Federal Public Service
Mobility and Transport
Air Accident Investigation Unit

Air Accident Investigation Unit -(Belgium)
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Safety Investigation Report

ACCIDENT TO THE PZL-BIELSKO SZD-55-1 REGISTERED D-5**** IN EBNM ON 18 MAY 2011

Ref. AAIU-2011-15-EBNM
Issue date: 10 August 2012
Status: Final

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FOREWORD

This report is a technical document that reflects the views of the investigation team on the circumstances that led to the accident.

In accordance with Annex 13 of the Convention on International Civil Aviation, it is not the purpose of aircraft accident investigation to apportion blame or liability. The sole objective of the investigation and the Final Report is the determination of the causes, and define recommendations in order to prevent future accidents and incidents.

In particular, Art. 17.3 of EU Regulation 996/2010 stipulates that a safety recommendation shall in no case create a presumption of blame or liability for an accident, serious incident or incident.

Unless otherwise indicated, recommendations in this report are addressed to the Regulatory Authorities of the State having responsibility for the matters with which the recommendation is concerned. It is for those Authorities to decide what action is taken.

The investigation was conducted by L. Blendeman and H. Metillon.
The report was compiled by L. Blendeman

NOTE:
For the purpose of this report, time will be indicated in UTC, unless otherwise specified.

Synopsis.

Date and hour of the accident

18 May 2011 at 13:15 UTC

Aircraft

PZL Bielsko SZD 55-1, msn 551192045, registered D-5***

Accident location

On EBNM, Templeux airfield

Aircraft operator

Private

Type of flight

General Aviation

Persons on board

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1. Factual Information

1.1. History of flight.

The pilot had recently purchased the sailplane, and wanted to gain some experience on it, before going abroad for a few weeks of flying holidays.

He went to the airfield of Temploux and prepared his sailplane for the first flight of the day.
Runway 24 was in service that day. The aerotow was done with the Robin DR400/180R registered D-E***.

During the take-off, the pilot had to react to roll movement of the sailplane resulting in the LH and RH wing alternatively touching the ground. The movement became too important, and the pilot decided to release the tow cable.

The sailplane rotated around the extremity of the LH wing, and the nose crashed into the ground, and fell back on its tail, rupturing the tail boom.

The pilot climbed out, uninjured.

1.2. Injuries to persons.

Injuries	Pilot	Passenger	Others	Total
Fatal	0	0	0	0
Serious	0	0	0	0
Minor	0	0	0	0
None	1	0	0	1
Total	1	0	0	1

1.3. Damage to aircraft.

The airplane sustained damage to the nose and tail boom

Fig. 1 Damage to the nose of the sailplane

Fig. 2 Damage to the fuselage

1.4. Other damage.

There was no other damage.

1.5. Personnel information.

Pilot
Age: 59 years old
Glider Pilot Licence, first issued 04 June 1996, last issued 10 March 2011 by the Royal Belgian Aeroclub, valid until 17 February 2013.

Rating: Aerotow
Carrying of passengers

Medical Certificate: Class 2, valid until 10 March 2012.

Total Flight Experience:
The pilot stated he had accumulated a total of 600FH on various type of gliders, including K6 (most recent), Jantar, LS1, Astir,...
The pilot flies 30 h per year on average.
At the time of the accident, he had flown the SZD55 for 6 flights, for a total of 6:30 FH.

1.6. Aircraft information.

The **PZL Bielsko SZD-55** is a Standard Class sailplane produced since 1988.

The SZD-55 is built of fiberglass and has an elliptical wing. It has top surface Schempp-Hirth type spoilers.

The airframe features a cantilever shoulder wing monoplane.

The fuselage and the fin are of glassfibre/epoxy construction. It has a retractable monowheel with tyre size 350x 135mm.

