

AA2014-5

AIRCRAFT ACCIDENT INVESTIGATION REPORT

PRIVATELY OWNED

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September 25, 2014



The objective of the investigation conducted by the Japan Transport Safety Board in accordance with the Act for Establishment of the Japan Transport Safety Board and with Annex 13 to the Convention on International Civil Aviation is to determine the causes of an accident and damage incidental to such an accident, thereby preventing future accidents and reducing damage. It is not the purpose of the investigation to apportion blame or liability.

Norihiro Goto
Chairman,
Japan Transport Safety Board

Note:

This report is a translation of the Japanese original investigation report. The text in Japanese shall prevail in the interpretation of the report.

AIRCRAFT ACCIDENT INVESTIGATION REPORT

- 1. PRIVATELY OWNED ROLLADEN-SCHNEIDER LS4-B
(GLIDER, SINGLE-SEATER), JA22WP**
- 2. PRIVATELY OWNED ALEXANDER SCHLEICHER ASK21
(GLIDER, TWO-SEATER), JA22RW**

**MID-AIR CONTACT INVOLVING TWO GLIDERS
IN THE AIR, APPROXIMATELY 300m OVER
MENUMA GLIDING FIELD
KUMAGAYA CITY, SAITAMA PREFECTURE, JAPAN
AT ABOUT 14:26 JST, SEPTEMBER 14, 2013**

August 22, 2014

Adopted by the Japan Transport Safety Board

| | |
|----------|--------------------|
| Chairman | Norihiro Goto |
| Member | Shinsuke Endoh |
| Member | Toshiyuki Ishikawa |
| Member | Sadao Tamura |
| Member | Yuki Shuto |
| Member | Keiji Tanaka |

SYNOPSIS

<Summary of the Accident>

At around 14:26 Japan Standard Time (JST: UTC+9hr, unless otherwise stated all times are indicated in JST on a 24-hour clock) on Saturday, September 14, 2013, privately owned Rolladen-Schneider LS4-b, registered JA22WP, launched from Gliding field No. 1 in Menuuma Gliding field in Kumagaya-City, Saitama Prefecture for the gliding competition, and privately owned Alexander Schleicher ASK21, registered JA22RW, which was in the launching process at Gliding field No. 2 in Menuuma Gliding field for the flight training, came into contact in the mid-air, and JA22WP was substantially damaged, while JA22RW sustained a minor damage.

A pilot was on board JA22WP, and a flight instructor and a trainee pilot were on board JA22RW, but no one was injured.

<Probable Causes>

It is highly probable that this accident occurred when JA22WP, launched from Gliding field No. 1 for the gliding competition, came into contact with climbing JA22RW, by flying diagonally across the airspace over the adjacent Gliding field No. 2, where JA22RW was in the launching process.

It is highly probable that the reason why the JA22WP flew diagonally across the airspace above the adjacent Gliding field No. 2, where JA22RW was in the launching process, was that the Pilot of JA22WP had become preoccupied with finding a thermal in order to achieve an advantage in the gliding competition, and had lacked awareness to avoid flying into the airspace over the adjacent Gliding field.

Furthermore, it is somewhat likely that the cause for the Pilot of JA22WP to lack the awareness to avoid flying into the airspace above the adjacent Gliding field was attributed to the fact that a standard practice, advising the launched glider to avoid flying into the airspace over the adjacent Gliding field, was not specified in any regulations.

1. PROCESS AND PROGRESS OF THE AIRCRAFT ACCIDENT INVESTIGATION

1.1 Summary of the Accident

At around 14:26 JST on Saturday, September 14, 2013, privately owned Rolladen-Schneider LS4-b, registered JA22WP, launched from Runway 14 in Gliding field No. 1 of Menuma Gliding field in Kumagaya-City, Saitama Prefecture for the gliding competition, and privately owned Alexander Schleicher ASK21, registered JA22RW, which was in the launching process at Gliding field No. 2 in Menuma Gliding field for the flight training, came into contact in the mid-air, and JA22WP was substantially damaged, while JA22RW sustained a minor damage.

A pilot was on board JA22WP, and a flight instructor and a trainee pilot were on board JA22RW, but no one was injured.

1.2 Outline of the Accident Investigation

1.2.1 Investigation Organization

On September 14, 2013, the Japan Transport Safety Board designated an investigator-in-charge of the investigation and another investigator to investigate this accident.

1.2.2 Representatives of the Relevant State

The JTSB notified the Federal Republic of Germany, as the State of Design and Manufacture of the gliders involved in this accident, of the occurrence of the accident, but the State did not designate an accredited representative.

1.2.3 Implementation of the Investigation

| | |
|--------------------|---|
| September 15, 2013 | On-site investigation, glider examination, and interviews |
| September 29, 2013 | On-site investigation, glider examination, and interviews |

1.2.4 Comments from the Parties Relevant to the Cause of the Accident

Comments were invited from the parties relevant to the cause of the accident.

1.2.5 Comments from the Relevant State

Comment were invited from the relevant State.

2. FACTUAL INFORMATION

2.1 History of the Flight

A privately owned Rolladen-Schneider LS4-b, registered JA22WP (hereinafter referred to as “Glider A”), with a Pilot on board, was launched from Gliding field No. 1 in Menuma Gliding field (hereinafter referred to as “the Gliding field”) in Kumagaya-City, Saitama Prefecture by winch towing around 14:24 JST on September 14, 2013.

Glider A was participating in the Tokyo Six Major University League Glider Championship sponsored by the Public Interest Incorporated Foundation - Japan Students Aviation League (hereinafter referred to as “JSAL”), which was taking place at Gliding field No. 1 between the planned period of September eight through 15.

On the other hand, right after Glider A was launched, privately owned Alexander Schleicher ASK21, registered JA22RW (hereinafter referred to as “Glider B”), with a trainee pilot (hereinafter referred to as “the Trainee Pilot”) in the front seat and the flight instructor (hereinafter referred to as “the Flight Instructor”) in the rear seat, was being launched from Gliding field No. 2 in the Gliding field for the flight training, using winch .

The history of the flight up to the time of the accident, according to the data recorded in the portable GPS on Glider A, and statements from persons on board both gliders, as well as the crewmembers on the Gliding field, is summarized as follows.

2.1.1 History of the Flight of Glider A based on the Portable GPS

Glider A was equipped with portable GPS receiver with built-in barometric altimeter (Garmin GPSmap62 of the U.S.), and the location as well as the altitude information was recorded throughout the flight from takeoff to landing.

(The derived altitude here is relative to the mean sea level, where recorded pressure altitude was corrected by the elevation of the Gliding field, and the derived speed is the ground speed, which was calculated using the distance travelled per hour.)

| | |
|----------|---|
| 14:24:08 | Glider A started launching from Gliding field No. 1. |
| 14:24:15 | Glider A reached the speed around 99 km/h, climbing at an altitude around six meters above ground level. |
| 14:24:45 | Glider A reached the maximum altitude of approximately 380 m. |
| 14:24:58 | Glider A slowly turned towards left, and started the gliding, accompanied by its gradual descent, along the left side of Gliding field No. 1 (along the right riverside of the Tone River) at a speed of approximately 96 km/h. |
| 14:25:24 | At a speed of approximately 98 km/h and at an altitude of approximately 339 m, Glider A slowly turned towards right, gradually descending, and started entering the airspace over the adjacent Gliding field No. 2. |
| 14:25:53 | At a speed of approximately 102 km/h and at an altitude of approximately 307 m, Glider A started flying diagonally across the airspace over the Runway where Glider B was being launched. |
| 14:25:58 | Glider A climbed approximately five m, and started the right turn at an altitude of approximately 312 m. |
| 14:28:31 | Glider A landed in Gliding field No. 1, after following the bank side traffic pattern. |

2.1.2 History of the Flights of both gliders based on the Statements

(1) Pilot of Glider A

The pilot of Glider A (hereinafter referred to as “the Pilot”) was going to fly Glider A as the third person in the competition taking place at Gliding field No. 1 on the day of the accident. The Pilot checked the weather condition and the competition related matters by participating in the pre-flight briefing around 10:00.

