AA2009-6

AIRCRAFT ACCIDENT INVESTIGATION REPORT

PRIVATELY OWNED

J A 2 1 3 0

July 31, 2009

Japan Transport Safety Board

The investigation for this report was conducted by Japan Transport Safety Board, JTSB, about the aircraft accident of PRIVATELY OWNED, ALEXANDER SCHLEICHER ASK13 registration JA2130 in accordance with the act for Establishment of the Japan Transport Safety Board and Annex 13 to the Convention on International Civil Aviation for the purpose of determining causes of the aircraft accident and contributing to the prevention of accidents/incidents and not for the purpose of blaming responsibility of the accident.

This English version of this report has been published and translated by JTSB to make its reading easier for English speaking people who are not familiar with Japanese. Although efforts are made to translate as accurately as possible, only the Japanese version is authentic. If there is any difference in the meaning of the texts between the Japanese and English versions, the text in the Japanese version prevails.

Norihiro Goto,
Chairman,
Japan Transport Safety Board

AIRCRAFT ACCIDENT INVESTIGATION REPORT

PRIVATELY OWNED
ALEXANDER SCHLEICHER ASK 13 (GLIDER, TWO-SEATER), JA2130
YOMIURI OTONE GLIDING FIELD, OTONE-MACHI,
KITASAITAMA-GUN, SAITAMA PREFECTURE, JAPAN
AT ABOUT 10:23 JST, JULY 20, 2008

July 10, 2009

Adopted by the Japan Transport Safety Board (Aircraft sub-committee)

Chairman	Norihiro Goto
Member	Yukio Kusuki
Member	Shinsuke Endo
Member	Noboru Toyooka
Member	Yuki Shuto
Member	Akiko Matsuo

1. PROCESS AND PROGRESS OF THE AIRCRAFT ACCIDENT INVESTIGATION

1.1 Summary of the Accident

On July 20 (Sunday), 2008, at about 10:23 Japan Standard Time (JST) (unless otherwise indicated, all times are JST, UTC+9h), a privately owned Alexander Schleicher ASK 13, registered JA2130, crashed at the Yomiuri Otone Gliding Field, Otone-machi, Kitasaitama-gun, Saitama prefecture, immediately after takeoff while being launched by a winch for training.

A student pilot who was the only person on board the Aircraft was seriously injured.

The Aircraft was substantially damaged.

1.2 Outline of the Accident Investigation

1.2.1 Investigation Organization

On July 20, 2008, the Aircraft and Railway Accidents Investigation Commission (ARAIC) designated an investigator-in-charge and another investigator for investigation of this accident.

1.2.2 Representative from Foreign Authorities

An accredited representative of Germany, as the State of Design and Manufacture of the Aircraft involved in this accident, participated in the investigation.

1.2.3 Implementation of the Investigation

July 20, 2008	On-site investigation and interviews
July 21, 2008	Examination of winch and interviews
October 23, 2008	Examination of winch operating and maintenance manual

1.2.4 Comments from Parties Relevant to the Cause of the Accident

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

1.2.5 Comments from the Participating State

Comments were invited from the participating state.

2. FACTUAL INFORMATION

2.1 History of the Flight

On July 20, 2008, at about 10:23, a privately owned Alexander Schleicher ASK 13, registered JA2130 (hereinafter referred to as "the Aircraft"), with one student pilot (hereinafter referred to as "the Student") seated in the front seat, crashed at the Yomiuri Otone Gliding Field, Otone-machi, Kitasaitama-gun, Saitama Prefecture (hereinafter referred to as "the Glider Field"), immediately after takeoff while being launched by a winch.

The history of the flight up to the accident is summarized below based on the interviews with the Student, an instructor, a piste staff and a winch operator.

(1) Student

I started glider training around May 2006, and on July 13, one week before the day of the accident, I was qualified for solo flights by an instructor-attended flight, and I flew solo twice after the qualification, and once the day before the accident. The flight in which the accident occurred was my fourth solo flight.

On the day of the accident, two gliders, i.e. the Aircraft and another of the same type, were flying by winch launching. The first, second and fourth launches were assigned to the Aircraft and the accident occurred when I was on board the Aircraft in the fourth launch. When I was looking at the Aircraft during the second launch, I felt that the acceleration of the winch launching was a little slow, so I consulted the instructor to reconfirm the procedure to use when a problem should occur during the launch. The instructor, after explaining the relevant procedure, told me, "Immediately grab the radio microphone in your left hand so that you can give the winch operator the necessary instructions."

I sat in the front seat and the Aircraft was launched in a southeastern direction. Immediately after leaving the ground, the Aircraft speed slowed down, so I instructed the winch operator, "Winch, quick" by radio. Since the Aircraft did not accelerate even after I waited a short while, I thought that it was dangerous to continue under this condition, so I decided to execute the operation to release the launching cable (hereinafter referred to as "the cable") and then bring the nose down to gain speed. At that time, the reading of the air speed indicator that I checked was somewhere between 50 and 60 km/h, so the Aircraft fell to the ground with no lift because of no time to gain the speed. When I was releasing the cable, I heard an instruction "Nose down" from the instructor by the radio. I think I also heard the sound of the cable being released from the Aircraft.

