AA2019-7

AIRCRAFT ACCIDENT
INVESTIGATION REPORT

GAKUSHUIN SCHOOL CORPORATION
J A 2 1 5 2

August 29, 2019

JTSB Japan Transport Safety Board

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.

Nobuo Takeda
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

HARD LANDING AFTER ABORTING WINCH LAUNCHING

ALEXANDER SCHLEICHER ASK13 (GLIDER, TWO-SEATER), JA2152 AT MENUMA GLIDING FIELD, KUMAGAYA CITY, SAITAMA PREFECTURE, JAPAN AROUND 15:10 JST, DECEMBER 9, 2018

August 9, 2019

Adopted by the Japan Transport Safety Board

Chairman	Nobuo Takeda
Member	Toru Miyashita
Member	Yoshiko Kakishima
Member	Yuichi Marui
Member	Yoshikazu Miyazawa
Member	Miwa Nakanishi

1. PROCESS AND PROGRESS OF THE AIRCRAFT ACCIDENT INVESTIGATION

1.1 Summary of the Accident	On Sunday, December 9, 2018, an Alexander Schleicher ASK 13, registered JA2152, operated by the Gakushuin School Corporation, with a flight trainee alone on board for a flight training of soaring club activities, experienced hard landing when it aborted launching with winch launching after lifting off from Menuma Gliding Field, and consequently, the airframe was damaged and the flight trainee on board was seriously injured.
1.2 Outline of the Accident Investigation	On December 10, 2018, the Japan Transport Safety Board designated an investigator-in-charge and two investigators to investigate this accident. An accredited representative of the Federal Republic of Germany, as the State of Design and Manufacture of the aircraft involved in this accident, participated in the investigation. Comments were invited from the parties relevant to the cause of this accident and the Relevant State.

2. FACTUAL INFORMATION

2.1 History of the Flight	According to the statements of the flight trainee (hereinafter referred to as "the Trainee"), the flight instructor A and two other flight instructors certified by Japan Student Aviation League (hereinafter referred to as "JSAL"), the launch controller at piste, the wing tip holder and the winch operator, the history of the flight is summarized as follows. On December 9, 2018 around 15:10 in Japan Standard Time (JST: UTC+9 hours; unless otherwise noted, all times are indicated in JST in this report on a 24-hour clock), Alexander Schleicher ASK 13, registered JA2152, operated by the Gakushuin School Corporation, was scheduled to

launch with winch launching from Manuma Gliding Field No. 2 in Menuma Gliding Field with a flight trainee alone on board in the training camp of club members hosted by Soaring Club of the Gakushuin*[1].

This was the second solo flight for the Trainee since the first flight conducted on September 13, 2018. Prior to the second solo flight, she conducted dual flight three times on the day of the accident with one of three flight instructors on board for each flight in order that she was evaluated for her proficiency necessary for the solo flight. The flight instructor A, who was on board in the third dual flight, approved, after the completion of the flight, that the Trainee possessed the proficiency necessary for solo flight; and consequently, she was set to proceed to conduct the solo flight under the supervision by the flight instructor A.

There was no anomaly in the flight control system and the Trainee commenced to launch in accordance with the normal procedures. The Trainee felt that the nose of the glider slipped to the left a little during ground roll; however, because it lifted off soon, she maneuvered to push control stick forward to a certain level in accordance with the points of launching to note as instructed by flight instructors in order to avoid an excessive nose-up attitude immediately after the lift-off. The Trainee judged, by seeing the parachute ahead, which was attached to tow line and could not have been seen from normal climb attitude, that the glider was under abnormal condition; and consequently, she pushed control stick forward to shift to descent attitude in accordance with the procedures set forth for the event that towline was cut. Having seen the glider not shift to a climb attitude at an altitude of about 5 m above the ground level and at the speed of about 100 km/hour, the flight instructor A instructed the Trainee to nose up with radio communication; however, there occurred no change in the situation. The Trainee did not remember that the instruction had been given.