General characteristics

- **Crew:** One
- **Capacity:** 195 kg of water ballast, plus 6 kg in tail
- **Length:** 6.41 m
- **Wingspan:** 15.00 m
- **Height:** 1.47 m
- **Wing area:** 9.6 m^2
- **Aspect ratio:** 23.4
- **Empty weight:** 237 kg
- **Flight weight (without ballast):** 350 kg
- **Max Take-off weight:** 500 kg

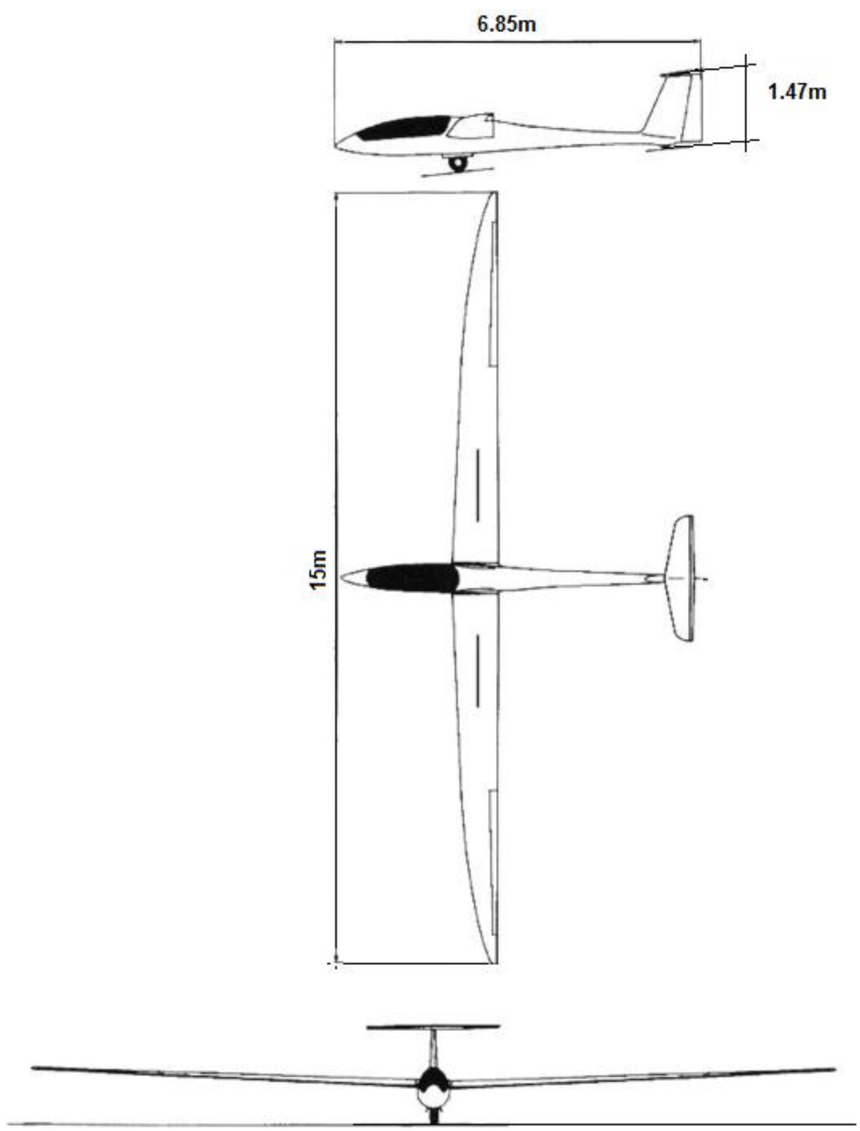

Fig. 3: 3-view drawing

Performance

- **Maximum speed:** 255 km/h
- **Stall speed in straight flight:** 63 km/h (take-off weight: 265 kg)
- **Stall speed in straight flight:** 84 km/h (max take-off weight: 500 kg)
- **Maximum glide ratio:** 44.1

Airframe:

- Manufacturer: Allstar PZL Glider Sp.z o.o.
- Type: SZD 55-1
- Serial number: 551192045
- Built date: 1988
- Registration: D-5***
- Total Time: 1350 FH / 350 FC

Flight Manual/ Chapter 4.8. Aerotowing states:

Directions for the sailplane pilot:

1. When the towing cable is tensioned the wheel should be braked. To avoid rolling over the cable. In case of surge and loosing of the cable immediately release the towing cable.