I had learnt the procedure to use when a problem should occur during winch launching like this time, but I had never experienced any of it before.

After the crash, I felt pain around my lower back, so I remained in the pilot seat waiting for rescue.

(2) Instructor

I was at the launch point of the Aircraft, and the Student asked me before the launching about the procedure in case a problem should occur during winch launching, so I told the Student the content that I had taught her in the past, and the Student seemed to have reconfirmed it. I usually educate my students to keep in mind the possible occurrence of problems whenever flying.

The Aircraft was launched, and I saw the accident at the launch point. It was in the initial stage of climbing that the Aircraft was released from the cable. And at that time, the control column should normally be held almost in a neutral position. I suppose that the winch operator throttled down the winch accelerator at that time, so the cable was loosened and released automatically. The altitude when the Aircraft was released from the cable was too low. I instruct my students to take a gliding attitude after the release of the cable while being careful not to push the control column too much forward. But this time, even if the control column had been pushed forward, the speed of the Aircraft was already so slow, so I suppose the elevators would not have worked so well.

(3) Piste staff (mainly based on the statement of the radio operator and supplemented by statement of the operation controller)

The beginning of the launch at the accident was normal, and the Aircraft lifted off around beside the piste. The Aircraft had a rather small pitch-up angle, which made the speed look a little slower than usual, and it continued climbing as it was, and the towing force of the winch was lost at the point where the climb angle should normally be much larger, and it seemed that the cable was loosened and then released automatically. Then I gave the Student instruction “Nose down” by the radio, then it seemed to be flying parabolically with the control surfaces not working, though it was not at a steep angle, but it grounded from the nose as it was and bounced several times and stopped with the nose facing sideways.

The pitch-up angle is normally about 25–30° during the initial climb phase up to a safe altitude of about 30 m, and the Aircraft appeared to have a pitch-up angle of about 25° at the time of the accident. The normal speed during the climb is also about 100 km/h. The highest altitude achieved by the Aircraft was about 17–18 m, I suppose.

After the crash, I dialed 119 to call an ambulance. The ambulance arrived about 15 minutes after the call and transported the Student to the hospital.

(4) Winch operator

I used to operate winches for about five years from around 1987, but I had not been engaged in winch operation for about 16 years after that period. The winch I had operated was a single-cable machine with no cable switching mechanism. The day before the accident, I was instructed on the operating procedure of this two-drum switching type winch by an experienced operator who had been highly skilled in operation, and I operated the winch for about 15 launches with the experienced operator attending just behind me, while I operated.

On the day of the accident, I was attended by a different experienced operator from the one who had attended me the day before the accident, but at the time when the accident occurred, he was not just behind me but on the ground.

The winch has drums on the left and right sides for winding in the individual cables, and the winch is operated while switching between the left and right drums alternately. The accident occurred at launch operation by the right drum.

When I finished launching another glider using the left drum, I pulled on the brake lever for the left drum to brake it and then moved the left-drum selector lever toward the disengaged position, and next, for launching the Aircraft, I operated the selector lever for the right drum to

engage. At that time, I think I confirmed that the unlock buttons*1 at the ends of both the left- and right-drum selector levers were not in their pressed in positions by touching the buttons *2 by my hand to confirm their height.

Just before launching the Aircraft, I grabbed the right-drum brake lever with my left hand, and the accelerator lever with my right hand; under this condition, I slowly moved the brake lever in the releasing direction in order to take up the slack in the cable. With the slack eliminated, I moved the brake lever to completely release the brake while slowly pushing the accelerator lever forward to start winding in the cable. Just then, I saw a parachute, placed at a point about 50 m from the winch, attached to the end of the left cable which was used for the preceding winch launching of another glider, was moving toward the winch, so I realized that the left drum was also winding in the cable simultaneously, and I began moving back the accelerator lever. In the meantime, the steel cable was wound up on the left drum and turned around below the winch operator seat, and the end of the cable was striking the winch structure around the drum while generating a roaring noise and sparks and creating a cloud of dust, so I moved back the accelerator lever completely and pulled on the brake lever to stop the winch. During my stopping operation of the winch, the Aircraft appeared to have slightly lifted off while the nose was going downward although it was about 1 km from the winch and obscured from my vision, so I thought it would land safely.

Before suspending the winch launching, I think it was desirable that I was able to have reported “winch red” meaning to stop the winch by the radio, but the cable on the left drum was generating a loud noise, so after I had done winch stopping operation, I took the microphone and did “winch red” radio report. I could not hear the radio report “Winch, quick.” from the Student in the roaring noise.

I heard from the experienced operator, that because the stopper is installed like strut between the root sections of the left- and right-drum selector levers under the floor of the winch operator seat, so that it was mechanically impossible to simultaneously move both selector levers to their engage positions by pulling them toward the operator seat, so I was surprised because it had wound in the left cable while launching with the right drum.

Though the indicator lights which turns on when the right or left drum is selected are installed on the instrument panel of the winch operator seat respectively, we have not executed the confirmation procedure of the indicator lights when operating the winch, because the right-drum selection indicator light did not turn on due to the malfunction. However, I think that the left indicator light had been turned off at that time.

The accident occurred at about 10:23 at the Gliding Field (latitude 36°09’ 58” north and longitude 139°40’ 03” east).