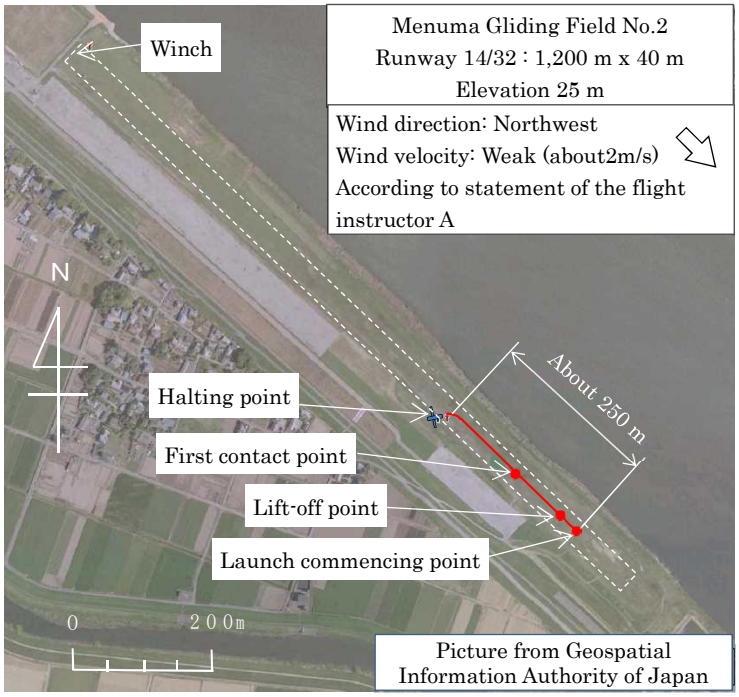
The glider collided with the ground after steep sinking, which resulted in the hard landing, and bounced due to the impact.

Then, the flight instructor A instructed the Trainee to open dive brake with radio communication and the Trainee opened dive brake after hearing the instruction; however, the glider collided with the ground twice, turned 45° or so to the left and finally came to a halt about 250 m in front of the place where the launching had commenced.

The Trainee managed to get out of the glider with the help from Soaring Club members who arrived at the site and was taken to hospital by ambulance because she appealed the backache.

The winch launcher raised winding power of tow line by pulling throttle lever of winch towing machine as normal after the glider had commenced launching. The winch launcher felt that the tension of tow line was weakened when the flight instructor A was instructing the glider to nose up

[1] Soaring Club of the Gakushuin is a collective name of integrated soaring clubs of Gakushuin University and Gakushuin Women's College and both schools are jointly performing their club activities.

	with radio communication, however, continued to wind tow line, and thereafter, stopped winding tow line when the winch launcher heard the flight instructor A instruct the glider to open dive brake with radio communication because the winch launcher judged that the glider in no case shifted to climb attitude.  Figure 1: Entire picture of Gliding Field This accident occurred about 300 m away from the approach end of runway 32 of Menuma Gliding Field No. 2 located in Kumagaya City, Saitama Prefecture (36° 11' 56" N, 139° 26' 07" E) on December 9, 2018 around 15:10.
2.2 Injuries to Persons	The Trainee was seriously injured.
2.3 Damage to Aircraft	Substantially damaged Nose fuselage: collapsed and damaged Canopy: destroyed Empennage: deformed and cracked Main wing: cracked Frame: deformed Flight control system (elevator, rudder and aileron): stuck

