

AA2008-1

**AIRCRAFT ACCIDENT
INVESTIGATION REPORT**

**PRIVATERY OPERATED
ALEXANDER SCHLEICHER
ASK23B (GLIDER, SINGLE-SEAT) JA2409
NAGOYA CITY, NAGANO PREFECTURE, JAPAN
ABOUT 15:24 JST, MAY 12, 2007**

January 25, 2008

**Aircraft and Railway Accidents Investigation Commission
Ministry of Land, Infrastructure and Transport**

The investigation for this report was conducted by Aircraft and Railway Accidents Investigation Commission, ARAIC, about the aircraft accident of PRIVATERY OPERATED ALEXANDER SCHLEICHER ASK23B(GLIDER,SINGLE-SEAT), JA2409 in accordance with Aircraft and Railway Accidents Investigation Commission Establishment Law and Annex 13 to the Convention of International Civil Aviation for the purpose of determining cause of the aircraft accident and contributing to the prevention of accidents and not for the purpose of blaming responsibility of the accident.

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Norihiro Goto,
Chairman,
Aircraft and Railway Accidents Investigation Commission

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**PRIVATELY OPERATED,
ALEXANDER SCHLEICHER
ASK23B (GLIDER, SINGLE-SEAT)
JA2409
NAGANO CITY, NAGANO PREFECTURE
ABOUT 15:24 JST, MAY 12, 2007**

December 14, 2007

**To be approved by the Aircraft and Railway Accidents Investigation Commission
(Air Subcommittee Meeting)**

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

1. PROCESS AND PROGRESS OF THE ACCIDENT INVESTIGATION

1.1 Summary of the Accident

The Alexander Schleicher ASK23B, JA2409, a privately operated glider, left the Nagano City gliding field in Nagano City, Nagano Prefecture, by winch launching on May 12, 2007 (Saturday), on a pleasure flight. At about 15:24, while flying towards Mount Taro (elevation 997m), located approximately 4.5 km to the southwest of the gliding field, it collided with a power line and crashed.

Injuries to persons on board : Pilot in command (PIC) - minor injury

Damage to aircraft : Airframe - destroyed

1.2 Outline of the Accident Investigation

On May 13, 2007, the investigator-in-charge and another investigator conducted a field investigation and interviews.

An accredited representative of Germany, the state where the glider was designed and manufactured, participated in the investigation.

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

Comments were invited from the participating state.

2. FACTUAL INFORMATION

2.1 History of the Flight

On May 12, 2007, at about 15:16, a privately operated Alexander Schleicher ASK23B JA2409 (hereinafter called “the glider”), left the Nagano City gliding field in Nagano City, Nagano Prefecture (elevation 338m, hereinafter called “the gliding field”), by winch launching.

The flight history of the glider, based on the statements of the PIC of the glider, a witness and the instructor, as well as the data recorded on the portable GPS is summarized below.

2.1.1 History based on Statements

(1) PIC

I arrived at the office of the Nagano City Gliders Association (hereinafter called “the Association”) at midnight. I had gone to bed at about 1:00am and gotten up at about 7:00am, upon which I had breakfast and arrived to the gliding field at about 8:00am. I assembled the airframe and checked it, then received a briefing from the person in charge of the Association at around 10:30. The weather was good, there was wind from northeast, and the using runway was 04.

The first flight was a proving flight for about 6 minutes, on which the instructor checked my maneuvering skills. We used a two-seat glider, I took the front seat and the instructor took the rear seat. After lunch, I made my second flight in a single-seat glider (Discus) for about 15 minutes.

On my third flight, I took off the gliding field by winch launching at 15:16. My launch cable was released at altitude about 720m, and I reported so to the Nagano Flight Service (hereinafter called “the Flight Service”). No problem about the airframe.

