



AIRCRAFT ACCIDENT REPORT

OCCURRENCE NUMBER 98/2908

SLINGSBY T-51 DART

ZK-GDV

NEAR BLENHEIM

18 OCTOBER 1998

Glossary of abbreviations used in this report:

BFR	biennial flight review
CAA	Civil Aviation Authority
CFI	Chief Flying Instructor
E	east
FAI	Fédération Aéronautique Internationale
ft	feet
g	acceleration due to gravity
hPa	hectopascals
kg	kilogram(s)
km	kilometre(s)
m	metre(s)
°M	degrees magnetic
min	minute(s)
mm	millimetre(s)
MHz	megahertz
NZDT	New Zealand Daylight Time
NZGA	New Zealand Gliding Association
S	south
SSR	secondary surveillance radar
UTC	Coordinated Universal Time
VHF	very high frequency



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Aircraft type, serial number and registration:	Slingsby T-51, FMD 87, ZK-GDV
Number and type of engines:	Not applicable
Year of manufacture:	1964
Date and time:	18 October 1998, 13:20 hours* (approx)
Location:	14 km south-south-west of Blenheim Latitude: S 41° 37.6' Longitude: E 173° 52.54'
Type of flight:	Private
Persons on board:	Crew: 1
Injuries:	Crew: Fatal
Nature of damage:	Aircraft destroyed
Pilot-in-command's licence	FAI Gliding Certificate; Silver Badge
Pilot-in-command's age	23 years
Pilot-in-command's total flying experience:	146 hours (all glider) 54 on type
Information sources:	Civil Aviation Authority field investigation
Investigator in Charge:	Mr A J Buckingham

* Times are NZDT (UTC + 13 hours)

Synopsis

The Civil Aviation Authority was notified of the accident at approximately 1430 hours on Sunday 18 October 1998. The Transport Accident Investigation Commission was in turn notified shortly thereafter, but declined to investigate. Mr A J Buckingham of the CAA was appointed Investigator-in-Charge and carried out an on-site investigation next day.

The glider was on a local soaring flight to the south of Blenheim. The pilot had encountered positive lift conditions and had reported at an altitude of 4300 feet. At about 1400 hours, the wreckage of ZK-GDV was sighted on Orchard Spur, and rescuers subsequently found that the pilot had been killed in the accident.

1. Factual information

1.1 History of the flight

- 1.1.1 On Sunday 18 October 1998, the owner/pilot of (ZK-)GDV, a member of the Marlborough Gliding Club, participated in the Club's normal weekend flying activities at Omaka Aerodrome. He had recently received his aircraft back after major refurbishment, and this was his first opportunity to fly it since 26 April 1998.
- 1.1.2 The sailplane was aerotow-launched at 1211 hours by the Club's Cessna 172 towplane. The pilot of GDV had told the tow pilot that he intended to fly only a circuit on his first flight, and he subsequently released at an altitude of approximately 700 feet, at the beginning of the downwind leg of the circuit.
- 1.1.3 The tow pilot landed normally after a flight time of five minutes, expecting to see GDV land shortly afterwards. GDV did not land as expected, and the tow pilot saw it a short time later to the south of the aerodrome, "scratching around", apparently gaining height. The north-westerly wind conditions at the time were producing positive lift over the hills to the south.
- 1.1.4 At 1246 hours, GDV reported to Woodbourne Tower that he was "ops normal" over the Taylor Dam, three kilometres south of Omaka, at 4300 feet. Immediately after this call, GDV tried unsuccessfully to call GMK, the Club's Blanik two-seat trainer, being flown by the Club CFI.
- 1.1.5 Another Club pilot in GTU, a Twin Astir, was aerotowed at 1248 hours, releasing in the vicinity of Orchard Spur, a ridge oriented north-east/south-west, about five kilometres in length and located some eight kilometres south-west of Omaka. The pilot of GDV called GTU at 1259 hours, with the comment that it was "quite rough", to which the pilot of GTU replied "Thanks (pilot's name), I actually had noticed." This exchange was the last communication with GDV, although the pilot of GTU recalled that his last visual contact with GDV was at about 1315 hours in the vicinity of Orchard Spur.