(See Figure 1 – Accident Site Layout, Figure 2 – Three Angle View of Alexander Schleicher ASK 13, Figure 3 – Winch, Photo 1 – Aircraft, and Photo 2 – Winch.)

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*1 The unlock button is, installed at the end of each selector lever, and when the selector lever is placed in either the engage or disengage position, the button pops out and locks the selector lever, and to move the selector lever, the button must be pushed and the lever must be unlocked.

*2 The amount of the height of the unlock button is about 5 mm when it is pushed in and about 10 mm when it is not pushed in.

2.2 Dead, Missing and Injured Persons

The Student was seriously injured.

2.3 Damage to the Aircraft

2.3.1 Extent of Damage

The Aircraft was substantially damaged.

2.3.2 Damage to the Aircraft Components

Fuselage	Nose deformed and its panel cracked, tail skin cracked, instrument panel of front seat detached
Wing	Panels at mid-portion of left and right wings cracked
Empennage	Horizontal stabilizer damaged

2.4 Personnel Information

Student	Female, aged 21
Student Pilot Certificate	June 17, 2008
Validity	June 16, 2009
Total flight time	17 hrs 42 min (125 launches)
Flight time in the last 30 days	1 hr 17 min (10 launches)
Total flight time on the type of aircraft	17 hrs 42 min (125 launches)

2.5 Aircraft Information

2.5.1 Aircraft

Type	Alexander Schleicher ASK 13
Serial number	13295
Date of manufacture	January 19, 1971
Certificate of airworthiness	No. 08-11-15
Validity	July 12, 2009
Category of airworthiness	Glider Utility U
Total flight time	4,316 hrs 36 min
Flight time since last periodical check (Annual check on June 15, 2008)	8 hrs 32 min

2.5.2 Weight and Balance

At the time of the accident, it is estimated that the weight was 408 kg, and the center of gravity was 222 mm aft of the reference point, and both of which are estimated to have been within the allowable range (480 kg in the maximum weight, and 70 – 247 mm within the allowable range for the center-of-gravity).

2.5.3 Stall Speed of the Aircraft

The flight manual of the Aircraft includes the following descriptions. (Excerpts)

5-1-1. Stall speed

At total flight weight of 365 kg 53 km/h

At total flight weight of 450 kg 59 km/h

2.6 Winch Information

Manufacturer	Tost Startwinden GmbH (Germany)
Year of manufacture	1980
Serial number	273

(1) Management of the winch

The winch owner did not possess "Operating and Maintenance Manual for Tost Two Drum Winches" issued by the manufacturer of the winch (hereinafter referred to as "the Company"), which describes the operation and maintenance procedures for the winch. Also the winch owner had not kept an operation log and a maintenance log of the winch.

(2) Winch manual

The winch manual that the winch owner obtained after the accident includes the following descriptions. (Excerpts)

1 OPERATING INSTRUCTIONS

(Skipped)

1.5 LAUNCHING GLIDERS AND MOTOR GLIDERS

(Skipped)

1.5.9 Engaging both drums together to launch two gliders simultaneously is not permitted under any circumstances. From winch number 564 onwards this is also physically impossible.

(Skipped)

4 GENERAL APPENDICES

(Skipped)

4.5 SAFETY, MODIFICATIONS AND FAULTS

Any of the following would be detrimental to safety and render the guarantee invalid:

(Skipped)

4.5.2 Unauthorised modifications to the equipment

(Following part omitted)

The description of *"From winch number 564 onwards this is also physically impossible"* means that the Company installed stoppers (safety interlocks) in winches on the production line.

(3) Right and left drum switching mechanism

The winch is provided with left and right two switching type drums, and the left-drum selector lever is installed on the left side of the operator seat, and the right-drum selector lever on the right side, respectively.

The position in which the selector lever is pulled to the winch operator seat side is the engaged position where the dog clutch is engaged by the lever operation, and the drum is engaged with the output transmission mechanism of the winch and rotated. The position in which the selector lever is pushed away from the winch operator seat is the disengaged position, and the drum is disengaged.

(4) Both drum simultaneous engagement prevention mechanism

In order to make it mechanically impossible that the operation of pulling both the selector levers simultaneously to the operator seat and placing them in the engaged position, the stopper is installed like strut between the root sections of the both selector levers under the floor of the winch operator seat.

The stopper is not connected to the selector levers, but is supported by the floor of the winch operator seat by means of bolts in such a way that the stopper moves to the left or to the right as either of the selector levers is moved left or right.

According to the winch owner, the winch had been used in Germany and was imported as a second-hand unit around September 2003, and at the time of the import the stopper was already installed on the winch. Whether the stopper installed in the winch is the one supplied by the Company or not, the winch owner inquired of the Company after the accident. The winch owner obtained the answer that the Company had not installed on production line, and the installed stopper was not the one supplied by the Company either, and did not know the detail in which the stopper had been installed.

(5) Left- and right-drum selection indicator lights

An electrical switch is installed on the winch frame near the root of each of the left- and right-drum selector levers respectively. When the lever is moved from the disengaged position to the engaged position, the switch which had been kept pressed by the lever is released, and this causes the switch contacts to close and energizes the corresponding circuit, and thus illuminates the associated drum selection indicator light on the instrument panel of the operator seat respectively.