After released, I headed for Mt. Tenno (elevation 635m) and the altitude of the glider was about 640m when it reached around the mountain. I performed a figure-eight flight (to fly in a number eight-shaped pattern) several times between Mt. Tenno and the power lines which are located farther than the mountain. Immediately before the accident occurred, I started to turn left before reaching the power lines, in order to stay away from the ridge ahead. Then, I saw the power lines above, and they appeared so close that I instinctively lowered the nose and increased the bank, but I felt a shock just after that. I saw green trees right in front of me, and the glider crashed into the mountains. The altitude, which I checked a little before the collision, was about 780m. I knew the existence of the power lines, but I lost sight of them temporarily.

After the crash, I made radio calls to the Flight Service a couple of times, but there was no response. I then called one of my fellow club members on the mobile phone, and told him “The glider has crashed, but I’m still alive,” “I can walk down by myself” and the like.

While I was walking away from the scene of the accident, I came across a person from the Association and we descended the mountain together.

During flight just before the collision, the ridge of Mt.Taro looked considerably higher than the horizon.

During flight in a figure eight, when I was flying toward the power lines and turning before the power lines, my forward field of view was occupied almost by mountains and right-hand half of my field of view was occupied mostly by mountain surface. The fuselage itself did not prevent me from catching view of the power lines.

I didn’t set any other auxiliary marks than the power lines for avoiding.

The moment the power lines came into my sight, I promptly took evasive action, but I

don't remember which power lines they were or how many lines I saw.

(2) Witness

I am a member of the Association and since the morning of that day I was volunteering to cut low-bush grass along the trekking path of Mt. Taro with some local residents. We worked along the ridge of Maguse Pass side and crossed the summit of Mt. Taro and up to a tourist spot called Koshiki Rock (elevation 795m), where we got together with another group of volunteers who had worked from Mt. Tenno side at about 12:30, and there the work finished.

Koshiki Rock commands a marvelous view, from where you can see the gliding field to the mountains, so we stayed there, leisurely watching the gliders flying.

Until about 13:30 the wind was blowing gently and there seemed no ascending air stream, we saw few gliders. At around 15:00, the wind started to blow constantly from the north, and we saw one glider after another flying towards us for a ridge soaring¹ utilizing the ridges from Mt. Tenno to Mt. Taro.

The glider flew passed just in front of me. At the moment I thought it was flying straight a little bit farther than usual and too close into the mountains, the glider made a steep turn to the left, with its nose down. The bank angle looked somewhere between 45° to 60°. Hardly had I been taken aback by the steep turn and nose down when the tip of the right wing hit the power line, making a loud noise and its pieces were scattered. I could see it clearly because the white broken parts struck sharp contrast with the green mountain. The airframe fell into the forest with the left wing and nose first. The breaking sound of the trees was so loud and clear and I could hear the leaves rustling as well. Even after the glider had vanished from my sight into the forest, the trees around there were shaking, in a manner completely different from the swaying caused by the wind.

Monitoring the frequency of the Flight Service with an air band receiver, I felt relieved when I heard the PIC of the glider reporting, "This is 2409. It crashed. I'm all right and alive." There were a number of gliders flying above us, and because radio communications were congested, I am not sure if the PIC received a reply. After a while, I heard radio from the flight service announcing that they could contact the PIC by mobile phone, and that the PIC was safe.

I climbed the ridge to help the rescue, then I met the PIC of the accident glider and came down the mountain together.

(3) Instructor

We assembled gliders on that day, starting at about 8:00 in the morning, and I checked them in accordance with the checklist and confirmed there was no problem.

At about 10:30, the operation manager of the Association made a briefing for the entire gliding field. After that, I told the club members about the flying rules to be concerned and the order of flights, and so on.

The PIC said he wanted to fly a single-seater, so I did a check flight on a dual-seater, with the PIC in front and me in the rear seat.

Having checked his skill on climb by winch launching, pattern flight, approach, and so on, I permitted him to fly a single-seater. The PIC took off on a single-seater different from the one that crashed, but he seemed to have landed shortly thereafter. I imagined that he couldn't get the thermal well.