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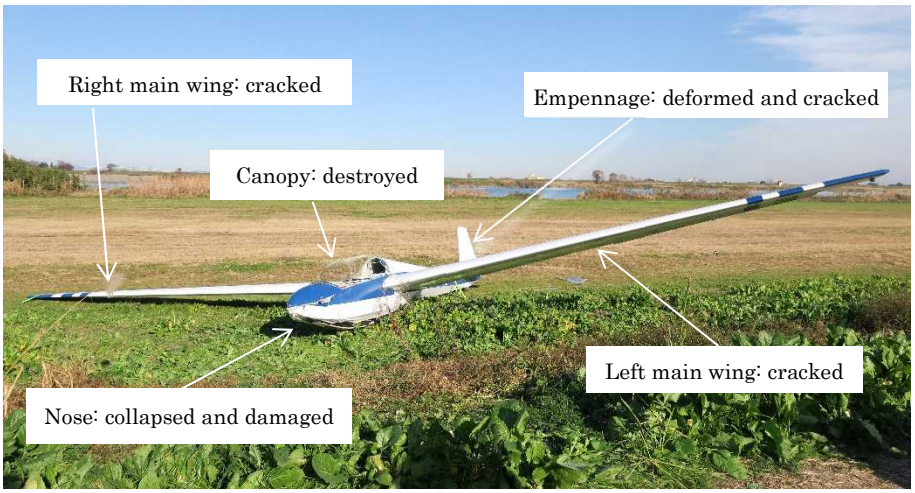
<tr><td></td><td> 

Figure 2: Accident glider</td></tr>
<tr><td>2.4 Personnel Information</td><td>Trainee Age 20
Flight training certificate validity May 16, 2019
Total flight time (cycles) 11 hours 10 minutes
(95 cycles inclusive of one time solo flight)
Total flight time in the last 30 days (cycles) 0 hours 40 minutes
(6 cycles with solo flight nil)
Total flight time on the type of aircraft (cycles) 9 hours 30 minute
(84 cycles inclusive of one time solo flight)
Flight instructor A Age 57
Commercial pilot certificate (high class glider) February 2, 2016
Flight instructor certificate (glider) December 7, 1984
Class 1 aviation medical certificate validity: February 28, 2019
Total flight time (cycles) 1,997 hours 15 minutes (5,777 cycles)
Total flight time in the last 30 days (cycles)
4 hours 11 minutes (12 cycles)
Flight time for flight instruction (cycles) 908 hours 15 minutes (4,675 cycles)
Flight time for flight instruction in the last 30 days (cycles)
4 hours 01 minutes (11 cycles)
Total flight time on the same type of aircraft (cycles)
about 200 hours 00 minute (about 1,500 cycles)
(Total flight time (cycles) described above is based on the statement of the Flight instructor A)
Total flight time in the last 30 days (cycles) 0 hour 57 minutes (8 cycles)</td></tr>
<tr><td>2.5 Aircraft Information</td><td>Type: Alexander Schleicher ASK 13
Serial number: 13437, Date of manufacture: June 6, 1973
Certificate of airworthiness No. 2018-53-05
Validity: June 15, 2019
Total flight time 3,083 hours 55 minutes
When the accident occurred, the weight and balance of the glider were within the allowable ranges.</td></tr>
<tr><td>2.6 Meteorological</td><td>According to the statement of the flight instructor A, weather condition of the gliding field at the time of the accident were as follows:</td></tr>
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Information	Fine weather, prevailing visibility; 10 km or more, wind direction; northwest and wind velocity; weak (about 2 m/s). Observations of Kumagaya Local Meteorological Observatory located about 7.4 km southwest of the accident site at the time relevant to the accident were as follows: 15:10 temperature 8.5 ℃ , precipitation 0 mm, wind direction 330 °, wind velocity 3.0 m/s
2.7 Additional Information	(1) Educational material of "Private practical curriculum text for private ground school training material" used by JSAL for theory training contains following descriptions (excerpt): *2.1 Normal take-off with winch launch* (omitted) *(Operational Procedures)* *1. Keep direction by rudder and horizontality by aileron, respectively, during ground roll.* *2. Maneuver to climb moderately up to an altitude of about 70 m above the ground level after take-off.* *(Cautions)* *1. Nose up or down operation or nose up attitude during ground roll easily results in steep climb up.* *2. Be mindful of moderate maneuvering to avoid shifting to steep pitch until reaching the minimum safety altitude (altitude 70 m above the ground level: difficulty in recovering from stalling and spinning).* (omitted) *6.1 Normal landing* (omitted) *(Operational Procedures)* (omitted) *3. Commence maneuvering of flare slowly with opening half or more dive brake when having reached an altitude of about 5 m.* *4. Keep attitude for horizontal flight near the ground surface, keep flare in harmonizing with the descent, and touch down under the condition which minimizes the sink rate as much as possible.* (omitted) *(Cautions)* *1. Keep the pitch attitude and stabilize approach speed* *2. Be mindful of timing, amount and speed of flare* (omitted) (2) "Theory manual for private practical examination" contains following descriptions (excerpt). *3. Maneuvering method and emergency treatment* (omitted) *(2) Towing procedures and various in-flight operations* *(i) Keep take-off attitude with pitch (climb angle) unchanged until*