According to the winch owner, the right-drum selection indicator light was already inoperative due to a malfunction when the winch was imported, and as the troubleshooting conducted by the winch owner failed to identify the cause, the winch had since been used unrepaired.

(6) Cables on the left and right drums

According to the winch owner, the cable on the left drum is made of steel, measures 1,200 m in length and weighs about 92 kg, while the cable on the right drum is made of nylon, measures 1,200 m in length and weighs about 13 kg.

(See Figure 3 – Winch.)

2.7 Meteorological Information

According to the piste staff, the weather conditions around the accident site at the time of the accident were as follows:

Weather: fine; Wind direction 130°; Wind velocity 2 – 3 m/s; Visibility: about 20 km.

2.8 Communication Information

Good communication conditions were maintained between the Aircraft and both the piste staff and winch operator.

2.9 Accident Site Information

The accident site is located at the Gliding Field on the right floodplain of the Tone River, and the Gliding Field is about 1,350 m in length, extending in the 130°/310° directions.

The Aircraft was launched from the northwest end of the Gliding Field in a 130° direction.

The winch had been positioned about 1,150 m away from the launch point. The parachute attached to the end of the cable having been released from the Aircraft was at a point about 60 m from the launch point. The cable was found running straight from the winch without any intermediate bends in the reverse direction. Ground contact mark of the Aircraft was observed at about 130 m from the launch point, and the Aircraft was in a stop with the nose facing leftward at an angle of about 70° at about 145 m from the launch point.

The piste was set up, on the extension line of right-angled direction from the point, about 30m from the launch point to the launching direction.

(See Figure 1 – Accident Site Layout, Photo 1 – Aircraft.)

2.10 Examination of the Winch

2.10.1 Left-Drum Selector Lever Position for Both Drum Simultaneous Engagement

Since both drums were engaged simultaneously when the accident occurred, causing the cables of both drums to be wound up simultaneously, an examination was conducted for the selector lever positions at which both drums would engage simultaneously.

(1) In the situation with the right selector lever in the engaged position, when the left selector lever was set to the disengaged position, the left drum was not engaged.

(2) In the situation with the right selector lever in the engaged position, when the left selector lever was operated toward the engaged position side with its unlock button pushed in, the root sections of both levers came in contact with the corresponding ends of the stopper, and at this point, the left selector lever was at the intermediate position between the engaged and disengaged positions while its unlock button was still in the pushed in position, and under this condition, it was found that the left dog clutch teeth were partially engaged and the left drum was engaged, and thus both drums were engaged simultaneously and their cables were wound in.

2.10.2 Left-Drum Selector Lever Position when the Drum Engaged and the Indicator Light Turned On

Since the winch operator stated that the left drum cable was wound in, but he believed the left-drum selection indicator light was turned off at the time of the accident, an examination was

conducted of the left selector lever position when the left drum would become engaged and when the left-drum selection indicator light would turn on.

In the situation with the right selector lever set to the disengaged position, the left selector lever was moved slowly toward the engaged position side from the disengaged position within the range at the intermediate lever position between the engaged and disengaged positions after pressing the unlock button and while leaving the button in the pressed position.

The amount of movement of the lever was measured at its top end using the disengaged position as a reference, and the left-drum dog clutch started to engage when the lever was moved about 3.5 mm, and the left-drum selection indicator light turned on when the lever was moved about 43 mm, and the unlock button popped out, locking the lever in the engaged position when the lever was moved about 45.5 mm.

The result of this examination showed that the lever has a travel range of 39.5 mm in which the drum is engaged without illumination of the indicator light.

The winch manual does not include any adjustment procedures for enabling the indicator light to turn on upon engagement of the drum when the lever is within the range at the intermediate position.

(See Figure 3 – Winch.)

2.11 Pilot's Operation in the Event of a Problem during Winch Launching

(1) "The Basics of Gliding Operation" by Kakuichiro Harada (published by Hobun shorin, 1990), an extensively referenced publication in the field of gliding aviation in Japan, includes the following descriptions. (Excerpts)

5. Pilot's Training during Winch Launching

(Skipped)

Pilot's Operating procedure (from page 74)

1. Takeoff and climb

1) Set all control surfaces to neutral, and in the initial stage of the ground roll, support the control column lightly against backward movement to prevent the glider from climbing steeply and the tailskid from hitting the ground hard. As the glider gains speed, bring the control column back to neutral so that the glider runs on the ground on its wheels.

(Skipped)

Let the glider lift off in its natural attitude. Pitching up with the elevators before sufficiently gaining speed will cause the tailskid to hit against the ground.

(Skipped)

3) Avoid a steep climb until the glider reaches an altitude of about 30 m (safe altitude). The safe altitude refers to an altitude determined considering the performance of each glider, at and above which you can gain the necessary speed by pitching down to prevent a stall should cable breakage, winch failure or any other abnormal conditions occur. If you attempt pitching down the glider at a height below the safe altitude, you may hit the ground hard before the glider can accelerate. You should be careful not to climb steeply just after takeoff.