2. On the very beginning of ground run a heavy pilot should pull the stick (this makes more easy to keep the direction at the side wind). A light pilot should push the stick.

3. When taking-off at the side wind on the very beginning of the ground run the airbrake should be slightly extended. When the full aileron control appears, slowly retract the airbrakes.

4. If the glider banks and the wingtip hits the ground immediately release the towing cable !

5. When the towing airspeed becomes steady trim the stick force (push the trimming lever and release).

6. It is not recommended to fly below the towing aeroplane due to the towing cable friction on the fuselage surface.

   NOTE – IN CASE THE HOOK INSTALLED ON THE UNDERCARRIAGE FORK IS USED IT IS PROHIBITED TO RETRACT THE UNDERCARRIAGE WHEN THE SAILPLANE IS AEROTOWED;

   PAY A SPECIAL ATTENTION THAT THE TOWING CABLE HAS NO EXCESSIVE SAG SINCE IT MAY RESULT IN A SELF-RELEASING

   - DURING TAKE-OFF WITH WATER BALLAST THE GROUND RUN SHOULD BE PERFORMED WITH AIR BRAKE PARTIALLY EXTENDED (ABOUT 10cm (4 in) OF COCKPIT CONTROL MOVEMENT) TILL THE LATERAL CONTROLLABILITY IS GAINED. THEN RETRACT THE AIR BRAKE GENTLY.

1.7. Meteorological conditions

Wind:
Direction: 240 degrees
Speed: 6 kts

Visibility: more than 10 km

Temperature: 23°C

QNH: 1017 hPa

1.8. Aids to navigation.

Not applicable.

1.9. Communication.

Not applicable

1.10. Aerodrome information

The Namur – Suarlée airfield (EBNM) is located near the city of Namur, at 50 km SE of Brussels and 60 km SW of Liege.

Coordinates are N 50° 29’ 17’’ – E 4° 46’ 08

The airfield is equipped with a 696 m long x 27 m wide grass runway, oriented 064°/244°.
Elevation is 594 ft above sea level.

The circuit is RH for Runway 24; LH for Runway 06.
The airfield is operated during daytime hours.
Flight information services are given by radio: "Namur Radio" - 118.000 MHz - Information only, no ATC .

Runway 24 for gliders shows a slight up slope, and is somewhat uneven.

