CANADIAN FORCES
FLIGHT SAFETY INVESTIGATION REPORT

FINAL REPORT

FILE NUMBER: 1010-C-GCLN (DFS 2-4-2)
DATE OF REPORT: 10 November 2003

AIRCRAFT TYPE: Schweizer 2-33 Glider
DATE/TIME: 1 September 2002 1100Z (0800 local)
LOCATION: Miramichi Airport, New Brunswick
CATEGORY: "A" Category Accident

SYNOPSIS

The glider and glider instructor pilot were participating in the Air Cadet Fall Familiarization Program. This was the first launch of the day and the objective of the flight was to position the glider at the upwind end of the runway in order to set up for the day's activities. Due to the tailwind, the glider, on a tow vehicle launch, experienced poor climb performance even though the tow vehicle was being driven at full power. The glider had travelled more than half way down the runway and had only climbed approximately 350' when the pilot elected to release the towrope, planning to land straight ahead. Initially, the pilot used forward slip to reduce altitude to achieve the straight ahead landing, but soon realized that there was not enough landing distance remaining before the airfield boundary fence. The pilot then attempted to complete a 180° turn and land into wind beside the runway. The glider had nearly completed the turn when it impacted the ground. The pilot was the sole occupant and received minor injuries.

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1. FACTUAL INFORMATION

1.1 History of the Flight

The accident glider and pilot were participating in the Air Cadet Fall Familiarization Program. The site at the Miramichi airport uses two gliders that are launched using a pick-up truck as tow vehicle. Glider operations are conducted on the abandoned runway 10-28 at the old Chatham air base. As the light winds favoured operations on runway 28, equipment was pre-positioned to the threshold area of runway 28. With both gliders tied down overnight near the threshold of runway 10, it was decided to launch the gliders with a slight tailwind component down runway 10 and to recover them on runway 28. For this launch, the Site Supervisor directed only instructor pilots to fly solo, thus keeping the gliders as light as possible.

Prior to the launches, radio checks were conducted between the gliders and Launch Control. Both monitored the local Unicom frequency as per standard procedure.

The Site Supervisor briefed the pilot to launch on runway 10 and, after gaining as much height as possible, to join a modified circuit for the grass strip to the left of runway 28. Just prior to the launch the LCO directed the pilot to conduct a straight-ahead recovery.

The accident glider, the first to take-off that day, took off under vehicle tow at 0800 local. The tow vehicle was operated at full power and reached speeds in excess of 100 Kph, but climb performance was less than expected as the glider's airspeed maintained approximately 50 MPH. The glider had only reached approximately 300' AGL when the pilot, believing that she had flown down approximately three quarters of the runway length and that the glider would not gain any more altitude, elected to release the tow cable. Without taking the tail wind into account, she utilized forward slip in an effort to land straight ahead, as directed to by the LCO. However, the pilot soon realized that there was insufficient distance remaining to land before the airfield boundary fence; she consequently decided to turn 180° to the right and land into wind beside runway 28. The glider had almost completed the 180° turn when, at 45 MPH and at greater than 30° angle of bank, the glider's right wingtip contacted the ground. The glider then yawed to the right as the nose and the left wingtip then impacted the ground in a steep nose-low attitude.

After the glider's release from the tow-rope, the tow vehicle driver turned the vehicle around to observe the glider and to remain clear of the glider's approach path. The tow vehicle crew witnessed the accident and were the first at the scene. The tow vehicle driver and the observer removed the canopy using the emergency hinge release cable and assisted the pilot in exiting the cockpit. The pilot then lay on the ground and awaited the emergency services. Once on scene, the LCO notified local authorities through 911 and initiated the local crash response.

The ambulance and the Miramichi police arrived on scene within minutes. The pilot was transported to the local hospital for assessment and toxicology sampling. The site personnel and the Miramichi police secured the site and took pictures.

1.2 Injuries to Personnel

The pilot's head hit the canopy, causing a minor concussion as well as minor soft tissue injuries to the neck.

1.3 Damage to Aircraft

The aircraft received A Category damage (photo 1). Both wingtips contacted the ground, the right wing broke in two pieces at the inboard end of the aileron, and the underside of the nose cone was pushed inward (photo 2). The left wing rear spar attachment point sheared (photo 3) and allowed the wing to rotate forward causing damage to the canopy frame and to the skylight. The rear fuselage bent at the midpoint (photo 4) and the tail wheel broke-off.