- 1.1.6 The pilot of GTU called vacating the Woodbourne control zone to the south-west at 1317 hours. After spending some time in the Wards Peak area, about six kilometres outside the zone boundary, he requested clearance at 1402 hours to re-enter the control zone. At 1404 hours, the pilot reported sighting the wreckage of a glider on Orchard Spur. He was able to confirm by 1410 that the wreckage was GDV, and that there was no sign of life. The pilot reported that he was unable to stay in the area because of the rough conditions.
- 1.1.7 At 1407 hours, the CFI of the Marlborough Aero Club was about to take off on a training sortie in a Piper Tomahawk, and volunteered to overfly the site. In doing so, he was able to confirm the observations of the pilot of GTU and the location of the wreckage of GDV.
- 1.1.8 The Woodbourne Tower controller alerted his supervisor who in turn notified the Rescue Co-ordination Centre of the accident. The tower controller also notified the Police via the 111 system. The Police call was relayed to an officer who happened to be visiting Omaka Aerodrome at the time. He and the President of the Gliding Club flew to the site by helicopter. On arrival they found that the pilot had died in the accident, and set about retrieving his body, leaving the wreckage for subsequent inspection.
- 1.1.9 The accident occurred in daylight, at approximately 1320 hours NZDT, 14 km south-south-west of Blenheim, at an elevation of 2300 feet. Grid reference 260-P28-829532, latitude S 41° 37.6', longitude E 173° 52.5'.

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 held an FAI Gliding Certificate and Silver Badge. The requirements for the award of a Silver Badge are a straight-course distance flight of at least 50 km, a five-hour endurance flight and a height gain of at least 1000 m.

- 1.5.2 His flying experience consisted of 54 hours on type and 146 hours total glider flight time. He had flown 1.2 hours in the 90 days prior to the accident, consisting of a seven-minute dual check in the Club's Blanik on 4 October, followed by a 1.1 hour solo soaring flight in the same aircraft. His logbook recorded that the flight was on Orchard Spur in westerly conditions, and that he climbed from 2000 feet to 4500 feet.
- 1.5.3. He had flown 22.5 hours in GDV in the first four months of 1998, as well as a dual check in a Blanik and a 0.6-hour passenger flight in the same aircraft. Between 26 April and 4 October he had logged no flying at all.
- 1.5.4. No BFR as such was recorded in the pilot's logbook, but as this requirement was still in transition, the pilot had until 31 December 1998 to complete one. However, in early 1997, he had done two dual flights totalling 32 minutes for the renewal of his passenger rating, and had done a further dual check in March 1998 to maintain the validity of this rating.
- 1.5.5. The pilot had flown 43.4 hours in the Omaka area since he commenced gliding training in 1990.
- 1.5.6. On the day of the accident the pilot had appeared to his fellow club members to be in good spirits and was particularly keen to try out GDV after having recently received it back from refurbishing.

1.6 Aircraft information

- 1.6.1 Slingsby T-51 (15-metre) Dart, serial number FMD 87, was constructed in England in 1963 and exported to New Zealand in a partially finished state. Completion was undertaken by a specialist sailplane engineer in Christchurch, and the aircraft was registered in New Zealand as ZK-GDV in 1964.
- 1.6.2 The aircraft was a single-seat high-wing monoplane of wood and fabric construction, with a fibreglass moulding forming the cockpit area. Primary flying controls were conventional, with the addition of elevator trim and dive brakes. The T-51 featured a "slab" or "all-flying" tailplane, with a geared balance tab. The latter served also as the elevator trim tab.
- 1.6.3 In September 1998, GDV had undergone major refurbishment at an approved repair facility. All fabric was stripped off, all painted surfaces were sanded back to the bare plywood, and a full wood and glue inspection was performed. The structure was found to be in good condition, and the appropriate areas were recovered with Ceconite 102 fabric and the entire airframe repainted.
- 1.6.4 Additionally, new rudder cables were fitted, altimeter and avionics tests were carried out and the aircraft reweighed. Logbook entries for this work were supplemented by entries certifying that an annual review of airworthiness had been performed, and the aircraft was released to service in accordance with Civil Aviation Rule requirements. A

new, non-terminating Airworthiness Certificate was issued by CAA on 6 October 1998.

- 1.6.5 The oxygen cylinder and regulator normally fitted to GDV had been removed for routine testing during the refurbishment, but the pilot had borrowed and fitted identical equipment. He was reportedly anxious to keep the aircraft centre of gravity within limits, having commented to a work colleague that his own weight was a problem in respect of the minimum cockpit load limitation of 70 kg for GDV.
- 1.6.6 Post-accident calculations established that the cockpit weight and the centre of gravity were within the prescribed limits.
- 1.6.7 The pilot had rigged GDV in the morning and performed a daily inspection, and had made and signed an entry to this effect in the aircraft Daily Inspection Book. The entry was countersigned by the Club CFI, who had carried out a duplicate rigging and control check.
- 1.6.8 No barograph was carried in GDV on the accident flight.