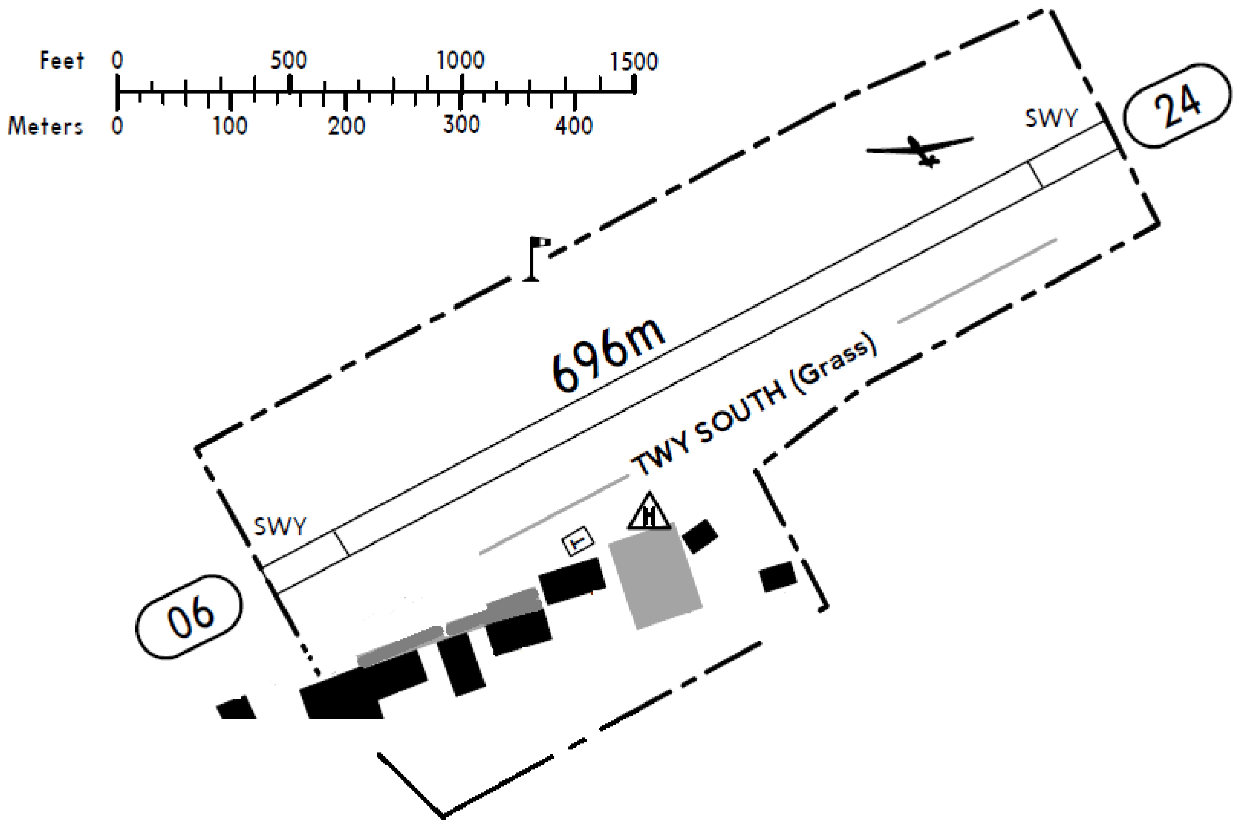

Fig.4 EBNM Airfield

Fig.5: View of EBNM airfield (from the website)

1.11. Flight Recorder

Not Applicable

1.12. Wreckage and impact information:

The events that led to the accident occurred 10s after the start of the towing; the speed was around 40 km/h and the sailplane had moved 80m.

1.13. Medical and pathological information.

Not relevant

1.14. Fire.

There was no fire.

1.15. **Survival aspects**

Not Relevant.

1.16. **Test and Research**

Not Applicable

2. Analysis.

The pilot was interviewed.
The towing occurs with the assistance of a launching crew running alongside the sailplane at the LH side and holding up the wing tip to avoid it touching the ground for the first few meters.

When the launching crew let the wing go, the LH wing tip fell on the ground. The pilot reacted immediately with RH aileron and rudder, but the reaction of the sailplane was slow, and the (unusually) tall grass caused a yawing effect to the left due to the friction forces.

At this moment of the flight, the airspeed is low, and the aileron effect is minimal to non-existent, furthermore, applying RH aileron means lowering the control surface into the grass, causing therefore an increase of the drag.

The sailplane was pointing 40° to the left of the towing airplane, the pilot directed the sailplane to the right, in order to align with the towing airplane. At some point, the left wing went up, causing the right wing tip to contact the ground. The pilot reacted by applying LH aileron and rudder, and the sailplane turned again to the left, but the LH wing tip hit the ground.

The pilot decided to release the tow cable. He stated the speed was around 40km/h.

When turning to the left, the airspeed on the RH wing increases, creating a lift when the airspeed reaches beyond the stall speed. The runway is also reported to be somewhat uneven (mostly in the second part of Runway 24), this might have induce a bouncing effect.

The RH side of the sailplane left the ground and the sailplane quickly rotated around the LH wing tip, in a nose dive.

The nose plowed into the ground. The sailplane came to a brutal stop, and fell back on its tail, causing the aft fuselage to break.

The flight manual prescribes to release the tow cable as soon as the wing extremity hits the ground

Additional Information:
The excellent Glider Flying handbook published by the FAA describes the problems of oscillation of the sailplane during take-off (pages 8.3 and 8.4 in appendix).