(Following part omitted)

(2) "Listen to the Wind" by Mitsuru Marui (published by Kantohsha, 1992) includes the following descriptions. (Excerpts)

STEP 3 Advanced In-flight Operating Procedure Course

(Skipped)

No. 16 Winch launching (1) Normal procedure (from page 65)

(Skipped)

Actions to be taken in the event of winch launching problems

Condition	*Launch speed*	*Action*	(Omitted)
(Omitted)	(Omitted)	(Omitted)	(Omitted)
Slightly slow	*80 km/h*	*While keeping the current attitude, tell the winch operator to speed up by the radio.*	(Omitted)
(Omitted)	(Omitted)	(Omitted)	(Omitted)
Very slow	*Less than 80 km/h*	*Make a callout while slightly easing the pitch-up attitude. If the glider still slows down or winch launching stays slow (at 70 km/h) pitch down and release the cable.*	(Omitted)

(Following part omitted)

While the Student kept a "Listen to the Wind" given by her instructor at the beginning of her training, she did not receive a specific lecture about the contents described above.

(3) The Student was instructed the following from her instructor as the actions to be taken in the event of a problem arising during winch launching.

If a problem arises below an altitude of 100 m, the pilot should basically descend while maintaining a straight direction, and land at a place with safe surface conditions.

If a problem arises above 100 m, the pilot should descend after a turn. At higher altitudes, the pilot should follow the instructions of the piste staff.

3. ANALYSIS

3.1 The Student held a valid student pilot certificate.

3.2 The Aircraft had a valid airworthiness certificate and had been maintained and inspected in accordance with applicable regulations. As the Aircraft had been flying normally up until the moment the accident occurred as described in the statements in 2.1, it is considered highly probable that there were no abnormalities in its airframe and flight control systems.

3.3 It is considered highly probable that the weather conditions at the time of the accident did not have any relation to the occurrence of the accident.

3.4 As the winch launchings were performed normally up until the accident occurred as described in the statements in 2.1, it is considered highly probable that there were no abnormalities in the output and transmission mechanism of the winch.

Judging from the statement of the winch operator described in 2.1 (4), it is certain that the winch operator suspended the winch launching of the Aircraft when he noticed that the left drum, which was not being used for the winch launching, was also winding in the cable.

It is considered probable that the reason the launch speed was slower than normal is that the left drum, which had a steel cable and on which brakes were applied, was also engaged.

3.5 Altitude of the Aircraft when Released from the Cable

As described in 2.9, the cable was found running straight from the winch without any intermediate bends in the reverse direction. It is therefore considered highly probable that the cable continued to be wound in by the winch even after it was released from the Aircraft.

As described in 2.1 (3), the piste staff stated that the Aircraft lifted off as it passed just in front of the piste. Since the piste was about 30 m away from the launch point while the end of the cable was found at a point about 60 m away from the launch point as described in 2.9, it is considered probable that it was on a stretch of about 30 m between the piste and the cable end point that the following series of evens occurred: takeoff of the Aircraft, start of moving back the accelerator lever by the winch operator, release of the cable from the Aircraft, and complete stop of the winch.

Since the distance from the point that the Aircraft took off to the point that the cable was released from the Aircraft should be shorter than the abovementioned distance, and the Aircraft appeared to have a pitch-up angle of about 25° as described in 2.1 (3), it is considered probable that the Aircraft was at a height of about 10 m above the ground when it was released from the cable.

3.6 Aircraft Operation by the Student

As described in 2.1 (1), the Student stated that she gave the “Winch, quick” instruction by the radio, because the Aircraft had slowed down immediately after leaving the ground, but since it did not accelerate even after waiting a short while, she decided to execute the operation to release the

cable and then bring the nose down. It is therefore considered probable that the Aircraft slowed down between the time when the winch operator started to move back the accelerator lever and the time when the Student started to bring the nose down to maintain speed.

The distance from the point corresponding to the time when the winch operator started to move back the accelerator lever to the point when the Aircraft was released from the cable is less than 30 m, as described in 3.5. It is therefore considered probable that it was difficult for the Student to start pitch-down control to maintain a safe speed at the earlier part of such a short period.

It is considered probable that the altitude at which the Aircraft slowed down was not high enough for it to gain the necessary speed for a safe landing during its descent after the release of the cable, which then led to the crash.

3.7 Winch Operation by the Winch Operator

(1) Judging from the findings of the winch examination described in 2.10.1, it is considered highly probable that at the time of the accident the left-drum selector lever was positioned between the engaged and disengaged positions with the unlock button pushed in. Although the winch design does not assume any operation with a drum selector lever in an intermediate position between the engaged and the disengaged positions, it is considered highly probable that during the disengagement operation of the left selector lever, the winch operator failed to fully ensure that the lever was definitely in the disengaged position by checking that the unlock button was in the “out” position and thus the lever was locked, so the setting of the lever to the disengaged position was incomplete. It is considered probable that a factor contributing to the operator's failure to make sure of the lever setting is that the operator did not know about the existence of lever positions that allow both drums to become engaged simultaneously.

(2) When the operator took up the slack on the right cable before the launch, it is considered highly probable that the left drum also started to move. It is considered highly probable that the operator was nevertheless not aware of the movement of the left drum because he did not expect that the left drum would move and, therefore, paid no attention to the left drum.