The first pilot to fly Glider A was able to score points by flying the determined flight course during the first flight, but the second pilot, who took over next, was not able to score any points even with two consecutive flights.

In his first flight, the Pilot turned towards right following the release of the towline and flew along the right (bank) side of Gliding field No. 2, but eventually landed with no score points because of failing to gain altitude. The Pilot felt at this point that the weather

condition on this particular day was not exactly suitable for gliding, because of the weak winds. While waiting for the next launch, the Pilot spent time drinking water and observing the sky condition.

For the second (last) flight, the Pilot took off at 14:24, and released the towline at an altitude of 380 m. The Pilot saw the sunny area ahead of the river direction (left side) and, in an attempt to catch a thermal by flying in between the sunny area and under the cloud on the bank side where Pilot failed to gain altitude during the first flight, turned the glider towards this direction without paying much attention to Gliding field No. 2.

After a little while, the Pilot suddenly heard the sound of an impact and simultaneously felt a jolt, and soon after saw a glider being towed by the towline flying in the upper left in front. The Pilot thought at the moment, that he came in contact with towline of the Glider B, because he did not feel the attitude disturbance of his own glider. After seeing the other glider flying ahead towards the left, the Pilot turned right reflexively. The Glider A eventually landed in Gliding field No. 1, after following the bank side traffic pattern.

The airspeed at the time of the contact was between 95 km/h and 100 km/h. The Glider B did not become visible until it showed up in the front. The pilot did not notice the radio communications between the glider launched from Gliding field No. 2 and the Menuma Piste*¹.

The Pilot has more than 200 launching experience at the Gliding field, and it was a usual practice not to enter the airspace over the upwind Gliding field by always turning right or left after releasing the towline. However, to fly over Gliding field No. 2 on this particular day was attributed to the fact that Pilot had become preoccupied with winning the gliding competition, and lacked the awareness to avoid flying into the airspace over Gliding field No. 2.

The fact that the Pilot flew along the right (bank) side of Gliding field No. 2 during the first flight was the result of heading towards the direction where thermals were likely to be found, and not for the reason of avoiding to fly into Gliding field No. 2.

(2) Launch Controller*² at Menuma Piste

The Launch Controller at Menuma Piste, which was located in Gliding field No. 1, had been controlling the launches and landings of the participating gliders since the competition was commenced at 10:30 under the supervision of the competition committee.

The launch of Glider A went normally up to the point of releasing the towline, and the glider appeared to be extending upwind leg for a while before being lost visual contact due to the similarly colored clouds behind it.

Normally, even when a launched glider is able to extend some upwind leg after releasing the towline, it is supposed to either turn left or right in order to avoid flying into the airspace over the another Gliding field. Therefore, the Launch Controller did not think that Glider A would fly straight into the airspace over Gliding field No. 2.

After a while, the radio communication from Glider A informed the Menuma Piste that it would be entering the traffic pattern since the glider came into contact with the towline.

*¹ Piste : A command post where crewmembers communicate with the glider in flight or others, regarding the Gliding field and the flying conditions in the vicinity, enabling the safe and smooth operation of the Gliding field. The JSAL places the Launch Controller and the Record Keeper in order to control the launching and landing process of the gliders. On the day of the accident, the Piste in Gliding field No. 1 was called the Menuma Piste, while the Piste in Gliding field No. 2 was called the Second Piste.

*² Launch Controller : A person responsible for maintaining the safety and order by controlling the glider launching and landing process using the radio communication as the principal measure.

However, the Launch Controller did not understand at the moment, under what circumstances would launched glider come into contact with the towline from the another Gliding field.

Since the voice of the Pilot was relatively calm over the radio, the Launch Controller did not ask about the situation any further.

Soon, there was a radio communication from the Second piste requesting the discontinuation of the competition, since there was a possibility that Glider A came into contact with the towline.

(3) Flight Observer on Ground at Menuma Piste

The Flight Observer on Ground was in charge of a role to observe the position of the gliders of the team that took part in the competition throughout their flight until the landing.

At the time of the accident, the Flight Observer confirmed seeing Glider A releasing the towline. However, he lost the glider after a short period of time while trying to check the position of the other glider. Subsequently, he searched the river side, since it was a standard practice for the glider to turn left after releasing the towline, but he was not able to find the glider.

Soon after, the Flight Observer was informed of Glider A coming into contact with glider's towline of other glider over Gliding field No. 2.

(4) The Flight Instructor

The Flight Instructor was giving flight trainings to trainee pilots, along with other instructors, using two gliders at Gliding field No. 2.

On the day the accident, there was almost no surface wind, and since towed gliders in a climbing phase had the tendency to be pushed slightly towards the direction of the bank, only the wind blowing from an eastward direction was recognized.

Glider B at the time of the accident was going through "instrument failure training", where trainee pilot in the front seat flies the Glider B without watching the instruments. After the launch, the trainee pilot was climbing steadily at a speed of approximately 110 km/h as planned.

When it was about to release the towline after reaching the altitude of over 300 m, Glider B suddenly experienced a jolt, and concurrently the glider nose became dropping with the towing force of the towline was lost. The Flight Instructor suspected the towline failure, and then released the towline while keeping nose down attitude. Since there was no problem with any of the control surfaces, Glider B continued gliding into the usual flight route. While monitoring the radio, the term of contact was recognized in the tense communication, but the Flight Instructor had thought that his problem was the towline failure; consequently, he thought other glider in Gliding field No. 1 came into contact with some object.

Although started the scheduled training item in the vicinity of the traffic pattern, the Flight Instructor recognized some type of an emergency situation taking place, and felt it would be better to land the glider as soon as possible, landed in Gliding field No. 2 via traffic pattern.

The Flight Instructor was informed heard after the landing that Glider A came into contact with the towline of Glider B. Therefore, he went to check the towline of the winch first, but could not find any problems. Soon after, he noticed the damage on the rudder of Glider B, and finally understood that they came into contact with Glider A.

(5) Trainee Pilot

During the climb, the Trainee Pilot in the front seat of Glider B heard the bang noise, which was accompanied by the violent shaking of the glider, resulting in objects inside the cockpit, such as the map, flying up in the air. At the same time, the towing force in the towline was lost and there was a sense of sudden loss in the altitude, which gave the Trainee Pilot the impression that his glider had encountered the towline failure.

Subsequently, the Trainee Pilot turned left passing the river, and landed after going through instrument failure training.

While being winch-towed, the glider will climb at a steep angle allowing only the view of the sky ahead. The Trainee Pilot did not see Glider A before and after the impact. It was necessary to turn right or left after being launched from Gliding field No. 1. Therefore, the Trainee Pilot did not think that the competition glider would fly into the airspace over Gliding field No. 2.

