The Gliding Federation of Australia Inc

Occurrence Summaries

01/01/2017 to 31/12/2017

Region(s): All

Club:

Christopher Thorpe
Executive Manager, Operations
The Gliding Federation of Australia Inc.

31-Dec-2017

The Gliding Federation of Australia Inc
SOAR Accident and Incident Occurrences
General Statistics

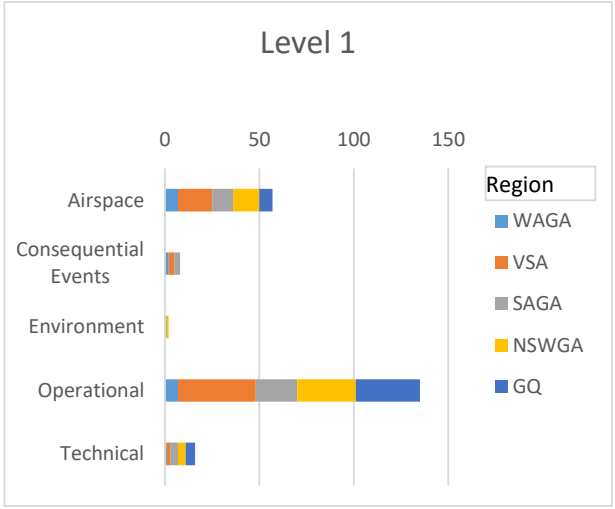
Date From: 01/01/2017
Date to: 31/12/2017

Damage						
	VSA	**NSWGA**	**GQ**	**SAGA**	**WAGA**	**Total**
Nil	41	33	26	35	11	146
Substantial	5	6	5	1	3	20
Minor	14	11	13	5	3	46
Write-off	4		2			6
Total	**64**	**50**	**46**	**41**	**17**	**218**
Injury						
	VSA	**NSWGA**	**GQ**	**SAGA**	**WAGA**	**Total**
Nil	59	48	42	41	16	206
Serious	1					1
Minor	1	2	3		1	7
Fatal	3		1			4
Total	**64**	**50**	**46**	**41**	**17**	**218**
Phases						
	VSA	**NSWGA**	**GQ**	**SAGA**	**WAGA**	**Total**
Launch	12	13	6	10		41
Landing	23	12	23	7	4	69
Thermalling	4	1	3	1	3	12
In-Flight	15	18	9	17	6	65
Ground Ops	7	4	4	5	1	21
Outlanding	2	2	1	1	3	9
Type of Flight						
	VSA	**NSWGA**	**GQ**	**SAGA**	**WAGA**	**Total**
Local	22	19	20	15	6	82
Cross-Country	8	4	3	4	4	23
Competition	14	6	1	5	5	31
Training/Coaching	12	15	16	11	1	55
Ground Ops	5	4	4	5	1	19
AEF	3	2	2	1		8
Total	**64**	**50**	**46**	**41**	**17**	**218**

The Gliding Federation of Australia Inc
SOAR Accident and Incident Occurrences
Classification Level 1

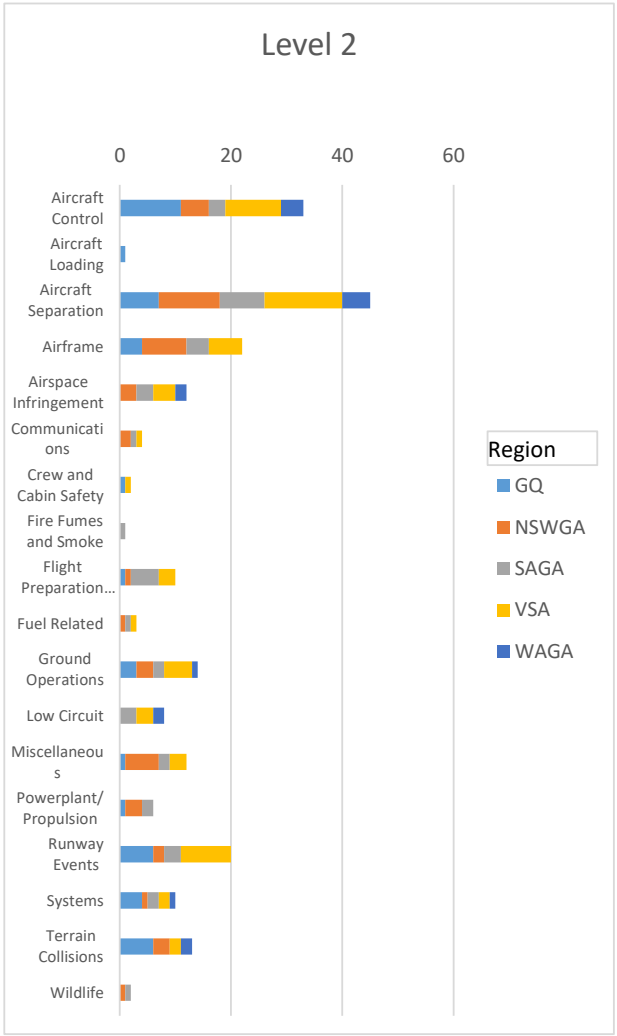
Date From: 01/01/2017
Date to: 31/12/2017

Level 1	VAG	VSA	SAGA	ISWG	GQ	Total
Airspace	7	18	11	14	7	57
Consequential Events	2	3	3			8
Environment			1	1		2
Operational	7	41	22	31	34	135
Technical	1	2	4	4	5	16
Total	**17**	**64**	**41**	**50**	**46**	**218**



The Gliding Federation of Australia Inc
SOAR Accident and Incident Occurrences
Classification Level 2
Date From: 01/01/2017
Date to: 31/12/2017

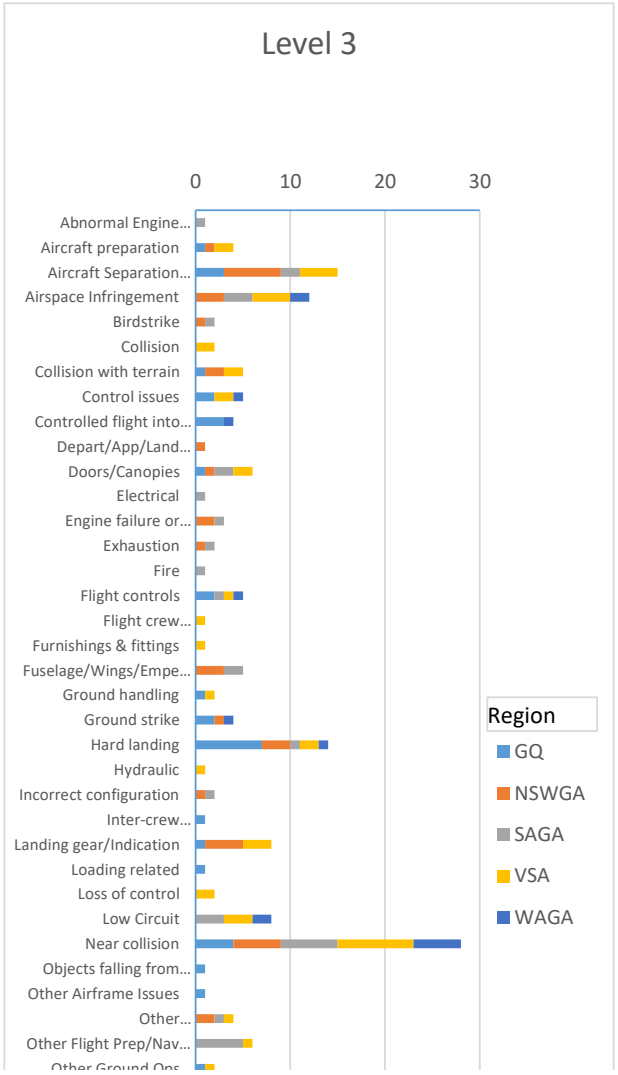
Level 2	GQ	NSWGA	SAGA	VSA	WAGA	Total
Aircraft Control	11	5	3	10	4	33
Aircraft Loading	1					1
Aircraft Separation	7	11	8	14	5	45
Airframe	4	8	4	6		22
Airspace Infringement		3	3	4	2	12
Communications		2	1	1		4
Crew and Cabin Safety	1			1		2
Fire Fumes and Smoke			1			1
Flight Preparation/Navigation	1	1	5	3		10
Fuel Related		1	1	1		3
Ground Operations	3	3	2	5	1	14
Low Circuit			3	3	2	8
Miscellaneous	1	6	2	3		12
Powerplant/Propulsion	1	3	2			6
Runway Events	6	2	3	9		20
Systems	4	1	2	2	1	10
Terrain Collisions	6	3		2	2	13
Wildlife		1	1			2
Total	**46**	**50**	**41**	**64**	**17**	**218**



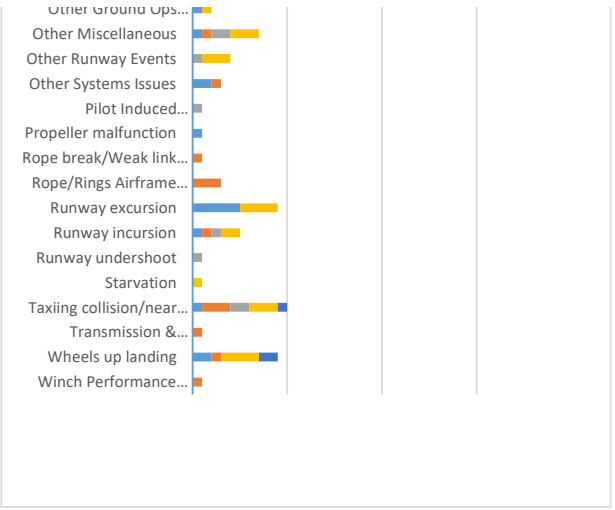
The Gliding Federation of Australia Inc
SOAR Accident and Incident Occurrences
Classification Level 3

Date From: 01/01/2017
Date to: 31/12/2017

Level 3	GQ	NSWGA	SAGA	VSA	WAGA	Total
Abnormal Engine Indications			1			1
Aircraft preparation	1	1		2		4
Aircraft Separation Issues	3	6	2	4		15
Airspace Infringement		3	3	4	2	12
Birdstrike		1	1			2
Collision				2		2
Collision with terrain	1	2		2		5
Control issues	2			2	1	5
Controlled flight into terrain	3				1	4
Depart/App/Land wrong runway		1				1
Doors/Canopies	1	1	2	2		6
Electrical			1			1
Engine failure or malfunction		2	1			3
Exhaustion		1	1			2
Fire			1			1
Flight controls	2		1	1	1	5
Flight crew incapacitation				1		1
Furnishings & fittings				1		1
Fuselage/Wings/Empennage		3	2			5
Ground handling	1			1		2
Ground strike	2	1			1	4
Hard landing	7	3	1	2	1	14
Hydraulic				1		1
Incorrect configuration		1	1			2



Inter-crew communications	1					1
Landing gear/Indication	1	4		3		8
Loading related	1					1
Loss of control				2		2
Low Circuit			3	3	2	8
Near collision	4	5	6	8	5	28
Objects falling from aircraft	1					1
Other Airframe Issues	1					1
Other Communications Issues		2	1	1		4
Other Flight Prep/Nav Issues			5	1		6
Other Ground Ops Issues	1			1		2
Other Miscellaneous	1	1	2	3		7
Other Runway Events			1	3		4
Other Systems Issues	2	1				3
Pilot Induced Oscillations			1			1
Propeller malfunction	1					1
Rope break/Weak link failure		1				1
Rope/Rings Airframe Strike		3				3



Date	1-Jan-2017	Region	NSWGA	SOAR Report Nbr	S-0885
Level 1	Operational	Level 2	Airframe	Level 3	Landing gear/Indication
A/C Model 1	IMC A-9A Callair	A/C Model 2			
Injury	Nil	Damage	Substantial	Phase	Launch	PIC Age	59

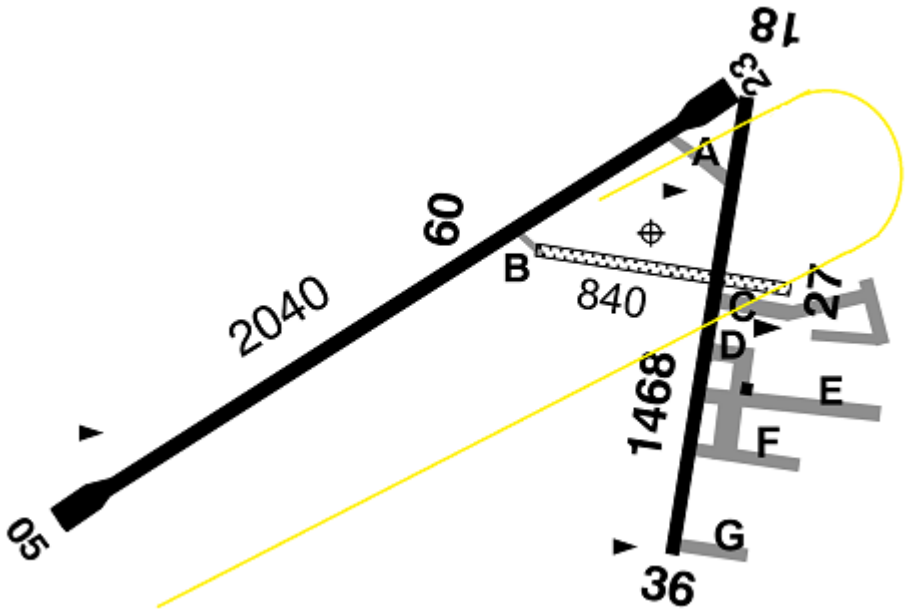
While under aerotow and just as the towing combination had left the ground the command pilot in the glider noticed the right main landing gear of the tow plane had come adrift and was hanging down. The glider pilot informed the tow pilot of the problem, whereupon the combination towed to a height where the glider could safely release. The tow pilot elected to land at a nearby Regional Airport where emergency services were available and alerted the control tower. The tow pilot was cleared to land and made an engine-off landing. The tow plane touched down on the left main gear and gently settled onto the right main gear, whereupon the tow plane gently turned through 180 degrees. The pilot was unhurt and the aircraft suffered minor damage to the right main gear, and the underside of the right wing and aileron. The aircraft was removed from the runway by aerodrome staff and subsequently transported to a maintenance facility by flatbed truck. Subsequent inspection revealed a badly welded joint from a previous repair to the shock absorber strut had failed, allowing the leg to separate.

Date	1-Jan-2017	Region	GQ	SOAR Report Nbr	S-0890
Level 1	Operational	Level 2	Runway Events	Level 3	Runway excursion
A/C Model 1	Ventus-2cM	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	74

The pilot arrived back at the home airfield after a cross-country flight at about 4,000 ft AMSL. While descending to crosswind circuit height there was a significant wind change consequent of a large thunderstorm to the south-east of the airfield. The pilot landed with about 20 knots tailwind component resulting in the aircraft entering the run-off area at the end of the runway. No damage was done to the aircraft or property. Investigation revealed the pilot had not flown much in the previous 12 months and was lacking currency.

Date	2-Jan-2017	Region	NSWGA	SOAR Report Nbr	S-0897
Level 1	Operational	Level 2	Runway Events	Level 3	Depart/App/Land wrong runway
A/C Model 1	Pilatus B4-PC11AF	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	69

The pilot misidentified the runway and called landing on one runway while intending to land elsewhere. The pilot called joining downwind for the operational runway 18 while positioned south-west of the airport (refer diagram). While observers initially thought the pilot was conducting a right-hand circuit, the pilot headed in a north-easterly direction and crossed runway 18 midfield losing a lot of height in the process. The pilot then overflew the threshold of runway 27 at about 400 ft and carried out a left turn, opening the dive brakes during the turn. The pilot lined up over the eastern boundary of the airfield to cross the operational runway diagonally at about 60 - 100 ft and landed ahead of parked gliders and cars in a grassed area on a heading parallel and to the south of runway 23. While the grassed area is suitable for landing, it is not designated as a landing area. Other than the location, the landing was normal and there was no significant crosswind component. The pilot has a relatively low total number of hours and high number of launches, with little soaring experience. While the pilot had flown with an instructor at this airfield on a few occasions the previous year, this was the pilot's first solo flight. It was determined that the pilot lost orientation due to overload caused by relative inexperience coupled with a first solo flight at an unfamiliar airfield. The pilot was debriefed by the CFI and subsequent flights were satisfactory.



Date	3-Jan-2017	Region	VSA	SOAR Report Nbr	S-0930
Level 1	Operational	Level 2	Aircraft Control	Level 3	Hard landing
A/C Model 1	Astir CS 77	A/C Model 2			
Injury	Nil	Damage	Substantial	Phase	Landing	PIC Age	81

An experienced and current pilot misjudged the flare and the glider bounced back into the air. Subsequent mishandling of the recovery resulted in the aircraft touching down heavily before coming to rest. The

undercarriage bulkhead was substantially damaged. The pilot was counselled on approach and round out procedures and undertook two further training flights with the CFI.

Date	4-Jan-2017	Region	VSA	SOAR Report Nbr	S-0924
Level 1	Airspace	Level 2	Airspace Infringement	Level 3	Airspace Infringement
A/C Model 1	Mini-Nimbus C	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Thermalling	PIC Age	50

During a cross-country flight the experienced pilot flew into controlled airspace without a clearance. The infringement was identified by the pilot's CFI following a review of the pilot's OLC trace. The infringement occurred despite the pilot carrying appropriate maps and GPS navigation device and may have been caused by inattention. The pilot was counselled.

Date	4-Jan-2017	Region	VSA	SOAR Report Nbr	S-0891
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Near collision
A/C Model 1	Piper PA-25-235/A1	A/C Model 2	Binder EB29 DR		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	70

On day 1 of the 2017 World Gliding Championships a towing combination approached, from below and behind, a motor glider on the right climbing under power. The tow pilot turned slightly left to provide clearance but the motor glider continued to drift toward the towing combination's flight path. The pilot of the towed glider attempted to alert the tow pilot to the potential conflict but this transmission was given at a late stage and the tow pilot did not react. Seconds later the motor glider passed from right to left over and between the tow plane and glider under tow with separation estimated at less than 100ft. The tow plane is a

two-seat, side by side Pawnee with the pilot sitting in the in the left seat. It is possible the tow pilot's vision was impeded up and to the right by the cockpit roof.

Date	7-Jan-2017	Region	VSA	SOAR Report Nbr	S-0892		
Level 1	Operational	Level 2	Terrain Collisions	Level 3	Collision with terrain		
A/C Model 1	ASG29	A/C Model 2					
Injury	Nil	Damage	Substantial	Phase	Ground Ops	PIC Age	39
Whilst towing the glider around the apron area the tow vehicle turned sharply and the elevator of the glider was caught against the vehicle. The elevator was substantially damaged.							

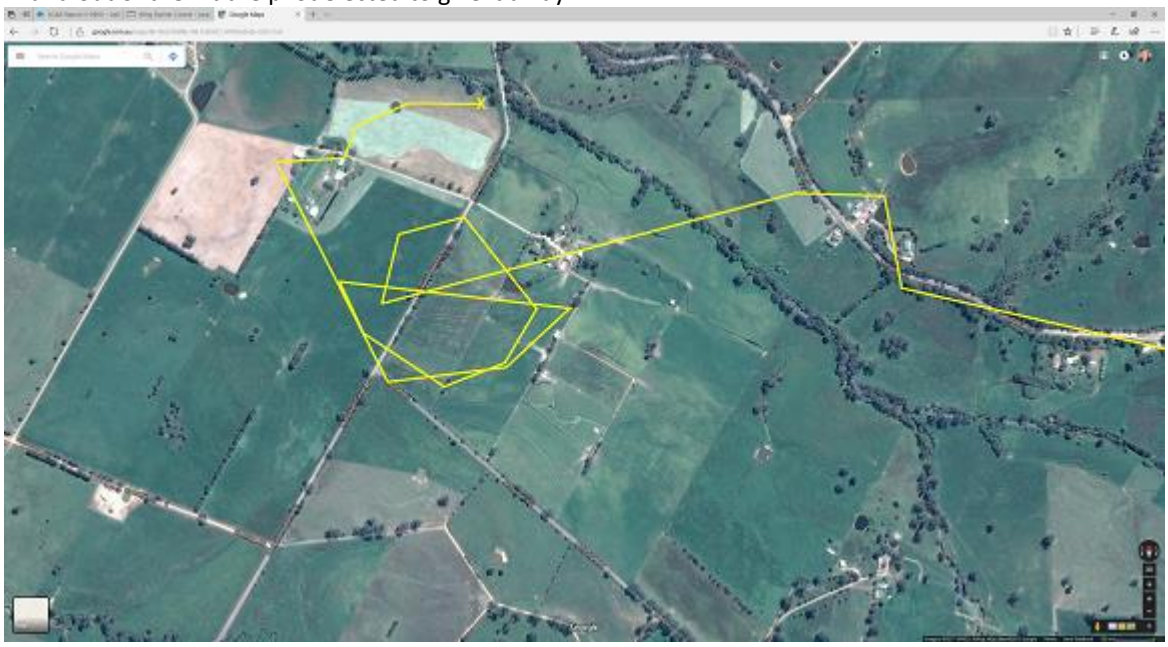
Date	9-Jan-2017	Region	VSA	SOAR Report Nbr		S-0907	
Level 1	Operational	Level 2	Aircraft Control	Level 3		Wheels up landing	
A/C Model 1		ASW-27-18		A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	73

The pilot advised that he was flying a straight-in approach and believed he was not allowed by the competition rules to pull-up to dissipate energy. He had not flown a straight-in approach previously and became preoccupied manipulating the flaps and airbrakes to slow down to landing speed. Due to this preoccupation and a high workload he forgot to lower the undercarriage and complete the pre-landing checks. Landing mishaps usually occur due to high workload, so it is important to get some of the tasks, like lowering the undercarriage, out of the way early. Refer also OSB 01/14 'Circuit and Landing Advice'.

Date	10-Jan-2017	Region	NSWGA	SOAR Report Nbr		S-0900	
Level 1	Operational	Level 2	Terrain Collisions	Level 3		Ground strike	
A/C Model 1		Arcus M		A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Outlanding	PIC Age	50

The pilots were competing in the World Gliding Championships 2017 and had been tasked into the hills to the East of the airfield. Conditions were poor with thermal activity going to 5,00ft. The command pilot headed south-east in the hope of catching a thermal in the hills. After covering 45 kilometres the glider was at 1500ft AGL in an area with few outlanding options, so the command pilot started the motor and headed back towards the airfield. About 20 kms from the airfield and at a height of about 3500ft the pilot shut down the engine with the view to gliding the remaining distance. Unfortunately, the command pilot did not follow

the correct procedure and the engine did not automatically retract. After a while the command pilot, thinking there was a fault in the auto retract system, manually applied the propeller brake and stopped the propeller in the correct vertical position for retraction. However, the brake had to be released in order to activate the manual retract switch and the propeller moved from the vertical position as the pylon started to retract. This led to the propeller jamming against the engine-bay doors, resulting in the electric retraction mechanism overloading and activating the circuit breaker. Having lost height while retracting the motor, and with the additional drag of the propeller and open engine bay, the pilot decided to conduct an outlanding. Although the glider was over a suitable landing field, the pilot chose not to land in it due to the presence of SWER lines on the approach and down one side, and headed towards another paddock a few kilometres further away. An unsuccessful attempt was made to climb away in weak lift but after several minutes flying in and out of the lift the pilot elected to give it away.



An attempt was again made to start the motor but this was unsuccessful as the pilot did not realise the circuit breaker had tripped. The aircraft was by now too low to complete a circuit to the intended paddock and the pilot noticed trees and powerlines on the approach. In addition, the right half of the paddock lengthways was about two metres higher than the left side. Flying at 75 knots, the pilot flew a high approach to avoid the trees and power line and aligned the aircraft to land on the left-hand lower side of the paddock. The aircraft touched down in the middle of the paddock at high speed, and the command pilot initiated a ground loop to prevent the aircraft running into the boundary fence. The rudder was substantially damaged and one wingtip skid was broken. Causal factors include a lack of familiarity with the engine management system, high workload and poor decision making. Being aware of the dangers of continuing into marginal circumstances, setting boundaries, having a sound knowledge of rules and procedures, disciplined adherence to minima and performance requirements, prioritisation of options, and planning to deal with potential situations will act as defences against unsafe conditions.

Date	11-Jan-2017	Region	VSA	SOAR Report Nbr		S-0911	
Level 1	Consequential Events	Level 2	Low Circuit	Level 3		Low Circuit	
A/C Model 1		ASW 27/18		A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	64

This incident occurred on Day 2 of the 34th FAI World Gliding Championships at Benalla Vic. The pilot crossed the finish line from the East approximately 3kms from the runway threshold at 200ft AGL and continued down to below 100ft AGL just before the Hume Freeway. The pilot pulled up to about 150ft AGL to cross the freeway then descended to about 50ft AGL. Shortly afterwards the pilot pulled up to about 50ft to cross some trees on the boundary of a canal running parallel to the freeway. The pilot again descended, this time to within about 20ft of the ground and held this height for about 1 km before clearing the airfield boundary fence. The pilot landed halfway down the runway some 800 metres later. The pilot was cited for dangerous flying, counselled and received a scoring penalty.

Date	11-Jan-2017	Region	NSWGA	SOAR Report Nbr		S-0948	
Level 1	Airspace	Level 2	Aircraft Separation	Level 3		Aircraft Separation Issues	
A/C Model 1		U/K		A/C Model 2	U/K		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	

GFA received an anonymous report from CASA that alleged gliders were operating at a Regional Airport contrary to the conditions in a NOTAM that was active at the time. The allegation was that the NOTAM advised that gliders would only be operating to the West of the Airfield, yet gliders were seen to the

East. Investigation revealed that the reporter had misread the NOTAM, which merely stated that glider operations would be using either runway 08/26, or the grass strip to the West of runway 17/35.

Date	11-Jan-2017	Region	NSWGA	SOAR Report Nbr	S-0953
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Aircraft Separation Issues
A/C Model 1				A/C Model 2	S.A.A.B. AIRCRAFT CO 340B
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	

A SAAB 340B aircraft was operating a passenger service from a Regional airport to Sydney. As the aircraft was taxying out they observed a glider tug and glider take-off from the operational runway and depart to the north-west. Shortly after take-off from the operational runway and at approximately 1000 ft the SAAB crew received a TCAS RA (Resolution Advisory) and observed a glider heading towards them from the north-west, possibly to join the downwind leg for the operational runway. The SAAB Captain estimated that the horizontal distance was approximately 1-2NM and the vertical distance was approximately 200'. When an RA is issued, pilots are expected to respond immediately unless doing so would jeopardise the safe operation of the flight. The SAAB crew followed their Standard Operating Procedures and manoeuvred to prevent conflict with the glider. As required by law, the Aircraft Operator reported the TCAS RA to the ATSB. The operator noted that the TCAS RA was triggered in the SAAB because the glider had a transponder fitted and operating. This allowed the flight crew to de-conflict with the glider traffic.

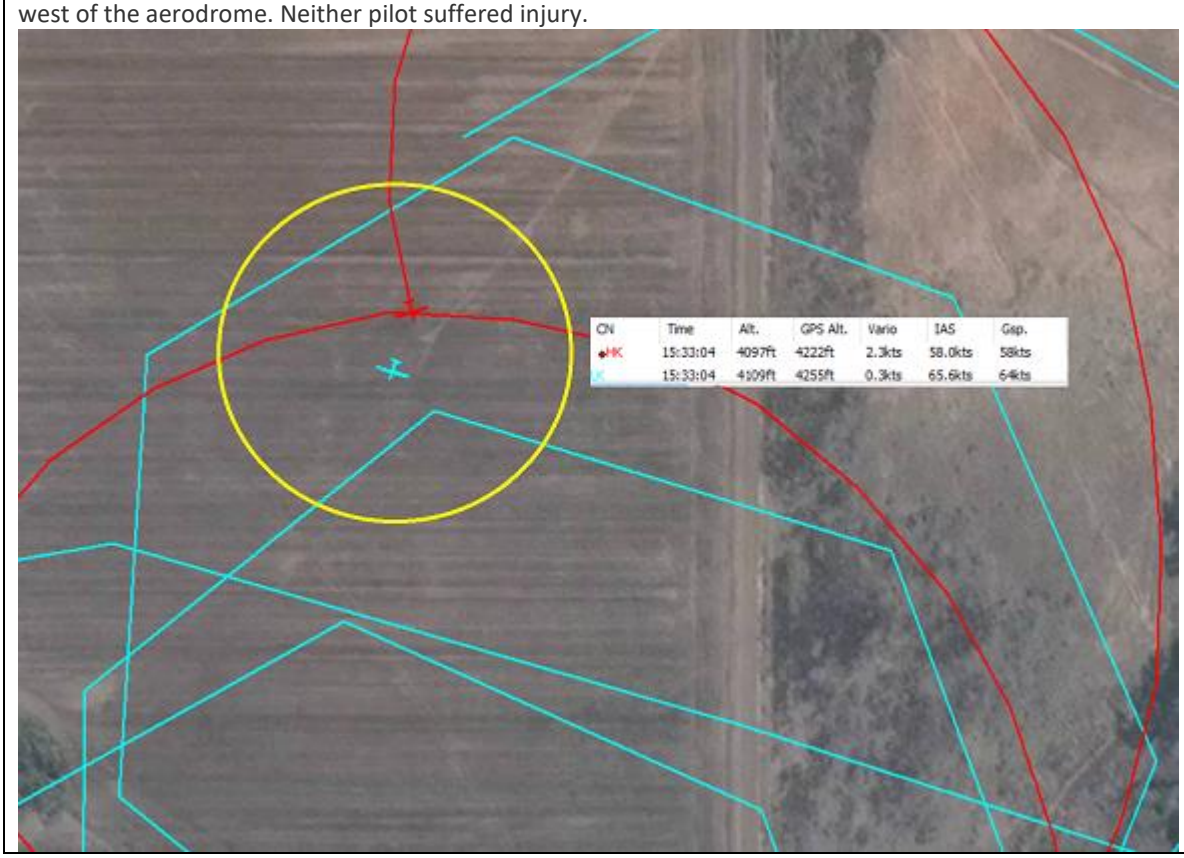
Date	12-Jan-2017	Region	SAGA	SOAR Report Nbr	S-0917
Level 1	Operational	Level 2	Runway Events	Level 3	Runway undershoot
A/C Model 1		Cherokee II		A/C Model 2	
Injury	Nil	Damage	Minor	Phase	Outlanding	PIC Age	62

During a local flight, the low hours pilot flying a low performance glider got caught out by heavy sink. The pilot attempted to make it back to the takeoff point but ran out of height and landed safely in a paddock adjacent the field.

Date	12-Jan-2017	Region	VSA	SOAR Report Nbr	S-0893
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Collision
A/C Model 1		ASG-29E		A/C Model 2	ASG-29E
Injury	Nil	Damage	Minor	Phase	Thermalling	PIC Age	52

On day 3 of the 2017 World Gliding Championships, two gliders collided in mid-air while thermalling about 44kms from Benalla aerodrome along the first leg some 15 minutes after the start. Analysis revealed the collision occurred near the top of the thermal being shared by six gliders. The two gliders involved were about 100ft apart vertically. Just prior to the collision another glider had resumed course for the turnpoint, which was observed by the pilot of the lower of the two gliders involved in the collision. Shortly afterwards, the lower glider flew through stronger lift, which placed it at a similar height to the other glider that was now only several metres behind and higher. At the moment of collision, the relative positions of the two gliders suggests a double-blind scenario where neither pilot had sight of the other glider. The starboard wing top surface and leading edge of the lead glider struck the left wingtip of the other, and both pilots felt the impact. Both gliders were only superficially damaged and remained controllable. One pilot flew back to Benalla aerodrome and the other conducted a precautionary outlanding on a private airstrip about 19 kms

west of the aerodrome. Neither pilot suffered injury.



Date	13-Jan-2017	Region	GQ	SOAR Report Nbr		S-0901	
Level 1	Operational	Level 2	Aircraft Control	Level 3		Hard landing	
A/C Model 1		Sundancer D13/15		A/C Model 2			
Injury	Nil	Damage	Substantial	Phase	Landing	PIC Age	67

The pilot had recently taken delivery of a new touring motor glider and, after a few assessment flights with a check pilot, flew back to the home airfield. On landing the pilot misjudged the flare resulting in the aircraft touching down heavily and rebounding into the air. The pilot mishandled the recovery from the bounce and the aircraft impacted on the nose wheel, which collapsed causing the rotating propeller to strike the ground. Contributing factors include limited experience on type and low currency.

Date	14-Jan-2017	Region	GQ	SOAR Report Nbr	S-0961
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Aircraft Separation Issues
A/C Model 1	HK 36 TC	A/C Model 2	N/A		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	52
The motor glider was transiting the Sunshine Coast CTR at 15,000ft and reported, to ATC, sighting a UAV at the mouth of the Maroochy River at approximately the same altitude. This position is 2.5nm from YBSU (Sunshine Coast Airport). The pilot was unable to give any details beyond small and dark. The UAV was unable to be sighted from the Control Tower and there were no other reports.					

Date	14-Jan-2017	Region	NSWGA	SOAR Report Nbr	S-0894
Level 1	Technical	Level 2	Powerplant/Propulsion	Level 3	Engine failure or malfunction
A/C Model 1	DG-1000M	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	52
After self-launching to a safe height the command pilot attempted to shut down the engine but could only reduce throttle to 5,000 RPM. The command pilot turned off with ignition and subsequently retracted the engine normally. Inspection revealed the throttle cable wheel had become partly detached from the throttle body spindle. The engine had only run for 11 hrs since replacement.					

Date	14-Jan-2017	Region	VSA	SOAR Report Nbr	S-0898

Level 1	Airspace	Level 2	Aircraft Separation		Level 3	Collision	
A/C Model 1		Ventus-2a		A/C Model 2		Ventus-2cT	
Injury	Serious	Damage	Write-off	Phase	In-Flight	PIC Age	34

FACTUAL INFORMATION

On day 4 of the 34th FAI World Gliding Championships two gliders collided in mid-air at about 4,860 feet AMSL over Yerong Creek NSW, in VFR conditions in Class G airspace. Both pilots successfully egressed by parachute but suffered injury upon landing. One pilot suffered a broken ankle and the other pilot received a broken nose and a compressed vertebra. Both aircraft descended in an uncontrolled manner before impacting terrain. The Rescue Coordination Centre was contacted, and emergency services attended. Both pilots were airlifted to hospital. The Australian Transport Safety Bureau (ATSB) was notified of the accident but declined to investigate.

1.1 History of flight

The 34th World Gliding Championships were being conducted from Benalla, Vic aerodrome from 9 January 2017 – 21 January 2017. On day 4 of the championships 37 pilots were competing in the 15-metre class. A Fixed (Racing) Task had been set for the Class, heading North to Morundah NSW, then East to The Rock NSW and then returning to Benalla Vic for a total distance of 419.1 kms (A Fixed (Racing) Task is a fixed course, typically consisting of three or four 'turnpoints'. The pilots must fly to each turnpoint in the correct order before heading to the finish line).

Current task

Day 4, 14.01.2017

Task for: 15 Metre class

Turnpoint	Distance	Direction	Observation zone
01NST	15.7 km	180°	To Next Point, Line 10km
55MORU	166.4 km	009°	Cylinder R=500m
69ROCK	82.9 km	117°	Cylinder R=500m
00Benalla A/D	169.8 km	215°	To Previous Point, Ring 8km
Total:	419.1 km		

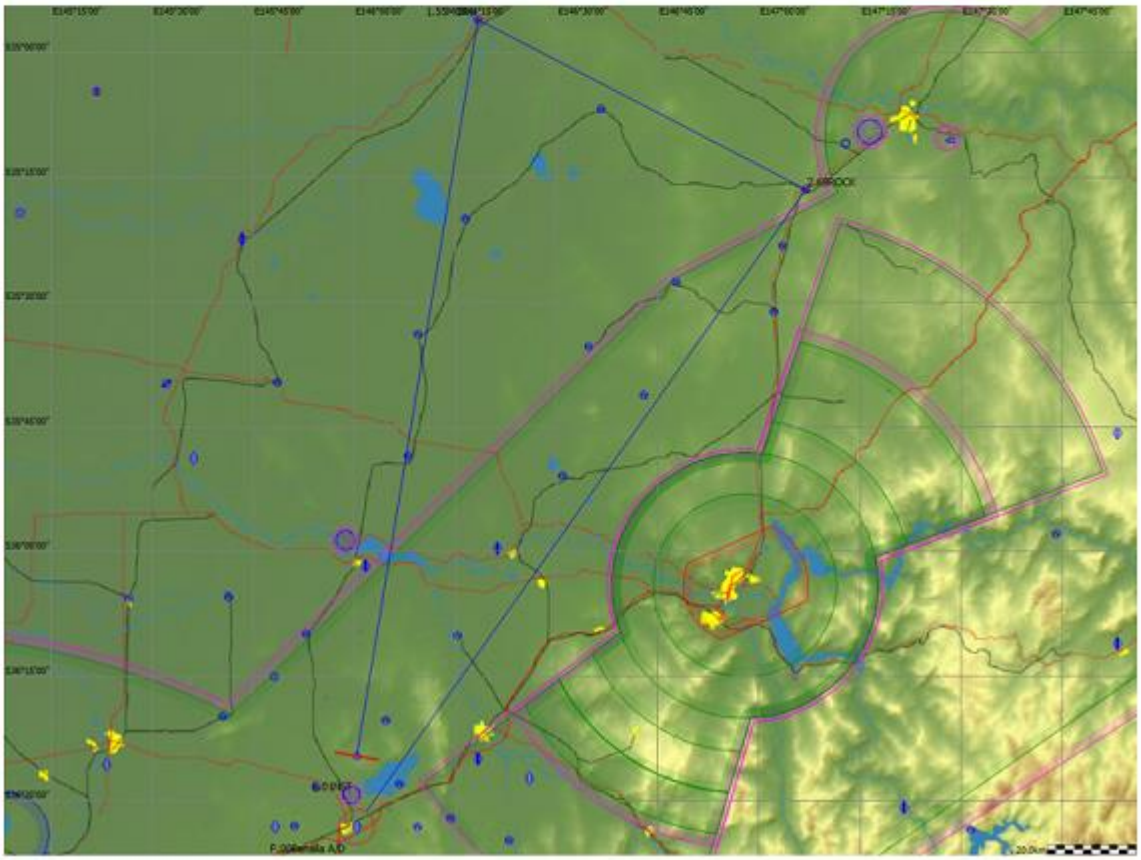


Fig.1 Task Sheet

Earlier in the flight conditions were such that there were some Cumulus clouds present. However, as the flight progressed the sky cleared, with the top of conviction reaching just over 5,600ft AMSL. The wind was from the South-west at speeds in excess of 19 knots. Thermal conditions were gusty, with climbs averaging around 400 feet per minute. In these conditions around half of the class (approximately 20 gliders) flew more or less as a single group (gaggle) such that they remained within reach of each other. The two gliders involved in the mid-air collision were part of this group. Launching for the class commenced at around 1224 hours EDST, and the 13 tow planes took 26 minutes to launch all 37 gliders. The German registered Ventus 2a (DE) launched by aerotow from near the front of the grid at 1325 hours. The Australian registered Ventus 2ct (O1) launched by aerotow from near the back of the grid 15 minutes later at 1240 hours. The two gliders first met up at 1315 hours, when glider O1 joined glider DE that was thermalling near the start line and

about 800ft higher in company with several other gliders. Glider DE started at 1347 hours at a height of 5700ft AMSL. Glider O1 started two minutes later at 5,600ft AMSL. Both aircraft were in the company of several other gliders that started around the same time. Both glider DE and glider O1 flew in the company of around 18 other gliders along the first two legs, and the gaggle rounded the second turnpoint for the trip home at around 1558 hours, with glider O1 slightly ahead of glider DE. The pilot of glider O1 later stated: "*The first leg to Morundah was straight forward and I was able to push fairly hard as we approached Lake Urana, trying to shake off the tentative gaggle that we had caught up with. The gaggle behaviour, as on previous days, was fairly ordered with a couple of aggressive types mixed in as usual, but nothing too uncomfortable. By the time we got to the first turn I found myself out in front by 5km or so, having taken a more westerly line than most. The second leg to The Rock was spent trying not to get run down by the now large gaggle, but the inevitable happened just prior to the turn and I was caught by about eight of the faster guys, with another 15 or so hot on their heels. After turning The Rock for the 160km run home into the wind, I had my teammates just below, and about 15km along the leg we took a 3kt climb to 5,000 ft, close to the inversion. As I left this climb, I noticed the group of eight or so gliders about 1 or 2km ahead on track turning right, and I decided to fly through the left edge of their thermal without stopping. As I entered the edge of the thermal, I let my speed wash off to around 75kts indicated and seemed to be clear of all the circling gliders, which were a bit above me."* Approximately 17 kms SSW of The Rock, on the final leg to Benalla, glider DE was circling in a thermal with several other gliders and turning to the right. Glider O1 in the company of at least eight other gliders at similar altitudes left a thermal approximately 3 kms back along track at 5135 feet and was flying towards the thermal occupied by Glider DE and at least 5 other gliders. At 1614:09, Glider O1 entered the edge of the thermal and flew into lift. The pilot veered to the left away from the thermal centre and slowed down slightly, which put Glider O1 on the tangent to the thermal circle of glider DE and about 100ft lower. Logger data shows that at this point glider DE straightened out from the thermal turn on a heading for the finish line as the pilot lowered the nose to increase speed. Simultaneously, glider O1 was on a collision course with glider DE as it gained height from the thermal lift. At 1614:21 glider O1 collided with glider DE at a height of about 5,040 ft AMSL. The pilot of glider DE heard a loud bang and the glider pitched forward. Realising the glider had collided with another glider, the pilot ejected the canopy and bailed out, whereupon a static line deployed the parachute. The pilot landed heavily and suffered a broken left leg. The pilot of glider O1 stated that their "last memory of normality was shifting back to negative flap with a couple of gliders well out to my right, in my mind I felt comfortable that I was clear of any conflict". The pilot of glider O1 stated: *"In the seconds following impact I found myself watching my hands eject the canopy frame and push it away into the airflow, then undo the harness. The next instinct was to try to get out in the same manner as I do on the ground, using my arms to lever down to raise myself up high enough to get my right foot under me to lift my body out over the side. This proved impossible due to the G loads being imposed. I tried a few variations of this, trying to go left and then right, all the while getting more anxious to get out, knowing that I was heading for the ground at a good rate. By now I was yelling at myself to "do something different" as this approach clearly was no good. All I could think to do was stick my already retracted right leg over the side to grab the airflow and this quickly pulled me around so that I could get both legs over the side and then roll the rest of me over the side and under the right wing. Having no idea of my height or where I was relative to the aircraft, I immediately found and pulled the ripcord, the chute deploying seemingly instantly. I've done a few jumps under round chutes a long time ago but was unprepared for the shock of the opening, which certainly knocked the wind out of me."* The pilot of glider O1 managed to abandon the aircraft at about 2,000ft AMSL, and soon after deploying the parachute landed heavily in a paddock. The pilot of glider DE landed in another paddock about 520 metres away a short time later. The pilot of glider O1 went to the aid of the other pilot, who appeared immobile after landing.

1.2. Injuries to persons

The pilot of DE landed heavily on their posterior, and then was dragged backwards 40 metres across the ground by the parachute. The pilot suffered a fractured vertebra, some bruising and minor abrasions. The pilot of DE landed heavily and sustained a broken left leg, some bruising and minor abrasions. Both pilots were airlifted to Canberra hospital. The pilot of O1 was released from hospital on 17 January, and the pilot of DE was released two days later.

Fig. 2 Emergency services on site (Victoria Police Photo).

1.3 Damage to aircraft

At impact glider O1 suffered catastrophic damage; the pilot's head smashed the Perspex canopy, the fuselage broke behind the engine bay, and half the tailplane broke away together with 2 metres of the outboard port wing. Glider DE appears to have suffered only minor damage from the collision. While under parachute descent the pilot of DE observed their glider to be complete and in a stable flat spin until it hit terrain. The pilot of O1 stated: *"In an instant I heard and felt a violent unseen impact, was aware of broken perspex, strong airflow and that my glider was immediately unflyable. My perception was that the glider pitched down steeply at impact and started spinning to the left in a violent unnatural action. The broken perspex was from my head breaking through the canopy, caused by the impact that took off most of the tailplane, broke the fuselage at the engine bay and took 6ft off the left wing."* When under parachute descent after a low-level egress, the pilot of glider O1 observed their glider falling vertically, with its port wing low, without oscillating. They observed damage to the tail and fuselage and heard a loud impact as the glider struck the ground. Both aircraft were substantially destroyed on impact and have been written off by their respective insurers. Glider DE was repatriated to Germany.

Fig 3. Damaged aircraft (Victoria Police photos).

1.4 Other damage

There was no damage sustained by objects other than the two aircraft.

1.5 Personnel information

The pilot of glider O1 held a GFA Glider Pilot Certificate that met the competency standards equivalent to the ICAO compliant Glider Pilot Licence issued in accordance with the Civil Aviation Safety Regulations, Part 61 Manual of Standards. The pilot held a GFA Level 2 Instructor endorsement and had in excess of 3,000 Hours gliding experience accumulated over nearly 5,000 flights. The pilot had 200 hours/60 launches on type and had flown 140 hours/40 launches in the previous 90 days. The pilot held a valid GFA Medical Actioner's Certificate of Fitness dated 19 September 2016. The pilot of glider DE, a German National, held an EASA issued ICAO Sailplane Pilot Licence endorsed for sailplanes and powered sailplanes. The pilot also held a Sailplane Flight Instructor endorsement, Their flight experience was not disclosed. The pilot held a valid German Class 2 Medical Certificate dated 25 November 2016.

1.6 Aircraft information

Glider DE is a Schempp-Hirth Ventus 2a, registered in Germany as D-9222. It was constructed in 1994 and issued serial number 2. The pilot was the registered owner/operator. It had a valid Certificate of Airworthiness and its most recent Maintenance Release was issued 31 March 2016 and expiring 14 April 2017, which indicated that the aircraft was equipped and maintained in accordance with existing regulations and approved procedures. At the time of the accident the aircraft had flown 3,090.6 hours over 673 flights. Glider O1 is a Schempp-Hirth Ventus 2ct powered (sustainer) glider, registered in Australia as VH-IKB. It was constructed in Germany in 2004 and issued serial number 129. The pilot's brother was the registered owner/operator. It had a valid Certificate of Airworthiness and its most recent Maintenance Release was issued 8 October 2016 and expiring 7 October 2017, which indicated that the aircraft was equipped and

maintained in accordance with existing regulations and approved procedures. At the time of its last annual inspection the aircraft had flown 1,564.15 hours over 419 flights.

1.7. Meteorological information

At the time of the occurrence, the wind was from the south-west at 19 knots. Conditions were clear skies and visibility was greater than 10 miles. Thermals were rising to 5000 feet AMSL, with some to 5500 feet AMSL.

1.8 Airspace

The airspace in the accident area was designated as Class G airspace and was classified as uncontrolled. In uncontrolled airspace, pilots operate on the principle of see-and-avoid. Maintaining an effective lookout for aircraft and other hazards is therefore a prime task for a pilot to avoid collisions, particularly when flying in uncontrolled airspace. However, there are limitations in the human visual system that serve to make collision avoidance difficult by visual means alone.

The 'see-and-avoid' principle can be enhanced by the use of electronic conspicuity aids that enable the proximity of other airspace users to be known. There are several types of electronic conspicuity aids currently available, which include transponders and radios, but each has its own limitations. In this case both aircraft were equipped with functioning radios and a type of electronic conspicuity aid called FLARM (FLARM was invented in Switzerland in 2004 in response to a high number of fatal mid-air collisions between gliders, which despite the principle of 'see and avoid', were still occurring in good visibility. FLARM is a flight alarm system that transmits the position and altitude of an aircraft over a low-powered, short-range radio to other FLARM-equipped aircraft once every second. The system is capable of displaying the proximity of other FLARM-equipped aircraft to pilots and providing an audible and visual warning if there is a risk of collision).

1.9. Communication

A dedicated competition frequency was in use for alerted see-and-avoid when gliders were operating outside a designated CTAF.

1.10 Flight Recorders

Both gliders had PowerFlarm systems installed that were functioning for the duration of the flight. The Flarm system, if properly installed and maintained, is usually reliable in glider installations. However, when multiple gliders fly intentionally close to one another, in curved banked turns, the system may not reliably handle conflict resolution in order to inform the pilot of a threat. This is partially due to GPS precision, small error margins, multiple targets and the rapid change in vector of the potential threats.

1.11. Wreckage and impact information

The gliders impacted near Yerong Creek NSW, which is situated about 50 km South-West of Wagga Wagga at location 35°23'29.59"S and 146°59'6.75"E.

Fig. 4 Wreckage distribution.

1.12. Survival aspects

Neither pilot was injured in the collision, and both were able to abandon the aircraft by parachute.

1.13. Organisational and management information

Planning for the 2017 World Championship spanned more than two years and a robust Risk Management Plan was developed and tested during the January 2016 'pre-world' championship event that was also run from Benalla, Vic. The organisers applied a clear process to identify risks, set an acceptable level for risks and took steps to keep risks at that level. Risks were managed by assessing potential consequences and likelihood, working out clear actions and designing a response plan.

Key responsibilities were assigned to specific people in areas such as operations management, task setting, marshalling gliders and launch operations. Risk review processes were implemented, registers of occurrences and complaints were maintained and monitored, risks were reviewed, communication and consultation processes were implemented, and all team members were trained on risk management. The organisation, rules and governance arrangements for the 2017 World Gliding Championships (WGC) were publicly available on the competition website. The championships were conducted in accordance with Federation Aeronautique Internationale (FAI) Rules, as managed by the International Gliding Commission (IGC). These rules include task setting, starting, finishing, scoring and operational requirements. The rules also mandated use of FLARM to aid in collision avoidance, and the wearing of parachutes in competition flights. Note that these rules did not exclude flying in gaggles in thermals, nor team flying practices to provide competitive advantage. The FAI Competition Rules were supplemented by local procedures. Pilots also had access to the GFA Competition Safety Pack dated October 2013, which contained detailed operational safety guidance for competitors, including lookout and collision avoidance issues. This was a reference document for the Mandatory Pilots Safety Briefing conducted on Thursday 5th January.

2. ANALYSIS

2.1. Pilot Qualifications

Both pilots were appropriately qualified for the flight, were in current flying practice and held valid medical certificates.

2.1. Collision

Flarm and logger records for all aircraft in the 15 metres class were made available. Analysis of these records revealed that glider O1 approached glider DE from the rear, flying about 160 ft below. From 1614:17 to 1614:20 hours, glider O1 was below glider DE, with a very small elevation difference, before the collision occurred. Glider O1 and glider DE collided when O1 slowed down and climbed in lift at the edge of the thermal and the pilot of DE lowered the nose to increase speed on exiting the thermal. An evaluation of the logger records suggests that the pilot of glider DE did not have an opportunity to recognise the approach of glider O1, which was approaching from behind and below. In contrast, the pilot of the glider O1 had glider DE in front of them most of the time and should have been able to see it. However, as there were several gliders in the immediate vicinity of glider O1, the pilot's focus may have been on other gliders they deemed more of a threat.

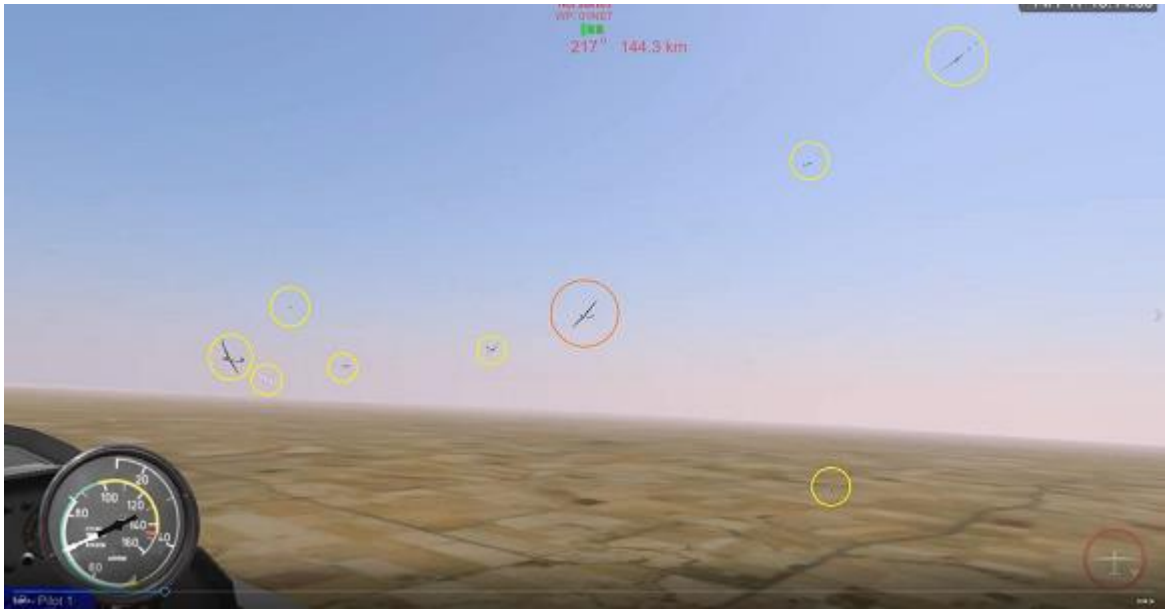


Fig.5: Simulated view (The IGC logger files for all aircraft in 15-metre class were loaded into the 'Silent Wings' flight simulator program in order to review the pilot's view just prior to the collision) from glider O1 as the pilot manoeuvres slightly left on entering the edge of the thermal approximately 20 seconds before impact. Gliders in thermal are circled. Glider DE is circled orange. Another glider (G1) is out of frame to the pilot's right.

Using the Flarm Range Analyser (flarm.com) revealed that both Flarms were performing to the minimum recommended range for the device. The Flarm radio log shows 31 aircraft in the Vicinity at the time of the collision. A review of the logger traces by the manufacturer confirmed that Flarm warnings were given at 16:14:17 and 16:14:19 just prior to the collision.

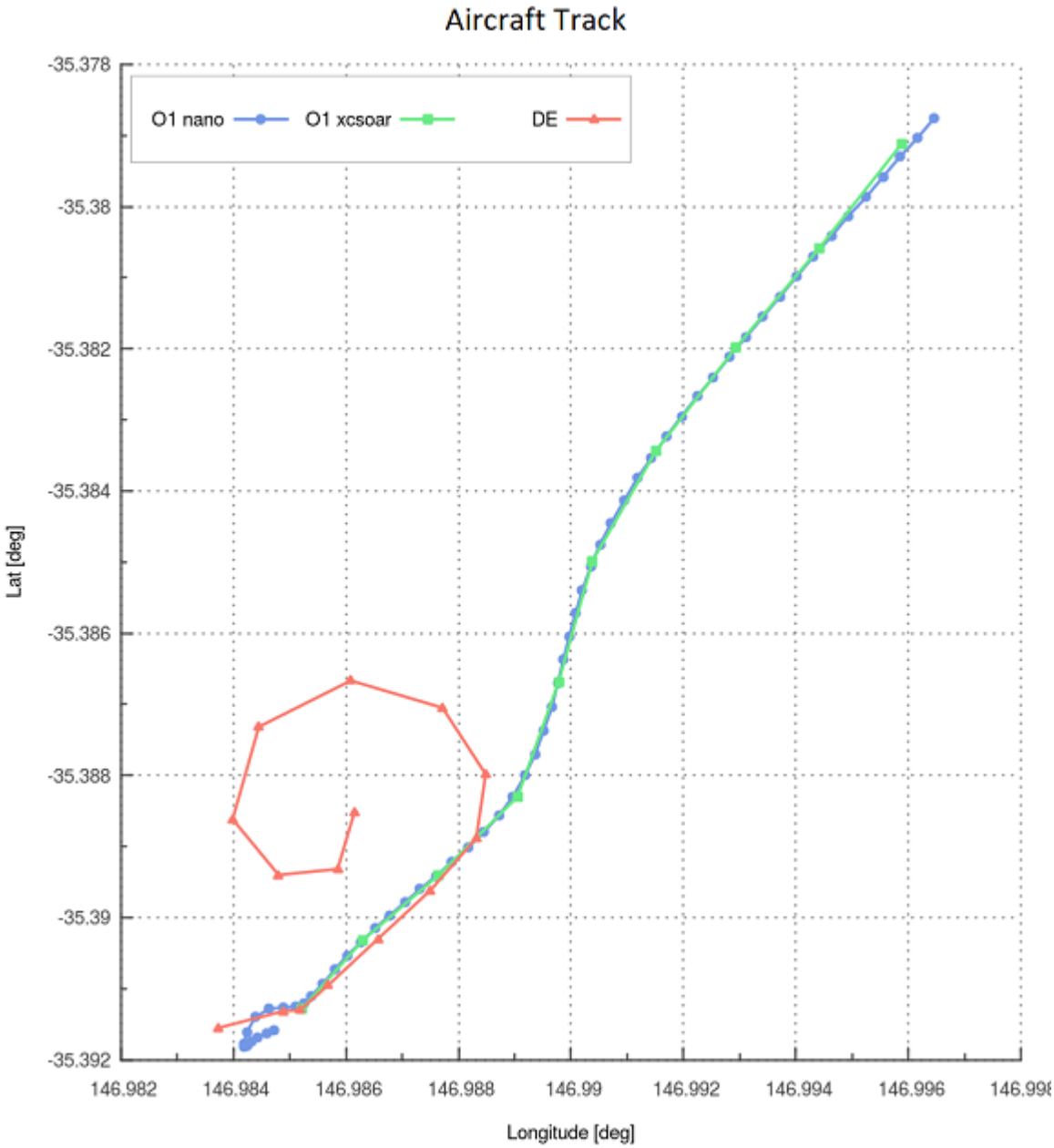
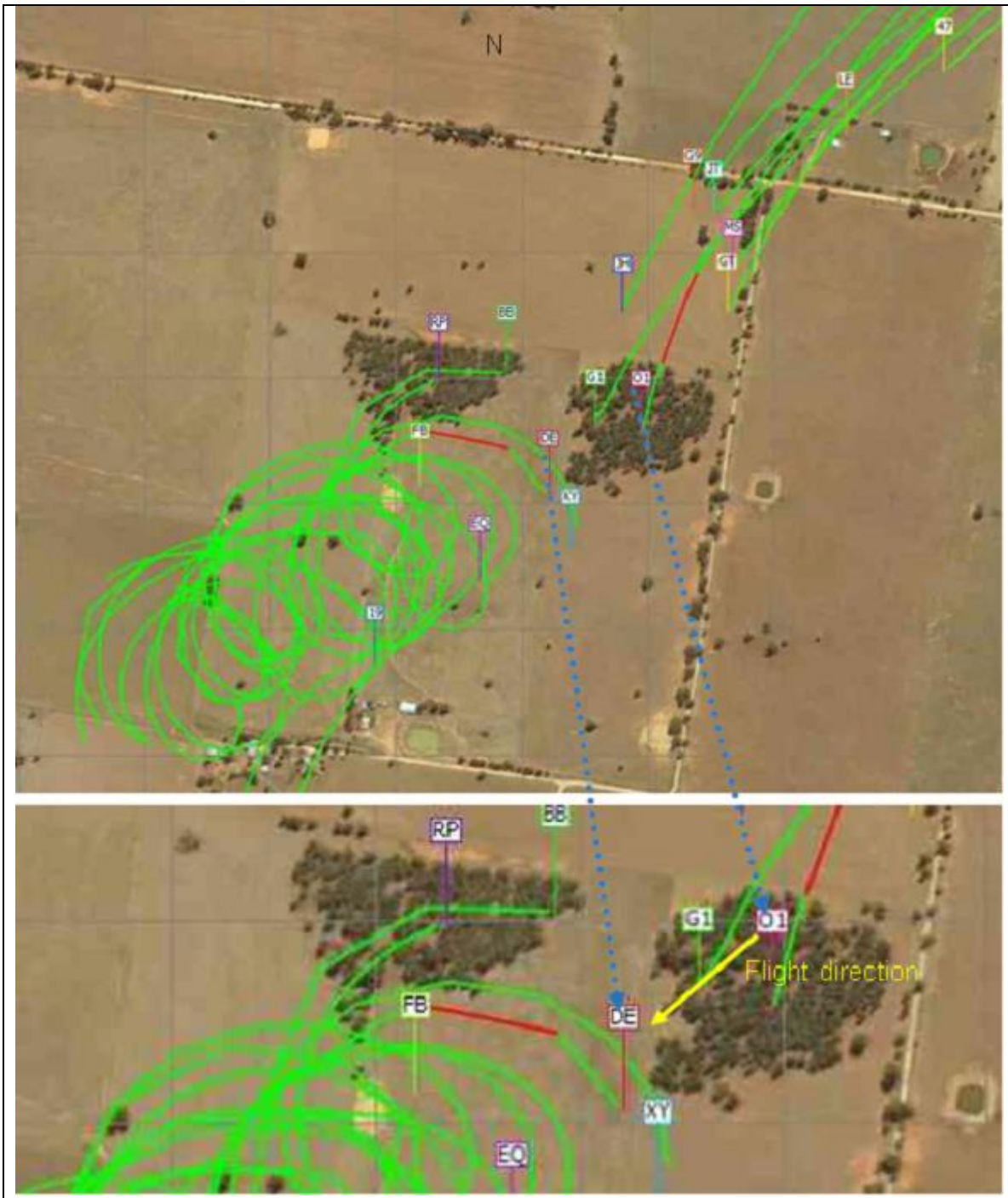


Fig.6: Flight tracks over the ground as plotted from both aircraft IGC logger records. Glider O1 carried two operational flight recorders.

2.4 Flight Recorder Analysis

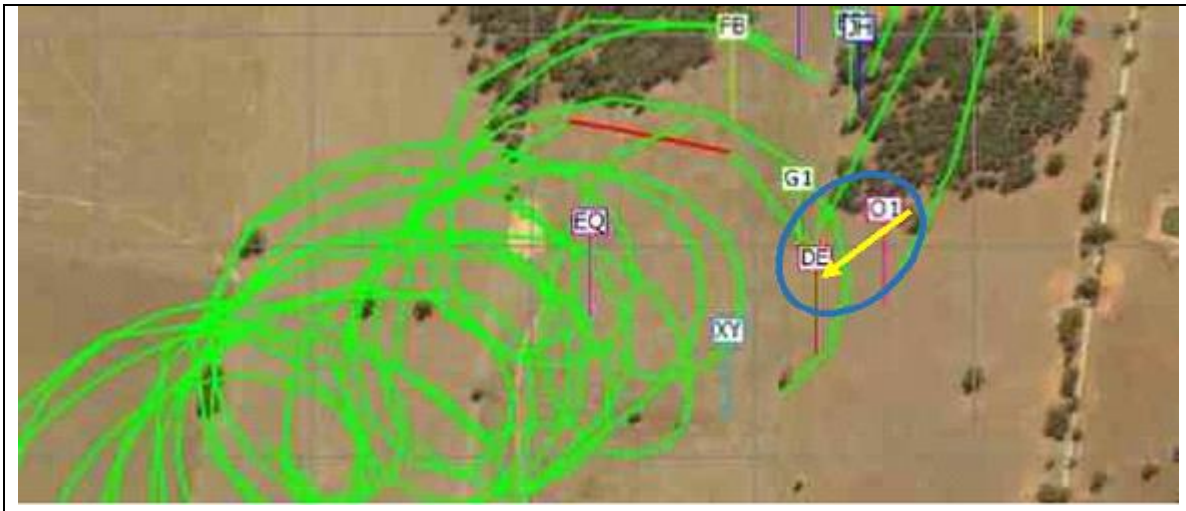
Initial situation at 1614:03 hours

Glider DE was at an altitude of 5,020 ft and was circling in a thermal with six other gliders. Glider O1 and two other gliders (G1 and JH) approached the thermal from a north-north-easterly direction at an altitude of 4,860 ft, with glider G1 slightly ahead and to the right of glider O1. The red lines depicted under show a collision alert on the Flarm for gliders DE and O1.



Approach of the two aircraft at 1614:07

Glider DE was at an altitude of 5,030 ft and glider O1 was at an altitude of 4,860 ft. Gliders DE and XY were directly in front of glider O1, glider G1 was in front of but displaced slightly to the right of glider O1, and another three gliders (FB, BB and JH) were behind glider O1 on the right. At this stage glider DE has rolled out of the turn and is heading off on track. The red line shows a collision alert of the Flarm of glider DE.



Approach of the two aircraft at 1614:14

Glider DE is at an altitude of 5,0230 ft and glider O1 is at an altitude of 4,940FT. Gliders DE and XY are now directly in front of glider O1, with glider G1 closer and to the right of glider O1. Glider G1 has pulled into the thermal to the right and glider JH is continuing through the thermal. The red line shows a collision alert of the Flarm of glider O1.

Approach of the two aircraft at 1614:18

Glider DE at an altitude of 5,042 ft and glider O1 is at an altitude of 4,970 ft.

Collision at about 1614:20.

Glider O1 collides with glider DE from below at an altitude of about 5,040 ft. From time 1613:53 the pilot of glider DE would not have sighted glider O1 due to the blind arc limitations as the glider was turning to the right. In the 20 seconds before the collision, Glider DE would have been visible to the pilot of glider O1 if its pilot was looking in the right direction.

2.5 Organisation Risk Management

An investigation of the competition organisation's risk movement system revealed a positive safety culture, where steps were taken by the organisers to reduce safety hazards as they were identified. The Organisers actively worked to reduce risk, which resulted in some significant improvement and reduction in reported incidents. During the championship pilots were repeatedly warned about the risks of aggressive flying, sharp pullups, turning inside other gliders in thermals, joining thermals incorrectly, and poor lookout or situational awareness. They were specifically briefed on the limitations of FLARM for collision avoidance, and on the proximity data recorded. Mandatory data loggers were used and traces analysed, to assist in investigating allegations of dangerous flying, as well as instances where near misses had occurred. Some fixed video recordings assisted in capturing useful data on near misses. The Safety Officer used Pilot Briefings, meetings with pilots, meetings with Team Captains and video recordings to highlight risk and safety issues.

2.6 Pilot Risk Management

Pilots are responsible for managing their own risk and displaying sound airmanship. Glider pilots are taught to lookout at all times, manage workload, mitigate risk, correct errors, and make good decisions. However, a single person can be more easily overwhelmed when faced with multiple decisions to make, and task management can quickly become difficult for even seasoned pilots when things go wrong. Consequently, errors can and will be made. All pilots participating in the competition were competent, experienced and current. However, by its very nature competition flying has several threats that increase the likelihood of pilots making an error that could lead to reduced safety margins or may contribute to an incident or accident. The type of threats that competition pilots need to manage include:

- Environmental issues such as, flying with other gliders, flying from an unfamiliar airfield, weather changes, unpredictable lift, different terrain with changes in height above sea level, partly unlandable country, or flat but very small paddocks;
- Navigational challenges;
- Physiological factors, such as fatigue, dehydration, hunger, hypoxia, impatience, frustration, optimism bias and overconfidence;
- Time pressure on the ground (including Launch delays) and in flight;
- Pressure to get home;
- Risk of outlanding;
- Final glides.

All the above threats increase the likelihood of pilots making an error that could lead to reduced safety margins or may contribute to an incident or accident. 'See-and-avoid' is recognised as the main method that a pilot uses to minimise the risk of collision when flying in visual meteorological conditions. 'See-and-avoid' is directly linked with a pilot's skill at looking outside the cockpit and becoming aware of what is happening in their surroundings. Its effectiveness can be greatly improved if the pilot can acquire skills to compensate for the limitations of the human eye (refer https://www.atsb.gov.au/publications/1991/limit_see_avoid.aspx). The primary method for implementing 'see-and-avoid" is lookout, which involves seeing potential hazards and assessing information prior to reacting. The primary source of information is vision. Whether it is aircraft attitude, position, physical hazards or other traffic, what a pilot sees is processed by the brain and used to build up situational awareness. The human eye is a very complex system. Its function is to receive images and transmit them to the brain for recognition and storage. About 80 per cent of our total information is received through the eye, which is therefore our prime means of identifying what is going on around us. In the air the pilot depends on their eyes to provide most of the basic input necessary for flying the aircraft, e.g. attitude, speed, direction and proximity to opposing traffic. As air traffic density and aircraft closing speeds increase, the problem of mid-air collision increases considerably, and so does the importance of effective scanning. The eye, and

consequently vision, is vulnerable to many things including, but not limited to, dust, fatigue, emotion, age, and optical illusions. In flight, vision is influenced by atmospheric conditions, glare, lighting, canopy deterioration and distortion, aircraft design, acceleration forces and so forth. Most importantly, the eye is vulnerable to the vagaries of the mind. We can 'see' and identify only what the mind permits us to see. Another inherent eye problem is the narrow field of vision. Although our eyes accept light rays from an arc of nearly 200°, they are limited to a relatively narrow area (approximately 10 – 15°) in which they can actually focus on and classify an object. Anything perceived on the periphery must be brought into that narrow field to be identified. Motion or contrast is needed to attract the eyes' attention, and the field of vision limitation can be compounded by the fact that at a distance an aircraft on a steady Collision Course will appear to be motionless. The aircraft will remain in a seemingly stationary position, without appearing to move or to grow in size, for a relatively long time, and then suddenly bloom into a huge mass, almost filling the canopy. A large smear or dirty spot on the canopy can hide a converging aircraft until it is too close to be avoided. Light also affects our visual efficiency. Glare during flight directly into the sun makes objects hard to see and scanning uncomfortable. An aircraft that has a high degree of contrast against the background will be easy to spot, while one with low contrast at the same distance may be impossible to see (especially against a cluttered background). A dirty, scratched, opaque or distorted canopy will make matters worse. While gliders have large canopies and theoretically offer an excellent field of view to the pilot, there are still blind arcs. The following diagram illustrates the field of view from a glider; the yellow cone is the narrow area in which we focus.

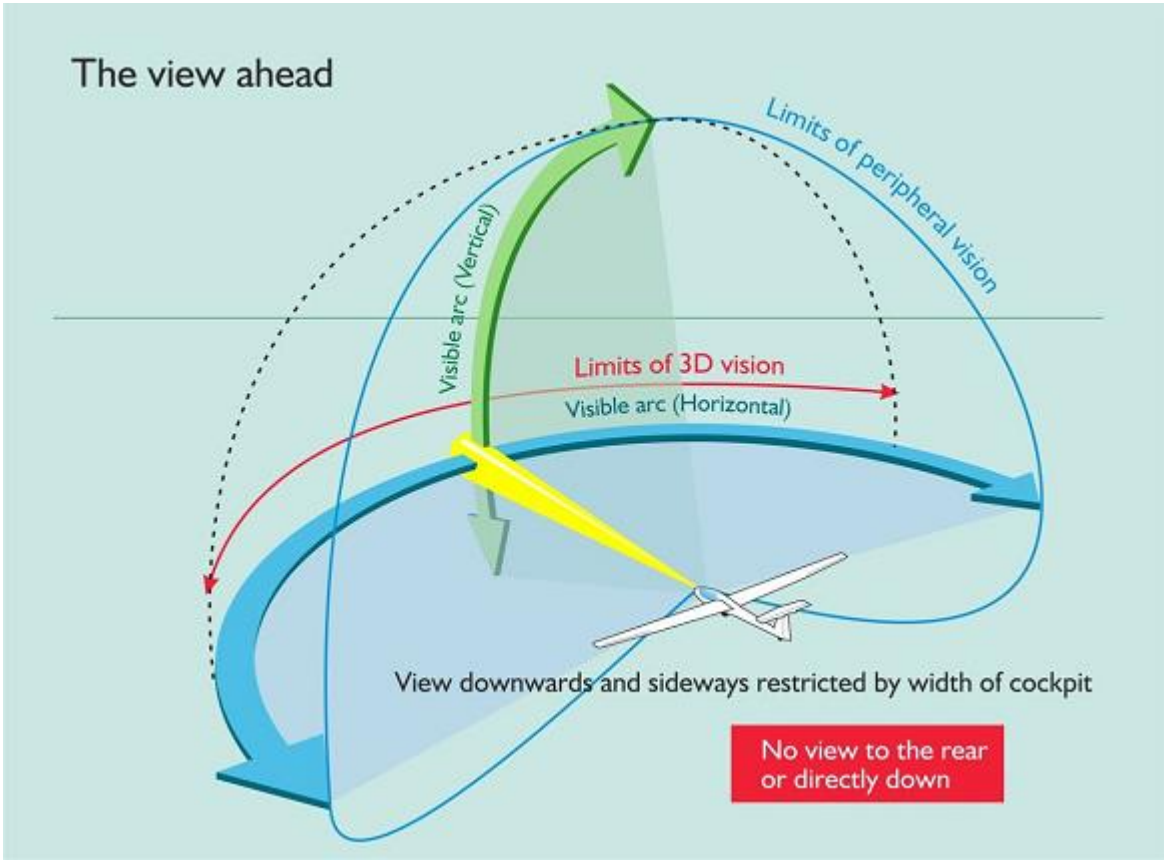


Fig.7: Pilot's field of vision.

3. CONCLUSION

The accident occurred because the pilots did not see each other's aircraft in sufficient time to take effective avoiding action. Collision avoidance was by lookout and visual detection, which has limitations, and the

presence of multiple aircraft in the immediate vicinity meant there were many potential targets requiring the pilots' attention.
It was found that:

- Both pilots were certified and qualified for the flight in accordance with existing regulations.
- The maintenance records of each aircraft indicated that the aircraft were equipped and maintained in accordance with existing regulations and approved procedures.
- Both aircraft were airworthy when dispatched for flight.
- All flight controls of both aircraft were operating correctly at impact and suffered damage due to the forces of impact with terrain.
- Multiple aircraft operating in close proximity would have demanded pilot attention and may have degraded overall situational awareness.
- All gliders have significant blind arcs, most notably below and behind.
- Glider DE was in the field of view of the pilot of glider O1 for several seconds before impact.
- Glider O1 was below and behind glider DE and outside the field of view of the pilot of glider DE.

Date	15-Jan-2017	Region	WAGA	SOAR Report Nbr		S-0981	
Level 1	Airspace	Level 2	Airspace Infringement	Level 3		Airspace Infringement	
A/C Model 1		Astir CS		A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	69
This incident occurred during the 2017 Western Australian Gliding Championships at Beverley WA. The pilot did not maintain adequate tolerance to the airspace limits and vertically infringed controlled airspace by less than 100ft while travelling enroute and received a scoring penalty. When flying near airspace boundaries pilots must ensure they use sensible tolerances to airspace.							

Date	15-Jan-2017	Region	WAGA	SOAR Report Nbr		S-0962	
Level 1	Airspace	Level 2	Airspace Infringement	Level 3		Airspace Infringement	
A/C Model 1		Ventus-2c		A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	63
This incident occurred during the 2017 Western Australian Gliding Championships at Beverley WA. The pilot failed to maintain adequate situational awareness and vertically infringed controlled airspace by over 1500ft while thermalling enroute and received a scoring penalty. The pilot noted that they were relying on a visual and aural warning from the flight logger that either did not happen (the logger was giving problems) or was missed. The type of navigational units found in gliders are not approved navigation systems and cannot be used as the primary means of navigation. Non-approved portable electronic devices with Global Positioning System functionality can only be used for situational awareness. AirServices document 'Using GNSS as an Air Navigational Tool' states: *"The use of a GNSS can significantly assist VFR pilots. However, it should only be used to supplement visual navigation techniques, not as a primary navigation source".* When flying near airspace boundaries pilots must ensure they use sensible tolerances to airspace. AIP ENR 1.1, paragraph 19.12 states: *"For aircraft operating in close proximity to an airspace boundary where there is a risk of an airspace infringement, the pilot in command should consider obtaining a clearance to enter the airspace or altering track to remain well clear."* Pilots should always navigate using CASA approved data and charts. Airspace files provided by competition organisers or downloadable from the internet are unapproved and should not be relied upon.								

Date	15-Jan-2017	Region	GQ	SOAR Report Nbr	S-0895
Level 1	Operational	Level 2	Runway Events	Level 3	Runway excursion

A/C Model 1		H 36 Dimona		A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	58
The command pilot landed the motor glider 'engine off' but failed to maintain adequate speed control during the round-out and bounced upon touchdown. As the glider rebounded it veered to the left but the pilot recovered and flew back over the bitumen runway. The glider touched down smoothly but during subsequent taxying towards the runway exit the pilot noticed a vibration in the rear of the aircraft. The pilot taxied onto the grass verge of the runway and the aircraft stopped abruptly. On exiting the aircraft the pilot noticed the tailwheel was flat. The pilot left the aircraft in situ while a new inner tube and tyre was obtained and subsequently refitted. Despite the glider occupying the far end of the runway for nearly two hours while it was being repaired, the Duty Instructor assessed the glider was sufficiently displaced so as not to pose a risk and gliding operations continued. Contributing factors to the incident include the pilot's limited experience on type, an excessively worn tailwheel tyre, and failure to remove the damaged glider from the runway expeditiously.							

Date	15-Jan-2017	Region	VSA	SOAR Report Nbr	S-0896
Level 1	Operational	Level 2	Airframe	Level 3	Doors/Canopies
A/C Model 1	DG-1000S		A/C Model 2		
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	
The rear canopy opened during aerotow. The command pilot, who was flying solo, released from tow and landed normally. The command pilot advised that the rear canopy was locked during the pre-boarding walk-around inspection but noticed another member open the canopy and then close it. The pilot assumed the other member had re-locked the canopy and did not re-check it. This incident highlights the importance of launch point hygiene and not to interfere with aircraft that has already been configured for launch.					

Date	16-Jan-2017	Region	WAGA	SOAR Report Nbr	S-0899
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Near collision
A/C Model 1	SZD-48-1 "Jantar Standard 2"		A/C Model 2	LS8-18	
Injury	Nil	Damage	Nil	Phase	Thermalling	PIC Age	63
This incident occurred during the 2017 Western Australian Gliding Championships. The Jantar pilot was completing the first turn in a thermal when an LS8 was observed joining from the north. The Jantar pilot expected to see the LS8 pilot turn wide to allow the Jantar to continue turning but the LS8 proceeded to move under the Jantar's flight path, causing the Jantar pilot to pull up to avoid a collision. The Jantar's airspeed was dropping through 40kts, preventing its pilot from taking evasive action by turning. The pilot of the LS8 had seen the Jantar and believed he could safely join underneath, unaware of the Jantar pilot's speed dilemma. Separation was 100 ft but would have been much lower if the Jantar pilot had not pulled up. When joining another glider or number of gliders already in a thermal, the pilot of the joining glider should establish themselves on the opposite side of the circle to the nearest glider. GFA rules of the air stipulate the minimum separation between gliders is 200ft horizontally and vertically.					

Date	16-Jan-2017	Region	VSA	SOAR Report Nbr	S-0905
Level 1	Operational	Level 2	Flight Preparation/Navigation	Level 3	Other Flight Prep/Nav Issues
A/C Model 1	Piper PA-25-235		A/C Model 2	ASW 27-18	
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	63
This incident occurred during the 34th FAI World Gliding Championships at Benalla Vic. The tow pilot was following instructions from the ground crew to take up slack in the rope just after the rope had been attached to the tow plane and then the "all out" signal was given. The tow pilot felt a jerk on the rope as the					

glider pilot released on initial acceleration for the launch and then heard a 'Stop, Stop, Stop" command over the radio. The tow pilot checked the mirrors to confirm the glider had released and then coasted to a stop. Investigation revealed a break down in situational awareness by the ground crew, who gave the "all out" take-off command to the tow pilot prior to the glider pilot being ready for launch and the glider's canopy still open. The glider pilot released the rope as the glider accelerated forward.

Date	16-Jan-2017	Region	VSA	SOAR Report Nbr	S-0906
Level 1	Technical	Level 2	Systems	Level 3	Hydraulic
A/C Model 1	Piper PA-25-235		A/C Model 2		
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	62
This incident occurred during the 34th FAI World Gliding Championships at Benalla Vic. As the tow plane was taxied to position for the first launch of the day, both brake slave cylinders failed and one wheel locked. The aircraft was removed from service and a Licensed Aircraft Maintenance Engineer replaced the brake pads, replenished the brake fluid and bled the lines of air.					

Date	17-Jan-2017	Region	VSA	SOAR Report Nbr	S-0909
Level 1	Airspace	Level 2	Airspace Infringement	Level 3	Airspace Infringement
A/C Model 1	Ventus-2cT		A/C Model 2		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	65
This incident occurred on Day 7 of the 34th FAI World Gliding Championships at Benalla Vic. The pilot failed to maintain adequate situational awareness and infringed controlled airspace by about 10 metres in level flight and received a scoring penalty. When flying near airspace boundaries pilots must ensure they use sensible tolerances to airspace. AIP ENR 1.1, paragraph 19.12 states: *"For aircraft operating in close proximity to an airspace boundary where there is a risk of an airspace infringement, the pilot in command should consider obtaining a clearance to enter the airspace or altering track to remain well clear."*					

Date	17-Jan-2017	Region	NSWGA	SOAR Report Nbr	S-0910
Level 1	Airspace	Level 2	Airspace Infringement	Level 3	Airspace Infringement
A/C Model 1	ASW 28-18		A/C Model 2		
Injury	Nil	Damage	Nil	Phase	Thermalling	PIC Age	45
This incident occurred on Day 7 of the 34th FAI World Gliding Championships at Benalla Vic. The pilot failed to maintain adequate situational awareness and infringed controlled airspace by over 200ft while thermalling close to the airspace boundary and received a scoring penalty. This incident highlights the importance of pilots maintaining adequate separation from airspace boundaries, both laterally and vertically. When flying near airspace boundaries pilots must ensure they use sensible tolerances to airspace. AIP ENR 1.1, paragraph 19.12 states: *"For aircraft operating in close proximity to an airspace boundary where there is a risk of an airspace infringement, the pilot in command should consider obtaining a clearance to enter the airspace or altering track to remain well clear."*					

Date	18-Jan-2017	Region	VSA	SOAR Report Nbr	S-1945
Level 1	Operational	Level 2	Miscellaneous	Level 3	Other Miscellaneous
A/C Model 1			A/C Model 2	N/A	
Injury	Nil	Damage	Nil	Phase	N/A	PIC Age	
REPCON REPORT - ATSB Reference AR201700005 **Reporter's concern**					

The reporter expressed a safety concern related to the safety culture which was encouraged and allowed to continue at the recent World Gliding Competition held at Benalla in January 2017. The reporter advised that there was known risk taking and aggressive flying from competitors which has resulted in at least two mid-air collisions during the competition. There are videos posted on the competition YouTube channel taken by pilots holding hand held cameras in the cockpit of a single seat glider while flying in a thermal with multiple gliders in the area. These 'gaggles' require full pilot attention to the actual flying in the thermal, but also to maintain separation from the multiple gliders flying in close proximity. These videos are an example of the known behaviours, which were allowed to continue during the competition – being rewarded by posting on the competition channel – rather than the pilot being educated on the safety implications.

Regulator's response (Regulator 1)

The Gliding Federation of Australia Inc (GFA), the organisation responsible for the administration of sport and recreational gliding and sailplane activities in Australia, was supplied with the report. The following is a version of the GFA's investigation report:

The Gliding Federation of Australia Inc. has investigated the reported concerns, namely that:

- *the competition organisers 'encouraged and allowed to continue at the recent World Gliding Competition held at Benalla in January 2017' a negative safety culture.*
- *'there was known risk taking and aggressive flying from competitors which has resulted in at least two mid-air collisions during the competition.'*
- *there were 'videos posted on the competition YouTube channel taken by pilots holding hand held cameras in the cockpit of a single seat glider while flying in a thermal with multiple gliders in the area.'*
- *'these 'videos are an example of the known behaviours, which were allowed to continue during the competition – being rewarded by posting on the competition channel – rather than the pilot being educated on the safety implications.'*

Agreed issues

The Gliding Federation of Australia Inc (GFA) agrees that there were two mid-air collisions between gliders during the 2017 World Gliding Championships (WGC2017). These are the subject of investigation by GFA, and were reported to ATSB and CASA in accordance with our agreements and obligations.

The first accident resulted in minor air-to-air contact, with both gliders landing safely and pilots uninjured. The second accident resulted in loss of both gliders, bail-out action by both pilots and some consequential injuries. These facts are not disputed.

GFA agrees that there are YouTube videos taken by pilots flying single-seater gliders while flying in thermal gaggles with multiple other gliders in the area, including on the WGC2017 YouTube channel. The presence of gliding inflight videos and related comments on social media is not disputed.

Disagreed issues

GFA specifically disagrees with allegations that the World Gliding Championships 2017 organisers have either:

- encouraged or allowed to continue an unsafe safety culture
- encouraged or allowed to continue unsafe airmanship standards and operational practices
- encouraged risk taking and aggressive flying practices
- rewarded pilots for unsafe behaviours, rather than pilots being educated on safety implications.

This response provides context on:

- how safety and operations in the 2017 World Gliding Championships were managed
- specific pilot safety briefing topics and presentations, addressing risks in gaggle flying and flying in close proximity to other gliders in competition, and pilot behaviour and risk appetite
- task setting arrangements and other responses to reduce the risks of large gaggles forming or collisions with other aircraft
- the primacy of Pilot In-Command responsibility for in-flight actions and decisions.

Overview

Sensationalised reports, although very good at generating public attention, are seldom balanced or objective and this report is believed to be no exception.

Our investigation did not reveal any evidence to support the allegation that the organisers were fostering a negative safety culture. To the contrary, investigations revealed that the organisers had a strong focus on risk management during the competition period as we will elaborate further.

During the course of the competition, there were two mid-air collisions and two near misses.

Each of these are being investigated, and analysis suggests the limitations of both single pilot operations and 'see-and-avoid', coupled with blind arcs and field of view limitations contributed to these events. While the reporter was correct that there were videos posted on social media by pilots using hand-held cameras, the use of hand-held cameras was the exception rather than the rule. When it was brought to the attention of the organisers, pilots were briefed not to use them and, to the organiser's knowledge, all pilots complied.