For correct operation of the drum selector levers, it is essential for operators of this winch to respect the basic procedure, i.e., to confirm locking of each lever in the engaged or the disengaged position by making sure that the unlock button on the lever is in the “out” position, and that the corresponding drum selection indicator light is illuminated or not illuminated.

3.8 Both Drum Simultaneous Engagement Prevention Mechanism

As described in 2.10.1, when the right selector lever was set to the engaged position, it was still possible to move the left selector lever toward the engaged side even to a position where the left drum is also engaged. It is therefore considered highly probable that the existence of this intermediate position is caused by the lack of stopper length to work as a safety component, i.e. as a both drum simultaneous engagement prevention mechanism.

As described in 2.10.2, when the right-drum selector lever was set to the disengaged position,

there was a positional range of the left selector lever between its engaged and disengaged positions, in which the left drum was actually engaged but the left-drum selection indicator light was not illuminated. Judging from this finding and the statement described in 2.1 (4), it is considered highly probable that at the time of the accident, the left indicator light was not illuminated.

It is certain that in the situation with one lever in the engaged position and the other in the disengaged position, if the length of the stopper is long enough to make both ends of the stopper come in contact with the root sections of both levers without any clearance, then, in the situation with one lever in the engaged position, any intermediate position does not exist in the other lever and, therefore, there is neither a lever position at which both drums are engaged simultaneously nor a lever position at which a drum is actually engaged but its indicator light is not illuminated.

3.9 Management of the Winch

As described in 2.6 (1), the winch owner did not possess the winch manual at the time of the accident and had not kept an operation log and a maintenance log of the winch, and also as described in 2.6 (5), the owner continued operating the winch without repairing the right selection indicator light, which had been found to be inoperative at the time of import of the winch, so, it is considered highly probable that management of the winch had been inadequate.

The winch should never have been used with the drum selection indicator light, a safety device, in an inoperative condition, and instead it should have been repaired before putting the winch in service, after importing it.

4. PROBABLE CAUSE

It is considered probable that this accident was caused by the following series of events. Immediately after the Aircraft took off by winch launching from the Gliding Field, the winch operator suspended the winch launching operation. This caused the Aircraft to decelerate while the Student was starting the operation for bringing the nose down. As the altitude of the Aircraft at that time was too low for it to gain a safe speed during its descent after the release of the cable, it crashed to the ground.

With regard to the reason why the winch operator suspended the winch launching operation, it is considered highly probable that he did so because he found that the left drum, which was not being used for the winch launching, was winding in its cable. With regard to the reason why the left drum was winding in the cable, it is considered highly probable that this condition resulted from the winch operator failing to completely set the left selector lever to the disengaged position and instead left it in an intermediate position between the engaged and the disengaged positions.

With regard to the reason why the left selector lever was able to stay between the engaged and the disengaged positions and thus allowing both drums to engage simultaneously, it is considered highly probable that this state is caused by the lack of stopper length.

5. REFERENTIAL MATTERS

After the accident, the owner of the winch implemented the following measures.

(1) The stopper on the winch was removed and replaced with a stopper supplied by the Company. As the length of the new stopper was adjustable, the owner adjusted it in such a way that there is no clearance between the stopper's ends and the levers' root sections when one lever is set to the engaged position and the other lever to the disengaged position, thereby eliminating any chance of the simultaneous engagement of both drums.

(2) The light system for the left- and right-drum selection indicator lights was repaired to ensure that the lights work respectively.

(3) A daily checklist has been established in order that the winch is inspected according to the daily checklist before every operation to check that there are no problems with the winch.