1.4 Collateral Damage

The accident occurred on the airfield. No fluids are carried onboard the glider and, therefore, no spills occurred. Minimal damage to the field was incurred.

1.5 Personnel Information

Personnel information is tabulated in Table 1. The pilot was a Civilian Instructor employed by the Atlantic Region Air Cadet Gliding Program. She had accumulated 493 flights in the Schweizer 2-33 glider and was enrolled at the Moncton Flight College in the Multi-engine Commercial IFR Programme.

Table 1: Personnel Information

	Instructor
Rank	Civilian Instructor
Currency/Category valid	Yes
Medical Category valid	Yes
Total Flying Time (Hrs)	215
Instructional (Hrs)	16
Flying hours on type	67
Flying hours last 30 days	10
Duty time last 24 hrs	8

1.6 Aircraft Information

The aircraft was serviceable prior to the accident. All maintenance and inspections were up to date. The weight and balance was within limits.

1.7 Meteorological Information

The accident occurred at 1100Z and the actual weather conditions for the Miramichi airport around the time of the accident were as follows:

CYCH 011000Z 23001KTS 15SM BKN270 5.2/4.4 A3047 RMK CI3 SLP320 SKY47=
CYCH 011100Z 25008G15KT 15SM BKN270 7.7/5.3 A3046 RMK CI3 SLP317
SKY47=
CYCH 011200Z 23008KT 15SM BKN270 9.4/6.1 A3045 RMK CI3 SLP313 58005
SKY47=

The forecast was:

CYCH 011037Z 011123 VRB03KT P6SM SKC
BECMG1315 24012KT
RMK NXT FCST BY 14Z=

The surface winds were calm before the accident and were assessed by the launch personnel as being below five knots at the time of launch. However, the wind indicator for the weather facility is above the height of a ground observer and had already started recording an increase in wind at 1100Z.

1.8 Aid to Navigation

Not applicable.

1.9 Communications

The glider and Launch Control were equipped with handheld aviation VHF radios monitoring the local Unicom frequency. Both radios were checked serviceable before launch. During the flight the pilot made all the appropriate radio transmissions. The site personnel used the site's cell phone to call 911.

1.10 Aerodrome Information

The Miramichi Airport is on the site of the old Chatham air base. The Cadets use the abandoned runway 10/28 for their glider operations while other civilian traffic uses the adjacent runway 09/27.

1.11 Flight Recorders

The aircraft was neither equipped nor required to be equipped with any type of flight recording device.

1.12 Wreckage and Impact Information

The glider was in a medium to steep right turn when the right wingtip contacted the ground on the grass infield adjacent to the runway. This initial contact damaged the right wing and caused the aircraft to yaw to the right and to impact the ground on the underside of the nose in a steep nose down attitude. Under the impact load, the left wing's rear spar attachment point sheared off and the left wing rotated forward until the wingtip contacted the ground. The fuselage then fell back to the ground and the glider came to rest in the position shown in photo 1. The pilot's head struck and cracked the canopy transparency.

1.13 Medical

The pilot received a minor concussion and soft tissue injuries to the neck muscles during the accident. The pilot was able to return to flying duties within 72 hours of the accident. Toxicology samples were taken at the local civilian hospital and the results of the alcohol and basic toxicological screen were negative. Insufficient quantities remained for a full evaluation by the US Armed Forces Institute of Pathology. A review of the pilot's hospital records was conducted; nothing relevant to the flight safety investigation was identified.

1.14 Fire, Explosives Devices, and Munitions

Not applicable.

1.15 Survival Aspects

The forward fuselage area around the cockpit was not deformed and the cockpit liveable space remained unchanged. The pilot's head struck and cracked the canopy transparency causing minor injuries. After the accident, the pilot exited the cockpit with the assistance of ground personnel using the emergency canopy hinge release cable.

1.15.1 Crash Survivability

The crash was survivable. The cockpit maintained its survivable volume and was undamaged. The deceleration forces were within the tolerance level of the human body.

1.15.2 Life Support Equipment

The four-point harness used by the pilot was effective and prevented further injury. A helmet could have prevented the minor head injuries received by the pilot but would not have prevented the soft tissue injuries to the neck.