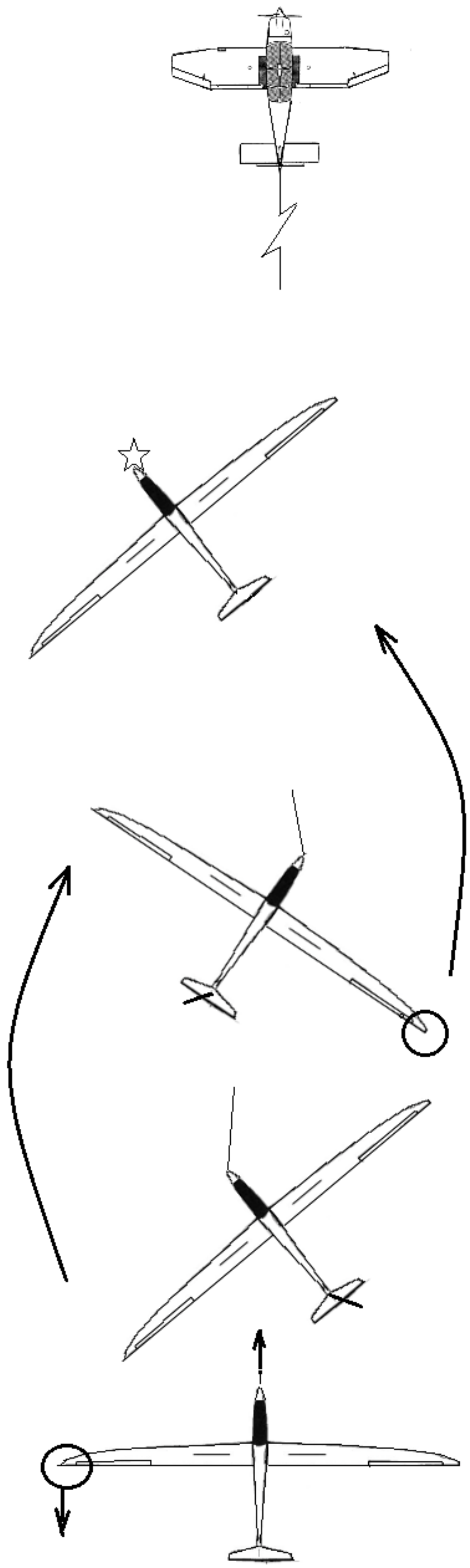

Fig.6 The flight

3. Causes

Findings:

- The airplane was airworthy
- The pilot was duly qualified
- The pilot had a low experience flying with the SZD 55, and the most recent experience was done on a Spruce and plywood with fabric covering glider, the Schleicher Ka 6.
- The meteorological conditions were favorable, with wind in the axis of the runway.

Cause

The accident was caused by a delay in reaction time to release the tow cable further to the wing tip touching the ground.

4. Recommendations

There are no recommendation issued for this report.

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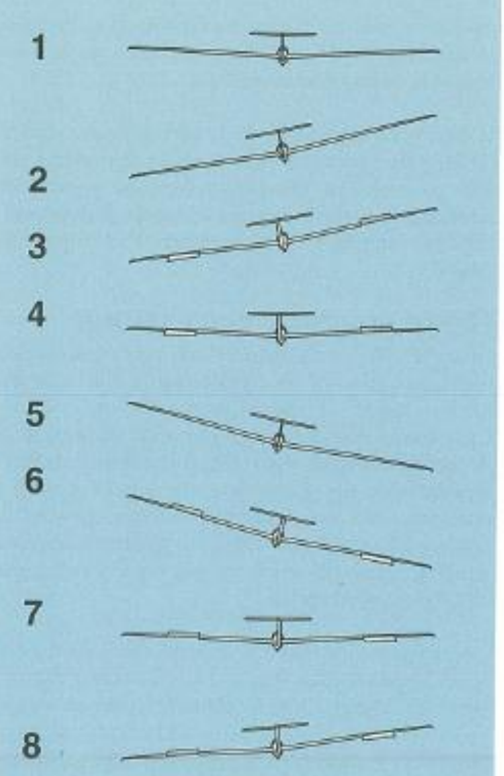
APPENDIX:

EXTRACT FROM THE GLIDER FLYING HANDBOOK (FAA-H-8083-13)

applying considerable forward pressure on the control stick. A series of PIOs may result. If the PIOs continue, a hard landing may occur.

