation. The left scissor link had buckled, so that the axle had twisted to about 60° to the lateral axis, while the oleo leg was at maximum extension. The right hub was undamaged, but the left hub had received a blow sufficient to fracture the outer rim. There was nothing in the vicinity of the wreckage which could have caused such damage.

1.11 The charred left wingtip lay some 9 m behind the engine, leading edge towards the engine and inboard face uppermost. It lay in a slight indentation in the ground. Small portions of wing structure lay ahead of the wingtip.

1.12 A watch found in the wreckage had stopped at 1425 hours. The airspeed indicator had a trapped reading of 80 knots.

1.13 In the vicinity of the accident site the surface was smooth punice dust, but from about 100 m north, for another 200 m, the surface had been eroded to a depth of about 1 m, exposing numerous boulders. The washed out area was bounded by escarpments lying across the valley.

1.14 The boulder field was examined to see whether the damage to the left scissor link and wheel hub could have occurred there, but the results were inconclusive. The valley between the airstrip and accident site contained some rocky outcrops, but there was no sign of the aircraft having struck one.

1.15 The engine was removed to an overhaul facility for strip examination. Extensive heat damage precluded detailed checks on the magnetos or fuel system, but no obvious fault was found. For its age the engine was in good mechanical condition. The throttle valve was closed during the fire. Since it was spring loaded to the open position, and since impact damage might have pulled it open but was unlikely to have closed it, it was probably closed on impact.

1.16 The density altitude at 3300 feet amsl at a temperature of 24°C with a sea-level pressure of 1020 hPa would have been 5000 feet. The effects of this density altitude, as compared to standard conditions at sea level, would have been to decrease the power of the engine at full throttle in the climb, from 93 shaft horsepower (shp) to 84 shp; to reduce the rate of climb from 730 feet per minute to approximately 350 feet per minute and to increase the radius of the

turning circle, at 30° bank and 80 knots indicated airspeed, from 1000 feet to 1100 feet.

1.17 A pilot familiar with this type of aircraft advised that there was insufficient power to maintain speed in a steep turn. In a level steep turn with full flap selected the speed would reduce rapidly.

1.18 The wheelmarks at Golden Hills airstrip showed that the undercarriage was undisturbed when the aircraft landed and took off there. The damage was done when the weight of the aircraft was off the wheels, since the left oleo was fully extended when the scissor link was twisted. This damage would have required a substantial blow, and the chipped wheel hub indicated that the blow was from a hard solid object. There was nothing at the impact site which could have caused such damage, nor was there at the airstrip. The most likely location for the impact was the boulder field nearby: the boulders were of such size as to be consistent with the hub damage, if the wheel struck one while the aircraft was being held off prior to touchdown.

1.19 The aircraft would then have flown some distance – at least 100 m – between striking the boulder and coming to rest at the accident site. This argues against a forced landing due to engine failure and in favour of a precautionary landing. If the aircraft was being held off just above the ground, heading downhill, with full flap selected and with no engine power, it is doubtful if it could have been lofted 100 m or more and sufficiently high as to strike the ground with the force it did, and while heading in the opposite direction. Certainly it could not have made a left-hand circuit through 270° or more after an attempted uphill landing, in such circumstances.

1.20 Before the fire, the boulder field was covered with tussock and scrub and would have been very difficult to distinguish from the surrounding terrain. The natural landing direction would have been uphill to the northeast, and the pilot could have perceived an advantage in the end of the landing run being in the vicinity of the track.

1.21 The shock of the aircraft striking a boulder during the landing flare might well cause the pilot to apply full power and climb away to consider the position: failure to retract the flaps, in the heat of the moment, rising ground and the high density altitude could then result in the wingtip striking the ground while the pilot tried to make a circuit, and the aircraft cartwheeling onto its nose.

1.22 Possible reasons for such a precautionary landing included lack of power to outclimb rising terrain, engine malfunction, propeller failure (possibly giving rise to severe vibration), pilot or passenger incapacitation, or fire. Whatever caused the pilot to decide on a precautionary landing, rather than fly to an airstrip two minutes away, must have been a matter of urgency.

1.23 Lack of power to outclimb the terrain could be discounted: the aircraft had adequate climbing performance to climb above the ridge height en route from the airstrip. Had the pilot not used all the available performance – for instance, if he had stayed low to try to sight his friends – there was plenty of room to turn back over the valley. This scenario was unlikely, since the pilot was probably aware from the hoofprints at the airstrip that his friends had gone on south. Even had there been a partial power loss, such as a magneto malfunction, the descending ground behind him should have enabled him to fly back to the airfield.

1.24 Loss of a propeller tip would have caused severe vibration and prompted an immediate landing. However, one propeller tip was found buried in the ground and the sheathing of the other blade was located nearby.

1.25 Pathological and toxicological examination revealed no evidence of incapacitation of pilot or passenger; both were young and fit, and the pilot's medical history gave no cause for concern. The pilot was holding the controls at impact. Not all incapacitating conditions would show on autopsy, so that incapacitation could not be ruled out, but medical advice was that it was unlikely.

1.26 Fire in the air could well make the pilot decide on an urgent landing. There was insufficient structure remaining to discover any signs that there was a pre-impact fire: the engine was examined for indications of an engine fire but none were found. However, in the absence of other likely explanations for the urgency of the landing, it is perhaps the most likely event.

2. FINDINGS

2.1 The pilot held a valid Private Pilot Licence – Aeroplane.

2.2 The aircraft had been properly maintained.

2.3 No defect was found in the engine.

2.4 The aircraft had sufficient performance to outclimb the terrain on departure from Golden Hills airstrip.

2.5 Damage to the undercarriage was consistent with the left wheel having struck a boulder in a boulder field 100 m away from the accident site and no other source of such damage was found.

2.6 The location of the boulder field in relation to the accident site suggested that the pilot was attempting to make a precautionary landing when the wheel struck the boulder.

2.7 While the pilot was attempting to turn the aircraft at low level the left wingtip struck the ground and the aircraft cartwheeled onto its nose.

2.8 The aircraft was completely destroyed in the ensuing fire.

2.9 The reasons for the attempted precautionary landing could not be established.

19 May 1992

M F Dunphy
Chief Commissioner