1.15.3 Emergency Transmitters

The glider was not equipped nor was it required to be equipped with any type of aviation Emergency Locator Transmitter (ELT).

1.16 Test and Research Activities

Not applicable.

1.17 Organisational and Management Information

All training, administrative and maintenance files were reviewed and found to be in order.

2. ANALYSIS

2.1 The Aircraft

The glider was fully serviceable prior to the accident. All inspections were up to date and all maintenance records were in order.

2.2 The Briefing

Although the accident pilot was an experienced glider instructor, she had never attempted a downwind take-off before. The Site Supervisor, who had overall control of the day's flying activities and who was to fly in the second glider, briefed the accident pilot thoroughly on the procedure to follow. She was instructed to gain as much altitude as possible on the launch from runway 10 and execute a modified circuit to land into wind on the grass field left of runway 28. The 1000Z weather report, now almost an hour old but indicating light winds of 230° at 1 Kt, was also reviewed.

2.3 The Launch

Immediately before launch, the Launch Control Officer (LCO), who co-ordinates the launches and recoveries (and is subordinate to the Site Supervisor), noted that the wind had picked-up slightly but he felt that it was still within limits. He then indicated to the accident pilot, in a change from the initial briefing, that he was expecting her to do a "straight ahead recovery" without explaining the full procedure. He intended for her to release from the tow vehicle soon after take-off, land straight ahead, and coast downwind to the intended launch point on runway 28, but this was not clear in the pilot's mind as this was her first attempt at a downwind launch and she had only been briefed for a modified circuit. Nevertheless, she acknowledged the LCO's request without any question. The LCO interpreted her acceptance of the change as meaning that she was comfortable with it. Despite her previous human performance training at Moncton Flight College, the pilot failed to resolve the conflicting requirements from both the LCO and Site Supervisor.

At launch time (1100Z), the airport Unicom reported winds of 250° at 8 gusting to 15 Kts. The LCO did hear the Unicom reported winds; however, the wind sock nearest the launch site indicated little wind, and he knew from his experience with gliding operations at Miramichi that actual launch site winds and Unicom reported winds often differed. Although he could have used the site's hand held anemometer to confirm the winds, the LCO did not. He was confident in his assessment that launch site winds were below 5 Kts.

The forecast and progression of winds noted in hourly reports suggest that wind speed was initially calm at the surface and stronger at altitude. As the morning progressed, this layer of wind descended until approximately 1100Z when it started to be detected by the airfield wind measuring equipment, located well above the

ground. By 1200Z this wind layer had reached the ground and the wind speed increased for the rest of the day.

2.4 The Flight

Based on the forgoing, it is likely that, shortly after take-off, the glider climbed into the stronger tailwind and experienced markedly degraded climb performance. In line with the initial briefing by the Site Supervisor, the pilot attempted to gain as much altitude as possible, and reached approximately 350' AGL. At that point she still had enough altitude to complete a 180° turn and land in the infield, but after releasing from the tow vehicle, she initiated a straight ahead approach to land as briefed by the LCO, purposely losing altitude with forward slip. By the time she realized that she would overshoot the airfield and land on the highway outside the perimeter fence, insufficient altitude remained to complete a 180° turn and land into wind on the airfield. She nevertheless attempted the turn and impacted the ground prior to its completion.

3. CONCLUSIONS

3.1 Findings

3.1.1 The glider was serviceable prior to the accident.

3.1.2 Though the pilot was properly licensed and current, she had never performed the requested manoeuvre before, that is, a downwind take-off to reposition a glider at the other end of the runway.

3.1.3 The site did have a portable wind indicator.

3.1.4 The LCO estimated the winds at launch time to be less than 5 Kts.

3.1.5 The winds at launch time were reported by the Unicom to be 250° at 8 Kts, gusting 15 Kts.

3.1.6 The LCO's past gliding experience at Miramichi indicated that differences between launch site and Unicom winds can exist.

3.1.7 The pilot was briefed by the Site Supervisor to gain as much altitude as possible and to carry out a modified circuit.

3.1.8 The LCO indicated to the pilot that he expected her to land straight ahead without fully explaining the procedure.

3.1.9 The pilot combined the two procedures and attempted initially to both gain as much altitude as possible and land straight ahead.