PILOT-INDUCED ROLL OSCILLATIONS DURING LAUNCH

Pilot-induced roll oscillations occur primarily during launch, particularly via aerotow. As the towpilot applies full throttle, the glider moves forward, balanced laterally on its main wheel. If a wingtip begins to drop toward the ground before the glider achieves significant speed, aileron control is marginal and considerable stick displacement must be applied to elicit a response from the glider. As the glider accelerates, the control response improves and the latency of response from the glider shortens. As acceleration continues, the pilot must recognize the quickening response of the glider to avoid over-controlling the glider. [Figure 8-2]



Pilot-induced roll oscillations during initial portion of takeoff ground roll. Momentum of long, massive glider wings tends to overshoot desired wings-level condition. This tendency is aggravated if the pilot holds corrective aileron pressure too long.

Figure 8-2. Pilot-induced roll oscillations during takeoff roll.

Although roll oscillations can develop during ground launch operations, they occur less often than during aerotow operations because excellent aerodynamic control of the glider is quickly achieved thanks to the rapid acceleration. Since control improves as acceleration increases, operations that use a powerful winch or launch vehicle are less likely to be hampered by oscillations.

Wing mass also affects roll oscillations. If the wings do not stay level, the pilot applies considerable aileron pressure to return the wings to level attitude. Because of the large mass and considerable aerodynamic damping that long-winged gliders exhibit, there is a considerable lag time from the moment pressure is applied until the moment the wings are level again. Inexperienced pilots maintain considerable pressure on the ailerons until the wings are level, then release the pressure. The wings continue their rolling moment due to their mass, length, and momentum about the longitudinal axis of the glider. The pilot senses this momentum too late, and applies considerable pressure in the opposite direction in another attempt to level the wings.

After a time, the wings respond and roll back to level, whereupon the pilot centers the ailerons once again. As before, the momentum of the wings about the longitudinal axis is considerable, and the wings continue their motion in roll. This series of PIOs may continue until one wingtip contacts the ground, possibly with considerable force, causing wing damage or a groundloop and an aborted launch. To reduce the likelihood of this type of roll oscillation, anticipate the momentum of the glider wings about the longitudinal axis and reduce aileron control pressure as the wings approach the level position.

PILOT-INDUCED YAW OSCILLATIONS DURING LAUNCH

Pilot-induced yaw oscillations are usually caused by overcontrolling the rudder. As with roll oscillations, the problem is the failure of the pilot to recognize that the glider is accelerating and has considerable momentum. If the glider is veering away from the towplane, rudder application in the appropriate direction helps correct the situation. If the rudder pressure is held too long, the large yaw momentum of the glider wings and fuselage results in overshooting the desired yaw position and veering off in the opposite direction. The alarmed pilot now applies considerable rudder pressure in the direction opposite from the original rudder pressure. As the glider continues to accelerate, the power of the rudder increases and the lag time decreases. In extreme cases, the glider may veer off the runway and collide with runway border markers, airport lights, parked glider, or

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other obstacles. The cure for this type of yaw oscillation is to anticipate the momentum of the glider wings and fuselage about the vertical axis and reduce rudder pedal pressure when the nose of the glider begins to yaw in the desired direction in response to rudder inputs. [Figure 8-3]

When a wingtip contacts the ground during takeoff roll, an uncommanded yaw results. The drag of the wingtip on the ground induces a yaw in the direction of the grounded wingtip. The yaw usually is mild if the wingtip is on smooth pavement but much more vigorous if the wingtip is dragging through tall grass. If appropriate aileron pressure fails to raise the wingtip off the ground quickly, the only solution is to release the towline and abort the takeoff attempt before losing all control of the glider.