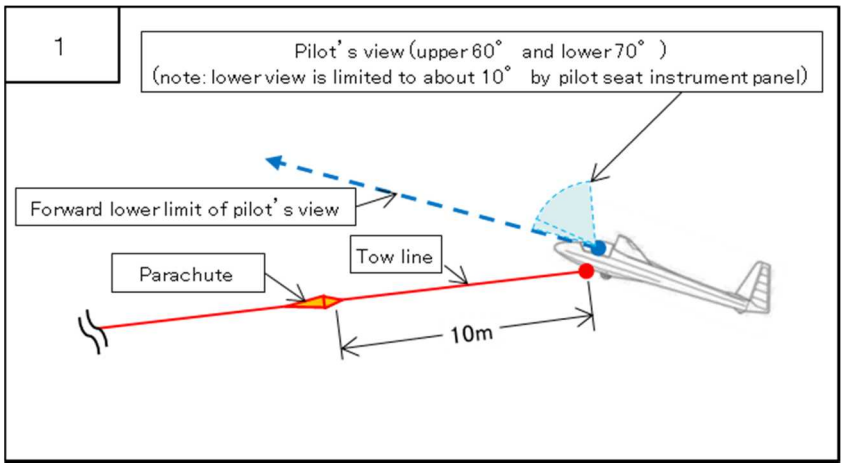
	reaching an altitude of about 5 m above the ground level after take-off. *(ii) Change attitude moderately to obtain the most efficient pitch (climb angle) of about 40° when flying over safety altitude of about 70 m above the ground level (QNH: 100 m).* (omitted) *(3) Emergency operational procedures for various cases (mal-towing, off-field landing and so on)* (omitted) *(iv) Tow line cut* *(Altitude is AGL)* *1. Before take-off: Release tow line, go forward keeping horizontality, brake and halt.* *2. Immediately after take-off to 10 m or lower: Pitch down the nose to landing attitude, release tow line and fly straight keeping horizontality for touchdown (be sure to confirm the speed of aircraft without fail in case of using dive brake).* *3. 50 m or lower: Make aircraft in gliding attitude smoothly, release tow line, use dive brake after confirming that the sufficient speed has been obtained and fly straight for touchdown.* *4. Safety altitude (100 m) or lower: Make aircraft in approaching attitude smoothly, release tow line and fly straight. Open dive brake or simultaneously use forward slip to process an altitude when the speed of the aircraft has been stabilized and land in runway area. In case that aircraft is expected to overrun runway as it is going to do, land on off-field forced landing site (dive brake is essential).* *5. 100 m or over: Make aircraft in approaching attitude smoothly, release tow line and fly straight after the attitude has been stabilized for landing on runway, if it is feasible. In case that landing on runway is infeasible, make a 360° turn or 180° turn twice to the leeward side and fly straight for landing not to make an altitude of the final turn below 100 m. In case that the head wind is one to two* (m/s) *or below and the release position is ahead of runway close to the winch, reverse approaching is feasible. In case of reverse approaching, turn to the leeward side first, and then separate the third turn and the fourth one (upwind landing is fundamental).* 6. *150 m or over: Make aircraft in approaching attitude smoothly, release tow line taking drop position into consideration and turn toward the check point after the attitude has been stabilized. In case that normal traffic pattern is feasible to be drawn depending on an altitude, land drawing such a traffic pattern. In case an altitude does not allow normal traffic pattern to be*