1.7 Meteorological information

- 1.7.1 A moderate to strong north-westerly flow covered the Marlborough area on 18 October 1998. Surface winds recorded at Woodbourne Airport automatic weather station were: 1200 hours, 290 ($^{\circ}$ M)/08 (knots); 1300, 260/15; 1400, 270/16. The maximum recorded gust between 1200 and 1300 was 21 knots, and between 1300 and 1400, 22 knots.
- 1.7.2 The forecast 2000-foot wind for the relevant period was 280/20.
- 1.7.3 The towplane pilot recalled that between the times he towed GDV and GTU, the wind freshened and backed from the north-west more to the west. He encountered moderate turbulence during the tow of GTU to the Orchard Spur area.

1.8 Aids to navigation

- 1.8.1 A Terra TRT 250 SSR transponder incorporating Mode C (altitude reporting) was fitted to GDV. As the area was known to be in good SSR coverage, a replay of the Christchurch radar recording for the same period was viewed. Although the replay showed a target corresponding with the pattern flown by the towplane when GDV was launched, no return was obtained from GDV. The use of the transponder was not mandatory within Woodbourne control zone.

1.9 Communications

- 1.9.1 GDV was equipped with a Bendix/King KY97A VHF transceiver, with which the pilot had made routine calls on 122.8 MHz throughout his flight. A transcript was made from the Woodbourne Tower tape covering the period of the flight and the subsequent discovery of the wreckage. There was no call to indicate any difficulty, other than the pilot's comment on conditions to the pilot of GTU.

1.10 Aerodrome information

- 1.10.1 Not applicable

1.11 Flight recorders

- 1.11.1 Not applicable

1.12 Wreckage and impact information

- 1.12.1 The accident site was located about 800 m from the southern end of Orchard Spur, on the western or windward side, close to the crest. The aircraft had struck the ground in a nose-down attitude between 45° and 60° from the horizontal, on a heading of 010°M, or roughly parallel to the line of the ridge. At the point of impact, the ground slope was about 30° down to the left of the impact heading.
- 1.12.2 A clear imprint of the right wing leading edge, along with fragments of the leading edge, was found in the grassed surface. A faint impression of the left wing leading edge was also evident. Strong winds between the time of the accident and the site examination had rotated the principal wreckage from its original alignment, so it was not possible to say from the ground scars alone if the aircraft was in a spin at the time of impact.
- 1.12.3 All parts of the aircraft were accounted for at the site. Pre-impact control integrity was established at the initial examination and confirmed at a subsequent examination once the wreckage had been retrieved to Omaka. No evidence was found of any pre-existing defect that could have contributed to the accident.
- 1.12.4 The initial report from rescuers indicated that the cockpit canopy was missing, the pilot's harness was undone and his parachute was partially deployed. However, investigation found that the canopy was present at the site, albeit comprehensively shattered, the pilot's harness release had been struck and operated by a corner of the radio panel, and the parachute ripcord handle had been snagged during the impact sequence and ripped from its pocket. This permitted the parachute pack to open, the drogue chute being caught by the wind and partially deploying the main parachute canopy.
- 1.12.5 The support bar for the shoulder harness showed evidence of considerable force being applied consistent with deceleration along the aircraft longitudinal axis, confirming that, at least in the early stages of the impact sequence, the pilot's harness was securely fastened.
- 1.12.6 The cockpit area was demolished, although the instrument panel had survived with minimal damage. The airspeed indicator pointer was stuck at 30 knots, one variometer pointer was stuck at 850 ft/min down, and the accelerometer showed extremes of +1 and -1.2 g, with the instantaneous pointer showing -0.4 g. The altimeter indicated 6500 feet, with the subscale set to 1011 hPa.
- 1.12.7 The VHF radio was ON, with the volume control knob set to about its mid range. The transponder was set to code 1400 and selected to Mode C.

1.13 Medical and pathological information

- 1.13.1 Post-mortem examination of the pilot found that he had died of multiple injuries consistent with impact.
- 1.13.2 No evidence was found of any pre-accident incapacitation or pre-existing condition which may have contributed to the accident.
- 1.13.3 Toxicological testing was limited to alcohol screening, which returned a zero result.

1.14 Fire

- 1.14.1 Fire did not occur.

1.15 Survival aspects

- 1.15.1 The accident was not survivable, owing to the high decelerative forces involved. Although the pilot was restrained (at least in the early stages of the impact sequence) by a combination lap and shoulder harness, the cockpit configuration, with the pilot seated in a semi-recumbent position, meant that there was little crushable structure (some 600 mm) forward of the pilot. Any significant longitudinal impact in this type of aircraft usually results in the destruction of the cockpit area with consequent effects on the pilot.