(6) Launch Controller at Second Piste

The Launch Controller at Gliding field No. 2 monitored the radio communications in Gliding field No. 1, and recognized that Glider A was launched from Gliding field No. 1 and released its towline. The Launch Controller determined that the launching from Gliding field No. 2 is possible, and thus sent verbal and flag signals to the Trainee Pilot and Flight Instructor of Glider B.

Subsequently, the Launch Controller checked the runway and conditions in its proximity as well as the wind direction and speed from the wind sock, and determined that there is no problem for the launching.

The Launch Controller received the ready sign from the Trainee Pilot of Glider B and Wing Runner, and called the winch operator*³ on the radio that the Glider B is ready. The winch operator replied “Roger,” and slack was taken up*⁴ from the towline. When taking up slack procedure was completed, the Launch Controller called the winch operator on the radio “second departure” to start the launching, and the towing of Glider B was initiated.

The Launch Controller was monitoring the launching process of Glider B, and realized that there was another glider following from behind Glider B, when it was about to enter into the final climbing phase.

The Launch Controller thought that this glider should also be monitoring the radio communications for the launching information in Gliding field No. 2, its flying altitude should be higher, but realized after taking a closer look that it was almost at the same altitude where Glider B was flying. While confused and thinking whether he should call the relevant parties, it appeared that the two gliders overlapped each other, and after a short time, he heard the sound of an impact. Glider B continued its climbing, and seemed that it had gone ahead of the other glider.

The Launch Controller handed over the radio to the other flight instructor who was nearby hearing the impact sound. This flight instructor instructed the other glider, who came into their airspace unexpectedly, to return to Gliding field No. 1 for a landing.

It was a standard practice for the glider launched from Runway 14 in Gliding field No. 1

*³ Winch Operator : A person responsible for operating the launch winch during the glider towing. The JSAL defines in regulation that the Winch Operator possesses the Driver's License, has capability to solo flight by winch towing, and is qualified in the examination that tests the knowledge and skill required in the winch towing.

*⁴ Take up slack : The procedure in reducing the slack in the towline by winch in advance for the prevention of sudden force acting on the glider when it is being towed.

to turn right or left in order to avoid entering into the airspace above Gliding field No. 2. Therefore, the Launch Controller did not think of the possibility of the launched glider from Gliding field No.1 to continue flying into the airspace over Gliding field No.2.

(7) Winch Operator

The Winch Operator at Gliding field No. 2 initiated the towing process of Glider B by controlling the winch throttle, after receiving “departure” call from the Second Piste. During the towing process, the Winch Operator paid a close attention to Glider B in adjusting the throttle.

While observing the upper airspace following the flight path of the climbing Glider B, the Winch Operator noticed a glider approaching from above Glider B. The altitude of Glider B at this point was approximately 250 m. Since Glider B appeared closer than the other glider, the Winch Operator decided to continue the towing process in order to avoid being caught up by the approaching glider. However, it stayed on and kept approaching towards Glider B. For this reason, the Winch Operator decided to try the alternative measure of gradually reducing the winch power, so as to let Glider B release the towline sooner.

Usually, the Winch Operator informs the launched glider via radio that the winch power will be reduced, but there was no time under the circumstances.

After completely reducing the winch power, the towline of Glider B got released. Therefore, the Winch Operator focused on winding the towline. At this point in time, since both gliders were so close to one another, the Winch Operator thought that they came into contact. However, Glider B called its towline release altitude, and continued flying towards the river as if nothing had occurred. Because of the loud engine noise from the winch, the Winch Operator was not able to hear the impact sound.

Subsequently, the Second piste called to inform that Glider A may have come into contact with the towline, directing the Winch Operator to perform the towline inspection. However, after stretching the rolled up towline, no damages were found even with the inspections by multiple persons..

The Winch Operator had approximately 200 times of towing experience.

The accident occurred at an altitude of approximately 300 m over Gliding field No. 2 in the Gliding field (Latitude 36°11'52" N, Longitude 139°26'14" E) around 14:26 JST on September 14, 2013.

(See Figure 1: Estimated Flight Route)

2.2 Injuries to Persons

There were no injuries to the persons on board, and was also no damage to the persons and properties on the ground.

2.3 Damage to the Gliders

2.3.1 Glider A

(1) Extent of Damage

Substantial damage

(2) Damage to the Glider Components

Crack with length of approximately 150 cm along the leading edge in the middle portion of the right wing, and bumpy deformation on lower surface of the right wing.

(3) Scratch mark and other damage

1) Scratch mark on the lower side of the right wing leading edge.

Scratch from the location approximately 90 cm from the wing tip towards the fuselage, in length of approximately 270 cm and width of approximately one cm.

2) Paint mark on the right wing leading edge

Blue paint from the rudder of Glider B

Around the location approximately 270 cm from the wing tip towards the fuselage, in length of approximately three cm and width of approximately four cm.

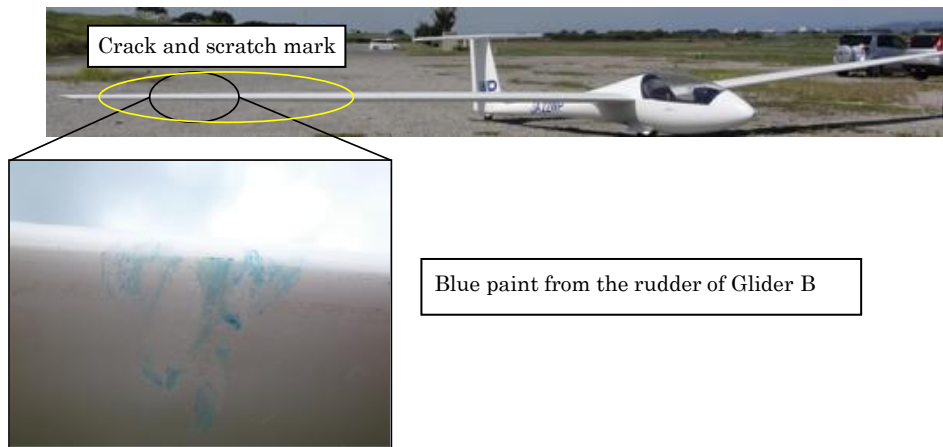


Photo 1: Damage on Glider A

2.3.2 Glider B

(1) Extent of Damage

Minor damage

(2) Damage to the Glider Components

Damage to the upper portion of the rudder (approximately 18 cm in lateral and approximately 13 cm in longitudinal directions).

(3) Scratch mark

Scratch mark on the upper surface of the horizontal stabilizer towards its aft (approximately two m in lateral and approximately 50 cm in longitudinal directions).