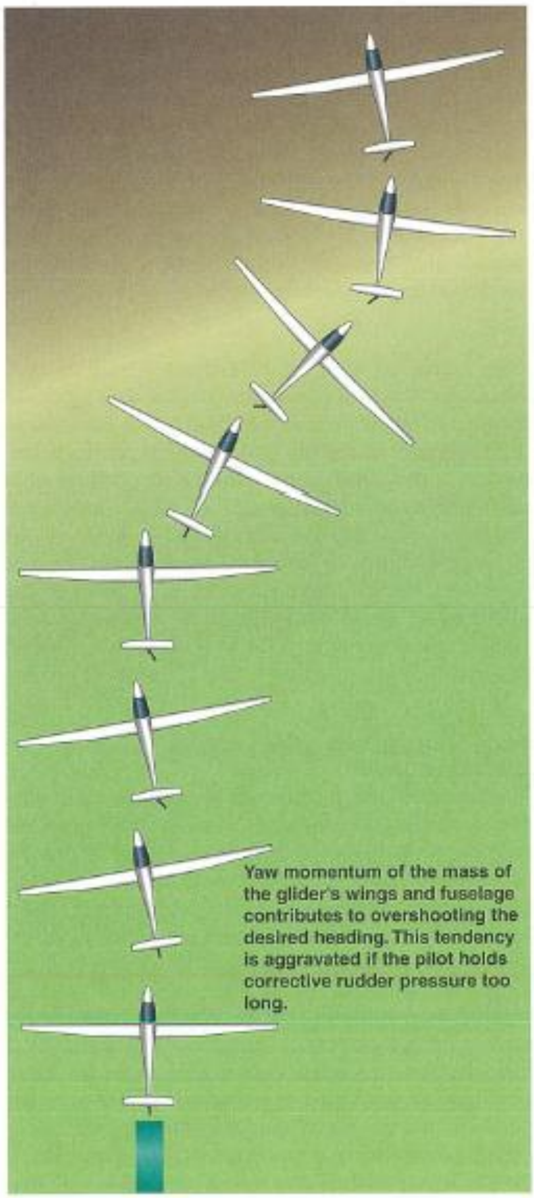

Figure 8-3. Pilot-induced yaw oscillations during takeoff roll.

The greater the mass of the wings and the longer the wingspan, the more momentum the glider will exhibit whenever roll or yaw oscillations arise. Some very high performance gliders feature remarkably long and heavy wings, meaning once in motion, they tend to remain in motion for a considerable time. This is true not only of forward momentum, but yaw and roll momentum as well. The mass of the wings, coupled with the very long moment arm of large-span wings, results in substantial lag times in response to aileron and rudder inputs during the early portion of the takeoff roll and during the latter portion of the landing rollout. Even highly proficient glider pilots find takeoffs and landings in these gliders to be challenging. Many of these gliders are designed for racing or cross-country flights and have provisions for adding water ballast to the wings. Adding ballast increases mass, which results in an increase in lag time.

If there is an opportunity to fly such a glider, study the GFM/POH thoroughly prior to flight. It is also a good idea to seek out instruction from an experienced pilot/flight instructor in what to expect during takeoff roll and landing rollout in gliders with long/heavy wings.

Gust-Induced Oscillations

Gusty headwinds can induce pitch oscillations because the effectiveness of the elevator varies due to changes in the speed of the airflow over the elevator. Crosswinds also can induce yaw and roll oscillations. A crosswind from the right, for instance, tends to weathervane the glider into the wind, causing an uncommanded yaw to the right. Right crosswind also tends to lift the upwind wing of the glider. When crosswinds are gusty, these effects vary rapidly as the speed of the crosswind varies.

Local terrain can have a considerable effect on the wind. Wind blowing over and around obstacles can be gusty and chaotic. Nearby obstacles, such as hangars, groves or lines of trees, hills, and ridges can have a pronounced effect on low altitude winds, particularly on the downwind side of the obstruction. In general, the effect of an upwind obstacle is to induce additional turbulence and gustiness in the wind. These conditions are usually found from the surface to an altitude of three hundred feet or more. If flight in these conditions cannot be avoided, then the general rule during takeoff is to achieve a faster than normal speed prior to liftoff. The additional speed increases the responsiveness of the controls and simplifies the problem of correcting

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