3.1.10 The pilot delayed the turn into wind until insufficient altitude remained to complete the turn.

3.1.11 The pilot suffered minor injuries.

3.2 Causes and Contributing Factors

3.2.1 Causes

This accident was caused by the glider pilot's attempt to turn 180° without sufficient altitude to complete the turn.

3.2.2 Contributing Factors

The pilot received conflicting advice from two supervisors who did not ensure their advice was harmonized. This compounded the pilot's inexperience with any kind of downwind take-off and created hesitation in the initiation of alternative actions.

A significant misinterpretation of winds aloft contributed to confusion over the process the pilot was to follow. Personnel on site disregarded the wind data from the local Unicom and used their personal experience to judge the wind directly.

4. SAFETY MEASURES

4.1 Safety Measures Taken

4.1.1 All downwind launches to position gliders for operations have been prohibited in the Atlantic Region until the completion of this investigation.

4.1.2 It was stressed to all Atlantic Region Site Supervisors the importance of keeping the wings level and landing straight ahead rather than turning when in close proximity to the ground.

4.2 Further Safety Measures Recommended

It is recommended that:

4.2.1 All Air Cadet gliding sites ensure that on-site wind measuring equipment is readily available to allow accurate surface wind measurement when local aviation weather reporting facilities are not available or impractical for use.

4.2.2 An accurate quantitative wind measurement as well as an assessment of winds aloft just prior to the first launch of the day be made a requirement.

4.2.3 The policy regarding downwind take-offs be reviewed. Points to consider must include training emphasis on the effects of decreasing performance shear on glider performance, training emphasis on the changes to tailwind component as a function of altitude, training emphasis on the particular susceptibility of ground-based launch methods to decreasing performance shear, and allowing first-flight-of-the-day downwind take-offs only when upper winds are accurately known.

4.2.4 Consideration be given to providing Human Performance in Military Aviation (HPMA) training to supervisors of air cadet gliding programmes.

5. DFS REMARKS

The decision to conduct a downwind takeoff to reposition the accident glider may not, by itself, have been dangerous. However, a number of factors combined to create the conditions for this accident to occur. Firstly, the two supervisors failed to co-ordinate their plans for this launch and consequently, the accident pilot was given conflicting direction. Secondly, the pilot did not resolve this conflicting advice prior to takeoff. These two conditions were then exacerbated by an inaccurate wind assessment that did not consider all available information. This accident highlights the importance of effective communication to ensure that everyone involved in the operation has a consistent and accurate mental picture of what is to take place. It also highlights the importance of considering all available information when making decisions.