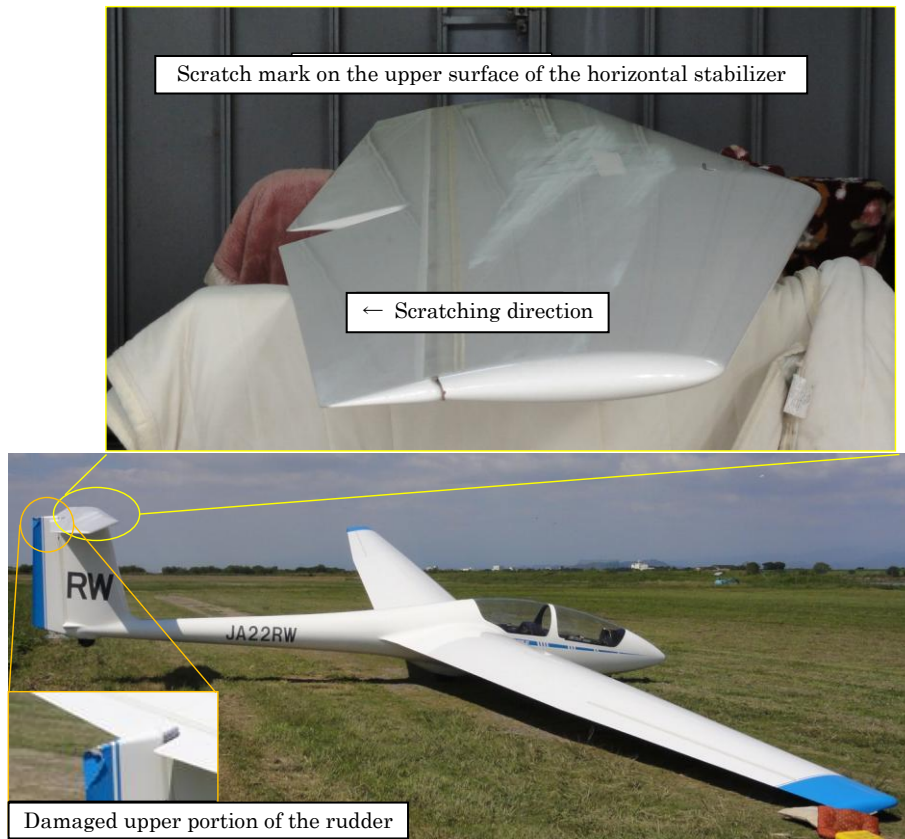


Photo 2: Damage on Glider B

2.4 Personnel Information

| | | |
|---|--------------|---------------------------------|
| (1) The Pilot | Male, Age 22 | |
| Private pilot certificate (Glider) | | |
| Type rating for high class glider | | December 17, 2012 |
| Class 2 aviation medical certificate | | |
| Validity | | January 9, 2014 |
| Total flight time | | 135 hrs 38 min (356 launches) |
| Flight time in the last 30 days | | 11 hrs 19 min (20 launches) |
| Total flight time on the type of glider | | 33 hrs 53 min (45 launches) |
| Flight time in the last 30 days | | 11 hrs 06 min (19 launches) |
| (2) The Flight Instructor | Male, Age 56 | |
| Private pilot certificate (Glider) | | |
| Type rating for high class glider | | September 12, 1979 |
| Flight instructor certificate | | October 1, 1982 |
| Class 2 aviation medical certificate | | |
| Validity | | May 2, 2014 |
| Total flight time | | 835 hrs 51 min (3,791 launches) |
| Flight time in the last 30 days | | 7 hrs 31 min (52 launches) |
| Total flight time on the type of glider | | 371 hrs 12 min (2,088 launches) |
| Flight time in the last 30 days | | 7 hrs 31 min (52 launches) |
| (3) Trainee Pilot | Male, Age 18 | |
| Student pilot certificate (Glider) | | June 12, 2013 |
| Validity | | June 11, 2014 |

| | |
|---|---------------------------|
| Total flight time | 1 hr 31 min (11 launches) |
| Flight time in the last 30 days | 1 hr 04 min (7 launches) |
| Total flight time on the type of glider | 1 hr 31 min (11 launches) |
| Flight time in the last 30 days | 1 hr 04 min (7 launches) |

2.5 Gliders Information

2.5.1 Glider A

(1) Glider

| | |
|---|--------------------------|
| Type | Rolladen-Schneider LS4-b |
| Serial Number | 41048 |
| Date of Manufacture | March 12, 2002 |
| Certificate of airworthiness | 2013-62-01 |
| Validity | July 28, 2014 |
| Category of Airworthiness | Glider Utility U |
| Total flight time | 1,984 hrs 02 min |
| Flight time since last periodical check | 44 hrs 40 min |

(Airworthiness inspection performed on June 15, 2013)

(2) Weight and Balance

At the time of the accident, the weight of the Glider was estimated to have been 356.7 kg, and the position of the center of gravity (CG) was estimated to have been longitudinally at 365 mm aft of the datum, both within the allowable range (maximum gross weight of 525.0 kg, and the CG range of 200 to 400 mm corresponding to the weight at the time of the accident).

(3) Performances

Aspect ratio: 21.4
Best glide ratio: 40

2.5.2 Glider B

(1) Glider

| | |
|---|----------------------------|
| Type | Alexander Schleicher ASK21 |
| Serial Number | 21656 |
| Date of Manufacture | September 1, 1997 |
| Certificate of airworthiness | 2012-27-25 |
| Validity | November 26, 2013 |
| Category of Airworthiness | Glider Utility U |
| Total flight time | 3,575 hrs 43 min |
| Flight time since last periodical check | 40 hrs 00 min |

(100-hour inspection performed on August 26, 2013)

(2) Weight and Balance

At the time of the accident, the weight of the Glider was estimated to have been 526.0 kg, and the position of the center of gravity (CG) was estimated to have been longitudinally at 398 mm aft of the datum, both within the allowable range (maximum gross weight of 600 kg, and the CG range of 234 mm to 469 mm corresponding to the weight at the time of the accident).

(3) Performances

Aspect ratio: 16.1

Best glide ratio: 34

(4) Procedure for Winch towing

The following statement is an excerpt from the Flight Manual of Glider B.

Winch tow

Trim : neutral

Max. tow speed : 150km/h (IAS)

*This glider is equipped with a tow release*5 for winch tow in front of the main wheel.*

The most favorable tow speed is 90-110 km/h (IAS).

(partially omitted)

Tow release: pull the release knob several times to the stop.

(See Figure 2: Three Angle View)

2.6 Meteorological Information

(1) According to a member of the competition committee at Menuma Piste, the weather in the vicinity of the accident site was, high clouds with wind blowing from an eastward direction at a velocity of one through two m/s, and visibility of over 10 km.

(2) According to the record keeper at Second Piste, the sky over around the accident site was covered mostly with the grayish clouds, and it was difficult to spot gliders from the ground.

2.7 Accident Site Information

2.7.1 Facility at the Gliding field

The Gliding field is established on the riverbed of the Tone River right bank in Kumagaya-City, Saitama Prefecture, which is located in the north western Kanto Plain, and JSAL is responsible for its management and operation.

The Gliding field has Gliding field No. 1 (field elevation: 26 m) with a length of 1500 m and a width of 100 m on the upstream of the riverbed, and Gliding field No. 2 (field elevation: 25 m) with a length of 1200 m and a width of 40m on the downstream of the riverbed, where runway direction for both Gliding fields is 14/32.

Gliding field No. 1 has three runways established labeled B, C, and D which trisected the riverbed width from the bank side, and Gliding field No. 2 has two runways which bisected the riverbed width; one on the bank side and the other on the river side. A municipal park, functioning as the integrated recreational sports facility (having soccer ground etc.) is located in between Gliding fields No. 1 and No. 2, where boundaries of both Gliding fields are separated by distance of approximately 600 m.