1.16 Tests and research

- 1.16.1 Not applicable

1.17 Organisational and management information

- 1.17.1 Not applicable

1.18 Additional information

- 1.18.1 To the west of Orchard Spur lies another (unnamed) ridge some four km in length, oriented north/south, and separated by approximately 1000 m between the crests. This ridge converges with Orchard Spur, rising to a maximum elevation of 2645 feet. The maximum elevation of Orchard Spur is 2690 feet. The gully between the two terminates in a wide basin, which is referred to by local glider pilots simply as “the basin”.

1.19 Useful or effective investigation techniques

- 1.19.1 Nil

2. Analysis

- 2.1 The time of the accident was estimated on the basis of the last reported sighting about 1315 hours, and of the pilot's failure to make a routine "ops normal" call, which would have been due between 1315 and 1320. The last radio call from GDV was at 1259 hours.
- 2.2 The pilot's divergence from his original intention to fly only a circuit on his first flight was not unusual in the circumstances. Very few glider pilots would deliberately ignore useable lift unless specifically committed to circuit training or having some other compelling reason to land. A prolonged soaring flight would have been an ideal opportunity for the pilot to re-establish a feel for the aircraft after not having flown it for almost six months.
- 2.3 Similarly, the decision to operate in the Orchard Spur area was understandable, as the pilot had achieved a gain of height of 2500 feet there in westerly conditions two weeks before.
- 2.4 However, at the southern end of Orchard Spur, the next ridge to the west would have had a significant effect on the airflow over the Spur, shielding it to a degree and giving rise to turbulent conditions. Rotor¹ formation in the lee of the ridge could result in unpredictable lift and sink conditions, particularly in the area known as the "basin" where the ridge converged with the south end of Orchard Spur.
- 2.5 The backing and freshening of the wind, as reported by the towplane pilot and confirmed by the change between the Woodbourne 1200 and 1300 reports would have placed the second ridge at about right angles to the wind direction. This would have maximised its effect on the wind flow, while reducing the lifting effectiveness of Orchard Spur, particularly in the "basin" area.
- 2.6 GDV had lost some 2000 feet between the time of the pilot's call at 1246 hours and the time of impact; whether that height was expended in reaching Orchard Spur or had been lost on arrival is unknown.
- 2.7 The impact evidence suggested that GDV had struck the ground after having stalled. The steep nose-down attitude was more consistent with a wing drop with or without partial recovery than a recovery attempt after a straight stall. The damage to the aircraft indicated a low-speed impact, probably at less than 50 knots. None of the post-impact instrument indications was considered reliable, with the possible exception of the airspeed indicator. The transponder settings, in view of the lack of returns received, were attributed to physical contact by the pilot or part of the airframe during the impact sequence.

¹ An "eddy" in the vertical plane, with updraughting air on one side and downdraughting on the other.

- 2.8 Possible reasons for the aircraft stalling were:
- an airspeed/groundspeed illusion close to the ground;
 - the effects of the turbulence in the area, giving significant airspeed fluctuations;
 - the pilot attempting to “stretch the glide” in an attempt to vacate the area. The northerly heading at impact could indicate that an attempt was being made to vacate, but equally could have been a random result if one wing had dropped and rotation had occurred.
 - A combination of the above.

There was no evidence to favour any particular one of these possibilities.

- 2.9 In the absence of any direct eyewitness or other evidence, it was not possible to determine the exact sequence of events preceding the accident, or to establish a definite cause.

3. Conclusions

- 3.1 The pilot was appropriately qualified for the flight.
- 3.2 The pilot had not suffered any incapacity in flight.
- 3.3 The aircraft had a valid airworthiness certificate and had been maintained in accordance with relevant requirements.
- 3.4 The aircraft appeared capable of normal operation up to the moment of impact.
- 3.5 Conditions for soaring were generally favourable, although the observed change in wind speed and direction would have rendered the area at the southern end of Orchard Spur difficult for the pilot in terms of turbulence and unpredictable lift or sink.
- 3.6 The aircraft stalled with insufficient height to recover before ground impact.
- 3.7 No definite cause could be established for the stall.
- 3.8 Weather conditions were probably a major contributing factor.
- 3.9 The pilot’s lack of recent experience, particularly on his own aircraft, was a probable contributing factor.

4. Safety actions

- 4.1 Subsequent to this accident and another which occurred eight days earlier, the National Operations Team of the New Zealand Gliding Association, published a reminder, concerning pilot currency, in the December/January issue of “Gliding Kiwi”, as follows:

Both accidents ended early season soaring flights, so please keep in mind that our skills will inevitably be somewhat rusty after a winter of non-soaring. We cannot expect to instantly resume our feats of wonder. Take it easy to start with and fly with greater safety margins until you feel “keyed in” to the glider again.”

- 4.2 In addition, the Operations Team have developed a stall/spin training package for dissemination to instructors.

(Signed)

Michael G Hunt
Assistant Director Safety Investigation and Analysis
8 April 1999