Dangerous recreational activity

Gliding is a 'dangerous recreational activity' because it involves the significant risk of physical harm and a risk will be 'significant' if there is a real chance that it will materialise.

Some level of physical risk is implicit to any sport and recreation. Like many sports and recreational activities, gliding involves high-speed, extreme effort, exposure to height, close proximity to other aircraft and environmental factors such as the weather.

To the outside observer, such risks may be considered unacceptable. However, participants accept that risk is involved when participating in these activities. At the same time, the organisers are aware of their responsibility and take steps to support the safety of participants, spectators, volunteers and the general public.

Competition statistics

The competition commenced on 5 January 2017 with the first of three practice days. These practice days allowed the organisers to fine tune their operations and identify risks that were not previously foreseen.

The competition commenced in earnest on 10 January 2017 and over the course of the next ten days, pilots flew tasks on eight days, although some classes flew more task days than others due to poor weather conditions precluding the launch of the entire fleet.

During the course of the event, the organisers were launching, from a single runway strip, up to 115 gliders each day in under 90 minutes. Over the course of the event, the thirteen tow planes conducted 1,019 glider launches, and self-launching sailplanes flew 105 launches.

There were a total of 3,267 movements at Benalla airfield, Victoria (Vic.), over the 17 days of the competition. The glider pilots flew tasks of up to 750 kilometres in distance and covered over 450,000 kilometres during the period; flying as far afield as Rankin Springs and West Wyalong, NSW to the North, Mount Beauty, Vic. to the East, Thornton, Vic. to the South and St Arnaud, Vic. to the West.

Competition risk management

<u>The organisation</u>

Planning for the 2017 World Championship spanned more than two years and a robust Risk Management Plan was developed and tested during the January 2016 'pre-world' championship event that was also run from Benalla, Vic. The organisers applied a clear process to identify risks, set an acceptable level for risks and took steps to keep risks at that level. Risks were managed by assessing potential consequences and likelihood, working out clear actions and designing a response plan. The organisers also met with emergency service personnel, CASA staff and the aerodrome operator to assist in the development of the risk management plan.

Key responsibilities were assigned to specific people in areas such as operations management, task setting, marshalling gliders and launch operations. Risk review processes were implemented, registers of occurrences and complaints were maintained and monitored, risks were reviewed, communication and consultation processes were implemented, and all team members were trained on risk management. In fact, all of the organisation team, contractors, volunteers, and participants involved in the event were informed and aware of the risk management process.

On each flying day the organisers sent an email advisory to all major airspace users in the task area. The advisory provided details of the task area, operational altitudes expected for the day, the direction gliders would be heading, and estimated arrival times at nominated 'choke points' on the return to Benalla.

Rules and governance

The organisation, rules and governance arrangements for the 2017 World Gliding Championships (WGC) at Benalla are provided at the competition website.

The championships were conducted in accordance with Fédération Aéronautique Internationale (FAI) Rules, as managed by the International Gliding Commission (IGC).

These rules include task setting, starting, finishing, scoring and operational requirements.

The rules also mandated use of FLARM (FLARM is an EASA-approved electronic system used to selectively alert pilots to potential collisions between aircraft. It is not formally an implementation of ADS-B, as it is optimized for the specific needs of light aircraft, not for long-range communication or ATC interaction.) to aid in collision avoidance, and the wearing of parachutes in competition flights. Note that these rules did not exclude flying in gaggles in thermals, nor team flying practices to provide competitive advantage. The FAI Competition Rules were supplemented by Benalla Local Procedures. This document also summarises the competition organisation and names of officers in various roles.

Pilots also had access to the GFA Competition Safety Pack dated October 2013, which contained detailed operational safety guidance for competitors, including lookout and collision avoidance issues. This was a reference document for the Mandatory Pilots Safety Briefing conducted on Thursday 5th January.

The organising team

The WGC Contest Director was [Name 1], an experienced world competition pilot and GFA Executive member. While he had overall responsibility for the safe and effective conduct of a viable competition activity, he was assisted by a large team of officers and operational staff, each contributing to safety outcomes.

[Name 2], another experienced international competition pilot, was the competition Task Setter, responsible each day for designing and setting cross-country soaring tasks for three separate classes of gliders, cognizant of meteorological conditions and available soaring time.

[Name 3], an experienced pilot and instructor, was the appointed Safety Officer, representing the GFA Operations Department in the competition organisation. He conducted and arranged daily safety briefings during the competition.

[Name 3] also advised the Competition Director on safety issues, liaised with GFA Executive Manager Operations on accidents and incidents, and worked with both Team Captains and the Pilots Safety Committee on issues of concern. He assisted in investigation of the collision accidents. He also worked with the Contest Director and Task Setter on spatial and temporal aspects of task design to reduce the probability of large thermal gaggles and conflicts between gliders.

The pilots

Pilots are also responsible for managing their own risk and displaying sound airmanship.

Glider pilots are taught to lookout at all times, manage workload, mitigate risk, correct errors, and make good decisions. However, a single person can be more easily overwhelmed when faced with multiple decisions to make, and task management can quickly become difficult for even seasoned pilots when things go wrong. Consequently, errors can and will be made.

All pilots participating in the competition were competent, experienced and current. However, by its very nature competition flying has a number of threats that increase the likelihood of pilots making an error that could lead to reduced safety margins, or may contribute to an incident or accident. The type of threats that competition pilots need to manage include:

- environmental issues such as, flying with other gliders, flying from an unfamiliar airfield, weather changes, unpredictable lift, different terrain with changes in height above sea level, partly unlandable country, or flat but very small paddocks
- navigational challenges
- physiological factors, such as fatigue, dehydration, hunger, hypoxia, impatience, frustration, optimism bias and overconfidence

- time pressure on the ground (including Launch delays) and in flight
- pressure to get home
- risk of outlanding
- final glides.
- All these threats increase the likelihood of pilots making an error that could lead to reduced safety margins, or may contribute to an incident or accident.

To quote from former World Gliding Champion Karol Staryszak, 8 May 2016:
'It is often said that the organiser should do this or that… They should call a day, they should create an easier task, they should make sure there are outlanding fields along the task route, they should not launch so many gliders at the same time, etc. But the task is not an order, you do not have to fly it; the decision to fly is yours and yours only!
Whether I go over an area with no fields and no option to return, or my final glide is below the glide path, or I fly in a gaggle, or in the clouds—this decision is only MINE!'

Task setting responses to reduce collision risk

The World Gliding Championships was a highly competitive event, with elite and experienced pilots flying very fast on long cross-country tasks, often in close company, often shadowing their competitors.
AS/NZS 31000 Risk Management highlights that risk (and opportunity) has dimensions of probability (likelihood) and consequence. The probability of mid-air collision in gliding events is increased when pilots fly in large gaggles in thermals, with large numbers of aircraft in the rising air mass in close relative proximity.
The probability of gaggle flying occurring is a function of:

- weather
- task design and
- pilot behaviour, competitiveness and risk appetite.

The probability of gaggle flying occurring is higher in 'blue' conditions, without cumulus clouds marking thermal position and cloud shape indicating thermal strength. During much of the competition period, blue days were experienced.
A number of measures were consciously addressed to discourage gaggle flying and reduce collision risk. These measures are based upon increasing spatial (distance) and temporal (time) separation of gliders in a competition. These included:

- setting different tasks for the three classes involved in the competition
- increasing spatial separation between the tasks, in particular on the first leg of the task, sending classes out in differing directions
- using dispersed start lines, SW, NW, NE and SE of Benalla AD, for the different classes, to reduce start gaggle size
- setting tasks of long duration relative to the projected soaring meteorological conditions, to encourage pilots to make rapid progress and not linger in groups or gaggles
- minimising overlaps between tasks for the three classes, and planning for temporal separation and minimum crossing angles where overlaps occurred
- planning Assigned Area Tasks, rather than fixed turnpoint tasks, to encourage pilot decisions to turn at dispersed locations and achieve greater separation.

All pilots were repeatedly warned about the risks of aggressive flying, sharp pullups, turning inside other gliders in thermals, joining thermals incorrectly, and poor lookout or situational awareness. They were specifically briefed on the limitations of FLARM for collision avoidance, and on the proximity data recorded. Mandatory data loggers were used and traces analysed, to assist in investigating allegations of dangerous flying, as well as instances where near misses had occurred. Some fixed video recordings assisted in capturing useful data on near misses. The Safety Officer used Pilot Briefings, meetings with pilots, meetings with Team Captains and video recordings to highlight risk and safety issues.

Inflight videos and social media

There are no rules governing the use of cameras and recording devices in aircraft and gliders. These are not prohibited by the competition rules applying to the WGC event.

GFA does not encourage the use of handheld cameras and devices for recoding inflight video, particularly in high workload situations, or where distraction may have adverse consequences. For this reason, GFA prefers that when cameras and recording technology are used, they should be either fixed mount or swivel on a fixed base, or else on headband or cap mount. They should not require constant viewfinder monitoring by the operator.

GFA has also found video footage to be beneficial to safety, training and instruction. A near miss between a climbing motor glider and a climbing glider/tow plane combination during the WGC event was recorded on video, which was in turn used to re-educate the pilots concerned and brief all pilots. Other accidents have seen video recording information used in accident investigation.

The decision to use a camera, data recorder, or other technology in the cockpit, at any given time, is primarily an issue for the Pilot In-Command. They are responsible for their own decisions and flight management. No amount of prescription or rule setting will change that.

Similarly, the decision to post still photos or video recordings of inflight situations on social media (Twitter, FaceBook, YouTube, Instagram etc.) is also an issue for the pilot-in-command and the owner of the social media account.

GFA does not accept that the organisers were encouraging risk taking and aggressive flying, rewarding pilots for unsafe behaviours in use of inflight video on social media. It is evident from much of the video on social media that pilots were trying to record and highlight the increased risk in gaggles, not glorify the practice. Many video clips used fixed mounts. Some handheld recordings were clearly made by gliders at the top of the thermal gaggle, not enmeshed in the higher risk environment lower down. Some recordings show the pilot stowing the camera in order to deal with higher priority airmanship tasks. Use of handheld cameras was a safety briefing topic on 19th January. Thermalling safety and lookout in gaggles were safety briefing topics on 13th January.

Safety culture

The safety culture of the event was positive and was supported by the organisers, the team captains from the 27 competing nations, the internationally appointed stewards and the jury members. A safety committee was convened, comprising one competitor from each of the three classes and the competition safety officer. The safety committee dealt with concerns raised by pilots about the flying conduct of other pilots.

The competition rules required a compulsory safety briefing at the beginning of the competition and regular safety communication throughout. At the start of the competition on 5 January 2017, a general safety briefing was delivered, and further safety briefings were delivered as issues became apparent.

All reported safety concerns were investigated using GPS records of the flights that enabled a reasonably accurate assessment of the actions of each pilot. In most cases, the complaint was found to be not sustained, and often involved less than ideal decision making by the pilots involved or unfortunate coincidences. In cases where poor behaviour by a pilot was evident, that pilot was interviewed, together with their team captain, and presented with the evidence so they could see how their behaviour had created a hazardous situation. The pilots and team captains were then placed on notice that a repeat of such behaviours would result in significant penalties. In all cases, the pilots did not re-offend. The process of self-awareness and the use of peer feedback, made pilots aware of their vulnerability to different types of errors, decision styles and biases.

Risk mitigation strategies

There is considerable evidence of actions by WGC officers to brief, educate, oversee and intervene where necessary to promote the required safety first culture.

A Fly-Tool Safety Reporting process was specifically introduced to facilitate reporting of issues by international pilots, supplementing the GFA accident and incident reporting system which many of them were unfamiliar with. Pilot Safety Reports were also introduced to allow pilots to advise who was causing concerns re safety.

Rules and Competition Safety Guide documents were provided for reference by teams and pilots.

A pilot safety committee was formed, to assist the safety officer and contest director. A mandatory safety briefing was held before the competition, and then each morning during the competition. These briefings included:

- close call re climbing motor-glider and tow plane-glider combination, recorded on video camera
- changes to procedures to improve separation between tow planes and motor gliders
- role of pilot safety committee, nominations and election of pilot representatives
- safety advice re gaggle flying, flying in close company, techniques for joining thermals, clearance, lookout, leaving
- dangers in gaggle flying
- analysis of first collision, gaggle safety and lookout when flying straight, flight trace analysis video
- analysis of complaint, flight trace regarding overtaking in straight flight
- use of pilot safety reports, nomination of pilots causing concerns to other pilots
- presentation by pilot involved in second collision and bail-out
- flying too close in cruise
- winning versus safety, relative priorities
- use of cameras in flight.

Task design measures described above were used to reduce the probability of gaggle flying in thermals and between thermals.

Summary

Overall GFA found the safety culture was positive and steps were taken to reduce safety hazards as they were identified. The Organisers actively worked to reduce risk, which resulted in some significant improvement and reduction in reported incidents.

A report is being prepared for the international Gliding Commission to encourage some rule changes that would reduce the risk faced by pilots. Many of these changes have already been implemented in Australia with proven benefit.

The organisers also identified methods to extract meaningful data from the GPS flight records to help identify pilots with a higher risk profile, and can also be used to issue penalties to the worst offenders.

Regulator's response (Regulator 2)

CASA has reviewed the REPCON and the information contained in the report and has the following comments:

There appears to be little evidence to support the claim that the organisers encouraged aggressive flying practices, increased risk taking and rewarded unsafe behaviour.

The GFA response provided to the REPCON did not suggest that adverse safety outcomes were as a result of the use of handheld cameras and highlighted the safety measures taken by the organisers when this issue was identified during the competition.

CASA attended the event also during this time and witnessed the competition mass briefing prior to operations, observed the departures and return of all glider classes on 16th of January 2017 and it was clearly evident that the organisers consciously attempted to address close proximity operations by de-confliction of routes and briefed pilots on the priorities of safe flight rather than winning.

It is CASA's opinion that while some persons may have used handheld devices to capture video, there does not appear to be any suggestion that unsafe operations or behaviours were actively encouraged by the WGC organisers, in fact tangible evidence exists that the organisers addressed known and emerging safety risks at the time of the high tempo operations.

CASA considers the steps, investigations and mitigators that the GFA have provided in response to the REPCON as appropriate under the circumstances of the World Gliding Competition at Benalla.

Date	21-Jan-2017	Region	WAGA	SOAR Report Nbr	S-0908
Level 1	Operational	Level 2	Ground Operations	Level 3	Taxiing collision/near collision

A/C Model 1		Standard Libelle 201 B		A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Ground Ops	PIC Age	

Whilst towing to the launch point on a narrow taxiway, the vehicle driver moved over to allow a car to pass in the opposite direction. During the course of this manoeuvre the trailing edge of the starboard aileron struck a star picket that the driver did not see. The collision uncoupled the tow hitch and the aircraft pivoted about the star-picket resulting in the trailing edge of the port wing impacting the back of the car. While the car was significantly damaged, the glider suffered only minor damage and was cleared to fly after a thorough inspection. This accident highlights the need to maintain situational awareness when towing a glider. It also serves as a reminder to drivers of vehicles on manoeuvring areas that they must yield to all aircraft, including gliders under tow.

Date	21-Jan-2017	Region	VSA	SOAR Report Nbr	S-0932
Level 1	Operational	Level 2	Runway Events	Level 3	Other Runway Events
A/C Model 1	Janus B		A/C Model 2	Unknown	
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	63

The glider launched from runway 17 on the last gliding flight of the day with the intention of landing long on runway 09, into a south-easterly crosswind, to finish near the hangars. When the student pilot joined downwind and made a radio broadcast there were no other aircraft on the runways or in the circuit area. As the aircraft passed the mid-downwind position the command pilot noticed a powered aircraft on the taxiway about to enter runway 17. The command pilot made two radio transmissions on the CTAF to alert the powered aircraft to the glider's intentions but no response was heard. After the student turned onto the base leg the command pilot observed the powered aircraft on runway 17 lining up for take-off, so the aiming point was modified to allow the glider to pass well beyond the runway intersection. As the powered aircraft took-off the glider passed behind and above and a safe landing ensued. The glider pilots did not hear any radio calls from the powered aircraft.

Date	22-Jan-2017	Region	GQ	SOAR Report Nbr	S-0912
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Near collision
A/C Model 1	IS-28B2		A/C Model 2	Gyrocopter	
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	69

Upon returning to the airfield following an air experience flight, the glider flew through heavy sink and lost a significant amount of height. The command pilot had intended to join a standard left-hand circuit for the operational runway but due to the loss of height decided to conduct a right-hand circuit. The glider pilot gave a broadcast on the CTAF and emphasised the glider was entering downwind for a right-hand circuit. Shortly afterwards the glider pilot heard a radio broadcast from another aircraft in circuit and identified a gyrocopter on mid-downwind for a left-hand circuit. The gyrocopter was on final approach as the glider pilot approached the base leg. As the glider turned onto the base leg the pilot made a CTAF broadcast advising turning base from the right-hand side of the circuit but did not receive an acknowledgement form the gyrocopter pilot, which continued its descent across the glider’s flight path. While the glider was now about 300ft behind the gyrocopter and committed to landing, the glider pilot was unconcerned as there were options to land on the grass verges either side of the runway. The gyrocopter landed and stopped on the runway threshold markings, so the glider pilot elected to land on the grass to the left of the bitumen runway in case the gyrocopter taxied off to the right as they tend to do at this regional airport. Upon landing the glider rolled past the gyrocopter at a minimal but safe distance. It was later determined that the gyrocopter had heard the glider’s radio calls but had not sighted the glider in circuit.

Date	22-Jan-2017	Region	NSWGA	SOAR Report Nbr	S-0918

Level 1	Operational	Level 2	Aircraft Control		Level 3	Hard landing	
A/C Model 1		LS 4-a		A/C Model 2			
Injury	Nil	Damage	Substantial	Phase	Landing	PIC Age	71

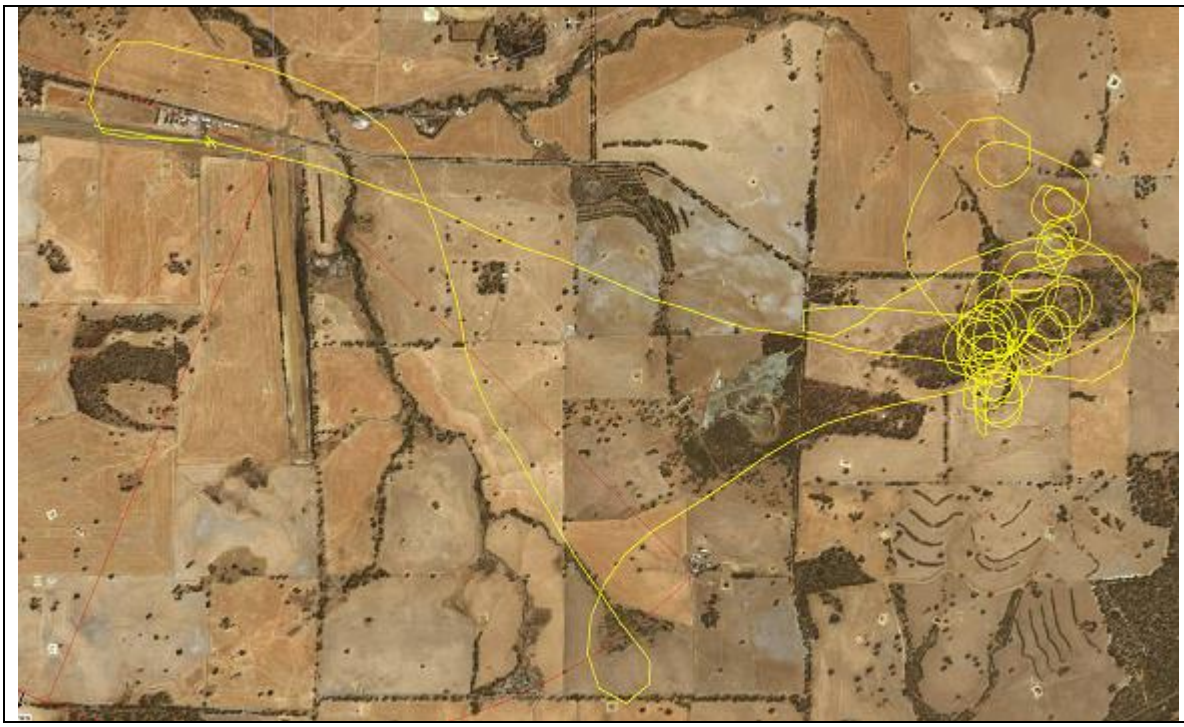
The low hours pilot reported experiencing strong lift on the base leg and did not properly manage the flight profile, resulting in the final approach being flown too fast and too high. In an effort to slow down the pilot increased the amount of airbrake when close to the ground and unintentionally pushed the stick forward at the same time. The glider struck the ground nose first, rebounded into the air and then crashed down hard. The forward fuselage suffered substantial damage. Causal factors include inexperience, lack of flying currency, and mishandling of the controls. The pilot underwent remedial training.

Date	26-Jan-2017	Region	VSA		SOAR Report Nbr	S-0913	
Level 1	Operational	Level 2	Runway Events		Level 3	Runway incursion	
A/C Model 1		Duo Discus		A/C Model 2			
Injury	Nil	Damage	Substantial	Phase	Landing	PIC Age	63

Following an otherwise uneventful 'conversion to type' flight, the aircraft returned to the circuit. The pilot under conversion had little experience in large span high performance two-seat aircraft and turned onto final approach too high. During the descent the pilots noticed a tractor occupying runway 'grass left' close to the bitumen runway near their aiming point and heading towards them. The Pilot under conversion decided to land on runway 'Grass Left' to the left of the tractor, as this was considered the best option because the tractor was too close to the bitumen runway to land safely on it, and the grass verge to the right did not have an adequate overshoot area. Despite the pilot applying full airbrake shortly after turning onto final, the aircraft remained in an overshoot position so the instructor took control at about 100 ft AGL when the aircraft was about half-way down the runway, and flew an 'S' turn to the right to lose height without gaining distance. As the instructor rolled out of the 'S turn' and lined up for the flare, the pilots noticed the tractor had turned to the right towards the Club hangar, and was traveling across the intended landing path. The instructor executed a steep low- level evasive turn to the right and narrowly missed the tractor. Unfortunately, the right wingtip struck the ground during the manoeuvre and the aircraft slewed, touching down with sideways momentum and sliding some 40m in the direction of landing. No person was injured but the aircraft was substantially damaged; suffering a broken tail boom, damaged elevator and a collapsed undercarriage. The tractor driver was a licenced pilot who was on the aerodrome management committee, and the tractor was being used to slash the runway grass. The tractor was not fitted with an air band radio and the driver was not using a hand-held radio as its battery was flat. At this ALA there is no requirement for a VHF radio to be carried by the tractor operator. While the tractor driver was familiar with the principles of see and avoid and did scan the sky for aircraft before entering the runway, the lack of a serviceable radio impeded the driver's situational awareness. The tractor driver first saw the glider heading towards the tractor from the left, so the driver turned to the right to move out of the way only to see the glider turn toward the tractor once again. As a consequence of this accident, the aerodrome management committee reviewed its procedures for using vehicles on movement areas and all vehicle drivers must now maintain a listening watch on the CTAF and give way to all aircraft. Maintenance activities will also be coordinated with the airfield users.

Date	28-Jan-2017	Region	WAGA	SOAR Report Nbr		S-0915	
Level 1	Consequential Events	Level 2	Low Circuit	Level 3		Low Circuit	
A/C Model 1		Hornet		A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	68

The pilot made a late decision to break off the flight and then proceeded to fly a low and modified circuit. During every flight pilots need to consider when to start heading for the circuit joining area. The decision will be influenced by wind strength and direction, and the location for the circuit joining area. Pilots must make a positive decision to join the circuit to land, and plan to arrive at the circuit joining area between 800 ft – 1,000 ft AGL, depending on glider performance.



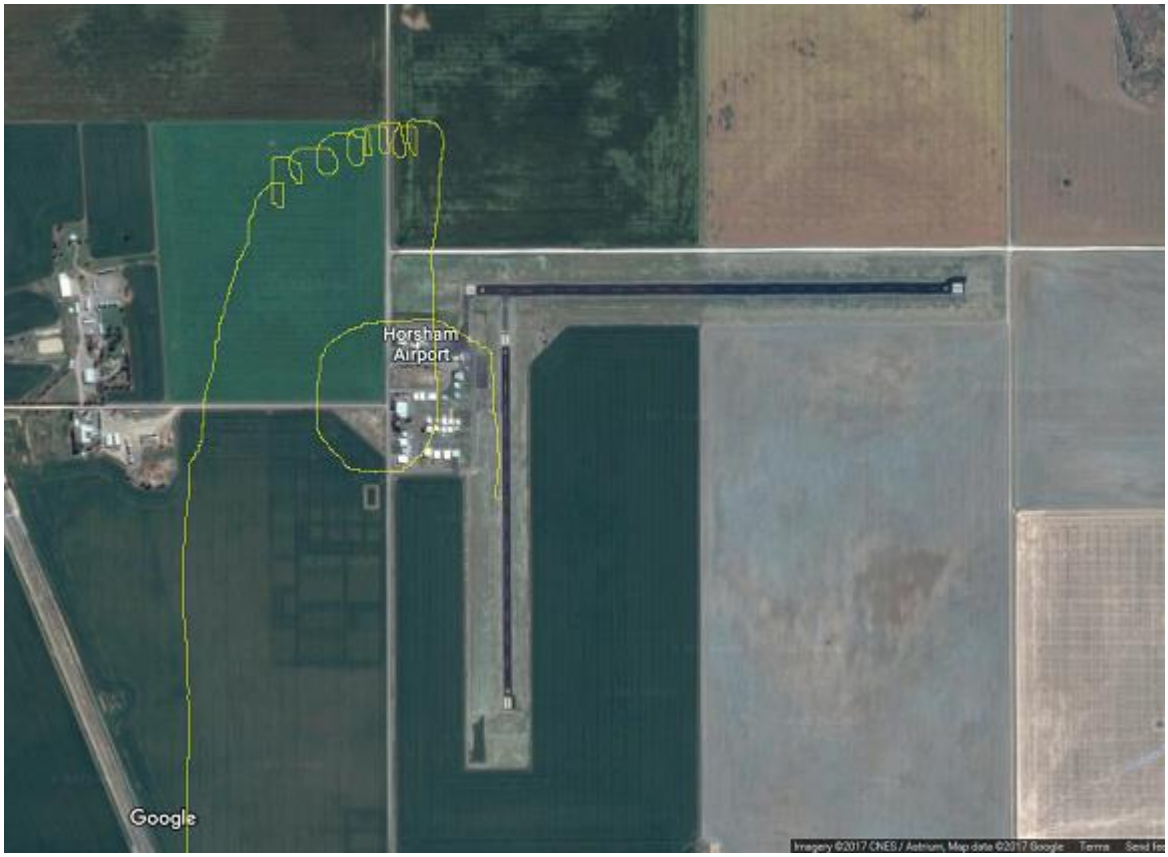
Date	29-Jan-2017	Region	GQ	SOAR Report Nbr	S-0914
Level 1	Operational	Level 2	Airframe	Level 3	Landing gear/Indication
A/C Model 1	Blanik L13 A1	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	48

The flight was to convert an experienced aerotow pilot to winch launching. The 'student' had 4 flights earlier in the day in the Blanik and had demonstrated good technique. After a simulated launch failure at a height of 200 ft, the 'student' landed straight ahead on the runway centreline. Upon touchdown the Undercarriage collapsed and the aircraft came to an abrupt halt due to the application of wheel brake when the undercarriage is retracted. The cockpit filled with the fumes of burnt rubber fumes and a small amount of smoke. Both Pilots were able egress without harm. It was determined that the undercarriage was not properly locked in the 'down' position. The POH requires the pilot to check for correct locking by a firm rearward pull on the undercarriage operating lever without turning the handle inboard.

Date	31-Jan-2017	Region	VSA	SOAR Report Nbr	S-0919
Level 1	Consequential Events	Level 2	Low Circuit	Level 3	Low Circuit
A/C Model 1	Ka 6	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	

The low hour's pilot was participating in a Regional coaching course with the aim of achieving some Badge flights. While the pilot intended to fly their club's SZD 51 Junior in which they were familiar, the aircraft was unavailable so a fellow club member offered the use of a KA6. The pilot undertook a type conversion flight two days earlier and was assessed as competent. On the day of the incident the pilot was attempting a 50km cross-country flight to qualify for a Silver Badge. The pilot was the second of ten pilots launch and took off on RWY 17 by aerotow at approximately 1315 hours into a blue sky. At approximately 1400ft AGL the pilot released from tow having observed another glider nearby climbing rapidly in a thermal. The pilot did not locate the expected strong lift but found a weak thermal just to the north-west of the airfield in which a

climb was attempted. Observers on the ground noticed the glider's inner wing drop and its nose pitch down followed by a recovery to normal flight on at least two occasions while turning in the thermal. Shortly afterwards the pilot elected to break off the flight as the glider was drifting away from the airfield without any appreciable height gain. The pilot flew into wind on the dead side of RWY 17 and as the glider approached the airfield the pilot noticed the Air Ambulance aircraft taxying on RWY 26 for take-off into the West.



The pilot increased airspeed to quickly cross the extended centreline of RWY 26 and gave a radio call advising of intent to land on RWY17. Unfortunately the radio was off-station and the broadcast was not heard by the Air Ambulance pilot or the gliding operation. The effect of increasing speed was to increase the rate of descent. After passing clear of the RWY 26 centreline the pilot recognised the glider was now low and decided to modify the circuit. At a height of about 400ft AGL the pilot turned 180 degrees to enter a mid-downwind for RWY 17, shortly followed by a 90 degree turn to the right to enter a base leg. The pilot turned onto base prior to crossing the boundary of RWY 26 and then turned onto final approach. The turn onto final was over-ruddered and under-banked, and the pilot was lucky the aircraft had sufficient speed that it did not enter a spin. After the glider made a safe landing on glider RWY17, the Air Ambulance departed.

Subsequent investigation revealed:

1. The pilot did not properly understand the speeds to fly the aircraft and was flying too slow for much of the flight.
2. The glider radio was off-channel by 0.1 MHz. The channel selector is easily moved and was most likely knocked prior take-off.
3. The glider pilot could have safely conducted a 'straight-in' approach to RWY 17 but, due to being overloaded and unfamiliar with the aircraft, did not consider this option.

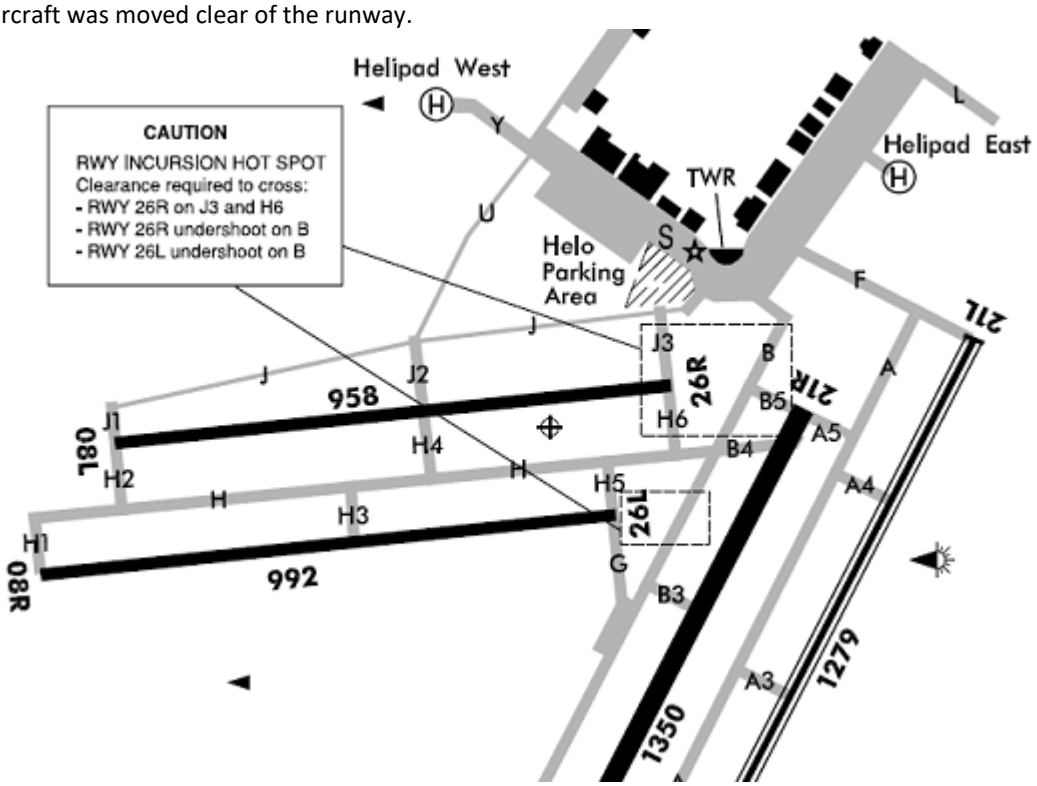
The pilot was debriefed by an instructor and the danger of low-level skidding turns was reinforced.

Investigation revealed the pilot's low hours, inexperience on type, flying from an unfamiliar airfield, early release from tow and failure to find a workable thermal caused the pilot to become stressed and

overloaded. This led to handling errors and poor decision making. The pilot agreed to undertake a check-flight exploring spin recognition and recovery, and then to complete a few local soaring flights to familiarise them with both the aircraft and site.

Date	3-Feb-2017	Region	SAGA	SOAR Report Nbr	S-0926
Level 1	Technical	Level 2	Powerplant/Propulsion	Level 3	Engine failure or malfunction
A/C Model 1	HK 36 TTC	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	53

The motor glider was being test flown at a controlled airport following replacement of a broken cowl flap pushrod the previous day that had caused the engine to run hotter than normal. An experienced pilot was flying while the maintenance engineer/co-pilot observed temperatures and settings. The aircraft had completed two 'touch-and-go' landings and one 'go-around' due to preceding traffic when, at approximately the mid-downwind position for the operational runway (RWY 21R) and just abeam the threshold of RWY 08L, the engine made a 'pop' sound and lost all power. The pilot declared a MAYDAY and, with the propeller windmilling and causing a high rate of descent, tracked direct to RWY 08L and conducted a forced landing. The aircraft landed safely and both occupants were uninjured. The airport duty safety officer was called and the aircraft was moved clear of the runway.



It was determined that the engine stalled after it backfired but an initial inspection could find nothing obviously wrong with the engine, which ran normally when tested. Further investigation identified a small split in the underside of a vacuum hose between a solenoid and the left carburetor. When power was applied and the pressure increased in this hose, the split would open leading to unbalanced carburettors. The damaged hose was replaced and the engine is operating normally.

Date	4-Feb-2017	Region	GQ	SOAR Report Nbr		S-0921	
Level 1	Technical	Level 2	Powerplant/Propulsion	Level 3		Propeller malfunction	
A/C Model 1		TST-10M		A/C Model 2			
Injury	Nil	Damage	Substantial	Phase	Launch	PIC Age	64

Shortly after take-off and at a height of about 200 feet AGL the pilot heard a thump and the engine surged. The aircraft immediately lost power so the pilot set the engine to idle, lowered the nose down to maintain forward speed, and then shut the engine down. The pilot turned the aircraft to the right at the cross strip to take advantage of a longer runway and landed safely. Subsequent inspection revealed damage to propeller mount, propeller drive belt and the propeller. Investigation revealed that one of the two bolts that attach a bracket at the top of the reduction box housing had not been tightened properly and had loosened over time due to vibration. This resulted in a stress fracture of the bolt head, which broke off and allowed the propeller shaft to move forward and down. In turn, this resulted in the drive belt coming off and tangling around the hub of the propeller. The destructive forces instantly created by the sudden imbalance of the propeller shaft cracked two of the three narrow support sections of the reduction box housing. Fatigue breaks are usually caused by insufficient tightening and the lack of proper preload or clamping force. This results in movement between the parts of the assembly and the bending back and forth or cyclic stressing of the fastener. Eventually, cracks will progress to the point that the bolt can no longer support its designed load. At this point the bolt fails with varying consequences. For the bolt to be properly loaded and prevent premature failure, a designated amount of torque must be applied. Proper torque reduces the possibility of the bolt loosening while in service. The correct torque to apply when you are tightening an assembly is based on many variables. The bolt is subjected to two stresses when it is tightened. These stresses are tension and torsion. Tension is the desired stress, while torsion is the undesirable stress caused by friction. A large percentage of applied torque is used to overcome this friction, so that only tension remains after tightening.

Date	4-Feb-2017	Region	VSA		SOAR Report Nbr		S-0922		
Level 1	Operational		Level 2	Ground Operations		Level 3	Taxiing collision/near collision		
A/C Model 1		ASW 27-18			A/C Model 2		Mosquito		
Injury	Nil	Damage	Nil	Phase	Ground Ops		PIC Age	77	

During a gliding Competition the three classes were given separate times to marshal to allow for an orderly gridding process. One pilot marshalled late and positioned their glider in the midst of another class that was in the process of gridding. Upon realising the error the pilot reversed the glider out of the position with the towing vehicle and, despite other pilots calling on the driver to stop, its left wingtip missed the rudder of another glider by centimetres. The pilot then attempted to drive forward but was stopped by the other pilots just prior to the wingtip colliding with the other glider. Manoeuvring a glider with a towing vehicle in close proximity to other gliders is unwise as the driver has a limited field of view. In such cases it is safer to

unhitch the glider from the vehicle and move it by hand. The driver was counselled by the Competition Safety Officer.

Date	10-Feb-2017	Region	GQ	SOAR Report Nbr		S-0927	
Level 1	Airspace	Level 2	Aircraft Separation	Level 3		Near collision	
A/C Model 1	Standard Libelle 201 B			A/C Model 2	Embraer EMB-120 ER		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	63

When about nine kilometres south-west of the home airfield and at about 5700 feet, the pilot initiated a left turn to enter a thermal. After turning through approximately 120 degrees the pilot saw an Embraer ERJ 170-100 LR passenger jet operated by a Northern Australia Regional Airline in a left-hand bank heading towards the Wellcamp Regional airport. The Airliner passed about 500 feet below and about 300 to 500 metres from the glider. The glider pilot did not hear any radio calls on the CTAF (126.7 MHz) and does not know whether the pilots of the airliner saw the glider. The CFI noted that there has been an increase in the number of airliners from one particular airline and dialogue has been opened with the airline to inform them of the gliding operations. Discussions were also had with the Regional GFA AA&A Officer and it was determined that the Club would continue to remain on the existing Multicom frequency but that its pilots would briefed on the high risk areas close to the broadcast area boundary.

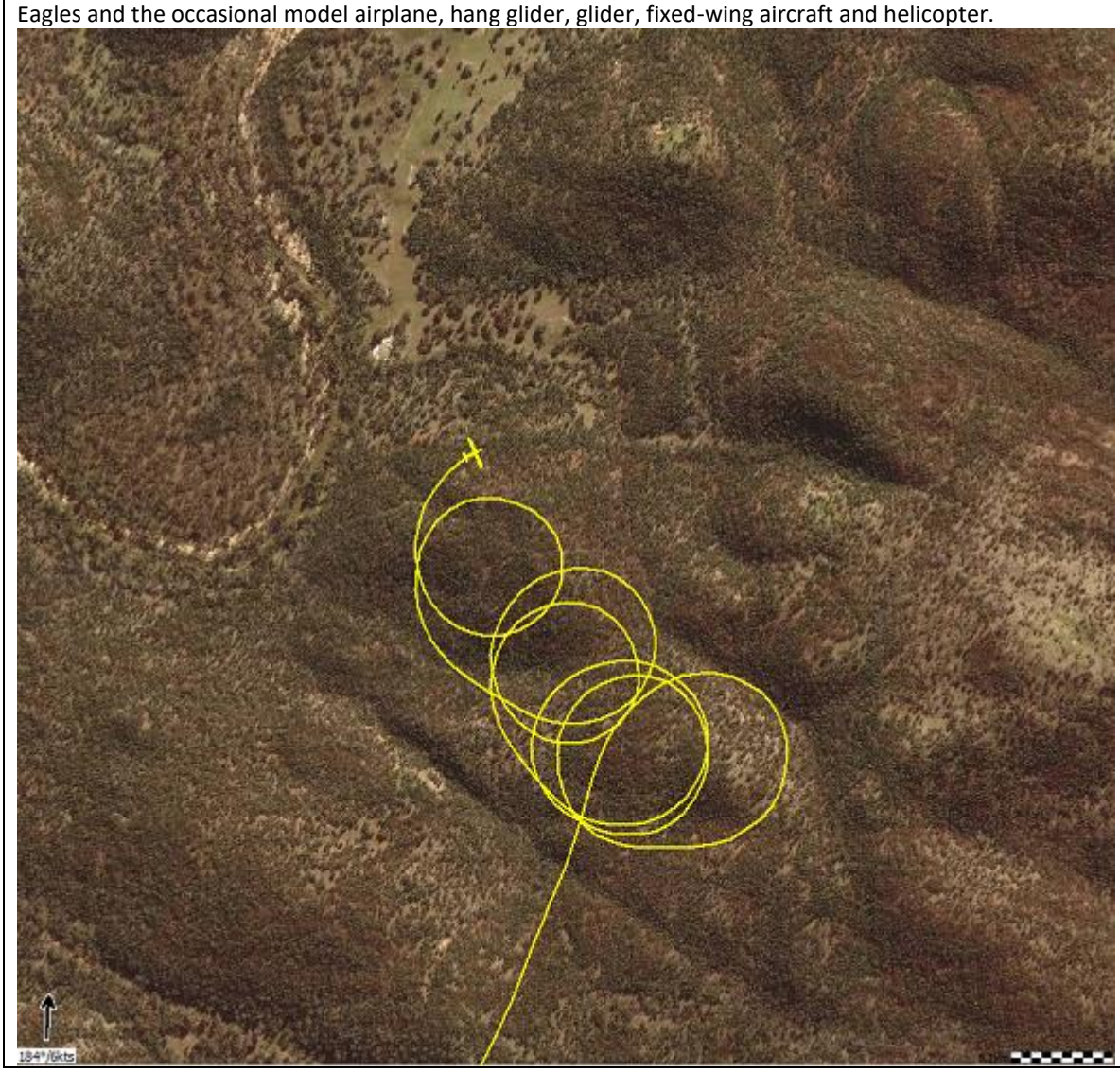
Date	11-Feb-2017	Region	SAGA	SOAR Report Nbr		S-0929	
Level 1	Operational	Level 2	Runway Events	Level 3		Other Runway Events	
A/C Model 1	Marianne 201B			A/C Model 2	AS-K 13		
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	88

A glider was cleared to launch by winch while another glider was established on final approach. A member in the control van observed the potential conflict and tried to stop the launch to no avail. A message was then relayed to the winch driver by radio after the "all out" signal had been given but the winch driver did not hear the call due to engine noise. The launch proceeded normally. The pilot of the landing glider saw what was happening and deviated to the right of the runway centreline to provide clearance and landed without further incident. Lookout is the principal method for implementing see-and-avoid. Effective lookout means seeing what is 'out there' and assessing the information that is received before making an appropriate decision. Nothing should happen with regard to taking up slack until the Pilot In-Command (PIC) has ascertained the airspace is clear for launch (Operational Safety Bulletin (OSB) 02/06(1) ‘Airspace Clear For Launch’ refers). The winch driver also has a part to play in maintaining operational safety, and should have a good overview and understanding of what is happening in the circuit including what aircraft have departed or are inbound. Therefore, winch drivers should wear a quality headset and maintain a ‘radio watch’ in order to enhance both situational awareness and safety (Operational Safety Bulletin (OSB) 01/13 ‘Wearing of Headsets - Pilots of Self Launching Gliders and Winch Drivers’ refers).

Date	14-Feb-2017	Region	SAGA	SOAR Report Nbr		S-0931	
Level 1	Environment	Level 2	Wildlife	Level 3		Birdstrike	
A/C Model 1	Stemme S10-VT			A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Thermalling	PIC Age	51

While the glider was thermalling at about 6,300ft AGL enroute during a competition flight, an eagle approached from the left and attacked the glider, impacting the inboard leading edge of the port wing. Although the pilots could not see any damage, the command pilot elected to return to base at slow speed. Other pilots in the competition also reported aggressive behaviour by the eagles. Subsequent inspection revealed the aircraft was undamaged. Although birds and glider pilots often share the same thermal and can operate near each other with relative safety, birds can and do occasionally come into contact with a glider.

While it is uncommon that a bird strike causes any harm to aircraft crew, many result in damage to aircraft. Wedge-tailed Eagles are territorial and are known to defend around their nest sites from other Wedge-tailed Eagles and the occasional model airplane, hang glider, glider, fixed-wing aircraft and helicopter.



Date	14-Feb-2017	Region	VSA	SOAR Report Nbr	S-0935		
Level 1	Operational	Level 2	Aircraft Control	Level 3	Control issues		
A/C Model 1	Discus CS	A/C Model 2					
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	70
The hand grip slid off the control column at 100 ft AGL during an aerotow launch. The pilot released from tow and completed a safe landing. It is believed the glue securing the hand-grip to the control column became soft in the heat, therby allowing it to slide free during the take-off. The hand grip was re-attached and secured by a set screw.							

Date	17-Feb-2017	Region	NSWGA	SOAR Report Nbr	S-0937

Level 1	Operational	Level 2	Miscellaneous	Level 3	Rope/Rings Airframe Strike

A/C Model 1	ASH 30 Mi	A/C Model 2	Piper PA-25-235

Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	65

On Day 5 of the 2017 Australian Two Seat Nationals the gliders were gridded on runway 04 and the tow planes were instructed to land on runway 29 and taxy to the launch point. Two self-launching sailplanes, an ASH 30 and an Arcus, elected to take-off from runway 29 as it was more into wind. Because the ASH 30 did not have a steerable nose wheel, the pilots positioned the glider on the centreline of runway 29 behind the displaced threshold while the Arcus was parked off to the side of the runway. The crew of the ASH 30 were donning their parachutes in preparation for launch as one of the tow planes turned onto final approach. The tow pilot, who had just completed their first launch, elected to land on the right-hand grass verge of runway 29 clear of the ASH 30. The tow pilot then flew a shallow approach with the aim of touching down adjacent to the marked threshold, despite being briefed earlier to land well beyond the displaced threshold. During the course of the approach the tow plane drifted towards the bitumen runway and the trailing rope and rings fell across the right-hand wingtip of the ASH 30 causing minor damage. The ASH 30 was removed from the runway and did not fly. A 55 metre tow rope hangs about 40 feet below a tow plane at approach speeds. Consequently, tow pilots should always approach high and land long in preference to cutting it fine near people or objects on the ground, and should avoid landing over the top of parked gliders. If the tow pilot has any doubt about obstacle clearance, whether it be buildings, vehicles, parked or taxying aircraft or people (especially people), they should drop the rope. When a rope is dropped, it loses forward momentum very quickly and ends up dropping almost vertically to the ground.

Date	18-Feb-2017	Region	GQ	SOAR Report Nbr		S-0936	
Level 1	Operational	Level 2	Airframe	Level 3		Doors/Canopies	
A/C Model 1		Twin Astir		A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Thermalling	PIC Age	38

The front canopy opened in-flight during private passenger flight. Just prior to launch the passenger secured the canopy and the command pilot observed that the canopy appeared to be locked. The wing-runner, an experienced solo pilot, did not observe the canopy to be 'proud' of the frame and considered it to be locked. The launch and subsequent flight was normal until the canopy opened about 20-25 minutes into the flight. The command pilot landed shortly thereafter. Upon landing the passenger was asked to open and close the canopy on the ground. When opening and closing the canopy the passenger was seen to pull the knob down

and back, rather than just back. When pulled down and back the pins engage in the slots/tubes but the knob does not slide completely forward. The canopy appeared to be closed and locked from inside and outside but was not fully secured and the pins disengaged during flight. Pilots flying with untrained persons should provide a thorough briefing on the correct operation of the canopy, and ensure the canopy is properly locked by either visual inspection or by asking the wing-runner to check.

Date	18-Feb-2017	Region	WAGA	SOAR Report Nbr		S-0941	
Level 1	Operational	Level 2	Aircraft Control	Level 3		Wheels up landing	
A/C Model 1		ASH 31 Mi		A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	62

The experienced pilot was undertaking a 'round the clubs' cross-country flight in a new self-launching glider. Weather conditions were fine but thermals were only going to 3,700ft AGL. A new electronic navigation device had been installed in the glider but the pilot was not relying on it as they were unsure that the pilot profile and final glide calculations were correct. The aircraft carried two fully charged batteries, one of which was used to power the aircraft and the other was being charged by the aircraft's solar panels. The flight started well and the pilot was unconcerned about the low ceiling. Having rounded the first turn point, the pilot was at 1,000ft AGL over an area with small and wet paddocks. In reach of a landable paddock, the pilot lowered the undercarriage and started the engine. After a short climb at about 6900 revs, the engine began to misfire, as it had done on a previous flight, and the pilot assumed the battery was low. The pilot cooled and stowed the engine and headed on task towards the second turn point. At this time the batteries were swapped so as to equalise the voltage in each. On nearing the second turn point the pilot reached a height that the navigation system suggested with provide a safe final glide home. While thermalling shortly afterwards the pilot heard a tapping noise that was thought to be the cover for the water dump valve flapping, but was later found to be the fuel filling pump running. Nearing home and at a height of about 1,500ft the pilot again started the engine. While the engine ran satisfactorily, all the electrical instruments went blank. When the pilot believed final glide for a straight-in approach had been established, the engine was again cooled and stowed. During the final approach the pilot set landing flap and proceeded to land with the wheel retracted. Due to the electrical failure, the undercarriage warning did not activate. While the pilot recalled doing the pre-landing checks, they merely looked at the undercarriage lever and perceived it to be in the correct position. The CFI noted that this incident resulted from a chain of stressful events. The crucial factor being that the pilot did not physically check the position of the landing gear lever. This is not uncommon when pilots fly a straight-in approach. The chances of identifying an error while flying a normal, standard circuit, is significantly higher than when on final glide for a straight-in approach. Causal factors include inexperience on type and a high level of stress that led to inattention to detail.

Date	18-Feb-2017	Region	SAGA	SOAR Report Nbr		S-0942	
Level 1	Airspace	Level 2	Aircraft Separation	Level 3		Near collision	
A/C Model 1		Grob G 103 Twin II		A/C Model 2		DG-1000S	
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	56

A DG1001 landed on RWY 23 Grass Right while a Twin Astir was on its base leg for the same runway. After exiting the glider, the crew of the DG1001 made no effort to vacate the strip but were awaiting a retrieve vehicle. The student flying the Twin Astir under instruction flew the glider into an undershoot position behind the DG1001. The Instructor in the Twin Astir assumed command and took action to prevent a landing behind the DG1001 and overflew the DG1001 at a low height, estimated at about 20 to 30 ft. The Instructor in the Twin Astir chose not to land on the gravel runway alongside because of a perceived risk of conflict with a launch that was about to commence on RWY Grass Left. Investigation revealed a breakdown in procedures, namely: a glider launch was commenced while the Twin Astir was established on a late final approach; the wing runner for the aerotow launch was inexperienced; and the crew of the DG1001 made no effort to vacate the runway for the following glider.

Date	22-Feb-2017	Region	GQ	SOAR Report Nbr		S-0938	
Level 1	Operational	Level 2	Terrain Collisions	Level 3		Ground strike	
A/C Model 1		Whisper Motorglider		A/C Model 2			
Injury	Nil	Damage	Substantial	Phase	Launch	PIC Age	68

When the pilot started the engine to taxi downhill the speed built up rapidly. The pilot applied the brakes and aircraft tipped onto nose destroying propeller and possibly damaging the engine. Two weeks prior to the

accident the pilot had been working on the aircraft's transponder. As some of the transponder wiring was routed near the throttle, the throttle was manipulated to ensure it was not binding and had been left in the half to three-quarter open position. The accident flight was the first flight since this maintenance was undertaken. Around midday the pilot completed his flight checks but omitted to set the throttle for starting. When the pilot started the engine it surged into life and the aircraft quickly accelerated downhill. The pilot immediately activated the hand brake, which resulted in the aircraft pitching forward and the propeller striking the ground.

Date	25-Feb-2017	Region	VSA	SOAR Report Nbr	S-0940
Level 1	Operational	Level 2	Airframe	Level 3	Furnishings & fittings
A/C Model 1	Eurofox TOW T2	A/C Model 2	PW-5 "Smyk"		
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	68

At around 2500' AGL the tow pilot noticed the PW 5 was being flown erratically. The tow pilot used the radio to speak with the glider pilot, who advised the release knob could not be reached. As the glider was directly above the airfield, the tow pilot instructed the glider pilot to move into high tow position so the tow pilot could activate the tug's release. Following release of the rope from the tow plane, the glider pilot was able to reposition themselves and manged to activate the tow release. The rope fell to the ground and was lost. Both aircraft completed a successful landing. Subsequent investigation revealed the seat back adjustment had failed, causing the glider pilot to move rearwards and away from the release. The seat adjustment is a fabric cushion that is adjusted by folding and secured to the rear bulkhead by Velcro. The glue adhering the Velcro strip to the rear bulkhead had failed, thereby allowing the cushion to slip from its intended position during take-off.

Date	25-Feb-2017	Region	GQ	SOAR Report Nbr	S-0943
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Aircraft Separation Issues
A/C Model 1	Twin Astir	A/C Model 2	TST-10M		
Injury	Nil	Damage	Nil	Phase	Thermalling	PIC Age	65

While thermalling during the conduct of an Air Experience Flight, the Twin Astir was joined below by a powered sailplane operating engine-off. The pilot of the powered sailplane turned in the opposite direction to the Twin Astir, and despite several radio calls from the Twin Astir pilot requesting the other pilot change direction, the powered sailplane continued to turn in the opposite direction while climbing towards the Twin Astir. The Twin Astir pilot left the thermal before separation was compromised. The pilot of the powered sailplane later stated that aircraft separation was significant enough to not pose a safety threat. Notwithstanding, convention dictates that when joining a thermal where another glider is circling, the joining glider must circle in the same direction. The pilot of the motor glider was counselled by the CFI.

Date	26-Feb-2017	Region	SAGA	SOAR Report Nbr	S-0944
Level 1	Operational	Level 2	Ground Operations	Level 3	Taxiing collision/near collision
A/C Model 1	LS 4	A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Ground Ops	PIC Age	70

After towing the glider to launch point, the driver manoeuvered towards a grassed area where the gliders are usually parked. After crossing the operational runway, the driver became focussed on a tow plane that was taxying towards its parking area behind the launch point. To ensure the tow plane had sufficient room to park, the driver towed the glider closer to an access road. While the driver was concentrating on avoiding

the tow plane, the starboard wing of glider struck a sign alongside the access road causing damage to its aileron.

Date	1-Mar-2017	Region	VSA	SOAR Report Nbr	S-0963
Level 1	Operational	Level 2	Flight Preparation/Navigation	Level 3	Aircraft preparation
A/C Model 1	Eurofox K2	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	68

While taxying the tow plane to position for a launch the pilot received a hand signal and radio call to stop. Upon stopping the pilot realised that the tow plane was dragging a concrete tie-down weight attached to the right wing tie down point. The tug was initially unoccupied and parked adjacent to the airstrip in readiness for a launch. Due to the windy conditions, a 20kg concrete block had been attached to the into-wind (right-hand) wing attachment point, opposite to the entry door and out of sight of the pilot when boarding. When launching was ready to commence the tow pilot boarded the tow plane but forgot to complete a pre-boarding check. As a consequence, the pilot did not notice the tie-down weight was still attached. The tug had moved about four metres before it was stopped and no damage was done to the aircraft. The pilot noted the *"Incident was witnessed by about ten people, including about 6 instructors and the RM/O - not a good time to stuff up!"* Consequent of this incident the club has reinforced the need for pilots to diligently complete their pre-boarding checks, and the concrete blocks will be painted in hi-visibility colours and the attachment clip flagged.

Date	3-Mar-2017	Region	WAGA	SOAR Report Nbr	S-0976		
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Near collision		
A/C Model 1	Ventus-2cM	A/C Model 2	Piper PA-31-350				
Injury	Nil	Damage	Nil	Phase	Thermalling	PIC Age	
It was reported that a Piper Chieftain engaged in Charter operations was instructed by Air Traffic Control to orbit at 10,000ft about 10NM east of the 'GRENE' IFR waypoint for sequencing into Perth airport. While							

conducting the orbit, the pilot reported a near miss with a glider. There was no observed traffic on surveillance. Investigation identified the glider pilot from OLC records. The glider pilot reported conducting a 180 km cross-country flight from Beverley, WA. When coming out of a thermalling turn onto a westerly course about 10 NM east of Greenhills, WA, the glider pilot observed the Piper Chieftain on a northerly heading and approaching the glider from the left and slightly behind. The glider pilot observed the Piper Chieftain slightly deviate from course and, when clear of the glider, return to its original course. The glider pilot noted that both aircraft were at a similar altitude with lateral separation under 150 m. The pilot was not monitoring the Area Frequency at the time. The Airservices Australia Aeronautical Information Publication (AIP) notes that glider pilots are encouraged, but not required, to monitor the area VHF when operating above 5,000 ft in Class G airspace. The AIP further states: *"Except for operations in controlled airspace, gliding operations may be conducted no-radio, or may be on frequencies 122.5MHZ, 122.7MHZ or 122.9MHZ, which have been allocated for use by gliders. … Except when operationally required to maintain communications on a discrete frequency listed above, glider pilots are expected to listen out on the area VHF and announce if in potential conflict."* The GFA Airways and Radio Procedures manual states: *"Gliders are encouraged, but not required, to monitor the area frequency when operating in Class E Airspace."* This exemption from the Rule exists to allow glider pilots to communicate on one of the discreet safety frequencies when flying in the company of other gliders to enhance situational awareness. However, where a pilot is flying alone, they should monitor the Area Frequency as an aid to collision avoidance. For further information, refer to OSB 02/14 'See-and-Avoid for Glider Pilots'.

Date	4-Mar-2017	Region	GQ	SOAR Report Nbr		S-0947	
Level 1	Operational	Level 2	Flight Preparation/Navigation	Level 3		Aircraft preparation	
A/C Model 1		IS-28B2		A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	68

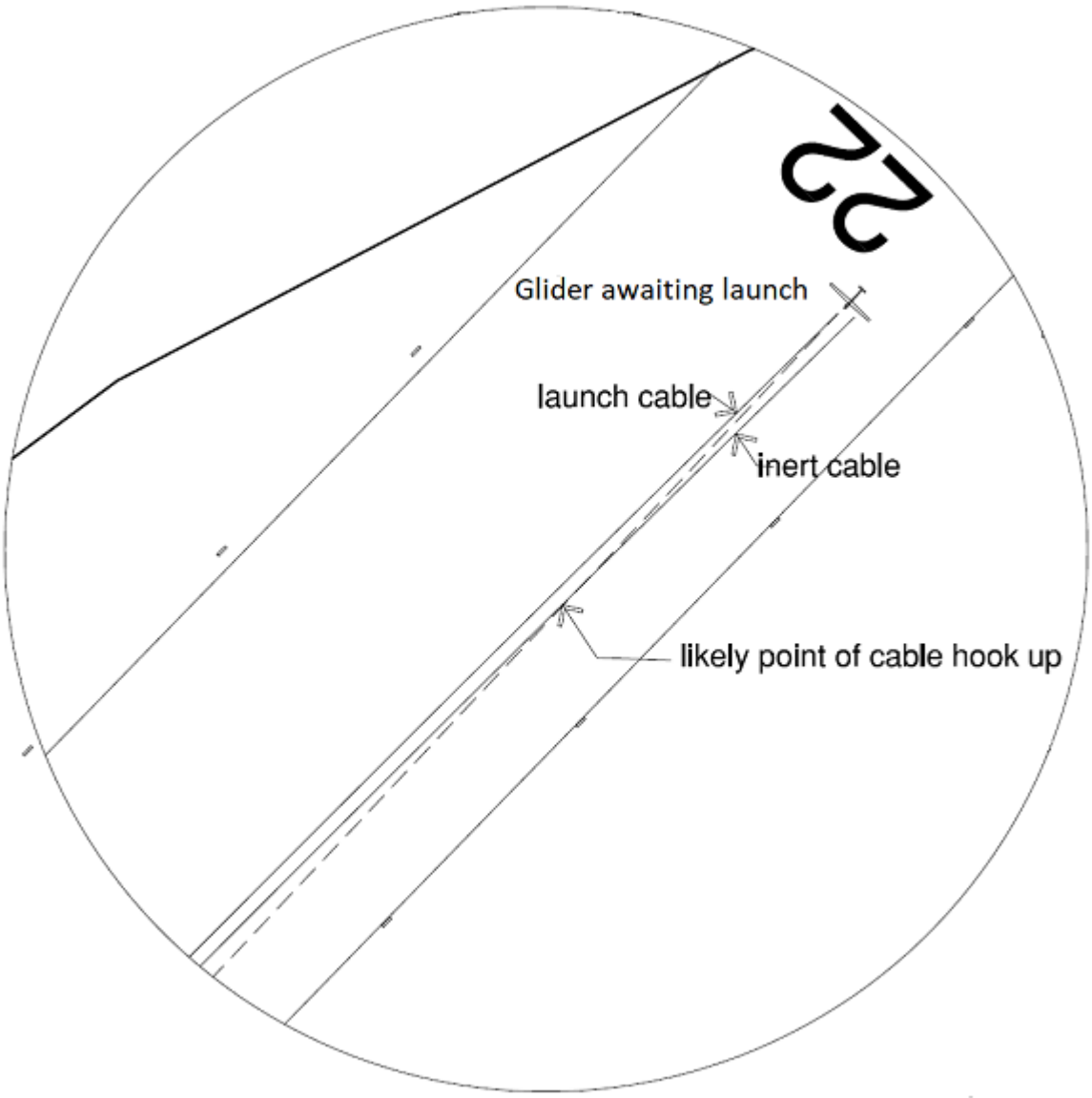
The aircraft was flown with the ground-handling rod incorrectly stowed inside a rear bulkhead inspection hole behind the rear seat. The ground-handling rod, which is used to aid in lifting the tail to fit the tail dolly after landing and also secures the rudder chock, and had been positioned in the tail overnight to secure the control surface. During the Daily Inspection the inspector removed the ground-handling rod from the tail and passed it to one of the students to stow in the fuselage. During the pre-boarding checks the command pilot noticed the ground-handling rod was not in its usual position and a search of the cockpit could not locate it. Believing the ground-handling rod was with the other ground handling devices in the retrieve vehicle, the command pilot completed all pre-flight checks and the aircraft was cleared for flight. Following an uneventful flight and landing the retrieve crew could not locate the ground-handling rod, so a further search of the glider was conducted. The ground-handling rod was subsequently located inside a rear bulkhead inspection hole behind the rear seat. This incident highlights the need for a dedicated level of focus when conducting critical inspections and pre-flight checks, without interruption. The concept of a sterile environment should be adopted during all critical duties or activities, such as the Daily Inspection and completion of check lists.

Date	4-Mar-2017	Region	SAGA	SOAR Report Nbr		S-0950	
Level 1	Operational	Level 2	Miscellaneous	Level 3		Other Miscellaneous	
A/C Model 1				A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	68

During a winch launch the launching cable picked up the second wire. The student pilot noticed the second wire being lifted into the air and immediately lowered the nose of the glider. With safe speed established, the student released and completed a landing straight ahead. For reasons that were not determined, the second wire had not been secured at the launch point.

Date	11-Mar-2017	Region	VSA	SOAR Report Nbr		S-0959	
Level 1	Operational	Level 2	Miscellaneous	Level 3		Other Miscellaneous	
A/C Model 1		Twin Astir		A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Launch	PIC Age	66

The club has a total of ten members, five of whom were in attendance on the day. Around 10am two members drove down to the winch and the winch driver prepared it for operations. The second member hooked the two cables onto the retrieve vehicle. The cables were towed on a slight curve along the eastern third of the runway to the launch point, whereupon they were taken off the car but not secured. After leaving the cables at the launch point the member drove to the other side of the runway to get their glider from the hangar. The Twin Astir was towed to the launch point and then later positioned close alongside the wires, and in such a position that its take-off path was directly towards the second wire. The second wire, with the drogue chute and trace attached, was not secured and this went unnoticed by the pilots and crew. The sortie was to be a mutual flight between two instructors. The command pilot was to fly the launch because the second pilot was not current. It was intended the two pilots would share the flying and that the second pilot would conduct the circuit and landing. Due to small numbers, there was only one member at the launch point to manage the launch and run the wing. The glider was launched around 11am and during the ground roll the glider over ran the second, unsecured, cable, which was picked-up by the tailskid. The glider became airborne with the second cable, including the attached drogue chute and trace, caught in the tailskid. The pilot in command reported difficulty maintaining speed and attitude during the launch and the climb rate was poor. At about 500ft AGL the command pilot released and pitched forward but the speed began to decay to close to the stall. The command pilot further lowered the nose to increase speed and the second pilot reported hearing a tearing sound and attributed the noise to the tailskid departing the fuselage. Once free of the cable the pilot in command flew a modified circuit and the glider landed safely. The second pilot provided the following sketch of the launch point layout just prior to launch.



The first quarter of the cable run from the winch is outside the marked area of the airfield and there are no obvious reference points for the retrieve driver to follow until the first gable marker is reached. In this case the vehicle driver delivered the cables to the launch point with a bow towards the runway centreline. The glider was then positioned closer to the cables than would normally be the case. It is not known why the pilots and crew did not secure the second cable to the tie-down points prior to launch but it is possible the members had become out of practice in dual wire operations. For several months prior to this incident the club had only operated with a single wire because the second drogue chute was unserviceable. With a single wire operation, it is acceptable to run the cable directly to the glider and there is no second wire to secure. As the glider overran the second wire, the metal shoe on the tailskid, which slightly protruded forward, picked-up the cable that had the drogue chute attached. With the additional drag of the second wire, the launch performance was seriously degraded as the glider transitioned into the climb and it is surprising that the command pilot could maintain sufficient control to avoid a serious accident. Following this incident the club conducted a formal review of its operation in terms of its SMS and have taken the following steps to mitigate the risk:

1. The tail skid has been replaced with one that has a flush leading edge.

2. The inert cable will be secured on all future winch launches.
3. Retrieve vehicle drivers will be briefed on the importance of ensuring the cables are laid straight and as close to the runway edge as possible.
GFA is also reviewing the winch launching manual to improve guidance for the laying of cables.

Date	12-Mar-2017	Region	GQ	SOAR Report Nbr	S-0951
Level 1	Operational	Level 2	Airframe	Level 3	Objects falling from aircraft
A/C Model 1	Piper PA-25-235	A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	25

The tow plane was established on final approach when, at approximately 350 feet AGL, it was struck by a gust that destabilised the aircraft and shifted the pilot in the seat. After re-establishing the glide slope the pilot inadvertently activated the tow release with their leg while repositioning in the seat. The tow rope fell onto a car travelling along the highway at speed and the car's occupants safely recovered the rope without further incident or injury. Subsequent inspection and testing of the release system did not reveal any fault. Attempts to replicate the problem revealed that excessive back-pressure on the release lever from a shoe or clothing can result in activation of the release but that such would be a rare occurrence.

Date	14-Mar-2017	Region	SAGA	SOAR Report Nbr	S-0952
Level 1	Consequential Events	Level 2	Low Circuit	Level 3	Low Circuit
A/C Model 1	DG-1000S	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	26

On establishing final glide at the end of a cross-country race, the pilot conducted a very marginal approach to the operational runway. At approximately 15kms out the glider was well over glide and the angle looked good, so the pilot pushed hard. At approximately 4km out and 1km from the finish line, the numbers on the instruments still looked good but the picture from the cockpit was starting to look poor. The pilot started to slow up gently and a little height was gained from pulling up but the picture improved only slightly. At this point the terrain beneath the glider was poor and the pilot elected to continue towards the airfield, having discounted diverting to an alternative runway as too risky. The pilot continued with the approach and cleared trees and powerlines by approximately 200ft during the turn onto final approach. The landing was uneventful. The command pilot was very experienced but was not current on type and usually flew gliders with significantly better glide performance. The command pilot misjudged the altitude required to cross the finish in order to join base leg at a safe altitude, and noted after the flight that the glider's altimeter was reading 160ft higher, probably due to atmospheric pressure changes during flight. The pilot's judgement may have been also influenced by another glider ahead that was at a similar height. The pilot was issued a 500 point scoring penalty by the competition organisers.

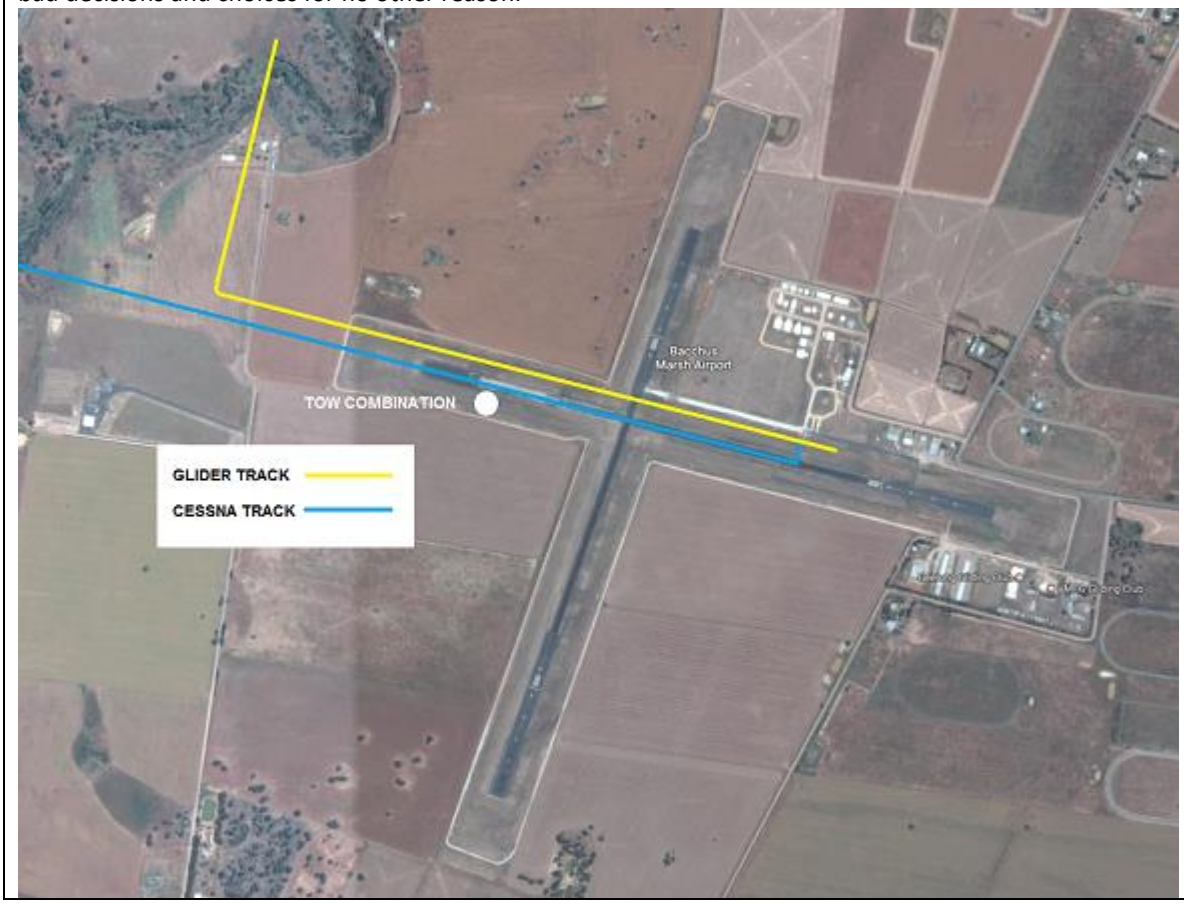
Date	17-Mar-2017	Region	GQ	SOAR Report Nbr	S-0955		
Level 1	Operational	Level 2	Runway Events	Level 3	Runway incursion		
A/C Model 1				A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Ground Ops	PIC Age	

At the end of the day's operation the control van was being towed back to its usual parking place. Before crossing the end of the operational runway the driver stopped the vehicle and looked out of the windows to check for aircraft on approach or entering the runway. Satisfied that it was safe to cross, the driver entered the runway and shortly afterwards a glider flew overhead about 50 feet above the vehicle. The command pilot in the glider had seen the vehicle stop and assumed the driver had it sighted. The command pilot was unconcerned when the vehicle entered the runway as there was no risk of collision. The driver of the vehicle was unware of how big a blind spot exists for the driver of the tow vehicle when looking left out of the passenger's window. In future the driver will exit the vehicle to check for approaching aircraft.

Date	18-Mar-2017	Region	VSA	SOAR Report Nbr	S-0954		
Level 1	Operational	Level 2	Runway Events	Level 3	Other Runway Events		
A/C Model 1	SZD-51-1 Junior			A/C Model 2	Cessna 152		
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	64

The glider pilot took a launch for a local flight after having earlier satisfactorily completing an annual flight review. During the course of the flight the pilot was contacted by the ground operation and informed that no one else required the aircraft and that the pilot could land long at the end of the flight so as to position the glider near the hangars. Sometime later the pilot joined circuit and gave a downwind call on the CTAF advising of the intention to land on the operational runway. During the base leg the pilot noticed a glider and tow plane were positioned for launch on runway grass right, and that a Cessna aircraft was on final approach for the bitumen runway. The glider pilot elected to land on runway grass left and turned onto final approach, with the Cessna now on the ground some 500 metres ahead. The glider pilot, realising the Cessna would probably turn left in front of the glider in order to taxi clear of the operational runway, made a radio call advising the Cessna pilot not to turn left. Shortly afterwards the Cessna turned left at the taxiway and stopped as the glider flew past just above the ground. The glider pilot stated *"this was a dangerous situation which followed from poor decision making on my part when on Base re where to land, a fixation on landing near the hangar, and a delayed appreciation of the relative positions of my aircraft and the Cessna when approaching the cross Runway, at which point my options were limited. I must have observed the powered aircraft landing on 09 and exiting on that taxiway literally hundreds of times. Had I not observed the Cessna holding on the Runway, I may have been able to retract the airbrakes and gain sufficient height to clear the taxiway. I do not think fatigue was a factor".* Good operating procedures and flying standards are developed

over time and built on the experience of many pilots and many mistakes. Pilots should always be aware that even slight departures from standard accepted good practice can have severe consequences. There is no doubt that convenience can be a seductive force and very many pilots (and clubs) have been tempted into bad decisions and choices for no other reason.



Date	19-Mar-2017	Region	SAGA	SOAR Report Nbr	S-0956		
Level 1	Airspace	Level 2	Airspace Infringement	Level 3	Airspace Infringement		
A/C Model 1	Glasflugel 304	A/C Model 2					
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	

The pilot was competing in the South Australian State Gliding Championships from Gawler airfield. The airspace around Gawler is complex and the local club has an agreement with the RAAF and AirServices for release of some airspace blocks upon application. While flying towards a turn point, the pilot inadvertently entered controlled airspace for a period of 3.5 minutes after mistakenly believing the glider was in an area that had been released for the competition. The pilot noted that all pilots had been warned of the airspace limitations at briefing and suggested a number of factors contributed, viz.:-

1. Electronic airspace warnings from the flight computer were turned off by the pilot in the belief there would be continuous false alerts in this environment, although the pilot subsequently learned that the airspace file had been specifically developed for this competition.
2. Although the pilot carried appropriate maps and charts folded ready for immediate reference as mitigation for lack of electronic airspace warnings, the pilot still misidentified the glider's position relative to the airspace boundary.

3. The pilot suspected complacency and stress played a part as the pilot had flown in this area many times in the past, and Self-imposed flight objectives may have contributed to a lack of situational awareness regarding the boundary of the airspace limits. The pilot was also concerned about the potential risk due to height above the steps on final glide later in the flight because of the effect of a sea breeze.

Date	19-Mar-2017	Region	SAGA	SOAR Report Nbr	S-0957
Level 1	Airspace	Level 2	Airspace Infringement	Level 3	Airspace Infringement
A/C Model 1	LS 4-a	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	56
The pilot was competing in the South Australian State Gliding Championships from Gawler airfield. The airspace around Gawler is complex and the local club has an agreement with the RAAF and AirServices for release of some airspace blocks upon application. On the first leg of the task the pilot inadvertently entered controlled airspace. The pilot advised that the breach occurred due to inattention to navigation. Compounding the error, the pilot disregarded airspace warnings from the flight computer (disuse of automation) due to numerous false alarms consequent of the daily variation in airspace blocks.					

Date	24-Mar-2017	Region	GQ	SOAR Report Nbr	S-1020
Level 1	Operational	Level 2	Ground Operations	Level 3	Other Ground Ops Issues
A/C Model 1		A/C Model 2			
Injury	Minor	Damage	Nil	Phase	Ground Ops	PIC Age	75
While disconnecting an under-tension rope from the moving retrieve vehicle in preparation for an autotow launch, the member suffered rope burn to their hand and was taken to hospital for medical treatment. The key to avoiding a rope burn is to avoid touching the rope until the vehicle has stopped. If it is necessary to handle a moving rope, then use suitable gloves or clothing between your skin and whatever's causing the friction. A person should seek medical treatment immediately if the rope burn is deeper than the upper layers of skin and hair.					

Date	24-Mar-2017	Region	GQ	SOAR Report Nbr	S-0958
Level 1	Operational	Level 2	Runway Events	Level 3	Runway excursion
A/C Model 1	Astir CS77	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Outlanding	PIC Age	37
The pilot selected an outlanding paddock that was 370m long, slightly downhill with contour banks. From the air, the pilot observed neither the slope of the paddock nor the contour banks. The final approach was over a forest and higher than usual due to the pilot's caution about the trees. As a result, touchdown occurred just over halfway down the paddock, whereupon contour banks twice relaunched the glider, resulting in a ground run that went past the end of the cultivated paddock, over a farmhouse entry road and 10m into the next cropped paddock without damage to the aircraft. Fortunately for the pilot there were no fences alongside the entry road. The CFI noted that despite much training the pilot lacks consistency, i.e. the pilot does not always respond in an identical manner when presented with multiple identical situations. The pilot has since undergone extensive reassessment and cleared for solo flight.					

Date	1-Apr-2017	Region	SAGA	SOAR Report Nbr	S-0986
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Near collision
A/C Model 1	DG1000S	A/C Model 2	Zodiac		

Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	55
It was reported that the pilot of an RA-Aus registered aircraft took avoiding action while on the downwind leg of the operational runway to avoid a glider flying directly towards it. The pilot stated that the aircraft were between 30 and 50 metres apart at the time. A radio call was subsequently made to the glider pilot but no response was received. Around the reported time of this incident a glider was conducting thermalling exercises and had drifted across the runway onto the active side of the circuit. At that point the trainee glider pilot elected to fly toward the circuit joining area but the flight path was against the traffic flow. The gliding instructor asked the student to turn onto downwind around the same time that the powered aircraft saw the glider. Neither crew of the glider saw the powered aircraft or heard its radio transmission. Both aircraft completed a normal landing. As a consequence of this incident the gliding club has reinforced the need of its pilots to remain clear of the active circuit area, keep a good lookout, and to also beware of aircraft on the inactive side. Instructors will ensure their air work is completed at a height sufficient to enable the student to arrive at the circuit joining area at an appropriate height for the prevailing conditions, and will also reinforce to students appropriate ways to modify their circuits.							

Date	1-Apr-2017	Region	GQ	SOAR Report Nbr	S-0960
Level 1	Operational	Level 2	Aircraft Control	Level 3	Hard landing
A/C Model 1	PW-6U	A/C Model 2			

Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	75
A normal circuit was flown but the pilot failed to flare correctly and flew the aircraft onto the ground causing it to hit hard and bounce, stall, and hit hard again. The pilot stated that when *"coming in on finals I reached what I thought was round out height but as I started to round out I hit the ground and bounced. I was too slow to catch it and hit the ground again. The port wing touched the ground and slewed the glider around onto the bitumen where I regained control and rolled down the runway for a short distance and then back onto the grass."* The pilot was on solo checks and had performed an adequate flight with the duty instructor that morning. Conditions were calm and favourable for a solo flight. The pilot is an older person who has recently come back into gliding after a long break. The pilot went solo a few weeks earlier after many flights with the Club's instructors but had struggled to maintain consistency. Potential causal factors include inexperience, high workload, incorrect landing technique and over controlling the glider in pitch following a bounced landing. The pilot also noted that an operation to treat cataracts several weeks earlier may have affected depth perception.							

Date	2-Apr-2017	Region	WAGA	SOAR Report Nbr	S-0966
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Near collision
A/C Model 1	SZD-48-1 "Jantar Standard 2"	A/C Model 2	SZD-50-3 "Puchacz"		

Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	51
While travelling north at 3500 ft and about 1km due east of the airfield, the Jantar pilot noticed the flash of a shadow as the Puchacz flew overhead from the rear left quarter. The Puchacz passed directly overhead the Jantar by less than 100ft separation. The Jantar pilot flew parallel to the Puchacz and tried to contact the other aircraft by radio to no avail. The pilot of the Puchacz did not sight the Jantar. It is apparent that while the gliders crossed paths at different heights and speed, blind arc limitations of the Puchacz made it difficult for the pilot to sight the other glider. It may have been possible the Puchacz pilot to have sighted the other glider had they been looking to the right and significantly down. However, the command pilot's attention was directed elsewhere at the critical time. It was noted that neither aircraft was fitted with FLARM. The primary method for implementing 'see-and-avoid' is lookout, which involves seeing potential hazards and assessing information prior to reacting. The primary source of information is vision. Pilots must maintain a good lookout and adequately compensate for any aircraft blind spots. This means avoiding long periods at a							

constant heading and checking that the airspace is clear before turning. For further information, refer to OSB 02/14 'See-and-Avoid for Glider Pilots'.

Date	5-Apr-2017	Region	SAGA	SOAR Report Nbr	S-0974
Level 1	Operational	Level 2	Runway Events	Level 3	Runway incursion
A/C Model 1	LS 4-a TOP	A/C Model 2	Piper PA-25-235/A1		
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	26

As the glider towing combination became airborne a dark coloured vehicle approached to enter the runway. The vehicle driver suddenly noticed the tow plane and glider and immediately stopped just prior to entering the runway proper. The combination flew passed the vehicle with a vertical separation of about 25 feet. Investigation identified the vehicle driver had looked but not seen the towing combination until the runway was about to be entered. The phenomenon of “We look but we do not see” is known as "inattentional blindness". It refers to the fact that we often think we see everything we' re looking at but this is far from true. While people often relate this (cognitive) tunnel vision and auditory exclusion to high-stress events, in reality we are experiencing these phenomena all the time - albeit to a greater or lesser degree. The member concerned published an article in the club magazine stressing the need to be vigilant when crossing all runways on the taxiways, both in aircraft and motor vehicles. The Club Operations/Training panel is also working with the aerodrome manager to extend the taxiways back to the runway thresholds to minimise crossing conflicts.

Date	6-Apr-2017	Region	GQ	SOAR Report Nbr	S-0965
Level 1	Operational	Level 2	Terrain Collisions	Level 3	Collision with terrain
A/C Model 1	KR-03A Puchatek	A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	64

The sortie was a currency check being conducted by an Instructor. The pilot under check had completed a normal landing when, just after touchdown and while the aircraft had a lot of momentum, the crew heard a loud bang from the main undercarriage and a felt a shock indicating the glider had hit something on the ground. Subsequent investigation of the runway revealed the glider’s main wheel had impacted an ant mound. Several other ant mounds, consequent of recent rains, were found in the runway and all were levelled. Inspection of the main undercarriage revealed one leg to be twisted laterally about 10 degrees and the wheel was displaced vertically sideways about 10 degrees. The aircraft has been sent away for repair.

Date	7-Apr-2017	Region	GQ	SOAR Report Nbr	S-0967
Level 1	Operational	Level 2	Aircraft Control	Level 3	Hard landing

A/C Model 1		ASK-21Mi		A/C Model 2		N/A	
Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	54

The pilot was a highly experienced power pilot with airline experience who had converted to gliders after 14 training flights. This incident occurred on the pilot's first solo glider flight. The final approach commenced high into a pilot-estimated 10 knot headwind, resulting in a steep approach with 1/2 to 3/4 airbrake. On short final the pilot recognised an increased sink rate and corrected by use of the elevator whilst reducing the brake setting to about 1/2. As the pilot began a slightly high flare a high sink rate was observed and the nose was further raised in an attempt to arrest the sink rate. To avoid a tail strike the pilot then pitched forward on the control column and the aircraft landed heavily on the main wheel and the aircraft then oscillated between the back wheel and front wheel before coming to rest with the steerable nose wheel assembly substantially damaged. The pilot will undergo some further training before flying solo. Causal factors include low experience, possibly wind gradient, incorrect technique for dealing with the high rate of sink on approach, and over controlling the glider in pitch during flare and hold off prior to ground impact. In addition, in this type of aircraft the nose and tail wheels have a small clearance between the ground, which enhances the tendency for the aircraft to oscillate around the main wheel if the recovery from a heavy landing is misjudged. To avoid this, pilots should always aim to touch down with minimum energy, in a two-point attitude whereby the tail wheel and main wheel touch simultaneously (or slightly tail wheel first). Before authorising any first solo flight, an instructor must be confident that the student has fully completed all the required pre-solo requirements to a consistently satisfactory standard, including consistently safe, well judged circuits and landings. Whilst some pilots with extensive experience in other flying disciplines may quickly master the basic flying skills of gliding, it is still necessary to ensure that they are taught and fully understand the glider-specific judgement required, particularly in the circuit and landing phases. In simple terms, they need to be taught to think like a glider pilot, which may in some cases require the discarding of some previous learning. In consideration of Duty of Care and legal liability, it is particularly important that not only must all sequences be known to have been properly covered, but they must be properly recorded as such.