(See Figure 1: Estimated Flight Route)

2.7.2 Status of Operation at the Gliding field

At Gliding field No. 1, only runway B was used for the launching, and runway B, C, and D were used for the landing during the gliding competition.

At Gliding field No. 2, the bank side runway was used for the launching, while the river side

*5 Tow Release: The device used to release the towline when it becomes unnecessary after the takeoff. The device functions by pulling the release knob located inside the cockpit.

runway was used for the landing, and pilots who did not participate in the gliding competition were taking their flight trainings.

2.8 Additional Information

2.8.1 Regulations for the Flight Operation at the Gliding field

As regulations promoting the safe flight training operations at the Gliding field, there are Regulations for Practicing the Gliding Sports Training and Menuma Gliding field Flight Operation Procedures (hereinafter referred to as “the Flight Operation Procedures”) prescribed by the JSAL.

There are following description in the Flight Operation Procedures regarding the concurrent use of Gliding fields No. 1 and No. 2 by two different groups.

(Excerpts from the Flight Operation Procedures)

(Operating Group)

7. In principal, when two different groups are using the Gliding field, they shall be separated into Gliding field No. 1 and Gliding field No. 2 in performing their flight operations.

(HF Radio Communication Procedures)

40. In general, the glider operating in the Gliding field shall be equipped with HF communications radio. Prior arrangement is required if not equipped with the HF communications radio.

(1) During the Takeoff

- 1. When flight preparation is completed, the person onboard the glider shall advise the wing runner that he or she is “ready.”*
- 2. The wing runner shall advise the Piste “(rearward clear) ready,” upon checking the clearance around the glider, including the rearward, and preparation status.*
- 3. Upon receiving the “ready” sign from the wing runner, the Piste shall call out “Menuma Winch JSAL 21 (for example) ready.”*
- 4. Upon receiving the “ready” sign from the Piste, the Winch shall call out “Menuma Winch JSAL 21 (for example) ready.”*
- 5. The Piste shall call out “JSAL 21 (for example) departing,” after tension has been completed taking up slack procedure..*
- 6. The Piste shall guide and instruct the towing speed and takeoff path while the glider is being towed.*
- 7. The Piste shall call “JSAL 21 (for example) towline release confirmed” after the towline has been released.*
- 8. The glider pilot shall report “towline release altitude is 380m (for example).”*

(Winch Tow)

- 19. When two groups are performing the flight operation at Gliding field No. 1, one of them is allowed to make “ready” radio call only after the parachute reaches the ground following the towline release of the other group. However, Gliding field No. 2 is allowed to make “ready” radio call, right after the “towline release confirmed” call from Gliding field No. 1.*
- 20. The glider, planning to make a thermal circling around the point where towline is released in the winch towing, shall place a request via radio call and obtain permission from the Piste. The Piste may reject the request if they believe this activity will interfere with the launching process of other gliders.*

It was a standard practice for the glider, launched from downwind, not to fly into the airspace over an upwind Gliding field when operating simultaneously in Gliding fields No. 1 and No. 2. The

trainee pilots being trained in this Gliding field were instructed to follow this practice. However, it was not specified in the Flight Operation Procedures or in any other regulations as an explicit provision.

2.8.2 Regulations for the Gliding Competition

There were following statements in the Gliding Competition Regulations and Safety Measures in promoting the safe competition.

(1) Gliding Competition Regulations

(Excerpts)

9. Ensuring Safety during the Competition

(1) The flight operations during the competition period must be performed safely in accordance with all the rules provided in the Civil Aeronautics Act, ordinances, regulations, and various JSAL regulations.

(2) The participants must ensure the safety of their flights especially keeping close attention to avoid the any hazards involving other participating gliders.

(2) Safety Measure

(Excerpts)

2. Flight Operation

(3) The Flight Observer must be stationed near the Piste in order to observe the participating glider in flight until its landing.

2.8.3 View from the Cockpit

The result of investigating the view from the cockpits of Glider A and Glider B by actually getting onboard the gliders and interviewing flight Instructors from JSAL is summarized as follows.

(1) Glider A

Left and right as well as the upper forward view are good, but the lower forward view is poor since the seat is inclined rearward, and floor and the instrument panel are obstructing the view.



Photo 3: View from Glider A Cockpit

(2) Glider B

The rearward view is poor from the front seat because it is obstructed by the occupant in the rear seat, and is similar from the rear seat because of the aft fuselage. In addition, as the glider climbs at a steep angle of approximately 25 degrees during the launching, pilots usually watch the travelling direction under normal conditions.



Photo 4: Cockpit Seat Arrangement of Glider B

3. ANALYSIS

3.1 Qualification of Personnel

The Pilot and the Flight Instructor held valid airman competence certificates and valid aviation medical certificates. The trainee pilot held an adequate and valid student pilot certificate.

3.2 Airworthiness Certificate of the Glider

Both gliders had valid airworthiness certificates and had been maintained and inspected as prescribed.

3.3 Relations to Meteorological Phenomena

As described in 2.6, the weather around the time of the accident was with high clouds and good visibility. It was, however, somewhat difficult to recognize the glider from the ground, as its white paint blended in with the similarly colored clouds behind it.

3.4 Damages to the Glider

It is highly probable that damages to Gliders A and B, as described in 2.3, were the result of both gliders coming into contact with each other and that no abnormalities were found in both gliders until the moment the accident occurred. .

3.5 Series of Events leading to Mid-Air Contact

3.5.1 Gliding field No. 1

(1) Glider A

1) The accident occurred on the day before the final day of the gliding competition.

As described in 2.1.2(1), the Pilot had taken part in the competition as a third participant flying Glider A, where the first participant had scored some points, the second participant had scored no points, and the third participant, the Pilot himself, had also scored no points on his first flight. After the second launch, the Pilot saw the sunny area ahead of the river direction (left side) and, in an attempt to catch the thermal by flying in between the sunny area and under the cloud on the bank side where Pilot failed to gain altitude during the first flight, turned the glider towards this

direction without paying much attention to Gliding field No. 2, according to his statement. It was a usual practice for the Pilot not to enter the airspace over the adjacent Gliding field by always turning right or left. However, the Pilot lacked the awareness to avoid flying into Gliding field No. 2 because he had become preoccupied with winning the gliding competition. The fact that the Pilot flew along the right (bank) side of Gliding field No. 2 during the first flight was the result of heading towards the direction where thermals were likely to be found, and not for the reason of avoiding to fly into Gliding field No. 2, according to his statement.

Judging from the aforementioned statements, it is highly probable that on the day of the accident, when the competition was in its final stage, the Pilot became preoccupied with finding a thermal in order to achieve an advantage in the gliding competition, and lacked awareness of the adjacent Gliding field No. 2 being used for other flight operations..

- 2) As described in 2.8.1, although not specified in the Flight Operation Procedures or in any other regulations as an explicit provision, it was a standard practice for the glider, launched from downwind, not to fly into the airspace over an upwind Gliding field when gliders are operating simultaneously in Gliding fields No. 1 and No. 2, and JSAL instructed the trainee pilots to follow this practice.

However, as this rule was not stipulated in any regulations, it is not able for the relevant parties to read the provision as to the prohibited operations, it is somewhat likely that the current system is not sufficient for the relevant parties to recognize the aforementioned practice as a rule that should be observed strictly.