In the afternoon, as the north wind of 4m/s or more began to blow, I went out for ridge

¹ Ridge soaring is a method of flying on an ascending current blowing on the slope.

soaring with a trainee on a dual-seater. When we were flying, we were able to soar with the upstream wind by the slope from Mt.Tenno to Mt.Taro. But at an altitude of about 830m, it became difficult to climb any higher, so we moved from Mt. Taro toward Mt. Mae. It seemed that the glider took off sometime after that, and started ridge soaring toward Mt. Taro.

After a while, I heard a transmission saying “It seems that an ASK23 has hit a power line and crashed.” I couldn’t tell who was on the radio, if it was a glider of our club member or of Nagano club. I flew closer to the scene, looked around carefully, and found something shining white in the mountains, and I thought that was the glider.

2.1.2 Data recorded on portable GPS

The glider was released from the winch at about 15:19, at an altitude of about 720m (about 380m above the ground). Then, the glider turned its nose right toward Mt. Tenno located to the south-southeast of the gliding field, and reached around Mt. Tenno at an altitude of about 650m.

The glider performed a figure-eight flight twice along the ridge between Mt. Tenno and the power lines before Mt. Taro. On its third from Mt. Tenno toward Mt. Taro, at about 15:24, the altitude of the glider became about 790m at about 100m before the power lines. Immediately after it started turning left, the position information stopped at the crash position, and the altitude lowered to 750m and stopped there.

The accident occurred at about 15:24 in the mountains (N 36° 36’ 22” and E 138° 16’ 09”) near the summit (elevation about 750m) of Mt. Kotaro (elevation 904m) in Nagano City Nagano Prefecture, approximately 3.5km south-southeast of the gliding field.

(See Figures 1, 2, and Pictures 1, and 2)

2.2 Pilot Information

PIC: Male, Age 28 years

Private pilot certificate (glider) September 21, 1999

Rating: soarer

2nd class aviation medical certificate

Validity Until June 13, 2007

Total flight time 132 h and 44 min. (374 flights)

Flight time in the last 30 days 3 h and 51 min. (8)

Flight time on the type 8 h and 35 min. (28)

Flight time in the last 30 days 1 h and 09 min. (2)

2.3 Aircraft Information

2.3.1 Aircraft

Type Alexander Schleicher ASK 23B

Total flight time 1,127 h and 54 min.

Weight and balance at the time of the accident Calculated at 337 kg with a center of gravity 400mm aft of the datum point, both of which are estimated to have been within the allowable

limits.

(See Figure 3)

2.3.2 Damage to the Aircraft

(1) Fuselage	Nose damaged, broken at midpoint
(2) Right wing	Broken and destroyed
(3) Left wing	Cracked and destroyed

2.4 Meteorological Information

The observation data in the weather reports at the Nagano Local Meteorological Observatory located 7.5 km to the northwest of the accident site at around the time of the accident was as follows:

15:00	Direction of wind... north-northeast	Velocity of wind... 3.6m/s,
	Temperature...21.2 °C	Duration of sunshine... 0.9
16:00	Direction of wind... north	Velocity of wind... 5.0m/s
	Temperature... 19.5 °C	Duration of sunshine... 0.6

2.5 Accident Site Information

The accident site is in the mountains at an elevation of approximately 750m, near the summit of Mt. Kotaro, about 3.5 km south-southeast of the gliding field.

Around the site, there was a natural forest made up of trees as tall as 10 - 20 meters. Just in front of the right wing of the glider, there was a Japanese red pine about 50 cm in diameter. Several boughs of it were broken, and the north-side bark was stripped off at about 2m from the ground. Terrain surface was covered with soft soil made up of leaf mold. The inclination of the slope was about 45° to 60°, and there were rocks here and there which give way easily.

With its nose facing southeast, the glider was broken at about the wing root. Its forward part of the fuselage and the wing barely escaped from slipping down thanks to the surrounding trees.

The broken pieces were scattered on the ground (slope) but a part of the right wing tip could not be found.

High up and to the north of the site, the power lines were suspended in a nearly east-to-west direction.

(See Pictures 1 and 2)

2.6 Details of Damage

The nose suffered cracks and dents, of which especially the lower left surface of the forward end was badly damaged.