Date	7-Apr-2017	Region	GQ	SOAR Report Nbr	S-0968
Level 1	Operational	Level 2	Aircraft Control	Level 3	Hard landing
A/C Model 1	ASK-21		A/C Model 2		

Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	60
During the final approach the student, who is close to solo standard, flared high. The Instructor, who is relatively new to the role, was late to take control and the aircraft landed heavily. The student had displayed good flying skills and the instructor was quite relaxed. As a consequence, the instructor was not prepared when the student mishandled the flare. This is not an uncommon occurrence and even experienced instructors can be lulled into a false sense of security. Notwithstanding the experience level of the pilot under check, Instructors must always guard themselves against unexpected reactions during the critical stages of flight by adopting a defensive posture; i.e. having their hands and feet ready to take control.							

Date	8-Apr-2017	Region	NSWGA	SOAR Report Nbr	S-0964
Level 1	Operational	Level 2	Runway Events	Level 3	Runway incursion
A/C Model 1				A/C Model 2	Piper PA25-235

Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	62
On short final the tow pilot had to execute a go-around due to the likelihood of a runway incursion by a retrieve vehicle. At this private airstrip runways 33, 30 and 27 form an arrowhead in the south-east corner of the airfield. On this day, runway 33 was the operational runway given wind strength and direction (NNW at 5 – 10kts). The 'pie-cart' and glider park area were on the eastern side of 33, sited approximately 80m in from the threshold. The tow plane had just launched the Club's two-seater on a training flight that involved a pre-planned simulated rope break at about 900ft AGL. Following release to tow pilot commenced a wide circuit to allow time for the two-seater to land. The pilots in the two-seater radioed their intention to conduct a crosswind landing on runway 27. Shortly afterwards the pilot of a single-seat glider joined circuit and radioed their intention to land on runway 30, which was more into wind. The driver of the retrieve vehicle, who was heading towards the two-seater on runway 27, stopped on runway 30 to let the single-seat glider land. The tow plane, which was landing on the operational runway (RWY 30) initiated a go-around due to the vehicle incursion. Investigation revealed the driver of the retrieve vehicle was unfamiliar with the rules for ground operations at this airfield, which required retrieve vehicles to be driven outside the runway makers and not on the runway. The vehicle driver was counselled.							

Date	12-Apr-2017	Region	NSWGA	SOAR Report Nbr	S-0969
Level 1	Operational	Level 2	Airframe	Level 3	Fuselage/Wings/Empennage
A/C Model 1		Standard Cirrus		A/C Model 2	

Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	59
The pilot rigged the Standard Cirrus that morning and experienced some difficulty attaching the tailplane. Once the aircraft was rigged it was taken to the flight line and the pilot completed the pre-boarding checks. The pilot then entered the cockpit and prepared for flight. While checking the controls for full and free movement the pilot noticed the elevator felt strange and made a noise. Nearby members informed the pilot that the tailplane was incorrectly rigged. The pilot left the cockpit and correctly fitted the tailplane. The pilot had only recently acquired the aircraft and had no previous experience with the type. This Standard Cirrus is an early model and the attachment of the tailplane can be quite tricky and many pilots struggle to properly fit it. The elevator is mounted by hooking the pushrod between two bearings, and then by dropping the trailing edge of the elevator to locate a "T" fitting at the pivot point into a locking bolt. Much of this is done by feel, although there is a small clear view window directly above the pushrod to visually check the correct location of the pushrod between the bearings. Unfortunately, it is possible to locate and lock the "T" fitting without the pushrod being properly located in the bearings, and in this case the clear view window wasn't very clear and will be fixed. To ensure the elevator is correctly fitted, pilots should always perform the following checks to ensure proper assembly:							

- Use the inspection hole (window) in the elevator to verify that the hook properly mates with the bearings.
- Swing the Elevator through its full range of motion. It should move smoothly, without rattling or the sound of the hook rubbing inside the faring.
- Move the control stick fore and aft, from stop to stop. Do this slowly and rapidly while watching the elevator. The elevator should follow every movement of the control stick smoothly and exactly. It should be evident that the control linkage is both pushing and pulling the elevator.
- Notice the angle of the Elevator with the control stick fully aft. The fairing should be fully concealed within the vertical fin. If the hook is not properly mated with the ball bearings the leading edge of the Elevator will not dip far enough.
- Perform a positive control check! This will confirm that the hook is both pushing and pulling the nose of the Elevator.

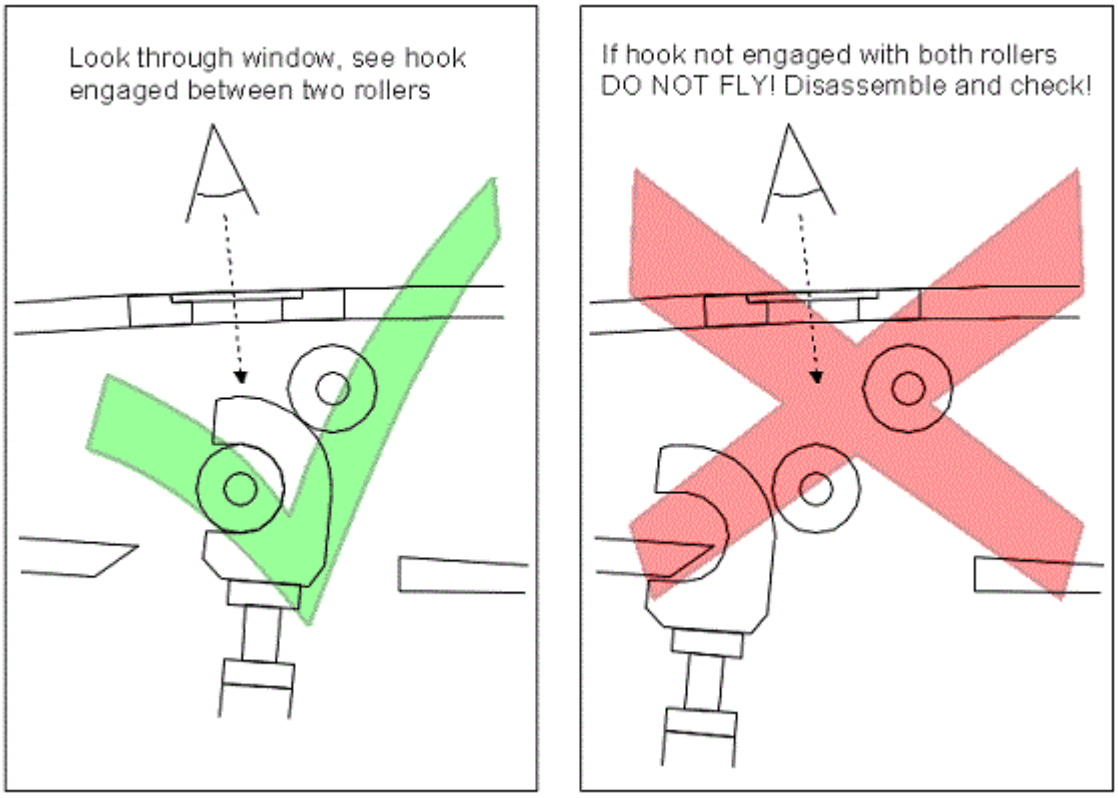


Image and above assembly notes adapted from http://www.standardcirrus.org/Elevator.php

Date	12-Apr-2017	Region	SAGA	SOAR Report Nbr	S-0972		
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Near collision		
A/C Model 1	HK 36 TTC	A/C Model 2	Diamond DA 40				
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	51

The command pilot was conducting an Air Experience Flight with a person who holds both GA and RAAus pilot qualifications. While the motor glider was tracking from the training area back to the inbound approach point of this controlled airport, the FLARM/Transponder instrument display showed another aircraft following. As the motor glider approached the inbound approach point, the command pilot sighted the other aircraft behind and to the right. As the motor glider arrived over the inbound approach point the command pilot noticed the other aircraft getting closer. Just after the command pilot made an inbound call to the

control tower, the other aircraft flew under the motor glider by about 500ft and then also made an inbound call to the control tower. The command pilot called the other aircraft on the radio but did not receive a response. When nearing the airport the command pilot heard the other aircraft respond to Air Traffic Control instructions and gave another radio call, asking the pilot of the other aircraft if they had seen the motor glider. The other pilot confirmed they had, which is why they descended below the motor glider. The operator of the other aircraft made a report to the ATSB, indicating their pilot was unaware of the motor glider until the motor glider pilot made the inbound call.

Date	15-Apr-2017	Region	GQ	SOAR Report Nbr	S-0970		
Level 1	Operational	Level 2	Terrain Collisions	Level 3	Controlled flight into terrain		
A/C Model 1	SZD-55-1	A/C Model 2					
Injury	Minor	Damage	Write-off	Phase	Landing	PIC Age	54

FACTUAL INFORMATION

At about 1539 Eastern Standard Time on 15 April 2017, while conducting a low-level and high-speed circuit onto runway 12 at McCaffrey's Field Qld, the pilot flew into the ground during the final approach. The aircraft impacted forcefully on its nose and came to rest about 100 metres from the point of impact. The aircraft suffered substantial damage, with the vertical and horizontal stabilisers separating from the fuselage.

Figure 1: Damaged aircraft.

Pilot Information

At the time of the accident the command pilot held a GFA Glider Pilot Certificate endorsed for Air Experience Instructing and had accumulated 2,326 Hours over 1,561 Launches. While an experienced pilot, he only had 9 fights for 25 hours on type.

Aircraft information

The aircraft was maintained by a GFA approved maintenance organisation. The Maintenance Release (MR) was issued on 23 July 2016 and recorded total flight time as 1062.23 hours for 410 flights. The aircraft was due for its next inspection on 22 July 2017. The MR records the aircraft had flown 55 hours for 22 flights since 24 July 2016 up until the date of the accident flight. There were no outstanding maintenance items recorded in the MR prior to the accident.

Meteorology

The weather at the time of the accident was good visual meteorological conditions (VMC).

Flight data recorder

No flight data was available.

Medical information

The command pilot held a valid GFA Medical Practitioner's Certificate of Fitness. The medical standards applicable for the issuing of this Certificate are the Austroads standards for the issue of a driver's licence medical certificate for a private motor vehicle.

Airfield information

McCaffrey Field is uncertified Aeroplane Landing Area (ALA) operated by the Darling Downs Soaring Club and situated approximately 4.5 NM WNW of Jondaryan Qld. It has a single grass runway (12/30) of 1200 metres length. The airfield is 1,215 ft above mean sea level. The Common Traffic Advisory Frequency is 126.7 MHz. The terrain around the airfield is flat with few trees, and there are no obstacles, hills or mountains of any influence in the vicinity.

ANALYSIS

Flight

The pilot was returning from a cross-country task and was established on final glide to the home airfield at 15Nm. The glider was established about 500ft above the calculated glide path based on a 3-knot ring setting, and the pilot was flying at a speed of 70 to 75 knots. At 10 miles the pilot changed to the CTAF and monitored communications between another glider and the ground discussing wind strength and direction, and the number of the operational runway. Just prior to entering the circuit the pilot heard a base leg joining call from the other glider pilot and then visually acquired it. The other glider was established on a long, wide base. Due to the high circuit speed of the SZD 55 (about 90 to 100 knots), the pilot made a radio call to the other glider pilot advising he would be turning base early and landing first. The SZD 55 pilot then completed a high-speed turn onto a final approach at such a low height as to be concerned about the port wingtip touching the ground. Upon levelling out the pilot realised he had not lowered the undercarriage and immediately set about lowering the landing gear. The pilot changed hands on the control stick to use his right hand to manipulate the undercarriage lever and, in so doing, caused the glider to pitch forward and impact the ground nose first at high speed.

Figure 2: Initial impact site with skins from the nose of the glider embedded.

Figure 4: Damage to the nose of the glider.

Pilot

The pilot was medically fit and qualified to undertake the flight. He held a Glider Pilot Certificate and was endorsed for low level finishes in August 2006. Fatigue and stress were evaluated as potential factors, but analysis was inconclusive. In the accident the pilot suffered a minor cut and bruise to the right eye that was attributed to the flight computer being flung from its mount and was transported by ambulance to the local Base Hospital for observation.

Aircraft

The aircraft struck the ground at high speed in a steep nose down attitude. The nose first impacted with the ground well forward of the instrument panel, leaving part of the lower fuselage skin embedded in the grass runway surface. The bottom of the fuselage was crushed but the cockpit structure of nylon woven into the carbon fibre weave prevented the fuselage from shattering on impact and contributed to the survivability of the pilot. The tail boom, fin and empennage broke away at impact and was located about 100 metres behind the final resting place of the fuselage. The root end forward of the starboard wing spar suffered severe cracking. There was no evidence of any pre-impact failure or system malfunction.

Findings

- The pilot confirmed they had not completed the pre-landing checklist, probably due to the distraction of dealing with the other glider in the circuit.
- Due to cockpit ergonomics, where the undercarriage control lever is situated on the starboards side of the cockpit, the pilot had to change hands on the control stick to lower the undercarriage. It is likely the pilot, flying with his non-preferred left hand, inadvertently pitched forward on the control column as he was pushing forward with his right hand to lower the undercarriage.

CONCLUSIONS

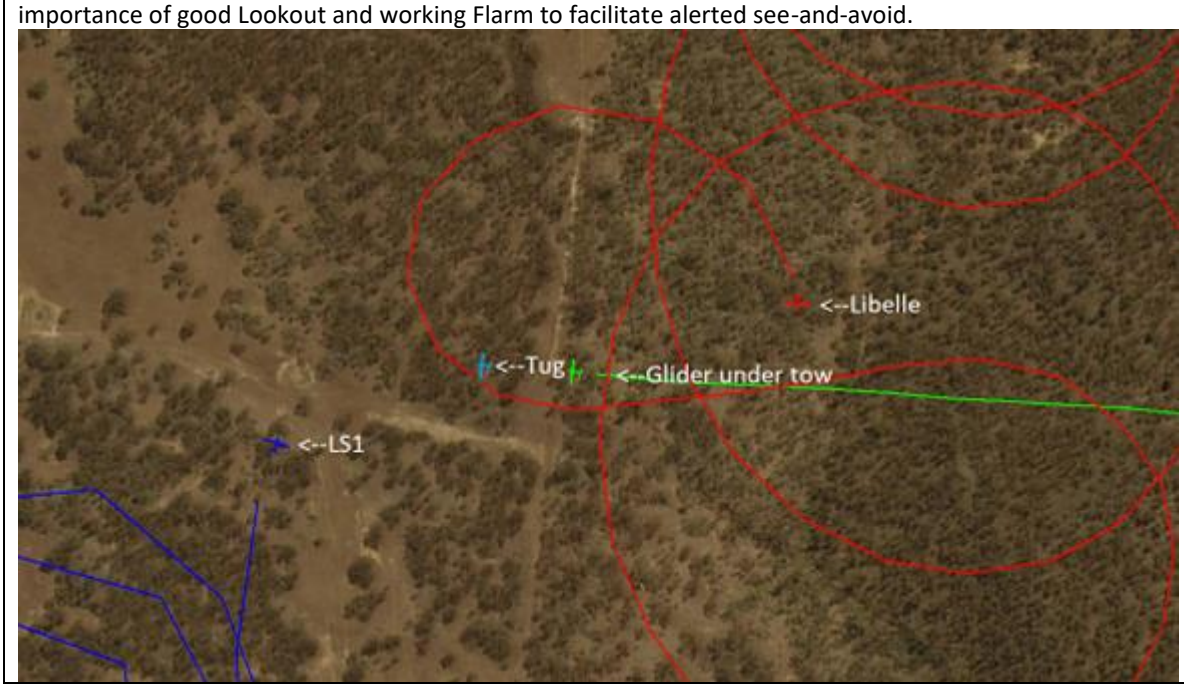
1. The command pilot was appropriately qualified and medically fit for the flight.
2. The aircraft had a valid Maintenance Release and had been maintained in accordance with relevant requirements.
3. The pilot did not configure the aircraft for landing and omitted to complete the pre-landing configuration checklist.
4. The aircraft struck the ground during the final approach due to misapplication of the controls by the pilot.
5. The aircraft was capable of normal operation up until the time of impact with terrain.

SAFETY ADVICE

Circuit and landing are high workload environments and pilots are encouraged to reduce their workload by configuring the aircraft for landing at an early stage. GFA training is to lower the undercarriage once the decision to land has been made and the undercarriage should be down before the circuit is joined. When the aircraft is configured early, the risk off a mishap from the omission of the pre-landing checklist, for whatever reason, will be reduced. Refer also to OSB 01/14 'Circuit and Landing Advice'. This accident also highlights the risk of injury to the pilot from poorly secured navigation devices in the cockpit. It is recommended that the security of installations of flight computers and other similar devices be assessed and approved by an Annual Inspector. The advice in GFA's 'Guidance on Mounting Cameras on Sailplanes and Powered Sailplanes' may inform appropriate actions.

Date	17-Apr-2017	Region	NSWGA		SOAR Report Nbr		S-0971		
Level 1	Airspace	Level 2	Aircraft Separation		Level 3	Near collision			
A/C Model 1	LS 1-f			A/C Model 2	Piper PA25-235				
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	76		
Near miss between a towing combination and an LS1 glider. The LS1 was tracking towards another glider, a standard Libelle, that was thermalling about 2 kms from the airfield. The LS1 pilot's focus was on the thermalling Libelle when they noticed the towing combination to starboard, which was climbing past very close. The towing combination did not appear on Flarm. The tow pilot had also sighted the thermalling Libelle and was towing towards it in order to drop the glider under tow in the thermal. The tow pilot									

reported conditions being hazy and stated: *"I simply don't know why I did not see (the LS1) on collision course but when on a collision course the angle does not change so (the LS1) may have remained behind the canopy frame, or under (the tow plane's) wing… or I could have been looking in the wrong direction at the instant."* The pilot of the LS1 stated they were looking up at the Libelle and did not se the towing combination until it was quite close. The LS1 pilot said: *"My lookout was clearly inadequate."* Later investigation determined that there were FLARM malfunction issues but the incident resolves into inadequate lookout by both the pilot of the LS1 and the pilot of tow plane. The LS1 pilot did not see the towing combination soon enough and the tow pilot did not see the LS1 at all. This incident highlights the importance of good Lookout and working Flarm to facilitate alerted see-and-avoid.



Date	17-Apr-2017	Region	NSWGA	SOAR Report Nbr	S-0973
Level 1	Operational	Level 2	Aircraft Control	Level 3	Wheels up landing
A/C Model 1	Hornet	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	75

This experienced pilot advised that he failed to retract the undercarriage during his post-release check, and then retracted it during the pre-landing check. A visual inspection to confirm the undercarriage was in the down position was not made, and the aircraft was landed with the wheel retracted. The pilot stated that his most recent flying had been in gliders with a fixed undercarriage, and believes he called "wheel fixed" when doing his post-release check and left the undercarriage down. He did not recall checking the undercarriage lever to the placards during the pre-landing check. OSB 01/14 'Circuit & Landing Advice' confirms that the pre-landing checklist is a 'check' and not an 'action' list. The undercarriage should be lowered as soon as the decision to break off the flight has been made and preferably before entering the circuit. The pre-landing check should be used to verify the undercarriage lever is matched to the lowered position on the placard.

Date	21-Apr-2017	Region	NSWGA	SOAR Report Nbr	S-1004
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Aircraft Separation Issues
A/C Model 1	DG-1000S	A/C Model 2	BRM Aero Bristell		
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	68

The glider was aerotowed from the grass glider strip situated close and parallel to the left of the main runway on a training flight. Some 16 seconds earlier, a powered aircraft had reported on a 1½-mile final for a touch and go on the main runway, and 23 seconds after the combination commenced take off another glider reported downwind for the glider strip. The gliding instructor was unaware of the presence of the powered aircraft or, apparently, the other glider. About one minute after take-off, at 300 feet AGL, a simulated cable break was executed, with the glider turning right into a light crosswind and continuing onto a reciprocal heading in order to line up and land back on the grass take off strip. In so doing, the glider infringed the extended centreline of the main runway and the powered aircraft, now already on the ground, applied heavy braking and aborted its touch and go. The glider then reported on short final before landing back on the glider strip and the other glider subsequently landed on a safe area to the left of the glider strip. Pilots must always be situationally aware and maintain "alerted see and avoid". That requires a thorough lookout aided by efficient monitoring and use of the radio. Before any take off, pilots need to establish that the airspace is clear. Even more so when conducting low-level emergency exercises, pilots must positively ensure that there is no conflicting traffic and remain alert and aware throughout the exercise. Causal factors include an inadequate radio listening watch that led to a lack of situational awareness that was possibly exacerbated by such Human Factors as:

- 'task fixation' to the exclusion of recognising the developing threat from the presence of the other two aircraft, or
- 'motion induced blindness' from fixating ahead and missing the peripherals.

Date	22-Apr-2017	Region	SAGA		SOAR Report Nbr		S-0977		
Level 1	Operational	Level 2	Flight Preparation/Navigation		Level 3		Other Flight Prep/Nav Issues		
A/C Model 1		ASK-21Mi			A/C Model 2		N/A		
Injury	Nil	Damage	Nil	Phase	In-Flight		PIC Age		
The student was participating in an AAFC flight training activity with an expired GFA membership. When this was discovered the student was withdrawn from the activity and counselled. The student subsequently renewed their membership, and the organisers have since amended their procedures to identify non-compliance.									

Date	23-Apr-2017	Region	NSWGA		SOAR Report Nbr		S-0975		
Level 1	Airspace	Level 2	Aircraft Separation		Level 3		Near collision		
A/C Model 1		Astir CS			A/C Model 2		Helicopter		
Injury	Nil	Damage	Nil	Phase	In-Flight		PIC Age		
The Glider was launched by winch to a height of 1,200ft AGL but no lift was found, so the pilot joined downwind for a left-hand circuit. At a height of about 900 ft AGL the pilot made a downwind call on the CTAF. Approximately halfway on the downwind leg at a height of approximately 750 ft, the glider pilot observed a white helicopter 400 metres ahead on a reciprocal heading, displaced about 200 ft vertically and 100 metres laterally to the right. The glider pilot rocked the glider's wings and made a call on the CTAF but did not get a response from the helicopter pilot. Earlier in the day the same or similar helicopter was observed transiting close to the airstrip on a Northerly heading below thermalling gliders without having been heard to make any calls on the CTAF. This airfield is a hot spot for low-level transiting aircraft and the CFI recently arranged for the airfield to be depicted on the aeronautical charts with appropriate symbology and a CTAF annotated. Despite this, some transiting pilots continue to pose a hazard to the gliding operation by not monitoring the appropriate frequency when in the vicinity of this airfield. The ATSB has been informed.										

Date	29-Apr-2017	Region	GQ	SOAR Report Nbr	S-0978
Level 1	Operational	Level 2	Runway Events	Level 3	Runway excursion
A/C Model 1	Twin Astir	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	

During the initial ground roll on an aerotow launch the glider's left wing dropped to the ground and the glider started to veer to the left. The pilot corrected but in so doing the prevailing crosswind caused the right wing to contact the ground and the glider veered right toward the airfield boundary fence. The pilot picked-up the right wing, released from tow and intentionally dropped the left wing to initiate a ground loop away from the fence. It was reported that the person running the wing let go after only one step. This incident highlights the importance of the wing runner maintaining a wings level position as far into the launch as possible to allow the pilot to gain control authority, and for pilots to release from tow as soon as control has been lost.

Date	30-Apr-2017	Region	VSA	SOAR Report Nbr	S-0980
Level 1	Operational	Level 2	Miscellaneous	Level 3	Other Miscellaneous
A/C Model 1	ASK-21Mi	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	59

It was reported that a glider was observed to do loop below 1000ft AGL on the downwind leg of a Military Aerodrome. Investigation revealed the reporter was mistaken. The glider was carrying a logging device and analysis of the flight trace revealed a loop was conducted at 11:58, about 1NM to the West of the runway, some 5 minutes prior to the glider joining the downwind leg of the circuit. The glider did not descend below 1200ft AGL during the manoeuvre. This information was provided to the reporter who, while somewhat perplexed that their recollection of events differs, acknowledged they must have been mistaken. While it is not good practise to conduct aerobatics in a circuit area, and that aerobatics are prohibited within 2 NM and below 2,000 feet above the level of a certified or registered aerodrome, Military aerodromes and uncertified aerodromes are subject to local requirements. In this case the gliding club had prohibited aerobatics, including spins, at this site and the command pilot has been counselled.

Date	7-May-2017	Region	NSWGA	SOAR Report Nbr	S-1040
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Aircraft Separation Issues
A/C Model 1	Twin Astir	A/C Model 2	AMD - ZODIAC CH640		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	59

A glider and tow plane combination departed the airfield for the Southern Training Area. Air Traffic Control (ATC) requested that the combination remain connected due to an ILS practice flight from another aerodrome. The tow pilot read back the instruction, but the glider pilot did not hear the request and released from tow shortly thereafter. ATC was informed of the glider's separation but continued to allow the aircraft conducting the ILS to continue its approach even though they did not have sight of the glider. The tower instructed the glider to operate south of the local parachute drop zone to provide separation from the other aircraft. Procedure at the aerodrome has been changed and ATC will also confirm the glider pilot has received and understood the instruction.

Date	13-May-2017	Region	NSWGA	SOAR Report Nbr	S-0984
Level 1	Operational	Level 2	Miscellaneous	Level 3	Winch Performance Issue
A/C Model 1	KR-03A Puchatek	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	42

The sortie was a training flight for an experienced glider pilot who had just joined the club and was undertaking a conversion to winch launching. The launch was to include a simulated power loss at the winch to assess the student's reactions. The simulation was to be done at a height sufficient for the pilot under training to complete a modified circuit, and the instructor personally briefed the winch driver for the exercise. A loss of power was identified in the glider at a height of about 850 ft AGL, and the pilot under training reacted promptly and correctly. A modified circuit was flown and the glider landed without incident. At the winch end the driver had reduced the power so quickly that the engine stalled. A number of attempts by the winch driver to restart the engine proved futile and the winch rope fell onto a neighbouring property and across high voltage power lines (11,000v). One of the ground crew then took hold of the rope and removed it from the powerlines, despite the power lines remaining active. This action by the ground crewman was contrary to Club Instructions, which is to stop traffic and call the power company to remove the rope from the power lines due to the risk of electrocution (although the club uses polypropylene rope, it can still conduct electricity if it is moist or contaminated with conductive material). The power company subsequently confirmed there was no damage to infrastructure. The CFI has implemented further training for the winch drivers, and is considering only conducting practice launch failures with the winch displaced further away from infrastructure, and/or using the reciprocal runway. The procedure to be used by winch drivers when simulating launch failures is being reinforced at morning briefings. The CFI has arranged for the power company to provide a safety lecture to club members.

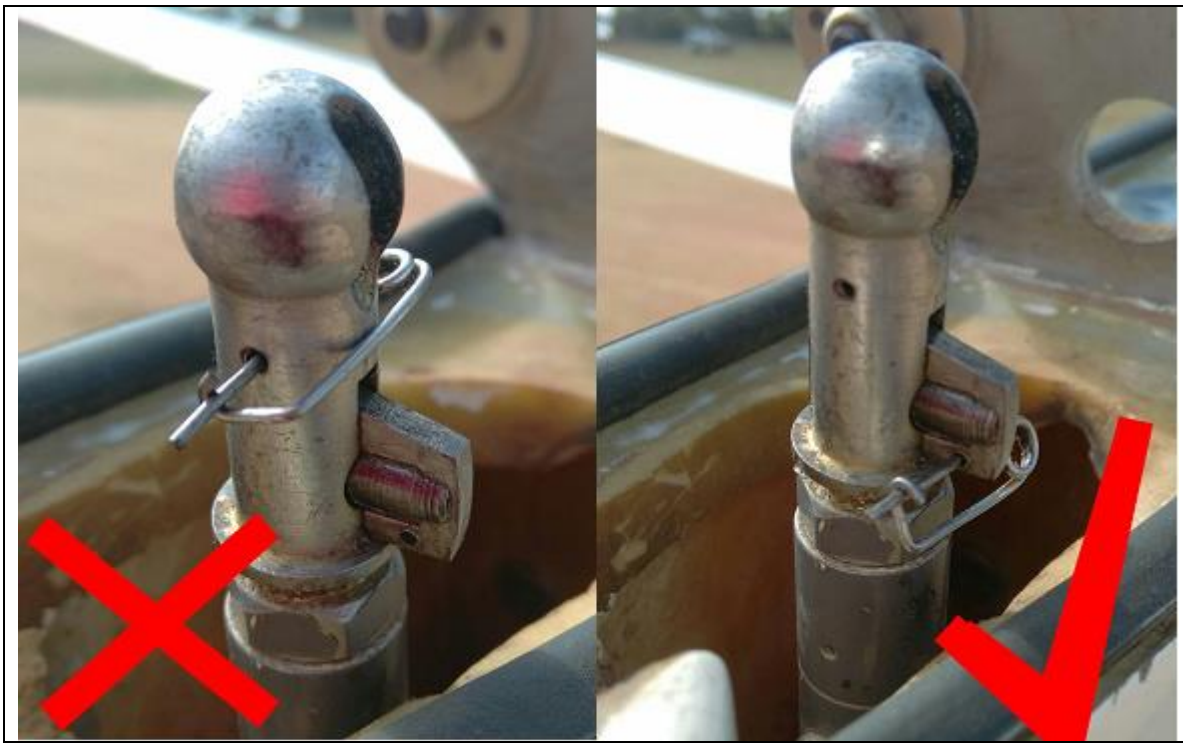
Date	13-May-2017	Region	NSWGA	SOAR Report Nbr		S-0985	
Level 1	Operational	Level 2	Terrain Collisions	Level 3		Collision with terrain	
A/C Model 1		TST-8 Alpin DM		A/C Model 2		Grob G 109	
Injury	Minor	Damage	Substantial	Phase	Ground Ops	PIC Age	70

The glider was recently purchased from a deceased estate and had been transported to the airfield for some minor maintenance by the local Airworthiness Maintenance Organisation. Inspection revealed additional work was required to the engine to bring it up to operational standard, including replacement carburettors and a fuel system upgrade. The pilot, who had been assisting with the maintenance, decided to start the engine and run it up for assessment. The glider had been parked nose-first into a hangar, which also housed a Grob 109. The pilot, working alone, pushed the glider backwards about 10 metres out of the hangar and placed two 4"x2" wooden chocks at the mainwheel. With the glider facing the hangar, the pilot sat in the front seat and proceeded to start the engine. After some initial difficulty, the engine started with a roar and at high revs. The glider jumped the chocks and moved towards the hangar. The pilot pulled on the handbrake to stop the glider but the cable had either disconnected or broken, and the glider moved into the hangar. One wing struck a hangar post, the other wing struck a vehicle in the hangar and the forward fuselage impacted the nose of a parked Grob 109 motor glider. After the collision the pilot had difficulty turning off the engine as the instrument panel had been bent backward obscuring the ignition key. The throttle was noted to be in the full open position, however it may have been altered after the event. The glider was substantially damaged and the Grob 109 suffered minor damage. The pilot suffered cuts and bruising to the face, and was transported to hospital.

After repair or replacement of an engine in an aircraft, it is necessary to check out engine performance on the ground prior to any flight test. During these tests, it is often required that the engines be run at or near full power and it is therefore necessary to physically restrain the aircraft. The most common way of restraining a sailplane is to use the wheel brake in conjunction with wheel chocks. However, this method should be used with caution during part or full power engine run-up tests because of the danger of the wheel brake failing, and the chocks may move or the aircraft wheels may ride-up and over them, especially if the chocks are not properly positioned. The ideal solution would be to also tether the aircraft to a fixed object. When ground running an engine of a glider that is having maintenance carried out on it, the person at the glider's controls must have sound knowledge of both the engine and aircraft systems to ensure the starting or running does not endanger any person or damage the aircraft. Before starting an aircraft engine: 1. Position the aircraft away from people and objects, and preferably pointing into the prevailing wind to ensure adequate airflow over the engine for cooling purposes. 2. Make sure that no property damage or personal injury will occur from the propeller blast or jet exhaust or the aircraft itself. 3. Check the throttle is set correctly. 4. Ensure the wheel brake is functioning and that the aircraft is secured against unwanted movement.

Date	13-May-2017	Region	SAGA	SOAR Report Nbr		S-0989	
Level 1	Technical	Level 2	Systems	Level 3		Flight controls	
A/C Model 1		Astir CS		A/C Model 2	N/A		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	

While de-rigging the aircraft for its annual inspection it was noticed that the safety pin used to secure the elevator l'Hotellier coupling was incorrectly located and ineffective (refer photographs below). The aircraft was last rigged and dual inspected in November 2016, and it had been flown for several months in this condition. The elevator coupling on the Astir series gliders can be visually inspected for security during the Daily Inspection by looking from behind and below the elevator with the rudder offset to the left. Over many years there have been a steady run of incidents arising from the disconnection of l'Hotellier couplings on gliders, many of which occurred due to incorrect assembly during rigging. GFA issued AD 177 to alert members to these problems (refer http://tinyurl.com/yc8ggeq3). This incident highlights the importance of conducting a thorough Dual Inspection before releasing the aircraft to service, and it also confirms the vital role a thorough Daily Inspection plays in our risk management system.



Date	17-May-2017	Region	SAGA	SOAR Report Nbr		S-1005	
Level 1	Technical	Level 2	Systems	Level 3		Electrical	
A/C Model 1		DG-1000S		A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	19

During a solo flight, the pilot reported that a FLARM Power Error and shutdown occurred. The pilot decided to return to the airfield and executed a normal circuit and landing. Investigation revealed the FLARM circuit breaker had tripped, the radio system was displaying 'Low Battery' and the transponder was not working. It was also noted that the cabin battery had been selected by the pilot but when the fin battery was selected there was no change to the symptoms. It was determined that the aircraft batteries had not been recharged from the previous day due as charging facilities were not available.

Date	20-May-2017	Region	GQ	SOAR Report Nbr		S-0987	
Level 1	Operational	Level 2	Aircraft Control	Level 3		Wheels up landing	
A/C Model 1		Discus bT		A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	81

The pilot lowered the undercarriage for landing but the wheel retracted on touchdown. The pilot was flying with an arm/shoulder injury and was unable to fully extend their arm in order to lock the undercarriage down. GFA Operational Regulation 3.2.2(c) states that a pilot shall not fly as pilot in command of a sailplane if he or she is temporarily unfit due to illness or injury. A person is deemed to be unfit where the medical deficiency may interfere with the safe operation of an aircraft. Pilots suffering from a physical injury should take steps to ensure any limitations of movement will not adversely impact the operation of the aircraft before flying in command.

Date	20-May-2017	Region	SAGA	SOAR Report Nbr	S-0990

Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Aircraft Separation Issues
A/C Model 1	DG-1000S	A/C Model 2	ICP Savannah		
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	55

The pilot of a powered aircraft conducted a low overflight of a glider awaiting a launch to land on the bitumen glider strip directly ahead rather than on the main gravel runway. The crew of the glider estimated separation to be about 40 feet. Aerodrome operating procedures require that powered aircraft pilots must use the gravel strip for landing when gliding operations are in progress. The pilot had developed a practice of landing on bitumen strips in preference to the gravel strips at the home airfield to reduce wear and tear on the aircraft. The pilot acknowledged that landing over the glider posed an unnecessary risk of collision, and has since reflected on their practice and re-familiarised themselves with the aerodrome operating procedures.

Date	21-May-2017	Region	NSWGA	SOAR Report Nbr	S-0988
Level 1	Operational	Level 2	Airframe	Level 3	Doors/Canopies
A/C Model 1	AS-K 13	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	57

The aircraft had just been returned to service after the fitting of a new canopy. The pilot reported having difficulty getting both of the canopy locking pins to engage and called a member of the ground crew for assistance. The crew person observed the canopy was sealed well externally and confirmed the rear lock was engaged and the lock handle in secured position. The passenger in the front seat advised that the locking pin was not engaged in the canopy frame, however this was misheard by both the command pilot and crew member. The pilot pushed-up on the canopy frame overhead to confirm the canopy was locked and the launch proceeded. At approximately 500 feet on the winch launch the canopy flew open with considerable energy and a loud bang. The command pilot immediately lowered the nose of the glider to get clear view of horizon and, together with the passenger, made two brief and concerted attempts to pull canopy closed. Unfortunately the force of the airflow prevented the canopy from being closed, so the command pilot released from the cable and assessed the options. As it was no longer possible to conduct a landing straight ahead, the command pilot commenced a left-hand turn for a modified circuit. During the turn the airflow forces on the canopy changed and the command pilot was able to secure the canopy with the assistance of the passenger and a safe landing ensued. The maintenance personnel inspected the canopy and advised it will need some minor adjustment as it settles in. In the meantime, canopy locking will be checked and confirmed by both pilots prior to every launch, or by a third party externally checking both locks if one of the occupants is not a qualified pilot. The minor defects section of the Maintenance Release has been endorsed to this effect.

Date	24-May-2017	Region	GQ	SOAR Report Nbr	S-1262
Level 1	Technical	Level 2	Systems	Level 3	Flight controls
A/C Model 1	Standard Libelle 201 B	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	77

Following a successful winch launch, the pilot found they were unable to increase the airspeed above 50 knots and decided to join circuit to land. In order to maintain airspeed during the final approach, the pilot only used a small amount of airbrake for glide slope control. The pilot completed a successful landing, albeit further down the runway. The pilot had previous experience on type but this was only their third flight in this particular aircraft. Subsequent investigation revealed that the pedal adjustment cable, in the position the pilot would have had it, could easily foul the control column and restrict its forward movement (refer photograph below). The aircraft owner, who is somewhat taller than the pilot flying, had not previously experienced this issue. The owner stated that they adjust the rudder pedals so they are further forward,

which reduces the length of the adjustment cable protruding from the seat pan so that it cannot interfere with the control column. In addition, the owner tucks the handle under the seat cushion after it is adjusted. Pilots flying aircraft with similar rudder pedal cables should ensure the cable and handle are secured, either under the cushion or the pilot's leg to prevent it interfering with the controls. Although the pre take-off check of controls for full and free movement should have identified this restriction, the pilot's lack of familiarity with this aircraft may have led to the restriction going unnoticed.

Date	28-May-2017	Region		SAGA		SOAR Report Nbr		S-0992	
Level 1	Operational		Level 2	Aircraft Control		Level 3		Pilot Induced Oscillations	
A/C Model 1		SZD-51-1 Junior			A/C Model 2				
Injury	Nil	Damage	Minor	Phase	Landing		PIC Age	62	

The pilot had rounded out during the final phase of landing and was beginning the hold-off phase when the glider ballooned about 1 meter. The pilot responded by pushing the stick forward and closed the airbrakes, which resulted in an increase in speed and the glider touched down and rebounded into the air. The pilot levelled the aircraft but opened the airbrakes causing the aircraft to again touch down. Subsequent

mishandling of the controls led to a series of bounces, or Pilot-induced oscillations, before the aircraft came to rest. The top of the pilot's head hit the canopy causing it to crack. The aircraft suffered no other damage. Pilot-induced oscillations occur when the pilot of an aircraft inadvertently commands an often increasing series of corrections in opposite directions, each an attempt to cover the aircraft's reaction to the previous input with an overcorrection in the opposite direction. The correct action when becoming airborne after a bounced landing is to select and hold a steady level attitude and retract the airbrakes. A second attempt at the landing can then be made but be careful when opening the airbrakes.

Date	2-Jun-2017	Region	GQ	SOAR Report Nbr		S-0995	
Level 1	Operational	Level 2	Airframe	Level 3		Other Airframe Issues	
A/C Model 1		ASK-21Mi		A/C Model 2	N/A		
Injury	Nil	Damage	Minor	Phase	In-Flight	PIC Age	65

The pilot flying was undertaking a currency check flight operating from rear cockpit. After a normal take-off and climb to 4000', the engine was shut down the propeller stop was activated. The pilot flying and the instructor, observing the propeller continuing to windmill, both attempted to engage propeller stop to no avail. The flight was abandoned and a successful landing was conducted with the propeller tower in the extended position and the propeller windmilling. Upon inspection, it was observed that the propeller stop had sheared off and scuff marks were evident on both propeller blades. The propeller stop assembly was bent backwards, and there was minor damage caused to the propeller tower shroud. The person who dispatched the aircraft for launch recalled hearing a noise as the aircraft entered the main runway but believed the noise had come from a nearby maintenance hangar. A subsequent check of the runway located the plastic sleeve from the propeller stop, revealing it was damaged during take-off. It is believed that the pilot flying had inadvertently knocked the prop stop handle when reducing the throttle to idle during taxying, which caused the the stop to extend and contact the rotating propeller.

Date	4-Jun-2017	Region	VSA	SOAR Report Nbr		S-0993	
Level 1	Operational	Level 2	Communications	Level 3		Other Communications Issues	
A/C Model 1		HK 36 R		A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	55

Upon returning to the airport in Class D airspace following a local flight, the pilot proceeded to fly the standard CTA entry procedure. The circuit was very busy and an unexpected and unfamiliar instruction was received from the Air Traffic Controller. The pilot read back the instruction incorrectly but the error was not noticed by the controller until the glider was observed descending in the wrong direction. Upon recognising the situation, the controller directed the pilot to climb and re-enter the and the light proceeded uneventfully under ATC instructions. Misunderstanding is not uncommon and the potential for misunderstanding increases when an ATC clearance contains more than two instructions. Pilots should always seek confirmation or clarification if they do not understand a procedure rather than proceed. Similarly, any readback by the pilot requires a hearback by the controller in order to close the communication loop. Most pilots perceive the absence of an acknowledgement or correction following a clearance readback as an implicit confirmation of the readback. The lack of acknowledgement by the controller usually is the result of frequency congestion, requiring the controller to issue clearances and instructions to several aircraft. Uncorrected erroneous readback can lead to breakdown in separation. The following points will assist achieve n effective pilot / controller communications:

- Understanding of pilots and controllers respective working environments and constraints;
- Disciplined use of standard phraseology;
- Strict adherence to the pilot / controller communication loop (i.e., confirmation / correction process);

- Alertness to request clarification or confirmation, when in doubt;
- Readiness to question an incorrect clearance or an inadequate instruction; and
- Preventing simultaneous transmissions.

Date	7-Jun-2017	Region	SAGA	SOAR Report Nbr		S-0997	
Level 1	Operational	Level 2	Communications	Level 3		Other Communications Issues	
A/C Model 1		Discus b		A/C Model 2		Piper PA-25-235	
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	64

The tow pilot lost sight of the glider in the mirror and, assuming the glider had released, commenced its descent while the glider was still attached. The glider pilot released before an upset developed. The tow pilot stated: *"When…we were approaching 3,000ft, I thought that I heard a brief transmission from (the glider pilot) to indicate that he was off tow. I checked the mirrors, saw nothing and commenced decent. I definitely felt the release moments after."* The Club's The tugmaster is having wider mirrors fitted to replace the current round ones.

Date	10-Jun-2017	Region	WAGA	SOAR Report Nbr		S-0996	
Level 1	Consequential Events	Level 2	Low Circuit	Level 3		Low Circuit	
A/C Model 1		DG-1000S		A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	67

This investigation involves a claim that a pilot, practicing a low-level finish manoeuvre at a Regional airfield, flew contrary to the Rules and Regulations. It was reported that, *"Following an evaluation flight the PIC joined a crosswind leg at a normal height but then, without any prior low-level finish warning calls, proceeded to descend at high speed to join the downwind leg at approx. 200ft AGL and then descended further to approx. 100ft AGL on the base leg before landing normally."* It was later alleged the pilot was showboating; i.e. acting in a manner to attract attention or admiration because the manoeuvre is very skilful. A key component of any investigation is to maintain objectivity, for otherwise it is merely just another person's opinion. Subjectivity is a viewpoint, or possibly a bias, regardless of the information it provides, and subjective opinions are ephemeral and influenced by any number of factors that can include a mix of facts and emotions. Consequently, the following is based on factual information, including interviews and written communications.

Scope of Investigation

This investigation considered:

- whether the pilot breached the rules and regulations and, if so, were they wilful violations:
- the intent of the rules around Low-Level Finishes; and
- whether the rules need to be amended to provide clarification.

Regulatory Requirements

- Civil Aviation Regulations 166A General requirements for aircraft on the manoeuvring area or in the vicinity of a non-controlled aerodrome.
- Civil Aviation Order (CAO) 95.4, paragraph 3(j)
- GFA Operational Regulation 6.5
- GFA Manual of Standard Procedures, Part 2, Section 10.8.3

Analysis of the Flight

The purpose of the flight was to undertake a performance evaluation following annual maintenance. The pilot in-command was experienced, with over 10,000 hours aeronautical experience on fixed-wing, including gliders, and rotary wing. The pilot holds an ATPL and was previously a Level 2 Gliding instructor and a former CFI. The other seat in the glider was occupied by an experienced glider pilot. The following information was taken from the flight log provided.

Note: *Times are UTC +8 hours. As the glider did not thermal during the flight, the logger did not calculate a wind component. Consequently, only ground speed was recorded. Wind speed was advised as 10 knots from 030 degrees.*

The glider was launched at 11:52 and released eight minutes later at 4,700 ft (QNH) about 3.5kms to the North-East of the operational runway. A few minutes after release and at about 4,100ft, the pilot in-command commenced a high-speed (near Vne) run to the South-West. The aircraft descended to about 2,700 ft, whereupon the pilot slowed down by climbing back to 3,200 ft. The aircraft then crossed the operational runway at about 3,100 ft and flew about 3kms to the South-West. Upon return to the airfield the pilot positioned to join for a right-hand circuit onto the duty runway 34. The pilot commenced a mid-field join a few hundred meters to the left of the runway intersection and crossed the operational runway at about 500ft AGL. The pilot then, while progressively increasing the glider's speed, turned onto a downwind leg at about 300ft AGL. The pilot continued the downwind leg at high speed to a low point of about 100ft AGL about 750 meters from the runway threshold, whereupon the pilot slowly climbed to about 150ft AGL for the turn onto final approach. Safe airspeed was maintained throughout the base and final legs. The glider touched down about 12:09. The flight track is below at Figure 1. Data points are at Table 1.

A review of the final few minutes of the flight follows (figures2, 3 and 4):

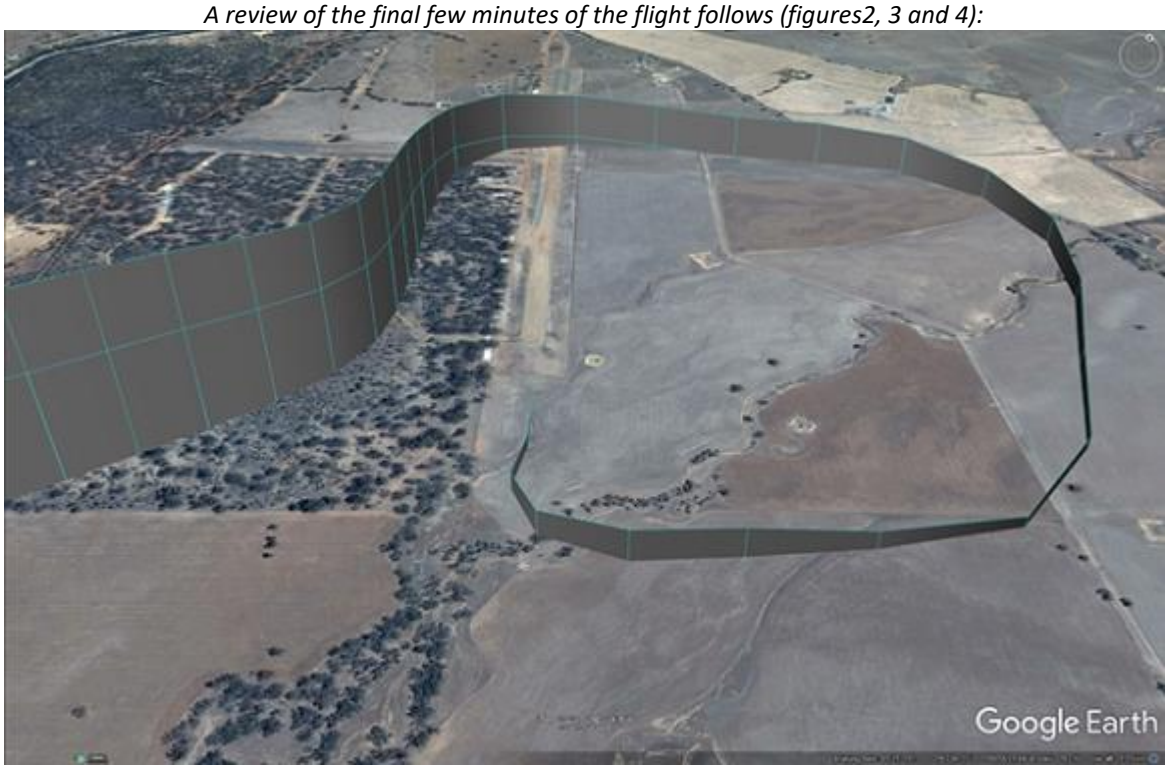


Figure 2 – Flight track (looking down from 3,000ft in direction of landing on Rwy 34

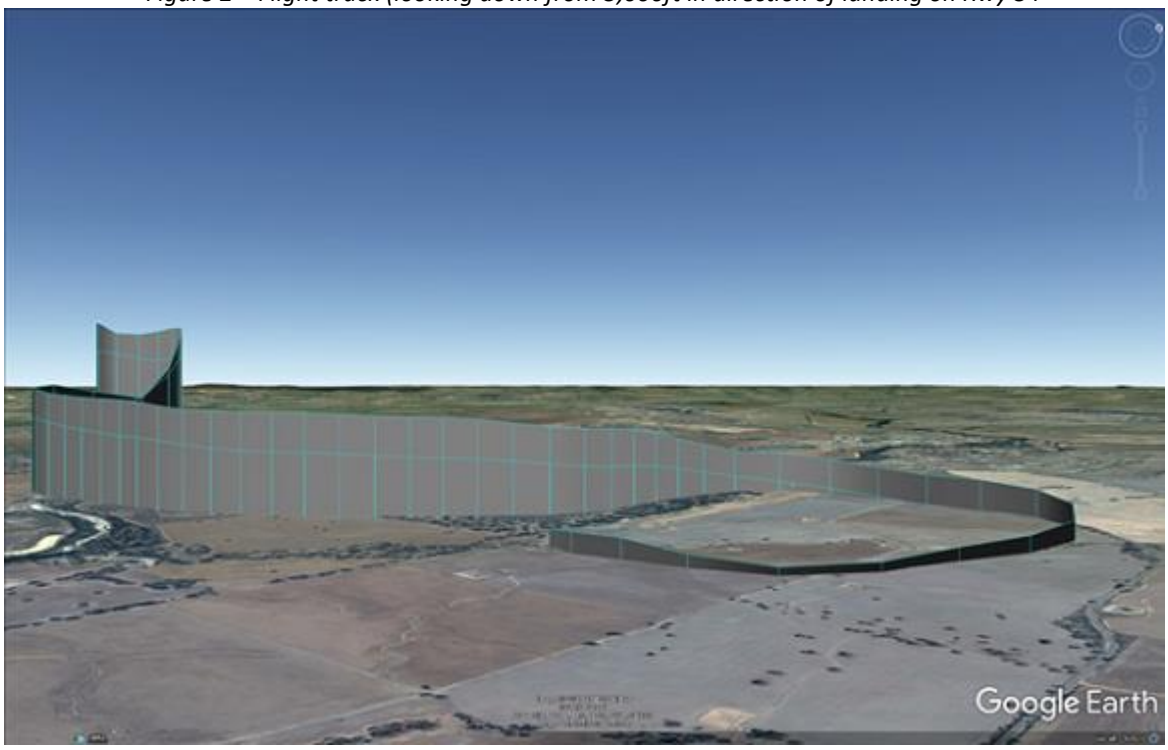


Figure 3 – Flight track (looking North-West from 2,000ft).

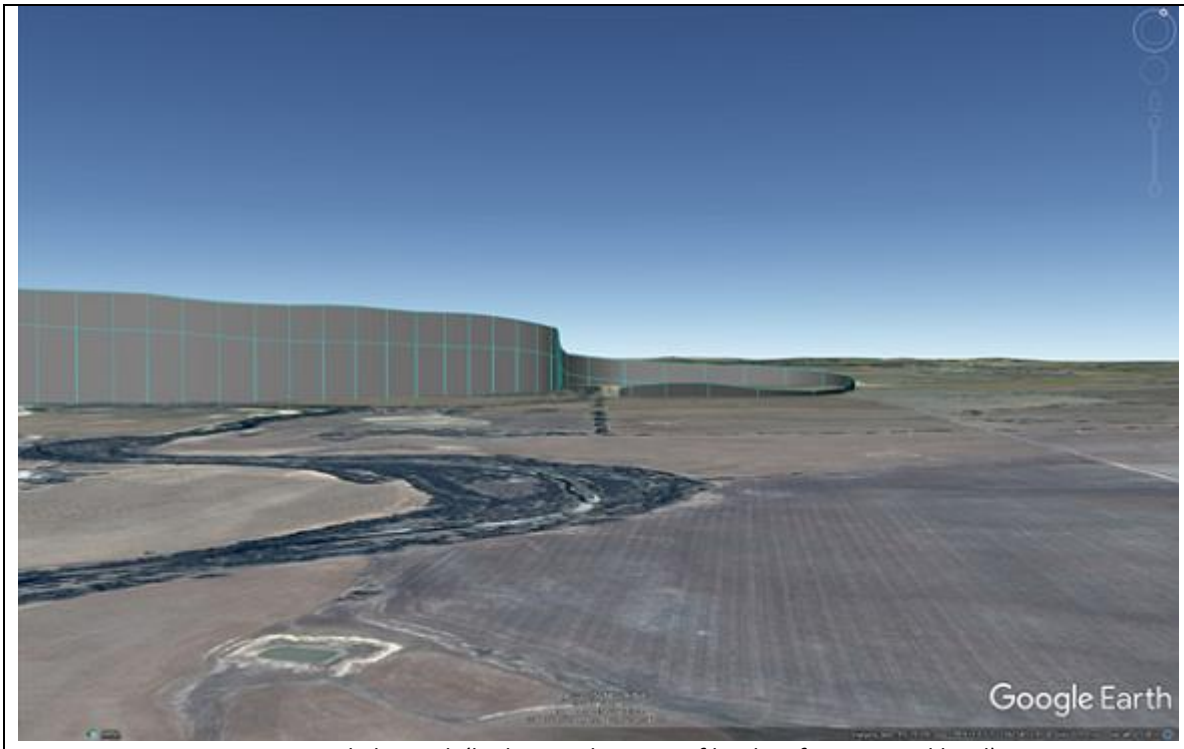


Figure 4 – Flight track (looking in direction of landing from ground level)

Photo of glider turning onto downwind.

Position	Time	AGL	GSp
LH into wind abeam end RWY 34	12:07:13	839	52
	12:07:17	814	50
	12:07:21	800	51
	12:07:25	770	55
Turning onto crosswind for RH downwind join	12:07:33	646	72
	12:07:37	492	84
	12:07:41	492	84
	12:07:45	438	91
	12:07:49	393	91
	12:07:53	351	90
	12:07:57	325	88
Turn onto downwind	12:08:01	303	94
	12:08:05	279	102
	12:08:09	245	108
	12:08:13	205	111
	12:08:17	168	110
	12:08:21	139	109
Turning onto base leg	12:08:25	117	103
During pullup on turn onto base leg	12:08:29	105	87
Base leg	12:08:33	128	72
	12:08:37	157	66
Turn onto final	12:08:41	169	55
	12:08:45	153	47
	12:08:49	119	47
	12:08:53	89	46
	12:08:57	59	45
Touchdown	12:09:01		
	12:09:05	20	36
	12:09:09		
End of roll	12:09:13	0	28

Table 1. Data points from logger. Note: Indicated Airspeed was not recorded.

Additional Information

The pilot reported: *"…I was to fly a high visibility LLF that provided lateral and height de-confliction with any possible 'unknown' traffic and allowed ideal general and targeted scan opportunities throughout. The continuous radio listening watch and thorough close in observation afforded by the five legs of a standard laterally spaced circuit made it obvious that I was the only aircraft airborne and that no one was about to launch from the landing airfield (Remaining Tug and glider were both side-lined at the launch point). There was simply no conflicting pilot to be 'surprised' by my LLF but the track and energy profile flown also allowed for other safe options should the unexpected occur."* The pilot advised in an interview that he made an 'all stations' broadcast of his intention to conduct a low-level finish. The reporter who observed the flight from the ground stated no call was made.

Analysis and Findings

1. After careful review of the flight parameters and the regulations, it is not evident that the pilot has breached any rules and regulations. The provisions of CAR 166A (as amended by CAO 95,4, Section 3(j)), to avoid a collision, were met. Furthermore, the glider's circuit did not conflict with the guidance detailed at paragraph 5.3.1 of Civil Aviation Advisory Publication (CAAP) 166-1(4.1) as the pilot has permission to descend below 500ft as per the CASA approved GFA Operational Regulation 6.5(b)(iii). However, the question of whether the pilot communicated his intentions in accordance with the rules in 10.8.3 in MOSP Part 2 Operations cannot be determined.

2. Track analysis shows that the high speed, low level finish phase of flight was conducted within the circuit area, not during the approach to the aerodrome from the SW. A safe speed was maintained during flight in the circuit area.

3. Assessment of whether the flight was conducted within the rules requires analysis of both the letter and the intent of those rules. Communications exchanged during the investigation highlighted some divergent interpretations of the rules and their intent.

Some witnesses expressed views that the low-level finish flown by the pilot was outside the intent of the rules:

(a) One witness stated: "The MOSP intention is clearly that a Low-Level finish should be planned and executed from a point outside the 5 km area not from well inside any 3 km finish circle and certainly not within 1 km of the airfield."

(b) Another witness stated: "The definition in MOSP states that the pilot must descend "with sufficient kinetic energy to enable the pilot to convert energy into height and recover adequate height to enable a safe circuit and landing to be performed". It seems clear from this that the intent is for the low-level portion of the flight to be completed before the circuit is commenced and for the circuit itself to be conducted at a normal height. A minimum circuit height is unfortunately not defined and so it is (apparently) open to interpretation. I certainly don't believe that the intention is to endorse the conversion of height to speed in order to do complete circuit as low & as fast as possible - which is exactly what I observed."

The above comments are the witnesses' interpretation of the rules. When interpreting the rules we should consider 'intent' in its widest sense to include such things as what the rule was intending to achieve and the mischief the rule was intended to remedy. Prior to 2006 "low-level finishes" could only be conducted at approved Competitions (State, National and International only) and required CASA approval. GFA was concerned about that process as it excluded any legitimate means of safely practicing or training for a procedure that clearly requires a high level of skill and judgement. It was also noted that the CASA approval only authorised the event at which the low-level finish procedure could take place but not the pilots, leaving control in the hands of the competition organisers, who may at times have little knowledge of the pilots that are performing them. After lobbying by GFA, CASA agreed to remove their approval requirement and hand over approval to GFA subject to GFA introducing acceptable pilot endorsement and low-level finish procedural requirements. The change was promulgated on 30 March 2006 via Civil Aviation Order 95.4 Amendment Order (No. 1) 2006. When this procedure was developed competition finish lines were usually set as some point on or near the aerodrome, and was usually an extended line from a runway or airfield boundary fence. It was only in more recent times that remote finishes were introduced, thereby displacing the finish point up to 3 kms from the aerodrome reference point. For example, WAGA Local Rules for Beverley 2011, para 15, define a finish circle 2km from the aerodrome reference point and a minimum finish altitude of 500ft. Original guidance in pilot's notes accompanying the original Operations Directive 01/06 stated: "It goes without saying that a safe landing is planned to follow the finish and pull-up. The circuit that follows the pull-up should ideally contain 3 legs, however, safety is the prime consideration. A circuit following a low-level high energy finish might be best likened to a modified circuit following a low-level winch launch cable break, but with a much higher pilot workload. As always, a pre-landing check is part of the circuit procedures. Pilots unable to safely perform such a circuit under these circumstances should never attempt (or be allowed to attempt) a low level high energy finish." The guidance closed with the comment that: "Low level glider finishes are spectacular and exhilarating events when conducted safely. However, they are skilled undertakings that require great care and planning." The intent of the rule was to train pilots

how to safely manage a low-level finish and allow pilots the opportunity to practice the manoeuvre to maintain proficiency. It is left to the pilot's discretion to manage the entry to the manoeuvre and the only requirement is that they do it safely and with prior permission where possible. The statements by witnesses (a) and (b) draw on the opening statement at paragraph 10.8 of MOSP Part 2 Operations: "A pilot holding a Low-Level Finish Endorsement may conduct low level finishes, which are defined as an approved circuit entry and landing technique where a glider descends below 500ft AGL within 5km of an airfield with sufficient kinetic energy to enable the pilot to convert "energy into height" and recover adequate height to enable a safe circuit and landing to be performed." The witnesses contend that the conversion of energy into height must be done at circuit entry. However, this is a very narrow reading of the statement and does not reflect the dynamics of a low-level finish manoeuvre or the variations to circuits that are actually flown in competitions and XC regattas. This should NOT be read as the pull-up must be done at circuit joining. It merely requires that a safe circuit and landing be performed., It is improbable for most gliders to gain 800-1,000ft required to join a standard circuit, more likely in the range 250-500ft. There are also many variations to circuits, such as straight-in approaches and joining from base leg, often preferred in competitions.

4. Based on 3 above, it is not intended to make any significant amendment to the rules. GFA MOSP Part 2 Operations Section 10.8.3 contains required procedures to achieve safety outcomes.

5. The GFA Operations Department will consult with the GFA Sports Committee to review whether any change to guidance in the GFA Competition Safety Pack or pilot's notes might be published. Guidance around training and practicing low-level finish manoeuvres will form part of this review.

6. GFA also recognises the obligations of Club CFIs and Operations and Training Panels, defined in MOSP Part 2 Operations Section 9.1, in maintaining operations and safety standards, maintaining compliance with rules, and pilot discipline. GFA recognises that clubs have the right to develop and publish local rules, competition rules and local operations supplements. Where restrictions are applied, consideration must also be given to providing opportunities and areas for safe training and practice.

Date	11-Jun-2017	Region	VSA		SOAR Report Nbr		S-0994		
Level 1	Operational		Level 2	Fuel Related		Level 3	Starvation		
A/C Model 1		HORNET STOL			A/C Model 2				
Injury	Nil	Damage	Nil	Phase	In-Flight		PIC Age	65	

While preparing to conduct endurance trials of a new tow plane type, the pilot dipped the tanks to measure fuel quantity. To prevent cross-feeding during the measuring process, the pilot closed the wing fuel tank shut off taps. Unfortunately, the pilot forgot to open the taps and did not check them during the pre-flight checklist. Shortly after settling into the cruise the engine stopped and the pilot safely conducted an off-field landing about five miles from the airfield. Investigation revealed that, just after the fuel quantity was measured, the pilot and maintenance crew observed an accumulation of carbon inside the exhaust pipe and briefly discussed the matter agreeing that the mixture was obviously too rich. The pilot agreed to adjust the air/fuel mixture control on the flight to lean the engine. The aircraft was then pushed to a grassed area where the pilot could carry out the daily inspection. The pilot completed the fuel drain tests along with the rest of the outside checks, and then boarded the aircraft. The pilot started the engine and allowed it to warm while carrying out the usual cockpit checks. The pilot then taxied to the operational runway and took off. The pilot stated: *"All went exceptionally well as I climbed on departure upwind to my decided upon altitude of 3500' AMSL. At top of climb, I levelled the plane out and spent about a minute or so setting the plane up to cruise at 4800 RPM with an in IAS of 75kts. A check of all instruments indicated that all was well. Shortly after… I noticed the mixture indicator starting to fluctuate and, as I had adjusted it on a number of occasions previously, I thought that it just needed adjustment for cruise altitude. After several attempts to rectify the now roughly running engine I decided it best to turn back towards (the airfield) … and try to ascertain the problem. The engine picked up again, but I realise that I was losing power and I carried out the 'Forced Landing' checks ... without checking that the fuel was turned on; presumably because I don't normally turn it off and by now I was looking at a stationary propeller!"* With a forced landing inevitable, the pilot gave a 'Mayday' broadcast on the CTAF and headed for landable terrain. The pilot completed a safe

landing and made a telephone call back to base. The pilot then proceeded to troubleshoot the loss of power and discovered the fuel had not been turned on. The pilot noted that *"previously when I have on the rare occasion turned the fuel valves off, I have turned them on again shortly after as when in the cockpit, they are up behind me and I (have now) decided that it was best to leave them on at all times."* With the assistance of the local farmer, the aircraft was towed to a more suitable paddock and the pilot flew the aircraft back to the airfield. Investigation revealed that shortly after assessing the fuel quantity the pilot was distracted by discussion about the fuel/air mixture and forgot to open the fuel taps. Although this should have been checked during the pre-flight checklist, the pilot overlooked the main fuel taps as they are usually left on permanently. The aircraft is also fitted with a 10-litre header tank under the pilot's seat, which held sufficient fuel to get the pilot airborne and away from the airfield. Fuel management is a perennial cause of accidents and incidents, particularly in general aviation. Flight Safety Australia has covered the topic regularly, most recently in 2016. CASA's Civil Aviation Advisory Publication 234-1: 'Guidelines for aircraft fuel requirements' covers methods for cross-checking fuel on board before flight. And the ATSB has published a selection of harrowing and embarrassing case studies of fuel management related accidents in Avoidable Accidents No. 5—'Starved and exhausted: Fuel management aviation accidents'.

Date	23-Jun-2017	Region	NSWGA	SOAR Report Nbr	S-0999		
Level 1	Operational	Level 2	Airframe	Level 3	Landing gear/Indication		
A/C Model 1	Piper PA-25-235/A1	A/C Model 2					
Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	65
After completing a normal landing the tail spring failed at the wheel fixing bolts. The wheel came off and the tow plane came to a halt. The spring was found to have fatigued and was replacd.							

Date	25-Jun-2017	Region	GQ	SOAR Report Nbr	S-0998
Level 1	Operational	Level 2	Ground Operations	Level 3	Ground handling
A/C Model 1	ASK-21	A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Ground Ops	PIC Age	61

The towing bar for this aircraft, which attaches to a motor vehicle, is of the extendable type with a self locking pin which maintains the towing bar in either the collapsed or the extended position. The usual practice for connection of this towing bar is to attach it to the tail dolly of the aircraft while it is in the collapsed position, release the locking pin, extend the towing bar (allowing the locking pin to locate itself into the hole further along the towing bar), connect towing bar to motor vehicle. Any attempt to connect the towing bar to the motor vehicle with the towing bar in the collapsed position would bring the rudder of the aircraft within very close proximity of the motor vehicle and would be a visual indicator that the towing bar should be extended before continuing with the connection to the motor vehicle. In this case, the aircraft and the motor vehicle were not aligned, which allowed the towing bar to be connected to the vehicle without the usual visual indicator being apparent due to the angle of the aircraft relative to the motor vehicle. Additionally, the towing bar is offset to the port side of the aircraft which placed the rudder further away from the vehicle when connected at this angle, thereby reducing the indication of there being a closer than usual proximity of the rudder to the vehicle (with the towing bar not extended). In transit (taxiing) from the flight line to the hangar there was no indication of any problem and no unusual noises were heard. Upon reaching the hangar the motor vehicle was steered to the left, it was at this time that a noise was heard. The vehicle was stopped and the damage to the aircraft rudder was observed.

Date	30-Jun-2017	Region	NSWGA	SOAR Report Nbr	S-1000
Level 1	Operational	Level 2	Ground Operations	Level 3	Taxiing collision/near collision
A/C Model 1	DG-1000S	A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Ground Ops	PIC Age	

At the end of the day the glider was being towed back to the hangar using its rigid tow-out bar on the tail rather than adhering to the established club practice of towing back by a rope on the nose to allow the wing walker to steer the glider clear of any obstacles should the driver not maintain sufficient clearance. An instructor was walking the wing closest to the club hangar whilst a teenage member of a visiting group of overseas school students was walking next to the other wing. Driving at slow speed into the sun, the driver took care to keep clear of the club hangar but did not appreciate the proximity of the row of T hangars on the other side, nor did the monitoring instructor or visitor alert the driver. The glider wingtip struck the corner of one of the T hangars at slow speed, fortunately causing only minimal damage to either the glider or hangar. At all times when towing or otherwise manoeuvring a glider on the ground, all participants must remain situationally aware, keep their minds on the job and be ready to call "STOP!" sooner rather than later to avoid an accident.

Date	30-Jun-2017	Region	NSWGA	SOAR Report Nbr	S-1012
Level 1	Technical	Level 2	Powerplant/Propulsion	Level 3	Engine failure or malfunction
A/C Model 1	H 36 Dimona	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	69

During the climb-out and at about 2000' AGL the motor commenced to run very rough. The command pilot immediately operated the electric fuel pump but there was no improvement, so the engine was shut down and the propeller feathered. A normal circuit and landing was made on the reciprocal runway. After

exhaustive examination of the aircraft's fuel and electrical systems, it was determined that the magneto capacitor had completely failed. The magneto, including capacitor, had been checked and passed as serviceable less than ten hours prior the incident.

Date	1-Jul-2017	Region	GQ	SOAR Report Nbr	S-1017
Level 1	Operational	Level 2	Aircraft Control	Level 3	Control issues
A/C Model 1	Twin Astir	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	51

The command pilot was to conduct a short flight to reposition the aircraft following a runway change, and offered the front seat to a low-hours student. After releasing from an uneventful aerotow the command pilot handed over to the student pilot, who immediately advised that the front rudder pedals were difficult to operate. The command pilot assumed control and safely conducted a circuit and landing. Subsequent inspection of the front rudder pedals revealed the left-hand front pedal the return spring had detached. Investigation revealed that the Daily Inspector had noticed the detached spring but was called away to attend a briefing before rectifying the problem. After the briefing the inspector, having forgotten the detached spring, completed the Daily Inspections and signed out the Maintenance Release. As the inspector subsequently stated: *"...I was interrupted doing the DI and didn't re-commence the DI from the start. I should have either completed the DI and insisted on a Sterile Environment, or started again from the beginning."*

Date	2-Jul-2017	Region	NSWGA	SOAR Report Nbr	S-1006
Level 1	Operational	Level 2	Aircraft Control	Level 3	Incorrect configuration
A/C Model 1	ASK-21Mi	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	75

On reaching to close the throttle for engine shut-down, the PIC inadvertently operated the prop stop handle. The rotating propeller contacted the prop stop and damaged it.

Date	8-Jul-2017	Region	NSWGA	SOAR Report Nbr	S-1007
Level 1	Operational	Level 2	Fuel Related	Level 3	Exhaustion
A/C Model 1	Piper PA-25-235	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	41

RAAF Field Investigation.

1. INTRODUCTION

A Piper Pawnee was conducting glider towing operations in support of an AAFC gliding activity at Bathurst airfield. Shortly after releasing a glider at the completion of a tow, the Piper Pawnee experienced a significant reduction in power, forcing the aircraft to land immediately, without normal engine power.

2. SEQUENCE OF EVENTS

Refuelling issue

Two days earlier the tow plane was taxied to the refuel point at the end of the day's flying in order to complete a refuel. At the refuel point the pilot was unable to access fuel, as a swipe-card issue prevented fuel delivery. The pilot had not experienced this issue previously and, unable to refuel, stored the aircraft in the hanger without refuelling.

Daily Inspection and Pre-Flight checks

On the morning of the incident flight another pilot was rostered as tow pilot. This pilot carried out the Daily Inspection and Pre-Flight checks. The pilot stated that the aircraft's fuel level would usually be checked whilst in the hangar (level ground), but on this day it was not checked until the aircraft was outside on a ramp (Figure 3). To allow another aircraft to exit the hangar, the pilot had moved the tow plane onto the

ramp outside the hangar prior to checking the fuel level. The angle of the ramp was approximately 3 degrees, with the aircraft positioned 'nose-high'. The pilot checked the fuel level by removing the fuel tank filler cap and determined visually that the tank was full, describing the fuel level as 'just under the filler cap'.

Operational runway change

On the day of the incident, the Chief Flying Instructor (CFI) was on duty. Due to a shifting wind direction, the CFI planned to move operations from RWY 35 grass left to RWY 26. Ground-handling gliders to the new operational runway was considered undesirable due to the time taken to complete the process. To expedite the runway change, the CFI planned to launch the remaining gliders from RWY 35 and recover them post-flight to RWY 26. Three launches would be required to achieve the planned runway change.

Mid-Operation refuel discussion

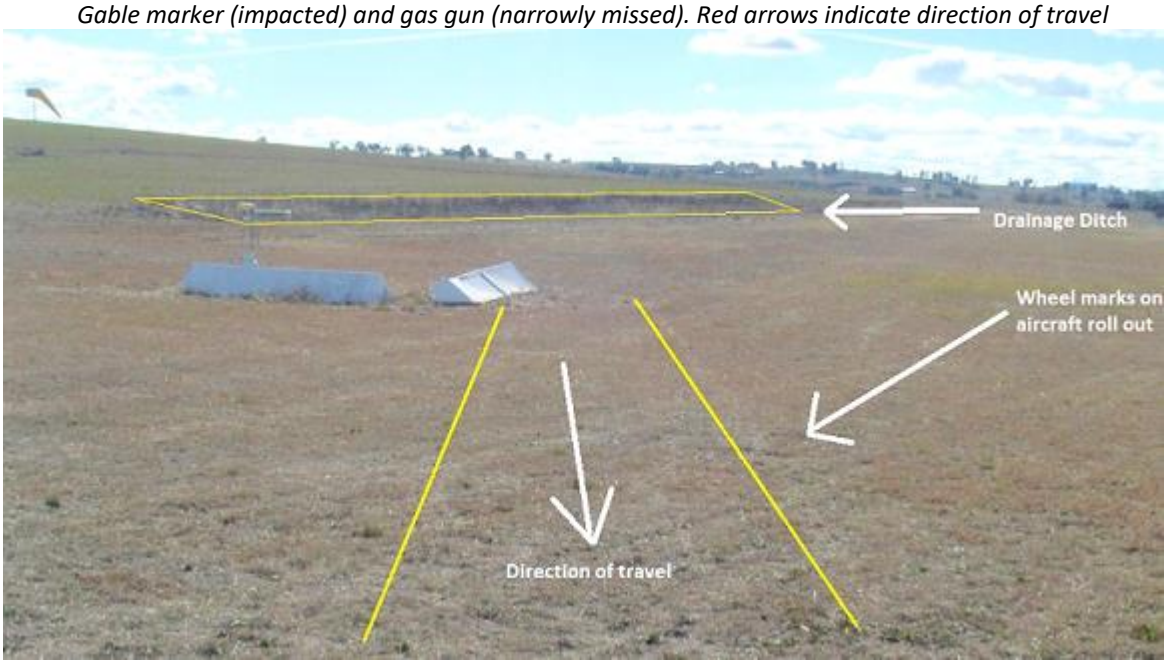
The tow pilot had been operating for approximately 90 minutes, at which point the fuel gauge was noted as 'a little bit above' the level at which they would normally refuel. Returning to land, the tow pilot radioed to the Operations Base the intention to refuel after one more glider launch. The CFI, an experienced tow pilot, overheard the radio call regarding the tow pilot's intention to refuel. The CFI was curious as to why the aircraft had not been able to operate for longer (The normal duration between refuels was 120 mins, rather than the elapsed time of approximately 90 mins). Over the radio the CFI stated they had three more launches before the change to RWY 26, then asked the tow pilot 'how do you feel about doing three more launches?' The tow pilot responded: 'not too sure about my fuel state'. After landing the CFI and Tow Pilot conferred at the aircraft, during which time the tow pilot remained strapped-in at the controls. The CFI confirmed with the tow pilot that the aircraft had started the day with a full fuel tank. The CFI opened the fuel tank filler cap and visually assessed fuel quantity, informing the tow pilot that the fuel level was approximately 30 – 40 millimetres (mm) below the filler cap. Based on the elapsed operating time and the visually assessed fuel quantity, the tow pilot and the CFI agreed that three more glider launches could be achieved. They planned to conduct the refuel after the third launch when ground personnel were relocating to the new operational runway. The CFI then transferred the Duty Instructor role to another Instructor in order to leave the airfield to conduct a noise assessment.

Engine loss of power and recovery.

The tow pilot conducted the three glider launches as planned. After releasing the third glider at the top of the third launch, the tow pilot closed the cowl flap, lowered the aircraft nose to commence the descent, and began to retard the throttle. The tow pilot felt the aircraft shudder and engine power reduced rapidly to idle. The tow pilot responded by selecting carburettor heat to full, cycling the fuel mixture control and throttle. However, these actions did not result in the recovery of engine power. The tow pilot continued the glider separation turn to track direct to the airfield, while assessing the arc under the wingspan for potential landing fields; the departure airfield fell within the arc. The tow pilot configured the aircraft at best glide speed and continued with the forced landing checklist, initially tracking for downwind RWY 35. A PAN was declared with the intention to land on RWY 35 grass left. Assessing the descent rate, the tow pilot realised that the aircraft was undershooting RWY 35, and changed intentions to track for a straight-in approach and landing on RWY 17 grass right. The engine was secured by isolating the magnetos and shutting off fuel. Recognising the aircraft was undershooting RWY 17 grass right, the tow pilot then moved the approach path east over main RWY 17, in order to make use of the longer undershoot area.

During the final stages of the approach, the tow pilot attempted to extend the glide by raising the aircraft's nose, to clear a drainage ditch running parallel with the main runway. The pilot successfully cleared the drainage ditch but airspeed had decayed, resulting in a hard landing and impact with a frangible runway gable marker. The gable marker was destroyed, and the aircraft's wing narrowly missed an airfield bird-scaring gas gun. It is likely that the aircraft missed the gas gun as a result of the aircraft bouncing due to the hard landing. The ground roll was short and the aircraft came to rest at the intersection of RWY 17/35 and RWY 08/26.

Gable marker (impacted) and gas gun (narrowly missed). Red arrows indicate direction of travel



Missed drainage ditch and aircraft wheel marks

Post Incident Actions.

The tow pilot was not injured during the hard landing. The Pilot exited the aircraft and was able to move it off the runway. The CFI and Duty Instructor attended the scene and directed that the aircraft was to be quarantined. The CFI opened up the filler cap and visually inspected the fuel tank – it appeared to be empty. The CFI contacted the Licenced Aircraft Maintenance Engineer (LAME), who was not located in the area at the time. The CFI and the LAME discussed the incident, detailing the troubleshooting required to identify the cause of the incident. This included filling the aircraft to check for leaks and inspection of the refuelling paperwork. Using a jerry-can, the CFI put a small quantity of fuel into the aircraft. The aircraft started immediately and was then taxied to the refuel point where the aircraft accepted 151.5 Litres of fuel

(including the fuel from the jerry-can). The CFI and LAME discussed the hard landing. The LAME advised an inspection of the undercarriage bungy cords for signs of damage or disturbance; no damage was found. The CFI scrutinised the refuelling paperwork and found evidence that the fuel tank had not been full at the start of the day. Based upon this information, the LAME assessed there was no requirement for maintenance. The LAME reasoned that the fuel system on the Pawnee (not fuel-injected) was not susceptible to air-locks, and therefore did not require bleeding. The LAME advised that the quarantine and flight restrictions could be lifted following successful engine runs.

Engine runs and next flight.

The following day, prolonged engine ground runs were successfully conducted. The aircraft was then operated without incident. As a precaution, the aircraft was refuelled at shorter operating intervals to assess and monitor the fuel burn rate.

3. DAMAGE TO AIRCRAFT

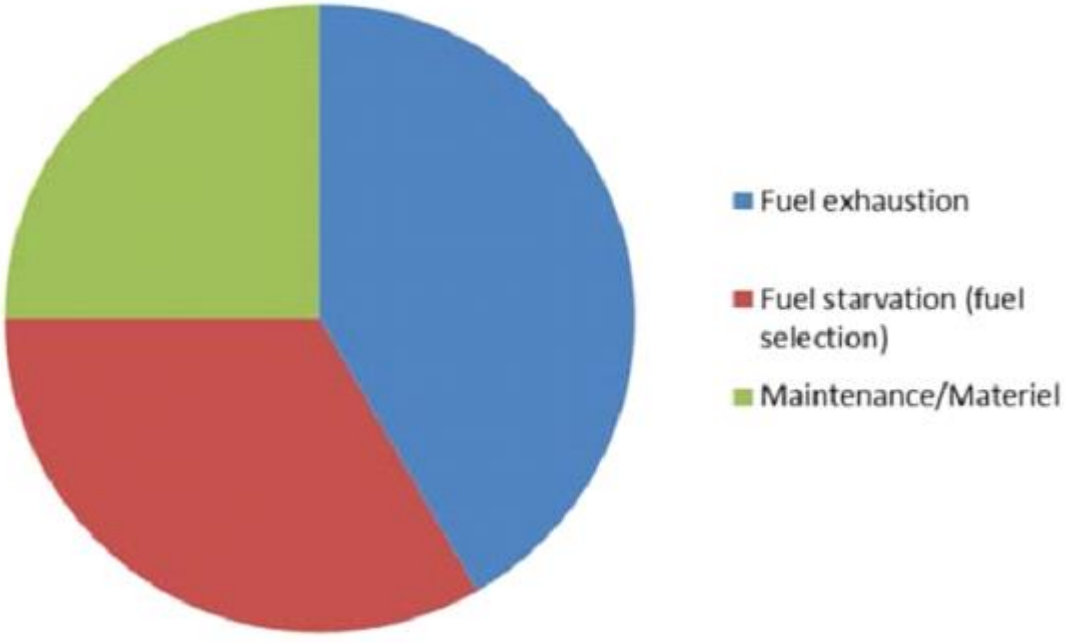
The right main undercarriage tyre suffered minor scuff marks as a result of the impact with the runway gable marker. The CFI assessed the damage as superficial only. No rectifications were required or performed.

4. METEOROLOGICAL INFORMATION

At the time of the incident the weather was reported as 'cloud and visibility okay' (CAVOK). Wind and sun position were assessed as not contributing to the incident.

5. SIMILAR OCCURRENCES

The Gliding Federation of Australia's (GFA's) database was queried to determine whether similar occurrences had occurred in the past. The GFA database for fuel-related occurrences returned 11 reports, with the oldest dated 19 November 2011. Figure 9 illustrated the breakdown of occurrences between fuel exhaustion, starvation and maintenance/materiel causes.



GFA database occurrences for fuel exhaustion/starvation

Of the 11 reports, seven were found to be dissimilar (i.e. fuel starvation, fuel system maintenance or material issues). Four were found to be similar (i.e. fuel exhaustion). The dataset suggests that on average there is a fuel exhaustion occurrence approximately every 20 months. Of the similar reports, three were very similar:

- 19 Nov 11, PA-25-235 Piper Pawnee. The aircraft ran out of fuel during a glider launch. The pilot safely executed an off-field landing. The pilot reported misreading the fuel tank quantity when checking the tanks before flight.

- 18 May 14, PA-25 Piper Pawnee. The aircraft ran out of fuel during a glider launch. The pilot did not notice a low fuel light. The pilot was forced to land, and a heavy off-field landing with significant aircraft damage resulted.
- 23 May 15, Cessna 150E. The aircraft momentarily lost power due to near- fuel-exhaustion. The pilot was able to land safely under power.

6. ANALYSIS

Applicable Fuel-related Regulation, Policy and Procedures

Gliding operations (including aerotowing in support of gliding operations) are by definition a private operation under CAR 1988. Civil Aviation Regulations 1988 (CAR) 209 (1) states that '[t]he operator and the pilot in command of an aircraft engaged in private operations shall comply with the provisions of these Regulations and such additional conditions as CASA from time to time directs in the interest of safety'. Regulation 234 requires the pilot-in-command of an aircraft to take reasonable steps to ensure that the aircraft carries sufficient quantities of fuel and oil for the proposed flight to be undertaken safely. The regulation also requires the operator of an aircraft to take reasonable steps to ensure that an aircraft does not begin a flight unless it is carrying sufficient fuel and oil to allow the flight to be conducted safely. The GFA Aerotow Manual, which is a CASA approved, recommends a fixed fuel reserve of **at least 30 minutes** is appropriate for normal aerotow operations (not involving cross-country transit). It is a condition of the tow pilot's Glider Towing Certificate that they comply with the GFA Aerotowing Manual. The GFA Aerotowing Manual has this to say:

"Tow pilots should start the day's towing with full tanks, keep a record of the number of tows and time flown, and refuel early rather than late. GFA recommends pilots carry no less than 30 minutes reserve fuel. On aircraft which have recording tachometers, or an engine hour meter connected to an air pressure sensor and switch, keeping track of tacho or meter time is a useful aid to fuel management. Fuel exhaustion incidents are most likely after a change in pilot, where the relief pilot has taken over an almost empty aircraft. In aircraft such as the Piper Pawnee it is difficult to determine the remaining fuel level by visually inspecting the fuel tank. Therefore, it is good airmanship to check the fuel state by reference to at least two separate methods of fuel management upon changing pilots."

The AAFC's policy for 'Fixed Fuel Reserves' is 45 minutes. It is also practice of AAFC clubs to completely fill the tow plane in the evening and during the day as required. AAFC guidance on this subject states:

"A good method to monitor the fuel state is to use a combination of the following 3 methods. Items a & b should be rigidly observed, while some latitude is allowed with item c.

a) Watch fuel contents gauge (it is red lined – under no circumstances should the tug launch with a reading below the red line).

b) Record Tacho Time at each refuel and limit time to a maximum of 2 Tacho hours.

c) Usually in the region of 15 x 2000ft tows can be carried out on a full tank of fuel.

Do not be bullied into a launch if you are concerned about the fuel status. This usually happens about the last flight of the day when the tanks are low. Remember that there never has and never will be a suitable reason for fuel exhaustion. It is entirely your responsibility."