Based on this fact, it is somewhat likely that the fact that a standard practice advising launched gliders to avoid flying into the airspace over adjacent Gliding fields was not specified in any regulations contributed, the cause of the pilot becoming preoccupied with finding a thermal and consequently lacking the awareness to avoid flying into the airspace over the adjacent Gliding field.

- 3) Under the circumstances mentioned above, it is highly probable that Glider A was launched from Gliding field No. 1 in a usual practice at 14:24:08 JST, as described in 2.1.1, 2.1.2(2) and Figure 1, and following the towline release, Glider A turned slightly to its left, reaching the right riverside of Tone River, where it started gliding, with gradually descending, and eventually flew diagonally across the airspace over the adjacent Gliding field No. 2, where Glider B was climbing in the launching process, and there the two gliders consequently came into contact in mid-air.

In addition, as described in 2.8.3(1), it is highly probable that the Pilot was not able to recognize the approaching Glider B, flying in the lower forward direction, where Glider A had poor view from the cockpit.

(2) Menuma Piste

According to the statement of the Launch Controller at Gliding field No. 1, as described in 2.1.2(2), the launch of Glider A went normally up to the point of releasing the towline, and the glider appeared to be extending upwind leg for a while before it became invisible due to the similarly colored clouds behind it. Normally, even when a launched glider extends upwind leg a little after releasing the towline, it is supposed to either turn left or right in order to avoid flying into another Gliding field. Therefore, the Launch Controller did not think that Glider A would fly straight into the airspace over Gliding field No. 2.

According to the statements in 2.1.2(3), the Flight Observer, who was stationed for the observation during the gliding competition, confirmed seeing Glider A releasing the towline. However, he lost sight of the glider after a short period of time while trying to check the position of the other glider. Subsequently, he searched the river side, since it was often the case that gliders turned left after releasing the towline, but he was not able to find the glider.

Judging from the aforementioned statements, it is highly probable that Menuma Piste, which was in charge of the launching of Glider A, made no attempt in communicating with Glider A and the Second Piste via radio, since the launch of Glider A went normally, and despite the fact that they had lost sight of the glider while it was in a straight flight extending upwind leg, they did not think that Glider A would fly over Gliding field No. 2, which was in use at the time.

Besides, it is probable that the reason for the Launch Controller and the Flight Observer to lose sight of Glider A was attributed to the fact that in spite of the good visibility, it was somewhat difficult to see the glider from the ground, as its white paint blended in with the similarly colored clouds behind it, as described in 3.3.

3.5.2 Gliding field No. 2

(1) Glider B

As described in 2.1.2(4), the Flight Instructor stated that the Trainee Pilot in the front seat was going through “instrument failure training” where he was learning to fly the glider without watching the instruments, and was climbing steadily at a speed of approximately 110 km/h as planned.

As described in 2.8.3(2), it is probable that the rearward view was poor from Glider B cockpit because it was obstructed by the aft fuselage or others and the persons on board the glider were only watching the travelling direction since they were climbing at a steep angle.

Judging from the aforementioned statements, it is highly probable that Glider B was launched and climbing as usual, but could not recognize Glider A, which was approaching from the upper rearward direction.

Under the circumstances mentioned above, as described in 2.1.1 and Figure 1, it is probable that around 14:25:55, when the estimated flight paths of two gliders are presumed to have intersected, Glider B came into contact with Glider A, which was gradually descending, at an altitude of approximately 300 m.

(2) Second Piste

As described in 2.1.2(6), the Launch Controller at Gliding field No. 2 had initiated the towing process of Glider B under the prescribed procedure, and when the glider was about to enter into final climbing phase, he realized that there was another glider following from behind Glider B. While thinking whether he should call the relevant parties on the radio, it appeared that the two gliders overlapped each other, and after a short time, he heard the sound of an impact.

As described in 2.1.2(7), when the Winch Operator at Gliding field No. 2 looked the upper airspace following the flight path of the climbing Glider B, he noticed the glider approaching from above Glider B. Since Glider B appeared closer from the other glider, the Winch Operator decided to continue the towing process in order to avoid being caught up

by the approaching glider. However, it stayed on and kept approaching towards Glider B; thus, the Winch Operator decided to reduce the winch power, so as to let Glider B release the towline sooner.

Judging from the aforementioned statements, it is probable that although both the Launch Controller and the Winch Operator at Gliding field No. 2 recognized Glider A approaching from behind Glider B just before the two gliders came into contact, the Launch Controller was not able to warn the relevant parties via radio, as he did not immediately understand the unprecedented situation of a glider flying into an adjacent Gliding field without permission, and the Winch Operator was only just able to reduce the winch engine power in order to let Glider B release its towline sooner than usual.

3.6 Mid-Air Contact

3.6.1 Damage to the Gliders

As described in 2.3.1, Glider A had a scratch mark and crack on the lower side of its right wing leading edge and blue paint residue from the rudder of Glider B. On the other hand, as described in 2.3.2, Glider B had a scratch mark on the upper surface of its horizontal stabilizer towards its aft, and damage to the upper portion of the rudder.

It is highly probable from this damage that, despite the fact that the right wing of Glider A and the upper surface of the horizontal stabilizer and upper rudder of Glider B came into contact, both gliders survived without major damage, indicating that the contact was relatively minor, and that Glider B was flying faster than Glider A, presuming from the direction of the scratch.

3.6.2 Mid-Air Contact

- (1) As described in 3.5.2(1) and 3.6.1, it is highly probable that the upper surface of the horizontal stabilizer and upper portion of the rudder of Glider B, which was in its climbing phase, came into contact with the lower side of the right wing leading edge of Glider A, which was gradually descending in its gliding phase, in such a manner that Glider A was overtaken by Glider B from below.
- (2) As described in 2.1.2(1), soon after the Pilot heard a sound and felt a jolt, he saw a glider being towed by the towline flying in the upper left corner in front.

Based on this, it is probable that the action taken by the Winch Operator in reducing the winch engine power, in an attempt to make Glider B release its towline earlier, was able to reduce the rate of climb of the Glider B. However, it is highly probable that the Winch Operator was not able to actually make Glider B release its towline before the contact took place.

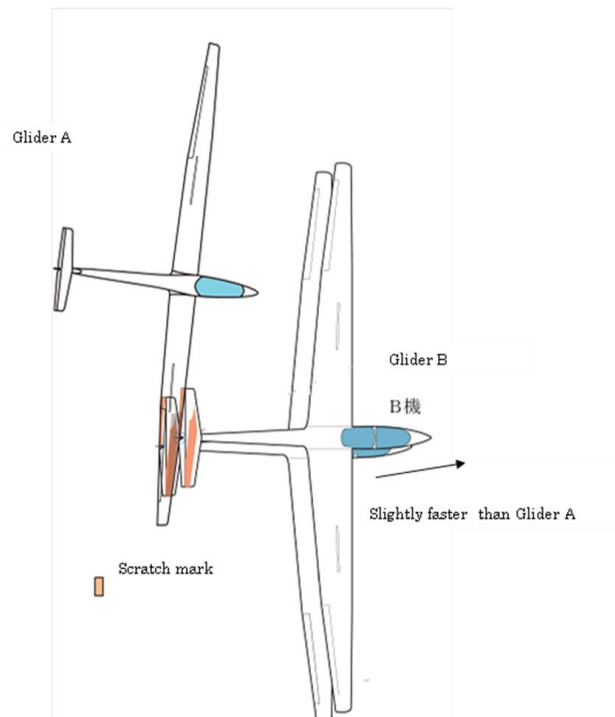
As described in Sections 2.1.2(1), (4), and (5), neither Glider A nor Glider B recognized the other glider by sight until the moment they came into contact; thus, it is highly probable that neither glider took any evasive maneuvers.