Figure 1 Accident Site Layout

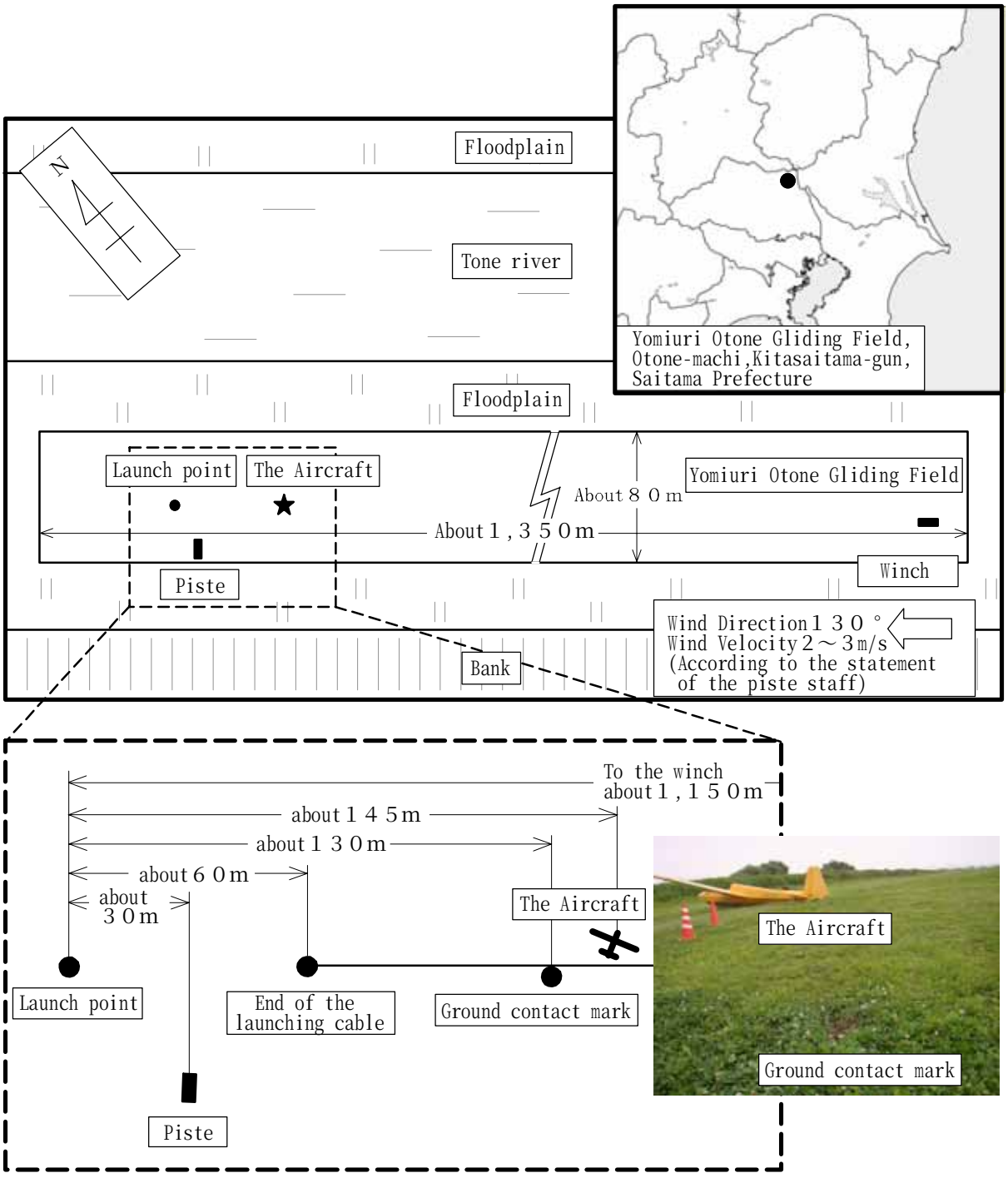


Figure 2　Three Angle View of
Alexander Schleicher ASK13

Unit：m

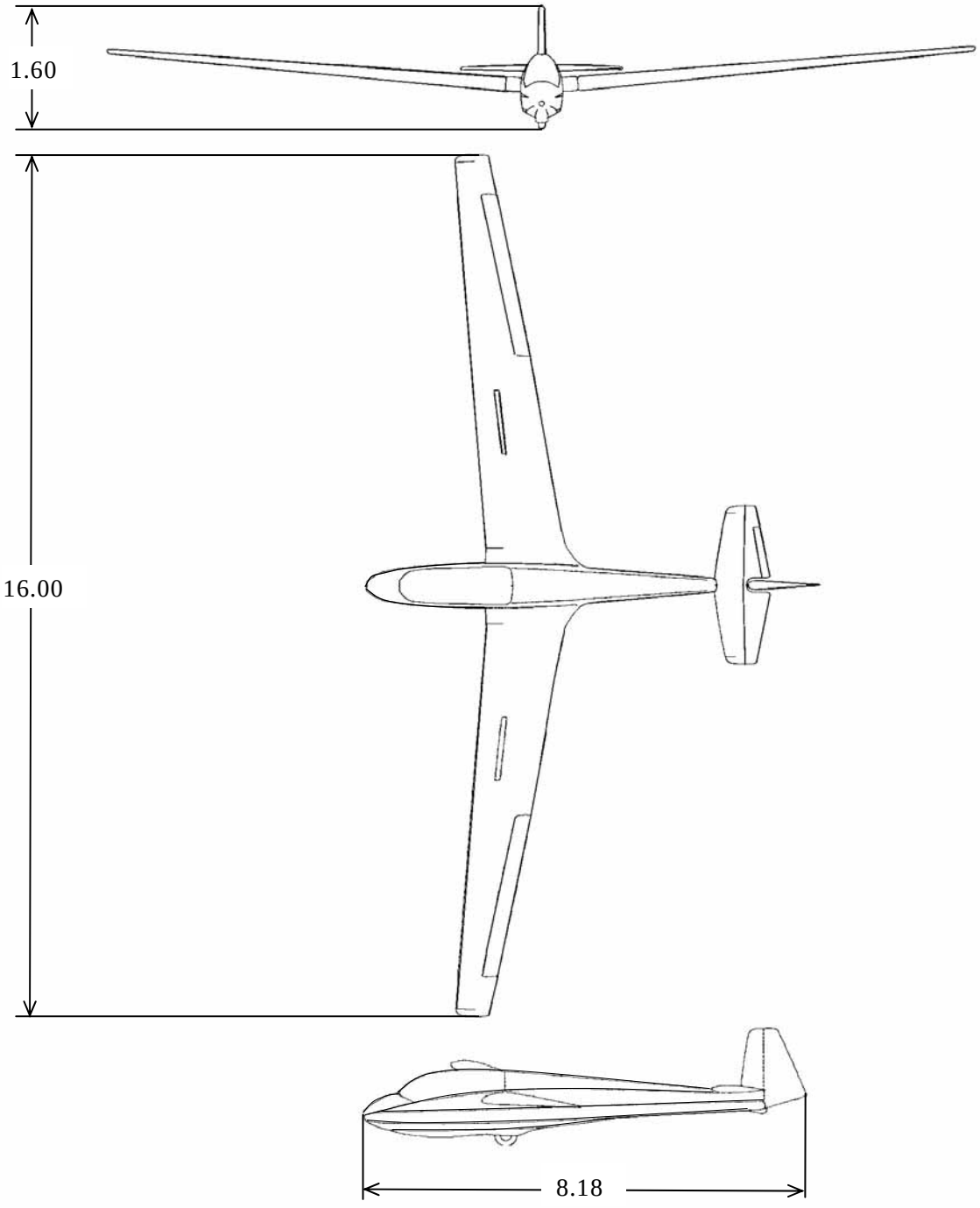
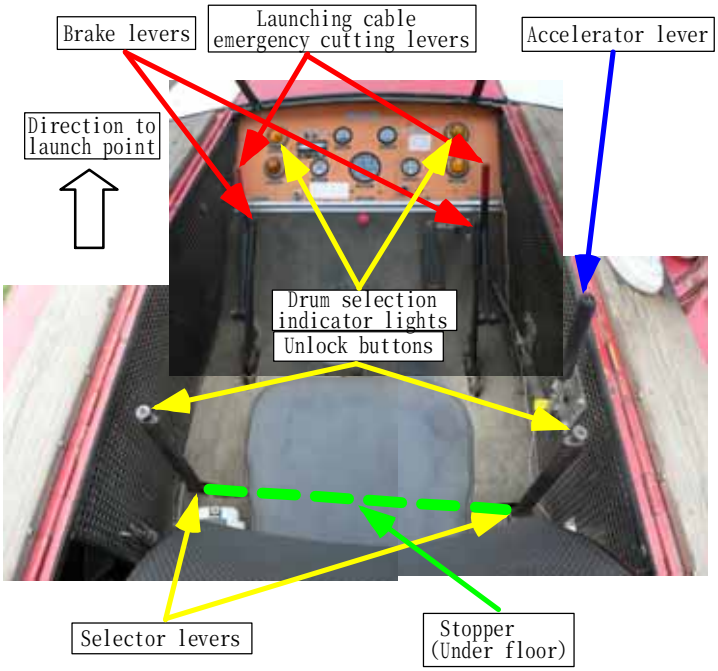