Piper Pawnee Pa-25-235 Fuel System

The Piper Pawnee PA-25-235 involved in this incident has a simple fuel system which transfers fuel using gravity from a single tank to a carburetted engine. Aspects of the fuel system, relevant to the incident are as follows:

a) ***Pump and feed.*** To start the engine, an engine primer pump moves fuel from the fuel strainer to the engine's cylinders. During normal operation, fuel flows under gravity through the strainer and into the carburettor.

b) ***Tank***. The aircraft is fitted with a single fuel tank, aft of the engine and forward of the hopper. The tank can accept 159 L of fuel, of which 148 L is useable. The tank geometry is such that the tank is wider at its top than at its bottom.

c) ***Gauge***. Fuel quantity can be determined by a float gauge. The float moves up and down depending on the fuel level, which in turn moves an indicator in the sight glass. The effect of the fuel tank geometry is that the rate of movement of the float gauge is slowest for a full tank and becomes progressively faster as the tank

empties. The gauge's sight glass is located on top of the fuel tank, within the pilot's line of sight from the cockpit. The sight glass on the incident aircraft was marked with a red line.

Fuel tank quantity gauge, seen from (L) cockpit and (R) side

Methods for determining fuel quantity

The extant methods for determining fuel quantity are:

a) visual inspection via the fuel filler cap;

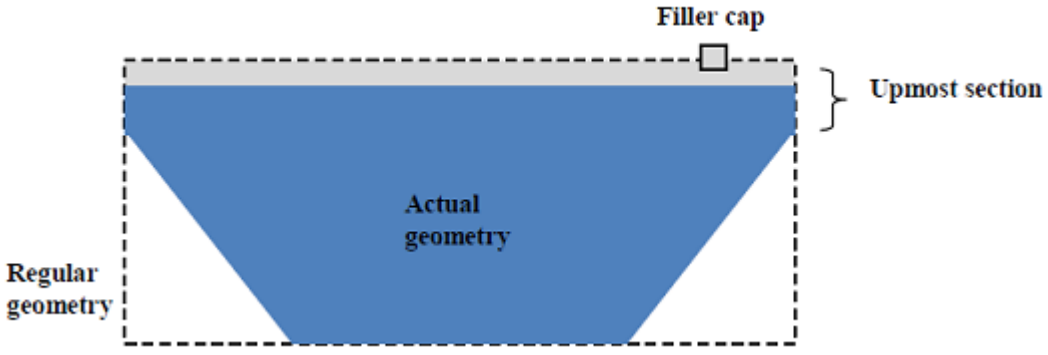
b) fuel gauge; and

c) fuel burn rate.

Visual inspection via the fuel filler cap.

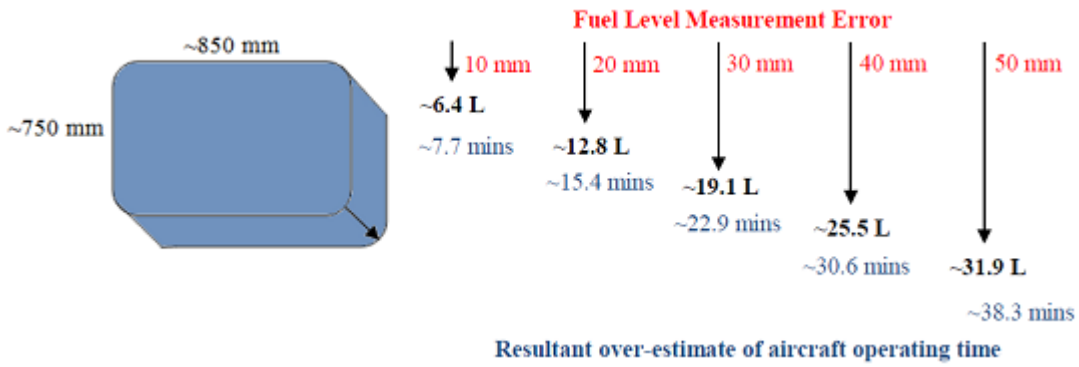
Direct visual inspection of the fuel level is possible by looking through the filler port (after removal of the filler cap). However, the accuracy of this method is problematic for the following reasons:

1. ***Tank geometry.*** The shape of the fuel tank means that the relationship between fuel level and fuel quantity is not constant. For the upper-portion of the tank, a small change in fuel level means a relatively large difference in fuel quantity. The tank is normally concealed from view by the aircraft fuselage. Figure 13 is a simplified representation of the fuel tank, compared to a regular geometry.



Simplified representation of Actual vs Regular fuel tank geometry (side view)

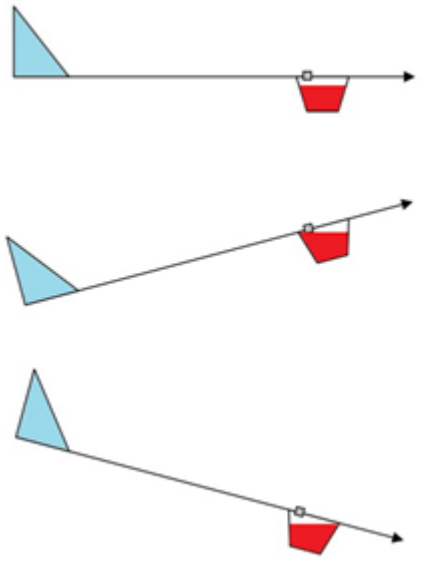
For the first 50 mm of the tank, the cross-sectional area is approximately constant. The Figure demonstrates the effect on available aircraft operating time for every 10 mm of error when measuring the fuel level.



Fuel level measurement error affect on fuel quantity

As shown, a fuel level measurement error of 40 mm could result in a misperception that the aircraft had over 30 min more fuel than actually carried.

2. ***Orientation of the aircraft.*** The fuel-level, when viewed through the filler port, is affected by the resting angle of the aircraft. Ensuring the aircraft is on level ground is an effective method of removing this variable. Figure 15 depicts how the observed fuel level can change with aircraft angle. Modelling suggests that for every degree nose-up pitch, the fuel level at the filler cap is raised by approximately 10 mm.



Effect of ground angle on fuel quantity checks

3. ***No authorised dipstick.*** Using a dipstick to determine fuel quantity is not authorised due to the potential for damaging the fuel tank lining.

For the reasons described above, visual inspection is only suitable for determining whether the Pawnee's fuel tank is either:

a) Full (known quantity); or

b) Not full (unknown quantity).

Further, without useable metrics, the definition of "Full" is subjective and can vary from person to person. There were no metrics or measuring devices available to Pilot 2 to enable an objective assessment of fuel quantity.

4. ***Fuel Gauge.*** As explained above, accuracy of the fuel gauge is limited for the following reasons:

a) the gauge is designed to be used when the aircraft is in level flight;

b) the indicator in the sight glass bounces due to engine vibration and flight movement;

c) the gauge sits on the fuel tank, external to the cockpit. Pilots must determine the position of the indicator within the gauge by viewing it through the windshield at a distance; and
d) the gauge has a prominent red line marked on it, but the meaning is not defined. The following was found:

1. The red line was applied locally by the LAME;
2. It was commonly understood that the red line indicated the fixed fuel reserve. However, there was no formal process for defining the meaning of the red line.
3. A red line on the gauge indicating fixed fuel reserve must be set based on an assumed average fuel burn rate. It was unclear how this assumed average had been decided – and by whom.For the reasons described the gauge has limited accuracy. Its capability is limited to a rough indication of fuel quantity only. Typically, pilots are able to use the gauge to tell whether they are above, approaching or underneath the red line.

5. ***Fuel burn rate***. Due to the limitations of the fuel gauge, operators of the Piper Pawnee determine their approximate fuel remaining, indirectly through measurement of operating time - using the Tachometer Clock ("tacho time"). The Tachometer Clock measures the duration of engine operation. When the initial fuel state (i.e. full) is known, the pilot can apply an estimate of fuel burn rate, and thus determine the time when re-fuel is required (i.e. when the non-reserve fuel has been consumed). Tow pilots at the Club generally used a tacho time of 2 hours (hrs) as the maximum operating time. This was based on a fuel burn rate approximation of 50 L/hr. Analysis of 30 days of glider-tug operations determined that the average, actual fuel burn rate for the incident tow plane was 47 L/hr. Therefore, the fuel burn rate used by the Club is appropriate for this tow plane's operating from the home airfield. Useable fuel capacity on the subject tow plane is 148 L - therefore after 120 mins operation, roughly 48 L remains. This remaining fuel gives approximately 57 mins of operating time, which comfortably accounts for 45 mins of fuel reserve. Effective fuel planning and fuel management rely on the accuracy of the predicted fuel consumption rate. The accuracy of the fuel consumption data used for the planning and decision making depends on the source of that data. During the interviews a number of figures were mentioned, however there was no common source quoted. Further, there was no promulgated fuel burn rate for the subject tow plane. Retro-fit devices are available to assist with fuel management (fuel flow meters, low fuel lights, etc.). The availability of such devices during the incident may have alerted the pilot to the low fuel state before the fuel ran-out.

7. HUMAN FACTORS

<u>Pre-flight fuel quantity check</u>

The tow pilot carried out a pre-flight fuel quantity check before the incident flight. However, this check was ineffective due to a combination of expectancy bias, knowledge based deficiencies and a decision error; outlined as follows:

a) ***Expectancy bias.*** It is standard GFA and Club practice to refuel tug aircraft at the completion of the day's flying. The tow pilot and others have come to expect the aircraft to be full when checked pre-flight. An expectancy bias is induced, whereby the tow pilot expected to see a full tank of fuel, via a visual assessment, during the aircraft pre-flight. Additionally, the tow pilot had no metrics or measurement devices available that would help define whether the tank was full or not, further compounding this bias.

b) ***Knowledge based deficiencies.*** The tow pilot was unaware of the fuel tank geometry and hence did not realise that a small fuel level discrepancy at the top of the tank meant a significant amount of missing fuel. During the conduct of the investigation, it was assessed that a number of current tow pilots were deficient in a working knowledge and understanding of the Piper Pawnee's fuel system design and operation. The tow pilot stated that, had the geometric shape of the fuel tank been known, it is likely that would have strengthened the decision to refuel at the time. It is considered good airmanship for an Aircraft Captain to have proficient knowledge of the aircraft systems. This knowledge is gained from ground school notes, system briefs, and hands on maintenance of the aircraft types flown. The training should be provided during aircraft type endorsement by appropriately trained persons. Systems knowledge allows pilots to diagnose problems and make informed decisions during operations and in emergency situations. Aircraft systems knowledge should be covered and assessed by the authorised tow pilot delegate.

c) ***Decision error.*** The tow pilot, lacking effective systems knowledge, combined with an interrupted pre-flight habit pattern, knowingly conducted the fuel check on sloping ground. This resulted in the fuel angling towards the fuel filler cap, giving the perception that it contained more fuel than it actually did. Re-creation of the scenario showed that the fuel tank angle of the incident aircraft changed by approximately 3 degrees (nose high) when compared to level ground. This could have raised the perceived fuel level by approximately 30 mm. The tow pilot did not understand the geometric shape of the fuel tank and the corresponding effect of sloping ground on the fuel level in the tank. Performing the fuel check on sloping ground was a result of a decision error stemming from knowledge based deficiencies. The knowledge based deficiencies were likely masked by engrained pre-flight habit patterns formed during training. The tow pilot, by moving the aircraft to the sloping ramp during the pre- flight checks, effectively broke a well engrained habit pattern which leads to the decision error of checking fuel on sloping ground.

Refuel Decision-Making process

The tow pilot had the intention to refuel, triggered by a fuel level indication approaching the red line on the fuel gauge. The intention was radioed through to glider operations; however, a combination of confirmation bias and experience/authority gradient resulted in a deferred decision and Pilot 2 continued flying without refuelling.

Confirmation bias. Confirmation bias involves favouring information that confirms previously held or existing beliefs. Confirmation bias can impact how people gather information and influence how they interpret information and make decisions. Starting with a based-lined full tank, towing operations would usually operate for two hours tacho time or until the red line was reached, at which point a refuel would take place. The basis of the Decision-Making process that occurred on the ground, between the CFI and tow pilot, assumed that the aircraft had a full fuel tank at the start of flying that day. This assumption of a full fuel tank was established by the CFI at the aircraft. Once the initial fuel state was established the following confirmations were sought to support the decision to continue for three more launches:

a) an observation of the fuel gauge on the ground

b) a visual inspection of the fuel tank contents, and

c) confirmation of tacho time flown.

Three methods existed for determining fuel quantity though no clear guidance exists for a case where the refuel line is reached prior to two hours tacho. During this incident a fuel gauge approaching the refuel line was likely dismissed because a visual inspection of the fuel tank on the ground and tachometer clock suggested there was sufficient fuel on the aircraft. A more appropriate course of action would be to refuel whenever any of the methods indicated a refuel was required.

Authority gradient. Authority Gradient refers to the established, and/or perceived, command and decision-making power hierarchy in a Team, Crew or Group situation, and also how balanced the distribution of this power is experienced within the Team, Crew or Group. Concentration of power in one person leads to a steep gradient, while more democratic and inclusive involvement of others results in a shallow gradient. Through interviews, it was established that the interaction between the CFI and tow pilot was professional and intended to be 'pilot to pilot' in nature. This intention aside, a subtle underlying authority/experience gradient was still likely present in the sub-conscience of the tow pilot. The CFI, a very experienced tow pilot, acting as Duty Instructor at the time did not make the decision for the tow pilot, though it is highly likely the tow pilot's decision-making process was influenced by the abovementioned confirmation bias and a perception of the CFI having greater knowledge due to the authority/experience gradient.

Fuel indication post decision to continue

The tow pilot likely noticed the decreasing fuel gauge indication and disregarded its meaning in order to execute the planned course of action and the distrust of general aviation fuel gauges. The fuel gauge is situated along the line of sight of the pilot looking out the windscreen while flying. Based on the fuel tank design, the fuel level indication during the final launches would have been reducing at a high rate. The tow pilot likely disbelieved, discarded, or downgraded the significance of the fuel indication below the red line, as it appeared to conflict with the expectations of the decided course of action. Additionally, the tendency to disbelieve, discard or downgrade the fuel indications were likely strengthened by the tow pilot's significant

distrust of General Aviation fuel gauges, which was cemented during the conduct of his Private Pilot's Licence (PPL) training.

Pilot recovery actions.

The tow pilot safely recovered the aircraft to the airfield. Troubleshooting actions were attempted; however, these actions proved unsuccessful and were discontinued at an appropriate time and altitude, to focus on the imminent forced landing. Tracking for the take-off runway (RWY 35 Grass left) was initiated, however the tow pilot, using good judgement assessed a significant undershoot and amended the tracking for RWY 17 Grass right. Further adjustments were made as the tow plane's glide performance became evident. The forced landing checks were appropriately conducted, and a PAN was declared, which appropriately informed other airfield users. The situation warranted an upgrade to a MAY DAY. However, the workload on the approach was high and the tow Pilot effectively prioritised flying over communication. The tow pilot is to be commended for his recovery actions.

8. ACTION ALREADY TAKEN

The AAFC implemented the following Aviation Safety Alerts:

a) Pilots will check fuel level, on a level surface, before commencing flying operations. If the fuel level is not within 1 cm of the fuel filler neck the aircraft shall be refuelled before commencing operations.

b) If the pilot has any doubt as to the quantity of fuel in the aircraft and/or remaining time available before fuel is required, the aircraft is to be refuelled immediately in order to positively establish a fuel baseline.

c) When the aircraft is refuelled, the pilot shall note the tacho time, as of the time of refuelling, on the laminated card attached to the instrument panel. This shall be updated before the aircraft is moved from the bowser to ensure that the number is accurate and not forgotten.

d) The pilot shall take care to accurately and promptly update the fuel log; and

e) Pilots of the Piper Pawnee shall not exceed 90 minutes Tacho time before conducting a full refuel.

9. CONCLUSION

The investigation identified the following organisational influences which aided the establishment of pre-conditions for this incident:

a) inconsistent regulation covering fuel measurement, fuel reserves and refuel procedures

b) informal fuel policies

c) ineffective communication, and

d) aircraft system knowledge deficiencies.

During the conduct of the Daily Inspection and Pre-Flight checks, knowledge deficiencies and expectation bias established the pre-conditions for the decision error of checking the fuel on sloping ground. This then led to an incorrect assessment of a full fuel tank at start of flying that day. Once this assessment was made there were no effective controls in place to prevent the sequence from continuing through to fuel exhaustion. The incident pilot recognised a recovery point to refuel, however once challenged, this recovery point was eroded through confirmation bias based upon the initial assessment of a full fuel tank at the start of flying. The decision to continue without refuelling was effectively deferred to experience based on a perceived experience/authority gradient. Once the decision was made the incident pilot then executed the course of action with effective task focus, likely discarding evidence of a reducing fuel gauge due to it not fitting the planned course of action. At the point of fuel exhaustion, a safe and effective forced landing to the departure airfield was conducted. The incident pilot is to be commended for his recovery actions and prioritisation whilst executing the forced landing. Whilst the above does not relinquish the responsibility of a pilot in command to conduct a thorough pre-flight recommendations made herein, when implemented, will reduce the likelihood of a similar occurrence. Since the incident a number of short term task specific actions have been implemented to allow for continued operations until full rectification of the identified deficiencies takes place.

Date	9-Jul-2017	Region		VSA	SOAR Report Nbr		S-1003
Level 1	Operational		Level 2	Runway Events		Level 3	Runway excursion
A/C Model 1		Twin Astir			A/C Model 2		

Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	62
Following landing the command pilot taxied the aircraft off the runway towards the hangar and a group of people. The pilot was counselled about the hazards of such a manoeuvre.							

Date	10-Jul-2017	Region	NSWGA	SOAR Report Nbr	S-1024
Level 1	Operational	Level 2	Communications	Level 3	Other Communications Issues
A/C Model 1	DG-1000S	A/C Model 2	N/A		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	65
During a period of extended radio transmissions, the instructor turned the volume down on the radio in order to clearly communicate with the student but failed to readjust the volume control afterwards. The command pilot later flew the circuit making standard radio transmissions but was effectively transmitting blind. Fortunately there was no traffic or breakdown in separation and the glider landed without incident. With gliders, where headsets and intercom systems are usually absent, radio chatter can be a distraction. Notwithstanding, the radio is an important tool for situational awareness and collision avoidance, and must be used properly to be effective. To this end the volume and squelch should always be adjusted to provide the best reception and hearing quality. Instructors should avoid turning down the volume unless absolutely necessary for flight safety.							

Date	12-Jul-2017	Region	SAGA	SOAR Report Nbr	S-1008
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Near collision
A/C Model 1	DG-1000S	A/C Model 2	Jabiru		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	67
During a check flight (Annual Flight Review) the pilot under check flew into the downwind leg to join circuit. The glider's flight path was head-on to a Jabiru aircraft established on the downwind leg. Although a collision was avoided the glider pilots were counselled. When flying at uncontrolled airports, pilots rely on each other to help avoid midair collisions by following the recommended procedures and communicating intentions on the common traffic advisory frequency (CTAF). The risks of flying against the circuit traffic are obvious.							

Date	15-Jul-2017	Region	VSA	SOAR Report Nbr	S-1009
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Near collision
A/C Model 1	Twin Astir	A/C Model 2	Unknown		
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	19
During the course of an annual flight review the instructor manoeuvred the glider towards the circuit joining area with the view to conducting a 'running out of height' exercise. As the pilot under check was manoeuvring to join circuit, a radio call was heard from the gliding operations base alerting the pilots to a powered aircraft flying overhead the airfield at about 700ft AGL, climbing out from the direction of the nearby certified aerodrome. The pilot under check spotted a low-wing powered aircraft just below the horizon and climbing straight towards the glider. The pilot under check manoeuvred the glider to avoid a collision and simultaneously made a radio broadcast to alert the powered aircraft to maintain its heading. The aircraft passed within 200 metres laterally at the same height. The pilot under check reported that the overcast conditions made sighting aircraft below the horizon difficult, especially against *"a variety of vineyards, scrubby terrain, buildings and swamps",* and that the powered aircraft may not have been sighted had the base radio alert not been made. The powered aircraft was not identified but witnesses at the nearby certified aerodrome saw the aircraft depart the runway in contravention to published procedures designed to ensure aircraft do not depart directly over the nearby gliding winch site.							

Date	15-Jul-2017	Region	NSWGA	SOAR Report Nbr	S-1013
Level 1	Operational	Level 2	Miscellaneous	Level 3	Other Miscellaneous
A/C Model 1	SZD-50-3 "Puchacz"	A/C Model 2	Pawnee		
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	55

The tow pilot was given the 'all-out' signal before the slack was fully out of the rope. The rope had momentarily become caught on a tussock of grass, which caused the glider to be catapulted forward and overrun the rope. The rope again came under tension as the tug accelerated and the glider was again catapulted forward. At this point the glider pilot released. While this incident was consequent of an erroneous signal by forward signaller, a slower application of power by the tow pilot may have pulled the rope clear of the tussock of grass.

Date	15-Jul-2017	Region	VSA	SOAR Report Nbr	S-1014
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Aircraft Separation Issues
A/C Model 1	Duo Discus	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	64

The glider was observed on the active side of the circuit conducting some thermalling turns and travelling upwind against the circuit pattern at a height below 1500' AGL. The aerodrome is a busy site and the conduct of the flight was contrary to Club rules. The pilot was counselled.

Date	16-Jul-2017	Region	GQ	SOAR Report Nbr	S-1019
Level 1	Operational	Level 2	Aircraft Control	Level 3	Wheels up landing
A/C Model 1	Discus CS	A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	54

The pilot had returned to the airfield after a 3-hour local soaring flight in hot and blustery conditions. The pilot's CFI commented that *"the flying (because of turbulence and unrelenting sun) was tiring (though with some spectacular streeted thermals in the blue)"*. The pilot arrived over the airfield at 2,000ft AGL in order to properly assess the wind direction by reference to the windsock. The wind speed at that height was 23 knots. After joining downwind, the pilot commenced the pre-landing checks but, due to concentrating on speed and trim in the blustery conditions, forgot to lower the undercarriage. The pilot noted: *"I didn't verbalise the FUST as I normally do. My workload was high as the downwind leg was fast and I neglected to lock the undercarriage down, and following base and final landed wheel up. The high wind speed on the ground made the landing quite short and mitigated further damage to the underbelly."* The pilot's CFI noted "*The conditions were certainly liable to invite heat exhaustion/dehydration and the kind of fatigue that allows checklist items to fall through the cracks. I can imagine how (the pilot's) attention would have been drawn into the immediate challenge of the circuit: managing speed and space in turbulent high-wind conditions. And that after a long flight in the bumpy, hot blue. I do know (the pilot) had drinking water with him, as I saw him put it in the glider."* Landing mishaps commonly occur when pilots become overloaded close to the ground. Workload management can be eased by proper flight management which includes attending to pre-landing tasks (like lowering the undercarriage) early rather than later in the circuit. Refer also OSB 01/14 'Circuit and Landing Advice'.

Date	21-Jul-2017	Region	SAGA	SOAR Report Nbr	S-1025
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Aircraft Separation Issues
A/C Model 1	DG-1000S	A/C Model 2	Jabiru J170-C		
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	55

The pilot of a powered aircraft conducted a low overflight of a glider, which was positioned behind the displaced threshold awaiting a launch, to land on the bitumen glider strip directly ahead rather than on the main gravel runway alongside. The crew of the glider estimated the powered aircraft overflew at a height of less than 30 feet. Aerodrome operating procedures require that powered aircraft pilots must use the main gravel runway for landing when gliding operations are in progress and not to overfly the gliding operation. Investigation revealed the powered aircraft was being flown on a training flight. The student overshot the turn onto final and lined up on the glider strip. The instructor, although aware of the requirement to land alongside the glider runway neglected to correct the student and allowed the approach to continue. While a good instructor recognises that a student must have opportunities to make and correct errors, when close to the ground there is less opportunity for correction and instructors must take control to ensure the safety of the flight. In this case the instructor should have recognised the danger of approaching low over aircraft and people, and taken control to realign the aircraft clear of obstacles. The incident was raised with the instructor and their CFI, and the need to set appropriate safety limits and comply with the aerodrome operating procedures was reinforced.

Date	26-Jul-2017	Region	NSWGA	SOAR Report Nbr		S-1010	
Level 1	Airspace	Level 2	Aircraft Separation	Level 3		Near collision	
A/C Model 1	JS1 B			A/C Model 2	Unknown		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	76
A glider was returning to land when an unidentified powered aircraft flew between the glider and the airfield within 500 feet. The duty instructor made two attempts to contact the aircraft on the CTAF to no avail. The aircraft, a blue and white coloured low wing monoplane with retractable gear, continued on its way. The aircraft was sighted by the glider pilot.							

Date	29-Jul-2017	Region	GQ	SOAR Report Nbr		S-1011	
Level 1	Operational	Level 2	Terrain Collisions	Level 3		Controlled flight into terrain	
A/C Model 1	MDM-1P "FOX-P"			A/C Model 2			
Injury	Minor	Damage	Substantial	Phase	Landing	PIC Age	60

1. FACTUAL INFORMATION (GFA Field Investigation)

1.1 History of flight

On 29 July 2017, the pilot flew the glider from Boonah, Qld on tow to Lismore airfield, NSW (YLIS) behind a Piper PA-25-235 Pawnee. The pilot arrived on tow over YLIS at 5,500 feet in order to have time and space to merge with other traffic. He landed at Lismore at 10:30 am (all times are local) on 29 July 2017, the day of the Lismore Aviation Expo. Air displays that day had been approved by CASA, to be conducted by Paul Bennet Airshows (the approved organisation). The glider pilot and tow pilot attended a private briefing session by the organiser's delegate at the Lismore Aeroclub, consistent with the Lismore Display Instructions from the organiser. The glider pilot and the tow pilot then both signed the participant signature sheet as per the conditions for the air display approval that day. The scheduled time for the glider display was 2:40 pm. At approximately 3 pm, the glider was towed to 3,500 ft. AGL by the Piper Pawnee and released over the display area (see section 1.10 Aerodrome information). Weather at the time was CAVOK with light winds. Altitude was used up as the glider performed its planned aerobatic manoeuvres inside the designated display box. At approximately 100ft AGL, a wing-over was initiated which brought the glider onto an ESE track inside the display zone. As planned, the pilot then initiated the final manoeuvre, a four-point roll. After this roll, another wingover was planned, followed by a landing on runway 33. The four-point roll was initiated at approximately 50ft AGL. Halfway through the manoeuvre, the glider appeared to be running out of energy, according to witnesses. While inverted, the pilot lowered the nose somewhat to increase airspeed, then pushed away from the horizon and levelled the wings to the upright position. The glider then impacted the ground near the runway, but outside the gable markers (see figure 1).

Figure 1: Impact point and glider resting position

According to witnesses, the wingtips both briefly contacted the ground on initial impact. The undercarriage separated from the glider, and the impact left an indentation of approximately 30-40cm in the soft grass. The glider slid to a stop and came to rest about 100m beyond the point of first ground contact. Given that it was outside the gable markers and not on the runway, the pilot remained in the aircraft until help arrived. No evacuation was needed. The pilot was assessed by local first responders, removed from the glider and taken to Lismore hospital, and later to the Gold Coast University hospital.

1.2. Injuries to persons

The pilot suffered a fractured T12 vertebra (The T12 vertebra is located in the last position of the thoracic section of the spine, and sits just above the lumbar section) as well as some minor lacerations. No other injuries. No long-term consequences of injury sustained.

1.3. Damage to aircraft

- Undercarriage and wheel fairing separated from airframe on first impact.
- Several tears and fractures of the seat pan and other inside cockpit side-wall structures.
- Skid marks along fuselage aft of the wheel well.
- No skid marks under the nose or forward of the wheel well.

1.4. Other damage

Nil.

1.5. Personnel information

- Pilot total flying hours: 7000+
- Hours on type: 170+
- Licences held: Private Pilot Licence, Glider Pilot Certificate
- Valid Medical
- CASA Low level aerobatics endorsement held.
- The pilot has considerable aerobatic and display experience, both in powered aircraft and gliders.

1.6. Aircraft information

- Manufacturer: MDM Marganski & Myslowski
- Type: Fox-P

- Country of manufacture: Poland
- Year of manufacture: 2001
- Engines: None
- Total airframe hours: 180
- Certificate of Airworthiness: Yes, perpetual
- Maintenance Release Yes, until end 2017
- Max allowable take-off mass: 535kg
- Max allowable landing mass: 535kg
- Stall speed (all-up mass) : 45 knots
- Stall speed (one pilot onboard): about 40 knots.

1.7. Meteorological information

CAVOK, light to zero wind.

Time	Wind dir	Wind spd km/h	Wind gust km/h	Tmp °C	Dew pt °C	Feels like °C	rh %	Fire	Rain mm	Rain 10' mm	Pres hPa
Sat 15:30 EST	-	0	4	22.3	4.4	22.3	31	9	0	0	1019
Sat 15:23 EST	NNW	2	5	22.4	1.4	22.4	25	12	0	0	1019
Sat 15:20 EST	-	0	0	22.2	2.3	22.2	27	10	0	-	1019

Table 1. Data from Lismore Airport AWS.

1.8. Aids to navigation

Not applicable

1.9. Communication

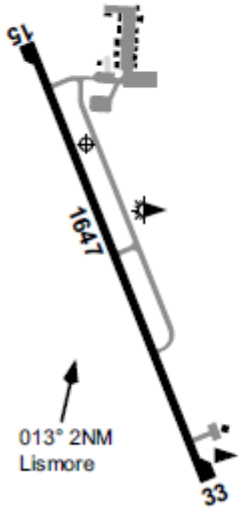
A dedicated display frequency was in use, in addition to the normal airfield CTAF for YLIS.

1.10 Aerodrome information

The runway at YLIS is sealed and oriented 15/33 and 1647m long (see figure 2). The air display line was offset from the runway by 65 degree (see figure 3). Displays were to be orientated south of an imaginary display axis line between the 1000ft RWY marker on RWY 15 and the NW corner of the large shed located on the eastern side of the field. Displays were to be conducted with all turns to the south (away from the spectators). Top side passes were permitted as long as the aircraft was not projected to be inside 200m from the spectator line (see figure 3).

LISMORE **ELEV 35**

AVFAX CODE 4012



NSW UTC +10 YLIS
S 28 49.6 E 153 15.5 VAR 11 DEG E CERT
AD OPR Lismore City Council, PO Box 23A, Lismore, NSW, 2480. PH 1300 878 387. PH AH 1300 878 387 or 0427 284 263. Fax 02 6623 2010.

REMARKS

1. AD Charges. Landing, Touch & Go, Stop & Go and parking fees apply to all non RPT ACFT. CTC AD OPR for details see www.lismore.nsw.gov.au.
2. This AD is a Security Controlled Airport.

HANDLING SERVICES AND FACILITIES

BP - Air BP Lismore (John Habib): D 2200-0700, BH 1HR PN, AH PN. Phone 02 6621 6940 or 0412 666 902. AH call-out fee applies. AVGAS, H24 Cardswipe AVGAS bowser - Air BP card only.
MOBIL - Lismore Airport JET A1: 1 HR PN, Ph 02 6622 8806 or 0422 441 277.
JET A1 - off site. JET A1 refuelling and deliveries in the Northern Rivers Region available 0422 441 277.

Figure 2. ERSA Entry for Lismore, NSW

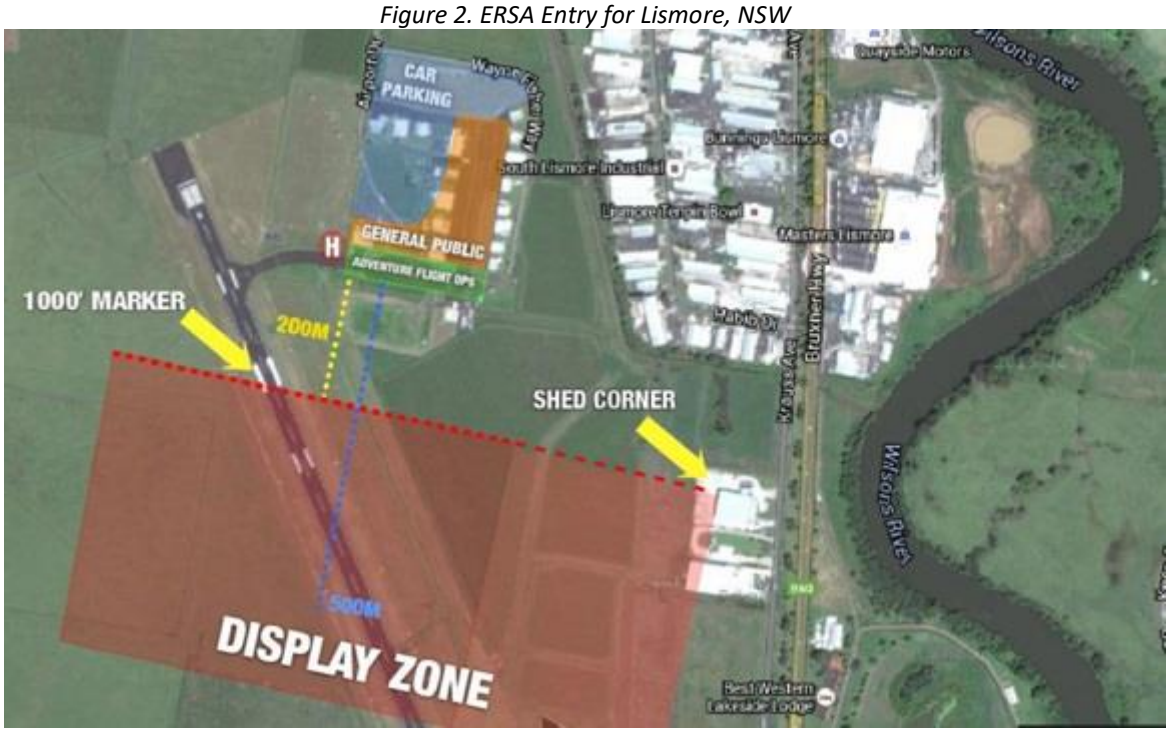


Figure 3: YLIS display zone for the Aviation Expo

1.11 Flight Recorders

The glider was not equipped with FLARM or another data logger device (Typically, these devices only record position and altitude at pre-selectable intervals down to one second.) at the time of the incident. Hence it was not possible to download a trace of the flight to aid the investigation. However, limitations on the resolution of the FLARM or logger data is likely to be too coarse to derive useful datapoints (e.g. descent rate) in the last second(s) of the flight. Also, such traces do not reveal rolling manoeuvres per se, and thus do not offer an authentic reflection of aerobatic flight.

1.12. Place of incident

The glider impacted and came to rest outside runway gable markers in grass next to the runway at Lismore airport, NSW.

1.13. Medical and pathological information

Not applicable.

1.14. Fire

None.

1.15. Survival aspects

The grassy ground where the glider impacted was muddy and relatively soft. The indentation in the soil made by the glider on first ground contact was about 30-40cm deep, absorbing a good part of the impact energy. The pilot was in the front cockpit sitting directly on the seat pan of the glider, with no cushion. The seat cushion (of dense foam) had been removed that morning for reasons of comfort and better glider controllability. The pilot was wearing a backpack type parachute that does not extend below the back to form a seat cushion for the pilot.

1.16. Tests and research

None conducted.

1.17. Organisational and management information

Air displays that day had been approved by CASA, to be conducted by Paul Bennet Airshows (the approved organisation). Ground and flight operational procedures had been established and clearly communicated to pilots both in the briefing and documentation sent out beforehand. A ringmaster had been appointed with the authority to run the day. Display abort procedures, diversion airfields, weather contingency plans and emergency response plans were all in place for the day and publicised beforehand, as well as briefed in detail on the day, to all participating pilots. A display schedule had been drawn up and was followed as closely as possible throughout the day.

1.18. Additional information

None.

1.19 Useful or effective investigation techniques

The glider pilot, tow plane pilot and airshow organiser were interviewed for this report.

2. ANALYSIS

2.1. Flight preparation

Before the display flight this day, the pilot elected to remove the seat cushion to change his seating position, as he was unable to get comfortable with the cushion on this day. Normally, the glider pilot sets his altimeter to QFE minus 200ft. This has been his practice for years to ensure that there is always adequate margin in the low-level manoeuvres. On this day, his altimeter was unintentionally left at zero feet (QFE). Investigators examined the situation around the glider's take-off in an attempt to understand the circumstances that may have led to this inadvertent altimeter setting. The glider pilot boarded the cockpit about 10 minutes before the actual take-off. With the help of a groundcrew, the glider was then pushed along the taxiway toward runway 15. The tow plane had taxied out in advance and was waiting with the rope on the runway. The glider was positioned behind the tow plane by the ground crew, but slightly off to the side in order to leave space for the preceding display—a helicopter demonstrating water bombing procedures. The tow pilot was communicating with the ringmaster on the display frequency, and directed a request at the helicopter to take off with the glider. The helicopter crew replied negatively, and the tow plane and glider—hooked up and ready to go—waited on the runway for another 4 minutes. They were then cleared for take-off once the helicopter was well out of the way. When the ringmaster called to clear the glider for its display, they had just climbed through 2,000 feet. A group of NASA researchers investigated the phenomenon of unintentionally not doing something that one had planned to do, which they referred to as an issue of prospective memory *[Dismukes, R. K. (2006). Concurrent task management and prospective memory: Pilot error as a model for the vulnerability of experts. Human Factors and Ergonomics Society 50th Annual Meeting, San Francisco, CA, HFES. And see also: Loukopoulos, L. D., et al. (2009). The multitasking myth: Handling complexity in real-world operations. Farnham, England; Burlington, VT, Ashgate Pub. Ltd.].* Remembering to set the altimeter to minus 200ft AGL after landing in the morning and before the aerobatic

display flight in the afternoon is a prospective memory task. NASA research established that the conditions under which prospective memory works most reliably are:

1. a linear environment where each step follows in a fixed sequence on the previous one;
2. a predictable environment where tasks and events can be exactly anticipated;
3. a controllable environment in which the pilot determines exactly what is going on around him or her.

In the situation on the ground at YLIS at the time, these three conditions were not or only partially met. The order in which the display flight pre-take-off checks could be accomplished was not fixed because of various parallel task demands. Pre-flight checks somehow assume that pilots are in control over the timing, pacing and manner of execution of their tasks. But the environment on the ground at an airshow is difficult to control for individual pilots because of other traffic, space constraints, and exact time allocations associated with the published display schedule. In addition, a glider cannot taxi under its own power, which means it is dependent on ground crew to manually manoeuvre it into position for take-off. The unplanned waiting time for the helicopter to pass and make room for the glider's take-off may have contributed to the sense that all pre-flight checks had been amply completed and obviated the need for another double-check of the cockpit setup. In addition, the negotiations with the helicopter, coupled with the time pressure that was building for the glider to take off so it could commence its display on time (as evidenced from the ringmaster's clearance which was received about halfway its climb), may have directed the glider pilot's attention and cognitive resources outside the cockpit rather than back inside.

2.2. Currency before the flight

The pilot commented that it is difficult to build up and maintain adequate proficiency for the kinds of flights done in displays. There is a general lack of possibilities for safe, and legal, practice for the kinds of aerobatic manoeuvres at low level that get displayed during airshows like the one at Lismore. There are very few areas in which low-flying is allowed, and very few airports at which the regulator has approved low-level aerobatic flying as a legal possibility. This lack of proficiency and currency mean that when it comes to flight preparation for an airshow, there is no authentic practice until the real event. This puts display pilots in a position where the manoeuvres are executed when (1) recovery margins are slim, where (2) visual cues are different from what was practiced at higher altitudes before, and where (3) diversion opportunities are few (because of tight display area limits).

2.3. Flight execution

When the pilot came out of a wing-over to begin the last run, which was to include a fast 4-point roll from level flight, then another wingover and then landing on RWY 33, he noticed that the altimeter showed over 400ft. He decided this was 'very good,' as he'd normally expect it to show about 200-250ft (given the -200 correction he normally puts in before the flight). When coming out of the wing-over, he saw a fence ahead which appeared surprisingly close, in a way that was inconsistent with the altitude he had just read off his altimeter. As a result, he was not able to generate quite as much airspeed for the 4-point aileron roll as he had liked. When entering the first quarter of the roll, airspeed was 80-85 knots, rather than the desired 90 knots. When inverted, the pilot noticed that the picture 'didn't look right,' and decided to abort the manoeuvre. The roll rate of the Fox glider is about 360 degrees/4 seconds, so this was literally a 'split-second' decision. From here on, all pilot actions were focused on mitigation and recovery. While completing the last part of the roll, the pilot used his knife-edge position to move the glider away from the display area and spectators and bring it over an empty, clear area of the airfield instead. As he was doing so, the nose was dropping and the descent rate was increasing. Not long after the pilot had levelled the wings, the glider contacted the soft grassy ground outside the gable markers on the western side of the airfield.

2.4. Ground contact

The skid marks on the fuselage, the damage sustained by the undercarriage, the 100 metre ground run through soft grass, witness statements, the fact that the ailerons and other control surfaces were responding accurately to pilot inputs during the last roll to level flight, and interviews with the pilot all suggest that the glider was not stalled when it contacted the ground, or that it had stalled at a higher speed because of additional wing loading in the recovery attempt close to the ground. The pilot recalled the glider flying about 60 knots when it made ground contact.

2.5. Plan continuation

The sequence of events fits a well-known pattern in human factors, called 'plan continuation.' The pattern has been studied extensively by another group of researchers at NASA Ames Research Center *(See: Orasanu, J. M., et al. (1996). Cognitive and contextual factors in aviation accidents: Decision errors. Applications of naturalistic decision making. E. Salas and G. A. Klein. Mahwah, NJ, Lawrence Erlbaum Associates)*. From a number of incidents, they concluded that:

In plan continuation, early and strong cues suggest that sticking with the original plan is a good, and safe, idea. Only later, and weaker cues suggest that abandoning the plan would be better, but they are not as convincing as the early cues that encouraged continuation. By the time later cues come in, margins for recovery and safe plan abandonment may have shrunk. In hindsight, outside observers may forget to see the cues from the point of view of pilot at the time, and when and how persuasively those cues appeared.

NASA researchers pointed out that decision-making in complex, dynamic settings such as the last part of an aerobatic display is not an activity that involves a weighty comparison of options against pre-specified criteria. Rather, such decision-making is "front-loaded:" this means that most human cognitive resources are spent on assessing the situation and then re-assessing it for its continued do-ability. In other words, decision-making in a dynamic situation is hardly about making decisions, but rather about continually sizing up the situation. The 'decision' is often simply the outcome, the automatic by-product of the situation assessment. This is what turns a decision on whether to continue with a plan into a constantly (re-)negotiable issue: even if the decision is not made on the basis of an assessment of the situation now, it can be pushed ahead and be made a few or more seconds later when new assessments of the situation have come in. The order in which cues about the developing situation come in, and their relative persuasiveness, are two key determinants for plan continuation. Conditions often deteriorate gradually and ambiguously, not precipitously and unequivocally. In such a gradual deterioration, there are almost always strong initial cues that suggest that the situation is under control and can be continued without increased risk. This sets a pilot on the path to plan continuation. Weaker and later cues that suggest that another course of action could be safer have a hard time dislodging the original plan. In summary, plan continuation means sticking to an original plan in rapidly evolving situations, while the changing situation actually calls for a different plan:

- Early cues that suggest the initial plan is correct are usually very strong and unambiguous. This helps lock people into a continuation of their plan. The persuasive early cue here would have been an indicated height of over 400ft AGL when coming out of the wing-over.
- Later cues that suggest the plan should be abandoned are typically more ambiguous and not as strong. These cues, even while pilots see them and acknowledge them, often do not succeed in pulling pilots away from the plan. In this case, later cues would have been the fence, and the inability to get the desired airspeed for the final 4-point roll. Neither cue made the roll manoeuvre impossible, however, and were not as convincing as the early height cue.When the plan was abandoned, there was still sufficient margin to steer the glider away from risk at the airfield and then level the wings, but there was insufficient height and/or energy for a landing with a slower descent rate.

3. CONCLUSION

3.1. Findings

1. Both glider and pilot were appropriately certified and approved for the display at Lismore on 29 July 2017, including low-level aerobatic manoeuvres.
2. The airshow was appropriately planned and approved.
3. The seat cushion was taken out before the display flight to achieve a better seating position.
4. The altimeter was set at 0ft AGL, and not at minus 200ft AGL, as is the pilot's usual practice for display flying.
5. In the wingover before the last planned 4-point roll, the pilot noticed indicated altitude to be around 400ft, whereas normally (with the altimeter adjustment) it would be around 250ft.

6. The sequence of events fits the pattern of plan continuation in which early, strong cues suggested the plan could be safely continued, and only later, less persuasive clues suggested the plan might need to be changed or abandoned.
7. The glider was flying at about 60 knots when it impacted the grass.

3.2. Causal factors

- There is a structural lack of legal possibilities for the safe and approved practice of low-level aerobatic manoeuvres in Australia, both for powered aircraft and gliders.
- The sequence of events in the glider incident at YLIS fits the pattern of plan continuation. In plan continuation, early and strong cues suggest that sticking with the original plan is a good, and safe, idea. Only later, weaker cues suggest that abandoning the plan would be better, but they are not as convincing as the early cues that encouraged continuation.
- The altimeter setting of Zero feet AGL, rather than the pilot's customary minus 200ft AGL, contributed to the strong height cue at the beginning of the last manoeuvre that suggested that continuing with the planned manoeuvre was safe.
- The pre-flight removal of the seat cushion may have contributed to the injuries sustained, but that is not certain: the seat cushion that was removed was made of dense foam but not designed to a specific G-rating.

4. RECOMMENDATIONS

1. GFA and appropriate bodies in General Aviation are recommended to work with stakeholders to create possibilities for the safe and legal practice of low-level aerobatic manoeuvres outside of airshow days and locations.
2. Pilots, whether before aerobatic display flights or any other flights, might be encouraged to take steps to ensure as 'sterile' a cockpit environment as possible as they are preparing their aircraft for departure. This ensures a micro-environment that is as controlled and predictable as possible, so that necessary preparatory steps are taken in a fixed order, and prospective memory problems are minimised.

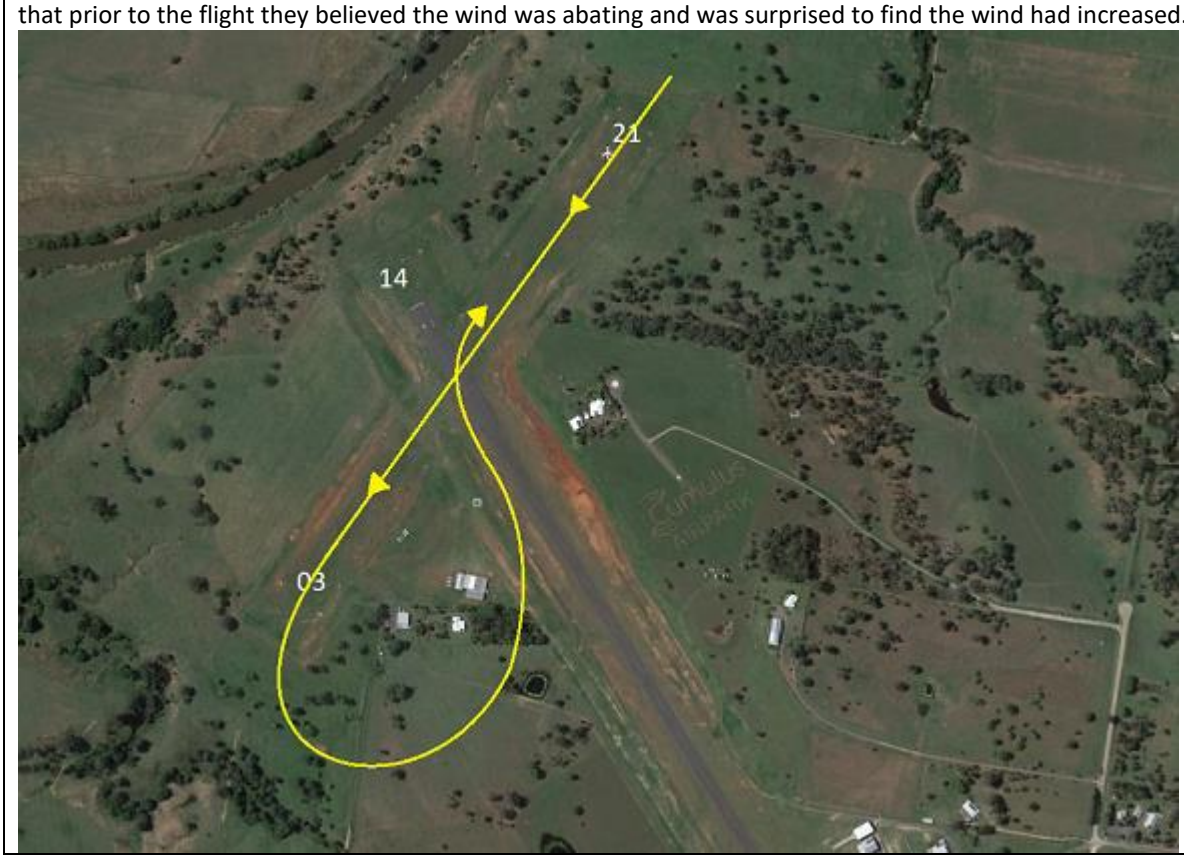
Date	6-Aug-2017	Region	WAGA	SOAR Report Nbr		S-1015	
Level 1	Operational	Level 2	Aircraft Control	Level 3		Control issues	
A/C Model 1		Glasfugel Libelle 201B		A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	

This incident occurred during a test flight following the completion of the glider's annual Form 2 Inspection. Weather conditions at the time the test flight was undertaken were benign and the pilot considered conditions were suitable to carry out a VNE run. After releasing from aerotow at 3500' AGL and following initial control checks and clearing turns, straight and level flight was assumed at a speed of 50 knots. From this starting point speed was increased in 10 knot increments with control checks carried out at each speed. This progressed normally with no adverse reaction to control inputs noted. Just as the speed reached VNE (135 knots) the pilot felt an upward surge of the aircraft as would normally be felt passing through a bubble of lift. The pilot did not feel this through the controls but rather through the "seat "and is convinced it was external to the aircraft. Immediately following the vertical surge the aircraft started to vibrate. The pilot stated: *"I can best describe the sensation felt as a "shimmy" coming from behind me, it as if the tail section was oscillating and shaking the rest of the aircraft. It was not a very high frequency shake, I would estimate the oscillations at 3-4 per second but the frequency may have been increasing before corrective action was taken."* Although the event happened quite suddenly, the strength of the oscillations was mild initially but increased in magnitude rapidly. As soon as the oscillations began the pilot gently reduced speed. As the speed bled off the magnitude of the oscillations initially seemed to increase in intensity but then gradually subsided and finally stopped completely when the speed dropped below 100 knots. As the pilot was preoccupied with getting the glider under control, observation of the wings and tailplane, which can be partially seen from the cockpit of the glider, was not undertaken. After resuming a stable attitude, the pilot

assessed the glider's handling and structure to be normal, so the flight was abandoned. The landing was uneventful and a visual inspection of the airframe did not reveal any damage. A detailed inspection of the aircraft identified excessive free-play in the rudder gimbal drive had led to a flutter event. The free-play was removed and the aircraft returnd to service.

Date	8-Aug-2017	Region	GQ	SOAR Report Nbr	S-1016		
Level 1	Operational	Level 2	Aircraft Control	Level 3	Hard landing		
A/C Model 1	Twin Astir	A/C Model 2					
Injury	Nil	Damage	Substantial	Phase	Landing	PIC Age	60

While demonstrating a simulated launch failure to the student, the instructor misjudged the round-out from a very steep approach and the aircraft landed heavily with some sideways drift. The tail boom broke off just behind the wings. The tow was taken to the usual 2000ft AGL on a day with little thermal activity. The decent was used for training sequences, such as control co-ordination, and a high approach was made to the operational runway (RWY 21) with the intention of demonstrating a simulated launch failure from about 500ft AGL at the far end of the runway. The instructor conducted a 270 degree turn to the right followed by a 90 degree turn to the left to align with runway 03. Unfortunately, the instructor had not identified that the wind speed had increased since launch and the glider drifted further downwind than anticipated during the turn. This placed the glider in a very steep approach to the remaining 350 metres of runway. The instructor used full airbrake and sideslip to increase the descent rate. Unfortunately, the instructor did not close the airbrakes in time to prevent the glider from landing heavily with some sideways drift. The instructor stated that prior to the flight they believed the wind was abating and was surprised to find the wind had increased.



Date	12-Aug-2017	Region	SAGA	SOAR Report Nbr		S-1018	
Level 1	Operational	Level 2	Ground Operations	Level 3		Taxiing collision/near collision	
A/C Model 1		Grob G 109		A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Ground Ops	PIC Age	67

As the aircraft was being taxied from the hangar apron to the aircraft parking area adjacent to the operational runway by an experienced pilot, the port wingtip contacted vegetation at the side of the runway resulting in minor damage. The taxiway is narrow, with minimal clearance for gliders due to constantly growing small gums. The club usually employs a person to guide the aircraft down the taxiway during crosswind condition but one was not employed on this occasion as the wind was light. It is believed the pilot may have been momentarily distracted by a cut on his finger that was bleeding. The Club will approach the airfield owner to reduce the encroaching vegetation.

Date	12-Aug-2017	Region	NSWGA	SOAR Report Nbr		S-1054	
Level 1	Operational	Level 2	Airframe	Level 3		Landing gear/Indication	
A/C Model 1		SZD-55-1		A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	70

The pilot lowered the undercarriage for landing but the locking mechanism did not engage. Upon touchdown the undercarriage retracted resulting in some minor scratching of the fuselage. The wheel retraction and lowering mechanism for this aircraft is via a mechanism on the right-hand side of the cockpit.

With the handle forward, the wheel is down; and with the handle rearward, the wheel is up. A small red trigger like device is fitted to the front of the handle, which must be depressed to retract the undercarriage. When the undercarriage is lowered the lock should automatically engage and the red trigger should need to be depressed if the wheel is to be retracted again. Although the pilot can see that the wheel is down there is no indent or visual way of verifying that the wheel is locked. The pilot noted that after lowering the wheel it is their practice to confirm the lever is locked by trying to retract it without depressing the red trigger. The pilot has a clear recollection of doing this on the day but noted that considerable force is required to retract the undercarriage, even when the trigger is depressed and the mechanism is unlocked. The pilot suspects on this flight that insufficient force was applied to the gear retraction mechanism to confirm it was locked.

Date	19-Aug-2017	Region	SAGA	SOAR Report Nbr	S-1022
Level 1	Operational	Level 2	Airframe	Level 3	Fuselage/Wings/Empennage
A/C Model 1	AS-K 13	A/C Model 2			
Injury	Nil	Damage	Minor	Phase	In-Flight	PIC Age	67

The purpose of the flight was to undertake a performance evaluation following annual maintenance. The command pilot flew the aircraft to Vne and, as the glider was slowed, some fabric separated from the top surface of the starboard wing immediately behind the airbrake box. While the aircraft felt heavy, the pilot was unaware of the problem until after landing. Investigation determined that when the wing was recovered some years earlier, the fabric had been cut flush with airbrake cut-out instead of being lapped into airbrake box. This error was masked by paint and was not picked-up at subsequent inspections. Gradual degradation of the paint and UV damage over time led to the leading edge of the fabric losing adhesion, thereby allowing the airflow to lift the fabric to the point that it tore off.

Date	19-Aug-2017	Region	VSA	SOAR Report Nbr	S-1026
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Near collision
A/C Model 1	PW-6U	A/C Model 2	DG-400		
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	

It was reported that a glider/tug combination climbing for height passed less than 100ft over a thermalling motor glider. Investigation revealed that the towing combination commenced take-off from operational runway 18 at 13:36, and almost one minute later, when the combination was just upwind of the runway perimeter, the DG-400 pilot commenced take-off. At 13:38, while at a height of about 800ft AGL, the towing combination commenced a procedural turn to the left. Approximately 30 seconds later and around 800ft AGL the DG-400 pilot turned to the right. A minute later the towing combination was on a Westerly heading just upwind and to the East of the operational runway when the glider pilot received a collision alert from the Flarm. At the same time, the DG-400 had completed 270 degrees of a turn and was heading in a Southerly direction when the pilot suddenly noticed the towing combination at a similar height closing from the left. The DG-400 pilot took avoiding action by tightening the turn as the towing combination passed within 100ft. It is possible the tow pilot did not identify the DG-400 as it was slightly lower and may have been obscured by the nose of the tow plane.

Date	20-Aug-2017	Region	VSA	SOAR Report Nbr		S-1021	
Level 1	Airspace	Level 2	Aircraft Separation	Level 3		Near collision	
A/C Model 1		DG-1000S		A/C Model 2		Piper Cub/Pacer	
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	54

On early downwind the command pilot identified a powered aircraft climbing from the left on a collision course and took avoiding action to prevent a collision. The pilot of the powered aircraft also took avoiding action and passed about 50-100m in front of glider. The glider was on an instructional flight and returning to the airfield to join circuit. It was late afternoon, and lighting conditions were dull due to an overcast sky. Just after the decision to break-off the flight, the crew of the glider heard a departure call over the CTAF from the pilot of a visiting Piper Tripacer. The gliding instructor visually acquired the Tripacer lifting off about two thirds down the operational runway. Nearing the circuit joining area the gliding instructor scanned the airspace for the departing Tripacer but did not see it. As glider became established on the downwind leg and at about 900ft AGL the glider instructor saw Tripacer in in the 10 o'clock position climbing on its crosswind track on a path that would conflict with the glider. The gliding Instructor assumed control of the glider and rolled left to pass behind the Tripacer. Shortly after the glider rolled, the Tripacer pilot also turned left to avoid the glider. At the closest point, the two aircraft were estimated to be 50 to 100 metres apart. It is considered that had neither pilot taken avoiding action a collision was likely. No radio communications followed the incident, and the Tripacer departed to the south. The glider instructor suspects the Tripacer may have been obscured from view by the Clear Vision Panel on the left-hand side of the glider's canopy. Investigation revealed the Student pilot, who is not solo standard, did not sight the Tripacer as their attention was directed at flying the glider. An inbound call was not made by the glider pilots as they had been operating within glide range of the aerodrome. The glider pilots also did not give a positional broadcast upon joining the circuit but this was considered a timing issue rather than an oversight as the incident occurred around the time a call was due to be made by the student.

Date	20-Aug-2017	Region	VSA	SOAR Report Nbr	S-1023
Level 1	Operational	Level 2	Airframe	Level 3	Doors/Canopies
A/C Model 1		Ventus c		A/C Model 2	

Injury	Nil	Damage	Minor	Phase	In-Flight	PIC Age	69
The purpose of the flight was to undertake a performance evaluation following annual maintenance. As the command pilot flew the aircraft to Vne the canopy opened. The pilot immediately slowed the aircraft and pulled the canopy down but could not close it fully so held it in position. The pilot noted that the canopy showed no inclination to lift open once the speed had decreased. The plot completed a successful landing without further incident. The pilot recalled noticing the canopy appeared not to be properly closed while conducting the pre-launch checks, so the canopy was opened and closed again. The pilot believes, with hindsight, that the canopy locking lever was not pushed sufficiently forward to properly engage the locking pins, and the pilot did not attempt to lift the canopy to ensure the lock was engaged. A witness to the launch believed the canopy was not properly closed but did not have access to a radio to alert the pilot. The pilot also noted that operations were being conducted on the main bitumen runway as the grass strips were unserviceable due to rain. Consequently, the take-off was smooth and the canopy did not move (movement over rough ground may have altered the pilot to the canopy being unlocked). Inspection of the locking mechanism revealed it to be stiff, which was alleviated to some extent by lubrication. While 'canopy closed and locked' is part of the pre-launch checklist, all too often a pilot will take off with the canopy closed but not locked. To prevent this, pilots should be in the habit of verifying the canopy is locked. This can be done by gently pushing up on the frame of the canopy, not the Perspex. Also, the command pilot is responsible for each canopy being closed, locked and verified and not just their own.							

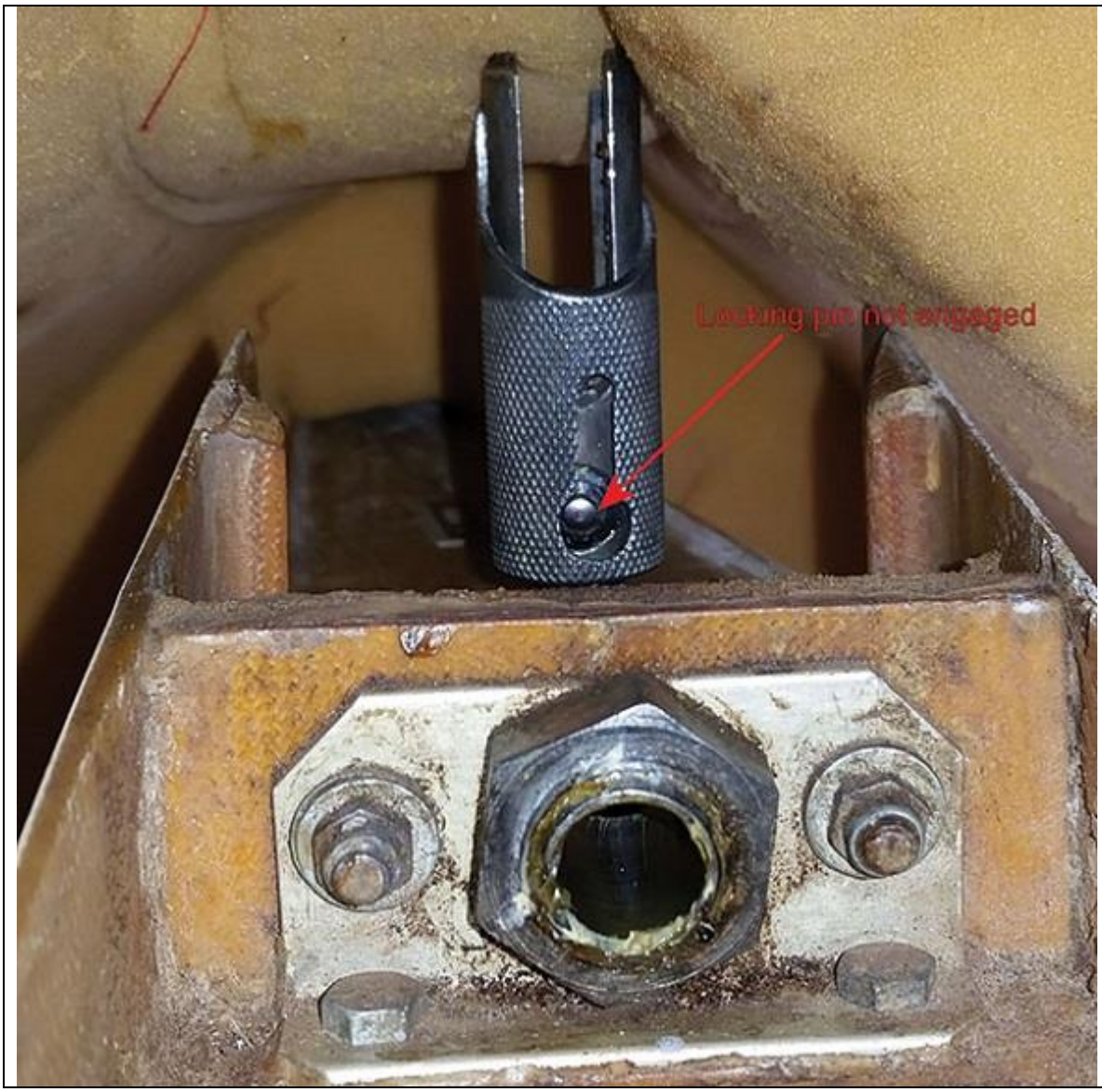
Date	27-Aug-2017	Region	VSA	SOAR Report Nbr	S-1027
Level 1	Operational	Level 2	Aircraft Control	Level 3	Wheels up landing
A/C Model 1	Twin Astir	A/C Model 2			

Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	73
During a training flight the glider was landed with the undercarriage retracted. Investigation revealed the instructor did not normally retract the undercarriage and got caught out when the student, who was undergoing type conversion, raised the undercarriage in flight. Both pilots did not properly complete their pre-landing checklist and failed to check the correct sense and position of the undercarriage lever. A contributing factor was an unserviceable undercarriage warning alarm. The instructor and student were debriefed by their CFI.							

Date	8-Sep-2017	Region	WAGA	SOAR Report Nbr	S-1033
Level 1	Technical	Level 2	Systems	Level 3	Flight controls
A/C Model 1	SZD-48-3 Jantar Standard 3	A/C Model 2			

Injury	Nil	Damage	Substantial	Phase	In-Flight	PIC Age	69
During the post-maintenance test flight the elevator pushrod disconnected. The pilot was able to land the glider using weight-shift techniques to dampen the phugoid oscillations. The pilot was uninjured, but the glider was substantially damaged.							

It was determined that the elevator coupling had not been secured during rigging and the dual check did not identify the problem. Inspectors must ensure the release button is securely locked during rigging, and should use a mirror and torch if necessary.



Date	9-Sep-2017	Region	VSA	SOAR Report Nbr		S-1032	
Level 1	Technical	Level 2	Systems	Level 3		Flight controls	
A/C Model 1		ASK-21Mi		A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Ground Ops	PIC Age	68

During the Daily Inspection the starboard wing airbrake pushrod was found disconnected from the l'Hotellier coupling in the fuselage. It is thought the diconnect occurred during landing on the prevous flight. Investigation evealed the L'Hotellier was functioning correctly, leading to the conclusion that it was not properly connected at time of rigging. This aircraft uses spring-loaded Wedekind safety sleeves and the manufacturer is unaware of similar occurrences on this model. They noted that a correctly fitted Wedekind sleeve will prevent an unintentional disconnection as long as the ball diameter is within specification and the wedge is not unduly worn. The Aircraft Flight Manual states: *"During assembly of the quick-release connectors either the aluminium safety sleeve is pushed back until the wedge may be pushed in entirely, or the spring is removed from the check hole of the wedge. After the careful assembly of the quick-release*

connectors check that the spring-loaded safety sleeve secures the wedge again completely. All quick-release connectors must be tested by pulling the pushrods - socket ends off the ball heads -, applying a force of not less than 5 daN (10 lb), and it must be checked that the safety elements are in their correct position." It is suggested that inspectors check the correct fitment visually, using a torch if necessary. The Wedekind sleeve also has a notch and pin arrangement that can be felt to conform it is correctly engaged. *[Refer also to SOAR Report S-0765].*

Date	10-Sep-2017	Region	VSA	SOAR Report Nbr	S-1084		
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Near collision		
A/C Model 1	ASK-21Mi			A/C Model 2	Cessna 172		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	51
After completing some training manoeuvres the glider instructor noticed a Cesna aircraft in close proximity (60 metres laterally) and turning away from the potential conflict. The identity of the other aircraft was not established.							

Date	10-Sep-2017	Region	VSA	SOAR Report Nbr	S-1085		
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Near collision		
A/C Model 1	ASK-21Mi			A/C Model 2	Cessna 172		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	23
The self-launching sailplane was operating from Runway 17 on a training sortie. Following a normal launch, and as the sailplane was climbing through 1200ft, the command pilot heard a radio call from the pilot of a Cessna aircraft reporting entering the CTAF at 10NMs. The sailplane pilot made a position report that was acknowledged by the Cessna pilot. Shortly afterwards, and at a height of 2,000ft, the student pilot in the sailplane alerted the command pilot of the presence of a Cessna ahead and slightly to starboard. The command pilot executed a clearing turn and the Cessna passed about 200ft laterally. The command pilot was unable to identify the Cessna and believes its pilot had not sighted the sailplane.							

Date	15-Sep-2017	Region	GQ	SOAR Report Nbr	S-1034		
Level 1	Technical	Level 2	Systems	Level 3	Flight controls		
A/C Model 1	Twin Astir			A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Ground Ops	PIC Age	66

While conducting the Daily Inspection, the inspector identified that mandatory maintenance based on 'time in service', i.e. the lubrication of L'Hotellier couplings, was not undertaken and the aircraft had flown on at least four occasions beyond the service due date. The outstanding maintenance was performed and the aircraft was returned to service. Before starting a Daily Inspection, it is essential to check that the Maintenance Release is valid, and no Major Defects are recorded which prevent flight. The inspector must also check the details of any scheduled maintenance as listed. If the Maintenance Release is not valid, there is no point in continuing to inspect the glider because it will be illegal if it is flown. The GFA Daily inspector's Handbook requires the following points to be checked:-

1. *Registration to correspond with glider registration, i.e. booklet is in the correct glider. The booklets are numbered and are specific to each glider registration. It is not permitted to swap booklets between gliders.*
2. *The date of expiry. The glider must not be flown if the document has expired.*
3. *The document is signed.*
4. *That the post-inspection evaluation flight has been signed off.*
5. *That any scheduled maintenance (recurring maintenance) due for completion by date or time is recorded as completed or, if the maintenance is now due but not completed, organise the*

maintenance to be carried out this day, if possible, by an appropriate person & certified before final DI signature and release for flying.

Date	16-Sep-2017	Region	VSA	SOAR Report Nbr	S-1035		
Level 1	Operational	Level 2	Runway Events	Level 3	Runway excursion		
A/C Model 1	Kestrel		A/C Model 2				
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	78
The pilot lost control while landing in a strong crosswind and a ground loop ensued. The pilot reported flying a high circuit due to the strong and gusty wind conditions, and the final approach was made with half landing flap. The pilot noticed significant drift just before touch-down but was able to counter this with rudder inputs. Just after touchdown the port wing contacted high grass at the edge of the runway resulting in the glider rotating through 120 degrees. There was no damage or injury. The pilot attributed the ground loop to a combination of pilot error, wind gusts and the denseness of the grass. One of the Club's instructors advised that, just prior to launch, the pilot was informed that the tail dolly was still fitted, and he had to get out of the glider to take it off. The pilot's CFI noted that while the pilot has been able to pass their annual flight review, some age-related issues are beginning to manifest.							

Date	16-Sep-2017	Region	VSA	SOAR Report Nbr	S-1041		
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Aircraft Separation Issues		
A/C Model 1	Beechcraft Baron		A/C Model 2				
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	
A powered aircraft enroute to a Regional Airport overflew the local glider airfield at low level, despite being alerted by radio that gliding operations were in progress. The gliding airfield is situated 2NM SSW of the Regional Airport and is mentioned in ERSA entry for the Airport. The gliding club launches by winch. About 1322 the ground operations heard a radio call from the pilot of a Beechcraft Baron entering the CTAF from the South-West. The Duty Pilot made a radio call to the Pilot of the Beechcraft to advise that gliding operations were in progress and received an acknowledgement. The CFI, who was about to fly with a student, decided to delay the launch. Shortly afterwards the Beechcraft flew across the operational runway at circuit height. The CFI made a call to the pilot of the Baron but did not receive a reply. The matter was referred to the ATSB, who alerted the Beechcraft pilot to the issues.							

Date	17-Sep-2017	Region	GQ	SOAR Report Nbr	S-1083		
Level 1	Operational	Level 2	Terrain Collisions	Level 3	Ground strike		
A/C Model 1	ASK-21Mi		A/C Model 2	N/A			
Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	70
The command pilot was conducting an air experience flight. After landing on runway 06 the aircraft had sufficient forward speed for the command pilot to taxi the aircraft clear of the runway with the aim of stopping on the apron outside the aerodrome terminal building. As ground speed reduced, the command pilot began to lower port wing onto the taxiway in order to keep the starboard wing well clear of the taxiway lights. A sudden gust of wind rolled the wings, and despite the input of full opposite aileron control, the starboard wing contacted the ground and struck a taxiway light. Due to the slow forward speed, the aircraft suffered only superficial damage. The Club CFI has banned taxying unless the aircraft is under power with one wing firmly down.							

Date	19-Sep-2017	Region	GQ	SOAR Report Nbr	S-1047

Level 1	Operational	Level 2	Terrain Collisions	Level 3	Controlled flight into terrain

A/C Model 1	ASK-21	A/C Model 2	N/A

Injury	Fatal	Damage	Write-off	Phase	Landing	PIC Age	62

GFA Field Investigation

1. FACTUAL INFORMATION

At 0933 hours on 19 September 2017 an ASK-21 two-place glider launched behind a Piper Pawnee tow plane from the Jondaryan airstrip in Queensland, and released at a height of about 2,400 ft above ground level (AGL) at 0937 hours. After a short flight the command pilot joined the downwind leg of the circuit for landing. During the final approach to the operational runway and at a height of between 50 and 30 feet AGL, the glider suddenly and unexpectedly nosed steeply towards the ground and impacted the surface of a ploughed paddock approximately 30 metres short of the runway. The accident was witnessed by the tow pilot, who was also a gliding instructor and the wife of the command pilot, and another trainee pilot. The two witnesses rushed to the accident site in a vehicle. Upon reaching the site they noted significant damage to the aircraft and that the flight crew had been seriously injured (refer figure 1). The trainee pilot telephoned emergency services and, together with the tow pilot, removed the flight crew from the aircraft and commenced CPR. Police and emergency services attended the scene shortly afterwards and confirmed the pilots were deceased. The Australian Transport Safety Bureau (ATSB) was notified of the accident but declined to investigate. The Gliding Federation of Australia (GFA) dispatched a Technical Advisor, who is an experienced investigator, to the site to assist the Queensland Police.

Figure 1: Glider resting position

1.1 History of flight

The command pilot and his wife, who are both flying instructors and tow pilots, were running a week-long ab-initio gliding course for two student pilots. They were alternating between flying the glider and flying the tow plane each day. The accident occurred on the third day of the course and was the second flight of the day; the first flight had been conducted without incident by the same instructor and same student, and in the same aircraft. The student pilot was occupying the front seat, and the instructor was seated in the rear of the cockpit. This was the student pilot's 8th training flight. The glider was observed by the witnesses towards the end of the flight just after it entered the circuit for a landing. The witnesses watched the glider flying the downwind leg for runway 31 and then observed the glider as it was turned onto the base leg slightly closer than on the previous flight. Both the tow pilot and trainee pilot were interviewed separately by the GFA's investigator, who recorded their conversations. The tow pilot later provided a written statement, which was similar to their recorded statement. In their written statement, the tow pilot noted that the *"Downwind leg looked well placed and at the right height; the base leg was similarly good height and distance away. The glider appeared to modify the base leg slightly towards the field as the wind was quite strong. No Airbrake seemed to be applied in this leg."* When the glider was approaching abeam the extended runway centreline, it was observed to turn onto the final approach. The flight log indicates this was at a height of about 700ft AGL. On final approach the glider appeared, to the witnesses, to be flying at normal speed, with airbrakes half extended. The flight log reports a ground speed of between 50 to 56 knots, which would be the normal approach speed into a reported 10 to 15 knot headwind. The tow pilot reported in their witness statement: *"The final leg looked well placed and at a good height for the wind on the day. I estimate it turned final at about 4-500 ft (but it can be checked on the GPS trace). Initially there was no airbrake applied. Then some airbrake came out for several seconds; then the airbrakes went away for several seconds; then airbrake deployed again. I thought that [the command pilot] was demonstrating the moving of the aiming point. Full airbrake was not deployed on either action. It then looked like the glider was on the stabilised approach with maybe one-third to one-half airbrake. It all looked entirely normal at this point."* On short final, at a height of between 30 and 50 feet above the ground, the glider was observed to make a sudden, very steep, nosedive. Coincident with the glider nosing over, the airbrakes were observed to became fully extended. The glider impacted the ground at an angle of about 65 degrees to the horizontal plane immediately after, with no evidence of any attempt by the flight crew to recover (refer Figure 2). The glider came to rest in an empty cotton field just short of the runway. The tow pilot wrote: *"When approaching about what I think was 30-50 ft the airbrake came out full and at the same time, the glider pitched violently forward to the near vertical position and within a second or not much more, hit the ground vertically. The glider landed about 10-15m short of the runway in the ploughed field."* In a recorded interview with the GFA's investigator, the trainee pilot said: *"The transition was very quick - from everything looking fine and from what you'd expect to be the final approach to everything obviously just being not good and it was over in like what was a second if that. There was obviously no time for the pilots or [the command pilot] to recover the aircraft, if say the student was in command or, I'm not sure."* He also stated: *"It wasn't a full 90 degree straight-in, it was more like 60 to 65 degrees; it was definitely quite steep."*

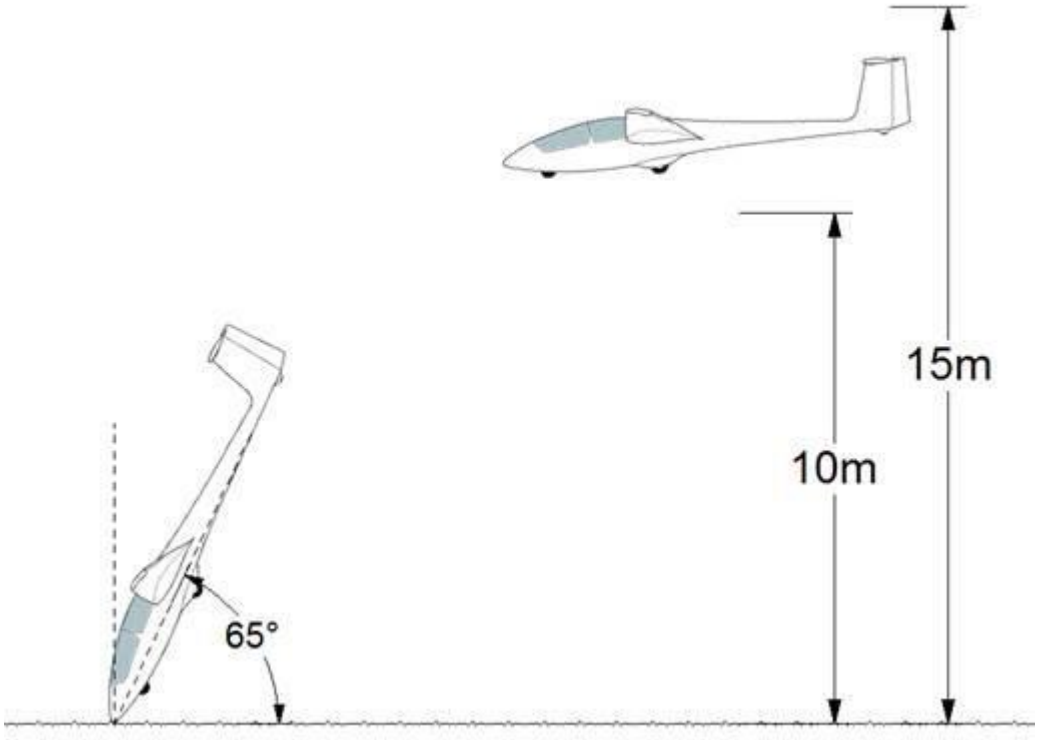


Figure 2: Impact profile

The tow pilot wrote: *"[The Trainee pilot] and I jumped in my car and we drove very fast to the crash site. I was horrified at the damage and as we approached the cockpit, it was apparent that there was catastrophic damage and the pilots were in bad shape, [the command pilot] (was) slumped in his seat and [the Student Pilot] (was) hanging out of his cockpit."* The trainee pilot told the GFA Investigator: *"We drove over there and as soon as we got to the wreckage it was definitely something that was pretty gnarly. After getting hold of emergency services, I managed to pull both occupants out of the cockpit and I began CPR on both – I started on [the student pilot], ended up pulling out [the command pilot] and continued on him until the emergency services took over."* Shortly after attending the scene, paramedics attempted resuscitation, but their attempts were unsuccessful and both men were pronounced deceased.

1.2. Injuries to persons

A full post-mortem examination demonstrated severe injuries in both flight crew, sufficient to cause death. The injury pattern is consistent with having been sustained during the impact of the glider with the ground.

1.3. Damage to aircraft

- An impact angle of about 65 degrees nose-down, was derived from a combination of damage to the underside of aircraft, wings and the indentation made in the field.
- Substantial damage was caused to the entire airframe consistent with high-speed steep-angle impact with ground. The nose cone, cockpit canopies and seat pans were shattered. Both control sticks were bent flat forward. The instrument panels were dislodged but largely intact themselves and still loosely held. Most of the instruments were still intact. The cockpit frame was bent and shorn in multiple places. The seat harnesses were intact but suspended from the cockpit frame, which itself was damaged substantially.

- There was no evidence of a ground run after impact. The aircraft came to rest about 1 metre from where it impacted, twisting up to 30 degrees to the left between the initial impact and final resting place (refer Figure 3).

Figure 3: Impact crater behind the main wheel.

Figure 4: Left wing displacement

- Evidence of impact (as marked by dust/sand imprinted from the field into the airframe) was visible on both wings, up to half the length of each wing from the tips inward. The outboard halves of both wings thus hit the ground on impact, likely (almost) simultaneously.
- The right wing was still in place. The left wing was mostly in place but torqued slightly forward and upward (refer Figure 4).

Figure 5: Tail boom, rudder and elevator.

- The tail boom had broken off approximately 1.5m inboard from rudder. It had cocked forward by almost 180 degrees, connected to the fin and empennage by only by the rudder cables and a severely deformed elevator pushrod control rod (refer Figure 5).
- The elevator circuit and trim system were both found to be intact (refer Figure 5).
- The airbrakes were unlocked and partially extended.
- All parts of the airframe suffered damage consistent with a high 'g' impact.

1.4. Other damage

Nil. The aircraft impacted on vacant rural land.

1.5. Personnel information

1.5.1 Flight Experience

Command Pilot

The command pilot held a GFA Glider Pilot Certificate with a Level 3 Instructor endorsement, and held the position of Chief Flying Instructor of the Darling Downs Soaring Club. He also held Commercial and Private pilot licences issued by the Civil Aviation Safety Authority (CASA). Logbook records show the command pilot commenced gliding in 1968, and at the time of the accident had flown 3,228 glider flights for a total of 1,933 hours; over 680 hours of which were as an instructor. The command pilot had an additional 2,960+ hours in General Aviation powered aircraft.

Student Pilot

Logbook and training records reveal the student pilot commenced their flight training two days earlier on 17 September 2017 and had accumulated just under 3½ hours flight time. The accident occurred on the student pilot's eighth flight. The tow pilot, who had flown with the student the day before, advised the GFA Investigator in a recorded interview that the student pilot had no prior aviation experience: *"I did make the*

comment to him and said you fly quite well have you got any prior experience and he said no, I ride a motorbike, and maybe that's it. No hang gliding or nothing."

1.5.2 Medical Information

Command Pilot (Instructor)

The command pilot had been examined by a Designated Aviation Medical Examiner on 19 August 2017 and was issued with a CASA Class II Medical Certificate valid to 9 August 2019.

Student Pilot

The student pilot was not required to hold a medical certificate but had informed the club that they were not suffering from any physical condition that would preclude them from operating a glider.

1.6. Aircraft information

The ASK 21 is a two-seat, mid-wing glider with 17m span. It has docile flight characteristics that makes it ideal for flight training, combined with easy handling – both on the ground and in the air. The two-part double-tapered wing is built as a fiberglass sandwich with hard foam core, and the wing spars use a conventional tongue and fork extensions to ensure a straight-forward wing assembly. There are very effective large dive brakes on the wing upper surface which give very good manoeuvrability, even in the case of a steep landing approach. Aileron, elevator and airbrakes are actuated via pushrods, and the rudder is actuated by stainless steel cables. The tailplane is fitted with an automatic elevator connection which, on rigging8, ensures that the stabilizer can be assembled only when the elevator control is correctly connected.

1.7. Meteorological information

The wind was about 320 degrees at about 10 -15 kts. No cloud was visible.

1.8 Aerodrome information

McCaffrey Field is uncertified Aeroplane Landing Area (ALA) operated by the Darling Downs Soaring Club and situated approximately 4.5 NM WNW of Jondaryan Qld. It has a single grass runway (12/30) of 1200 metres length. The airfield is 1,215 ft above mean sea level. The Common Traffic Advisory Frequency is 126.7 MHz. The terrain around the airfield is flat with few trees, and there are no obstacles, hills or mountains of any influence in the vicinity.

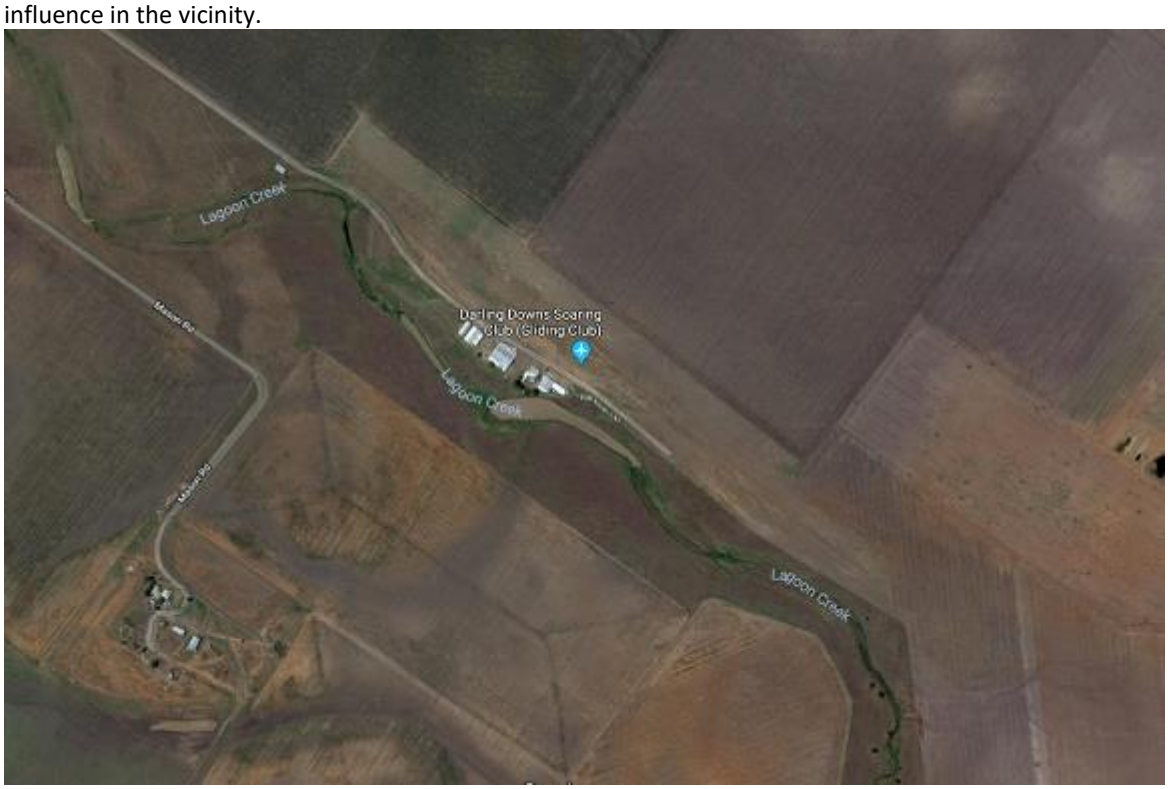


Figure 6: McCaffrey's Field (Google Maps)

1.9 Flight Recorders

The Gliding Club has fitted 'dittolog' to their aircraft, which is a system that captures pertinent flight data from the aircraft's FLARM device and automatically uploads this data to a wireless base station connected to the internet. A data file providing fight parameters for the accident flight was obtained from the base station.