Judging from the aforementioned statements, it is probable that although the contact damage incurred on both gliders in this accident was relatively minor, with no influence on flight control systems on either glider, it is happened to be the result of coincidence in how both gliders approached each other at the time of the accident, and not from evasive maneuvers taken intentionally, functioning effectively and properly.

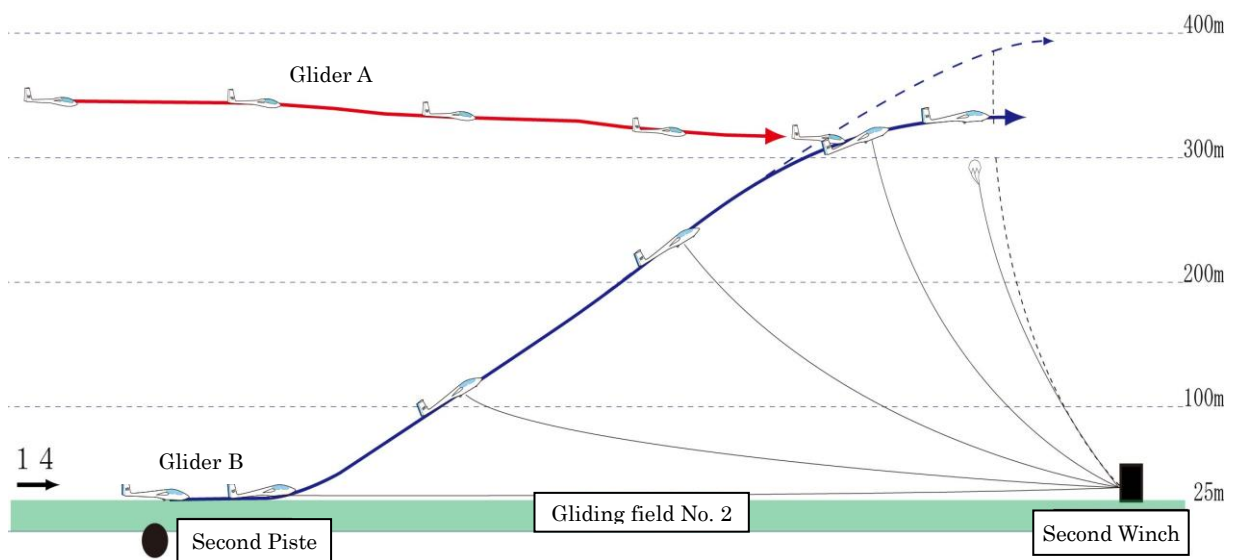
It is probable that if the circumstances during the time of the accident, when both gliders were approaching towards each other, were different even to the slightest degree,

the right wing of Glider A and the tail of Glider B may have collided and structurally failed, disabling the flight controls of both gliders, leading to a major disaster involving fatal injuries of persons onboard of both gliders.

(TOP VIEW)



(SIDE VIEW)



Circumstances during the Mid-Air contact (presumed)

3.7 Prevention of the Mid-Air Contact at the Gliding field

The Gliding field operates two Gliding fields that are adjacent to each other, where each of those Gliding fields operates multiple runways that are being used by many universities.

Because of the unique characteristics of this Gliding field, the following measures must be taken in order to prevent the mid-air contact..

(1) Clarification of the Gliding field Operation Procedures

Clarifications must be made with respect to the launching procedures and other operations so as to avoid entering the adjacent gliding field, and regulations promoting the safety in every aspect must be established clearly in the regulations even for a standard practice that was simply being followed as a tradition, so that relevant parties, including the large number of new students who are joining the flight operation every year, can easily understand the rules that must be followed.

(2) Clarification of the coordination and control procedures between each Piste

In operation of the multiple runways at the same time, when more than one Piste are involved, the Piste must communicate directly with each other in confirming the safety in controlling takeoff and landing, instead of merely monitoring the radio communications at each Piste. Furthermore, the clarification must be made, such as by specifically establishing this procedure in the regulations.

(3) Ensuring the Safe Competition

During the competition where many gliders fly simultaneously in the vicinity of the Gliding field, the competition staff must impress the participants that ensuring the safety precedes the competition score, and must make sure as a top priority that this rule is obeyed during the competition.

4 PROBABLE CAUSES

It is highly probable that this accident occurred when Glider A, launched from Gliding field No. 1 for the gliding competition, came into contact with climbing Glider B, by flying diagonally across the airspace over the adjacent Gliding field No. 2, where Glider B was in the launching process.

It is highly probable that the reason why Glider A flew diagonally across the airspace over the adjacent Gliding field No. 2, where Glider B was in the launching process, was that the Pilot had become preoccupied with finding a thermal in order to achieve an advantage in the gliding competition, and had lacked awareness to avoid flying into the airspace over the adjacent Gliding field.

Furthermore, it is somewhat likely that the cause for the Pilot to lack the awareness to avoid flying into the airspace over the adjacent Gliding field was attributed to the fact that a standard practice, advising the launched glider to avoid flying into the airspace over the adjacent Gliding field, was not specified in any regulations.

5 SAFETY ACTIONS

The JSAL has taken the following safety actions in response to the occurrence of this accident.

5.1 Revision of the Flight Operation Procedures

The Flight Operation Procedures were revised as follows on September 19, 2013.

- (1) The launched glider, upon release of the towline, must not enter an upwind gliding field by crossing over the end of its runway.
- (2) If a pilot wishes to enter the traffic pattern of the adjacent gliding field while in-flight, he or

she must obtain permission from the Piste of corresponding gliding field via radio.

- (3) Before the launching and during the winch towing, the launch controller and the record keeper in the Piste shall pay attentions to other gliders in the vicinity, rather than to simply focus on the glider that is in the process of launch.

The following safety measures were put on a trial run from October 31, 2013, before the Flight Operation Procedures were revised on April 1, 2014 as follows.