A. Hunter
Colonel
Director of Flight Safety

Annex A: Photographs

Photo 1: Final resting place

Photo 2: Nose damage

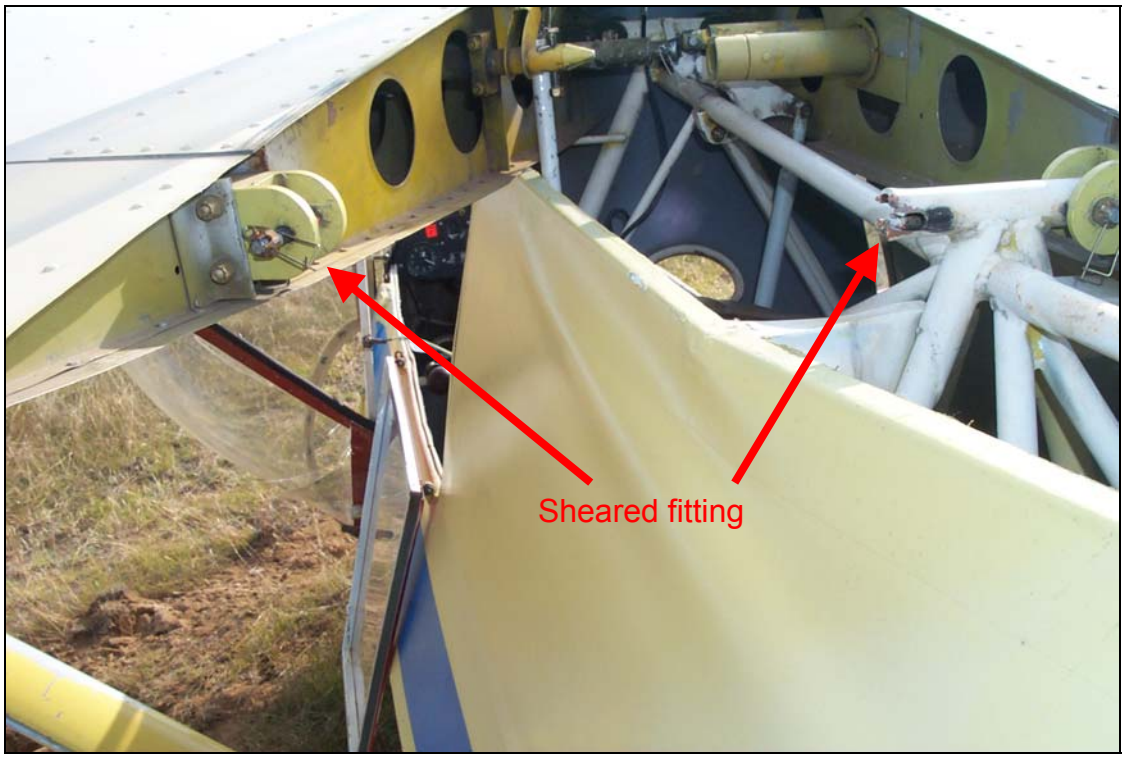

Photo 3: Rear spar attachment point

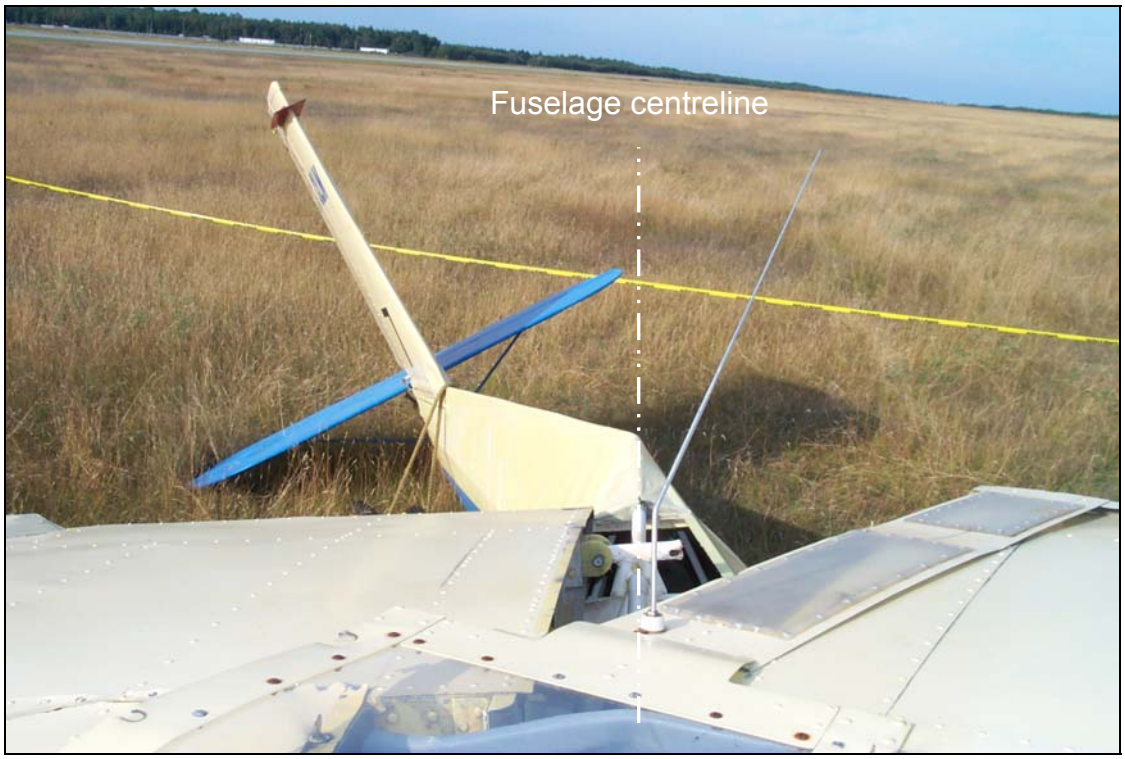

Photo 4: Rear fuselage damage