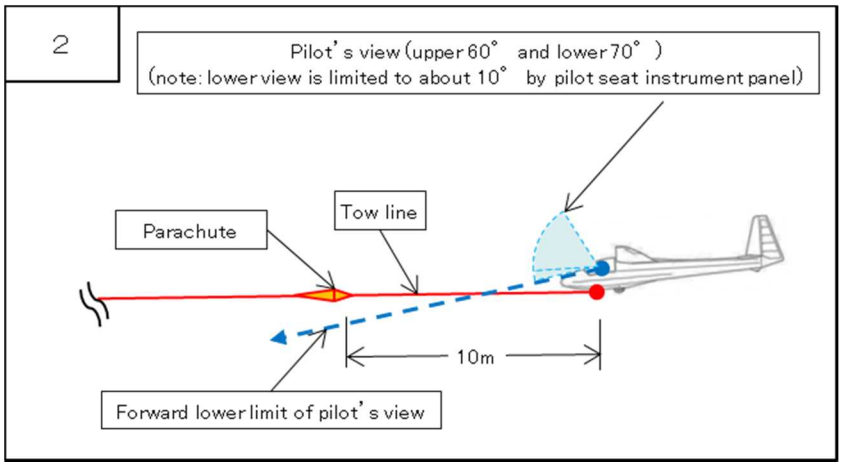
	drawn, land in runway area making small traffic patterns be drawn paying attention not to make the final turn 100 m or lower. (omitted) (3) Training situations (normal and emergency maneuverings) of trainees Soaring Club of the Gakushuin has established progress chart in accordance with training syllabus set by JSAL, and training is conducted depending on progress status of each trainee. In these trainings, launching and landing including emergency actions such as cut tow line and so on are conducted by ground school training and practical training, and the first solo flight is conducted after such trainings have been completed. The Trainee conducted her first solo flight on September 13, 2018 after having completed the trainings designated by Soaring Club; and thereafter, she conducted dual flight 12 times (aggregating 64 minutes). The trainings for actions to be taken for emergency cases such as cut tow line were conducted by the Trainee as follows: (i) Ground school: procedures for emergency release and subsequent landing depending on release altitude It was conducted on June 29 and July 6, 2018. (ii) Practical training: procedures for emergency release and subsequent landing at a little lower altitude than normal release altitude It was conducted on September 13, 2018, just before her initial solo flight. It was conducted at a little lower altitude (250 m to 300 m) than normal release altitude (about 400 m); however, the Trainee had not experienced training at a low altitude immediately after lifting off.