Figure 3 Winch



Schematic figure of winch rear view

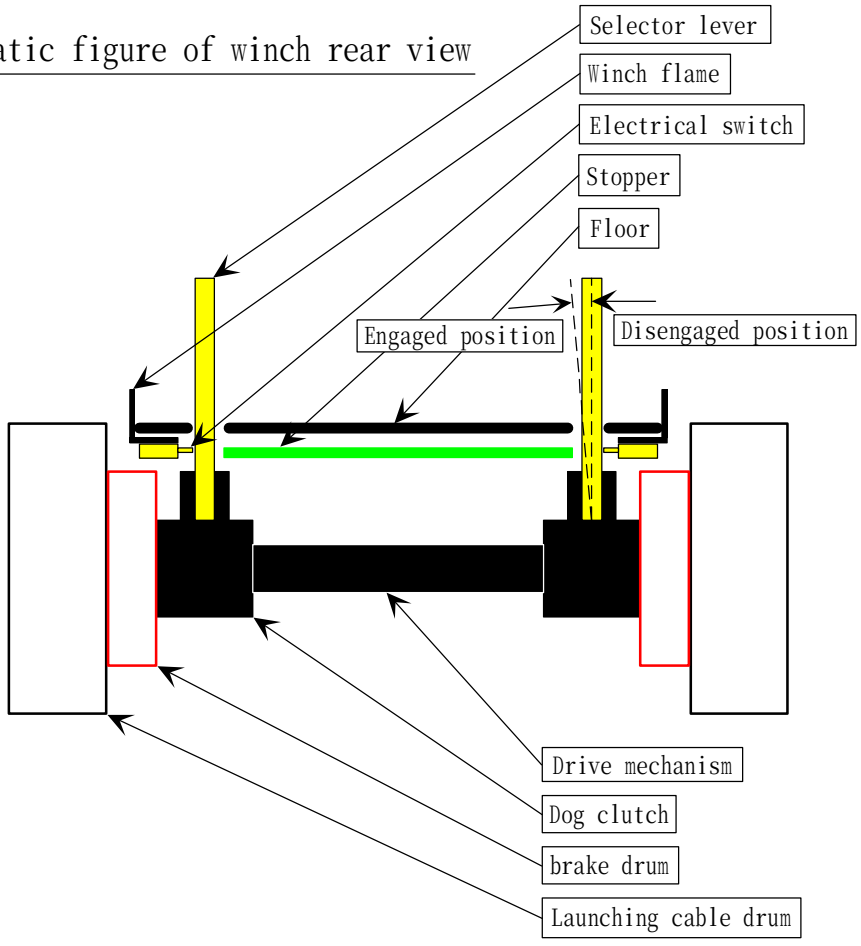


Photo 1　The Aircraft

Photo 2　Winch