1.10. Wreckage and impact information

The aircraft impacted wings level in a steep nose down attitude. The aircraft came to rest upright, about 1 metre from the point of impact in the direction of flight (030 Magnetic). The underside of the nose took the initial impact, forward of the nose wheel. The main wheel did not contact the ground during the initial impact, as the fibreglass wheel fairing showed only pre-existing damage. Both wing leading edges contacted the ground during the initial impact. The fin and horizontal stabiliser separated from the fuselage at the base of the fin (refer Figure 5). There was other damage to the fuselage aft of the wings indicating large compressive forces had been applied to the top of the fuselage. The left wing rotated forward far enough to tear the drag pin fitting from the root rib, crushing the left side of the fuselage into the rear cockpit in the process. Damage to the front of the aircraft, including the front cockpit was catastrophic, and the rear cockpit was also heavily damaged. In both cockpits the survival space had been severely compromised. Initial examination of the wreckage showed that all extremities of the aircraft were present at the crash site, as were all control surfaces. The control surfaces were not able to be moved with the aircraft assembled.

1.10.1 Elevator Control System

The separation of the fin and horizontal stabiliser had severely bent the elevator pushrod, but it was confirmed as intact, and connected to the elevator bellcrank at the base of the fin. When the fin was separated from the remainer of the wreckage by cutting the pushrod, the elevator system in the fin was found to be complete and operating smoothly. The elevator was still correctly engaged with the fitting at the top of the pushrod in the fin. The horizontal stabiliser was still connected to the top of the fin by the bolt, which was locked and taped. The bolt was easily removed using a standard Allen Key. The horizontal stabilizer mountings did not appear damaged. The forward end of the elevator pushrod still ran through all the fairleads but the aft-most fairlead had been torn from its mounting by impact forces. The pushrod could not be moved in a forward/aft direction and was intact and still connected to the lever on the aft end of the aileron/elevator torque tube. Detailed examination of the control system showed that both control sticks remained connected to the torque tube, although the front control stick was bent forward by impact forces, and the torque tube itself was bent and flattened. The supports at each end of the torque tube had separated from the structure as a result of impact forces, but all fasteners were present and correct. The aileron/elevator rocking arm was still properly attached to the rear control stick, and the pushrods to the elevator were intact and working. The elevator control system was intact at impact.

1.10.2 Elevator Trim Controls

The elevator trim system in the ASK-21 is a spring bias system. A trim lever is located to the left at the base of each control stick, and these are joined at the bottom by a pushrod. This pushrod is connected to the aileron/elevator torque tube between the two cockpits by two springs, one at each end of an adjuster plate, the centre position of which is changed by moving either trim lever. This entire mechanism is located in the forward fuselage, under the front seat and aft instrument panel. Examination of the trim system showed that both trim springs were intact, and still connected to the aileron/elevator torque tube at one end and to the adjuster plate at the other. The adjuster plate was still correctly attached to the trim pushrod. However, the forward end of the trim pushrod was broken off at the weld at the base of the forward trim lever. Crushing and bending of the pushrod adjacent to the failure, as well as buckling at the after end of the pushrod, indicated that the pushrod had been subjected to substantial longitudinal forces at impact. There was no evidence of any pre-existing defect.

Figure 7: Trim Pushrod Forward end showing failure

Figure 8: Trim Pushrod rear end

Figure 9: Trim System showing Trim Springs and Trim Pushrod

1.10.3 Aileron Control System

Both ailerons were immoveable with the aircraft rigged, and both aileron l'hotellier fittings in the fuselage centre section were found properly connected and locked by their locking sleeves. Once the wings were removed, both ailerons moved normally. The pushrods within the fuselage remained connected to the aileron/elevator rocking arm, which was still connected correctly to the rear control stick and moving freely. All aileron control system fasteners in the fuselage were present and correct. The aileron control system was intact at impact.

1.10.4 Rudder Control System

The fin and horizontal stabiliser separated from the fuselage at the base of the fin, and one rudder cable had snapped as a result. The aft end of both cables were still attached to the rudder horns by their respective bolts and 'nyloc' nuts. Despite the disruption of the forward fuselage, and the broken rudder cable, it was evident that the rudder control circuit was intact until impact.

1.10.5 Airbrake Control System

The airbrakes were found closed but not locked. Neither the airbrake lever nor the airbrakes could be moved as a result of the damage to the forward fuselage and the dislocation of the left wing. Both airbrake l'hotellier fittings in the fuselage centre section were found properly connected and locked by their locking sleeves. The disruption to the forward fuselage, and the displacement of the wings during impact prevented determination of the airbrake position at impact. There were no witness marks. The left airbrake had been forcefully driven out beyond normal full travel as a result of the left wing's displacement under impact forces. The inboard airbrake arm had crushed the inboard end of the airbrake box, but there was no such damage on the right airbrake indicating that the damage was asymmetric and the result of the impact. The airbrake pushrod in the cockpits was severely bent as a result of impact forces, but all connections were in place and once the wings were removed, movement of the airbrake handles produced motion in the bellcranks holding the l'hotellier fittings. The airbrake control system was intact at impact.

1.10.6 Front Cockpit

Virtually no intact structure remained of the front cockpit. The whole nose structure, including canopy, canopy frame, instrument panel and fuselage side and floor were reduced to fragments. As result, the survivable space in the front cockpit was severely compromised during the accident sequence. The aircraft was equipped with five-point harnesses. As a result of the fragmentation, the anchorages for the crotch strap and for both ends of the lap belt had become detached from the structure. The two shoulder belts were intact and attached to front cross-bar, but the bar was severely bent and detached from the cockpit walls on both sides. Impact damage was consistent with high 'g' deceleration and a steep nose down attitude at impact.

1.10.7 Rear Cockpit

The rear cockpit was severely damaged, mostly forward of the front of the rear seat, but deformation of the forward fuselage, and possible intrusion of the leading edge of the left wing into the rear seat, together with much of the forward fuselage and front cockpit meant that the survivable space in the rear seat was severely compromised during the accident sequence. The rear seat lap belts had torn their anchorages from the structure, as had the crotch strap. The two shoulder straps remained intact and attached to the after cross-bar.

1.10.8 Harnesses

The aircraft was equipped with two ETSO C114 five-point harnesses. As mentioned above, the anchorages of the crotch and lap straps of both harnesses were torn out during the crash sequence by failure of the associated structure. However, the harnesses remained effective up to that point, indicated by the fracture of the tang of the crotch strap on both harnesses. Both tangs appear to have failed by bending. The buckle from the rear harness appears to have sustained internal damage. The pin for the crotch strap was not moving freely and was not extending as far as the other pins in the buckle, or the pins in the buckle from the forward harness. This damage would have resulted from the same forces that caused the failure of the rear seat crotch strap tang. These forces had to have been considerable and applied before the strap anchors failed. The peak longitudinal acceleration during the crash sequence would have been in the order of 50 to 60g10, and with each harness restraining a mass of 80 to 100 kg, extreme loads would have been imposed on the harnesses and buckles. Both harnesses were manufactured by Schroth and fitted with buckles Part Number SL 10.02 manufactured in week 40 of 2014. According to Schroth Service Information Letter SIL SSP-00711 these harnesses may be used for aerobatics with a maximum life of five years. These buckles are not affected by EASA AD 2017-022512 that was issued on 17 November 2017. As the glider was less than 3 years old, the buckles were serviceable.

Figure 10: Front Harness with failed crotch Strap tang

Figure 11: Rear Harness with failed crotch strap tang

1.11. Medical and pathological information

Autopsies were performed on both the instructor and the student. Within the limits of the autopsy, no natural disease which could have caused or contributed to the accident was positively identified. Post mortem examination of the:

- command pilot identified marked atherosclerotic narrowing of one of three main coronary arteries, but there was no associated luminal thrombosis or myocardial infarction.
- student pilot identified severe coronary atherosclerosis, but there was no associated luminal thrombosis or myocardial infarction.The medical Examiner noted that “severe stenosis of the coronary arteries may be asymptomatic but may also cause sudden incapacitating arrhythmia and even death. The contribution of this finding to the events leading to the glider collision cannot be determined.”

The toxicological examination did not reveal any factors which might have influenced the performance of the flight crew.

1.12. Survival aspects

Because of the angle and severity of impact, damage to the front of the aircraft, including the front cockpit, was catastrophic, and the rear cockpit was severely damaged. In both cockpits the survivable space had been severely compromised during the accident sequence. The accident was not survivable. Both pilots were removed from their respective seats by witnesses who arrived at the scene of the crash shortly after it had occurred and were laid next to the cockpit. Resuscitation attempts were initiated but then abandoned.

Both pilots were subsequently pronounced dead by ambulance personnel. Based on height, airspeed and impact angle, the time from normal flight on final approach to impact was calculated to have been between 0.36 and 0.54 seconds. The impact force was calculated to have been between 11g and 12g. Harnesses in both the front and back seats had held, but the structures from which they are suspended had shorn in various places. Both control sticks had been bent flat forward, presumably by the impact of the respective bodies, likely resulting in substantial soft-tissue and internal damage.

1.13. Tests and research

An extensive program of test-flying the ASK-21 was initiated by the GFA, with the help of German colleagues near Heidelberg, the Beverley Soaring Society in WA and the Gliding Club of Victoria in Vic. Instructor and student weights were matched as closely as possible, and the glider was instrumented with cameras (where possible to the side and to the front) to record flight angle, height and airspeed information. The purpose of the tests and research was twofold:

- Establish whether the ASK-21 could have entered a dive with the steepness and suddenness of VH-GVJ without active pilot control. These tests were mostly conducted in Germany shortly after the accident. They were meant to examine (and possibly rule out) incapacitation on either or both of the pilots.
- Establish the angle and speed that can be obtained within 50ft of height from flight at approach speed with half airbrakes, into a sudden bunt with full airbrakes. These tests were performed in Victoria and WA. The results of these tests and the research were as follows:
- It is impossible to make the ASK-21 dive into a downward angle of 65o by itself, independent of front-seat pilot weight, trim setting or airbrake manipulation or height available. The maximum downward angle achieved during 50 ft of height loss in the German tests was about 40o when pilot incapacitation was simulated.
- The airbrakes on the ASK-21 used in these tests did not move noticeably when the handle was released and the glider was nosed over.
- The impact angle cannot have resulted from a stall at 50ft.
- When bunted deliberately (taking the glider from flight at approach speed of 62 kts with airbrakes half out, and then nose fully forward and airbrakes fully out), the ASK-21 will achieve a downward angle of about 80o and an airspeed of about 70 kts within the first 50ft of height lost. Results were consistent in repeated tests. As this was done, the pilot-not-flying, who had been cradling the controls loosely (like an instructor might), reported his hands flying involuntarily upwards to the canopy due to the negative 'g' of the bunt. The half-second of the manoeuvre under negative 'g' proved insufficient to regain a grasp of the controls. Although a flight log was retrieved from the Dittolog system, the low sampling rate of 5 seconds did not allow for any meaningful conclusions to be drawn about the last seconds of the flight.

1.14 Useful or effective investigation techniques

Two witnesses were interviewed. They were the instructor pilot's business partner/wife and another student pilot. Both witnesses had deliberately been visually following the flight, circuit and approach of the glider from the ground, verbalising and discussing what they saw as a way of instructing the student on the ground. The witnesses were placed down the runway, some 600m from the crash site. Height and flight path information (apart from the impact angle, for which the wreckage and the disturbed ground was used) relied on by this investigation come largely from these witness statements, and in part from normal procedures used at this field. One of the witnesses reported that the student had been learning about the interaction between the airbrakes and control stick on his last flight on the day before, and that he could have *"a death grip"* on the control stick; indicative of higher student tension at this stage of flight. A tight grip on the control stick is usually accompanied by coarser control movements using arm muscles, in contrast to finer control movements using wrist and fingers with a more relaxed grip. Other than that, this student was said to have a relatively good aptitude for flying, particularly given his age. The instructor was known as being both prudent and careful.

2. ANALYSIS

2.1. General

The command pilot held appropriate flight and medical certificates, and was trained and qualified for the flight. The aircraft was properly certificated, and there was no evidence that aircraft maintenance was a factor in the accident. Flight tests were conducted in aircraft of the same type to investigate aircraft behaviour when the controls were released, and also to determine the level of human intervention in order to replicate the flight path as described by the two witnesses. Weather was not considered to be a factor in this accident.

2.2 Flight operations

The glider was launched by a Piper PA-25-235 Pawnee at 0933 hours from runway 30 into the North-West. About five minutes later the combination was flying on a North-Easterly heading when, at a height of about 2,300 ft AGL, the command pilot released from tow. The glider then turned to the right about 90 degrees and then was established on a South-Easterly heading. After about 30 seconds the glider turned onto a North-westerly heading. At 0941 hours, when at about 1,700ft AGL and about 4.3 NMs (8kms) from the runway threshold, the glider was turned through 180 degrees and flown on an extended downwind leg back towards the airfield. Base leg was joined at 0945 hours at a height of about 1,000ft AGL, and was flown on a slight angle away from the runway. At 0946 the glider was turned onto final approach at a height of about 700ft AGL and about 1,600 metres from the runway threshold. Barograph records indicate the approach was steepened at least twice, which is in line with the tow pilot's observations: "Initially there was no airbrake applied. Then some airbrake came out for several seconds; then the airbrakes went away for several seconds; then airbrake deployed again." Refer figures 12 to 14 following.

Figure 12: Flight path

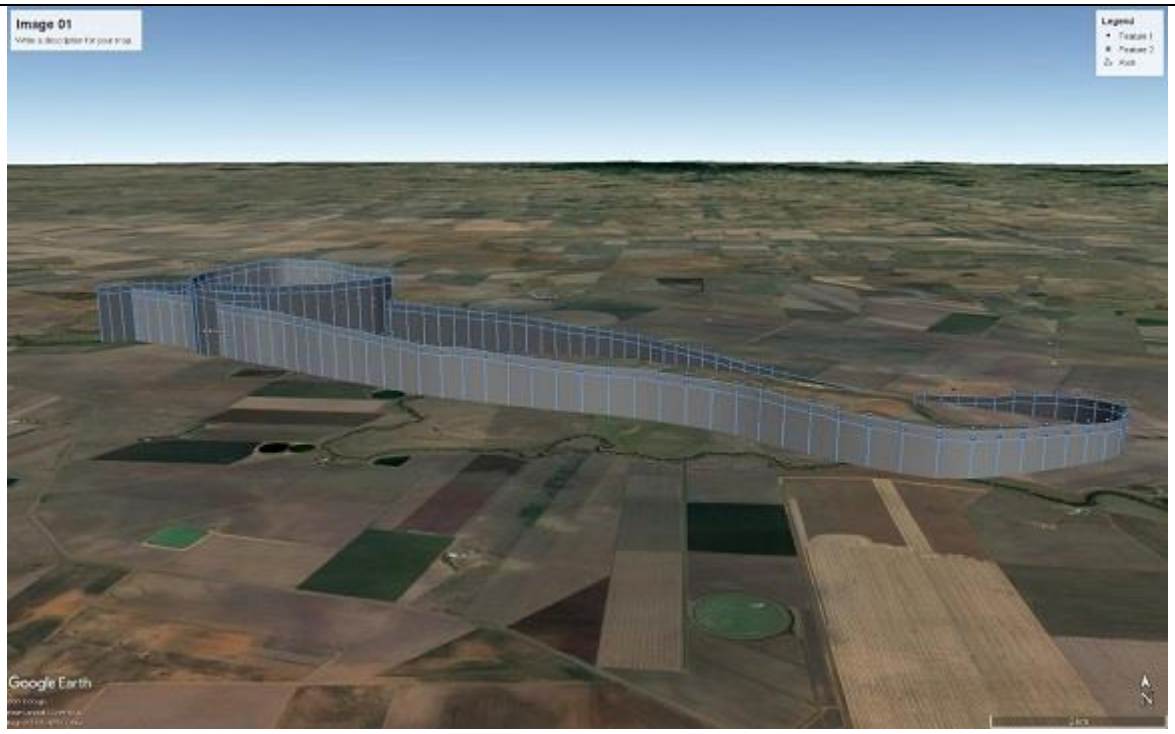


Figure 13: Flight path showing height above ground (max. 2,300 ft).

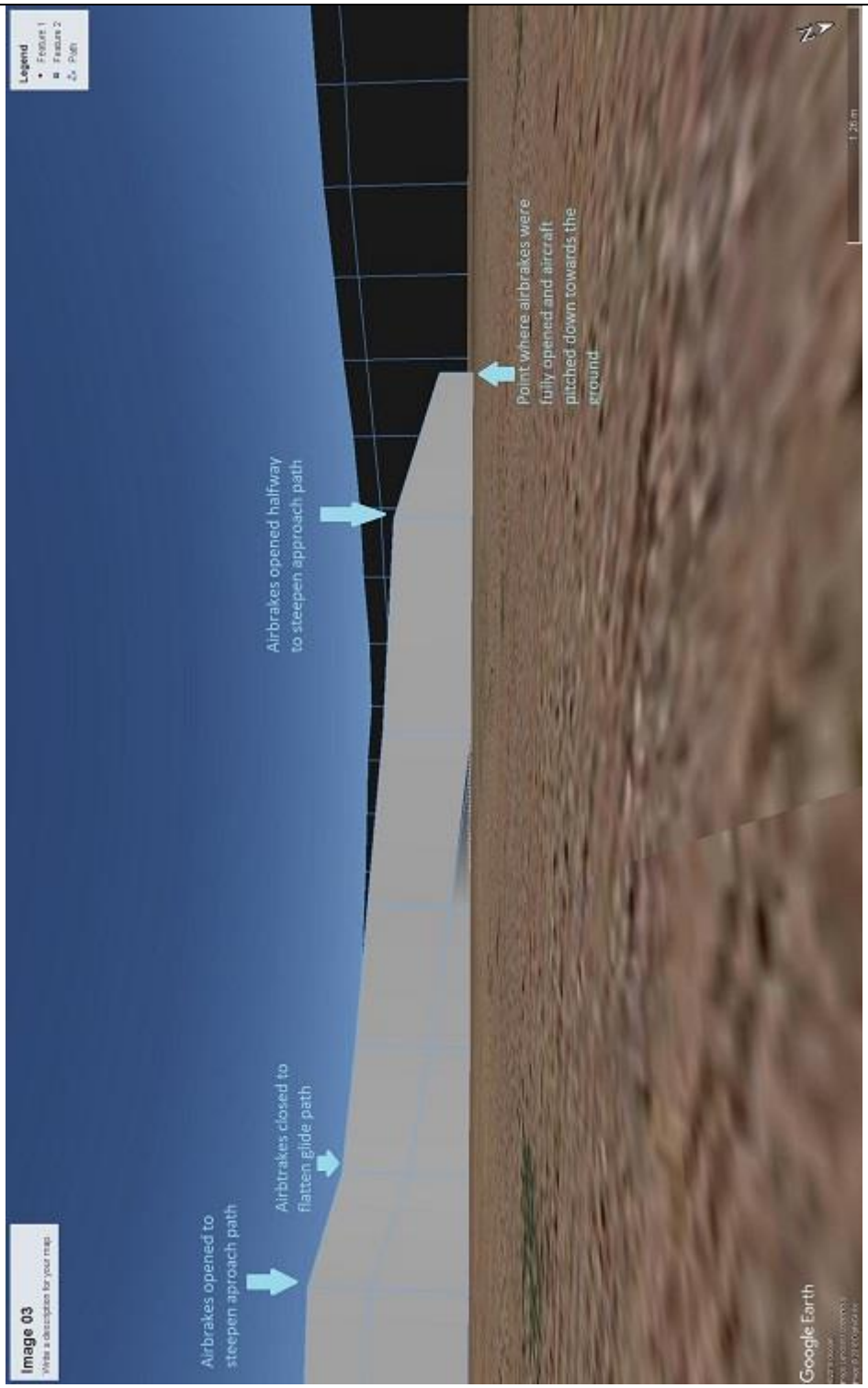


Figure 14: Final approach path.

Flight tests suggest that medical incapacitation is unlikely to have led to the aircraft pitching nose down in the manner witnessed. In fact, these tests confirmed that it is impossible to make the ASK-21 pitch down 60 to 65 degrees as was observed without one of the crew members actively and deliberately manipulating its controls. The possibility of an inadvertent stall was also ruled out, as it is impossible for an ASK-21 to achieve

an angle of 65 degrees within a height of 50ft, even with airbrakes fully extended. Furthermore, both witness observations about the final approach are inconsistent with a stall. The student pilot's instructor on the previous day was the tow pilot for the accident flight. In their recorded interview with the GFA's accident investigation, the tow pilot stated: *"So, I flew with him the previous day – four flights making reasonable progress, but we weren't up to doing anywhere near landings or anything. I was talking him down and he could hold speed control and all that sort of thing and good coordinated turns. So yesterday when I flew with him I had him down to lining up on final and then I was taking over from final onwards, so he wasn't really up to landings, as of yesterday afternoon." "One comment I wanted to make which may be relevant is when I did the take-offs with him yesterday, I said I just want you to come on the controls and feel the controls but be loose on the controls just because we had done – [the Trainee pilot] was much more advanced with his flying and we were doing briefings for [the Trainee pilot] so [the Student pilot] was listening to the briefings – so I said I'm happy for you to come on the controls, feel the controls as I'm doing the take-off but don't impede my control inputs, and all I can say is when he got on the controls he was solid as a rock. He's a big man and really firm and I had to prompt him to get off the controls, and when I was doing aero-tow training with him yesterday, he had a little bit of trouble with that and I told him to fly with a finger and a thumb because he was flying too rigidly, so I don't know if there was a bearing if he was on the controls whether something..."* The GFA's investigator asked whether it was likely that the command pilot would have been similarly coaching the student, to which they responded: *"He may have been, similar to me, just saying stay on the controls with me while I do this. He certainly, [the instructor] had done previous flights, so he would have made an assessment of his skills at that point. So, it is quite possible he was on the controls, but I don't know."* Later in the interview the tow pilot stated: *"What else can I add in there. He was just an average student. A 60-year-old student doing better than your average 60-year-old who have heaps of trouble even getting coordinated but he was doing – well you can have a look at his flight card if you like. But yesterday we did stalls, we had a lot of thermals, we had an opportunity to cover lots, so we did stalls and use of airbrakes, so he did quite a bit of exercise using the airbrakes, putting them away and adjusting."* When prompted for more detail by the GFA's investigator, the tow pilot explained: *"When I was doing the airbrake exercise, which is a standard thing, you know, you say now I want you to fly 60 knots and you pull the airbrake out and there's an adjustment on the nose to keep it at 60 knots – I wonder whether he's exaggeratedly…."* The tow pilot was suggesting the student may have forcefully lowered the nose in response to the airbrakes coming open. Review of the Student pilot's 'Glider Pilot Certificate Pre-Solo Training Card' revealed they had been assessed as competent in the following relevant exercises after 6 flights:

- Primary and secondary effects of the controls;
- Straight flight at various speeds and trim;
- Use of airbrakes;
- Low speed handling; and
- Stall recognition and recovery.The description of the student pilot being *"solid as a rock"* on the controls, using excessive force, and *"flying too rigidly"*, is normally associated with student tension. This often manifests with an overly firm clamping grasp on the control stick with all fingers and thumb, a rigid wrist and coarse movements of stronger arm muscles. This can be exacerbated by excessive force on rudder pedals and use of upper leg muscles, tensing up the entire body. It can be difficult to overcome such forces used by a big, strong pilot. Students often need to be instructed on using a more relaxed grip, with greater 'feel' of controls, using wrist muscles and finger pressure for finer control movements.

The transition from a stabilised approach (with airbrakes half open) into the flare, requires a gradual backward pressure on the elevator to arrest the rate of descent. If airbrakes are extended during the approach, then a light forward pressure on elevator might be required to retain a safe approach speed until beginning the transition into the flare. These movements require fine motor control of elevator, not coarse movements with massive pitch angle changes. The observed sudden change in pitch angle close to the ground indicates that the pilot on the controls was probably the student pilot, with an excessively coarse

forward push on the elevator. Due to inexperience, the student pilot may also have not recognised that at about 50ft, they should be preparing to initiate transition into the flare. The student pilot was also aware of the concept of maintaining a 'Safe Speed Near the Ground' and had been introduced to turns and aerotowing. When training students in the use of the airbrakes, the GFA Instructor's Handbook states (page 60): "In the early stages it may be helpful for the student to fly the approach using the primary flight controls while the instructor controls the airbrakes/spoilers. It is not necessary with all pilots, but some students respond very positively to this technique, which significantly reduces their workload in the early days of learning landings." Consistent with the information obtained from witnesses, tests and research, as well as wreckage analysis, the accident may have resulted from an instructional sequence in which the student was allowed to handle the control stick on final approach, while the instructor manipulated the airbrakes. As per the tow pilot's comments, it is evident the student had been allowed to fly the circuit down to the final approach the day prior, and that the student was cognisant of the need to maintain safe speed near the ground and of the need to lower the nose of the glider to maintain airspeed when the airbrakes were opened. It is likely the command pilot was continuing the theme established by the earlier instructor and was allowing the student pilot to fly the circuit and approach while they manipulated the airbrakes.

2.3. Aircraft

Mechanical failure on either the elevator control, airbrake or trim system was ruled out.

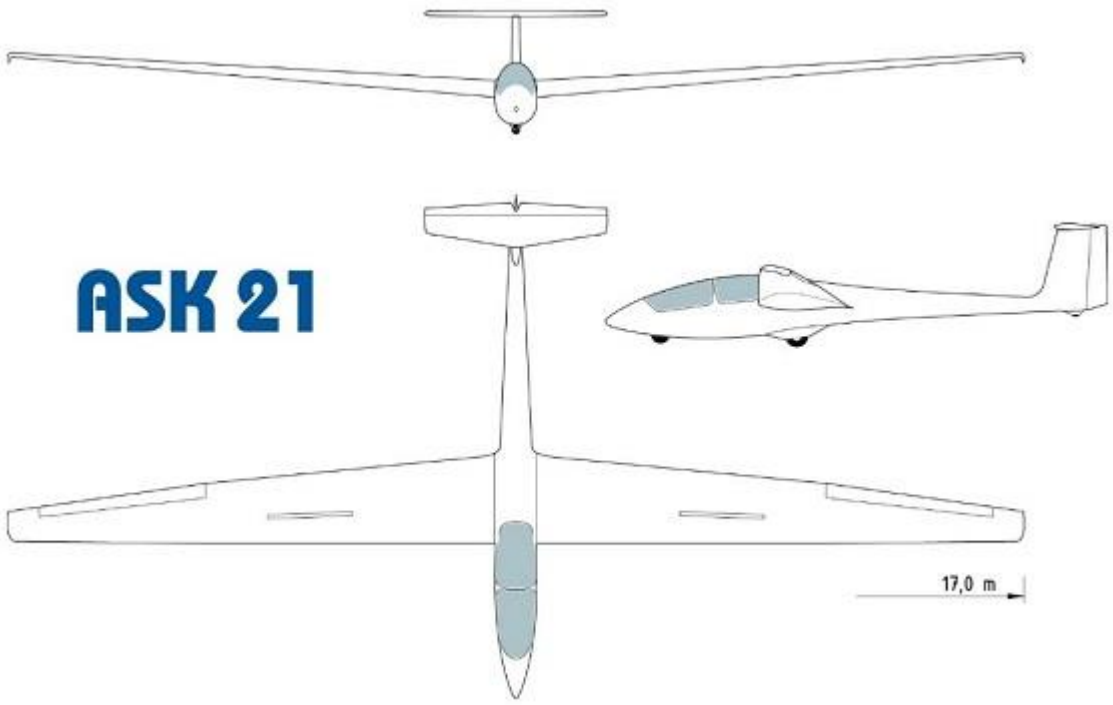


Figure 15: Three-view drawing of ASK-21

2.3.1 Aircraft maintenance

The Schleicher ASK-21 glider was purchased new by the Gliding Club and delivered in April 2015. Its first maintenance Release was issued on 22 April 2015. The aircraft was maintained in accordance with GFA requirements, using GFA Form 2 and the ASK-21 Maintenance Manual. The last annual inspection was completed on 23 April 2017. At the time of this inspection the aircraft had flown 577 hours over 1,288 flights. There were no open minor defects in the Maintenance Release and only one that had been closed off. The Maintenance Release had no entries for major defects. The command pilot conducted the Daily Inspection and certified the aircraft fit for flight by signing the Maintenance Release at 0900 hours.

2.3.2 Post-accident analysis

While the forward fuselage of the glider was damaged severely, examination of the control systems showed that all flight controls circuits except the elevator trim and the rudder were intact and connected to their respective control surfaces. Failure of one rudder control cable was the result of impact forces and the separation of the fin and horizontal stabiliser during the crash sequence. Damage to the inboard end of the left airbrake box was the result of the violent deployment of the left airbrake as the left wing swivelled forward during the crash sequence. Failure of the crotch straps on both harnesses was the result of extreme loads imposed during the crash sequence, and before the structure to which the crotch straps were anchored failed as a result of structural disintegration.

2.2.2.1 Failure of the Elevator Trim Pushrod

The elevator trim system in the ASK-21 is a spring bias system. A trim lever is located to the left at the base of each control stick, and these are joined by a pushrod. This pushrod is connected to the elevator/aileron torque tube between the two cockpits by two springs, one at each end of an adjuster plate, the centre position of which is changed by moving either trim lever. Once the trim has been set, the elevator trim pushrod only carries the loads imposed by the trim springs, and when the aircraft is flying at the trimmed speed, the loads imposed by the two springs cancel each other out; there are no net loads on the ends of the trim pushrod. Loads are only imposed as the trim levers are moved, or if the control sticks are moved significantly away from the trimmed position. The trim levers are connected to the base of the control sticks by a friction brake at each end, and these are set to share the task of preventing the trim pushrod from moving except when a trim lever is moved. Hence, even if the trim pushrod were to fail at one end, the friction brake at the other end would preclude free movement of the trim pushrod, although it would not necessarily prevent it entirely. The elevator trim pushrod was broken at the weld near its connection to the forward trim lever. Crushing and bending of the pushrod adjacent to the failure, as well as buckling at the after end of the pushrod, indicated that the pushrod had been subjected to substantial longitudinal forces. These cannot have been imposed by control forces as the only connection to the trim pushrod is through the two trim springs. The trim pushrod runs parallel to the elevator/aileron torque tube and is the same length. During the crash sequence, the elevator/aileron torque tube was bent and buckled, as was the trim pushrod. Examination of the wreckage showed that the resultant, damaged lengths of the two pushrods were almost identical (See Figures 7 to 9). Therefore, it is most likely that the trim pushrod and the elevator/aileron torque tube remained connected during the crash sequence, and the trim pushrod failed as a result of impact forces.

2.3.3 Mass and balance

The structural strength of an aircraft places upper limits on the weights it can support. The wings are self-supporting but the fuselage and its attachments (tailplane, pilot, luggage, etc.) are suspended from the wings or spar. The designer of the aircraft has placed an upper limit on the weight in the fuselage (or non-lifting parts) which must never be exceeded. However other more critical issues arise when it is realised that the aircraft may not even fly if it is too 'nose heavy 'or too 'tail heavy', that is, if the centre of the mass (centre of gravity (CG)) is too far forward or too far aft. The consequences of too little weight at the nose, resulting in a CG aft of the aft limit, are that the aircraft may pitch up, be unstable, even uncontrollable, impossible to trim, and impossible to recover from a stall or spin. Too much weight in the cockpit will result in a forward out-of-range CG, making the pilot use full back stick/elevator (beyond trim range) to maintain speed, leaving no capacity to flare the glider on landing. The aircraft's weight and balance were last calculated on 25 April 2015. Assesmsnet of the weight of the flight determined the aircraft was flown well within the prescribed centre of gravity limits.

2.4. Human Factors

The judgment of whether and when to allow a student to manipulate the controls close(r) to the ground is known to be a difficult one. In this case it was distributed across a husband-and-wife team who were alternating the days they were teaching this student during the ab-initio course. On the day before the accident flight, the student had been taught by the other instructor about the workings of the airbrakes and had also been taught how to recover from a stall, which involves a resolute forward movement of the control stick. The accident flight was the student's second on that day. Both flights had been short, and stall practice would not have been included, so the instructor this day may not have experienced the stick-

forward response from this student. The student had not yet developed fine motor skills in his flying and was known to be somewhat heavy-handed. When on short final, either in response to instructions or on the basis of what he had learned about airbrakes and nose attitude the day before, he may have applied a version of his freshly learned stall-recovery stick-forward response. Instructors often loosely cradle or 'shadow' the control stick when students fly closer to the ground. Instructors are trained to adopt a "defensive posture"; and to have appropriate "thresholds of intervention" for particular flight sequences. Put simply, a minor variance from intent may result in the instructor asking a question, or making a verbal command, whilst a major variance would result in a physical intervention such as taking over control. All of this assumes there is time to react, so as the time available reduces, the demands on the instructor increase. It is possible for the instructor to prevent the control stick from moving backward or sideways by blocking its path, but this is much harder for forward movements, particularly if the instructor was holding the airbrake handle in his left hand, in which case only his right hand would have shadowed the stick. A sudden forward movement would have forced his hand forward with the stick, or for the stick to be forced past his fingers with relative ease. In addition, the instructor's hand may well have flown upward from the control stick because of negative 'g' forces (see section 1.14). Even if the control stick was within the grasp of the instructor, human reaction time (also known as response latency) in cases such as this one vary between 200 and 400 milliseconds, which would have been barely (or simply not) enough to safely intervene. Once established in the observed steep nose down attitude, the height required to recover to a normal landing attitude was far more than the height available.

2.5 Survivability

The crash was nonsurvivable and the deceleration forces exceeded those of human tolerance.

3. CONCLUSION

The accident was almost certainly the result of controlled flight into terrain, that is, an airworthy aircraft under the control of the flight crew was flown unintentionally into terrain.

3.1. Findings

1. The command pilot was certified and qualified for the flight in accordance with existing regulations.
2. The maintenance records indicated that the aircraft was equipped and maintained in accordance with existing regulations and approved procedures.
3. The aircraft was airworthy when dispatched for the flight.
4. All flight controls were operating correctly at impact and suffered damage due to the forces of impact with terrain.
5. No other defects were found that would have adversely affected the airworthiness of the aircraft.
6. The mass and centre of gravity of the aircraft were within the prescribed limits.
7. There was no evidence of a stall before impact.
8. There was no evidence that either of the flight crew suffered any sudden illness or incapacity which might have affected their ability to control the aircraft.
9. Toxicological tests were negative.
10. The accident was not survivable due to the magnitude of the deceleration forces.

3.2. Causal factors

The accident most likely resulted from an instructional sequence in which the student handled the control stick on final approach while the instructor manipulated the airbrakes. The student pilot's likely coarse elevator control inputs were inconsistent with a safe transition from a stabilised approach into the flare and landing, instead resulting in a sudden and unrecoverable steep dive into the ground. This sudden manoeuvre, initiated at very low level, was beyond the limits of instructor intervention and safe recovery.

4. SAFETY RECOMMENDATIONS

There is no single error or latent factor that can be addressed to prevent an accident of this kind. The following recommendations are made, to reduce the likelihood of such circumstances in the future:

1. GFA provide further educative material to instructors, in the form of an Operational Safety Bulletin, and in the GFA Training Manual under development, on safe instructing sequence, instructor

defensive posture, thresholds of intervention, reaction time (response latency) and cognitive biases regarding student performance.

2. GFA develop and publish educative material for widest distribution online, in Gliding Australia and through clubs, on the effects of pilot tension on muscular movements and glider control, more effective fine control methods, relaxation techniques and pilot self-awareness.
3. GFA reinforce the importance of progression through the GPC training syllabus and reinforcement of key concepts of control and energy management.
4. GFA might also encourage sharing of "I learned about gliding instructing from that" case studies, for use in Flight Instructor Refresher Courses and Instructor Training, drawing upon accidents and near miss occurrences related to instructor assumptions, biases, interventions, unplanned events and student behaviours outside expectations.

Date	22-Sep-2017	Region	NSWGA	SOAR Report Nbr		S-1043	
Level 1	Operational	Level 2	Aircraft Control	Level 3		Hard landing	
A/C Model 1		DG-1000S		A/C Model 2			
Injury	Minor	Damage	Substantial	Phase	Landing	PIC Age	21

The glider was established on a stable final approach, but the flare was executed higher than normal followed by a rapid rate of descent and a heavy landing causing the main undercarriage to collapse. There were only very minor injuries to the student, and no injuries to the Instructor. The instructor stated that the student was struggling to maintain circuit speed on the base leg of the circuit and this continued onto the final approach. The student was also having difficulty maintaining directional control on final approach and the instructor was prompting the student to maintain the runway centreline. On late final approach the instructor noticed the airspeed was decaying as the airbrake was being deployed. The instructor assumed control and applied forward pressure on the control column to lower the nose and regain airspeed. The aircraft impacted the ground directly on the main gear, followed by the nose gear and tail wheel. The main undercarriage collapsed on impact. The Instructor applied full back stick and full airbrakes and the airframe came to rest approximately 95 metres from the initial main gear witness mark. Investigation revealed the student pilot was on their eleventh flight in a glider and had not flown for 5 months. Although the Instructor was aware the student had not flown for an extended period, the student's training records showed they had previously demonstrated satisfactory approaches and landings, so the instructor chose to direct and monitor the approach and landing rather than demonstrate. The investigation also identified that the instructor had not maintained a defensive stance with their hands near the relevant controls in order to react quickly during the approach and landing. The causal factors included a late and inappropriate intervention by the instructor to regain airspeed on short final. The nose attitude was abruptly lowered resulting in an excessively steep descent from which a normal flare and landing was improbable. Witness accounts suggest the airbrake remained deployed throughout instead of being closed to arrest the rate of descent. The instructor undertook remedial training focussed on student planning and management, instructor intervention and correct methods for rectifying incorrect and mishandled student approaches and landings.

Date	23-Sep-2017	Region	NSWGA	SOAR Report Nbr		S-1046	
Level 1	Operational	Level 2	Miscellaneous	Level 3		Rope/Rings Airframe Strike	
A/C Model 1		Grob G 103 Twin II		A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Launch	PIC Age	41

Just as the slack was taken up in the aerotow rope, the glider lurched forward and the tension on the rope relaxed. The wingtip signaller, who did not notice the glider had overrun the rope and that the tension had come off the rope, gave the 'all out' signal. The tow pilot accelerated rapidly, causing the rope to snatch. The weak link broke and the rope sprang back, with the weak link striking the fuselage in front of the canopy on the starboard side. Investigation revealed a number of contributing factors:

1. The runway sloped downhill in the direction of launch, making it easy for the glider to roll forward.
2. The wingtip runner was a new student pilot who had only been at the club for two weeks. Although briefed on the duties of a wingtip runner, the student did not fully appreciate the effect of a slack rope at launch.
3. The two pilots in the glider did not release the rope, despite being aware that the glider had significantly overrun it.The Club CFI has reminded pilots to release immediately in the event of a suspected overrun.

Date	23-Sep-2017	Region	GQ	SOAR Report Nbr		S-1042	
Level 1	Operational	Level 2	Aircraft Control	Level 3		Control issues	
A/C Model 1		ASK-21		A/C Model 2	Cessna 150E		
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	68

Just after becoming airborne, and at a safe height, the instructor commanded the student pilot to descend into the low tow position. As English is the student's second language, the command was misunderstood and the student climber higher and the tow plane disappeared from view. The instructor took control quickly and restored the glider to the normal low tow position and the rest of the flight was conducted uneventfully. The student pilot had power flying experience but was on their 11th flight in a glider. The

instructor reported that they were surprised just how quickly the glider got out of station. If the glider is allowed to climb rapidly behind the tug, it can very quickly become impossible to prevent it accelerating upwards in a slingshot action (rather like a winch launch), and tipping the tug over into a vertical dive. Once that has happened only height can save the tug pilot from disaster. Downward displacement of the glider to a position below the slipstream is quite acceptable, but upward displacements are much more critical. The glider pilot must release immediately if the glider is going high and the tendency cannot be controlled, or the pilot loses sight of the tug. The trainee should not attempt the take-off and early part of the launch until he can maintain position successfully during the latter part of the tow. The demonstrations and the trainee's early attempts shouldn't begin until the tow reaches a height and position from which landing back on the airfield poses no problems.

Date	30-Sep-2017	Region	VSA		SOAR Report Nbr		S-1049		
Level 1	Operational		Level 2	Aircraft Control		Level 3	Loss of control		
A/C Model 1		LS 8-18			A/C Model 2				
Injury	Fatal	Damage	Write-off	Phase	Outlanding		PIC Age		

GFA Field Investigation

INTRODUCTION

On 30 September 2017, at 1352 Australian Eastern Standard Time, and while flying in the vicinity of Benalla Victoria, a Rolladen Schneider Flugzeugbau GmbH, LS8-18 glider departed controlled flight following a low-level right-hand turn and impacted the ground. The aircraft rebounded approximately 8 metres from the impact point and came to rest upright. The aircraft was substantially damaged and the pilot suffered fatal injuries. The aircraft crashed onto a rural property approximately 230 metres South-South-West of Murray Road Benalla, between the Midland Highway and the Benalla-Yarrawonga Road. The accident site was approximately 3 kilometres north of the Benalla Aerodrome. The accident was witnessed by a passing motorist, who saw the aircraft low in the sky and coming in at a steep descent angle just before it struck the ground. The witness arranged for the emergency services to be contacted and waited for them to arrive at the entrance to the accident site. Police and emergency services attended the scene and confirmed the pilot was deceased. The Australian Transport Safety Bureau (ATSB) was notified of the accident shortly thereafter but declined to investigate. The Gliding Federation of Australia (GFA) provided technical assistance to the Victoria Police.

FACTUAL INFORMATION

History of the flight

This was the pilot's first flight in the aircraft, having purchased it in April 2017. It was also the pilot's first flight on type, although he had flown earlier model gliders from this manufacturer. It is believed the pilot's intentions were to conduct the post-maintenance assessment flight and explore the handling qualities of the aircraft. It is unlikely the pilot intended to fly a cross-country task as the conditions on the day were not conducive to such, and he did not record the flight in the Search and Rescue Register as is required by the gliding club for all cross-country flights. The pilot arrived at the glider launch point on glider runway 26 around 13:30 and positioned the aircraft at the front of the launch grid as directed by the Duty Instructor. Another club member assisted the pilot with the launch and observed the pilot conduct a *"measured and methodical pre-flight"*. The tow plane was positioned in front of the aircraft, and the tow rope was then attached to the aircraft. Data from the pilot's portable flight logger recorded the take-off time to be 13:43:51. The flight logger showed the tow plane and glider combination turned onto a northerly heading around 400ft AGL and then turned on a north-easterly heading when at about 1,000ft AGL.

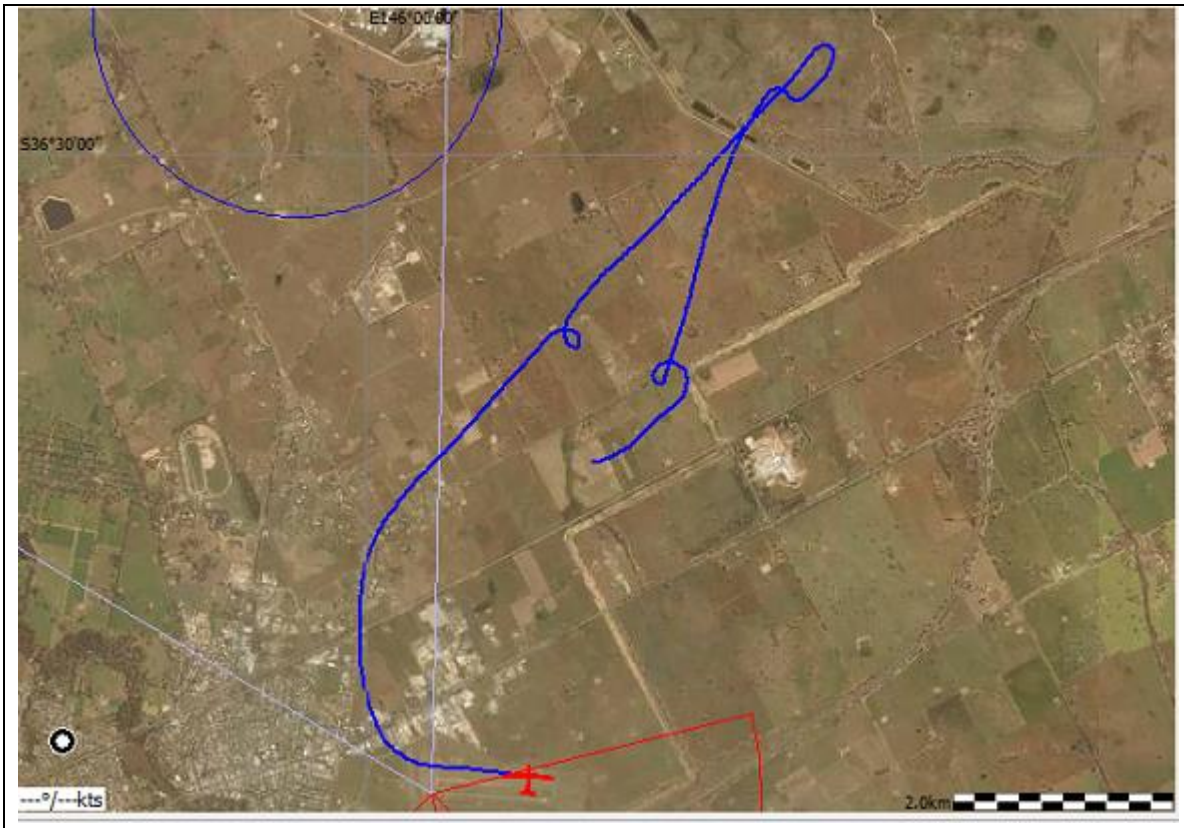


Figure 1: GPS Track.

The tow pilot recalled towing the glider towards the nearest clouds indicating lift, and that it was a “bumpy tow”. Data from flight logger disclosed the pilot released from the tow at a height of 1,563ft AGL at 13:46:25.

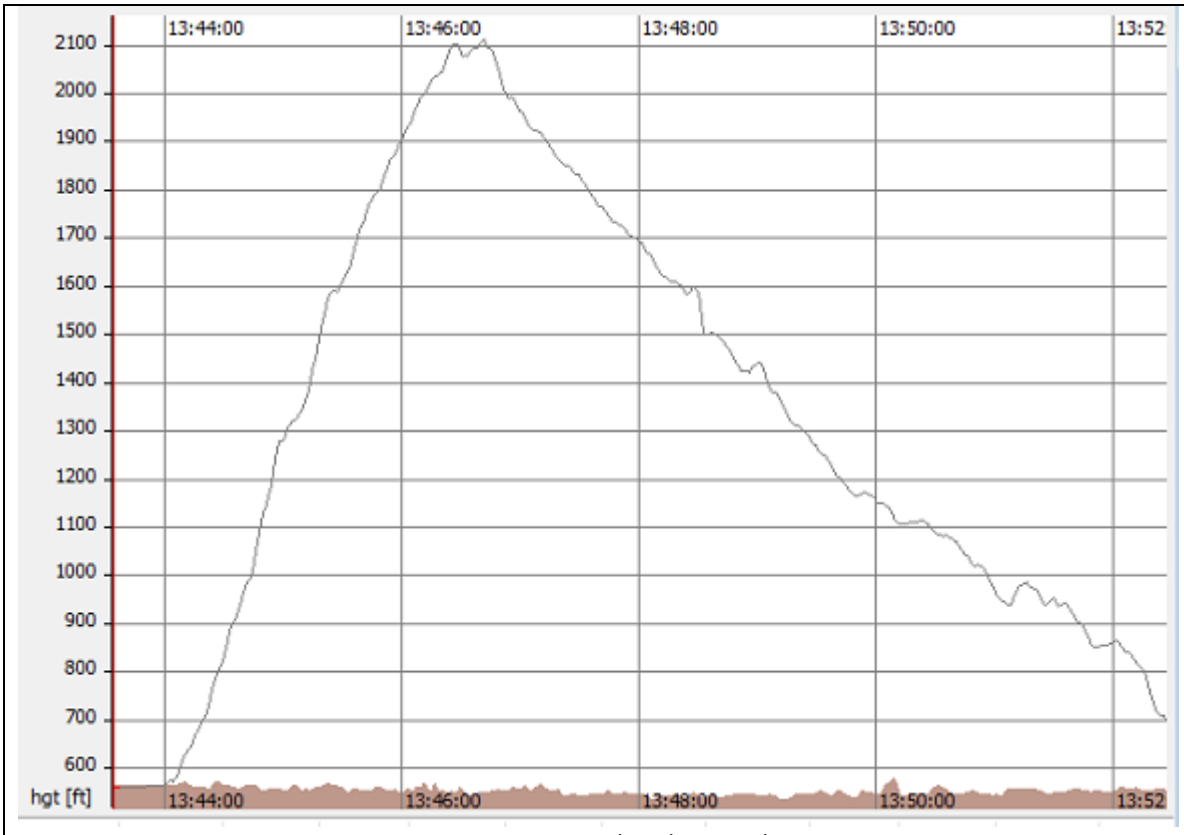


Figure 2: GPS Altitude Record

The data indicates the glider and tug combination flew into rising air but when the glider pilot released and turned to the right, the glider encountered descending air. The tow pilot was surprised by the *"very early"* release from tow by the glider pilot as they had not yet reached the clouds. Immediately upon release the glider pilot completed a 360 degree turn to the right and then resumed the north-easterly heading, continuing towards the clouds. The pilot flew for three kilometres and then, at a height of about 1,000 ft AGL at time 13:48:28, turned through 180 degrees and headed back along the track previously flown. Approximately 30 seconds later, and at a height of about 880ft AGL, the pilot turned right 90 degrees and then back onto track where the aircraft encountered an area of reduced sinking air. These two turns suggest the pilot was heading towards potential sources of rising air to keep the aircraft airborne. The pilot was unsuccessful in finding rising air and at about 700ft AGL the aircraft turned onto a southerly heading directly towards the aerodrome. At 13:51:15 the aircraft was approximately 3kms north of the aerodrome at a height of about 450ft AGL. In response to an indication of rising air, the pilot conducted a 360 degree turn to the right but was unsuccessful in establishing a climb. Upon completion of the turn the pilot resumed a heading towards the aerodrome. At 13:52:28, after travelling approximately 600 metres in a south-westerly direction, and at a height of about 130ft AGL, the aircraft commenced a right-hand turn. This was the last recorded data point of the flight.

Figure 3: 3D representation of the flight track (Google Earth)

The aircraft was observed by a witness who was driving their car in a south-westerly direction along Murray Road. The witness: *"…noticed a white glider flying very low to the ground. The glider was travelling towards me from the West. I looked at it and I thought it was going to land as it was that low. Suddenly it appeared that the wind flipped his right wing and then the glider went straight towards the ground. I believe the glider was about 20 metres off the ground when it flipped."* In a subsequent telephone interview with the witness, the GFA's investigator was informed that the aircraft was flying towards the witness and parallel to the road. The witness saw the aircraft's *"right wing go up and the left wing go down"*. The witness stated the aircraft *"spiralled to the left into the ground"*. The aircraft impacted the ground about 150 metres and 90 degrees to the right of the last recorded data point.

Injuries to persons

The pilot sustained multiple injuries consistent with a rapid deceleration leading to death.

Damage to aircraft

The aircraft impacted the ground almost vertically, with the nose and left wing forming deep depressions in the ground. The cockpit area was severely compromised, and the remains of the canopy were scattered at the impact site. The rear fuselage split about 40cms behind the trailing edge of the wings and lay parallel to the left wing. The leading edge of the left wing suffered multiple breaks consistent with initial ground impact left wing down.

Figure 4: Accident site

Pilot information

At the time of the accident the pilot had accumulated 661 flights for a total of 1,167 hours. This was the pilot's first flight in this aircraft and first on type. However, the pilot did have considerable experience in earlier model Rolladen Schneider 'LS' sailplanes, with many similarities in cockpit design and handling characteristics. His last annual revalidation flight had been satisfactorily completed on 10 September 2017, prior to which the pilot last flew on 20 August 2017 at Warkworth, NSW with Hunter Valley Gliding Club (Annual revalidation check flights include demonstrating correct spin recovery technique). The pilot was a member of the Gliding Club of Victoria and usually operated from Benalla, Vic aerodrome. The pilot's logbook revealed he was an experienced cross-country pilot, and during the previous year had flown 15 cross-country flights for a total of 5,240 kms.

Aircraft information

The LS8 sailplane was approved by the German Federal Aviation Office, Luftfahrt-Bundesamt (LBA), in accordance with Joint Aviation Requirements for Sailplanes and Powered Sailplanes (JAR-22) dated 28 October 1985. The LBA-Type Certificate2 No. 402 for the LS8-18 was issued on 20 January 2000. The LS8-18 is a single-seat sailplane with carbon fibre wing shell, winglets, T-tail, wing and vertical tail fin water ballast systems, retractable and sprung landing gear, and upper wing surface air brakes. The LS8-18 may be operated in 15m or 18m span and winglets in both versions. It is designed for competition flights - high performance combined with excellent handling. The aircraft was flown on this occasion in 15-metre configuration. The controls of the aircraft are of conventional layout as shown below:

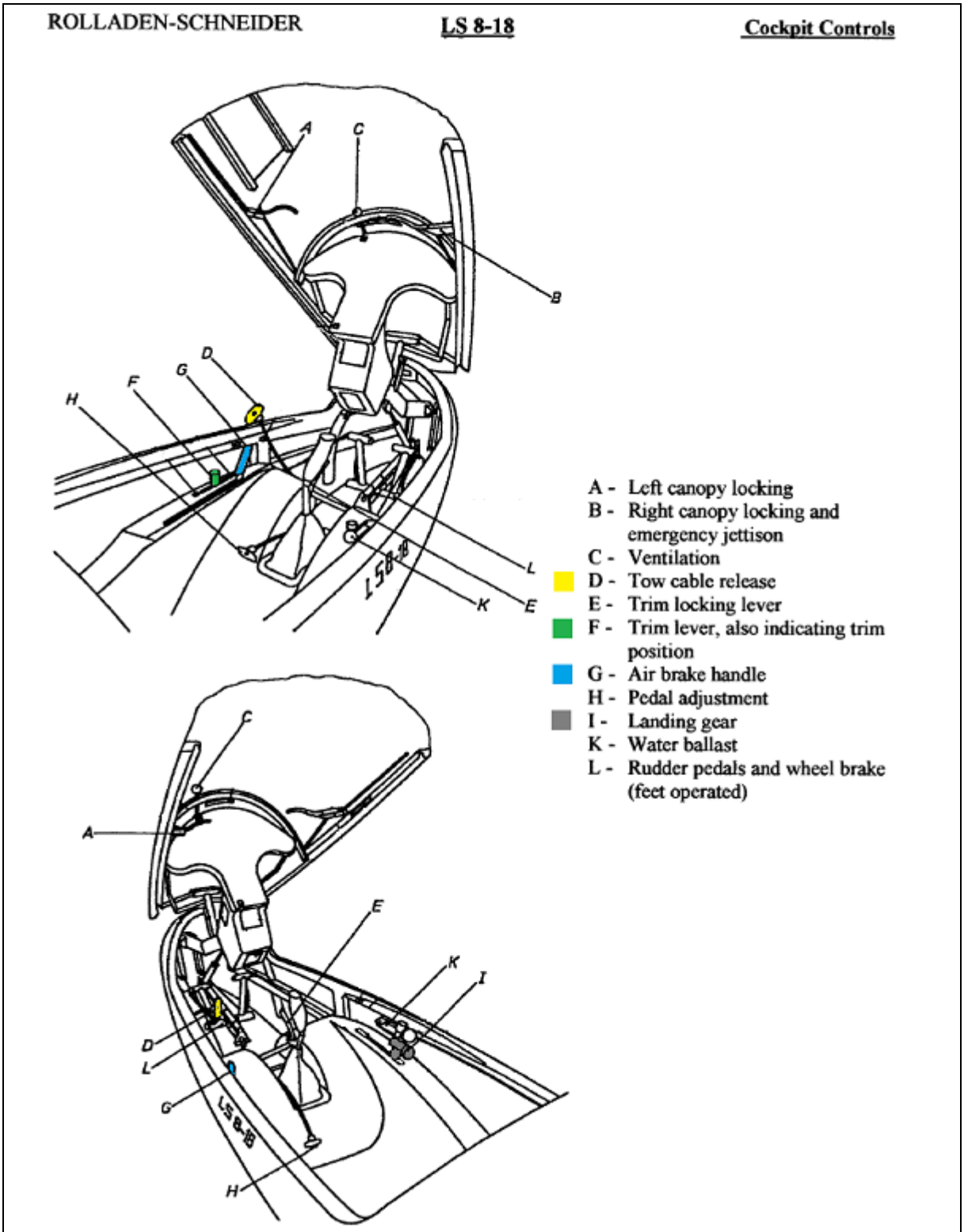


Figure 5: Cockpit controls

A description of the primary controls follows:

Control Column

The ailerons and elevator are operated from the cockpit by means of the 'control column'. The control column is located between the pilot's legs and just in front of the instrument panel. Movement from side to side operates the ailerons, while movement backward and forward operates the elevators. The Ailerons bank the aircraft in the direction they are moved and are used to initiate a turn. The elevator controls the pitch of the aircraft; forward movement lowers the nose of the aircraft, while rearward movement raises the nose.

Rudder Pedals

The rudder pedals are located forward of the cockpit and are operated by the pilot's feet. Forward pressure with one foot or the other operates the rudder. The rudder pedals cause the aircraft to yaw in the direction of the pedal being depressed and are used in conjunction with the ailerons to turn the aircraft. Yawing motion may also have an additional effect of causing roll in the direction of yaw, due to more lift being generated by the faster moving wing. At low energy, excess yaw may cause the slower moving inside wing to stall.

Airbrakes

Airbrakes are used to control the rate of descent and angle of glide when approaching to land, thus making it easier to land safely in small spaces. They increase the drag, and hence steepen the angle of glide (a steeper angle of glide is necessary to maintain the same airspeed). The airbrake lever is situated against the left-hand cockpit wall and is operated by the pilot's left-hand.

Landing Gear

The retractable landing gear is operated by a push-pull rod with a handle at the right-hand side of the cockpit. The handle is pushed forward to retract the undercarriage and pulled backward to extend the undercarriage. The handle is pushed/pulled through a guide slot with two locking recesses. To retract the undercarriage, the handle is swung out of the rear locking recess and pushed forward through the slot and engaged into the forward locking recess. To extend the undercarriage, the handle is swung out of the forward locking recess and pulled backward through the slot into the rear locking recess. In order to manipulate the undercarriage lever the pilot must fly left-handed whilst activating the landing gear handle.

Stalling Characteristics

Stalls from straight flight will result in the nose dropping. The amount the nose drops depends on how steeply the aircraft entered the stall; the steeper the entry, the lower the nose drops. The impending stall is usually signalled by slight oscillation of the horizontal tail plane and the aileron controls becoming sloppy and can be prevented by the pilot easing the control column forward. A stall in flight with accompanying yaw usually results in the aircraft pitching down steeply in the direction of the lower wing. The downward pitching is usually greater than that experienced in level flight, accentuated at higher bank angles. The Pilot Operating Handbook notes the stalling speed for straight and level flight, air brakes retracted and without water ballast to be 37-38 knots in 15-metre configuration. Stalling speed will be slightly higher in a turn.

Spinning

The flight manual notes that if the angle of incidence is increased considerably by further *"pulling"* on the control column during an asymmetric stall, spinning may result, especially with an aft Centre of Gravity (CG) position. No spin check was performed when the aircraft entered Australia as it is not approved for spinning. Notwithstanding, aircraft designed to JAR-22 requirements are capable of being recovered from a spin if the standard spin recovery technique is applied. Note: GFA Annual Revalidation Checks flown by pilots include a mandatory demonstration of correct spin recovery technique in a suitable two-seater glider.

Weight and Balance

The last Weight and Balance calculation was completed on 26 September 2014. The maximum pilot weight (with parachute) was 108 kgs. At the time of the accident a battery was fitted to the tail (fin) of the glider. The Medical Examiner noted the pilot's weight to be 80 kgs. The pilot was wearing a parachute that weighed 7 kgs, and the aircraft was fitted with one ballast weight in the cockpit that was equivalent to 5kg on the front pilot seat. At 92kgs pilot weight and with a tail battery installed, the aircraft was being flown within the normal flight envelope.

Meteorological information

Weather conditions observed on Benalla aerodrome3 around the time of the accident were:

- Wind speed: 5 to 10 Knots, gusting to 15 knots.
- Wind Direction: South westerly.
- Cloud: 4/8 Cumulus at 4,000ft AMSL.The Bureau of Meteorology data collected by the weather station at Benalla Aerodrome does not cover the time period of the accident. However, observations at Wangaratta were similar, viz.:
- 1:30PM: Wind Speed 21 kph/11 Knots, gusting to 28 kph/15 Knots.
- 2:00PM: Wind Speed 22 kph/12 Knots, gusting to 30 kph/16 Knots.

- Wind direction 200 degrees to 210 degrees.

Benalla Airport (Site No. 82170)

Date	Time (LCT)	Rain since last obs (mm)	QC	Air Temp (°C)	QC	Dwpt Temp (°C)	QC	Rel Hum (%)	QC	Wind Speed (km/h)	QC	Wind Direction (degrees)	QC	Visibility (m)	QC	Total Cloud (oktas)	QC	Present Weather	QC	Past Weather	QC
30/09/2017	06:00 AM	0.2	N	9.0	N	6.9	N	87	N	17	N	270	N	30000	N	7	N	Fine	N	Fine	N
30/09/2017	09:00 AM	0.0	N	11.5	N	6.4	N	71	N	9	N	270	N	35000	N	5	N	Fine	N	Fine	N

Observations from Benalla Airport (BoM Site No. 82170)

Bureau of Meteorology Data Document HAJN4A[illegible]648-1

Wangaratta Aero (Site No. 82138)

Date	Time (LCT)	Rain since 9am (mm)	Air Temp (°C)	Dewpoint Temp (°C)	Relative Humidity (%)	Wind Speed (km/h)	Wind Direction (degrees)	Wind Gust (km/h)	MSL Pressure (hPa)
30/09/2017	10:30 AM	0.0	13.4	6.5	63	30	250	39	1019.1
30/09/2017	11:00 AM	0.0	14.2	7.0	62	21	280	30	1018.9
30/09/2017	11:30 AM	0.0	14.3	4.9	53	26	250	37	1018.8
30/09/2017	12:00 PM	0.0	11.3	7.6	78	28	200	41	1019.4
30/09/2017	12:30 PM	0.0	14.0	7.8	66	15	180	21	1019.6
30/09/2017	01:00 PM	0.0	15.4	5.9	53	18	230	28	1019.1
30/09/2017	01:30 PM	0.0	16.0	6.2	52	21	200	28	1018.8
30/09/2017	02:00 PM	0.2	15.9	5.2	49	22	210	30	1018.6
30/09/2017	02:30 PM	0.2	16.1	6.0	51	22	210	30	1018.3
30/09/2017	03:00 PM	0.2	14.7	5.2	53	21	230	30	1018.3
30/09/2017	03:30 PM	0.2	15.9	6.1	52	24	240	35	1018.4
30/09/2017	04:00 PM	0.2	14.9	6.2	56	17	240	22	1018.8
30/09/2017	04:30 PM	0.2	15.5	3.9	46	21	250	31	1019.1
30/09/2017	05:00 PM	0.2	15.2	5.1	51	15	200	21	1019.3
30/09/2017	05:30 PM	0.2	13.6	3.9	52	15	250	21	1019.6
30/09/2017	06:00 PM	0.2	12.5	4.5	58	13	230	17	1019.8
30/09/2017	06:30 PM	0.2	10.7	4.2	64	11	220	15	1020.1
30/09/2017	07:00 PM	0.2	10.4	4.1	65	2	230	5	1020.3
30/09/2017	07:30 PM	0.2	9.6	5.4	75	0	000	0	1020.6
30/09/2017	08:00 PM	0.2	8.0	4.8	80	0	000	0	1021.0
30/09/2017	08:30 PM	0.2	7.1	4.2	82	0	000	0	1021.5
30/09/2017	09:00 PM	0.2	6.1	3.8	85	0	000	0	1021.7
30/09/2017	09:30 PM	0.2	5.4	4.1	91	0	000	0	1022.0
30/09/2017	10:00 PM	0.2	5.7	4.8	94	5	190	8	1021.9
30/09/2017	10:30 PM	0.2	5.2	4.5	95	0	000	0	1022.0
30/09/2017	11:00 PM	0.2	4.7	3.5	92	0	000	0	1022.2

Observations from Wangaratta Aero (BoM Site No. 82138)

Strathbogie (Site No. 82042)

Date	Time (LCT)	Rain since last obs (mm)	QC	Air Temp (°C)	QC	Dwpt Temp (°C)	QC	Rel Hum (%)	QC	Wind Speed (km/h)	QC	Wind Direction (degrees)	QC	Visibility (m)	QC	Total Cloud (oktas)	QC	Present Weather	QC	Past Weather	QC
30/09/2017	09:00 AM	0.8	N	8.9	N	7.9	N	93	N	4	N	270	N	10000	N	7	N	Drizzle	N	Rain	N

Observations from Strathbogie (BoM Site No. 82042)

Edi Upper (Site No. 83083)

Date	Time (LCT)	Rain since last obs (mm)	QC	Air Temp (°C)	QC	Dwpt Temp (°C)	QC	Rel Hum (%)	QC	Wind Speed (km/h)	QC	Wind Direction (degrees)	QC	Visibility (m)	QC	Total Cloud (oktas)	QC	Present Weather	QC	Past Weather	QC
30/09/2017	09:00 AM	1.3	N	10.4	N	9.6	N	95	N	9	N	310	N	5000	N	7	N	Drizzle	N	Rain	N

Observations from Edi Upper (BoM Site No. 83083)

Figure 6: Synoptic Observations

Flight recorder

The pilot carried a portable 'NANO' flight recorder manufactured by Slovenian company LXNAV. This flight recorder features an integrated 66-channel GPS receiver, built-in antenna and built-in battery. Flight data, such as time, position and altitude, are stored directly in IGC format and are downloadable through a USB connection. The unit was set to record data points at two-second intervals.

Wreckage and impact information

Examination of the occurrence site and wreckage indicated that the aircraft was in a left-hand spiral when it struck the ground in a left-wing-low, very steep nose-down attitude. After the initial impact the aircraft rebounded rearwards approximately eight metres. The aircraft came to rest right side up on a Westerly heading, with the right-hand wingtip passing through a post and wire fence. The nose of the aircraft left a single conical impact point some 75mm deep and 100mm in diameter. The impact point was about 8.1 metres from the final resting place of the fuselage. The tail boom broke behind the wings, with the tailplane tucked under the left-hand wing.

Figure 7: Accident site

Figure 8: Damaged glider

The left wing contacted the ground almost simultaneously with the nose along its full length, leaving a well-defined depression in the ground. The left-hand wing suffered significant damage.

Figure 9: Left-Wing Impact Marks

The aircraft was equipped with four-point lap and shoulder restraints, which was worn by the pilot. The harness remained intact during the accident. Gliding club personnel noted all flight control surfaces were accounted for at the accident site. While there were multiple overload failures of the flight control system in

the fuselage and cockpit areas, control continuity was established. The hand grip from the control column was rotated about 45 degrees to the right, i.e. clockwise.

Figure 10: Twisted Control Column Grip

The undercarriage was found to be collapsed and the tyre deflated. The undercarriage lever was noted in the 'down and locked' position, and the guide rod immediately forward of the handle was bent upwards by impact forces. Dirt and debris accumulated between the tire and wheel confirmed the undercarriage was down and locked at the moment of impact. It was also noted that the left and right airbrakes were unlocked but a lack of damage to the airbrake mechanism in the wings is indicative of them being in the closed position prior to impact. The airbrake lever was in the locked position in the cockpit. The airbrakes most likely become unlocked when control circuit integrity was lost. The instrument cluster suffered substantial damage. The electrical system master switch toggle was broken and the number 2 circuit breaker to the electric Variometer had popped. The needle electric Variometer (top right in the instrument cluster) was indicating a rate of descent of 600ft per minute. The needle on the Air Speed Indicator (top left in the instrument cluster) was stuck on 70 knots, and the needle on the altimeter (bottom left in the instrument cluster) was indicating 160 feet.

Figure 11: Instrument Cluster

Medical and pathological information

The pilot held a GFA Medical Practitioner's Certificate of Fitness dated 28 October 2015. The medical standards applicable for the issuing of this Certificate are the Austroads standards for the issue of a driver's

licence medical certificate for a private motor vehicle. The issuing Medical Practitioner signed the Certificate and attested: *"I hereby certify that I have examined the applicant and to the best of my knowledge he is not suffering from a medical condition which would preclude him from flying a sailplane as pilot in command."* Medical notes obtained by the pathologist from the pilot's Medical Practitioner revealed his past medical history included:

- Cerebrovascular incident (2015, no residual neurological deficit).
- Coronary angiography - no significant obstruction (2015).
- Gastro-oesophageal reflux disease.
- Cataract surgery (bilateral).

The Pathologist noted that there was *"…significant narrowing of the carotid sinuses which are capable of causing transient ischaemic attacks (mini strokes) and the possibility of one causing loss of consciousness and/or coordination should be considered as one possible causal or contributing factor for this crash."*

Survival aspects

The forward cockpit was severely compromised upon impact with the ground. The pilot was found reclined in the seat and still restrained by the aircraft harness. The impact forces were not survivable.

ANALYSIS

Pilot qualifications

The pilot was appropriately qualified for the flight but was lacking currency, having flown only two flights since 1 March 2017. The flight immediately preceding the accident flight was a 10-minute check flight with his Chief Flying instructor (CFI) on 10 September 2017. The CFI noted that *"[The pilot] recently hasn't been flying much and he was a little rusty"*. The flight covered emergency procedures and upper air stalling exercises. The pilot flew a normal circuit and landing, with the CFI commenting: *"Beside a better lookout there was nothing I could fault him. We debriefed, and both came to the conclusion that more time on the stick would benefit [the pilot]. I signed his logbook confidently."* Although the accident flight was the pilot's first in an LS8 sailplane, the pilot had considerable experience in flying earlier model LS gliders, with many similarities in cockpit design, controls and in-flight handling characteristics. He also had much experience flying cross-country in other high-performance glider types. He had a Glider Pilots Certificate and Independent Operator Rating, qualifying him for independent unsupervised flight.

Weather

The weather was generally fine, but other pilots who flew that day noted there was moderate turbulence at lower levels. Turbulence is usually present in two forms; mechanical and thermal. Mechanical turbulence is a product of wind strength and variation in the terrain (trees, buildings, ridges, etc.). It can extend up to 500ft above terrain and is more pronounced the lower the pilot flies. Thermal turbulence is caused by variations in ground heating of the air, creating buoyancy. Thermals can be quite broken and turbulent below 1,000ft above ground.

Flight Recorder

A GFA technical expert attended the Benalla Police station at 9.00am on the 1 October 2017 and recovered a data file from the Nano data recorder. The flight recorder recorded altitude and position data for the flight up until approximately two seconds prior to impact with terrain. It is believed power to the unit was lost at impact that prevented the unit from continuing to record GPS data. The data obtained allowed a reconstruction of the flight as detailed earlier under the heading 'History of the Flight'. An overlay of the flight on a 'Google Earth' satellite image provides a reasonably accurate track of the aircraft over the ground and through the air.

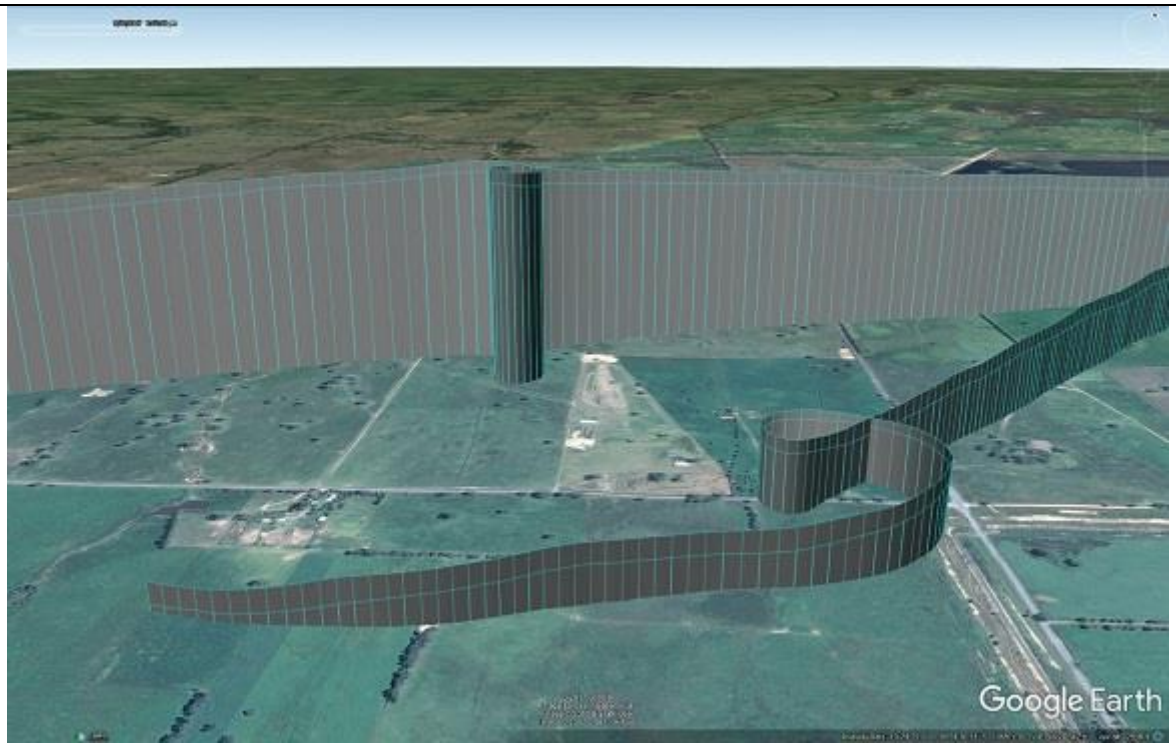


Figure 12: Flight Track

While GPS and pressure altitude and GPS track data cannot be relied upon with absolute accuracy due to horizontal and vertical resolution errors, and the two-second sampling rate, in this case the heights and track data recorded are consistent with the statements of the tow pilot and the sole witness to the accident. Using the last recorded data point and the position of the aircraft wreckage, it was possible to extrapolate the flight path and identify the probable landing point.

Figure 13: Projected flight path

Aircraft

A post-crash inspection of the wreckage was undertaken by a GFA Airworthiness Inspector. As far as could be determined, inspection of the aircraft did not identify any defects which might have affected the pilot's ability to control the aircraft in flight.

Aircraft maintenance

The aircraft was maintained by the pilot, who held GFA authorisation to conduct annual inspections. Prior to purchase, the aircraft was maintained by the owner. The current inspection schedule confirmed compliance with GFA and the Manufacturer's requirements. The aircraft was certified airworthy and fit for an evaluation flight. The schedule also confirms that a dual inspection of the control safety locking was undertaken prior to closing all access panels, and an independent control check was conducted by another person following assembly of the aircraft on 9 September 2017. At the time of this inspection the aircraft had flown 1,418 hours over 438 flights. The current Maintenance Release was issued by the pilot on 30 September 2017 with an expiry date of 29 September 2018. The maintenance release evidences the pilot undertook a Daily Inspection in accordance with GFA operational procedures at 12:40 and prior to the first flight of the day. No defects had been recorded.

Mass and balance

As previously noted, the aircraft was flying within its weight and balance envelope.

Aircraft instrumentation

The aircraft carried basic instruments. Due to the effect of impact forces on the Altimeter, it is not possible to determine whether the pilot set the altimeter to record QNH (height of the airfield above sea level - 569 feet) or whether it was set to record QFE (altitude relative to an airfield - 0 feet). The Airspeed Indicator (ASI) was stuck on 70 knots. This most likely indicates the aircraft's indicated airspeed at impact.

Analysis of injuries and fatalities

It is sometimes possible to determine which hand the pilot had on the control column at the time of the accident from injuries sustained to the hand and fingers. The control column of most gliders is situated between the pilot's legs and very close to the instrument panel. During a crash of this nature it is common for the fingers of the hand holding the control column to impact the instrument panel and leave contusions. In the case of this accident, the Injuries to the pilot's left hand and arm are consistent with pilot flying left-handed. This is further supported by the position of the control column hand grip, which was found to be rotated 45 degrees clockwise, to the right.

General

Review of the flight trace suggests the pilot was in control of the aircraft up until the point of departure from controlled flight into a low-level spin, leading to collision with terrain.

The pilot's decision-making processes during the course of the flight warrant consideration:

1. This was the post-maintenance flight of the aircraft, so it would be usual for the pilot to take a much higher tow to, say, 3,000 ft, in order to confirm the aircraft was airworthy and provide sufficient altitude to abandon the aircraft should a serious technical problem be identified. Furthermore, it would be usual for a pilot to exercise a degree of caution on their first flight on type. Notwithstanding, it is possible, at the moment of release, the pilot believed he was in sufficient lift to climb to height without the tow plane. Unfamiliarity with the differences in LS8 aircraft feel from other type and functioning of the Variometer may have been a contributing factor. Another potential factor that may have contributed to the pilot's decision to release from tow was misreading the altimeter. The pilot's previous glider was fitted with a metric-style 2-hand altimeter showing 3,000ft per revolution (refer Figure14: Altimeters). In this case, misinterpretation by the pilot could have resulted from the difference between the conventional altimeter and the 3000ft-per-revolution altimeter. When the conventional 1000ft-per-revolution altimeter reads 700ft, the hands of a metric altimeter in the same spatial position would read about 2000ft. A misinterpretation of altimeter height is possible even in the face of contradictory cues (short time on tow, external visual cues) in what the human factors literature refers to this as a 'capture error.' In this, people follow a similar but unwanted and unintended line of action because it is triggered by a strong contextual cue (in this case the altimeter hands), which eclipses other cues. External visual cues may have been less persuasive because of attentional narrowing under the stress of the

upcoming flight, and the time spent on tow would have similarly been less obvious because of the common distortion of time perception under these circumstances.

2. It is evident the pilot headed downwind, away from the airfield, for a total distance in excess of seven (7) kilometres in search of rising air (refer Figure 11: Measured Maximum Distance from Benalla Aerodrome). Pilots will usually remain within glide range of the airfield until they have sufficient height to fly further away, and they will usually not fly far downwind. A pilot will assess glide range visually, taking onto account the angle down to the destination, which is a function of the aircraft's height above ground and distance to run, and the effect of any wind. It is likely the pilot's decision was influenced by the presence of cumulus clouds, which form at the top of thermal convection.
3. The pilot made a very late decision to break-off the flight and conduct a landing. The flight trace suggests the pilot made the decision to break-off the flight immediately following the last attempt at contacting a thermal and at a height below 500ft AGL (refer Figure 15: Estimated Break-off Point). Breaking off the flight at this height is contrary to GFA training and safe practice. Glider Pilots are trained that when below 2,000 ft AGL, searching for lift and other upper air activities should normally be conducted upwind of the intended circuit joining area, and that the glider should be flown so as to ensure it can always join circuit at a safe height and commence a normal downwind leg. The normal height for joining circuit in a high-performance glider like the LS8 would be around 800ft AGL or higher. Sufficient height is especially important when landing in a paddock of which the pilot has no knowledge, as it enables the pilot to properly check for any hazards and allow for safe flight to an alternative landing area should the first option prove unsuitable.

Metric-style altimeter fitted in Pilot's previous glider (LS3 VH-WUP). Source: GFA

Standard altimeter fitted in crashed glider. Source: GFA

Figure14: Altimeters

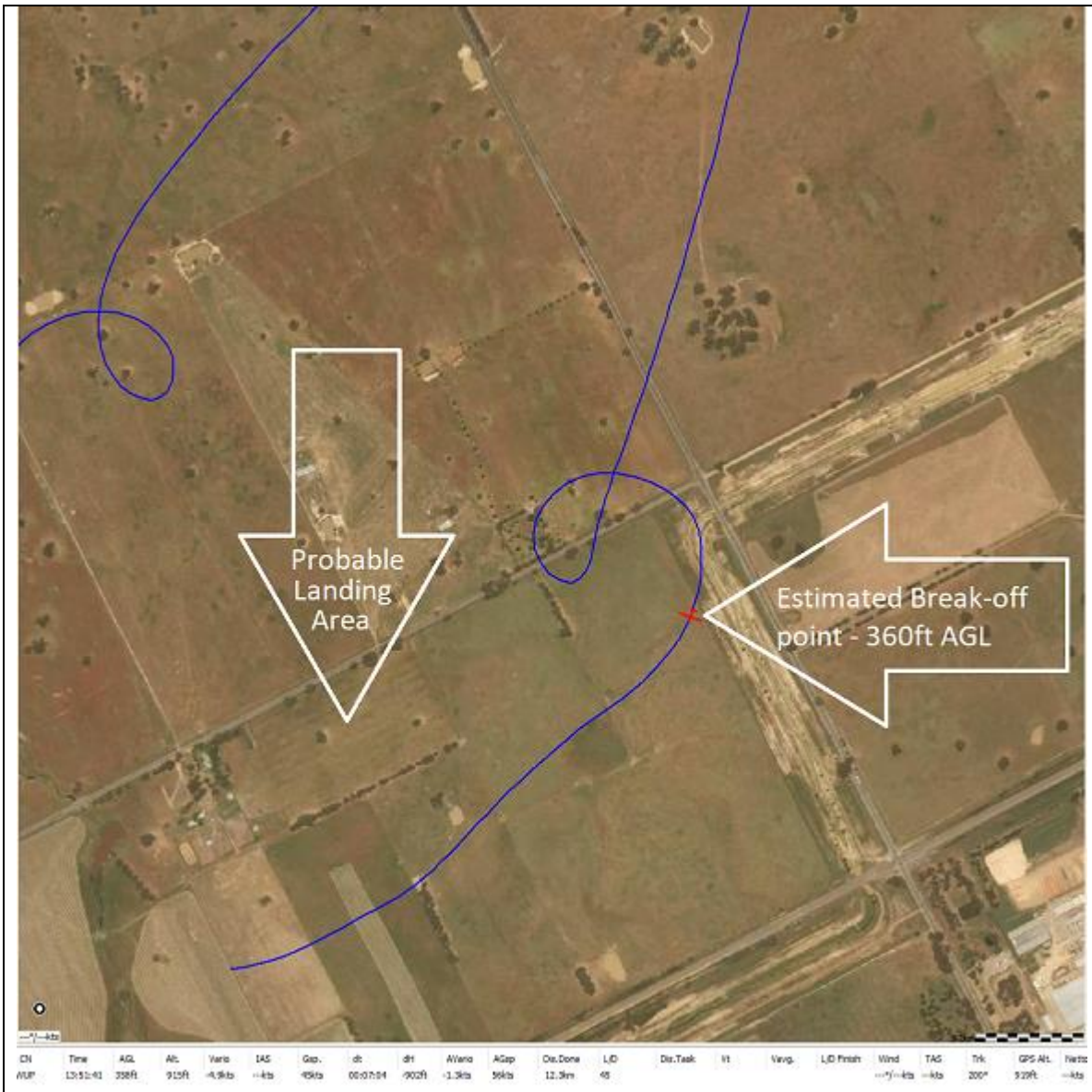


Figure 15: Estimated Break-off Point

Reconstruction of the flight trace, which did not record the last seconds before impact, and review of the statement of a witness suggests the pilot was attempting to conduct a downwind landing in a paddock parallel to Murray Road. The aircraft appears to have departed controlled flight after rolling out of the right-hand turn to wings level while on final approach to the paddock. As previously mentioned, the nature of injuries to the pilot's left hand and left forearm, plus the orientation of the control column grip, suggest he was holding the control column with his left hand at the time of impact with terrain. It is unusual for a pilot, at such a late stage of the circuit and final approach, to be flying left-handed. This is because the airbrake controls used to manage the final approach are manipulated by the pilot's left hand and are usually held for the duration of the approach and landing. It is therefore probable the pilot was flying left-handed because he changed hands to lower the undercarriage, the lever for which is on the right-hand side of the cockpit. If this was the case, then the pilot had not configured the aircraft for landing prior to turning onto final approach, which is indicative of workload management being affected by increased stress. The ergonomics of this control activation sequence are relevant to possible contribution to low level loss of control leading to

a collision with terrain. To lower the undercarriage, the pilot must use his right hand to disengage the undercarriage lever from the 'UP' locking recess and pull it back into the DOWN' locking recess. The act of pulling backwards with the right hand can lead to the pilot also moving the left hand and possibly applying pressure to one of the rudder pedals if the undercarriage lever is somewhat difficult to engage into the retaining slot. Such action could cause the aircraft to pitch and yaw, which coupled with low-level turbulence may have led to the aircraft departing controlled flight and entering a spin.**Human Factors**

From an aviation operations and safety management perspective, accidents may be analysed in terms of active errors ("unsafe acts") and latent (systems, organisational) conditions. In this case there appears to be some active errors and failed defences that have combined in the accident causation chain, with fatal result. These include:

Active errors:

- The pilot headed too far downwind for the conditions, having released from aerotow at a lower altitude than is normal for post-maintenance evaluation flights and first flight in a new type.
- The pilot did not break-off the flight and commit to a landing at a safe height; and
- It is likely the pilot had not configured the aircraft for landing at a safe altitude prior to final approach.