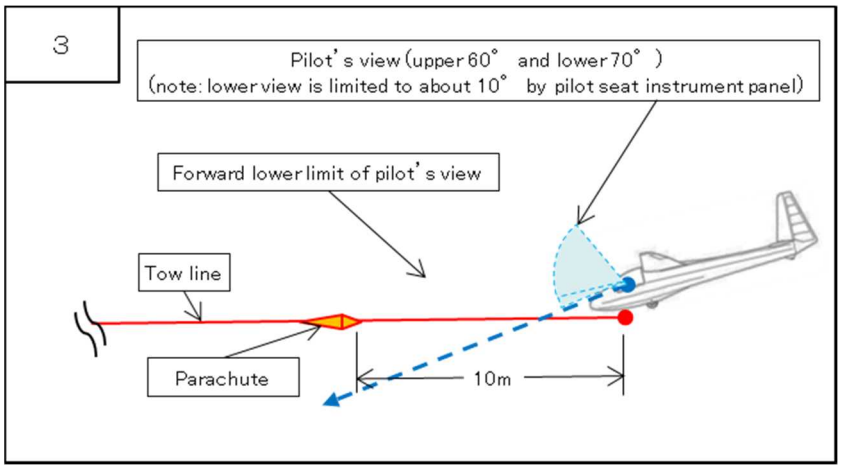
3. ANALYSIS

3.1 Involvement of Weather	None
3.2 Involvement of Pilot	Yes
3.3 Involvement of Aircraft	None
3.4 Analysis of Findings	(1) Situations from Aborting Launching until Occurrence of the Accident The glider commenced launching with winch launching with the trainee alone on board. However, because the Trainee could not shift to a normal climb attitude (attitude shown in Figure 3-1) after lifting off , it is highly probable that the Trainee aborted the launching at an altitude of about 5 m above the ground level and at the speed of about 100 km/hour, and then attempted landing. Thereafter it is highly probable that the aircraft shifted to an excessive nose down attitude (attitude shown in Figure 3-3) and the lower side of nose collided with the ground, which resulted in hard landing. Because the control system of the aircraft had no anomaly when it commenced launching, it is highly probable that the lower side of nose got

stuck due to collapsing at the time of the collision, which resulted in disabled maneuvering of the aircraft.







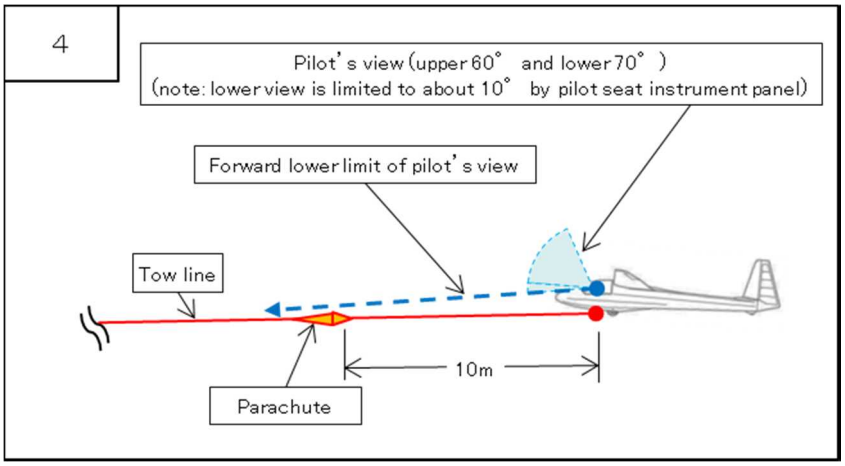


Figure 3: Attitude of airframe and pilot's view

(2) Judgment and Maneuvering of the Trainee

(i) It is probable that though the trainee felt that nose of the glider slipped to the left a little during ground roll after launching; because it lifted off soon, she maneuvered to push control stick forward to a certain level in accordance with the points of launching to note as instructed by instructors in order to avoid an excessive nose up attitude associated with an accelerated speed immediately after lifting off. It is probable that, because the maneuver to push control stick forward became excessive, the effect to limit the nose up attitude acted larger than the Trainee had expected; and thus, the aircraft shifted to a lower nose attitude than a normal climb attitude. Then, it is probable that by seeing the parachute attached to tow line, which the Trainee had never seen before at launching, the Trainee recognized that the aircraft was in abnormal attitude, and the Trainee decided to abort launching and attempted to land.

(ii) It is probable that the reason the Trainee had seen the parachute was that the aircraft had passed over tow line and had been in nose down attitude (attitude in Figure 3-2). Because coping procedures to be taken in case of passing over tow line is same as the case of tow line cut, it is probable that the Trainee attempted to follow the coping procedures for the case of tow line cut. From training experiences in the past, it is probable that the Trainee held knowledge on coping procedures to be taken in case of tow line cut. However, due to lack of experience of practical training simulating tow line cut immediately after take-off and at a low altitude of 10 m or lower, it is probable that the Trainee could not conduct an appropriate maneuvering and pushed the control stick forward too excessively, which caused the aircraft to become too excessive nose down attitude (attitude in Figure 3-3). And it is probable that the glider increased the sink speed, and collided with the ground without deceleration and flare. Besides, it is probable that the Trainee, as a result of having confronted different situation from normal, could not hear the voice of the flight instructor who instructed to nose up with radio communication.