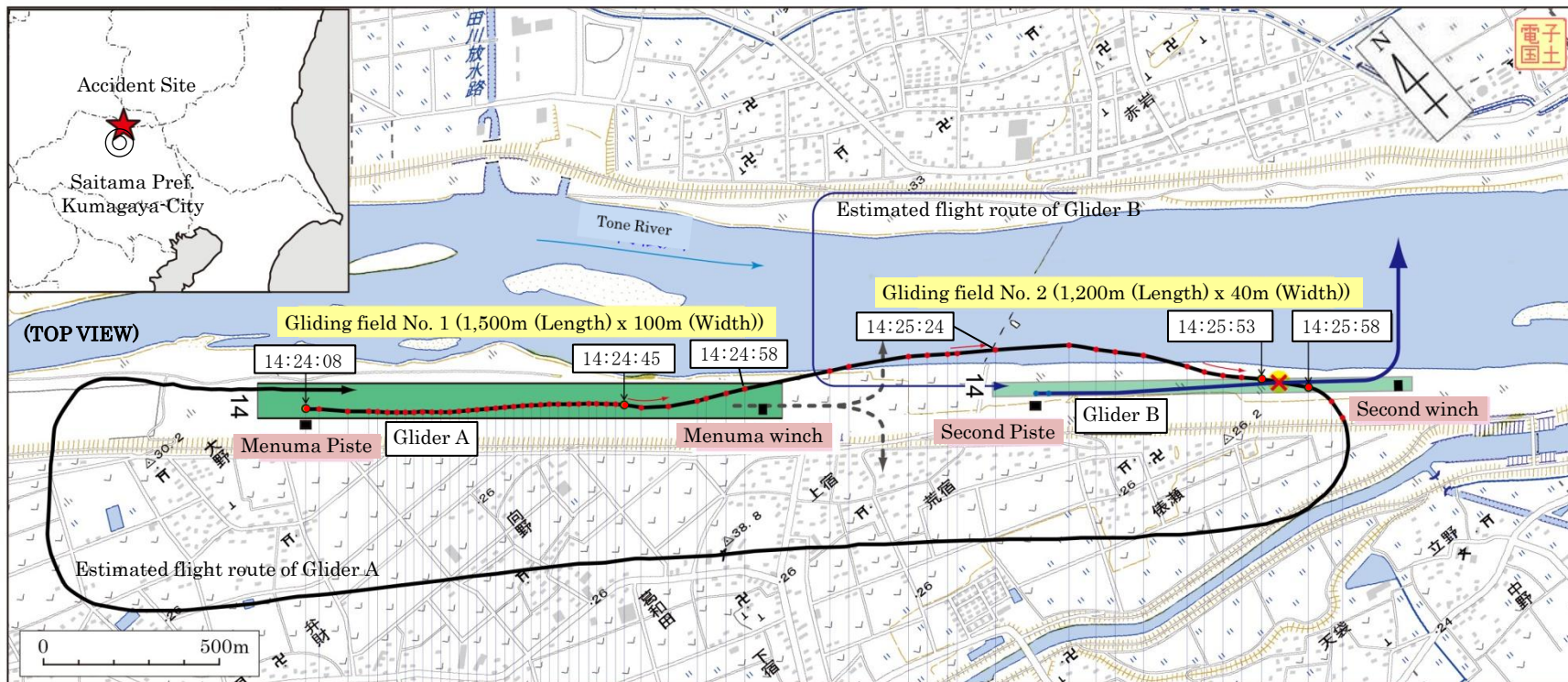
- (1) The launched glider shall inform the Piste via radio of the towline release altitude and the turning direction (right or left) during the towline release. Upon confirming the turning direction of the glider during its towline release, the Piste shall inform the Piste in the adjacent gliding field of the turning direction of the glider and the feasibility of the next launch from the another gliding field.
- (2) The upwind Piste shall confirm by visual observation the turning direction of the glider being launched from the downwind gliding field after the towline release.

5.2 Revision of the Safety Measures for the Competition of All Japan Student Glider Championships Competition

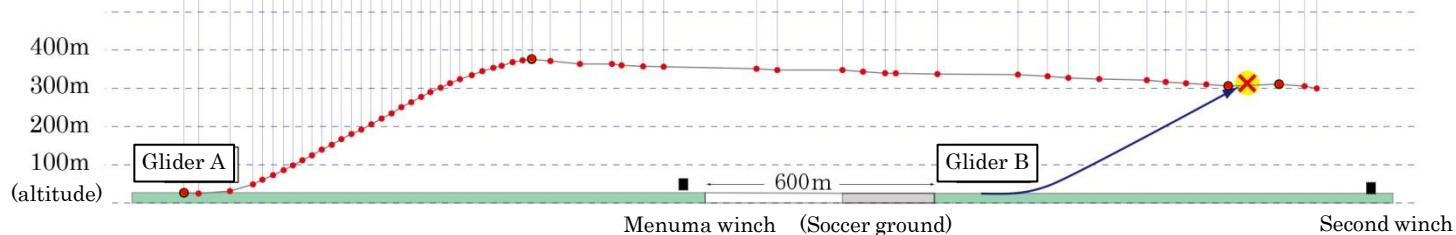
The JSAL revised the safety measures for the competition of All Japan Student Glider Championships Competition on April 1, 2014, and instructed that those be applied to the safety measures during the competitions between the universities.

- (1) Additionally allocate the competition staff in the Piste who assists in grasping the situation of the participating gliders during the flight.
- (2) Determine the possibility of flight by using the “check sheet” which will be used in order to understand the physical and mental conditions of the participants and address the safety as a top priority during the competition.

Figure 1 : Estimated Flight Route



SIDE VIEW

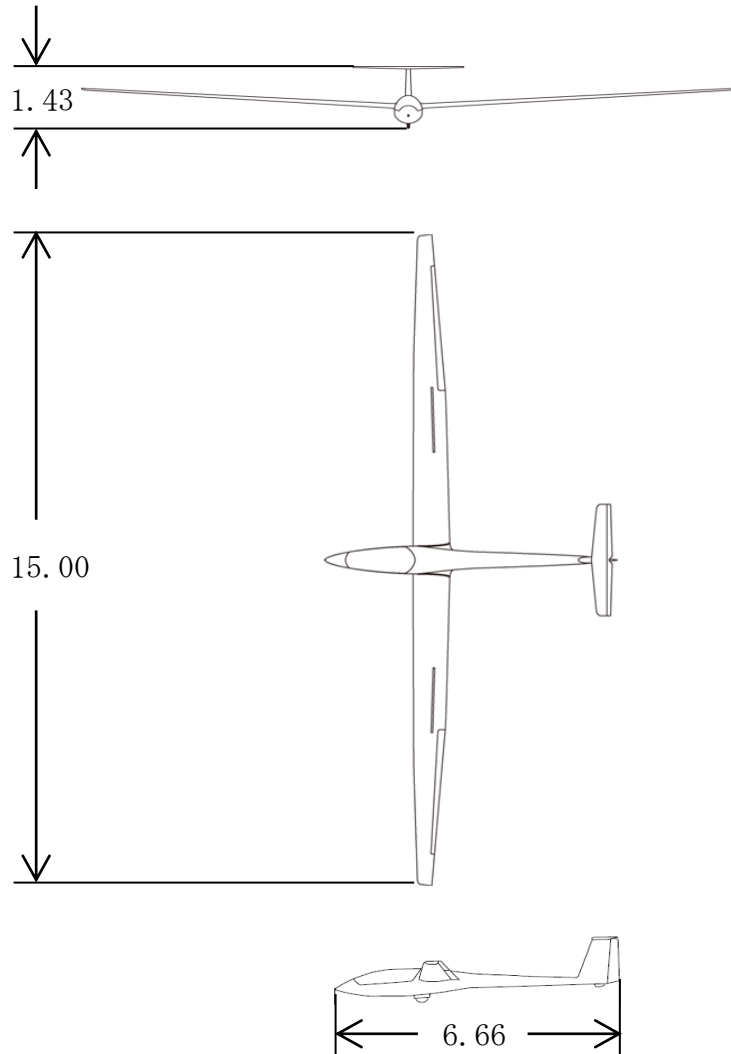


● Points where GPS location and pressure altitude were recorded

Figure 2 : Three Angle View

Unit : meters (m)

Glider A: Rolladen-Schneider LS4-b



Glider B: Alexander Schleicher ASK21