Failed Defences:

- Non-adherence to standard operating procedures for safe circuit and landing, possibly due to high workload and stress.

The effect of age

Due to the nature of a pilot's work and the demands that are placed on an individual's abilities, the process of aging is of importance to a pilot. The natural and expected process is that as one becomes older, there is a gradual deterioration of some of the body's physical components and sensory functions, although the degree of deterioration varies greatly from person to person. The first change to manifest is certain bodily stresses, especially fatigue, becoming more difficult to handle as a pilot ages. The body's reaction time, efficiency, and recovery from climatic extremes slows down as it gets older. Quickness of response begins to decline with maturity, so an older person will be slower to respond to urgent situations than a younger person, and a slower reaction time may be more significant in landing procedures in which many actions must be carried out rapidly. Due to the gradual loss of elasticity, the lens of the eye may be unable to focus properly on near objects, making it more difficult to read instruments, charts, or radio controls. To better cope with age-related factors, pilots need to ensure:

1. they are physically fit, not just at the time of their medical exams but in the two years between them' and
2. fly more, not less, to keep skills current—and every so often go out and practice manoeuvres such as stalls, slow flight, approaches, take-offs and landings, in order to maintain their flying skills.**CONCLUSIONS**

While it is not possible to determine the cause of this accident with certainty, review of the evidence suggests the aircraft most likely departed controlled flight when the pilot initiated crossed control inputs while lowering the undercarriage when flying with his non-preferred left hand, while on final approach into an unplanned off-aerodrome landing. Low-level turbulence may also have been a contributing factor. It is also possible that the pilot's decision making identified in this report was affected by a transient ischaemic attack prior to, or during flight.

Findings

1. The pilot was qualified for the flight in accordance with existing regulations.
2. The pilot lacked recent flying practice and had no prior experience on type.
3. The aircraft's maintenance records indicated that it was equipped and maintained in accordance with existing regulations and approved procedures.
4. All control surfaces were accounted for, and all damage to the aircraft was attributable to the severe impact forces.

5. There was no evidence of any defect or malfunction in the aircraft that could have contributed to the accident.
6. The aircraft appeared capable of normal operation up to the moment of impact.
7. Weather conditions were generally favourable, although increased thermal turbulence could have been experienced close to the ground.
8. The pilot's previous glider was fitted with a metric-style 2-hand altimeter showing 3,000ft per revolution. An altimeter misinterpretation (capture error) may have suggested to the pilot that he was significantly higher than he actually was when releasing from tow.
9. The pilot made a number of decisions and interpretations during the flight that led to an attempted off-aerodrome landing.
10. During final approach for a paddock landing, the aircraft inadvertently stalled and departed controlled flight at a height too low for the pilot to recover before ground impact.**SAFETY RECOMMENDATIONS**
11. Given the possibility that 'metric' style altimeters can be misread, GFA will recommend to new owners of gliders fitted with a 'metric' style altimeter that they consider replacing them with standard altimeters.
12. The GFA include advice regarding conversion of pilots to high wingspan, high inertia gliders, and controllability considerations in its current update of the GFA Training Manual.
13. The GFA Operations Department review, and update as required, guidance to instructors and pilots on safety implications of low recency and currency, especially in regard to older pilots.

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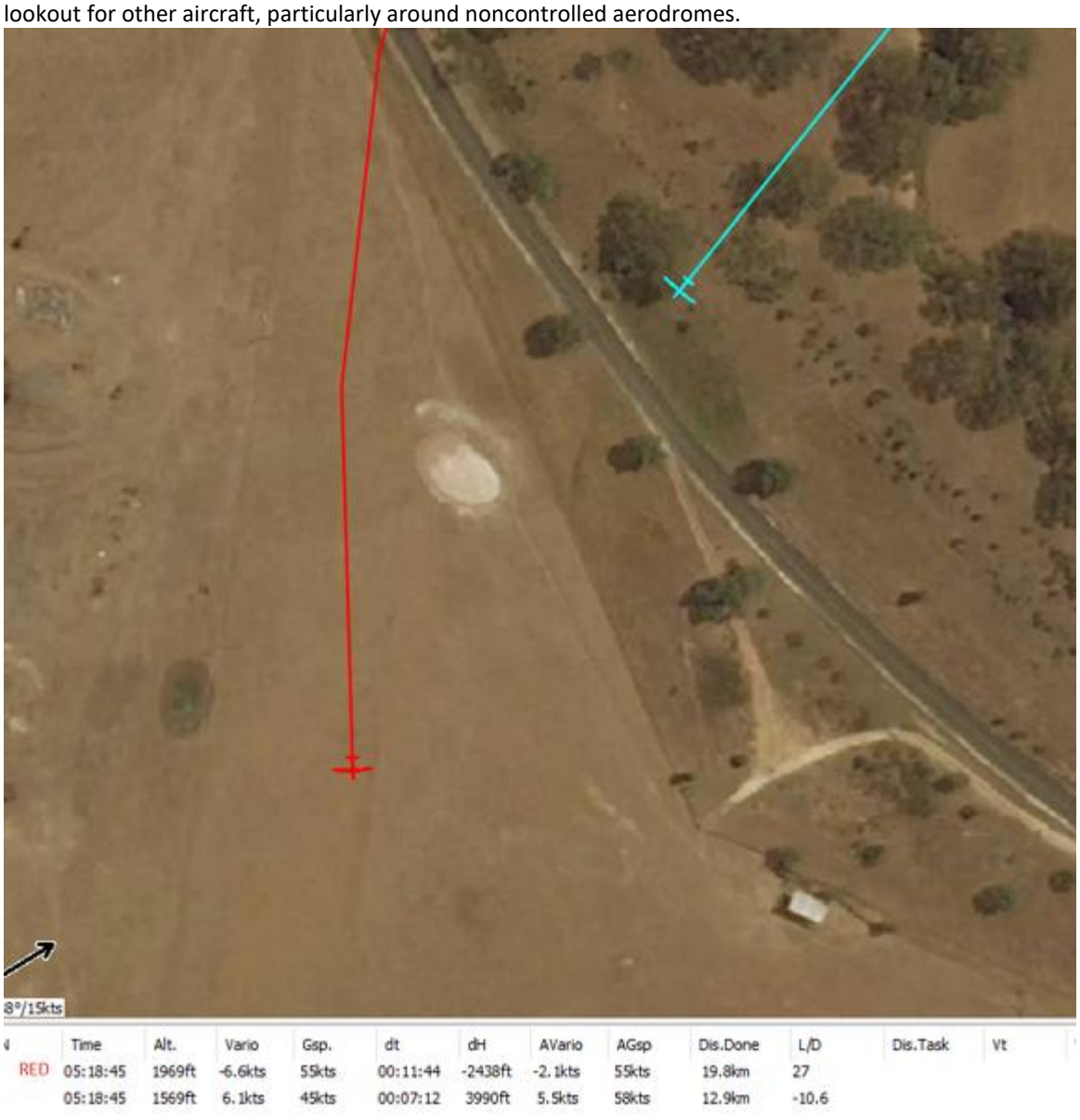
9 The Ageing Pilot, New Zealand Civil Aviation Authority, Vector Magazine March/April 2010

Date	30-Sep-2017	Region	VSA		SOAR Report Nbr		S-1050		
Level 1	Airspace	Level 2	Aircraft Separation		Level 3	Near collision			
A/C Model 1	Puchacz				A/C Model 2	PIK			
Injury	Nil	Damage	Nil	Phase	Launch		PIC Age	51	

During an aerotow launch and about 800' AGL, the attention of the pilot of the glider under tow was caught by a shadow passing over the glider. The pilot looked up to see another glider (PIK 20) approximately 400' directly above heading to join circuit. The pilot of the tow plane and the pilot of the PIK 20 were both unaware of the potential conflict. Investigation revealed the pilot of the PIK 20 pilot had earlier sighted the

towing combination on the ground but did not hear the tow pilot's radio calls that would have alerted them to the take-off. As the pilot of the PIK turned onto downwind, the tow plane was almost directly underneath. It is possible neither the PIK pilot nor the tow pilot sighted each other due to blind arcs. When operating at uncontrolled airspace, it is the pilot's responsibility to maintain separation with other aircraft. For this, it is important that pilots utilise both alerted and unalerted see-and-avoid principles. Pilots should never assume that an absence of traffic broadcasts means an absence of traffic. Unalerted see-and-avoid relies entirely on the ability of the pilot to sight other aircraft. A traffic search in the absence of traffic information is less likely to be successful than a search where traffic information has been provided because knowing where to look greatly increases the chance of sighting the traffic. This incident highlights the importance of broadcasting radio calls to alert pilots and assist in see-and-avoid practices. It also serves as a reminder to keep a good lookout for other aircraft, particularly around noncontrolled aerodromes.



Date	4-Oct-2017	Region	NSWGA	SOAR Report Nbr	S-1051

Level 1	Environment	Level 2	Wildlife	Level 3	Birdstrike
A/C Model 1	DG-200/17 C	A/C Model 2			
Injury	Nil	Damage	Minor	Phase	In-Flight	PIC Age	

While in the cruise on a cross-country flight the pilot spotted an eagle approximately 1,000 feet higher. The eagle dived towards the glider head first and wings folded, leading with its talons. The eagle passed over the canopy and wing but struck the fin. The pilot conducted a control check and found it to be normal, so flew back to the home airfield. Subsequent inspection revealed only minor damage, comprising a bent TE probe and a scratch down the fin and rudder. Breeding Wedge-tailed Eagles are particularly sensitive to aircraft approaching the nest, even if the aircraft remains many hundreds of metres away. To avoid collisions when flying over nesting habitat during the breeding season (between August and January), pilots must learn to recognise aggressive behaviour and be on the lookout for warning signs while flying.

Date	5-Oct-2017	Region	NSWGA	SOAR Report Nbr	S-1052
Level 1	Airspace	Level 2	Airspace Infringement	Level 3	Airspace Infringement
A/C Model 1	JS1 C 18/21	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	41

The pilot was flying in the 2017 Queensland State Gliding Competition. On day 2, the pilot was flying a 2.5-hour AAT task of up to 353kms. During the course of this flight the pilot briefly violated restricted airspace for 1min 38 seconds and a distance of not more than 1km. The pilot reported no relevant airspace warnings of any kind were received from the flight computer, despite being correctly configured and using the competition airspace file. Post-flight analysis determined that the airspace file had been corrupted during conversion to a format used by the flight computer. This was a latent threat, not presenting itself until it had become an error, as the lateral limits of the airspace types were shown correctly, and the flight computer was generating warnings for Danger areas and CTAF's that were coded correctly. The pilot also noted that they missed the day briefing and presented to the CD afterwards for a makeup briefing. The pilot suspects that had they been present in the tasking instruction, it is doubted the error would have been made. When flying near airspace boundaries pilots must ensure they use sensible tolerances to airspace. AIP ENR 1.1, paragraph 19.12 states: *"For aircraft operating in close proximity to an airspace boundary where there is a risk of an airspace infringement, the pilot in command should consider obtaining a clearance to enter the airspace or altering track to remain well clear."* Pilots should always navigate using CASA approved data and charts. Airspace files provided by competition organisers or downloadable from the internet are unapproved and should not be relied upon.

Date	6-Oct-2017	Region	SAGA	SOAR Report Nbr	S-1059
Level 1	Operational	Level 2	Airframe	Level 3	Fuselage/Wings/Empennage
A/C Model 1	ASK-21Mi	A/C Model 2	N/A		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	

The aircraft had been flown for a week with the port drag pin unlatched. At the conclusion of flying operations, the aircraft was de-rigged. During the derig it was noted that the port wing drag spar pin, which had been covered with tape, was not secured by the safety latch. The safety latch had been compressed by the pin. It is likely the pin was not properly secured during rigging the week earlier, and that subsequent Daily Inspectors failed to notice this due to the tape covering.

Date	7-Oct-2017	Region	VSA	SOAR Report Nbr	S-1053
Level 1	Operational	Level 2	Runway Events	Level 3	Runway excursion
A/C Model 1	Piper PA 25-260	A/C Model 2			

Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	80

Following a successful glider launch, the tow pilot returned to the aerodrome and established the tow plane on a stable final approach for the operational runway 01. The runway strip comprises a bitumen surface with wide grass verges either side for the use of gliders, tow planes and vintage aircraft. A permanently displaced threshold exists to allow the gliding operations to be conducted without occupying the runway proper. Weather conditions on the day were fine, with a prevailing NNE wind of between 5 to 10 knots. The tow plane was aligned with the runway centreline, as both the left and right-hand verges behind the threshold were occupied by gliders. The tow plane touched down on the mainwheels and bounced slightly. While still airborne the tow plane was struck by a wind gust or thermal from the west that resulted in the tow plane yawing to the left. The tow plane touched down again slightly sideways as the aircraft weathercocked to the left. The port wingtip lifted in the gust, resulting in the starboard wingtip contacting the ground. The tow plane turned through 180 degrees and stopped facing the opposite direction to travel. During this excursion the pilot switched off the engine. The aircraft was manhandled off the runway and some minor damage to the starboard wingtip was identified. A few pilots witnessed the accident and confirmed the aircraft was struck by a sudden wind gust from the West. Tailwheel aircraft are particularly susceptible to ground-looping, which occurs when directional control is lost by the pilot and the tail passes outside the centre of gravity, spinning the aircraft. Although the pilot conducted a wheel landing, which is preferred in higher wind conditions because the aircraft is then less susceptible to the yaw generated from wind gusts, the gust struck just as the aircraft was approaching the stall and the pilot was unable to correct the ensuing swing.

Date	9-Oct-2017	Region	VSA	SOAR Report Nbr	S-1055
Level 1	Operational	Level 2	Aircraft Control	Level 3	Loss of control
A/C Model 1	JS1 C 18/21			A/C Model 2	N/A

Injury	Fatal	Damage	Write-off	Phase	In-Flight	PIC Age	75

GFA Field Investigation

SYNOPSIS

On 9 October 2017, at about 1314 hours Eastern Standard time, a Jonker Sailplanes Pty Ltd JS1C, registered VH-IBS (IBS), was towed into the air from Goondiwindi Aerodrome Queensland by a Piper PA25-235 Pawnee tow plane registered VH-TOJ. The pilot intended to fly a practice task in preparation for participation in the National Gliding Competition that was scheduled to start the following day. At about 1320 hours the glider pilot released from tow at a height of about 2,000ft above ground level (AGL) just north-west of the airfield. Several minutes later the glider was observed by a number of other pilots in a steep nose-down attitude spiralling towards the ground at a position approximately 4 kms south-west of the airfield along the extended centreline of Runway 22. The glider did not recover from the dive and impacted the ground in a steep nose-down attitude at high speed and was destroyed. The pilot, who was the sole occupant, was fatally injured. The accident was notified to the Gliding Federation of Australia by the competition Director shortly after it occurred. The GFA, operating under a deed of agreement with the Civil Aviation Safety Authority, is the organisation responsible for the administration of gliding activities in Australia. A GFA field investigation was commenced immediately to support the NSW Police investigation pursuant to a Deed of Agreement between the GFA and The Crown in Right of The State of New South Wales, for and on behalf of the NSW Police Force.

1. FACTUAL INFORMATION

1.1 History of flight

The pilot was competing in the 37th Australian Club and Sports Class National gliding championships being held at Goondiwindi (Qld) Aerodrome during the period 9 to 18 October 2017. At around 0900 hours on Monday 9 October 2017 the pilot, together with other competitors, attended a morning briefing at which weather conditions, tasks, gridding order on the airstrip and operational instructions were provided. The day was to be practice before the competition commenced the following day. The pilot was flying the glider in 'Open Class', where there are no restrictions except a limit of 850 kg to the maximum all-up mass. At briefing the pilots of Open Class were informed they would fly an Assigned Area Task of between 249.66 kms and

474.77 kms, with a task duration of three hours. The pilot was assisted just prior to launch by crew member. In a statement to NSW Police dated 21 November 2017, the crew member stated *"[The pilot] was flying that day at about mid-morning, it was a practice day for the competition. I had seen [the pilot] at the morning briefing prior to his flight. I next saw [the pilot] on the flight line and he was standing at the side of the glider and I made it obvious to him that I would run his wing. I watched him get into the glider cockpit and I think he made a comment like "this will take a minute." I noticed that he was wearing a parachute. When [the pilot] was in the cockpit I helped him strap in, which is putting on the harness. I do not recall where the harness buckle was in relation to his torso…. At [the pilot's] request I helped him close the canopy. I did this by reaching in to put pressure on the canopy sill. [The pilot] assisted with his hands to put pressure on the sill, so he appeared to have arms movement."* Flight sheets maintained by the competition organisers record the glider was aerotow launched from Goondiwindi aerodrome at 1314 hours by a Piper PA25-235 Pawnee tow plane registered VH-TOJ. The tow pilot provided the flight track in a diagram at Figure 1. The tow pilot advised that he followed the runway heading towards the south-west and, after crossing the railway, turned about 90 degrees to the right and flew parallel to the railway line. Just after crossing Brennan's Road at a silo complex, the tow pilot then turned 90 degrees to the right on a north-easterly heading and parallel to the operational runway. The tow pilot advised that approximately five minutes into the launch and at a height of about 2,000 feet AGL, the glider pilot released from the tow. The tow pilot turned slightly to the left and observed the glider in a right-hand turn. The tow pilot estimates the glider pilot released at a position approximately 100 metres east of the point where Polo Road crosses a creek. The release position was about 4.75 kms from the crash site. The tow pilot then flew a curved path towards the east, before heading south to align with the extended centreline of runway 30.

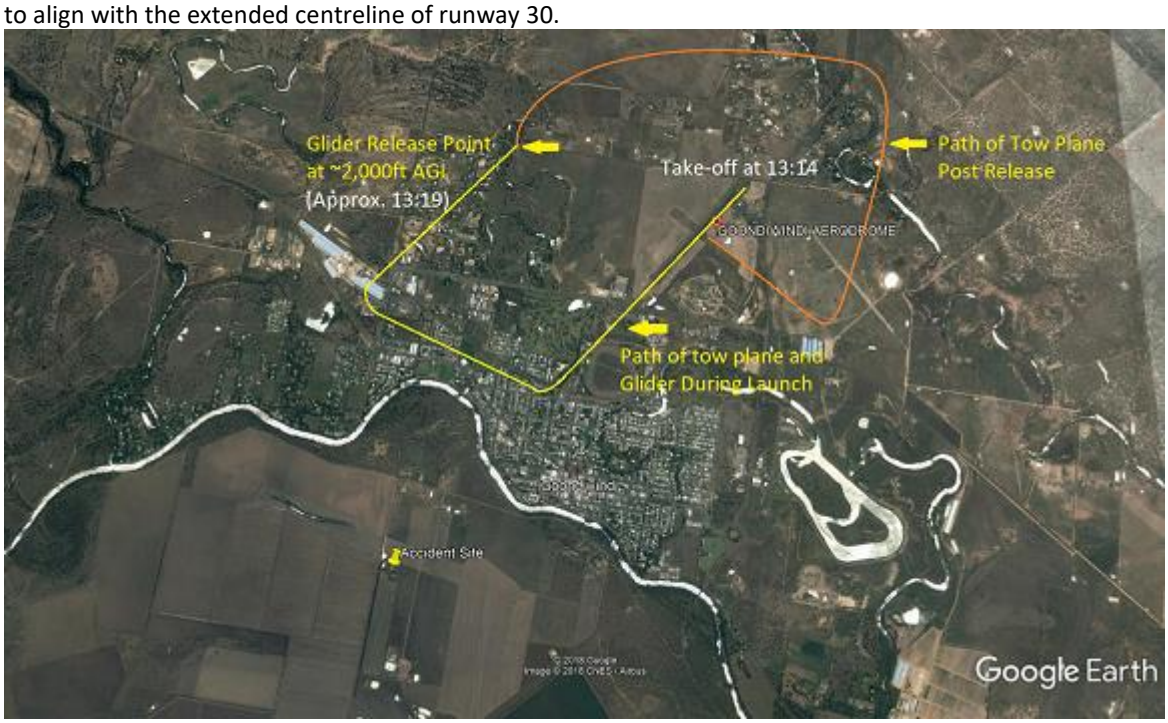


Figure 1: Aerodrome environs showing take-off path of the towing combination (yellow) and the path of the tow plane after the glider pilot released from tow (orange).

A few minutes after release, the glider was observed by a number of other pilots in a steep nose-down attitude spiralling towards the ground approximately 4 kms south-west of the airfield along the extended centreline of Runway 22.

1. A glider pilot flying a JS-1B glider noted in their statement to NSW Police dated 9 October 2017 that, while they were on tow they noticed a glider in their *"10 o'clock position, slightly higher". They stated "Initially I thought the glider might have been in a stall, but it wasn't a developed spin and*

there was very little rotation. I thought there was time to recover but the glider didn't seem to be recovering. The speed was building up and the nose was towards the ground, very close to vertical. …The glider moved to my 9 o'clock position as we (glider-tug combination) continued the turn to the right. The glider was below at this stage in a fast (and) vertical dive. I didn't think there was sufficient height to recover at this stage. I watched until almost impact but didn't see impact. The glider remained vertical the whole way down. The wings were flexed up but, as I have a JS1-18, I was familiar with the upsweep of the wings. I didn't have the impression the glider was under any 'g' loading."

2. Another glider pilot, flying an ASW 19-B glider, noted in their statement to NSW Police dated 18 October 2017 that *"I had been up for approximately 10 to 15 minutes, still in the thermal, when I saw [a glider] straight in front of me on the NSW side of the Boarder. I saw [the glider] was in a very nose down attitude rotating, I think to the right. It was very nose down and quicker than a spin. I would say it looked to be in a spiral dive and, in my opinion at that time and at that particular height, it looked like he had time to recover. … [the glider] had done a number of rotations at this point and I was concerned that [its pilot] hadn't followed procedure for corrective action at this time. I still thought [the glider] had height to do that. My initial thought was if [the pilot] put a corrective action in, he was going to be too low to make it back to the field but he could have made it into a cultivated field which was straight ahead of him. A routine call in this situation would have been a mayday call. At no time did I hear [the pilot] make a call. It is not common for glider pilots to make calls during competition except in emergency situations or to communicate with other glider pilots. In saying that, [the pilot] would have been under enormous mental pressure and may not have had the presence of mind to make the call. When I saw [the glider] get to a height of between 500 to 300 feet I knew [the pilot] was not going to be able to put corrective action in and outland safely. [The glider] was still in a very nose down attitude and still rotating. I saw [the glider] go behind a line of trees at very high velocity and [it] would have impacted virtually nose first. I did not see the impact."*
3. The tow pilot flying Piper Pawnee VH-SWR, was towing a JS-1B. The pilot of VH-SWR noted in his statement to NSW Police dated 18 October 2017 that when the towing combination was in a right-hand turn at about 700 feet near the Macintyre River he *"became aware of a glider in a steep descending turn having all the appearances of a spiral dive. In layman's terms, a spiral dive is a descending turn in a steep, nose down attitude with a steep angle of bank but rotating slowly, unlike a spin. The glider had a steep nose down attitude, at least 60 degrees down and a steep angle of bank, at least 60 degrees. The glider was higher than the tug, approximately 1000 feet AGL and in my 10 o'clock high position relative to me. The glider was less than one kilometre away from me. I observed the wing tips appeared deflected up, approximately three metres from normal flight. There was a very pronounced curve in the wings. That Jonker has a lot of flex in the wings due to their length and thinness. The flex indicates how much load the wings are under, so I could see the glider was under a lot of load. As I had a glider on tow it wasn't possible to manoeuvre the tug to keep the glider in sight. The glider was moving below and behind the left wing of the tug as I continued the turn. At this point the glider disappeared from my sight. My last observation of the glider was it appeared intact although under load. The canopy was still on."*

The glider did not recover from the dive and impacted the ground in a steep nose-down attitude at high speed and was destroyed. The pilot, who was the sole occupant, was fatally injured. In a statement to NSW Police dated 6 March 2018, the pilot who towed VH-IBS mentioned: *"I was on the ground taxying back to the launch point for the next glider and departure, and that's when I became aware that something was going wrong in the sky, but I still didn't know who it was."* The tow pilot advised the total flight time was about 8 minutes, and it was while he was taxying the tow plane on the runway that he heard radio chatter advising of a mishap. An experienced competition Pilot, in a statement to NSW Police dated 15 April 2018 noted: *"About 7 or 8 minutes after [the pilot] had taken off, I was still on the ground waiting to take off when I heard a "mayday" call on the radio in my aircraft on the CTAF frequency that was being used by the*

competition. The call was made by the Tug pilot (of VH-SWR) and he indicated that a glider was going in." The accident occurred in daylight, at approximately 1325 hours AEST.

1.1.2 Location

The aircraft crashed onto a rural property located on the NSW side of the Qld/NSW border. The crash site was situated east of an unnamed road immediately opposite Uathery Lagoon and approximately 500 metres to the south of the intersection with Kentucky Lane, Boggabilla, NSW. This position was approximately 4 kms south-west of the Goondiwindi (Qld) Aerodrome along the extended centreline of Runway 22 at co-ordinates 28º33'15" S 150º17'33" S. The site elevation is 710ft above mean sea level (AMSL).

1.2. Injuries to persons

The pilot, who is an Australian national, suffered a catastrophic pattern of injuries in the accident, involving the commingling of the limbs, head and torso that would have led immediately to death.

1.3. Damage to aircraft

The aircraft was seriously damaged. The wings, rear fuselage and empennage were damaged but identifiable, and the cockpit area forward of the wings was destroyed. All aircraft wreckage was confined to the accident site.

1.4. Other damage

Nil. The aircraft impacted on vacant land.

1.5. Personnel information

1.5.1 Flight Experience

The pilot had been flying gliders since about 1995 and held a GFA Glider Pilot Certificate, endorsed with Carriage of Private Passengers and Independent Operator Level 1. The Certificate was valid to 30 September 2018, aligned with the pilot's GFA membership expiry date. According to the competition entry form, the pilot's last Annual Flight Review was conducted on 16 April 2017. Flight records from the pilot's primary club (the Gliding club of Victoria), evidence that the pilot flew with the Club's Chief Flying Instructor (CFI) on that day. In an email to the GFA's Technical Advisor dated 20 November 2017, the CFI stated: *"For an annual flight review we use our AFR template and we include recover from a fully developed spin and the differences to a spiral dive. We did not do any spin training; also with him flying in the rear seat, I could not check on lookout. …I can't recall any unsatisfactory flying or errors in his skills, decision making process and situational awareness."* Flight records reveal the pilot to be very experienced, with over 2,026 hours and 2170 flights. However, the pilot's experience on type prior to the accident was modest; comprising 80 hours in 35 flights. The pilot was not in current flying practice, having last flown in a glider on the day of his alleged Annual Flight Review almost 6 months earlier. The pilot's penultimate flight in the accident aircraft was on 8 February 2017.

1.5.2 Medical Information

The pilot's treating cardiologist, in a statement to NSW Police dated 14 December 2017, noted that the pilot had had a history of hypertension, obesity, smoking, dyslipidaemia, sleep apnoea, moderate alcohol intake, type II diabetes mellitus and left ventricular hypertrophy but had no symptoms of heart failure or coronary artery disease. The GFA medical standards are explained in GFA Operational Regulations at subparagraph 3.2. Pilots who do not suffer from any of the listed disqualifying medical conditions, and who do not hold instructor or charter pilot qualifications, are eligible to self-declare their medical fitness. In all other cases, the pilot is required to submit to a medical examination and hold a valid medical certificate. Pilots who do not hold a valid CASA Civil Aviation Medical Certificate are required to be assessed by a legally qualified Australian registered medical practitioner and found fit to fly in accordance with the 'Austroads' standards for the issue of a private motor vehicle driver's licence medical certificate. The 'Austroads' standards are contained in their publication 'Assessing fitness to drive for commercial and private vehicle drivers: medical standards for licensing and clinical management guidelines, March 2012', or a later version as is in force from time to time. On 12 September 2017, as part of his annual online membership renewal, the pilot declared that he was not suffering from any physical condition that would preclude him from operating a glider as pilot in command. In the aforementioned statement to Police, the pilot's treating cardiologist stated: *"According to the 'Austroads' standards (current) regarding cardiac issues, he (sic) had no reason to limit or deny him a licence for a private motor vehicle. His LVH (Left Ventricular Hypertrophy) on echo had not*

caused any clinical or echocardiographic heart failure." Several witnesses observed that the pilot was overweight and occasionally breathless, but on the day of the accident he was variously described as his 'normal' or 'jovial' self.

1.6. Aircraft information

- Manufacturer: Jonker Sailplanes Pty Ltd
- Type: JS1C 18/21
- Country of manufacture: South Africa
- Year of manufacture: 2013
- Serial Number: 1C-055
- Engines: 1 x Turbine Jet Engine MD-TJ42
- Total airframe hours: 279.37 (90 Flights)
- Total engine hours: Zero
- Certificate of Airworthiness: Experimental
- Maintenance Release: No. P1687, until 21 September 2018
- Max allowable take-off mass: 720kg (21 Metre configuration)
- Max cockpit load: 115 kgs
- Stall speed (all-up mass): 56 knots at maximum weight

1.7. Meteorological information

The weather at the time of the accident was good. The weather observation by the contest organisers at the time of the accident was:

- Surface wind WNW at 5 to 7 kts;
- Outside Air Temperature of 31ºC; and
- Sea level pressure of 1010 hPa.

1.8. Communication

Goondiwindi (Qld) aerodrome is situated in non-controlled Class G airspace. As it is a registered aerodrome the carriage of radio is mandatory for aircraft operating within its vicinity. An aircraft is in the vicinity of a non-controlled aerodrome if it is within:

- airspace other than controlled airspace;
- a horizontal distance of 10 NM from the aerodrome (reference point); and
- a height above the aerodrome (reference point) that could result in conflict with operations at the aerodrome. Consequently, all aircraft flying in the competition were radio equipped. The primary frequencies authorised for use by competitors were:
- CTAF: 126.70
- Safety: 122.025
- Aerotow Retrieves: 122.5
- Finish: 126.70 (CTAF)

1.9 Aerodrome information

The Goondiwindi Airport is a CASA registered airport under the Civil Aviation Safety Regulation Part 139 for Aerodromes. The airport site lies approximately 3km north of the town of Goondiwindi on the western side of the Cunningham Highway. The airport provides a limited scale of commercial air charter services and serves an important function for private aviation access to Goondiwindi for residents in the region. The aerodrome operator is the Goondiwindi Regional Council. On the day of the accident, gliding operations were being conducted on the left-hand (grass) side of runway 22. Gliders were gridded in two rows.

Figure 2: Goondiwindi Aerodrome (Google Maps)

Airstrip details:

- Aerodrome Reference Point - 28° 31.6' S - 150° 19.5' E
- Aerodrome Elevation - 714ft above mean sea level

Runway Information for RWY 04/22:

- Runway Bearing - 033 degrees magnetic
- Length 1340m x 30 m wide
- Slope 0.1% down to NE
- Length of Clearway - 60m each end
- Dimension of Runway Strip - Length 1460m, width 50m (graded 90m)
- Surface - sealed bitumen

Runway Information for RWY 12/30:

- Runway Bearing - 123 degrees magnetic
- Length 795m x 30m wide
- Slope 0.1% down to SE
- Length of Clearway - 60m each end
- Dimension of Runway Strip - Length 915m, width 90m
- Surface - grey clay

1.10 Flight Recorders

The aircraft was equipped with an LXNAV LX9000 avionics system, with serial number 09924. According to the manufacturer's website the device contained various sensors to provide inertial, variometer, attitude and heading reference system, and wind information. It was also equipped with an engine noise level sensor and had a flight recording function.

Figure 3: LXNAV LX 9000 vario navigation system (photo from manufacturer's website)

The LX9000 recovered from the accident was severely damaged, with damage to the external case, screen, buttons, and internal electronic components (refer Figure

4).

Figure 4: The damaged LXNAV LX 9000 taken from VH-IBS

The Gliding Federation of Australia is not equipped to forensically examine damaged electronic components. The assistance of the ATSB was sought to download information from the avionics unit, and the GFA arranged for the NSW Police to send the unit to the ATSB facilities in Canberra. The ATSB contacted the manufacturer of the device for information regarding the physical location of data recorded on the device. The manufacturer advised that the flight data was stored on a micro-SD card located on the rear of the main circuit board. Examination of the micro-SD card holder found it to be damaged. The ATSB removed the micro-SD card from the holder (refer Figure 5). The micro-SD card was SanDisk 16GB card. It was found to contain a crack in the middle of the card, consistent with the damaged area on the holder (refer Figure

6).

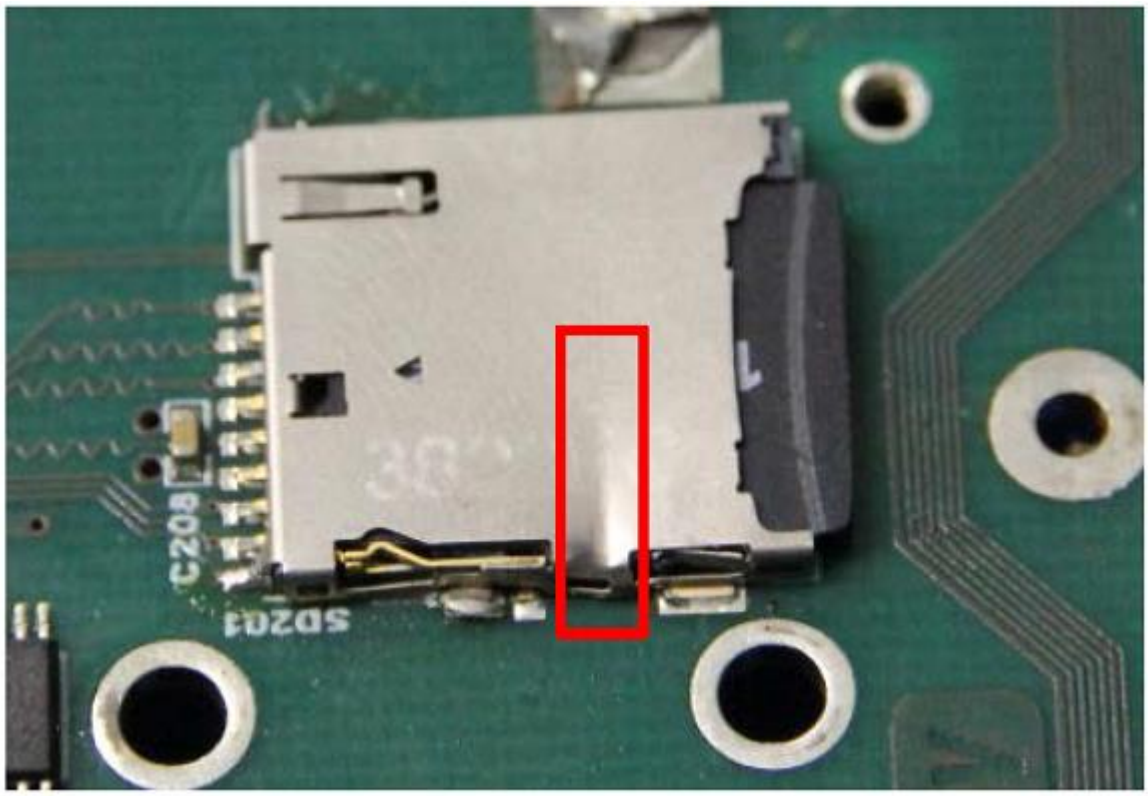


Figure 5: Damage to the micro-SD card holder.

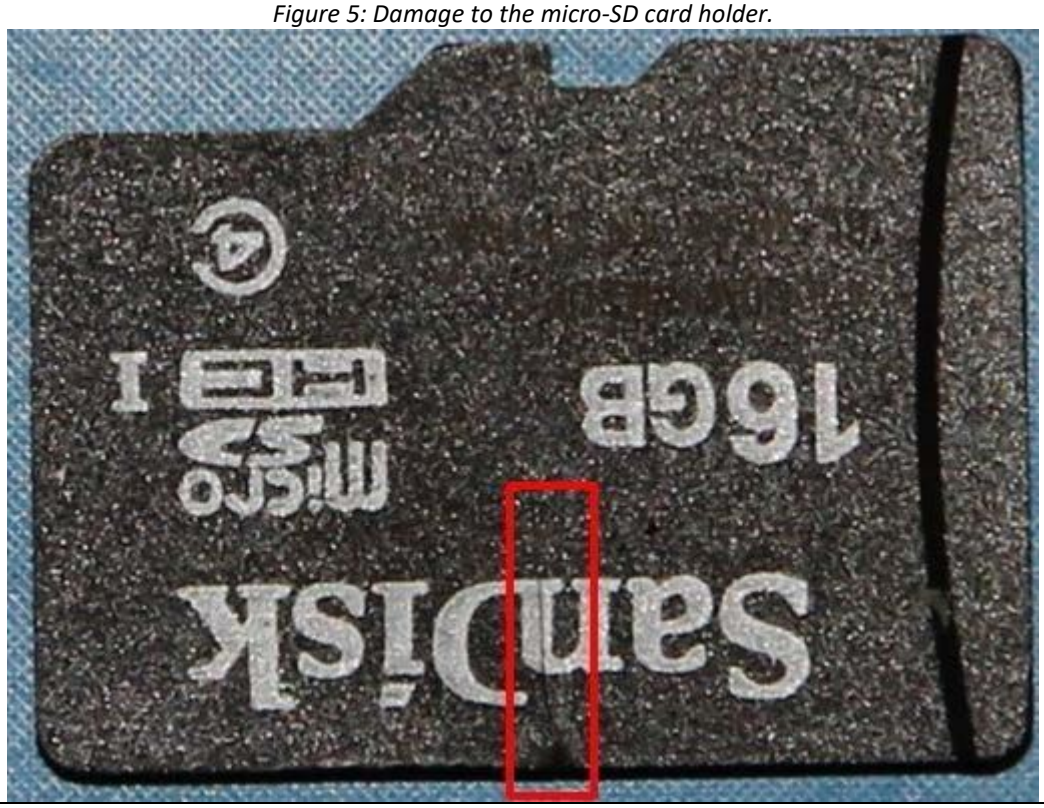


Figure 6: Micro-SD card from the unit, damage to the micro-SD card is marked in the red box

The ATSB subsequently had the card x-rayed to determine the extent of the damage (Figure 7). The damage found during the examination made it unlikely that the device would function correctly, however there did not appear to be any short circuits. The device was connected to a forensic read-only card reader; however, it did not respond correctly and was unable to be downloaded. Micro-SD cards are entirely encapsulated devices. No internal parts are removable or replaceable. Recovery of the device may be possible by exposing memory chip interconnects and connecting these to an identical micro-SD card controller. This process would involve significant resources. The ATSB currently does not have the hardware or resources to carry out such a task. No analysis was undertaken.

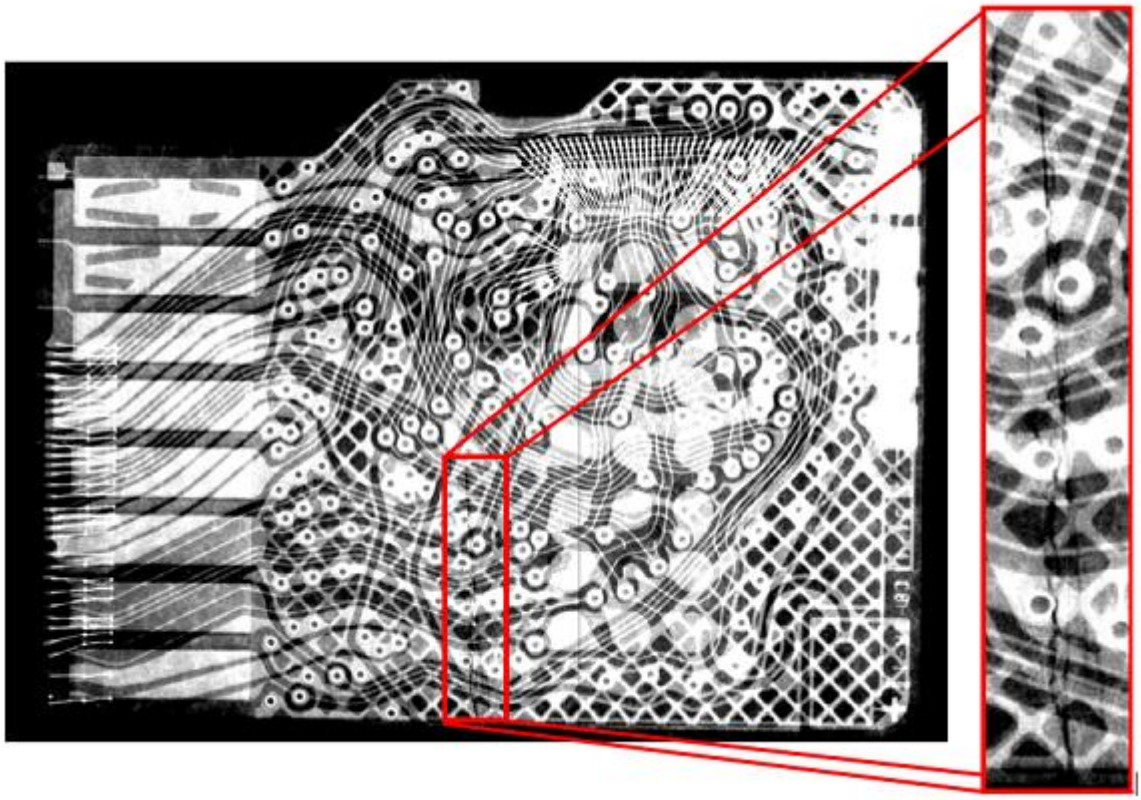


*Figure 7: X-ray of micro-SD card*The following conclusions were made with respect to the examination of the avionics unit provided to the ATSB:

- The device exhibited signs of damage both internally and externally.
- The flight data was stored on a micro-SD card located on the main circuit board.
- The micro-SD card containing the flight was damaged and unreadable.
- The ATSB was unable to determine the state of the memory integrated circuit.
- The ATSB does not have the hardware or resources required to attempt recovery on the memory IC encapsulated within the device.

1.11. Wreckage and impact information

Examination of the occurrence site and wreckage indicated that the glider struck the ground in a very steep nose-down attitude. The GFA's Regional Manager Operations (RMO) assisted the Police at the scene. In his report emailed to the GFA's Technical Advisor on 1 October 2017, the RMO noted: *"Approaching the scene, I could only see the wings, fin, tailplane, and aft fuselage boom. From closer-up it became evident that the rest of the aircraft was reduced to debris and largely obscured in the impact hole in the black soil. The wings were level and ground impacts indicated the wings struck more or less simultaneously. The wings were still attached together by the two main pins with the 21 m tips lying alongside. The fuselage forward of the wing*

trailing edge was utterly destroyed. The aft fuselage was lying beside the wings, split down the boom, broken through in front of the fin, and the tailplane (less elevators) was still properly rigged to the fin."

Figure 8: Crash site

Figure 9: Aerial photograph of crash site showing the ground scar left by the wing (yellow)

All flight control surfaces were accounted for at the accident site and were separated from their normal locations by the impact. Due to the extent of the damage, it was not possible for the RMO to identify much of the debris in the cockpit and forward fuselage area. Examination of debris excavated from the impact hole was inconclusive, and much cockpit equipment could not be found or identified; some items had been removed with the body of the pilot. Consequently, it was not possible to determine the airworthiness status of the glider prior to impact. Scars in the ground left by the wing (refer yellow line in Figure 9) suggest the aircraft was under load and travelling at a very high speed; likely in excess of 130 knots (240 kph). The RMO noted: *"From examination of the wreckage and the ground impact hole, it was evident that:*

- *The glider did not break up in mid-air;*
- *It struck the ground with huge energy;*
- *It struck in a steep nose down attitude;*
- *The wings struck the ground more or less simultaneously;*
- *There was no tail compartment battery and a tiny amount of water drained from the tail when it was moved; and*
- *There was no other sign of water draining from the wreck and the water ballast compartments were empty."*The RMO located and identified the aircraft Maintenance Release, the LNAV avionics unit, the radio, the FLARM display and the altimeter face.

Figure 10: collection of instruments recovered from the accident site.

In respect to the Maintenance Release, the RMO noted in his report that *"…the daily inspection had been signed the previous morning by the pilot."* The RMO further stated that the *"… accident flight was the first since the annual inspection and GFA Form 2 Maintenance Release issue on 18 September 2017, so technically this was the 'evaluation flight'."*

1.12. Medical and pathological information

A post-mortem examination revealed that the pilot had died of severe multiple injuries, all of which were consistent with the impact. In the autopsy report dated 20 November 2017, the pathologist noted:

1. The CT report showed catastrophic injuries involving comingling of all soft tissues, internal organs and the entire appendicular and axial skeleton. There was complex comminution of all long bones, multiple separations of the spine, fragmentation of the cranial and facial bones, comminution of the mandible, a complex pelvic fracture and multiple rib fractures.
2. The deceased had a history of heart disease, however, at autopsy examination the heart could not be identified (The pilot's treating cardiologist would clarify, in a statement to NSW police dated 14 December 2017, the pilot had no symptoms of heart failure or coronary artery disease.).
3. Toxicology showed a low liver alcohol level of 0.022g/100mL, most probably decomposition alcohol and not relevant.
4. Histology was non-contributory.

1.13. Survival aspects

The impact was not survivable. The cockpit structure was destroyed by impact so that no liveable space remained, and the deceleration forces exceeded those of human tolerance.

2. ANALYSIS

2.1. General

The aircraft had a current Maintenance Release and was properly maintained. No evidence was found of any defect that could have caused or contributed to the accident. The pilot was properly certified and authorised to fly the aircraft in competition. The weather was good, and the pilot was in good spirits. Thermal turbulence was weak, with one pilot reporting a climb rate of about 1.5 knots or 150ft per minute.

2.2. Aircraft

The Jonker Sailplanes JS-1C Revelation is a high performance single-seat sailplane. It has shoulder wing with flaperons, conventional T-type tailplane, with triple blade airbrakes on the wing upper surface, water ballast tanks in the wings and fin, a retractable main landing gear with brakes, and 18m or 21m span wings including winglets (refer figure 11). It is constructed from glass-fibre, carbon fibre and Kevlar. The manufacturer is Jonker Sailplanes of Potchefstroom, South Africa. The accident aircraft, VH-IBS, is a JS1-C 18 model with the 21m tips fitted. It was also fitted with a turbo jet engine (refer Figure 12) for sustaining height and self-retrieve. It was constructed in 2013 to the Certification Specifications for Sailplanes and Powered Sailplanes as described in EASA document CS-22, issued 14 November 2003. Although the aircraft met the South African type certification requirements as stated in their Civil Aviation Regulations Part 21 Subpart 2, Australia does not recognise the South African type acceptance system. Consequently, the aircraft was issued with an Experimental Certificate of Airworthiness on 12 March 2014 by the Gliding Federation of Australia under delegation from CASA.

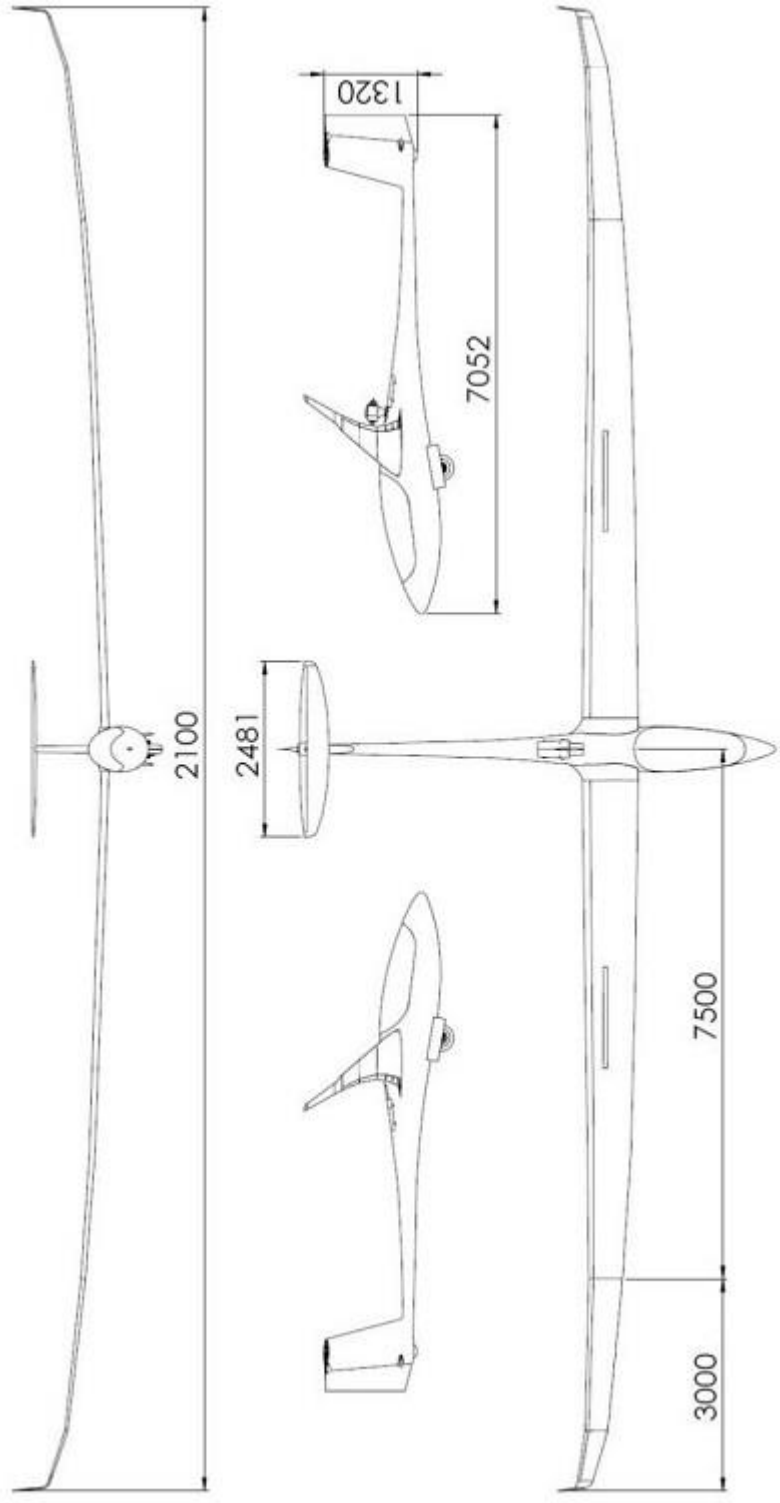


Figure 11: Three-view drawing of JS1C-21

Gliders are stowed and transported in disassembled configuration, with the wings and horizontal stabiliser being detached. To minimise the possibility of incorrect assembly in this model glider, the designers included automatic connection of the controls during rigging.

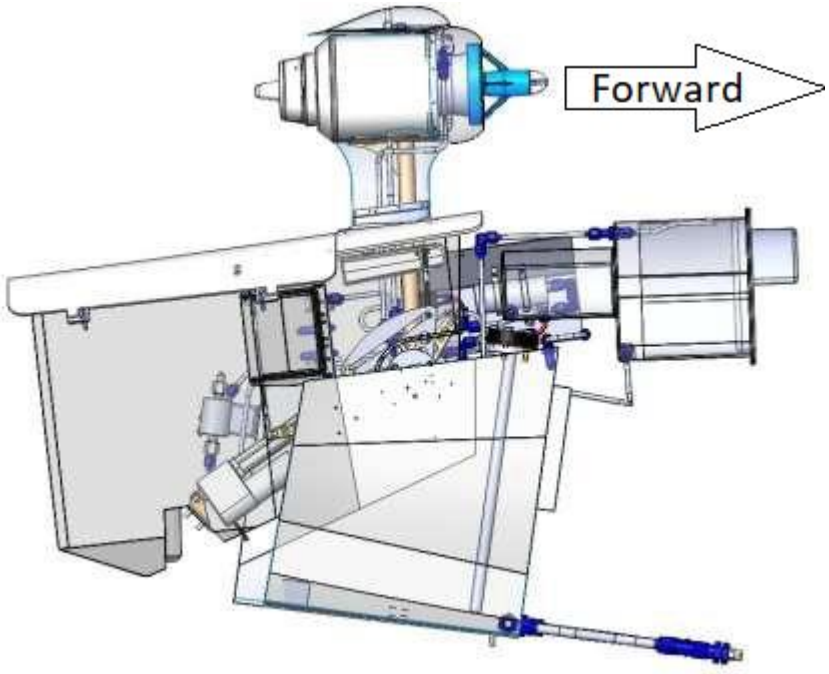


Figure 12: Jet system illustration

2.2.1 Aircraft maintenance

The airframe was maintained in accordance with the GFA system of maintenance, and the engine was maintained in accordance with the manufacturer's requirements. In addition, the aircraft operator was also required to comply with all special Inspections and lifed component changes which are listed in:

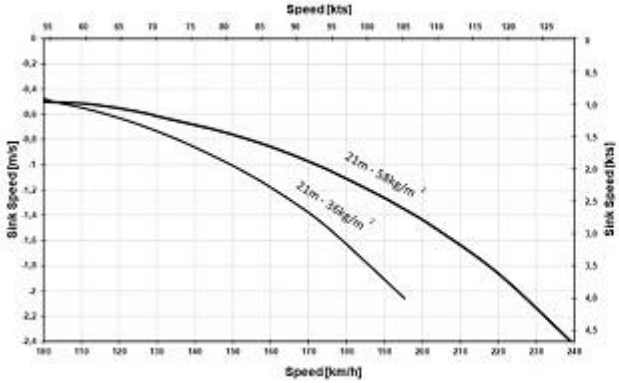
1. A schedule of Airworthiness Limitations contained in the Maintenance Manual applicable to the aircraft;
2. Approved data relating to modifications incorporated in components in the aircraft; and
3. Approved data relating to modifications incorporated in components installed in the aircraft.

The aircraft was purchased new from the factory in 2013 and the initial Maintenance Release was issued on 3 March 2014 by a GFA Approved Maintenance Organisation (AMO) in Qld. The most recent annual inspection was undertaken in September 2017 by the pilot. A Victorian-based AMO oversaw the pilot's maintenance and issued the Maintenance Release on 22 September 2017. The authorising engineer and principal of the AMO is a CASA Licensed Aircraft Maintenance Engineer with over 30 years' experience. He also holds GFA maintenance qualifications enabling him to maintain gliders. In a statement to NSW Police dated 15 May 2015, the AMO principal advised: *"[The pilot] completed the work. I conducted the final inspection of what had been done; no flight controls were removed during the entire process, and during the inspection the flight control system was inspected, including gap seals. No defects were noted. After the inspection was completed, [the pilot] and I rigged the glider and I carried out all flight control deflections and wing frequency checks. The aircraft was in an airworthy state when it left [my company]."*

2.2.2 Aircraft performance

The aircraft flight manual notes, at Section 1.1, that *"The JS1 Revelation is a high-performance sailplane and not a trainer. Even though it possesses excellent performance and handling qualities, it can only be flown by a skilled pilot who complies with the limitations and recommendations set out in this manual."* The aircraft had a maximum speed never to be exceeded of 146 knots when flown in 21-metre configuration. The flight

manual advises *"Do not exceed this speed in any operation and do not use more than 1/3 of control deflection."* Operating above this speed is prohibited as it may result in damage or structural failure. Theoretical performance in 21-metre configuration gives a claimed best glide of around 1:60 at 65 knots and maximum weight (refer figure 13).



Best Glide Ratio	60
Best Glide Speed at MAUW	120 km/h (65 kts)
Best Glide Speed at 450 kg	100 km/h (54 kts)
Minimum Sink Rate at empty weight	0.48 m/s (95 ft/min)
Sink Rate at 200 km/h (MAUW)	1.44 m/s (283 ft/min)

Figure 13: Performance Polar JS1C-21 (Sink rate vs airspeed).

VH-IBS had been flown on a number of occasions by an experienced glider pilot and a commercial pilot flying for a major international airline. In a statement to NSW Police dated 15 April 2018, this pilot advised: *"I had previously flown [the Pilot's] glider on a number of occasions, it was a fantastic glider. It was a big glider when configured with the 21-metre wing. The handling characteristics changed with the 21-metre wing with a slower roll rate and needing more rudder to aileron to co-ordinate the aircraft. If in 18-metre wing configuration it was a lot easier to handle."* This aircraft is certified in the Utility category, and some basic aerobatic manoeuvres (e.g. spins, stall turns, positive loops, chandelle) are permitted in 18-metre configuration only. Aerobatic manoeuvres are not permitted when flying with water ballast. As previously mentioned, three pilots observed the glider heading earthward in a steep nose-down position. In view of these observations, the spinning and spiral dive characteristics of the glider are reviewed hereunder. A graphical depiction of the spin and spiral dive is at Figure 14.

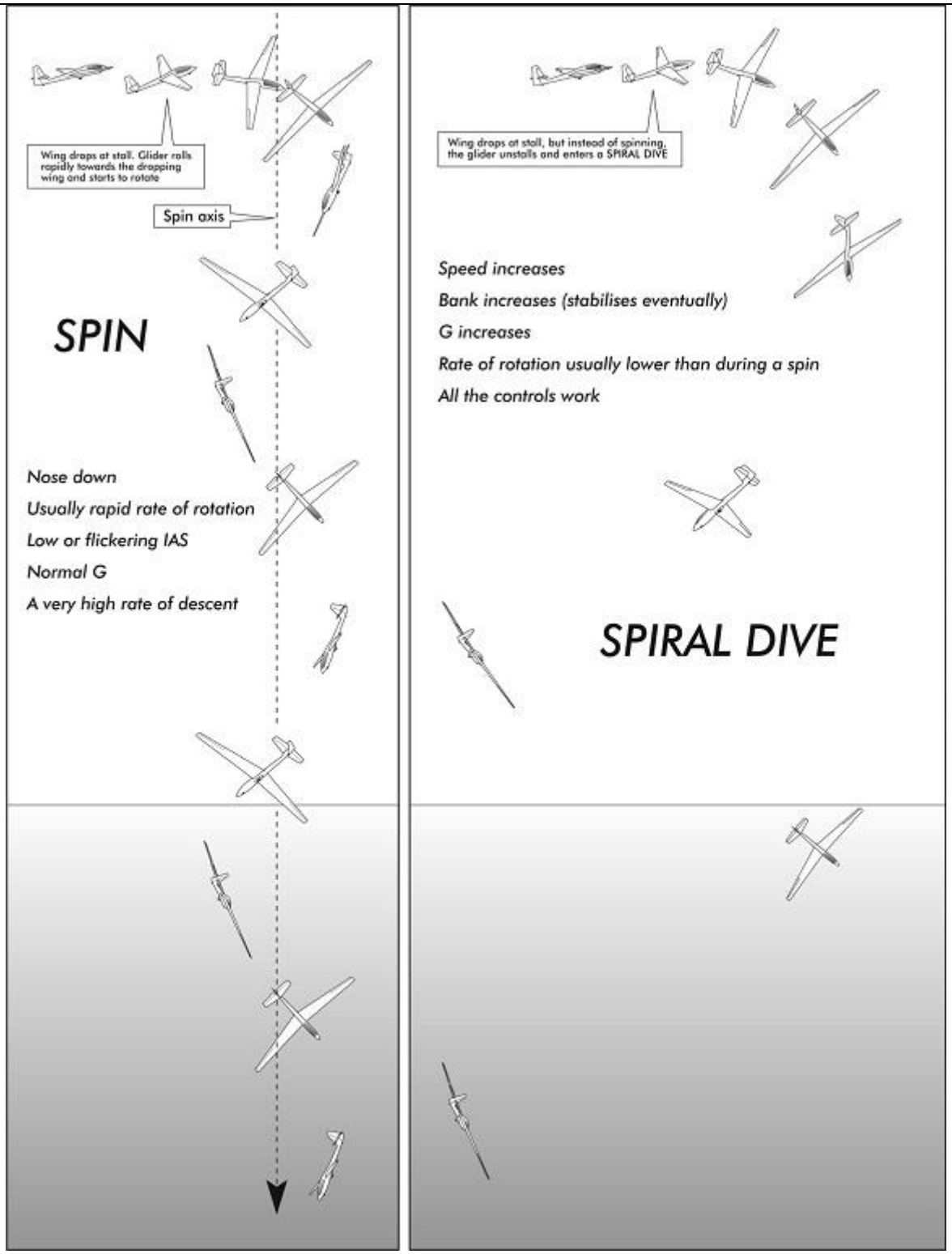


Figure 14: The spin and spiral dive (image courtesy of the British Gliding Association).

A stall with wing drop can result in a spin if the glider remains stalled, or a spiral dive if it unstalls. The characteristic symptoms of the spin (i.e. those which are obvious without input from the pilot) are:

- a usually nose-down and rapid rotation of the glider (if the spin is unstable the rate of rotation and the pitch attitude may change periodically);
- low or flickering indicated airspeed;
- very high rate of descent; and
- no increase in 'g' force.
- The characteristic symptoms of a spiral dive are:
- the speed increases rapidly;
- 'g' force increases if the stick is held back or moved back;
- the rate of rotation is markedly slower than most spins; and
- the controls feel heavy but are effective.

2.2.2.1 Spin recovery

The aircraft flight manual notes that spin recovery is performed using the standard recovery procedures. Intentional spins with water ballast or in 21-metre configuration are prohibited. The standard recovery procedure is:

- full opposite rudder - to reduce the amount of yaw, and indirectly (as a result of roll coupling) to help pitch the nose down.
- centralise the ailerons - to reduce the down going wing's Angle of Attack.
- move the stick progressively forwards until the rotation stops - to unstall the glider, even though the nose is already pointing steeply downwards. In powered aircraft it is usual to pause between applying opposite rudder and moving the stick forward. In gliders this isn't necessary.
- centralise the rudder when the rotation stops to prevent a spin in the other direction, and also to prevent high sideways loads on the fin as the speed increases.
- recover from the ensuing dive.

Altitude loss during recovery from a spin is between 100m and 150m (330 ft to 500ft) without water ballast and up to 220m (720 ft) at maximum weight. The spin rotation speed is relatively low, typically five to six seconds per rotation. The flight manual notes that if the spin is entered with a high incident angle, the nose will oscillate in pitch during the first two rotations. After approximately one rotation, the nose will (with very aft CG positions) rise above the horizon before stabilizing in a nose down spin attitude. Pitch oscillation may continue during the spin, especially with aft CG positions. In an email to the GFA's Technical Advisor dated 16 October 2017, the manufacturer advised that, according to certification spin test results, the aircraft is unlikely to enter a spin with the CG so far forward (as with the accident aircraft), and recovery is usually automatic after 1 turn even if pro-spin control input is maintained.

2.2.2.2 Spiral dive recovery

The aircraft flight manual states that a spiral dive may occur when:

1. The aircraft terminates spinning automatically should the pilot continue applying into-spin control inputs.
2. During excessive slip angles with full rudder deflection.

Indications of a spiral dive are high bank angle, increasing airspeed and a high G-loading. Spiral dive recovery is performed by:

1. Apply aileron, co-ordinated with rudder, gently against the direction of the turn until the wings are level with the horizon.
2. When the wings are level, neutralize both aileron and rudder.
3. Gently pulling out of the resulting dive.

During the resulting dive the pilot must take care not to exceed VNE. With water ballast in the wingtips a glider has substantially more roll-wise inertia and will not respond as quickly to aileron deflection. Consequently, the aforementioned spiral dive recovery technique will take longer to occur, thereby increasing the height loss during recovery. The recovery techniques from a spin and a spiral dive aren't the

same since in the spin the object is to break the stall by reducing angle of attack and increasing airspeed and in the spiral dive the goal is to reduce speed.

2.2.2.3 Excessive sideslip recovery

The aircraft flight manual also notes that an excessive sideslip may occur when the pilot applies full cross control input. At a slip angle exceeding 20° rudder control forces reverse as the rudder is sucked into the wake of the stalled fin. The pilot's control inputs to recover from an excessive slip are:

1. Apply opposite rudder against the direction of the yaw.
2. When balanced flight is restored, neutralize both aileron and rudder.

The flight manual notes that if an excessive slip angle is not corrected with opposite rudder input, the secondary effect of yaw may cause the sailplane to roll and enter a spiral dive. It is not possible to prevent roll by applying full opposite aileron during excessive sideslip.

The flight manual cautions that the rudder control input force to recover from a side slip exceeding 20° is high (approximately 20daN) and increases if the speed is allowed to build up during the resulting spiral dive. The pilot must apply sufficient rudder input to recover from the sideslip to prevent spiral dive.

2.2.3 Mass and balance

The structural strength of an aircraft places upper limits on the weights it can support. The wings are self-supporting but the fuselage and its attachments (tailplane, pilot, luggage, etc.) are suspended from the wings or spar. The designer of the aircraft has placed an upper limit on the weight in the fuselage (or non-lifting parts) which must never be exceeded. However other more critical issues arise when it is realised that the aircraft may not even fly if it is too 'nose heavy 'or too 'tail heavy', that is, if the centre of the mass (centre of gravity (CG)) is too far forward or too far aft. The consequences of too little weight at the nose, resulting in a CG aft of the aft limit, are that the aircraft may pitch up, be unstable, even uncontrollable, impossible to trim, and impossible to recover from a stall or spin. Too much weight in the cockpit will result in a forward out-of-range CG, making the pilot use full back stick/elevator (beyond trim range) to maintain speed, leaving no capacity to flare the glider on landing. Advanced gliders carry additional weight (as water) in the load bearing parts (wings). This water ballast can enhance performance but also affects the weight and balance of the glider. Water ballast is generally quite close to the spar (0.15m say), but can still introduce a forward movement of CG, requiring back trim. Some gliders are fitted with an auxiliary tank in the tail to permit a counter balance. The safe limits for water are recorded in the flight manual. The manufacturer of the JS-1C provides the pilot with an 'Excel' spreadsheet specific to the glider to enable the pilot to calculate the CG at various loading configurations. **Note:** While the JS-1C was designed for a maximum all up weight of 720kgs in 21-metre configuration, the factory only demonstrated the glider to 600 kg.

2.2.3.1 Water Ballast

The water ballast system allows the weight of the aircraft to be increased to achieve higher wing loadings. The water ballast system consists of two main tanks, each integral to a wing and holding approximately 90 litres of water, and two trim tanks in the vertical fin. The tail ballast tanks consist of an expendable tank of approximately 7.5 litres and a non-expendable tank of approximately 5 litres. The 21 m wing tips also feature integral tanks, with a capacity of approximately 17 litres (17kgs) each.

2.2.3.2 Weight & Balance Calculations

On 8 October 2017 the pilot ballasted the glider to the weight he intended to fly during the competition. The aircraft was then weighed by the competition organisers to obtain a reference weight, which would be checked each day before flight. The aircraft are weighed in their flying configuration, including the pilot and parachute. The aircraft is initially positioned so that its mainwheel and tailwheel are each resting on a scale, and the weights at both locations are recorded. The aircraft is then connected to the pilot's towing vehicle (car) with the glider's mainwheel positioned on the scale, and the (tow out) weight is recorded. The glider's reference weight (usually the maximum all up weight) is recorded and the variation between actual weight and reference weight is recorded. A table of weights recorded for VH-IBS follows:

Rego	Main wheel	Tail wheel	Total	Tow out	Ref WT	Variance
IBS	590	39	629	456	720	-91

Table 1: Weighing results (in kilograms)

The tow pilot who launched the glider, in his statement to NSW Police dated 27 November 2017, confirmed the glider was ballasted on the day of the accident: *"Upon commencing to tow out, nothing appeared unusual at all. When towing this type of glider, it feels heavy for four to five seconds as it is heavy compared to the smaller gliders. I know it was ballasted because of the usual acceleration and weight. The JS-1 sits and looks perfectly normal."* The competition weighing data was forwarded to the Manufacturer for analysis. The manufacturer's principal entered this data in the weight & balance calculator for this specific aircraft to determine the glider's Centre of Gravity position on the day of the accident (refer Figure 15).

Mass and Balance Report

Flight date: _____ **Flight number:** _____

Enter loading only in this column

	Loading points:	Max allowed (kg)	Actual Loading (kg)	Mass (kg)	Moment (kg.m)
Tot	***Empty aircraft***	***400.0***	361.0	361.0	212.5
Pilot	Pilot + Parachute	115.0	135.0	135.0	-77.6
NoseB	Nose ballast	11.0	4.0	4.0	-7.2
H2O Main	Water ballast main	180.0	44.0	44.0	8.8
H2O Tips	Water ballast tips	34.0	34.0	34.0	16.3
Tail1	Expendable tail tank	7.5	7.5	7.5	34.3
Tail2	Non-expendable tail tank	4.5	0.0	0.0	0.0
TailW	Brass Tail wheel (additional)	2.0	0.0	2.0	9.1
TailB	Tail battery	2.6	2.0	2.0	9.0
Bag	Baggage compartment	15.0	2.0	2.0	0.3
O2	O2 bottle	2.0	2.0	2.0	0.0
Jet	Jet engine	3.5	0.0	0.0	0.0
JetS	Jet System	4.2	0.0	0.0	0.0
Fpanel	Jet Fuel panel	1.6	0.0	0.0	0.0
ECU	Jet Electronic Control Unit	1.2	0.0	0.0	0.0
Ftank	Jet Top Tank	1.2	0.0	0.0	0.0
Rtank	Jet Rear Tanks	2.8	0.0	0.0	0.0
FF	Jet Fuel Front (with water 11kg)	8.8	8.8	8.8	3.8
FR	Jet Fuel Rear (with water 33kg)	26.4	26.4	26.4	19.9
			Totals	**628.7**	**229.2**

Flying condition	Mass (kg)	Wing loading (kg/m2)	Flying CG position (mm)	Moment (kg.m)
With water ballast	**628.7**	**51.2**	**364.6**	229.2
Expendable water ballast dumped	**543.2**	**44.3**	**312.6**	169.8

Figure 15: VH-IBS Weight & Balance calculation based on competition weights.

Using known information (empty weight and balance, pilot weight with parachute, maximum weight during flight, and that the aircraft did not have the tail battery fitted or carried ballast in the nose and non-expendable tail tank), and assuming the pilot loaded the 21m tips first in accordance with manual and had about 2kg of luggage (water or similar) on board, the manufacturer arrived at two scenarios:

- Scenario 1 – Expendable tail tank full - In this case the aircraft was on a CG position of 352mm, well in front of the aft CG range.
- Scenario 2 – Expendable tail tank empty - In this case the aircraft was on a CG position of 300mm, well behind the most forward CG range.

According to the manufacturer's calculations and scenario interpretations it is highly unlikely that the aircraft was flown outside its CG range (refer Figure 16).

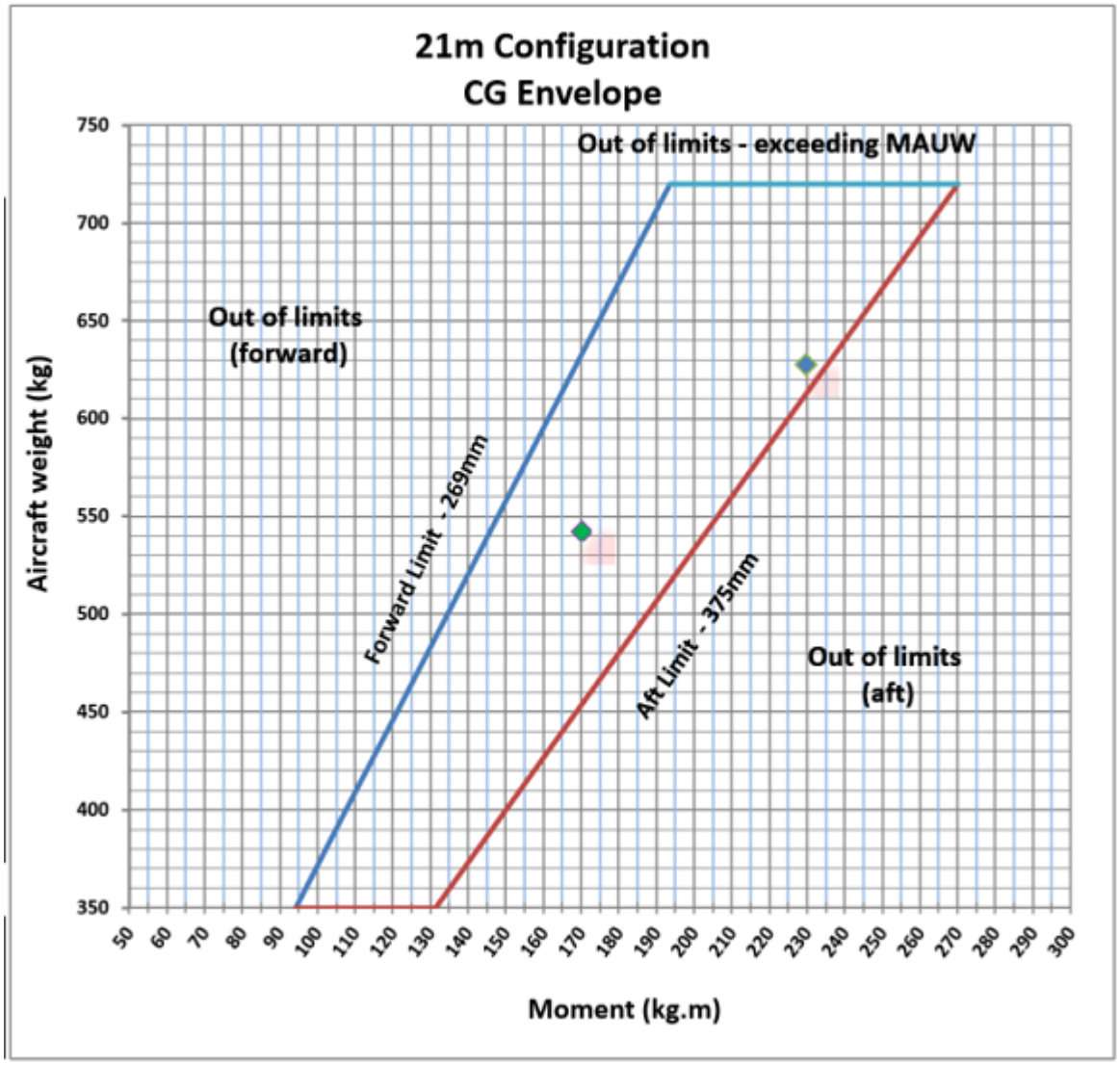


Figure 16: VH-IBS Calculated CG envelope.

The manufacturer also stated that, according to certification spin test results, the aircraft is unlikely to enter a spin with the CG so far forward, and recovery is usually automatic after 1 turn even if pro-spin control input is maintained. **NOTE**: Notwithstanding the manufacturer's comment about spinning, it is still possible for the aircraft to enter a spiral dive from a loss of control event, including excessive sideslip (as described in 2.2.2.3).2.2.3.3 Flight Crew

The minimum and maximum pilot mass is indicated on the cockpit placard.

- Minimum cockpit load: 70 kg (154.3 lbs)
- Maximum cockpit load: 115 kg (253.5 lbs)

Nose ballast may be added to enable lighter pilots to meet the minimum cockpit load. The nose ballast weights for VH-IBS were located in the glider's trailer parked at the aerodrome. The weight and balance calculator for VH-IBS, which is a factory supplied computer spreadsheet with data specific to that airframe, was obtained from the pilot's laptop computer. This spreadsheet recorded the weight of the pilot and

parachute at 130 kgs. This weight is consistent with observations made by some of the witnesses. At 135 kgs, the pilot was flying the glider outside the maximum cockpit load. This was in breach of GFA Operational Regulation 4.1.3, which states: *"A pilot shall at all times operate a sailplane within the limits of its cockpit placards and shall not exceed the privileges of their authorisation(s)."* In the case of the JS-1C glider, the maximum cockpit load is limited by the seat harness and not the glider's structure. As the weight & balance calculations demonstrate, the aircraft was being flown within the designed flight envelope. By exceeding the harness load of 115 kgs, the pilot assumed the risk that in a serious accident the harness was unlikely to restrain him, and he could suffer serious injury. In the case of this accident this is a moot point, as the accident was not survivable. The pilot was described as having a large build and was 6' 2" tall. The crew member noted, in his statement to NSW Police dated 21 November 2017, that the pilot *"physically filled the cockpit and it was a very close fit due to his size. He had really big thighs so there was not a lot of spare room left in the cockpit."* Another witness, in their statement to NSW Police dated 21 February 2018, stated *"The cockpits of the gliders are inherently small and [the pilot] was a big man. I recall [the pilot] appeared comfortable in his glider, however it was a tight fit."* The experienced competition pilot, in their statement to NSW Police dated 15 April 2018, stated *"Although I did not see [the pilot] prepare or get into his glider prior to the flight on 9th October 2017 I have seen him prepare and get into the glider on previous occasions. Although he was a big guy, he did not have much difficulty fitting into the cockpit of the glider. Coordination in flying the glider that [the pilot] owned, in particular in 21 metre configuration, could be demanding but there would have needed to have been a significant issue for the glider to have entered the dive before the accident."* The crew member and the experienced competition pilot both commented that they believed the pilot could adequately manipulate the flight controls surfaces (elevator, ailerons and rudder).

- Crew member: *"I do not recall seeing [the pilot] exercise full and free movement of the controls. There is such a thing as a Chaotic Check27 but I did not see [the pilot] undertake this bit I noticed control deflection such as movement of the flight control system, it appeared that [the pilot] had movement of the controls."*
- Experienced competition pilot: *"I also believe that [the pilot] had full control movement of the glider whilst he was flying as he had been flying the glider for a couple of years without issues."*

2.2.4 Aircraft instrumentation

The aircraft was equipped with a Pitot-static type airspeed indicator, an altimeter, a magnetic compass, a variometer and a LXNAV LX9000 avionics system providing navigation display. On the left of the instrument panel was mounted the Jet Display Unit (refer figure 17).

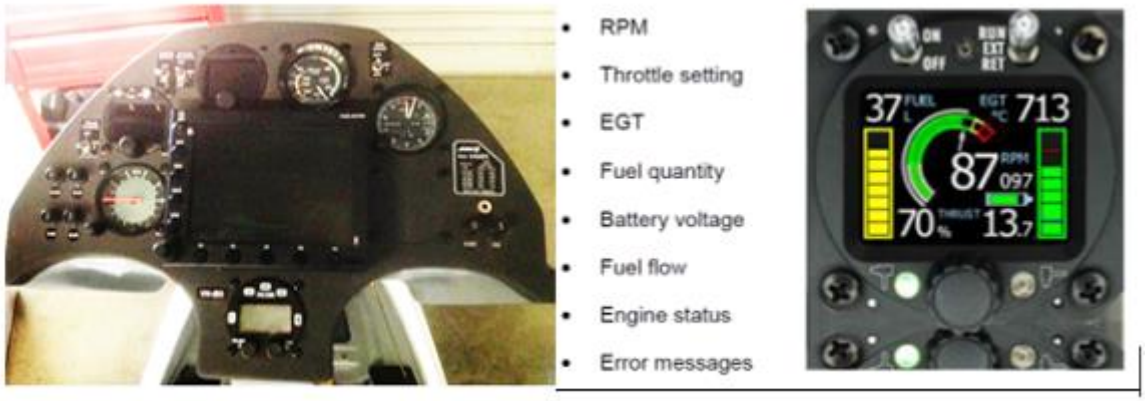


Figure 17: Left - Instrument panel layout (Note: the centre screen was replaced with the LX9000) and Right - Jet Display unit with Information displayed.

2.2.5 Aircraft systems The aircraft ancillary controls of airbrakes, flaps, trim and landing gear are of conventional layout, with the airbrakes, flaps and trim located on the left-hand side of the cockpit, and the landing gear on the right-hand side of the cockpit.

2.2.5.1 Landing Gear Operation

The landing gear handle is located on the right-hand side of the cockpit and labelled as illustrated in Figure 18.

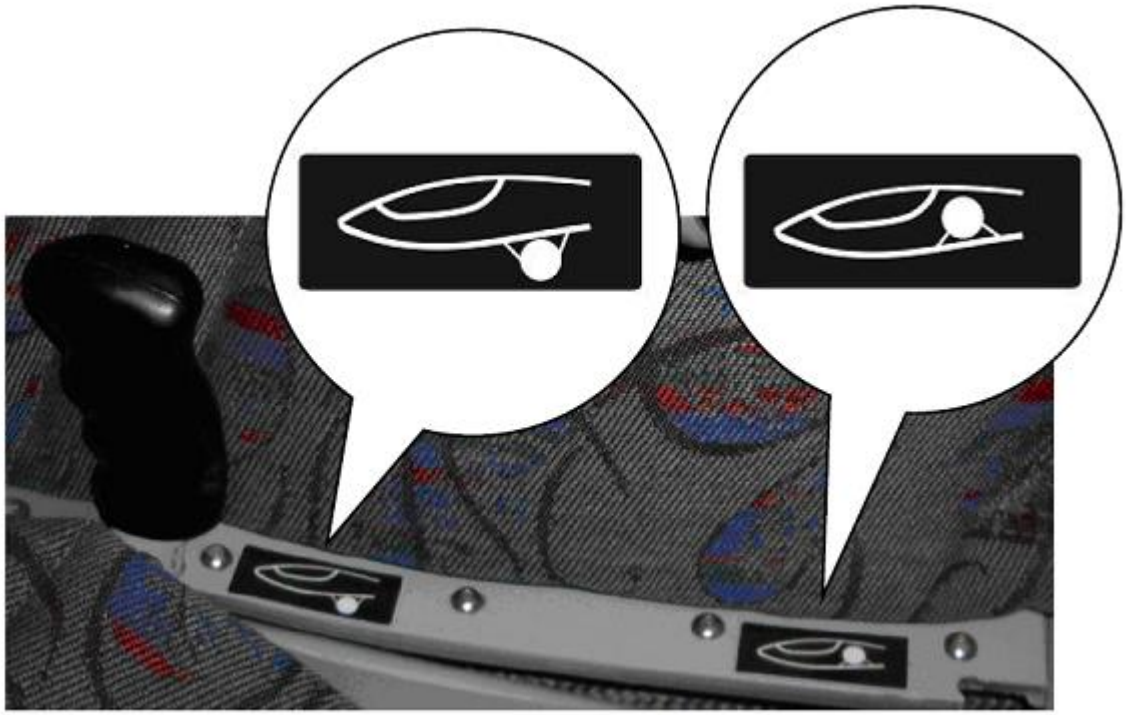


Figure 18: Landing gear handle.

Pulling the handle backwards retracts the wheel into the fuselage and pushing it forward extends the wheel. The handle is rotated firmly towards the cockpit side to lock in the extended and retracted position. The Aircraft Flight Manual does not recommend retracting the landing gear on aerotow. As previously stated, the pilot was a person of large stature. When the GFA's Technical Advisor sat in the cockpit of a similar JS1 glider he identified that raising the landing gear would have been difficult in flight for a larger person. This was because the pilot's arms would be constricted when placed between the side of cockpit and torso. It is considered unlikely the pilot would have had the room to move the right arm sufficiently backward to fully retract and lock the landing gear, and the use of both hands may have been needed. Other JS-1 pilots, of smaller stature, advised the GFA's Technical Advisor that it was difficult get the leverage needed to engage the rearward locking mechanism and needed exertion of force. One pilot said that he 'bunted' the aircraft to get the landing gear locked up. If the pilot was flying left-handed because he changed hands to raise the landing gear, the act of pulling backwards with the right hand may have led to the pilot also moving the left hand and possibly applying pressure to one of the rudder pedals. Such action could cause the aircraft to pitch and yaw, which coupled with a forward Centre of Gravity could lead to the aircraft departing controlled flight and entering a spiral dive. A spiral dive may also occur if depression of the rudder only resulted in a sideslip as described at 2.2.2.3 above.

2.2.5.2 Personal Egress Device

The pilot was using an egress device known as a *"Whoopsie Cushion"* that was designed and manufactured by another glider pilot. The device is intended to be used to assist the pilot quickly get out of the cockpit following a mid-air collision and parachute to safety. The system's main element is an air cushion that is inflated by pressurised gas (CO_2). It is not dissimilar to a car's airbag, except that it is manually operated (refer Figure

19).

Figure 19: Left - Deflated cushion and pouch. Right - Inflated cushion.

The pilot places the deflated cushion on the seat pan of the glider and sits on it. The system is designed such that the pilot then places a pouch containing the pressurised gas cylinders onto a thigh strap in easy reach. In the case of an emergency requiring the pilot to abandon the aircraft, the pilot would:

1. jettison the glider's canopy;
2. undo the seat harness;
3. open the flap of the pouch to reveal a lanyard attached to the actuators; and
4. pull the lanyard to activate the flow of gas.

When the lanyard is pulled, compressed gas flows from the cylinders and inflates the cushion. The inflating cushion pushes the pilot upwards and above the cockpit side, enabling them to roll out of the aircraft. The device was designed to be used as personal apparel at the pilot's own risk. It was not designed to be fixed to the aircraft structure; consequently, it did not need to meet any certification requirements. The investigation examined whether inadvertent activation of the egress device led to the pilot losing control of the glider. The designer and manufacturer was interviewed by NSW Police on 18 January 2018. In their witness statement they advised that it was not possible to accidentally or inadvertently activate the device as supplied, because it requires at least two deliberate, considered actions – opening the Velcro sealed pouch, and pulling the lanyard. Nevertheless, and in response to feedback from prospective users, the manufacturer also supplied a small disposable knife with the pouch to deflate the cushion if needed.