(iii) It is probable that the aircraft could safely touch down if it pitched down the nosed to landing attitude (attitude in Figure 3-4), released tow line, flew straight keeping horizontality and appropriately used dive brake confirming the speed of the aircraft, when it was brought to different condition from normal, in accordance with emergency operational procedures of "Theory manual for private practical examination", which is used in ground school training of JASL for the case that tow line is cut immediately after take-off to an altitude of 10 m or lower.

(3) Instructions and Competence Authorization by Flight Instructor A

(i) It is probable that, in Soaring Club of the Gakushuin, instructors who have acquired flight instructor certificate are instructing, each flight instructor shares information on progress status of each trainee and training is conducted based on training syllabus set by JSAL.

Though flight instructors are instructing, as the points of launching to note, to push control stick forward to a certain level in order to prevent an excessive nose-up attitude immediately after the lift-off, it is somewhat likely that it was not thoroughly understood by students that such maneuvering should be flexibly conducted depending on the attitude of aircraft, instead of maneuvering in automatic uniform way.

(4) The Way Practical Training Is to Be

(i) In consideration of possibility that the failure of the aircraft to shift to normal climb attitude (attitude in Figure 3-1) after lift-off was attributable to lack of proficiency of the Trainee to control the glider at an appropriate pitch angle during launching, it is desirable that the current way of evaluation of proficiency to permit trainees solo flight be reviewed. Besides, in view of the lack of experience of the Trainee of the practical training simulating such case as occurrence of tow line cut at a low altitude of 10 m or lower immediately after lift-off, which is considered to have resulted in the Trainee inability to cope with the emergency situation, it is necessary that JSAL review how practical trainings prior to solo flight should be.

(ii) In the practical training of the accident, there was no recording taken such as video footage and so on. Because effective instructions can be expected if practical trainings are recorded by video camera and so on, which enables instructors to confirm the proficiency level of trainees and the trainees can look back their own proficiency level objectively, it is desirable that training method utilizing video recording and so on be considered.

4. PROBABLE CAUSES

In this accident, it is highly probable that the glider experienced a hard landing and damage to the airframe, and the Trainee was seriously injured, because it was unsuccessful shift to normal climb attitude during the launching with winch launching, excessive nose down attitude at a low altitude when the glider aborted launching.

Regarding the failure of the glider to shift to normal climb attitude during launching of the aircraft and excessive nose down attitude at a lower altitude, it is probable that because the maneuvering of pushing down of the control stick immediately after lift-off was excessive, and effect to limit the nose up attitude was largely acting.

5. SAFETY ACTIONS

In the wake of the accident, JSAL has taken following safety actions. Besides, Soaring Club of the Gakushuin is set to evaluate trainings and proficiency in accordance with such safety actions.

(1) Training in response to Emergency Situation during Winch Launching

Ground school training and practical training related to emergency maneuvering simulating mal-launching at a low altitude are clarified in the training syllabus and such trainings are conducted.

(2) Establishment of Practical Training System and Confirmation of Proficiency prior to Solo Flight

In addition to the establishment of effective training system including utilization of the footage of practical instruction of trainees and so on, proficiency and its stability of trainees who have experienced a limited number of solo flight are confirmed by flight with multiple instructors on board or multiple dual flights in case of one instructor on board prior to solo flight.

(3) Management of Training Progress

In addition to establishment of flexible training curriculum taking character, physical condition and suitability of each trainee into consideration, system incorporating thorough management of training progress and consultation which brings trainees a chance of dialogues with senior trainees and instructors is established.