Figure 20: Cushion and gas cylinders at the accident site.

The manufacturer's review of the cushion in the wreckage (refer Figure 20) revealed that the gas cylinders had been affixed to the cockpit structure, possibly at the base of the instrument panel. It appears the cylinders were not contained in the pouch, so it is possible the actuating lanyard was within the pilot's reach. If so, the safeguards against inadvertent activation would not have been present. The manufacturer was provided with copies of photographs taken of the cushion at the accident site. According to him the cushion did not display the tell-tale signs of activation (split seams and deformation). The designer and manufacturer concluded they were *"…of the opinion that the cushion has not inflated. I can see two tears in the cushion, but they are not ruptures due to pressure because my experiments during development showed that the weak points were the seams of the cushion."***2.3. Human Factors**

Several human factors related to this incident have been discussed in previous sections, among them the pilot's lack of flying currency, large stature, and possible excessive control inputs when retracting the landing gear.

2.4 Survivability

2.4.1 Rescue fire service response

The accident occurred at around 1326 hours and emergency services were called immediately thereafter. The emergency services responded quickly. The Queensland Fire and Emergency Services received notification of the accident at about 1329 hours, and their first unit arrived at the accident site at 1351 hours. On arrival they observed that Police and QLD Ambulance officers were already in attendance, those having arrived at around 1346 hours. NSW Rural brigades also attended the incident scene however their approximate arrival time was not recorded.

2.4.2 Analysis of injuries and fatalities

The crash was nonsurvivable and, within the limits of the autopsy, no natural disease which could have caused or contributed to the accident was identified. The toxicological examination did not reveal any factors which might have influenced the performance of the pilot. The medical pathologist noted: "It is not possible to comment on whether this accident was the result of pilot error, an aircraft fault or a natural disease event."

2.5.3 Survival aspects

The cockpit structure was destroyed by impact so that no liveable space remained, and the deceleration forces exceeded those of human tolerance. The impact was not survivable.

3. CONCLUSION

Witness reports evidence the glider departed controlled flight at a height between 2,000 ft and 1,000 ft AGL. Witness observations of the glider pointing steeply earthwards, rotating at a high bank angle with the wings under load is indicative of the aircraft being in a spiral dive. This is also supported by the ground scars at the

impact site. Given the high mass of the glider and water ballast in the wingtips, it is likely the glider did not have sufficient height for the pilot to recover, presuming the pilot was not otherwise incapacitated.

3.1. Findings

1. The pilot was certified and qualified for the flight in accordance with existing regulations.
2. The pilot lacked recent flying practice and only had modest experience on type.
3. The pilot had not completed an Annual Flight Review.
4. The maintenance records indicated that the aircraft was equipped and maintained in accordance with existing regulations and approved procedures.
5. The aircraft was airworthy when dispatched for the flight.
6. Due to the destruction of the aircraft by the impact, it could not be determined whether any pre-impact failure or system malfunction contributed to this accident.
7. The pilot was flying the glider outside the maximum permitted cockpit load.
8. The mass and centre of gravity of the aircraft were within the prescribed limits.
9. The glider departed controlled flight and entered a spiral dive, from which there was insufficient height available to effect a recovery.
10. The lack of a data from the avionics unit covering the period of the incident prevented some details of the events from being resolved.
11. There was no evidence that the pilot suffered any sudden illness or incapacity which might have affected his ability to control the aircraft.
12. Toxicological tests were negative.
13. The accident was not survivable due to the magnitude of the deceleration forces.**3.2. Causal factors**

Due to the extent of damage to the glider and the injuries sustained by the pilot, it was not possible to determine the cause of this accident with any certainty.

- The pilot may have suffered a catastrophic medical event. This cannot be discounted as the autopsy was inconclusive.
- A maintenance error may have left the aircraft unairworthy resulting in the pilot's loss of control. This is considered unlikely given: 1. a post-maintenance dual inspection of the aircraft was undertaken that confirmed the functioning and security of the controls; 2. the aircraft controls automatically engage during assembly; 3. the pilot conducted a pre-flight inspection the previous day and certified the aircraft as airworthy in the aircraft Maintenance Release; and 4. The airframe and all control surfaces were accounted for at the crash site.
- The pilot may have contributed to the loss of control. The accident occurred shortly after release from tow and during the period the pilot would be conducting the post-release configuration, which includes raising the landing gear. As outlined earlier, the pilot may have experienced difficulty retracting the landing gear. Due to cockpit ergonomics, the pilot could have inadvertently applied control inputs through the control column and/or rudder pedals while in the course of manipulation of the landing gear lever leading to the aircraft departing controlled flight.

4. SAFETY RECOMMENDATIONS

1. The GFA to develop and disseminate pilot education material regarding minimum impediments to operation of controls, controllability and other safety considerations for large pilots.
2. The GFA to include advice regarding conversion of pilots to high wingspan, high inertia gliders, and controllability considerations in its current update of the GFA Training Manual.
3. The GFA Operations Department to review, and update as required, its guidance to instructors and pilots on safety implications of low recency and currency, especially in regard to older pilots and pilots entering competitions.

Date	9-Oct-2017	Region	SAGA	SOAR Report Nbr	S-1056

Level 1	Technical	Level 2	Powerplant/Propulsion	Level 3	Abnormal Engine Indications
A/C Model 1	Super Dimona	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	71

The pilot was conducting a positioning VFR flight from Darwin NT to Parafield SA. About 45 NM north of Alice Springs at 9,500ft AMSL, the motor glider's engine began surging and running roughly. The pilot was unable to increase power by more than 45% but was able to maintain height. The pilot contacted Air Traffic Control (ATC) to advise of the engine problems and declare an emergency. The pilot requested a diversion to the gliding airfield at Bond Springs airfield, including permission to enter Class C controlled airspace so as to maintain glide slope for a landing at the diversion airfield. ATC coordinated with the Alice Springs tower, and the aircraft was cleared to proceed as requested with no restrictions or requirements. The Aircraft safely landed at the diversion airfield and the emergency phase was cancelled. Subsequent investigation, including a check of the fuel system and carburettors, did not identify the source of the trouble but the owner suspects it may have been due to fuel contamination.

Date	9-Oct-2017	Region	SAGA	SOAR Report Nbr	S-1060
Level 1	Airspace	Level 2	Airspace Infringement	Level 3	Airspace Infringement
A/C Model 1	HK 36 TTC	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	71

The pilot inadvertently entered Alice Springs controlled airspace while awaiting a clearance. The pilot was navigating using AvPlan, which is an approved application, but the airspace radials north of Alice springs were not displayed on the 'MegaVFR' chart being viewed by the pilot. The matter was raised with Airservices Australia who advised the following:

1. MegaVFR chart (Alice springs) – WAC chart only view at the zoom selected. No airspace boundaries visible.
2. MegaVFR chart (Alice springs) - WAC automatically overlaid with Alice Springs VTC. At higher levels of zoom the VTC is displayed to provide greater detail. Airspace boundaries only displayed as on VTC chart.
3. MegaVFR chart (Alice Springs) - WAC overlaid with Alice Springs VTC and "Airspace enabled in AvPlan". Same zoom level as 2, but AvPlan is supplementing the missing airspace boundaries in this instance.
4. Alice Springs only VTC chart – Complete VTC overlaid on Open Street map. Airspace boundaries are visible as per the area covered by VTC.The mapping system works by layering maps that display the best resolution available for the area currently in view. Depending on the zoom level the map displayed will show the WAC at the lowest zoom/furthest out display through to the VTC at the highest zoom/closest in display. The user has the option of enabling the system to show airspace to fill in the missing boundaries (as per 3). If flying with just paper versions of the WAC and VTC the same issue would have been encountered. In summary the AirServices map products have the required level of detail which appears to be reflected in the third party AvPlan product when "zoomed" to the required level. AvPlan users need to be aware that, in certain configurations and zoom levels, not all information is displayed.

Date	13-Oct-2017	Region	NSWGA	SOAR Report Nbr	S-1070
Level 1	Technical	Level 2	Systems	Level 3	Other Systems Issues
A/C Model 1	DG-1000S	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	58

Prior to a 3.3 hour local soaring flight, the integral tail ballast box located in the fin was loaded with five factory-supplied 2.4kg and 1.2kg brass weights. The glider was within its C of G limits for the two persons

carried on the flight. After the flight the glider was not used again and was returned to the hangar. The ballast box is secured by a perspex cover incorporating a fixed pin which locates into a fitting in the bottom of the opening and a sliding plunger which must be pushed slightly inwards then fully up into a locating hole at the top. Additionally there is a manufacturer's requirement for the edges of the cover to be secured to the fin on all four sides with tape having a minimum width of 19mm. At the next daily inspection it was found that:

- the top plunger had not been pushed up into its locating hole, and was barely resting with a light spring pressure against the top of the ballast box,
- the top of the cover had moved outwards about 5 mm from the surface of the fin, and
- there was only one piece of tape present, that being on the vertical front edge of the cover, but it had been progressively peeling off from the top so that less than the bottom 15cm was still attached.Had the flight continued much longer, it is likely that the perspex cover would have completely detached from the ballast box, potentially allowing the weights to depart from the glider. The serious ramification of the five brass weights falling onto persons or property on the ground needs no further explanation.

Care must always be taken in properly securing any type of ballast, as failure to do so can lead to serious or fatal consequences.

Date	14-Oct-2017	Region	VSA	SOAR Report Nbr	S-1057		
Level 1	Operational	Level 2	Aircraft Control	Level 3	Wheels up landing		
A/C Model 1	ASW 20C	A/C Model 2					
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	

The pilot did not properly conduct the pre-landing check and landed with the undercarriage retracted. The pilot had launched to 2600ft AGL and joined two other gliders in a weak thermal. The pilot could not connect with the thermal and kept searching for lift while gradually losing height. At 1100ft AGL the pilot gave up searching for lift and headed to the circuit joining area. On downwind leg the pilot verbalised the pre-landing check list and confirmed the flap setting and trimmed for safe speed near the ground but did not check the undercarriage. The pilot noted that, while not current on type, "…I am relatively current, having flown passengers, instructed and done some aero(batic)s during the winter months. All of this was of course in the K21 where flaps and undercarriage get a mention during FUST but are never actioned." This is not an uncommon occurrence for pilots who are accustomed to flying gliders with a fixed undercarriage, where not having a lever to operate leads to familiarity and 'habit' such that the inaction becomes the normal routine. This 'normalisation of deviance' is easier to prevent than to correct, so pilots should always aim to do their checks diligently at all times and not be complacent.

Date	15-Oct-2017	Region	VSA	SOAR Report Nbr		S-1061	
Level 1	Operational	Level 2	Aircraft Control	Level 3		Hard landing	
A/C Model 1		DG-1000S		A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	70

The elderly pilot, who was in current practice, was attempting to land short rather than fly between two gliders on either side of the runway. However, the pilot misjudged the approach and landed longer than intended. While focussing on landing between the gliders, the pilot misjudged the landing flare and the glider touched down heavily and rebounded into the air. The pilot pitched forward on the control column and the nosewheel impacted the ground resulting in damage to the fairing. During the bounced landing the plastic handgrip on the airbrake lever came off in the pilot's hand. Investigation revealed that the pilot is prone to task saturation as workload levels increase, and they are now flying with a safety pilot.

Date	20-Oct-2017	Region	VSA	SOAR Report Nbr		S-1071	
Level 1	Consequential Events	Level 2	Low Circuit	Level 3		Low Circuit	
A/C Model 1		Grob G 103 Twin II		A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	73

The command pilot was conducting a right-hand (modified) circuit onto the operational runway when he heard a Cessna aircraft join a normal left-hand circuit. In order to avoid a head-on situation during the base leg, the command pilot of the glider opened the airbrakes and flew a non-standard curved base turn to land well ahead of the Cessna. The command pilot misjudged the rate of descent and crossed the aerodrome boundary fence at such a low height that the aircraft touched down before it had aligned with the runway centreline. The command pilot was counselled by their CFI who witnessed the incident.

Date	21-Oct-2017	Region	SAGA	SOAR Report Nbr		S-1064	
Level 1	Airspace	Level 2	Aircraft Separation	Level 3		Near collision	
A/C Model 1		DG-500 Elan Orion		A/C Model 2	Jabiru		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	49

A Glider and Jabiru got close during the downwind leg of the circuit. While the glider was over the cross-strip conducting a midfield join of the circuit, the command pilot observed a Jabiru had just taken off from the operational runway and was maintaining the runway heading. The Jabiru then turned crosswind and halfway down the crosswind leg the pilot call entering downwind. The command pilot in the glider recognised the potential for both aircraft to arrive at the same point simultaneously and md a radio call advising the Jabiru pilot that the glider will be joining downwind shortly ahead of the Jabiru. The second pilot who was flying the glider, then gave a radio call on joining downwind. The command pilot noted the Jabiru pilot "still well

behind us in what appears to be a climbing turn onto downwind". The glider was slightly high and wider than normal, so the pilot flying used some airbrake to descend 200ft. The command pilot then looks back over the right wing to the rear to get a visual on the Jabiru and noticed the Jabiru about 50ft lower and about 50 metres behind taken avoiding action by turning to the right. It is unclear why the Jabiru pilot did not sight the glider. The command pilot of the glider later reflected: *"I should have continued to assume we were unseen and/or the Jabiru pilot was unaware of us being there and used our extra height to extend further into the joining area and ensure we were behind the Jabiru."* By itself, the concept of 'see-and-avoid' is far from reliable. It is important that pilots apply the principles of 'see-and-avoid' in conjunction with an active listening watch. Research has shown the effectiveness of a search for other traffic is eight times greater under alerted circumstances than when un-alerted. Pilots should be mindful that transmission of information by radio does not guarantee receipt and complete understanding of the information. Without understanding and confirmation of the transmitted information, the potential for alerted see-and-avoid is reduced to the less safe situation of un-alerted see-and-avoid. The club is looking at fitting Flarms to their light sport aircraft.

Date	22-Oct-2017	Region	NSWGA	SOAR Report Nbr	S-1063
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Aircraft Separation Issues
A/C Model 1	Piper PA-25-235	A/C Model 2	RPAS (Drone)		
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	61

Gliding operations were being conducted on runway 27 with landings long on runway 15. Following the first launch of the day, a member decided to drive to the threshold of runway 15 to look for a rudder chock that had gone missing earlier. While in transit the member saw two vehicles parked in the sealed parking area on the side of the highway adjacent to the airfield. After confirming the rudder chock was not there, the member drove back to the operational runway, during which time they noticed a drone at about 50ft AGL flying north, abeam the runway 15 threshold and inside the airfield boundary; about 50 meters to the east side of runway 15. The member observed three or four people beside two vehicles in the highway parking bay, one of whom was in control of the drone. The member drove out of the airfield to speak with the drone operator, but the two vehicles had departed north. Model aircraft and drones must not be flown within 5.5 kilometres of a non-controlled aerodrome if there is a manned aircraft operating to, or from, the aerodrome. The provisions of AC 101-3(0): 'Unmanned aircraft and rockets: Model aircraft' also apply.

Date	23-Oct-2017	Region	SAGA	SOAR Report Nbr	S-1077
Level 1	Operational	Level 2	Airframe	Level 3	Doors/Canopies
A/C Model 1	Discus-2cT	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	73

Shortly after launch the pilot deployed and started the sustainer engine to confirm it was in order. The engine was run for two minutes and then stowed. This is the pilot's usual practice, as the engine cannot be started on the ground. The pilot then headed off on a cross-country task. About one hour into the flight the aircraft flew into some turbulence and the pilot heard a loud noise and whistling sound. The pilot identified the whistling was being caused by air flowing through a small gap between the canopy and fuselage on the starboard side. The pilot returned for home and landed uneventfully about half an hour later. The pilot discovered the canopy hinges were not engaged in the locking mechanism but was able to open the canopy on the ground with the help of two other pilots. Investigation revealed no damage to the canopy or hinges, and it was determined that the pilot inadvertently pulled the canopy release lever, mistaking it for the fuel open/ close valve lever that was found in the 'open' posiiton. In this aircraft the fuel lever is located immediately below the right-hand canopy hinge release lever, and both levers, although different sizes, are painted black. The Registration Holder advised: *"The Discus C has a different canopy jettison system to earlier models. The flight manual is quite clear that only the left-hand lever should be pulled in a canopy*

jettison situation, hence it's a requirement that ONLY the left lever is painted red, which it clearly is (actually red/white as it's also the main canopy opening lever). The hinges on the right-hand side of the C model are sacrificial and break away under load. That lever (actually a sliding knob) on the right is purely for removing the canopy on the ground and should expressly not be operated in a canopy jettison (i.e. emergency) situation. Hence, it's not painted red. It's poor design that this lever is situated adjacent to the fuel valve and is the same colour." This incident highlights the importance of the adage **'Locate, Identify and Operate'**. The fuel lever was permanently marked with a thin white stripe to aid differentiating it from the on-ground canopy detachment lever.

Date	28-Oct-2017	Region	VSA	SOAR Report Nbr	S-1065
Level 1	Operational	Level 2	Ground Operations	Level 3	Taxiing collision/near collision
A/C Model 1	Discus CS	A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Ground Ops	PIC Age	

While being towed back to hangar, the wing walker wheel struck runway gable marker, causing the aircraft to separate from tow bar and collide with back of tow vehicle. On the morning of this incident the pilot was to rig the glider with the intention of carrying out the post-maintenance assessment flight. While rigging the glider it was noticed that the wing pin was missing, so the pilot had to make a two-hour round-trip home to retrieve it. The Glider was then rigged, inspected and signed off. The pilot arrived at the flight line mid-afternoon and eventually completed the assessment flight without incident. The accident occurred due to a lapse in concentration after a long and stressful day.

Date	28-Oct-2017	Region	VSA	SOAR Report Nbr	S-1080
Level 1	Operational	Level 2	Runway Events	Level 3	Runway excursion
A/C Model 1	SZD-51-1 Junior	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	

During flight the wind picked up in intensity and changed direction, and the gliding operation moved to the more into wind runway. The low-hours pilot had not identified the change of wind direction or operational runway and joined circuit for the runway they had launched from. The pilot only became aware of the wind direction and speed during the final approach but was committed to a landing. The pilot flew a crabbed approach but did not apply enough correction to prevent the aircraft from drifting towards the runway boundary. As a consequence, the glider touched down close the airfield boundary and the pilot had to initiate a ground-loop to avoid colliding with the boundary fence. The pilot was uninjured and the aircraft undamaged. Weather conditions can quickly change, so it is important that pilots monitor the windsock when entering the circuit. Pilots also need to remain aware of the crosswind components of their aircraft and land as near as possible into wind.

Date	29-Oct-2017	Region	GQ	SOAR Report Nbr	S-1066
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Near collision
A/C Model 1	ASK-21	A/C Model 2	Cessna 172 R		
Injury	Nil	Damage	Nil	Phase	Thermalling	PIC Age	58

At this Regional aerodrome, gliders and powered aircraft fly contra circuits as advised in the ERSA. This incident involved a powered aircraft flying through the glider circuit. The student pilot in the powered aircraft was performing an overhead mid-field departure and performed a climbing circuit to 2000ft AGL in close proximity to a glider. Had the student pilot conducted a normal circuit the proximity event would not have occurred. The Club Safety Officer contacted the Chief Pilot of the aircraft operator, who advised the student pilot was undertaking their first solo cross country and did not report the incident. The Chief Pilot

undertook to debrief the student and ensure other students flying in the vicinity of the gliding operations were briefed on the ERSA requirements.

Date	30-Oct-2017	Region	NSWGA		SOAR Report Nbr		S-1072				
Level 1	Operational		Level 2	Flight Preparation/Navigation		Level 3	Aircraft preparation				
A/C Model 1		LS 7-WL			A/C Model 2						
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age					
The pilot forgot to lock the airbrakes, which came open during aerotow launch. The pilot is experienced across a range of flight disciplines, including general aviation and hang/para gliding, but has limited experience in sailplanes (52 hours). This was the pilot's first flight on type and was to be the pilot's first attempt at a 300km cross-country flight. At about 300ft AGL on aerotow, the pilot heard a bang. The pilot *"...immediately checked tow rope and normal control functionality. All appeared normal. While maintaining the tow, I checked all instruments and noticed the radio was off and assumed the bang was related to an electrical (possibly fuse) popping."* The tow pilot recognised the airbrakes had deployed and signalled the pilot, who then realised their error and locked the airbrakes. The pilot decided to release from tow to land and check the problem with the radio. A normal landing ensued. The pilot recognised that they were in a hurry to get away on time and had rushed the pre-take-off check list. As a consequence, the pilot did not recognise that the airbrakes, while closed, were not locked. As for the radio, the pilot believes they knocked the on/off switch to off at some stage on tow. The pilot took another launch and successfully completed a 200km cross-country flight. The pilot was debriefed by their CFI.												

Date	4-Nov-2017	Region	SAGA		SOAR Report Nbr		S-1073				
Level 1	Operational		Level 2	Flight Preparation/Navigation		Level 3	Other Flight Prep/Nav Issues				
A/C Model 1		Discus b			A/C Model 2						
Injury	Nil	Damage	Nil	Phase	Ground Ops	PIC Age	55				
During the Daily Inspection the inspector noted the audio variometer sound was intermittently cutting in and out and decided to note this as a Minor Defect in the Maintenance Release. The inspector mistakenly recorded the entry in the Major Defect section. The aircraft was then cleared for flight with a major defect recorded in the Maintenance Release. As the inspector was the first person the fly the aircraft on that day, a pre-boarding check of the Maintenance Release, including DI validity, was not undertaken.											

Date	4-Nov-2017	Region	SAGA		SOAR Report Nbr		S-1074				
Level 1	Operational		Level 2	Flight Preparation/Navigation		Level 3	Other Flight Prep/Nav Issues				
A/C Model 1		DG-1000S			A/C Model 2						
Injury	Nil	Damage	Nil	Phase	Ground Ops	PIC Age	69				
During the daily inspection it was noticed the Maintenance Release had not been signed on the day the aircraft last flew. Investigation revealed that on the day the aircraft previously flew, a Daily Inspection was conducted but the inspector got distracted rectifying the flat tailwheel and forgot to sign the Maintenance Release. As the inspector was the only person the fly the aircraft on that day, a pre-boarding check of the Maintenance Release, including DI validity, was not undertaken.											

Date	4-Nov-2017	Region	SAGA	SOAR Report Nbr	S-1076

Level 1	Operational	Level 2	Flight Preparation/Navigation	Level 3	Other Flight Prep/Nav Issues
A/C Model 1	Discus b	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	67

The aircraft was flown with a major defect recorded in the Maintenance Release. The experienced pilot did not notice a Major Defect was recorded in the Maintenance Release during the Pre-boarding Inspection. Fortunately, the defect was only minor and did not affect the safety of flight. The pilot advised that they checked that the correct Maintenance Release was in the aircraft, and that a Daily Inspection had been completed by an authorised inspector. The pilot did not understand they also needed to check for defects and other issues. The pilot noted that in future they will carry out additional checks of the Maintenance Release as follows:-

- Check that the aircraft is still inside the Maintenance Release validity period;
- Check that there are no current Major Defects;
- Check the Minor Defects and ensure they are no worse; and
- Check that the aircraft still has the required hours left for my flight and at least one launch left before a scheduled maintenance item is due.

Date	5-Nov-2017	Region	GQ	SOAR Report Nbr	S-1098
Level 1	Operational	Level 2	Aircraft Loading	Level 3	Loading related
A/C Model 1	Blanik L13 A1	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	

While conducting the pre-boarding checklist the student pilot confirmed there was no ballast in the aircraft but did not consider the weights of the pilots. The instructor also did not consider the weights of the pilots and the aircraft subsequently flew 15 Kgs over the maximum cockpit load and with a forward centre of gravity (CoG). All gliders must be flown within carefully defined CoG limits. To achieve this, the pilot weights must lie within the margins specified on cockpit weight and balance placards. Pilots must know how much they weigh to ensure that the weight requirements are met. In some cases, it is necessary to carry extra weight (ballast) to ensure the aircraft is within the CoG limits. A 'ballast' check is part of the pre-boarding checklist and must be completed before the pilots enter the aircraft to confirm that the cockpit loading is within the placarded limitations. Ballast will be added or removed as necessary. Checklists are an essential part of aviation and are used prior to all critical aspects of flight, such as take-off and landing, to ensure that the aircraft is correctly configured for the next phase of the flight. They serve as a formal reminder to help prevent errors of omission and contribute to a safer flying environment. Instructors must ensure their student's complete the checklists diligently, and be satisfied they have been completed correctly. **NOTE**: It is not uncommon for pilots to conduct successive flights without the need to alight from the glider. In such circumstances the pilot may assume that the pre-boarding ABCD components of the checks conducted before the previous flight (or first flight) remain valid, if it is considered there is no likelihood that any changes will have occurred. In respect of two-seater successive flights, it is not uncommon for the pilot combination to change and if so the pilot in command must consider the cockpit loading requirements and must be satisfied that cockpit loading compliance remains valid.

Date	5-Nov-2017	Region	GQ	SOAR Report Nbr	S-1099
Level 1	Operational	Level 2	Crew and Cabin Safety	Level 3	Inter-crew communications
A/C Model 1	Blanik L13 A1	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	

On final approach and at low level (100ft AGL) the instructor advised the student, who was flying the approach, to ease off the airbrakes a little to avoid an undershoot. As the student moved the airbrake lever

forward they unconsciously pulled back on the stick and the aircraft quickly lost airspeed. With the aircraft close to the stall, the Instructor took over control and was able to regains airspeed and conduct a safe landing. The instructor noted that they *"were not as quick to the controls as* (they) *should have been"*. Up until that point the student had displayed good flying skills and the instructor was quite relaxed. This is not an uncommon occurrence and even experienced instructors can be lulled into a false sense of security. Notwithstanding the experience level of the student, Instructors must always guard themselves against unexpected reactions during the critical stages of flight by adopting a defensive posture (i.e. having their hands and feet ready to take control), and taking over quickly. Students should not be on the controls at low levels until competence in smooth and reasonably accurate co-ordination has been acquired, and the student should have some idea of anticipation in the use of the controls.

Date	5-Nov-2017	Region	VSA	SOAR Report Nbr	S-1075		
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Aircraft Separation Issues		
A/C Model 1	DG-500 M	A/C Model 2	Piper PA-25-235				
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	73

A self-launching glider entered the runway and commenced its take-off run while a Pawnee tow plane was on base leg. The Pawnee tow plane landed alongside and ahead of the glider taking off. The pilot in command of the glider heard the Pawnee pilot make a call on joining the base leg and, believing they had sufficient time, made a radio call advising of their intention to enter the runway for take-off. The pilot in a Eurofox tow plane that was positioning to launch another glider at the launch point, saw the Pawnee turn onto final approach and identified the potential for a mishap. The Eurofox pilot made a radio call advising the taxiing glider pilot to stop but it was not heard. The glider pilot did see a stop signal given by the crew at the launch point but thought the signal was for the Eurofox pilot. The powered sailplane continued its take-off run, while the pilot of the Pawnee manoeuvered to land on the runway ahead of the Eurofox. The Eurofox pilot, who was also the Tugmaster, debriefed the Pawnee pilot and suggested that a 'go around' would have been a better option than conducting the modified landing. The Tugmaster also debriefed the glider pilot, who recognised they should not have entered the runway while the tow plane was on the latter stages of its circuit.

Date	6-Nov-2017	Region	GQ	SOAR Report Nbr	S-1105		
Level 1	Operational	Level 2	Aircraft Control	Level 3	Hard landing		
A/C Model 1	Twin Astir	A/C Model 2					
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	69

This early solo pilot was on their first solo flight from this site, having just completed a check flight with an instructor. The pilot released from aerotow into what they thought was a thermal and, after spending some time and height trying to find it, the pilot chose to return to the airport and enter the circuit. On release from tow the pilot did not orient themselves and it took some additional time and height to locate the airport. The pilot entered circuit at low altitude and became fixated on reaching the launch point, but during the downwind leg recognised they were now very low and that a modified circuit was necessary. The pilot conducted a low-level turn from mid downwind directly onto final. After a short and unstable approach, the aircraft touched down hard and the glider bounced twice. The glider was not damaged in the incident and the pilot underwent further check flights with a local instructor to orient and familiarise themselves with local landmarks, and to work on their circuit planning. Goal fixation often manifests in times of stress, which coupled with site unfamiliarity and a lack of currency results in a failure of the pilot to analyse information appropriately leading to a loss of situational awareness. Situational awareness must precede decision-making because the pilot must perceive a situation in order to have an outcome. Situational awareness also allows the pilot to stay ahead of the aircraft. To prevent the loss of situational awareness, implement proven

best practices, such as orienting oneself post release (post-release checklist), remaining current, and breaking of the flight at an appropriate height.

Date	9-Nov-2017	Region	WAGA	SOAR Report Nbr		S-1078	
Level 1	Airspace	Level 2	Aircraft Separation	Level 3		Near collision	
A/C Model 1		Astir CS77		A/C Model 2	Cessna 172		
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	69
While turning onto final for the operational runway the pilot of the single-seat glider saw a Cessna 172 under their right wing. The Cessna was turning to the right and away from the glider as its pilot made a radio call that they were “going around”. The glider landed safely. The incident was observed by the club tow pilot and two members at the control van. Investigation revealed that the Cessna pilot made an inbound call at 10Nms and was conducting a ‘straight-in’ approach. Sometime later the glider pilot made a radio call on joining downwind for a conventional circuit. Just prior turning onto the base leg, the glider pilot heard a radio transmission from the Cessna pilot, who asked the glider pilot if he would have room to land behind the Cessna if it did a full stop landing. The glider pilot misunderstood the transmission and thought the Cessna pilot has advised they were landing behind the glider. Although the glider pilot had not sighted the Cessna, they acknowledged in the affirmative and then turned onto the base leg of the circuit. In the meantime, the tow pilot had been observing the situation and identified that a risk of Collison was developing. Fearing that the glider would collide with the Cessna during the final approach, the tow pilot made a radio call advising the Cessna pilot that there was a glider to their left. The Cessna pilot immediately altered course about 20 degrees to the right and acknowledged that they had the glider in sight. The following causal factors were identified: • There were no radio calls heard from the pilot of the Cessna advising of the intention to conduct a straight-in approach. • The glider pilot misinterpreted the radio call from the Cessna pilot, and did not sight the Cessna on final approach.Straight-in approaches to non-controlled aerodromes are not a recommended standard procedure. However, Regulation 166B of the Civil Aviation Regulations does not preclude pilots from conducting straight-in approaches provided certain conditions are met. Pilots who choose to adopt a straight-in approach should only do so when it does not disrupt, or conflict with, the flow of circuit traffic. Paragraph 166 (2) (b) of the Civil Aviation Regulations requires a pilot conducting a straight-in approach to give way to any other aircraft established and flying in the circuit pattern. **Nonetheless, pilots conforming to the circuit pattern – particularly on the base leg – should continue to check for traffic entering along the final approach path.**							

Date	12-Nov-2017	Region	NSWGA	SOAR Report Nbr		S-1086	
Level 1	Operational	Level 2	Airframe	Level 3		Landing gear/Indication	
A/C Model 1		LS 6-c		A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Outlanding	PIC Age	
The undercarriage collapsed during an outlanding in a rough cattle grazing paddock. The owner has had the indent for the undercarriage locking lever increased in size to make it less prone to unlocking during landing.							

Date	12-Nov-2017	Region	VSA	SOAR Report Nbr		S-1091	
Level 1	Operational	Level 2	Flight Preparation/Navigation	Level 3		Aircraft preparation	
A/C Model 1		SZD-48-1 "Jantar Standard 2"		A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	56

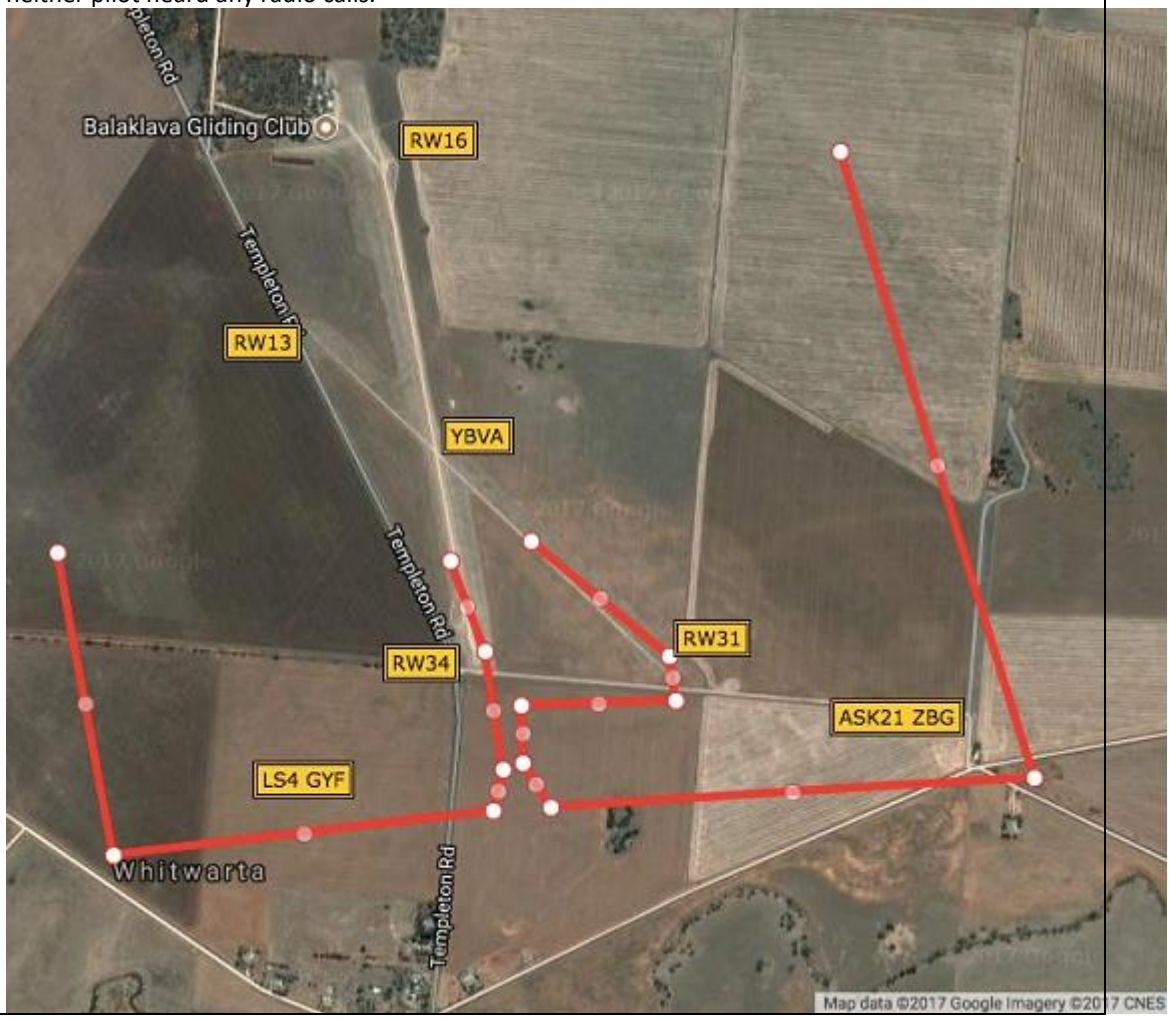
Launching was being conducted on runway 19 with a crosswind component from the east of between 5 & 8 knots. During the initial ground roll the glider's left wing dropped to the ground, causing the glider to veer away from the runway. As the experienced pilot reached for the release, the wing came up and the pilot elected to continue the launch. Once the tow plane and glider were airborne and climbing away, the glider pilot identified that the climb rate was lower than expected but rationalised that the combination was flying through strong sink. When the climb rate did not improve for about another 1 to 2 mins and at about 800ft AGL, the pilot decided to raise the undercarriage, at which time the undercarriage warning horn sounded alerting the pilot to the airbrakes being open. The glider pilot closed the airbrakes, and the launch continued normally with a much-improved climb rate. On the other end of the rope the tow pilot, flying a 260 Hp Pawnee, had noticed the airbrakes were out and initially thought the glider pilot had used the airbrakes to increase aileron control on take-off and had not put them away. The tow pilot elected not to signal with a rudder waggle at this time as the climb rate, while less than usual, was acceptable, and he did not wish to risk an inadvertent release by the glider pilot until better landing options were available to the glider pilot. The tow pilot became engaged in lookout while negotiating turns, and when he again checked the mirror, the brakes were away and the climb rate improved. The glider pilot was adamant that the airbrakes were closed and locked prior to launch, and believes they dislodged from the over-centre lock position during the rough ground roll. The over-centre locking mechanism was inspected after the incident and found to be in satisfactory working order. The pilot's CFI noted that the high workload associated with the early stages of a launch and the need to focus on flying the glider at a critical time, made it difficult for the pilot to consider airbrakes, even though the pilot was aware that the climb rate was not what it should be. Also, the pilot was unlikely to associate the reduced climb performance with the airbrakes being unlocked because they believed they had closed and locked the airbrakes during the pre-take off check and had previously experienced reduced climb performance during aerotow launch.

Date	12-Nov-2017	Region	SAGA		SOAR Report Nbr		S-1107		
Level 1	Airspace	Level 2	Aircraft Separation		Level 3	Near collision			
A/C Model 1	ASK-21			A/C Model 2	LS 4				
Injury	Nil	Damage	Nil	Phase	Landing		PIC Age	20	

At around 1700 hours an ASK 21 on a training flight joined a right-hand circuit for a landing on the operational runway (RWY 36). At the same time, an LS4 returning form a cross-country flight joined a left-hand circuit for a landing on the operational runway. Both pilots assert that radio calls were made during the downwind leg but neither pilot heard the transmissions. Neither pilot had the other sighted as they turned onto base leg on a heading towards each. The Flarm in the ASK21 gave an audible alert and the command pilot, a new Level 1 instructor, turned onto final early to avoid a potential conflict. The pilot of the LS4 turned onto final at the same time and then got an alert on their Flarm. The command pilot of the ASK21 then observed the LS4 abut 50ft below and to the left, and so immediately turned away to the right to provide more separation. The LS4 pilot continued the approach and landed safely on the operational runway. The command pilot of the ASK21 conducted a low-level manoeuvre to divert to runway 31 and conducted a safe landing. Potential causal factors identified included:

- contra circuit operations were being used;
- the position of the sun, and cloud cover on the horizon may have made sighting of the LS4 difficult; and

- neither pilot heard any radio calls.

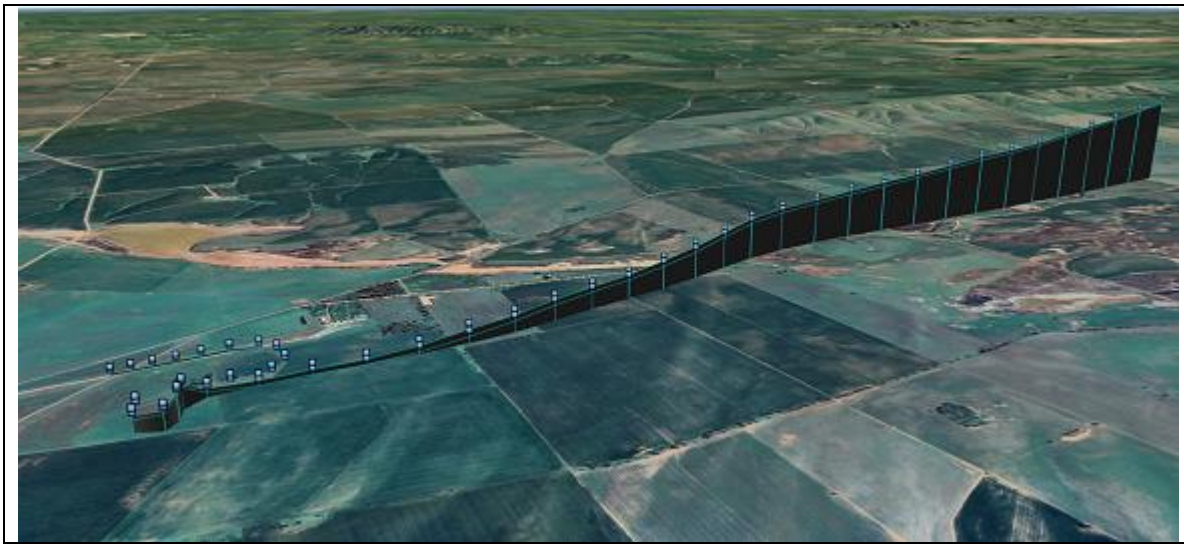


Date	12-Nov-2017	Region	SAGA	SOAR Report Nbr	S-1082		
Level 1	Consequential Events	Level 2	Low Circuit	Level 3	Low Circuit		
A/C Model 1	ASK-21	A/C Model 2					
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	26

While approaching the airfield during a low-level finish manoeuvre to runway 34, the pilot noticed gliding operations had changed to runway 16. The pilot then conducted a very low modified circuit to the new runway with low energy. The final turn onto the approach was conducted extremely low to the ground; estimated at no more than 25 ft with around 30 degrees of bank. The aircraft landed safely. Investigation revealed the pilot:

- did not recognise the wind had changed direction as the 'sea breeze' came inland and that the glider had to penetrate the wind to get back to the aerodrome;
- had not identified the change to runway 16, possibly due to the presence of two gliders at the end of runway 34 that were due to be towed to the operational end of the runway;
- underestimated the sink rate of the glider at the speed being flown;
- flew the low-level finish manoeuvre at too low a speed resulting in only a moderate gain of height during the pull-up to join the circuit.

The pilot was counselled and underwent remedial training with their CFI.



Date	13-Nov-2017	Region	NSWGA	SOAR Report Nbr	S-1081		
Level 1	Operational	Level 2	Ground Operations	Level 3	Taxiing collision/near collision		
A/C Model 1	LS10-st	A/C Model 2					
Injury	Nil	Damage	Substantial	Phase	Ground Ops	PIC Age	

While towing the glider to the flight line, a northerly wind gust lifted the port wing and wing-walker off the ground resulting in the starboard wingtip contacting the ground. As the pilot slowed to a stop the towing-bar disconnected from the tail dolly. The glider continued towards the car and the trailing edge of the port-wing aileron collided with the vehicle. The aileron was damaged over a total length of 600mm and full chord width in places.

Date	15-Nov-2017	Region	NSWGA	SOAR Report Nbr		S-1087	
Level 1	Operational	Level 2	Aircraft Control	Level 3		Hard landing	
A/C Model 1	AS-K 13			A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	75

During an instructional flight the student pilot mishandled the approach and the instructor failed to correct the situation before the aircraft touched down heavily. The instructor noted that they had omitted to accurately ascertain the pupil's previous experience before flight, and allowed the student, who was undertaking their fourth flight in a glider, on the controls too early in the training. During the course of the flight the student displayed reasonable handling skills and the instructor was comfortable allowing the student to fly the approach. Unfortunately, the student did not have the skill or experience to land the glider and the instructor was caught unaware. Although the instructor briefed the student on the landing exercise before the flight, they had not reviewed the student pilot's training record or logbook. Had they done so, it would have been obvious that the student was not at that stage of their training. This incident highlights the importance of instructors ensuring their students are not on the controls at low levels until competence in smooth and reasonably accurate co-ordination has been acquired, and that the student has some idea of anticipation in the use of the controls.

Date	17-Nov-2017	Region	SAGA	SOAR Report Nbr	S-1126
Level 1	Operational	Level 2	Flight Preparation/Navigation	Level 3	Other Flight Prep/Nav Issues
A/C Model 1	DG400			A/C Model 2	

Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	44
The pilot flew with a lapsed Annual Flight Review. Discussion with the pilots' CFI revealed the pilot had not flown in a two-seater for three years. The pilot was grounded pending a satisfactory flight review. While pilots need to have a valid flight review if they want to exercise the privileges of command flying, it is important to consider that the annual flight review is the only regular proficiency training experienced by many pilots. Consequently, the review should not be viewed as a check ride but rather the opportunity for an independent assessment of a pilot's knowledge and ability to perform safe flight operations, and to correct those areas in which a deficiency is identified. The Annual Flight Review should be considered as the aeronautical equivalent of a regular medical check-up and ongoing health improvement program.							

Date	18-Nov-2017	Region	GQ	SOAR Report Nbr	S-1088
Level 1	Operational	Level 2	Ground Operations	Level 3	Taxiing collision/near collision
A/C Model 1	ASK-21Mi	A/C Model 2	N/A		

Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	49
The command pilot was conducting a flight with another instructor as passenger. After landing on runway 06 the command pilot taxied the aircraft onto the apron outside the aerodrome terminal building. As the command pilot began to lower the port wing onto the taxiway, a gust of wind forced the starboard wing down. The command pilot applied correcting control inputs to no avail and the starboard wing leading edge struck one of the taxiway lights. The taxiway light separated from its base and a small section of Gel Coat was removed from the leading edge of the wing. The CFI immediately suspended the practice of taxying onto the Apron area.							

Date	18-Nov-2017	Region	VSA	SOAR Report Nbr	S-1089
Level 1	Operational	Level 2	Ground Operations	Level 3	Ground handling
A/C Model 1	ASK-21Mi	A/C Model 2	Cessna 172		

Injury	Nil	Damage	Minor	Phase	Ground Ops	PIC Age	51
While being manhandled into the hangar, the nose of the glider struck a bolt in the hangar floor causing minor damage.							

Date	18-Nov-2017	Region	SAGA	SOAR Report Nbr	S-1094
Level 1	Consequential Events	Level 2	Low Circuit	Level 3	Low Circuit
A/C Model 1	Astir CS	A/C Model 2			

Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	69
The experienced pilot was observed to pull up over a line of trees and then a fence on final approach and landed just inside the airfield boundary. Review of the flight trace revealed the pilot joined the circuit in the usual position but much lower at around 570ft AGL. Heavy sink was encountered at the end of the downwind legs and on the base leg. The pilot appears not have noticed the worsening situation as no attempt was made to modify the circuit. Upon turning final the pilot dived the aircraft down to around tree-top height, presumably to keep speed and to lessen the time spent in the sink. The pilot's CFI noted the pilot did not properly monitor the flight-path throughout the circuit, and may not have set the altimeter correctly prior to launch, leading the pilot to believe they were higher than they were.							

Date	18-Nov-2017	Region	VSA	SOAR Report Nbr	S-1096
Level 1	Operational	Level 2	Ground Operations	Level 3	Taxiing collision/near collision

A/C Model 1		Duo Discus		A/C Model 2			
Injury	Nil	Damage	Substantial	Phase	Ground Ops	PIC Age	69

A squall line with thunderstorms and heavy rain was approaching the airfield, and flying operations had ceased. The glider was being towed back to the hangar by vehicle. As the vehicle driver was negotiating the glider between the aerodrome access gate and the hangar, the left wing struck a star picket. This caused the rear wheel of the glider to leave the retaining cup resulting in the rudder impacting the vehicle. The rudder was substantially damaged.

Date	19-Nov-2017	Region	WAGA	SOAR Report Nbr	S-1093
Level 1	Operational	Level 2	Terrain Collisions	Level 3	Ground strike
A/C Model 1		Jantar Standard 2		A/C Model 2	

Injury	Nil	Damage	Minor	Phase	Outlanding	PIC Age	42

The pilot had just returned to flying cross-country after a long absence, and was attempting a 300km flight when an outlanding became inevitable. With most of the paddocks containing unharvested crops or stock, the pilot elected to land in the clear side of a paddock containing sheep. Just after rounding out the pilot noticed two lambs 10 metres ahead. The pilot raised the nose of the glider and cleared the lambs, but as the airbrakes were not reduced or closed, the airspeed decayed rapidly. The pilot lowered the nose attitude to regain a suitable speed but over pitched, and the nose of the aircraft struck the ground followed but the mainwheel and the tailwheel. The aircraft rolled to a stop and subsequent inspection revealed only superficial damage to the bottom of the fuselage. A potential contributing factor is the effect of startle on the pilot. Where people are startled, and a threat persists, then the startle reflex is likely to transition into a full surprise or a startle reaction. The pilot will react to the threat, but cognitive processes may be impaired. In this case the pilot reacted immediately by climbing the aircraft but did not consider the additional safeguards of closing the airbrakes and recovering to a normal landing attitude.

Date	20-Nov-2017	Region	VSA	SOAR Report Nbr	S-1090
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Near collision
A/C Model 1		Twin Astir		A/C Model 2	Arcus M

Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	67

The powered sailplane had been towed with a vehicle to the operational runway (RWY 08) with the intention of taking off on a cross-country flight. Upon arrival at the launch point it was noted that there was no gliding activity being conducted and the wind was favouring the reciprocal runway (RWY 26). After consulting with a tow pilot and other members, the powered sailplane pilot towed the glider to RWY 26. However, by the time the powered sailplane pilot was ready to launch, the wind had swung around and was now favouring RWY 08. Shortly afterwards the pilot flying a two-seat glider returning from a short cross-country coaching flight entered the circuit area. The command pilot of the two-seat glider noted that the windsock closest to the runway intersection was uninformative, however the windsock on the eastern end of the airfield indicated a wind speed of about 5-7 knots with a direction from 120 degrees. The decision was made to land on RWY 08 and a radio call was made on entering the downwind leg. About the time the glider turned onto the base leg, the pilot of the powered sailplane started their take-off run. No radio call was heard from the powered sailplane pilot, and it was later determined that the radio was set to another frequency. The tow pilot on RWY 08 heard the engine of the powered sailplane as it started its take-off run and saw the glider on base leg. Identifying the risk of a collision between the powered sailplane and glider, the tow pilot made a radio call to the glider pilot alerting them to the powered sailplane taking off on the reciprocal runway. Just after turning final, the command pilot of the glider sighted the powered sailplane climbing towards them directly in front. The command pilot assumed control and took avoiding action by opening the airbrakes and diving to the right. The two aircraft passed within 30 meters. Causal factors include:

- variable wind conditions made identification of the operational runway problematic;
- normal "alerted see and avoid" processes used to achieve situational awareness were degraded by the radio in the powered sailplane being set to the wrong frequency;
- the powered sailplane pilot did not identify the radio was set to the wrong frequency;
- the powered sailplane pilot did not sight the glider in circuit;
- the glider pilots did not sight the powered sailplane until a collision was imminent.

When operating outside controlled airspace, it is the pilot's responsibility to maintain separation with other aircraft. For this, it is important that pilots utilise both alerted and unalerted see-and- avoid principles. Pilots should never assume that an absence of traffic broadcasts means an absence of traffic. The pilot of the powered sailplane was counselled.

Date	21-Nov-2017	Region	VSA	SOAR Report Nbr	S-1092		
Level 1	Operational	Level 2	Terrain Collisions	Level 3	Collision with terrain		
A/C Model 1	Discus 2c		A/C Model 2	N/A			
Injury	Fatal	Damage	Write-off	Phase	In-Flight	PIC Age	78

The following is an extract from the New Zealand Civil Aviation Authority Investigation Report. The original report can be downloaded from this link: https://www.aviation.govt.nz/assets/publications/fatal-accident-reports/zk-gxg-fatal.pdf

EXECUTIVE SUMMARY

A Schempp-Hirth Discus-2c glider was being flown by a visiting overseas pilot as part of the South Island Regional Gliding Championship (the Championship) on the afternoon of 21 November 2017. The pilot had achieved the first two points of the set racing task and was thermalling (Thermalling is the process of circling within columns of rising air to gain lift) close to terrain below the Hunter Ridge in the Huxley Range, Central Otago. Following a series of right hand turns the aircraft made a left turn, the airspeed rapidly reduced, followed by an aerodynamic stall (Aerodynamic stall is a condition where the wing's angle of attack increases beyond a certain point such that lift begins to decrease. The angle at which this occurs is called the critical angle of attack). There was insufficient height to recover from the stall and the glider impacted the terrain. Competitors in the Championship saw the glider on the hillside and raised the alarm. One of these gliders flew lower and the pilots observed the pilot motionless in the glider. A search and rescue helicopter arrived on scene and medics confirmed the pilot had received fatal injuries. The Transport Accident Investigation Commission was notified of the accident and elected not to open an inquiry. Accordingly, a Civil Aviation Authority safety investigation commenced. The safety investigation identified the following contextual factors:

- Wreckage signatures and track data indicated an unrecovered aerodynamic stall
- Though an experienced glider pilot, they had minimal experience gliding in the South Island mountainous environment
- The pilot made an error in judgement by delaying a decision to stop circling.
- It was possible the pilot's performance had degraded after a period of challenging flying
- Flying in the Championship may have influenced the pilot's decision-making
- The South Island mountainous area is regarded by pilots as one of the world's most challenging gliding environments and the soaring conditions were challenging that day.

SAFETY MESSAGES AND RECOMMENDATIONS

Pilots new to flying in the South Island mountains need to be cognisant of the challenges this environment poses and consider the risks of flying solo. Pilots are reminded that the South Island mountainous environment is particularly challenging, even for those experienced in the area. Anything that affects their fitness to fly or decision-making will increase the risk of something going wrong. Pilots are advised to:

- gain knowledge and skills from experienced local pilots
- undergo instruction, or at least fly with another experienced local pilot until familiar with the environment

- fly with caution and within their own limitations
- always have an escape route when circling below a ridge and make the decision to turn away early.

A safety recommendation has been made for Gliding New Zealand Incorporated (GNZ) to consider the appropriateness of visiting pilots flying as solo competitors if they are new to the New Zealand South Island mountainous area and have limited recent experience in similar environments. GNZ accepted this recommendation and has provided further guidance in GNZ Advisory Circular 2-13 Mountain & Ridge Soaring Safety Principles, Section 7 Competitions.

INCIDENT TIMELINE

- 11 Nov 2017 - The pilot and a friend arrive at Omarama to attend a week-long mountain soaring course with a gliding training organisation (the organisation), followed by the South Island Regional Glider Championship (the Championship)
- 12 to 16 Nov - The pilot completes the course and passes a biennial flight review (BFR). A current BFR flight check is required by GNZ before any pilot can take part in the Gliding Championship. The pilot decides to enter the Racing Class of the Championship with his friend acting as crew.
- 17 to 18 Nov - Two practice flights are flown by the pilot in a single seat Discus-2c, ZK-GXG, rented from the organisation.
- 19 Nov - First day of the Championship. The pilot completes the Racing Class task, placing 10th.
- 20 Nov - All Championship flying tasks are cancelled due to the weather.
- 21 Nov - Morning - The pilot attends the morning briefings and conducts pre-flight planning and the daily inspection. By 1300 NZDT5 The pilot and his friend are on the grid ready for launch for the Racing Class
- 1347 - ZK-GXG is launched by aero tow
- 1535 - ZK-GXG achieves the first racing point, Stewarts (Refer to Figure 1: Racing Class Task A), at 7125 feet (ft) and soars to the next task point, Makarora East.
- 1616 - ZK-GXG enters the eastern edge of the Makarora East point at 6030 ft then soars across the Hunter Valley towards the Hunter Ridge (The Hunter Ridge refers to the ridges above the Hunter River and are part of the Huxley Ranges) for the next task point, Morven.
- 1625 - ZK-GXG arrives on the western side of the Hunter Ridge at 4500 ft and completes six right turns attempting to gain altitude from thermal uplift (refer to Figure 3). The wind averages 182°Magnetic and 8-10 knots (kt) and the glider's indicated airspeed (IAS)10 ranges between 49 and 68 kt in the turns.
- 1629:11 - No lift is gained and ZK-GXG stops circling and tracks close to rising terrain on a north-easterly heading (refer to Figures 3 and 4)
- Next 6 seconds - ZK-GXG's IAS progressively reduces (refer to Figure 3 and 4)
- 1629:17 - The IAS reduces to 41kt, ZK-GXG enters a left turn, rapidly loses height and strikes terrain two seconds later (refer to Figures 4 and 5)
- 1658 Passing Championship pilots observe the damaged glider below the ridge and see no sign of movement. They make a MAYDAY call "glider down on the Hunter Ridge" to the Championship operations base. Championship emergency response procedures commence
- 1709 Rescue Coordination Centre of New Zealand (RCCNZ) is alerted and a rescue helicopter is dispatched. RCCNZ notifies the CAA
- 1725 The tow plane from Omarama flies to the accident site to act as a marker for the helicopter, and relays information to base
- 1742 Rescue helicopter arrives on site. The pilot is confirmed as deceased
- 1801 The Transport Accident Investigation Commission elects not to open an inquiry. Accordingly, a CAA safety investigation commences

INCIDENT MAPS AND PHOTOGRAPHS

Day 2 Racing Class Task A

Task Information *Reg 2017 Day 2 (21/11/17) Racing - Task A*

Type: Assigned area task with 3 areas **Reg 2017 Day 2 (21/11/17) Racing - Task A**

Task distance: 144.3km/314.5km (225.9km)

Style	Code	Points	Latitude	Longitude	Dis.	Crs.
Start		303-Horrible	S44°32.000'	E170°00.000'		
1.Point		099-Stewarts	S43°57.000'	E169°58.000'	64.9km	358°
2.Point		L305 Makarora East	S44°16.400'	E169°12.100'	71.0km	239°
3.Point		064-Morven	S44°38.500'	E169°30.400'	47.6km	149°
Finish		305-OM Finish	S44°28.800'	E169°59.433'	42.4km	65°

Observation zone description:
Start 303-Horrible: Cylinder R=5.0km, Max.alt. is 7999ft
1.Point 099-Stewarts: Cylinder R=15.0km
2.Point L305 Makarora East: Cylinder R=25.0km
3.Point 064-Morven: Cylinder R=15.0km
Finish 305-OM Finish: Cylinder R=3.0km

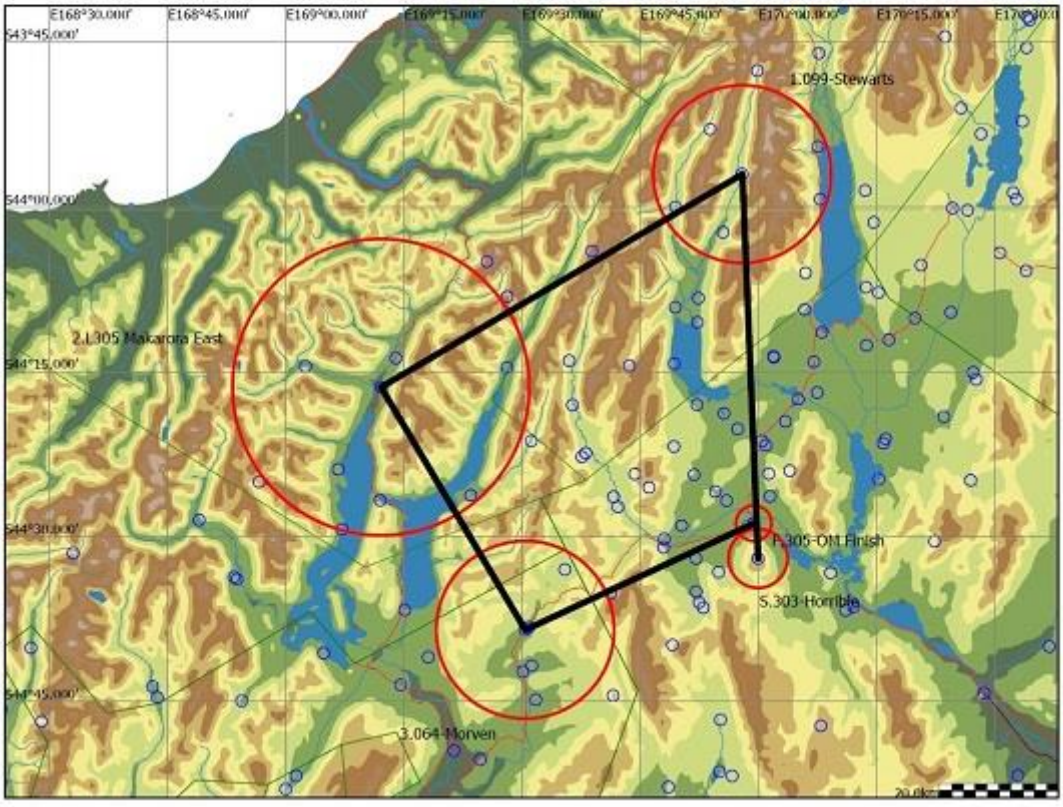


Figure 1: Racing Class Task A as provided to competing pilots. (Source: Gliding New Zealand)

Incident maps

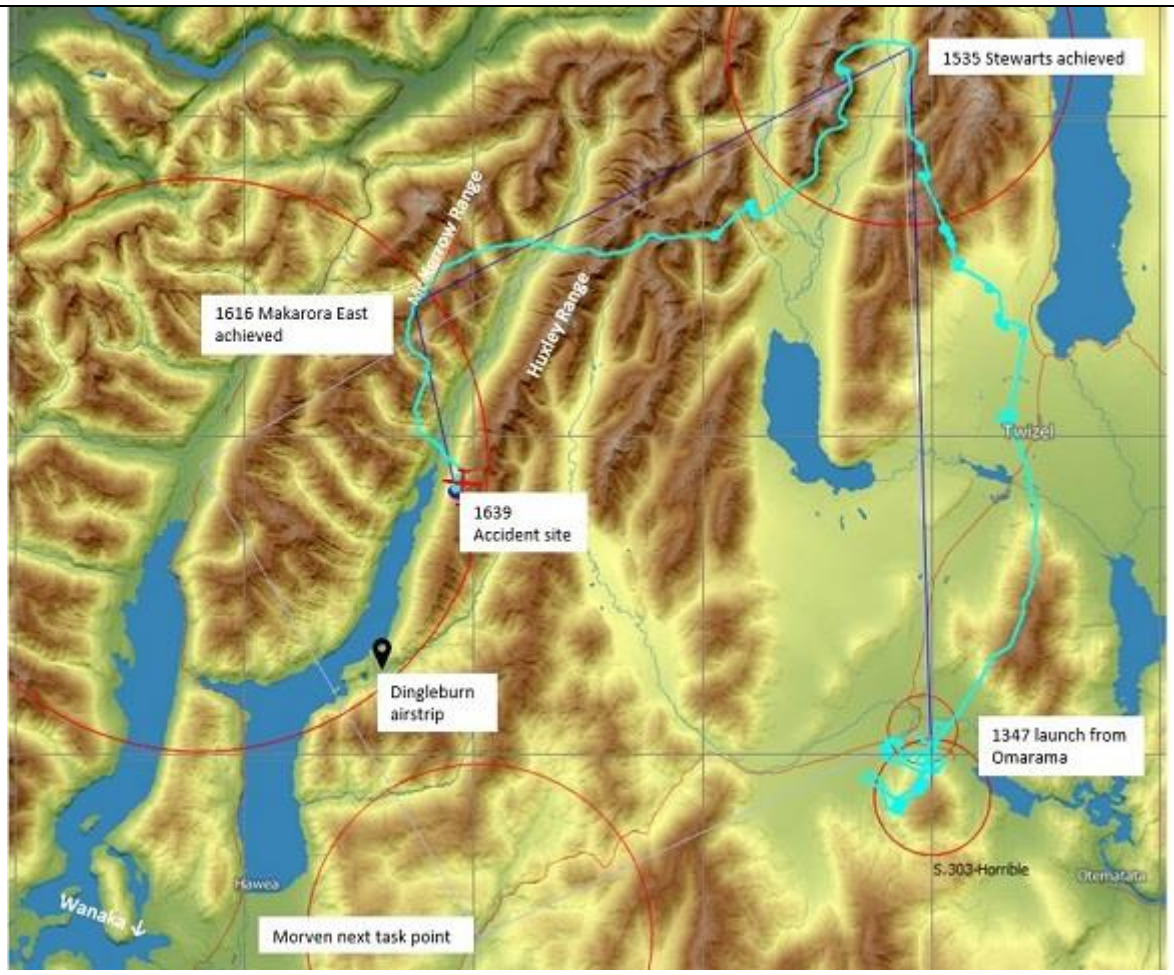


Figure 2: Map of flight path. (Source: Pilot's Oudie GPS)

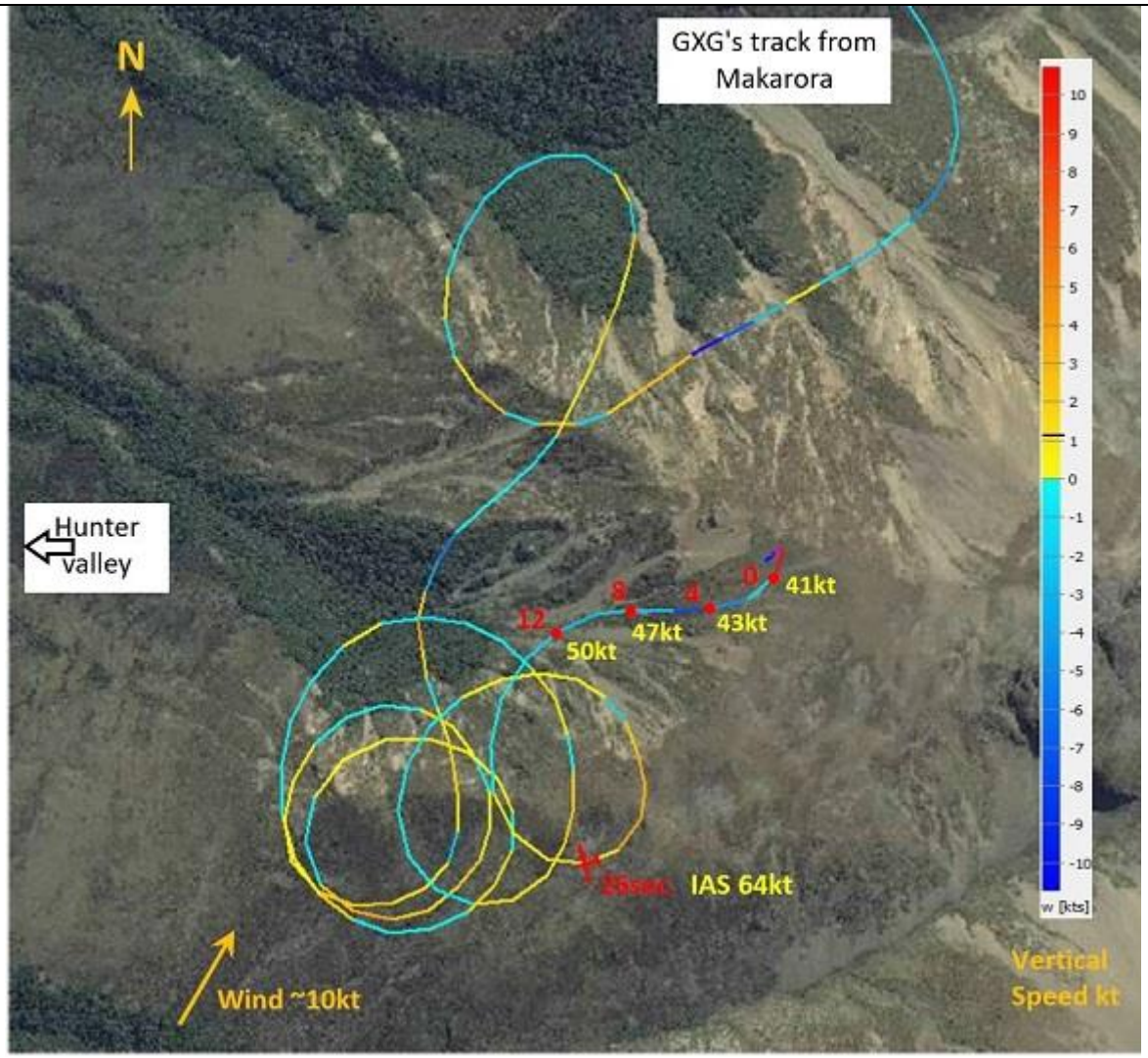
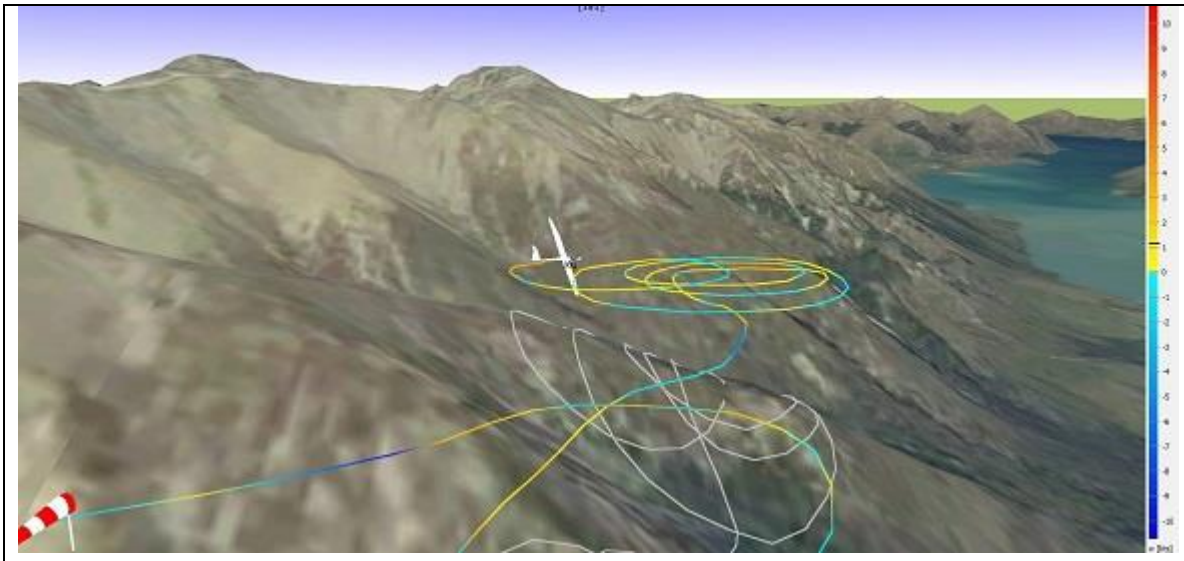


Figure 3: ZK-GXG's track below the Hunter Ridge showing spot speeds up to 26 seconds before the stall. Refer also to Figure 4. (Source: ZK-GXG LX9000)

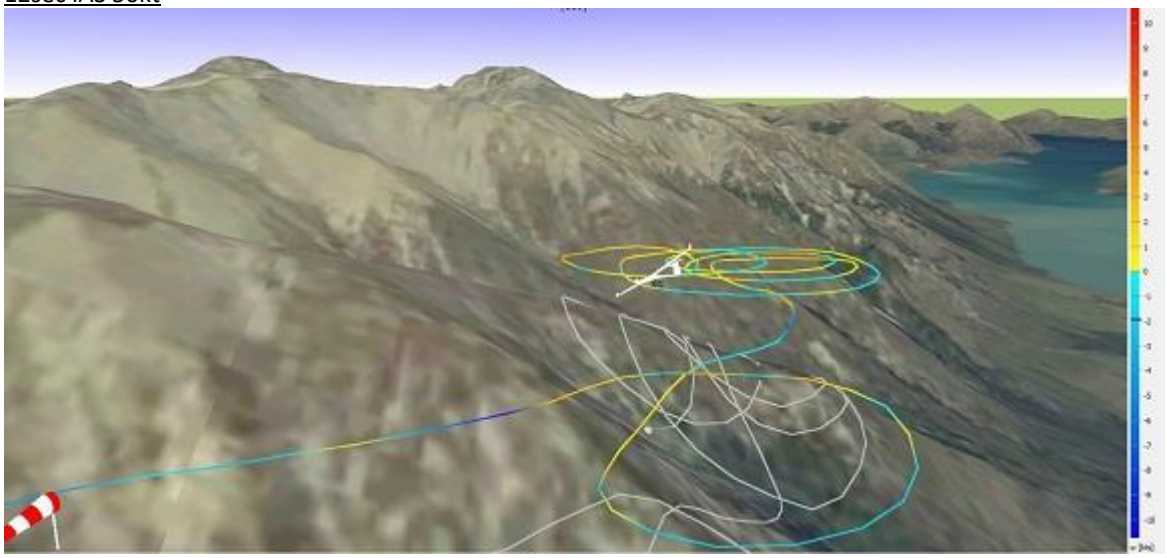
Screenshots for the 26 seconds prior to ZK-GXG stall

On the following page(s), Figure 4 shows a series of See You™ screenshots of the last 26 seconds of ZK-GXG's flight before the aerodynamic stall. These screenshots were created by GNZ using data from the LX9000 installed on ZK-GXG. Use the mouse scroll wheel, or arrow keys, to animate these eight images. Note: The white dot at the end of the ground trace in each screenshot indicates the ground clearance directly below the glider.

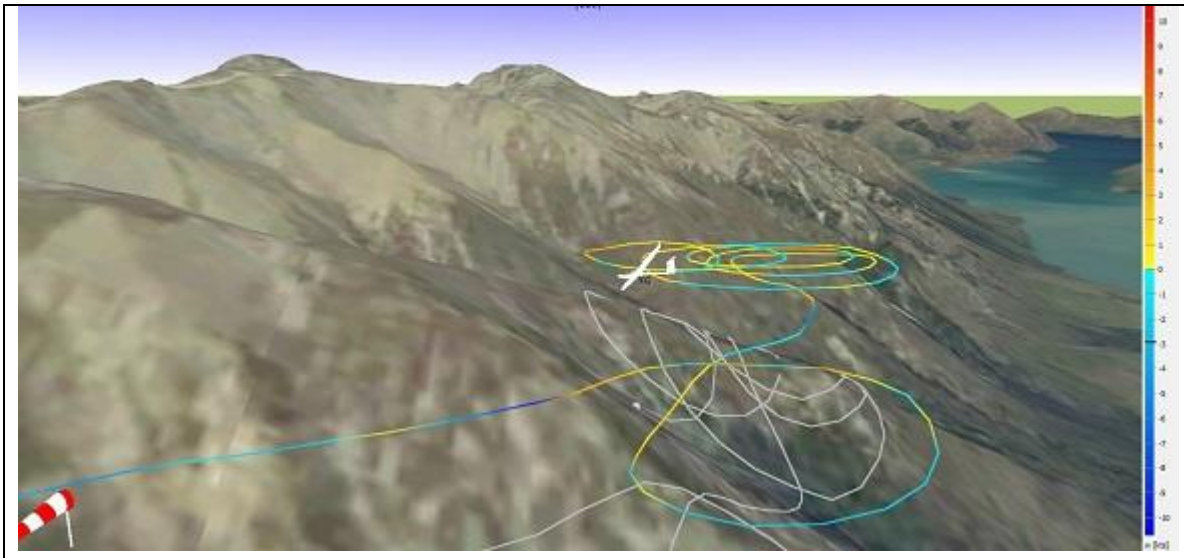
26sec IAS 64kt



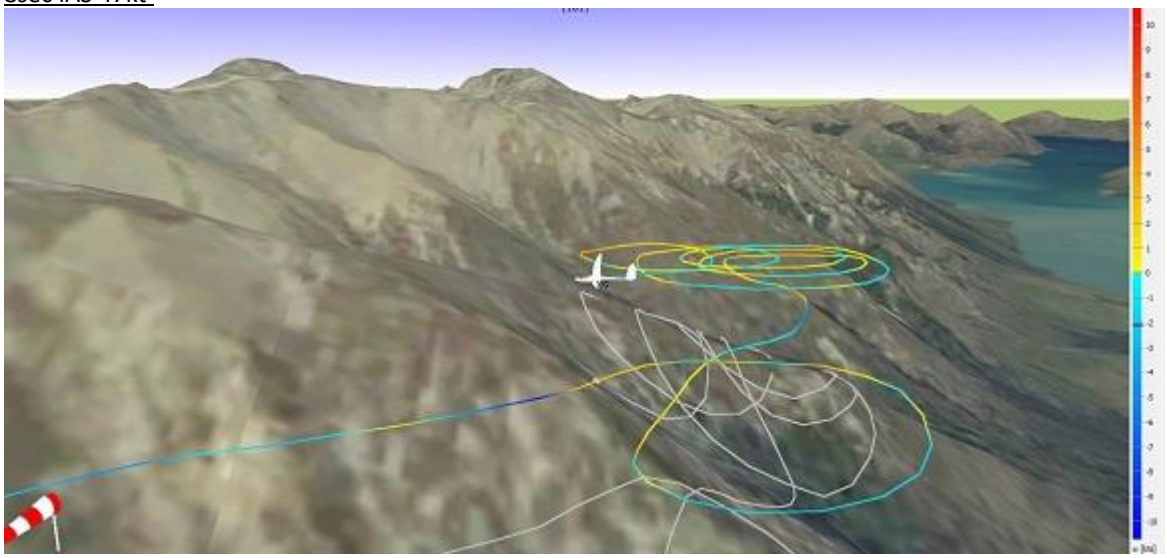
12sec IAS 50kt



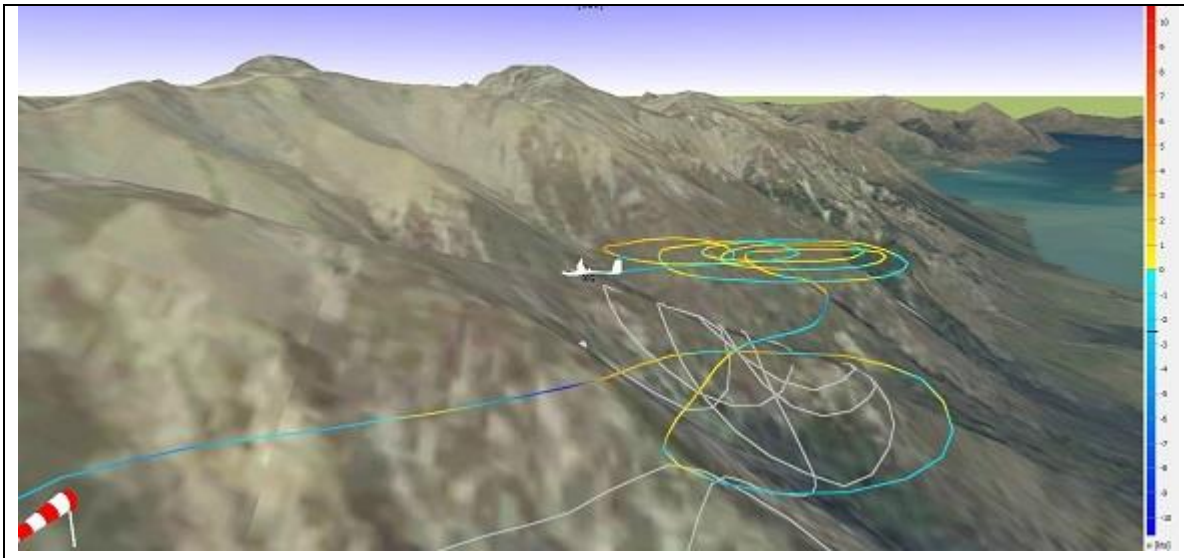
10sec IAS 46kt



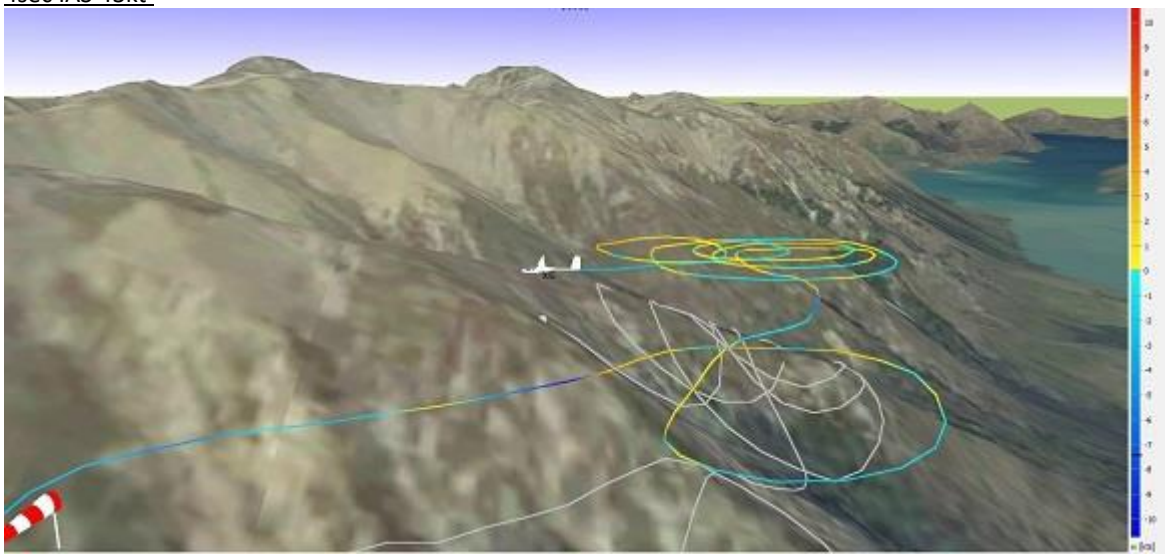
8sec IAS 47kt



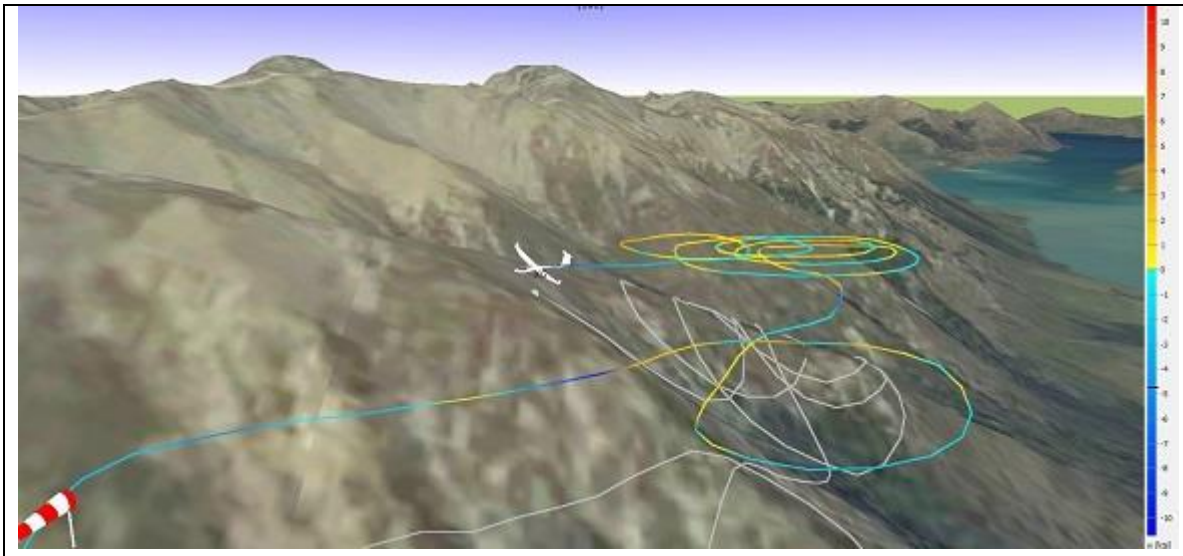
6sec IAS 47kt



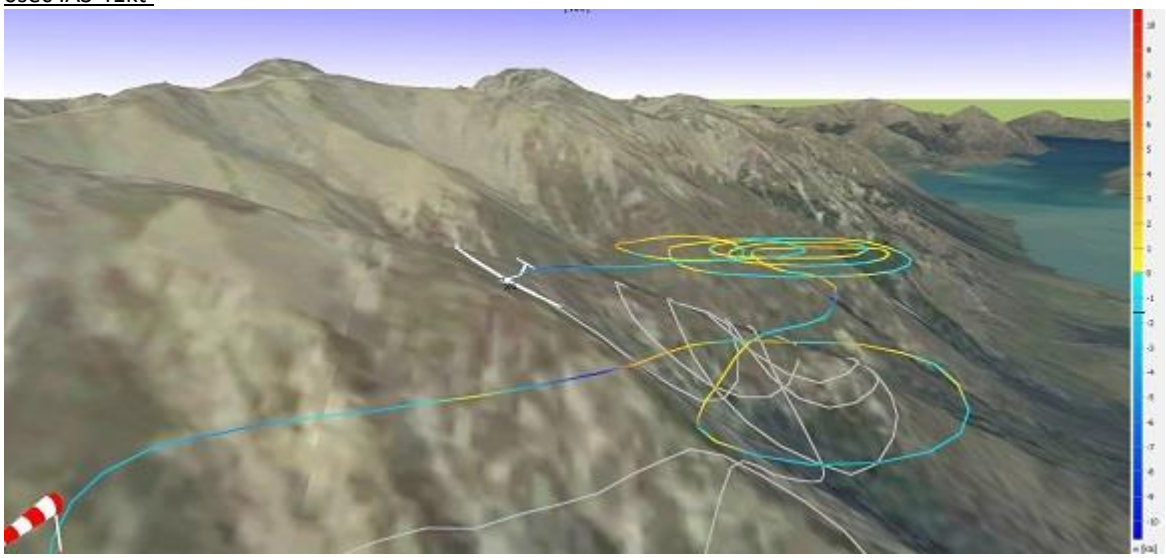
4sec IAS 43kt



2sec IAS 39kt



0sec IAS 41kt



Photographs

Figure: 5. ZK-GXG below a spur on the Hunter Ridge. Main fuselage is facing south. (Source: CAA field investigation 0810 23/11/17 NZDT

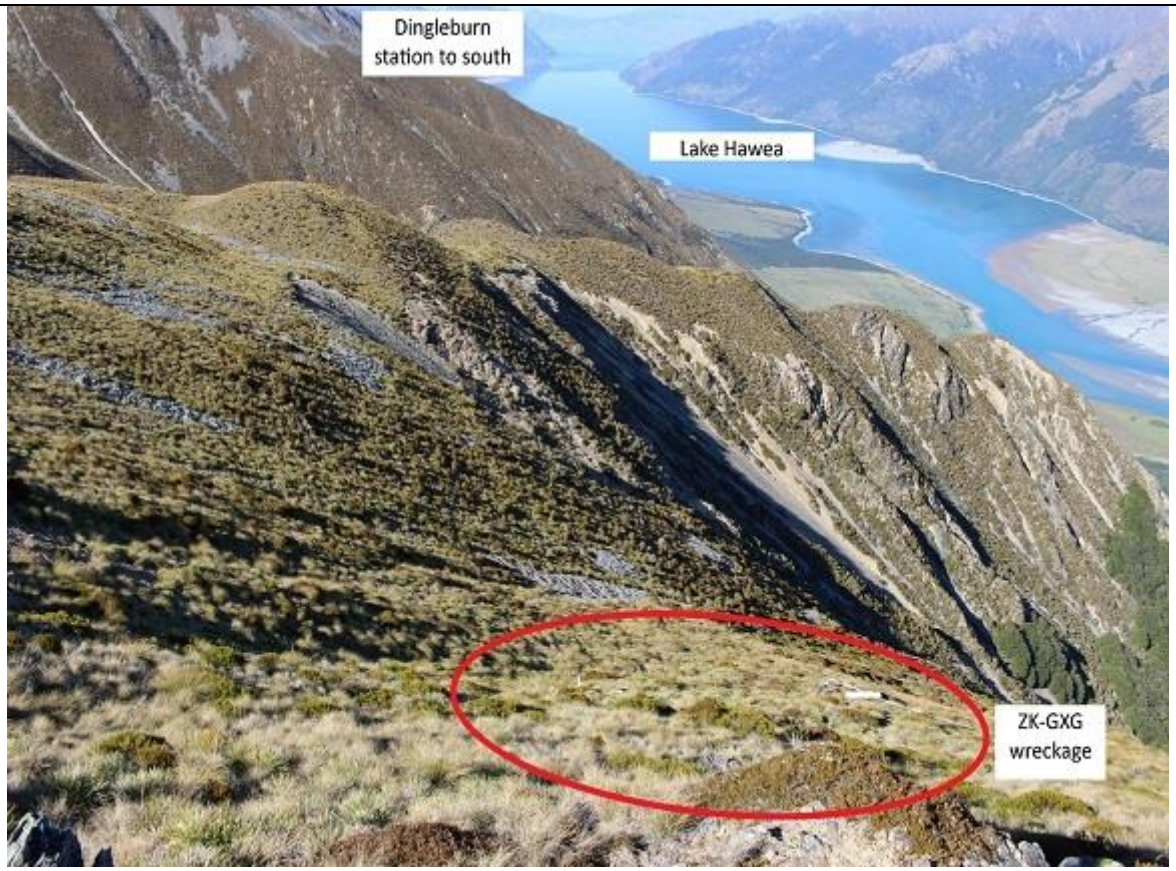


Figure 6: ZK-GXG on a 30° slope facing south. The Hunter River valley is to the right and Dingleburn Station airstrip is further south. (Source: CAA field investigation 0839 23/11/17 NZDT)

FINDINGS AND CONCLUSIONS FROM THE INVESTIGATION

The safety investigation covered human factors, equipment factors, and environmental factors. The key findings are listed below and are then described in more detail.

Equipment factors

- No pre-accident defects were found with the glider
- Wreckage signatures and track data indicated an unrecovered aerodynamic stall

Human factors

- Though an experienced glider pilot, he was not experienced at gliding in the South Island mountainous environment.
- The pilot made an error in judgement by delaying a decision to stop circling
- It was possible the pilot's performance had degraded after a period of challenging flying
- Flying in the Championship may have influenced the pilot's decision-making.

Environmental factors

- The soaring conditions were challenging that day
- The South Island mountainous area is regarded as one of the world's most challenging gliding environments
- The Championship operated in accordance with Gliding New Zealand procedures and Civil Aviation Rules.

Equipment factors

Aircraft information

ZK-GXG was a Discus-2c, single seat, high-performance glider constructed from fibre-reinforced plastic. It had a swept-back wing with winglets and airbrakes on the upper surface and was flown in the 18-metre configuration for the Championship. It was fitted with an LxNav LX9000 Vario Navigation system (LX9000) from which Global Positioning System (GPS) data pertaining to the flight was accessed. The pilot's portable NavITer Oudie Navigation system also tracked the flight.

Figure: 7. Example of Discus-2c (Schempp-Hirth brochure)

No pre-accident defects were found with the glider

ZK-GXG was built in Germany in October 2007 and registered as D-6111. It was imported into New Zealand in November 2009 and a certificate of airworthiness in the standard category was issued by the CAA. The annual review of airworthiness was completed on 11 October 2017 with no defects or discrepancies. There was no recorded maintenance carried out on the glider after that. At the time of the accident the glider had accrued 1840 hours total flight time. On the day of the accident, the organisation's ground crew and the pilot both completed the daily inspection. Thirty litres of water ballast were added to each wing and approximately five litres to the tail.11 Other Championship competitors reported dumping some of their water in flight. The safety investigation was unable to determine if ZK-GXG's pilot did the same, or by how much, as any remaining water was lost during the accident sequence. It was calculated that the glider was within weight and balance limitations. During the site examination, no mechanical defects which may have contributed to the accident were identified.

Wreckage signatures and track data indicated an unrecovered aerodynamic stall

Following what appears to be an uneventful flight, ZK-GXG achieved the Makarora East point and soared towards the Huxley Range and the next task point, Morven (refer to Figures 1 and 2). Near the accident location, six right turns were completed close to the Hunter Ridge at between 300 to 1200 ft agl at an average IAS of 54 kt. After rolling out of the last right-hand turn, the glider progressively slowed as a left turn was initiated at around 4500 ft. The IAS reduced to 41 kt followed by a 30° bank left turn away from the ridge at 100 ft agl (refer to Figures 3 and 4). The glider descended rapidly, and the left wing impacted the terrain, followed shortly by the fuselage and right wing. After the initial impact, the glider slid forward on a westerly heading then rotated left to slide down the slope and come to rest approximately 25 metres from the initial impact point (refer to Figures 5 and 6). The wreckage signatures and the track data indicated that the glider's critical angle of attack was exceeded, with a loss of lift, typical of an aerodynamic stall. There was insufficient height above terrain for the pilot to recover control.

Human factors

Though an experienced glider pilot, he was not experienced at gliding in the South Island mountainous environment.

The pilot was considered an experienced pilot and instructor, having accrued 4682 hours of flight time in gliders. He met the GNZ requirements for entry into the Championship which included completing the mountain soaring course and passing the GNZ BFR. The pilot had limited gliding experince in New Zealand prior to this visit. He was reported to have had considerable (hundreds of hours) flying and instructing in the Australian mountains of Victoria where he was based. He had gained some mountain soaring experience in the USA and more recently in the French Alps in 2012. Pilots experienced in both the South Island and Australian environments reported the South Island flying conditions are quite different to Australia and, in their opinion, would have been challenging for the pilot, despite his experience in USA and France. The pilot was cognisant of his lack of local experience and completed the mountain soaring course and conducted solo flights prior to the Championship. The organisation's owner stated that given the pilot's age and lack of New Zealand mountain flying experience, he reviewed the tracks from every flight the pilot completed and discussed these with him. He stated that the pilot had flown appropriately and in accordance with *"what he had been told"* in the first Championship task. The owner reviewed ZK-GXG's track leading up to the accident. He noted that the pilot had flown well with a steady pattern of climbing and soaring and had achieved the first point, Stewarts, well into the circle. He stated the pilot *"clearly had a plan for the task"* and *"appeared to have easily achieved Makarora"*. The owner, and experienced local pilots all stated that the pilot's actions close to the Hunter Ridge were contrary to gliding best practice. Several stated they felt the conditions were *"stretching [the pilot's] ability".* In 2016 the CAA investigated an accident that occurred during the South Island Regional Gliding Championship. During a reversal turn, away from a ridge, the right wing of the glider G-OJTA struck terrain, the glider was destroyed, fatally injuring both occupants. The CAA Accident Report, G-OJTA Section 4.115 made a recommendation to GNZ that they: *"encourage gliding clubs to mentor visiting pilots, and pilots with limited experience on gliding in the New Zealand Southern Alps during a contest environment"*. It appears that the pilot in ZK-GXG did receive mentorship from:

- the organisation -both during the course and during the Championship
- the Championship itself, via daily briefings and a competitor mentorship programme
- fellow competitors and local pilots on an informal basis.

However, a safety recommendation has been made to GNZ to consider the appropriateness of visiting pilots flying as solo competitors if they are new to the New Zealand Southern Alps and have limited recent experience in similar mountainous environments. GNZ has accepted this recommendation and has provided further guidance in GNZ Advisory Circular 2-13 Mountain & Ridge Soaring Safety Principles Section 7 Competitions.

The pilot made an error in judgement by delaying a decision to stop circling

It appears the pilot made a late decision to stop circling below the ridge, leaving no escape option. The series of right turns plus the effect of the south-westerly tail wind (12 kt average) took the glider progressively closer to the side of the Hunter Ridge. The general south-easterly airflow over the Hunter Ridge created pockets of sinking air which reduced the thermal lift. Any remaining water ballast would have increased the stall speed and adversely affected the handling of the glider close to the stall but was unlikely to be a contributory cause of the stall. GNZ Advisory Circular AC2-13 Mountain & Ridge Soaring Safety Principles provides advice on circling near a hill which states: *"It is vitally important when considering circling near a hill that you consider the risk of sudden loss of height if sink is encountered. Many mountain flying accidents have occurred due to insufficient margin when circling near the hill. Both horizontal and vertical separation needs to be considered along with drift due to wind. Circling against slopes (as opposed to figure of eights) is potentially hazardous, particularly in weak climbs. In these conditions, there is a constant need to closely monitor drift and push out from the slope for a few seconds on each turn. Figure of eights should be used if you have any doubt, carefully watching your drift and always turning away from the hill."* The pilot had been taught to perform figures of eights in the mountain soaring course. His instructor commented that he demonstrated proficiency in conducting the figure of eight. This was confirmed by the investigation review of the tracks from the training flights. It is likely due to the weak thermal conditions that the pilot opted to use the circling technique instead of the figures of eight. During the circles the glider had drifted

progressively closer to the ridge. Following the sixth circle the glider flew parallel to the ridge and commenced the left turn. It takes some time to reverse a turn and, in this case, this was compounded by the tailwind and loss of thermal lift. The glider covered significant ground in this time. With the spur in front of him and little clearance from the terrain, the pilot had no escape options remaining. Gerrard G Dale explains the importance of making early decisions when circling below hill tops.

If continuing the turn into a circle, make the decision early

When the wind on the ridge is very light and there are thermals mixed into the flow, you may climb better by circling. It takes a long time to reverse a turn from one direction to the other and in that time a glider will travel quite a long way over the ground. By circling you can keep the glider in a smaller area of lift. However, if you want to continue a turn and fly a full circle near or below the hill top then you must make the decision very early, when you are flying parallel to the ridge. If you try to change your mind later on you may find that you are already committed - you are pointing towards the hill and cannot turn away if you suddenly realise you are too close.

A late decision may lead to an inevitable crash

This is a trap for newcomers to ridge soaring and one of the reasons you should not circle beneath the hill top until you are experienced in this type of flying. Even then you should think carefully about the situation before you decide to circle. If you are not absolutely sure, without any doubt, that there is room to circle plus a big safety margin - don't! Fly a figure-eight instead.

Source: Dale, G.

The Soaring Engine, Volume 1, page 19.

There is a wealth of information and advice for pilots flying in mountainous areas including flying in proximity to ridge lines. Below is a short summary on threats from experienced glider pilot, Arthur Gatland (Gliding Threat and Error Management. Soaring, August 2010).

Threats	Possible Strategies
Irregular ridge lines	Be aware of the probability of unexpected ridges and spurs appearing in front of you. Irregular ridges are guaranteed to produce strange wind effects. Always have a safety margin in distance from the ridge, and always fly at a minimum of your "safe speed near the ground." Trim for this speed and always have an escape route away from terrain.
Inconsistent winds, giving stronger and weaker lift, windshear, turbulence	There will be instances of loss of airspeed, one wing lifting unexpectedly, possibility of stall. Expect this to happen and allow safety margins. Remember, unlike the car ads – in gliding it is Lack Of Speed that Kills!
Stronger winds due to funnelling etc	Recognise this as a serious threat! Often you will find yourself closing with the ridge faster than expected. Never fly directly towards the ridge, but close on it obliquely so you can always turn away when required.
Difficulty in depth perception	Ridges – particularly in the South Island – that do not have vegetation (trees) make it difficult to assess how far away you are. The rock you can see might be 5 metres wide or the size of a house – you really can't be sure. This has probably resulted in several pilots flying too close and dying as a result. Allow more margin than you think necessary!
Any nagging doubts or uncertainty about what you are doing ...	Get out of there – pronto!
Over-confidence (This includes a level of confidence higher than your level of experience.)	Every pilot must acknowledge that we are all human and we do all make mistakes. Ridge flying is very unforgiving and over-confidence has proven repeatedly to be fatal.

Table 1: Ridge Soaring -Threats and Strategies (source Arthur Gatland)

Previous CAA accident investigation reports describe the causes of gliding accidents in mountainous terrain. Pilots are reminded of the recommendation made in the CAA Accident Report ZK-GZV: *"When operating in close proximity to high or mountainous terrain, it is vitally important that sufficient distance from the terrain is maintained to allow for any sudden height loss due to unexpected changing environmental conditions. Glider pilots need to be aware of not falling into the trap of continued flight close to terrain while leaving themselves with no other options for a safe flight path away from the terrain."* Pilots are encouraged to:

- gain knowledge and skills from experienced local pilots
- undergo instruction or at least fly with another experienced local pilot until familiar with the environment
- always have an escape route when circling below a ridge and make the decision to turn away early
- be cautious to fly within their own limitations.

It was possible the pilot's performance had degraded after a period of challenging flying Championship competitors stated the gliding conditions were "difficult" and "challenging" that day. At the time of the accident the pilot had already flown 2 hr 42 minutes and had been preparing for the flight all morning. It is possible that the combined effects of a prolonged period of physical and mental demands on the pilot may have reduced his performance when he encountered the area of poor thermal lift below the ridge.

Hydration and nutrition

It had been several hours since the pilot had eaten or drunk anything. Though he carried one water bottle and snacks in the glider only a few sips of water and a few nuts had been consumed. Interviews with other witnesses stated they would normally drink one to three litres of water in a three-hour flight. Family

members and gliding colleagues stated that the pilot usually drank water from a Camelback™ type system or bottles during flights. He was an experienced instructor pilot and aware of the need to maintain blood sugar and hydration. However, his instructor stated he had to remind the pilot about maintaining hydration during the mountain soaring course. The Championship daily briefings included reminders about the importance of inflight hydration and nutrition. A level of mild dehydration or low blood sugar may have affected the pilot's physiological wellbeing and performance, but it cannot be concluded as a definitive causal factor. All pilots are reminded of the importance to maintain hydration and blood sugar during flight.

Medical fitness

The pilot held a Civil Aviation Safety Authority (CASA), Australia Class 2 medical which was valid to 02 August 2018. He had a current Gliding Federation of Australia Medical Practitioner's Certificate of Fitness stating that he had a chronic condition that was *"under control and does not impact his ability to fly"*. His family reported that he was fit and well. Concerns were expressed by the course instructor and other Championship competitors that the pilot appeared *"frail", "physically and mentally tired"*. Some made comments relating to the pilot's age (78 years). The owner stated he reviewed the pilot's performance during the mountain soaring course and after all solo flights. He said had there been any concerns he would not have authorised the pilot to enter the Racing Class solo. The pilot was aware of the effects of ageing on pilot physical and cognitive performance and had written an article titled 'Ageing Pilots', for his local gliding club. The pilot's friend stated that the pilot had a good night's sleep the day prior to the accident. He had taken his prescribed medications, was in good spirits, and appeared fit to fly. The autopsy report determined that the pilot died of injuries sustained in the accident and not from any pre-existing medical condition.

Physical and cognitive demands

The pilot was an experienced instructor and competition pilot. He had, however, been exposed to an intense period of mental and physical exertion; the week's mountain soaring course followed by the Championship. This was in a new and challenging environment flying a glider different to his own. The instructor stated that the pilot *"wasn't used to putting in the effort required [for the environment] …. he could fly okay, but performance dropped at the end".* He passed the course, but the instructor cautioned the pilot about entering the Championship due to concerns about the prolonged (five-hour) effort required. ZK-GXG's flight track showed the expected pattern of thermalling and soaring to achieve the first two points of the racing task. However, below the Hunter Ridge the pilot made an error in judgement, flew too close to terrain and left no escape options, ultimately leading to the accident. The difficult soaring conditions likely subjected the pilot to prolonged physical and cognitive demands, possibly leading to fatigue. A level of fatigue could explain his decision to persevere with circling below the ridge. Several similar accidents have occurred involving younger/fitter pilots who were equally inexperienced in the South Island mountainous environment. Other Championship pilots reported they found the flying conditions challenging that day. Therefore, the pilot's age and fitness can only be considered a possible contributory factor in context of the environment he was in. All pilots are reminded to assess their fitness to fly both before the flight and as the flight progresses.

Flying in the Championship may have influenced the pilot's decision-making

It is possible that the pilot's decision-making prior to the accident was influenced by an unconscious bias to continue with the original plan despite changing conditions (plan continuation bias). He got into a hazardous situation by becoming fixated on the challenge of finding rising air in the difficult thermal conditions, rather than turning away earlier from the rising terrain. Alternative options were to land at the Dingleburn airstrip or conduct an outlanding on the valley floor (see Figures 2 and 6). Both were well within gliding range and annotated on the Oudie map. Several factors may have influenced his decision to continue to thermal in that location:

- His desire to complete the set task. An outlanding would mean he would not achieve the task that day. His family and gliding friends reported that flying in the South Island mountains was a long-held goal for the pilot. He did not have an expectation to place high in the Championship contest.
- His lack of familiarity with the area and outlanding sites.
- Possible concern about damaging the (rented) glider in an outlanding.
- The inconvenience to others of his retrieval so distant from Omararama.

Previous accidents have involved competition flying. The CAA Accident Report, ZK-GJO highlighted the adverse effect that competition flying can have on decision-making. *"In terms of human factors, with the attraction of a goal, mountain climbers have been cited as saying that withdrawing shortly before reaching the summit is exceedingly difficult. A strong motivation puts us inside a mental tunnel from which too often there is no exit".* Though not a conclusive contributory cause to this accident, the CAA reminds pilots again of the influence competition flying can have on decision-making, especially the risk of continuation bias.

Environmental factors

The soaring conditions were challenging that day

Many witnesses stated that the soaring conditions were not easy that day but comparable to previous days with clear blue sky and variable winds. The thermals were reported as *"choppy" "mashy"* and *"rough"* by some. Pilots experienced in the area stated they deliberately stayed high above the ridges as they expected it to be rough lower down, and lift would be hard to find. The pilots in the glider that descended below the ridge to the accident site found it *"rough"* and that they *"had to hunt around"* for thermals to climb back above the ridge. A briefing was provided by the Championship Meteorological Officer and the pilot was cited by family and flying colleagues as having a keen interest in meteorology. However, *"summer easterlies" were cited by many experienced local pilots to be "the most difficult [conditions]"* and local knowledge was vital. Whilst the general airflow may be south-easterly, the winds are often quite different below the ridges. The Hunter Ridge is known to be particularly difficult to find good lift. On the day of the accident several phenomena existed which could have created local rotors and turbulence below the ridge:

- a general south-easterly flow above and over the ridge line
- thermal (solar) heating on the westerly face of the mountain
- an afternoon sea breeze from the west coast
- a local south-westerly airflow
- funneling up the valley from Lake Hawea.

These conditions contributed to ZK-GXG drifting closer to the ridge, and to the difficulty the pilot had in gaining lift. The witnesses stated that the conditions were "flyable that day" but would have been "challenging" for a pilot with limited experience in the local environment.

The South Island mountainous area is regarded as one of the world's most challenging gliding environments

Without exception, every witness stated that the South Island mountainous area is regarded by the worldwide gliding community to be one of the most challenging gliding environments. Several pilots (including local instructors) with between 30-50 years of local gliding experience said they still learn something every flight. Some of the comments included:

- "It can be quite tiring -harsh, demanding, unrelenting."
- *"When flying low in these mountains you must be 100 percent and sometimes that's still not enough."*
- *"In 20 years of flying in New Zealand only now getting a handle on it. First 15 years I was still ironing out wrinkles. The conditions here are tricky."*
- *"Flying conditions are enormously different from Australia -almost all thermal flying is well away from terrain. The [NZ] mountain thermals are more broken and turbulent than our [Australia] flatland thermals."*

Previous gliding accidents in the South Island have involved visiting pilots who were considered experienced glider pilots but inexperienced in the New Zealand mountainous environment. Pilots must know and fly within their limits and apply a much larger margin when flying in the South Island mountains. Fly with a local pilot especially in competitions when there are additional pressures.

The Championship operated in accordance with Gliding New Zealand (GNZ) procedures and Civil Aviation Rules

GNZ has standard procedures for conducting the Championship. This Championship has been running for many years and the procedures are progressively updated. The safety investigation reviewed the following procedures, with no concerns raised:

- daily task briefings (meteorology, pilot wellbeing, safety, task route, rules)
- pilot mentorship
- flight tracking and following
- post-flight debriefing of the pilot (conducted by the operator)
- emergency response plan (The overdue aircraft and emergency response procedures were implemented within 28 minutes of the accident. This is within the 60 minutes required by the GNZ Advisory Circular AC 1-05 Emergency Plans).

Though competitors described the conditions as challenging, no-one stated that it wasn't suitable for the day's flying to go ahead. The Championship committee had cancelled the previous day's flying and have done so in previous championships. There was no pressure for the tasks to go ahead and several pilots elected to return, or not fly, based on their personal limits. Given the information at the time, the Championship committee and the organisation had no specific reason to enforce the pilot's withdrawal from the day's flying or the Championship. Ultimately it was the pilot's decision to participate in and continue to fly the racing task that day.

SAFETY ACTIONS ALREADY TAKEN

The accident has been discussed within GNZ, GFA and wider gliding community. The accident has served as a sobering reminder of the risks of flying below and close to a mountain ridge. The operator has stated that they will be extremely conservative about renting gliders to solo visiting pilots, no matter how much overall gliding experience they may have. GNZ has updated GNZ Advisory Circular 2-13 Mountain & Ridge Soaring Safety Principles. The GNZ Flight Training Program, "Task Flying" and "Alpine Flying" sections will also contain more detailed guidance and information for mountain soaring glider pilots.

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Dehydration

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Date	22-Nov-2017	Region	VSA	SOAR Report Nbr	S-1097
Level 1	Airspace	Level 2	Airspace Infringement	Level 3	Airspace Infringement
A/C Model 1	DG-200/17	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Thermalling	PIC Age	67

The pilot was thermalling near an airspace boundary while on a cross-country flight and drifted into Class C airspace. The pilot subsequently recognised the error and immediately vacated the area. The pilot self-reported the incident. Investigation revealed the pilot was carrying appropriate charts but was not using electronic navigation aids. The pilot's CFI noted causal factors as primarily pilot complacency while flying in good weather on a day of higher than normal convection. The pilot was counselled on the importance of constantly reviewing their location relative to airspace, especially when in close proximity to boundaries. The pilot also completed the UK CAA airspace infringement on-line training at: http://infringements.caa.co.uk/

Date	23-Nov-2017	Region	NSWGA	SOAR Report Nbr	S-1095
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Near collision
A/C Model 1	DG-400	A/C Model 2	Piper Seneca		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	72

The pilot was on the final leg of a 590km cross-country flight at 8,500ft in Class G airspace when they noticed a twin-engine aircraft climbing towards them from the right. The pilot took avoiding action by pulling up, and rolled about 30 degrees to the left to make the glider more visible. The other aircraft passed about 150 metres behind and below. The glider pilot was not monitoring the Area Frequency at the time but was on

one of the glider frequencies. When operating above 5,000 feet AMSL in Class G or E airspace, pilots are encouraged to monitor the area VHF frequency rather than a glider frequency. The use of the glider frequency as an aid to alerted see-and-avoid should only be necessary when multiple gliders are flying together. When flying alone, glider pilots should be monitoring the same frequencies as other airspace users.

Date	23-Nov-2017	Region	WAGA	SOAR Report Nbr	S-1104
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Near collision
A/C Model 1	SZD-48-1 "Jantar Standard 2"	A/C Model 2	Cirrus		
Injury	Nil	Damage	Nil	Phase	Thermalling	PIC Age	52

Two gliders got close while thermalling before the start in the WA State Championships. The Jantar was established in a thermal at a height of 5400ft and was positioned opposite another glider when its pilot observed the Cirrus approach the thermal from above. The Jantar pilot widened the turn to provide separation but soon lost sight of the Cirrus. The Cirrus pilot had not sighted the other gliders and believed they were thermalling alone. The next time the Jantar sited the Cirrus it was in front and about 100ft below. The Jantar pilot made a radio call to advise the Cirrus pilot that they were above and behind. The Cirrus pilot, believing the Jantar had just joined the thermal, acknowledged the call, and maintained altitude and thermal radius. The Cirrus pilot looked back and above but did not sight the Jantar. Shortly afterwards the Jantar pilot noticed the separation with the Cirrus reducing and made a radio call while manoeuvring away from potential conflict. The Cirrus pilot, on hearing the call, looked above and behind saw the Jantar pull away. The Cirrus pilot made a radio call advising they were leaving the thermal. A review of the flight traces after the flight showed that both gliders had been in the other's blind spot resulting in a 'double-blind' situation developing.

Date	24-Nov-2017	Region	GQ	SOAR Report Nbr	S-1100
Level 1	Technical	Level 2	Systems	Level 3	Other Systems Issues
A/C Model 1	Club Libelle 205	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	74

During launch and at a height of 1300 ft the tow rope unexpectedly departed the glider. The pilot did not activate the release. Upon landing a visual and physical investigation did not identify the reason for the un-commanded release. A test flight was conducted the following day and the relase again let go - refer SOAR report 1137.

Date	25-Nov-2017	Region	VSA	SOAR Report Nbr	S-1102
Level 1	Operational	Level 2	Aircraft Control	Level 3	Control issues
A/C Model 1	Twin Astir -LP	A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Launch	PIC Age	60

During a winch launch the glider's wing dropped and, unbeknown to the pilot, struck a PVC pipe situated outside the runway markers. The pilot was able to raise the wing and continue with the launch. The PVC pipe was the remains of a runway light fitting that had not been removed from its original position on the grass runway strip in use on the day. The fitting was about 200mm high and made from 90mm PVC pipe and was obscured by clumps of freshly mown grass. The wing drop occurred when the wing runner prematurely releasing the wing before aileron control was gained. The glider suffered superficial damage, which did not affect the airworthiness of the glider. The PVC pipe was removed.

Date	25-Nov-2017	Region	SAGA	SOAR Report Nbr	S-1103

Level 1	Operational	Level 2	Airframe	Level 3	Doors/Canopies		
A/C Model 1	LS 7-WL	A/C Model 2					
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	
Shortly after take-off the pilot noticed the canopy was not properly secured. The pilot immediately landed, and inspection revealed the rear locating pin had not fully engaged. The pilot properly secured the canopy and relaunched. The reason for the failure of the pin to engage was not determined.							

Date	25-Nov-2017	Region	VSA	SOAR Report Nbr	S-1120		
Level 1	Operational	Level 2	Airframe	Level 3	Landing gear/Indication		
A/C Model 1	Arcus M	A/C Model 2					
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	69
The pilot advised that, when retracting the undercarriage post launch, the lever became stuck halfway between the up and down positions. Both pilots were able to use mutual hand forces to lock the undercarriage down and an uneventful landing ensued. Post flight inspection revealed a bolt in the overcentre mechanism of the left undercarriage leg was missing. The aircraft owner noted that the undercarriage assembly had been disassembled, cleaned and lubricated the previous year and the locknuts had not been replaced as they were deemed fit for further use. It appears a locknut had vibrated loose over 46 take-offs and landings, enabling the bolt to fall out. The undercarriage was disassembled, cleaned, lubricated and reassembled using new locknuts and Loctite. FAA Advisory Circular AC43-13-1B suggest that locknuts may be reused if the prevailing torque is within specification. However locknuts are relatively cheap, so replacement of self-locking nuts in critical areas is good practice.							

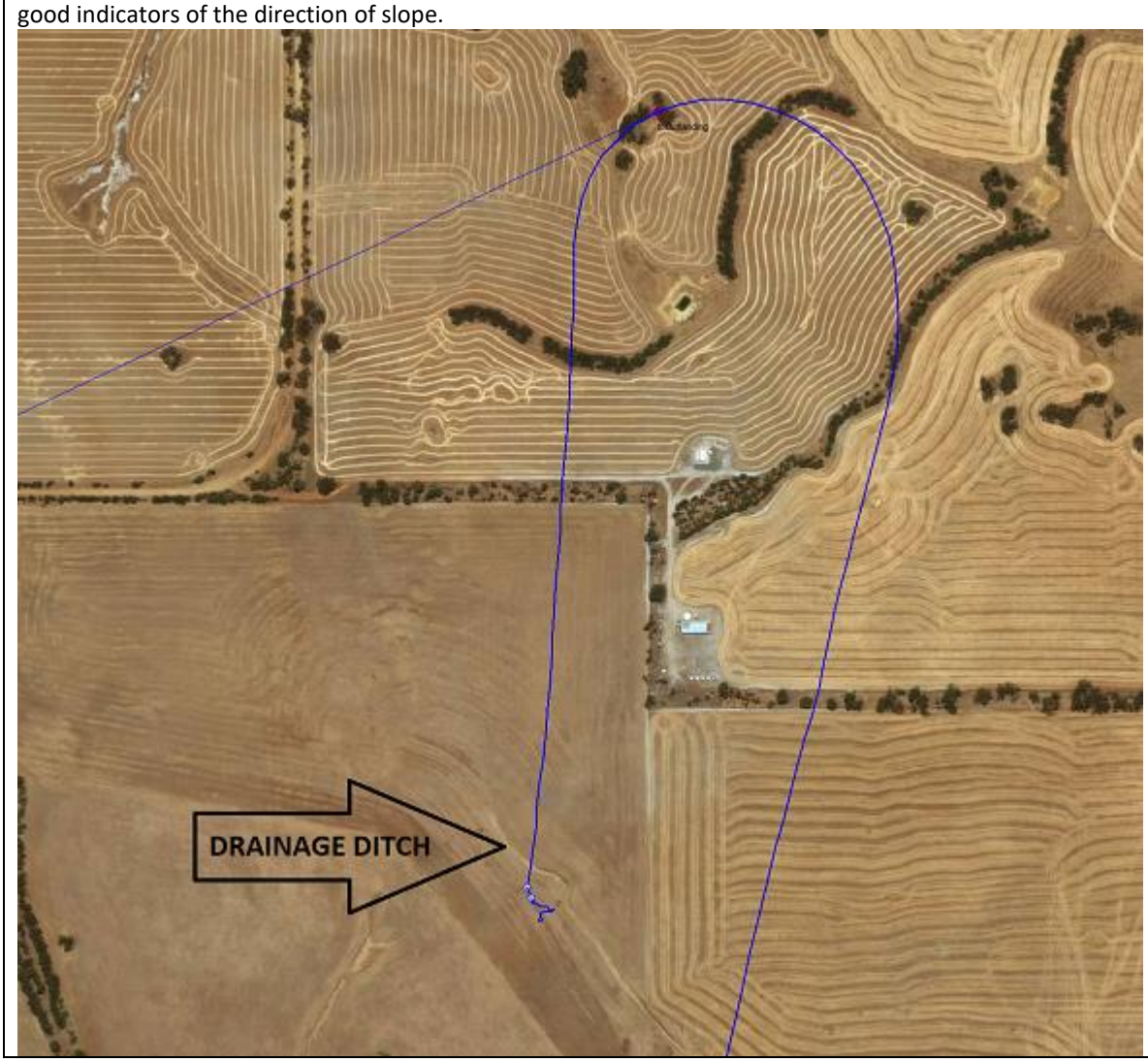
Date	25-Nov-2017	Region	GQ	SOAR Report Nbr	S-1137		
Level 1	Technical	Level 2	Systems	Level 3	Other Systems Issues		
A/C Model 1	Club Libelle 205	A/C Model 2					
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	70
The flight was to troubleshoot an uncommanded release the previous day (refer SOAR Report 1100). During take-off and at a height of approximately 150 ft, the glider flew through a vertical and the release activated. The pilot safely landed on the cross strip. Investigation revealed the release mechanism was not going into the 'over-centre' position as the cable was too short. As a consequence, the beak was not opening sufficiently wide to fully insert the ring. The length of the release cable was adjusted by connecting it to a lower position on the activating arm, thereby restoring the over-centre and beak mechanisms. The aircraft was test flown and has done a number of flights since with no further problems.							

Date	26-Nov-2017	Region	WAGA	SOAR Report Nbr	S-1101		
Level 1	Operational	Level 2	Aircraft Control	Level 3	Hard landing		
A/C Model 1	SZD-50-3 "Puchacz"	A/C Model 2					
Injury	Minor	Damage	Substantial	Phase	Landing	PIC Age	45
During final approach in blustery conditions, the glider stalled onto the ground from about 3 feet while travelling sideways resulting in the undercarriage strut breaking. It was reported that there was significant wind shear on short final.							

Date	27-Nov-2017	Region	WAGA	SOAR Report Nbr	S-1106
Level 1	Operational	Level 2	Terrain Collisions	Level 3	Controlled flight into terrain

A/C Model 1		Jantar Standard 2 (SZD48-1)		A/C Model 2			
Injury	Nil	Damage	Substantial	Phase	Outlanding	PIC Age	52

During a short cross-country flight an outlanding became inevitable and the pilot elected to land in an uncropped paddock. The pilot flew a circuit and inspected the paddock but did not recognise it sloped downhill from the landing direction. Also, grass cover obscured a substantial drainage ditch about halfway along the paddock in the landing direction. The glider touched down normally but the downhill slope made the landing roll longer than anticipated. The glider was still travelling fast when the pilot noticed a sand embankment along the drainage ditch when only about about 20 metres ahead. The main wheel struck the sand bank and immediately collapsed, and the glider slid to a halt on its fuselage. Subsequent inspection revealed the undercarriage to be substantially damaged. The pilot was debriefed by their CFI, who reinforced that slope is difficult to detect but that the position of dams, streams and drainage ditches are good indicators of the direction of slope.



Date	7-Dec-2017	Region	VSA	SOAR Report Nbr	S-1110
Level 1	Operational	Level 2	Runway Events	Level 3	Runway incursion
A/C Model 1	Piper PA-25-260		A/C Model 2		
Injury	Nil	Damage	Substantial	Phase	Landing	PIC Age	25

At around 12:00 midday, the tow plane was approaching the threshold of RWY 26 from the North East, in a steep low curve to align with runway. Gliders and several vehicles were involved in preparing for launch on the right-hand half of the runway opposite the RWY 26 threshold. As the tow plane flew toward a touchdown point, a vehicle was driven slowly across the runway and adjacent to the assembled gliders. The driver was in the process of returning to the hangers to retrieve a parachute to replace one they had inadvertently opened in the glider. As the perimeter road was unusable due to council earthworks, the driver elected to cross the runway. The driver was looking towards people on the right and gesturing to one of them, and so did not notice the tow plane landing to their left. Several people nearby identified the hazard and called to the driver to stop. Upon hearing the calls, the driver stopped short of the projected path of the tug but by then, the tug had touched down and was braking heavily. The tow pilot continued braking while diverting away from the vehicle, resulting in the tow plane tipping forward onto the propeller. Wheel marks on the runway show that the ground roll of the tug from touchdown to nose-over was about 60 metres. The tracks indicated heavy braking for most of this ground roll and curved slightly to the left consistent with the tug pilot steering away from the vehicle. The heavy braking track and the growing curvature of the track implies that the tug pilot saw the vehicle somewhere at or before touchdown. The tug stopped perhaps 10 or 20 metres short of, but clear from, the vehicle. Low engine revs, a composite propeller and drive belt resulted in limited shock loading on the transmission. One blade on the propeller was broken and the other blades suffered damaged by impact with the ground. The following potential causal factors were identified:

- the vehicle driver did not check that the airspace was clear before entering the runway;
- the tow pilot flew a non-standard low and curving approach under power to the landing point, which limited the opportunity to identify the developing hazard;
- the slow-moving vehicle may have appeared stationary in the pilot's field of view due to a lack of relative movement; and
- the tow pilot had limited time to react once the risk of collision was identified.

Date	8-Dec-2017	Region	VSA	SOAR Report Nbr	S-1144		
Level 1	Operational	Level 2	Crew and Cabin Safety	Level 3	Flight crew incapacitation		
A/C Model 1	LS 3-a	A/C Model 2					
Injury	Minor	Damage	Nil	Phase	In-Flight	PIC Age	

The pilot was flying their second long-distance cross-country flight, during which they became progressively unwell to the point that the pilot elected to outland rather than continue. Post flight investigation of the pilot's symptoms suggested that the pilot either suffered from airsickness due to a lack of currency and turbulent conditions, or more likely due to a contaminated hydration pack. Inadequate maintenance will allow mould and bacteria build up in the hydration system, in the tube, mouthpiece, or the bladder itself. If a pilot is not finishing their water and allowing it to sit for long periods of time before drinking it again, they also risk allowing bacteria to grow. Water bottles and bladders with mould and bacteria in them are breeding grounds for stomach ailments. Properly cleaning the water bottle will reduce the risks considerably. To help prevent bacteria from growing your hydration pack, the following cleaning regime is recommended:

- Use hot water and two tablespoons of baking soda or bleach. Mix the solution inside your bladder and hold it up above your head while you pinch the bite valve, allowing the mixture to run through the tube.
- Let the bladder and cleaning solution to sit for about 30 minutes.
- Wash the reservoir with hot water and mild soap. Be sure to completely rinse away any bleach or cleaning solution before using again. Brushes are the best way to ensure you are scrubbing all the areas of the bladder clean.

- Be sure to air dry the bladder so no moisture is trapped inside, which can cause mould to grow. Inserting a bent wire coat hanger into the bladder aids the drying process by keeping the surfaces apart.The pilot purchased a new water bladder and now takes a travel sickness tablet before long flights.

Date	8-Dec-2017	Region	SAGA	SOAR Report Nbr	S-1152
Level 1	Operational	Level 2	Aircraft Control	Level 3	Hard landing
A/C Model 1	Discus		A/C Model 2		
Injury	Nil	Damage	Nil	Phase	Landing	PIC Age	

On the day of this incident the wind was gusting to 12 knots and swinging from 50 to 130 degrees, and rain cells were visible from the airfield. Cloud base was 3,000ft and thermals were broken with some strong peaks. After a soaring flight of about one hour the pilot broke off the flight and headed to the airfield. The pilot joined circuit for RWY 05 and configured the aircraft for landing. Due to the wind conditions the pilot set the approach speed at 65 knots. The pilot reported *"In the flare when I was 2 to 4 feet above the runway … I felt some lift immediately before the aircraft dropped like a stone onto the bitumen in the hardest landing I have experienced in over 30 years of flying both gliders and powered aircraft."* The pilot returned the glider to the hangar, where it was inspected and found to be undamaged. Another pilot who landed shortly afterwards had a similar experience. It is likely the aircraft flew through turbulence, possibly created by trucks driving on the freeway that runs next to the runway boundary.

Date	9-Dec-2017	Region	GQ	SOAR Report Nbr	S-1111
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Aircraft Separation Issues
A/C Model 1	Piper PA-28R-180		A/C Model 2		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	

A powered aircraft was observed flying at low-level through the circuit of this Regional aerodrome in the opposite direction and in contravention of requirements promulgated in the ERSA. At the time of the incident gliders were in circuit.

Date	9-Dec-2017	Region	NSWGA	SOAR Report Nbr	S-1112
Level 1	Operational	Level 2	Miscellaneous	Level 3	Rope/Rings Airframe Strike
A/C Model 1	SZD-9 bis 1E Bocian		A/C Model 2		
Injury	Nil	Damage	Minor	Phase	Launch	PIC Age	65

A cable break occurred during a winch launch at approx. 800' AGL. The cable rebounded and struck the upper surface of the starboard tailplane, punching two small holes in the ply-wood surface. The rope broke about 2 metres from the trace when the glider was in full climb attitude at about 55kts with no layoff. At this point there would be a significant load on the rope. Immediately after the rope broke, and before the cable was released from the tow hook, the trace pivoted about the release under the influence of the airstream and possibly the elastic reaction of the rope break. When the release was activated the trace fell away but the weak link unit had sufficient upward rotation to rise just above the tail plane and was collected by the leading edge causing the weak link assembly to pivot down and impact the upper surface. The club uses 9mm Supa-Dan polypropylene rope fitted with a 5m trace (no drogue chute). The trace set up is in general conformance with the GFA Winch Launching Manual, although there was some elasticity in the system. The club has been using this trace configuration for several years and has not suffered a glider strike by a weak link unit after a cable break before this incident. Following their investigation of this incident,

the club has decided to replace all rope traces with an inelastic material (steel or dyneema) encased in a stiffer tube. Consideration will also be given to changing the length of the trace to keep the weak link unit clear of the tailplane in similar circumstances.

Date	9-Dec-2017	Region	SAGA	SOAR Report Nbr	S-1115
Level 1	Operational	Level 2	Fuel Related	Level 3	Exhaustion
A/C Model 1	Piper PA 25-235	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	50

During an aerotow launch the tow plane ran out of fuel. The pilot conducted a safe 'dead-stick' landing on the airfield. The tow pilot was rostered to fly the afternoon shift and arrived at the aerodrome just before midday. The tow plane was at the launch point and the tail wheel was being inflated. The tow pilot conducted a brief take-over from the other tow plot but did not check the fuel level, as they believed it had only conducted two tows since refuelling. During the course of the day the pilot was monitoring the fuel level by reference to the Maintenance Release and flight log. After flying a further 8 launches, the tow pilot calculated there was enough fuel for three more launches but decided to fly one more launch and refuel. However, after returning from the planned last launch the tow pilot was asked to launch another glider on a training flight. After further calculation by reference to the flight log, the pilot believed there was enough fuel and flew three more launches. It was during the last of these launches that the tow plane ran out of fuel. Poor fuel management in aerotow operations is a problem which every pilot can help eliminate by maintaining high personal standards of safety in their planning. Tow pilots must be familiar with, and follow, the procedures recommended in the Pilot's Operating Handbook. Accurate fuel management starts with knowing exactly how much fuel is being carried at the commencement of a flight. This is easy to know if the aircraft tanks are full or filled to tabs. If the tanks are not filled to a known setting, then a different approach is needed to determine an accurate quantity of usable fuel. Accurate fuel management also relies on a method of knowing how much fuel is being consumed. Many variables can influence the fuel flow, such as changed power settings or the use of non-standard fuel leaning techniques. If they are not considered and appropriately managed, then the pilot's awareness of the remaining usable fuel may be diminished. Keeping fuel supplied to the engines during flight relies on the pilot's knowledge of the aircraft's fuel supply system and being familiar and proficient in its use. Adhering to procedures, maintaining a record of the fuel selections during flight, and ensuring the appropriate tank selections are made will lessen the likelihood of fuel starvation at what may be a critical stage of the flight. The chance of fuel exhaustion can be reduced by:

- using more than one source of information to obtain consistent results about the fuel on board before flight;
- the use of a consistent procedure that is regularly checked to know the exact rate of fuel consumption; and
- ensuring the pilot is fully familiar with the operation of the fuel system for both normal and abnormal operations.For further information, see ATSB publication "Avoidable Accidents No. 5 - Starved and exhausted: Fuel management aviation accidents": https://www.atsb.gov.au/media/4115276/ar-2011-112_no5.pdf.

Date	9-Dec-2017	Region	VSA	SOAR Report Nbr	S-1116
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Aircraft Separation Issues
A/C Model 1	SZD-50-3 "Puchacz"	A/C Model 2	PIK-20B		
Injury	Nil	Damage	Nil	Phase	Thermalling	PIC Age	78

Two gliders were observed from the ground thermalling together in opposite directions. The pilot of the PIK reported that while thermalling above the aerodrome at an altitude of 3,200 feet the Flarm sounded loudly

and alerted to a potential threat below and to the right. The pilot altered heading away from the threat until the alarm ceased and then sighted the Puchacz about five to six hundred feet below and displaced laterally by a few hundred metres. The pilot of the Puchacz had been thermalling in the opposite direction nearby and had gradually moved closer to the PIK, thereby triggering an alarm.

Date	9-Dec-2017	Region	NSWGA	SOAR Report Nbr	S-1129
Level 1	Operational	Level 2	Ground Operations	Level 3	Taxiing collision/near collision
A/C Model 1	TST-10M	A/C Model 2			
Injury	Nil	Damage	Substantial	Phase	Ground Ops	PIC Age	75

The pilot had earlier rigged and inspected the glider, and then attended the morning briefing. The glider was being towed to the launch point along the southern boundary of the airfield, so the driver made a taxying call on the CTAF. The driver then observed the tow plane positioning for a launch and decided to move further away from the runway. The driver, believing they were clear of the fuel dump fence, commenced a turn to the left, whereupon the left wingtip struck the fence. The driver stopped and exited the vehicle to assess the situation. The glider's wingtip had struck the fence at a shallow angle, resulting in damage to both the steel fence and the glider. The damage to the glider was severe, with the fuselage broken behind the engine-bay. The driver, who is a very experienced pilot, stated *"I was trying to be very slow, careful, and deliberate all morning, but may have been hurrying a bit to get out of the way of the operation at the very moment I needed to stop and look at the situation from out of the car."*

Date	9-Dec-2017	Region	SAGA	SOAR Report Nbr	S-1155

Level 1	Operational	Level 2	Fire Fumes and Smoke	Level 3	Fire		
A/C Model 1				A/C Model 2			
Injury	Nil	Damage	Substantial	Phase	Ground Ops	PIC Age	

During the mid-afternoon a wind change necessitated a change of runway and the winch was towed to the new runway by the retrieve vehicle. The retrieve vehicle was then parked ready to hook the cables to their retaining block when smoke was observed coming from under the bonnet. A small grass fire was noticed under the vehicle. In the absence of firefighting equipment at the launch site, club members retrieved fire extinguishers from the clubhouse and successfully extinguished the fire. Following this incident, the club reviewed their firefighting capability. Multiple new fire extinguishers were purchased and installed at multiple locations around the hangars, clubhouse and airfield. The Club's Safety Management System was updated to include steps required to maintain the extinguishers, and smoke detectors were fitted to the sleeping quarters. A club member, who is also a member of the Country Fire Service organised training for club members on extinguisher use.

Date	10-Dec-2017	Region	NSWGA	SOAR Report Nbr	S-1113		
Level 1	Operational	Level 2	Terrain Collisions	Level 3	Collision with terrain		
A/C Model 1	DG-1000S			A/C Model 2	N/A		
Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	71

During landing the glider drifted towards the runway boundary and the starboard wing contacted a cone marker. The student pilot was conducting a landing under instruction on the far right-hand side of the gliding strip as the left-hand side was occupied by a previously landed glider. The aircraft student pilot did not sufficiently correct for drift, and the aircraft flew towards the runway boundary resulting in the right wingtip extending over the alignment of the adjacent cone and gable markers. The instructor immediately took over but in affecting recovery the underside of the right wingtip grazed the top of a yellow cone marker which overturned but was not damaged. Subsequent inspection of the glider revealed a faint cord-wise yellow graze under the right wingtip, but the aircraft was otherwise undamaged. The most common instructing accident is 'instructor failed to take-over in time'. These accidents usually involve the trainee responding in an unforeseen way or failing to respond at all. Given that the overall idea is to let the trainee do as much as possible within their level of skill the instructor should never wait until the last moment - which can rapidly become 'too late' - before responding to a situation that is going awry. This is particularly true of any manoeuvres close to the ground.

Date	10-Dec-2017	Region	WAGA	SOAR Report Nbr	S-1114		
Level 1	Operational	Level 2	Aircraft Control	Level 3	Wheels up landing		
A/C Model 1	Astir CS			A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Outlanding	PIC Age	57

The pilot conducted a straight-in approach to outland in a paddock and the aircraft landed with the undercarriage retracted. As the weather forecast for the day was good, with 15 knots wind and thermals predicted to 9000ft, the pilot planned to fly a 310km closed triangle. The first two legs were completed in good time, with the pilot concisely finding thermals to 8000ft. As the pilot rounded the second turnpoint for the leg home, they noticed the cloud was beginning to over develop and lift was difficult to find. About 20 kms from the turnpoint the pilot was at 3,000ft and spent a long time working weak lift. The pilot eventually climbed the glider back to 8,000ft and set course for the 60kms trip home. At this point the navigation computer was showing 6the glider to be 1,000ft below glide, so the pilot tracked away from the over-development in search of better air. Some weak lift was found that improved the glide margin, but the glider was still below the glide slope with 16kms to run. The pilot made an inbound radio call and advised that an outlanding was likely. The pilot stated that *"there were numerous suitable paddocks in front so I continued. I sighted a large flat clear paddock at 10 o'clock to my track that was ideal for landing and aero or trailer*

retrieve." When down to 800 ft AGL the pilot realised they would not make the airfield and turned left onto base leg for the earlier identified paddock. After turning final the pilot conducted a minimum energy landing with the tailwheel touching first. The pilot stated that *"the nose came down and kept going down! The fuselage touched the ground around the undercarriage doors without much downward force. Deceleration was rapid and straight. Wings remained clear of ground. I realised immediately I had not put the wheel down."* The pilot noted that this was their longest cross-country flight and that *"stress levels had been high trying to get back…in worsening lift conditions."* Fatigue was also a contributory factor. As a consequence of fatigue and stress, and because the they did not fly a proper circuit, the pilot did not complete their pre-landing checks that would have alerted them to the undercarriage being up. Fortunately, the aircraft only suffered minor damage to the undercarriage doors and a scuffed fuselage.

Date	10-Dec-2017	Region	NSWGA	SOAR Report Nbr	S-1121
Level 1	Airspace	Level 2	Airspace Infringement	Level 3	Airspace Infringement
A/C Model 1	Duo Discus	A/C Model 2			
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	59
During de-briefing with the Duty Instructor at the end of the day's flying, the second pilot mentioned that they had flown to a regional town some 60kms east of the aerodrome. When questioned as to whether the aircraft had kept clear of the restricted airspace in that area airspace, the pilots advised they were unaware of any airspace restrictions. A subsequent check of the flight log revealed the glider penetrated six kilometres into the restricted airspace for 11 minutes. The pilots were counselled. Violations of controlled airspace can be avoided by remaining situationally aware, ensuring you have current airspace charts, and by thoroughly familiarising yourself with local airspace and other aeronautical issues.					

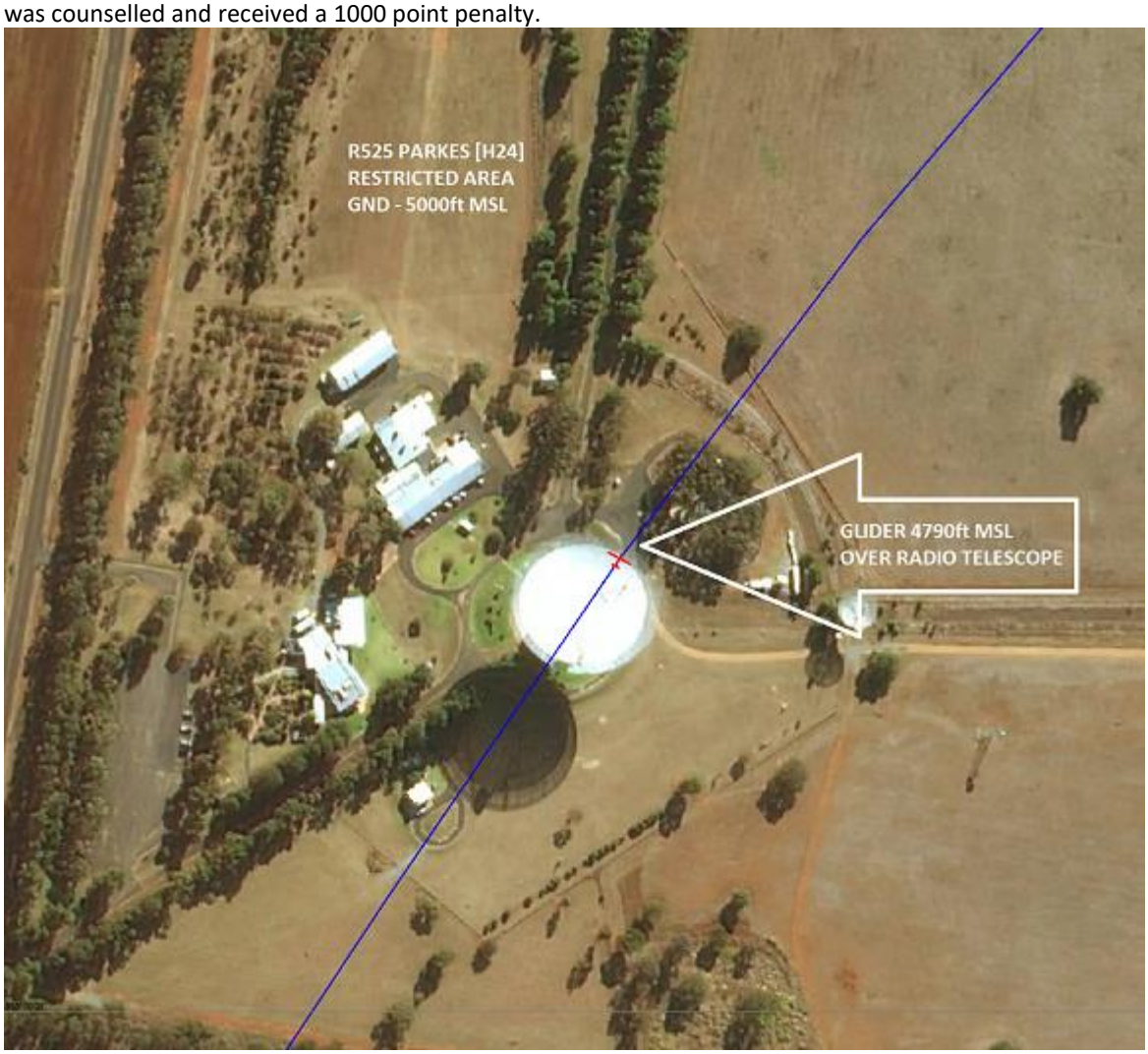
Date	12-Dec-2017	Region	NSWGA	SOAR Report Nbr	S-1117
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Near collision
A/C Model 1	LS 3	A/C Model 2	Unidentified Twin		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	50
The pilot was competing in the NSW State Gliding Championships. During the cruise the glider pilot took avoiding action when an unidentified Twin-engine aircraft crossed the glider's track. Seperation was less than 200 metres. The glider pilot was monitoring the glider Safety Frequency as authorised by NOTAM issued by Airservices Australia.					

Date	12-Dec-2017	Region	NSWGA	SOAR Report Nbr	S-1118
Level 1	Operational	Level 2	Miscellaneous	Level 3	Rope break/Weak link failure
A/C Model 1	Piper PA-25-235	A/C Model 2	N/A		
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	71
The aerotow rope broke at a splice just as the tow pilot applied take-off power. Inspection revealed the rope comprised two sections spliced in the middle. The rope broke between the middle joining splice and the glider ring splice in a section of otherwise unremarkable rope. While the rope had seen significant use, it had been inspected before operations commenced that morning and no signs of the impending failure were visible. The rope was replaced.					

Date	12-Dec-2017	Region	VSA	SOAR Report Nbr	S-1119
Level 1	Airspace	Level 2	Airspace Infringement	Level 3	Airspace Infringement
A/C Model 1	Discus-2b	A/C Model 2			

Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	74

While competing in the NSW State Gliding Championships, the pilot infringed restricted airspace. The pilot was counselled and received a 1000 point penalty.



Date	14-Dec-2017	Region	GQ	SOAR Report Nbr	S-1177
Level 1	Operational	Level 2	Miscellaneous	Level 3	Other Miscellaneous
A/C Model 1	ASK-21Mi		A/C Model 2	N/A	

Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	60

The glider suffered a main wheel tyre puncture while landing on the main bitumen runway. Investigation revealed the inflation stem had sheared from the inner tube. The reason for this damage was undetermined but thought to be caused by debris on the runway.

Date	14-Dec-2017	Region	GQ	SOAR Report Nbr	S-1128
Level 1	Airspace	Level 2	Aircraft Separation	Level 3	Near collision
A/C Model 1	LS 8-18		A/C Model 2	Zodiac Ch 601 Hds	

Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	29

The pilot of a Zodiac was conducting circuits onto the operational runway and observed three to four gliders operating from the airfield. On the Zodiac pilot's third circuit, and while transiting from crosswind to the downwind leg at a height of about 1200ft, a glider was observed thermalling in the circuit area at the same height. The Zodiac pilot made a broadcast of the CTAF advising they were entering downwind, while maintaining a visual on the glider. Just as the Zodiac pilot was about to conduct the pre-landing check list, the glider pilot turned out of the thermal and proceeded to cross in front of the powered aircraft at a similar height and passed within 100 metres. The Zodiac pilot did not need to take avoiding action and, upon landing, spoke with the gliding operation Duty Instructor and the glider pilot concerned. The glider pilot, who is very experienced, said they heard the Zodiac pilot's radio call but did not see the aircraft at any stage. It was also noted that the glider pilot was a visitor to the airfield and had not flown there in many months. The glider pilot stated: *"I did not see him at all. I am quite disappointed with myself with this incident as I feel like I was keeping a very good lookout. I have spent the last day trying to understand how I missed it and it has been a big wake up call."* The gliding CFI noted that the glider pilot, who was conducting the post-maintenance evaluation flight of a newly imported glider, may also have been distracted while using new and unfamiliar instrumentation. This near miss highlights the dangers of gliders operating in the vicinity of the live side of the circuit.

Date	15-Dec-2017	Region	VSA	SOAR Report Nbr		S-1125	
Level 1	Operational	Level 2	Aircraft Control	Level 3		Wheels up landing	
A/C Model 1		Nimbus3dt		A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	78
The glider landed on runway 26 with the undercarriage retracted, suffering minor damage. The command pilot had returned to the airfield from a 400km cross-country coaching flight. Conditions during the flight were challenging, but there were good climbs to around 7,000ft and the pilots average 110kph around the task. Upon joining circuit, the pilots omitted to complete a pre-landing check and did not lower the undercarriage. The aircraft touched down on the grass runway and suffered minor abrasions to the lower fuselage. It is not uncommon for pilots returning from a cross-country flight to become focussed on the final glide and omit to configure the aircraft for landing prior to joining circuit, and then fail to complete the pre-landing checks. Stress and fatigue are often contributory factors. When nearing the aerodrome, pilots need to transition from a 'soaring pilot' to a 'landing pilot' and configure the aircraft for landing. This includes dumping any water ballast, lowering the undercarriage and setting the flaps. If these actions are completed early, the likelihood of a mishap due to a failure to complete the pre-landing check list is reduced. For further guidance, refer to Operational Safety Bulletin (OSB) 01/14 – 'Circuit and Landing Advice'.							

Date	15-Dec-2017	Region	SAGA	SOAR Report Nbr		S-1153	
Level 1	Operational	Level 2	Miscellaneous	Level 3		Other Miscellaneous	
A/C Model 1		Discus		A/C Model 2			
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	79
A pilot exercising Level 1 Independent Operator privileges omitted to inform their CFI prior to flight (MOSP2, Section 13.1.1 refers).							

Date	16-Dec-2017	Region	GQ	SOAR Report Nbr		S-1122	
Level 1	Operational	Level 2	Aircraft Control	Level 3		Hard landing	
A/C Model 1		ASW 20F		A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	56
On completion of a 3-hour flight, the glider was positioned for a left circuit for the operational runway. The weather conditions gave a quartering tailwind, and this was expected to produce some turbulence on final,							

so the pilot chose a to land with a higher speed than normal for the flap setting being used. The final approach, flare and round out was normal and no turbulence was detected. While the pilot was holding off about a metre above the ground, the starboard wing rapidly lifted, and the glider rolled left. The pilot used full aileron deflection to level the wings and the glider ballooned. Despite rapidly closing the airbrakes, the pilot was unable to prevent the glider touching down heavily. The undercarriage partially collapsed. Investigation revealed the glider was struck by a gust. The pilot's CFI noted that the *"… contour of the buildings and other obstructions tend to exacerbate the effects noted on this day with that wind direction."*

Date	17-Dec-2017	Region	NSWGA	SOAR Report Nbr		S-1178	
Level 1	Airspace	Level 2	Aircraft Separation	Level 3		Aircraft Separation Issues	
A/C Model 1	Piper PA-25-235			A/C Model 2	Piper Warrior		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	

The glider towing combination was positioned on the glider runway to the left of the main runway. The glider pilot was conducting a solo flight. As the tow plane moved forward to take-up the slack in the tow rope, a Piper Warrior on a training flight was conducting a glide approach for a touch-and-go onto the main runway. The tow pilot was unaware of the position of the Piper Warrior, and the forward signaller had not sighted it on approach. Once the slack had been taken-up the forward signaller signalled "all out" to the tow pilot, who opened the throttle to commence the launch. The forward signaller sighted the Piper Warrior on short final just before the tow plane went passed and signalled the tow pilot to stop. Although the tow pilot saw the 'stop' signal, they elected to continue the launch due to the speed of the combination and his belief that he had identified the reason for the stop signal. The glider pilot reported not seeing the stop signal. The CFIs from the Gliding and powered operations reviewed the incident and concluded:

- Aircraft on powered glide approaches can be difficult to spot due to the low altitude profile and non-standard pattern. These aspects make it more difficult to visually identify traffic leading to a scheduled gliding combination departure;
- Radio transmission density was high, and it is possible that the ground crew and pilots missed the Piper Warrior pilot's radio call.
- The decision of the tow pilot to continue the take-off was reasonable. It was assessed that the risk of the combination infringing the main runway during take-off was low when compared to the risk of the glider running into the back of the tow plane.The CFI of the powered operation noted: *"It is not for us to utilise the safety management system to second guess (the tow pilot's) decision as the Pilot in Command using hindsight rather than supporting his command decision that resulted in a safer outcome based on his personal risk assessment for which he had seconds to make."*

Date	17-Dec-2017	Region	VSA	SOAR Report Nbr		S-1133	
Level 1	Operational	Level 2	Runway Events	Level 3		Other Runway Events	
A/C Model 1	LS 7-WL			A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Outlanding	PIC Age	77

The experienced pilot released from launch in a thermal and at the top of the climb headed off towards some cumulus clouds for another climb. Before reaching the clouds, the pilot turned back towards the airfield while the glider still had final glide. The pilot flew through sinking air and diverted to nearby hills in the search for lift while staying in reach of suitable landing areas. The pilot stated they *"tried to determine wind direction from dams and dust without success."* The glider encountered lift just prior to the turn onto final approach and the pilot made several thermalling turns before encountering sink. The pilot resumed the approach to the selected paddock, but a steep approach was necessary as the glider had drifted too close to the approach boundary. The pilot tried to maintain the aiming point by use of full airbrake and elevator but was unable to prevent the speed form building-up. The aircraft touched-down at speed well into the

paddock. In order to avoid running onto the end fence, the pilot lowered the left wing to the ground and imitated a ground loop. The glider came to rest 25 metres from the fence. After exiting the glider, the pilot *"noticed that the wind direction had changed and was then a tailwind, although only a few knots."*

Date	18-Dec-2017	Region	NSWGA	SOAR Report Nbr	S-1123
Level 1	Operational	Level 2	Airframe	Level 3	Fuselage/Wings/Empennage
A/C Model 1	Piper PA-25-235	A/C Model 2	N/A		
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	19

While lining up for glider tow, the tow noticed in the mirror that the rear elevator inspection hatch was partially detached from the aircraft. The tow pilot parked the tow plane and secured the hatch. The pilot advised that the hatch was removed to inspect the control cables and surfaces for the aircraft at the start of the day as per the daily inspection requirements of CAR Schedules 5 and 8. The pilot screwed all the screws back in to what was believed to be a reasonable torque, but the front two screws worked loose during the day and parted company with the aircraft. The pilot replaced the missing screws and then tightened them more securely.

Date	18-Dec-2017	Region	NSWGA	SOAR Report Nbr	S-1124
Level 1	Operational	Level 2	Communications	Level 3	Other Communications Issues
A/C Model 1	DG-1000S	A/C Model 2	N/A		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	

Following take-off on a training flight, and at approximately 2000 feet AGL, the flight instructor noticed the radio had been quiet for some time. On manipulation of the volume knob the instructor noticed it had been turned down. The volume was readjusted and transmissions were heard. Investigation identified that the student pilot turned the radio volume down so that the instructor could hear them conduct the pre take-off checklist. This incident occurred at a busy regional airport that has regular public transport and powered flight training operations, where radio alerted see-and-avoid is essential. Prior to flight, pilots must always ensure the radio is on the correct frequency, that volume and squelch are correctly set, and that the microphone is positioned for best performance.

Date	18-Dec-2017	Region	NSWGA	SOAR Report Nbr	S-1127
Level 1	Operational	Level 2	Airframe	Level 3	Fuselage/Wings/Empennage
A/C Model 1	DG-1000S	A/C Model 2	N/A		
Injury	Nil	Damage	Nil	Phase	In-Flight	PIC Age	76

During the pre-flight inspection, the student pilot noticed excessive play in the tailplane mounting (the play at the tailplane tip was measured to be 10mm). The Flight Instructor confirmed this and grounded the aircraft. Investigation identified that the Inspector who conducted the daily inspection earlier that morning had detected a small amount of play in the tailplane but considered it to be within limits. Upon removal of the tailplane, it was noted that the right-hand locating pin was loose and could be partially rotated with fingers. The nuts on both locating pins were tightened and the aircraft was returned to service. The cause of the nut becoming loose was not determined but may have occured due to flight loading or an error in maintenance. It is important that aircraft are not flown with excessive play in the horizontal stabilser, as this can lead to flutter and possible structural failure.

Date	18-Dec-2017	Region	NSWGA	SOAR Report Nbr	S-1163
Level 1	Technical	Level 2	Powerplant/Propulsion	Level 3	Transmission & Gearboxes
A/C Model 1	Grob G 103c Twin III SL	A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Launch	PIC Age	70

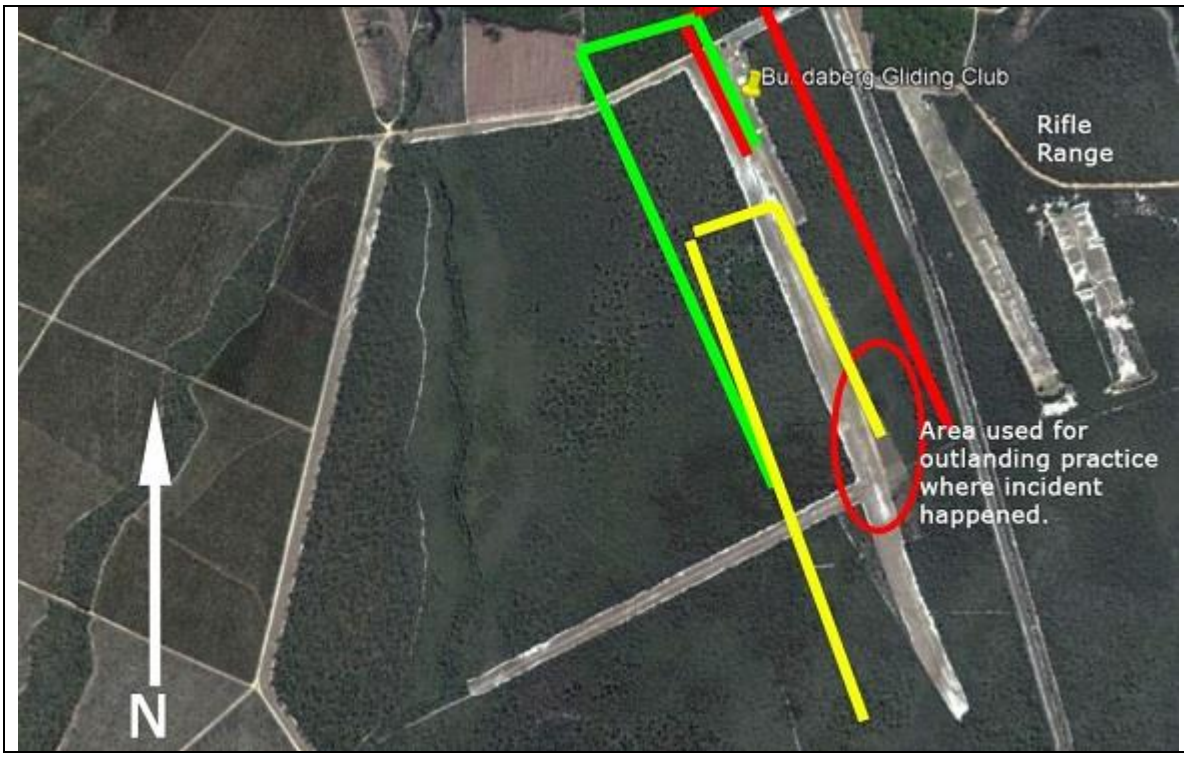
Shortly after take-off and at a height of about 300 ft AGL, the pilot of the self-launching glider noticed a change in the engine note accompanied by other noises. Suspecting an engine malfunction, the pilot switched off the engine and safely conducted an off-field landing. Inspection revealed the engine drive belt had failed due to it being of a substandard quality. A replacement belt sourced from the manufacturer was fitted.

Date	19-Dec-2017	Region	SAGA	SOAR Report Nbr	S-1175
Level 1	Operational	Level 2	Aircraft Control	Level 3	Incorrect configuration
A/C Model 1	ASK-21Mi	A/C Model 2	N/A		
Injury	Nil	Damage	Nil	Phase	Launch	PIC Age	55

The aircraft had been involved in a winch launch failure during the initial ground roll. The student released the cable and applied the wheel brake, and the aircraft came to a stop about 10 metres down the runway. The ground crew elected to relaunch the aircraft from its new position. The student conducted the pre-flight checks and pre-launch challenge (CARD) as required and the aircraft was relaunched. During the initial ground run the instructor noticed the airbrake handle start to move back and moved it forward into the locked position. The airbrake remained locked for the rest of the launch and the flight proceeded without further issue. During the post-flight debriefing, the student advised they had locked the brakes correctly and also checked again on the pre-launch challenge. The instructor noted that the airbrake over-centre is quite strong, and the student may not have realised that the airbrakes were closed but not locked. When operated on the ground after the flight, the airbrakes did not exhibit any abnormal behaviour and no further issues were noted on subsequent flights. It is possible fatigue and heat issues may have contributed to the incident. The Club's instructors will ensure students are well briefed on the force required to lock airbrakes.

Date	23-Dec-2017	Region	GQ	SOAR Report Nbr	S-1130
Level 1	Operational	Level 2	Runway Events	Level 3	Runway excursion
A/C Model 1	Grob G103A Twin II Acro	A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	76

The sortie was a training flight involving a simulated outlanding on a section of the home airfield. The 'runway' was road between high grass that forms part of the perimeter track. During the ground roll, the main wheel caught in a rut and the glider ran off the starboard side of the 'runway'. The starboard wing caught in long grass, and the glider was turned through 90 degrees to the right. During the excursion the glider slid sideways for a period resulting in debris lodging between the tyre and hub of both the main and tail wheels. The main wheel inner tube was punctured, and the tyre later went flat. At this airfield the winds are predominantly from the east, so the club generally flies right-hand circuits. One of the Club's instructors likes to use a section at the far end of the runway for outlanding practice as it is not too familiar to the student. Upon review of this incident, the Club's Training Panel have decided not to conduct outlanding practice in this area in future but will use the cross strip, which is not often used.



Date	23-Dec-2017	Region	VSA	SOAR Report Nbr	S-1136
Level 1	Operational	Level 2	Ground Operations	Level 3	Other Ground Ops Issues
A/C Model 1	Astir CS	A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Ground Ops	PIC Age	

Whilst de-rigging the glider, an inexperienced person was stationed on the right wingtip and was asked to hold it while the left wing was removed. It was assumed the person was familiar with the process, so they were not given a briefing on what to do. When the left wing was removed, the person on the right wingtip was unprepared for the sudden weight shift and dropped the wing. The spa stub, which was still in the fuselage, angled upwards and damaged the wing carry-through structure. This incident serves as a reminder that complacency, making incorrect assumptions and not communicating effectively can easily lead to damage to equipment.

Date	27-Dec-2017	Region	VSA	SOAR Report Nbr	S-1131
Level 1	Operational	Level 2	Airframe	Level 3	Landing gear/Indication
A/C Model 1	LS 4-a	A/C Model 2			
Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	44

After a normal circuit and landing on the grass runway, the undercarriage collapsed during the ground roll. The bottom of the fuselage suffered compression cracks and full thickness penetration of the composite structure by small stones, and the undercarriage doors were badly damaged. Witnesses reported the glider was seen on a stabilised approach with the undercarriage lowered but came to rest quickly after touching down. Investigation revealed the undercarriage struts had failed, resulting in the undercarriage retracting back into the fuselage. The fuselage damage was repaired, new struts were fitted, and the aircraft was returned to service.

Date	27-Dec-2017	Region	VSA	SOAR Report Nbr	S-1139		
Level 1	Operational	Level 2	Airframe	Level 3	Landing gear/Indication		
A/C Model 1	LS 3-a	A/C Model 2					
Injury	Nil	Damage	Minor	Phase	Landing	PIC Age	17

The pilot had ballasted the glider to its maximum take-off weight with the intentions of completing a long cross-country flight. The aircraft was winch launched with only a light headwind, which coupled with the high wing loading resulted in a launch to only 1200ft AGL. After encountering sink and nil lift, the pilot elected to join circuit and land. At the time of touchdown, the glider was still fully loaded with water ballast. The pilot landed at a higher speed than usual to compensate for the added weight. Shortly after touching down the pilot noticed the glider decelerate more quickly than usual. Subsequent inspection revealed the tyre was flat. It is believed the tyre probably moved on the rim during braking as a consequence of the heavy loading, resulting in the inner tube tearing near the valve.

Level 1	Level 2	Level 3	Definition
Airspace	Aircraft Separation	Collision	An aircraft collides with another aircraft either airborne or on the runway strip, or a vehicle or person on the runway strip.
Airspace	Aircraft Separation	Issues	Airspace - Aircraft separation occurrences not specifically covered elsewhere.
Airspace	Aircraft Separation	Near collision	An aircraft comes into such close proximity with another aircraft either airborne or on the runway strip, or a vehicle or person on the runway strip, where immediate evasive action was required or should have been taken. (a) En-route (b) Thermalling (c) Circuit
Airspace	Airspace Infringement	Airspace Infringement	Where there is an unauthorised entry of an aircraft into airspace for which a clearance is required.
Airspace	Other	Other Airspace Events	Airspace occurrences not specifically covered elsewhere.
Consequential Events	Ditching	Ditching	When an aircraft is forced to land on water.
Consequential Events	Diversion / Return	Diversion / Return	When an aircraft does not continue to its intended destination, but either returns to the departure aerodrome or lands at an alternative aerodrome.
Consequential Events	Emergency / Precautionary descent	Emergency / Precautionary descent	**Emergency descent** - Circumstances that require the flight crew to initiate an immediate high rate descent to ensure the continued safety of the aircraft and its occupants.
Consequential Events	Emergency evacuation	Emergency evacuation	When crew and/or passengers vacate an aircraft in situations other than normal and usually under the direction of the operational crew.
Consequential Events	Forced / Precautionary landing	Forced / Precautionary landing	**Forced landing** – Circumstances under which an aircraft can no longer sustain normal flight and must land regardless of the terrain. **Precautionary landing** - A landing made as a precaution when, in the judgement of flight crew, a hazard exists with continued flight.
Consequential Events	Low Circuit	Low Circuit	Any occasion where a pilot flies a Low Circuit that was potentially hazardous.
Consequential Events	Other	Other Consequential Events	Consequential events not specifically covered elsewhere.
Environment	Weather	Icing	Any icing issue that affects the performance of an aircraft.
Environment	Weather	Lightning strike	The aircraft is struck by lightning.
Environment	Weather	Other Weather Events	Weather occurrences not specifically covered elsewhere.
Environment	Weather	Turbulence/Windshear/Microburst	Aircraft performance and/or characteristics are affected by turbulence, windshear or a microburst.
Environment	Weather	Unforecast weather	Operations affected by weather conditions that were not forecast or not considered by the flight crew.
Environment	Wildlife	Animal strike	A collision between an aircraft and an animal.
Environment	Wildlife	Birdstrike	A collision between an aircraft and a bird.
Environment	Wildlife	Other Wildlife Events	Wildlife related occurrences not specifically covered elsewhere.
Operational	Aircraft Control	Airframe overspeed	The airspeed limit has been exceeded for the current aircraft configuration as published in the aircraft manual.
Operational	Aircraft Control	Control issues	The flight crew encounter minor aircraft control difficulties while airborne or on the ground.
Operational	Aircraft Control	Hard landing	Damage occurs during the landing.
Operational	Aircraft Control	Incorrect configuration	An aircraft system is incorrectly set for the current and/or intended phase of flight.
Operational	Aircraft Control	In-flight break-up	The aircraft sustained an airborne structural failure or damage to the airframe, to the extent that continued flight is no longer possible.
Operational	Aircraft Control	Loss of control	When control of the aircraft is lost or there are significant difficulties controlling the aircraft either airborne or on the ground.
Operational	Aircraft Control	Other Control Issues	Aircraft control occurrences not specifically covered elsewhere.
Operational	Aircraft Control	Pilot Induced Oscillations	Any PIO occurrence occassioning damage.
Operational	Aircraft Control	Stall warnings	Any cockpit warning or alert that indicates the aircraft is approaching an aerodynamic stall.
Operational	Aircraft Control	Wheels up landing	An aircraft contacts the intended landing area with the landing gear retracted.

Operational	Aircraft Loading	Loading related	The incorrect loading of an aircraft that has the potential to adversely affect any of the following: a) the aircraft's weight; b) the aircraft's balance; c) the aircraft's structural integrity; d) the aircraft's performance; e) the aircraft's flight characteristics.
Operational	Aircraft Loading	Other Loading Issues	Aircraft loading occurrences not specifically covered elsewhere.
Operational	Airframe	Doors/Canopies	When a door or canopy, or its component parts, has failed or exhibited damage.
Operational	Airframe	Furnishings & fittings	An internal aircraft furnishing or fitting, including its component parts, has failed or exhibited damage.
Operational	Airframe	Fuselage/Wings/Empennage	Damage to the fuselage, wings, or empennage not caused through collision or ground contact.
Operational	Airframe	Landing gear/Indication	When the landing gear or its component parts (including indications), has failed or exhibited damage.
Operational	Airframe	Objects falling from aircraft	Objects inadvertently falling from or detaching from an aircraft.
Operational	Airframe	Other Airframe Issues	Technical - Airframe occurrences not specifically covered elsewhere.
Operational	Airframe	Windows	A window or a component part has failed or exhibited damage.
Operational	Communications	Other Communications Issues	Communications occurrences not specifically covered elsewhere.
Operational	Communications	Transponder related	The incorrect setting of a code and/or usage of transponder equipment.
Operational	Crew and Cabin Safety	Cabin injuries	A cabin crew member or passenger has suffered an illness or injury.
Operational	Crew and Cabin Safety	Flight crew incapacitation	A Flight Crew member is restricted to nil or limited duties as a result of illness or injury.
Operational	Crew and Cabin Safety	Inter-crew communications	Relates specifically to a loss, or breakdown, of communication between flight crew or associated ground staff.
Operational	Crew and Cabin Safety	Other Crew and Cabin Safety Issues	Cabin safety occurrences not specifically covered elsewhere.
Operational	Crew and Cabin Safety	Passenger related	Where the actions of a passenger adversely or potentially affects the safety of the aircraft.
Operational	Crew and Cabin Safety	Unrestrained objects	When objects are not appropriately restrained for the aircraft operation or phase of flight.
Operational	Fire Fumes and Smoke	Fire	Any fire that has been detected and confirmed in relation to an aircraft operation.
Operational	Fire Fumes and Smoke	Fumes	When abnormal fumes or smells are reported on board the aircraft.
Operational	Fire Fumes and Smoke	Smoke	When smoke is reported to be emanating from: a) inside the aircraft; or b) an external component of the aircraft.
Operational	Flight Preparation/Navigation	Aircraft preparation	Errors or omissions during the planning and/or pre-flight phase that affect or may affect aircraft safety in relation to: a) the aircraft's weight; b) the aircraft's balance; c) the aircraft's structural integrity; d) the aircraft's performance; e) the aircraft's flight characteristics.
Operational	Flight Preparation/Navigation	Lost / Unsure of position	When flight crew are uncertain of the aircraft's position and/or request assistance from an external source.
Operational	Flight Preparation/Navigation	Other Flight Preparation/Navigation Issues	Navigation - Flight planning occurrences not specifically covered elsewhere.
Operational	Flight Preparation/Navigation	VFR into IMC	An aircraft operating under the Visual Flight Rules enters Instrument Meteorological Conditions.
Operational	Fuel Related	Contamination	When the presence of a foreign substance is found in fuel.
Operational	Fuel Related	Exhaustion	When the aircraft has become completely devoid of useable fuel.
Operational	Fuel Related	Leaking or Venting	Relates specifically to the unplanned loss of fuel from a fuel tank or fuel system.
Operational	Fuel Related	Low fuel	The aircraft's supply of fuel becoming so low (whether or not the result of a technical issue) that the safety of the aircraft is compromised.
Operational	Fuel Related	Other Fuel Related Issues	Fuel related occurrences not specifically covered elsewhere.

Operational	Fuel Related	Starvation	When the fuel supply to the engine(s) is interrupted, but there is still usable fuel on board the aircraft.
Operational	Ground Operations	Foreign Object Damage/Debris	Any loose objects on an aerodrome have caused, or have the potential to cause, damage to an aircraft.
Operational	Ground Operations	Ground handling	Any ground handling and aircraft servicing that caused, or has the potential to cause injury or damage to a stationary aircraft.
Operational	Ground Operations	Jet blast/Prop/Rotor wash	Any air disturbance from a ground-running aircraft propeller, rotor or jet engine that has caused, or has the potential to cause, injury or damage to property.
Operational	Ground Operations	Other Ground Ops Issues	Ground operation occurrences not specifically covered elsewhere.
Operational	Ground Operations	Taxiing collision/near collision	An aircraft collides, or has a near collision, with another aircraft, terrain, person or object on the ground or on water during taxi.
Operational	Miscellaneous	Missing aircraft	The aircraft is reported as missing.
Operational	Miscellaneous	Other Miscellaneous	Miscellaneous occurrences not specifically covered elsewhere in this manual.
Operational	Miscellaneous	Rope break/Weak link failure	Towplane separation incident necessitating a modified circuit.
Operational	Miscellaneous	Rope/Rings airframe strike	Airframe struck by launch cable or rings. Includes entanglemt with rope.
Operational	Miscellaneous	Warning devices	Situations in which an aural or visual aircraft warning device activates to alert the flight crew to a situation requiring immediate or prompt corrective action.
Operational	Miscellaneous	Winch Performance Issue	Any incident caused by poor winch performance, such as power failure, or mechanical reasosn.
Operational	Runway Events	Depart/App/Land wrong runway	An aircraft that: a) takes off b) lands, c) attempts to land from final approach d) operates in the circuit at, to or from an area other than that authorised or intended for landing or departure
Operational	Runway Events	Other Runway Events	Runway event occurrences not specifically covered elsewhere.
Operational	Runway Events	Runway excursion	An aircraft that veers off the side of the runway or overruns the runway threshold.
Operational	Runway Events	Runway incursion	The incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft.
Operational	Runway Events	Runway undershoot	Any aircraft attempting a landing and touches down prior to the threshold.
Operational	Terrain Collisions	Collision with terrain	Any collision between an airborne aircraft and the ground, water or an object, where the flight crew were aware of the terrain prior to the collision.
Operational	Terrain Collisions	Controlled flight into terrain (CFIT)	When a serviceable aircraft, under flight crew control, is inadvertently flown into terrain, obstacles or water without either sufficient or timely awareness by the flight crew to prevent the collision.
Operational	Terrain Collisions	Ground strike	When part of the aircraft drags on, or strikes, the ground or water.
Operational	Terrain Collisions	Wirestrike	When an aircraft strikes a wire, such as a powerline, telephone wire, or guy wire, during normal operations.
Technical	Powerplant/Propulsion	Abnormal Engine Indications	A visual or cockpit warning that indicates an engine is malfunctioning or operating outside normal parameters.
Technical	Powerplant/Propulsion	Engine failure or malfunction	An engine malfunction that results in a total engine failure, a loss of engine power or is rough running.
Technical	Powerplant/Propulsion	Other Powerplant/Propulsion Issues	Powerplant / Propulsion occurrences not specifically covered elsewhere.
Technical	Powerplant/Propulsion	Propeller malfunction	The failure or malfunction of an aircraft propeller or its associated components.
Technical	Powerplant/Propulsion	Transmission & Gearboxes	The failure or malfunction of an aircraft transmission/gearbox and/or its associated components.

Technical	Systems	Avionics/Flight instruments	The partial or complete loss of normal functioning of the avionics system or its components.
Technical	Systems	Electrical	The partial or complete loss of normal functioning of the aircraft electrical system.
Technical	Systems	Flight controls	The partial or complete loss of normal functioning of a primary or secondary flight control system.
Technical	Systems	Fuel	The partial or complete loss of normal functioning of the fuel system.
Technical	Systems	Hydraulic	The partial or complete loss of the hydraulic system.
Technical	Systems	Other Systems Issues	Technical - Systems occurrences not specifically covered elsewhere.