The pilot seat remained somehow unscathed and the canopy frame remained but shattered pieces of the windshield were scattered around.

The fuselage was broken at about the wing root, and the part was hanging on the steep slope.

As to the right wing, the part from the aileron to the tip was broken and the part of about 2m long from the wing root was extensively destroyed due to the collision with the trees.

As to the left wing, a tree had cut into its leading edge at about 1.5 m from its root.

2.7 Other Information

2.7.1 The glider was equipped with a portable GPS with a built-in pressure altimeter, on which data such as position and altitude were recorded every four seconds.

2.7.2 Information of the power lines

To the north of the accident site, there were power lines suspended between No.6 pylon (53.7 m high, base elevation 803m) to the west and No.7 pylon (47.7m high, base elevation 747m) to the east. The distance between the two pylons is 347m. Three power lines were suspended in the valley side (north side), and in the mountain side (southern side), respectively and one overhead ground wire² was suspended over the power lines.

The anti-twist damper³ installed on the lowest (9.7 m downward from the top of the pylon) of the three power lines suspended in the valley side (north side) was partially deformed at about 136 m from No.6 pylon, and the wire of the armor rod⁴ was sprung up. Furthermore, white materials adhered to the power line.

According to Chubu Electric Power Co., that the point of the power line is located about 90 m above the ground and the elevation is 810 m.

(See Figures 1 and 2)

2.7.3 “The Basic Rules for Slope Soaring between Mt. Tenno and Mt. Taro” Established by the Association

The basic rules for soaring from Mt. Tenno to Mt. Taro state as follows:

The strict rules to abide by in slope soaring:

1. *Turning must be made to the wind ward. (Don't turn toward the slope.)*
2. *Do not make 360° turns at altitude same as the ridge or lower.*
3. *Fly in the upwind of the ridge.*
4. *When at the same altitude, the glider who looks at the mountains in the right side has priority.*

Once at or higher than 700 m, approaching the power lines is permitted.

Once at or higher than 900 m⁵, flying over the power lines is permitted.

2.7.4 Field of View of the Glider

As to the field of view of the glider, to about 10° below the horizon can be seen when looking down over the nose in the most limited area, and 180° or wider is assured both horizontally and vertically in other areas.

² “Overhead ground wire” has a purpose to protect the power lines from lightning strikes and works as a lightning rod.

³ “Anti-twist dampers” have a purpose to prevent the twist of the power lines.

⁴ “Armor rods” are reinforcements wound around the mounting bases of anti-twist dampers, so as to relieve burden from the power lines.

⁵ 900 meters may not satisfy the minimum safety altitude depending on the area for flying over the power lines.

3. ANALYSIS

3.1 The PIC possessed a proper airman competence certificate and a valid aviation medical certificate.

3.2 The aircraft had a valid certificate of airworthiness and had been maintained and inspected in accordance with applicable regulations.

3.3 It is estimated that the weather conditions at the time of this accident was not a contributory factor to the accident.

3.4 Position and GPS Height at the Time of Crash

On the basis of the statement of the PIC as described in 2.1.1 (1), the damage to the glider described in 2.6, and the damage of the power line described in 2.7.2, it is recognized that the glider collided with the part of the power line.

With regard to the fact that the highest altitude recorded on the GPS immediately before the collision is lower than the actual elevation by about 20 m, it is considered to be an error resulting from such that the GPS records data every four second.

3.5 Conditions that led to the Crash

It is estimated that the power lines would have been recognizable if the PIC had been paying attention continuously, because, as described in 2.1.1(1), he stated that the power lines were not hidden by the fuselage.

Based on that the elevation of Koshiki Rock is 795 m , the ridge from Koshiki Rock to Mt. Taro is a rising slope, and the PIC stated that when looking forward the forward field of view was occupied almost by mountains, and the right hand half of the field of view was occupied mostly by mountain surface, it is estimated that the background of the power lines seen from the glider was the surface of the mountains.

It is estimated that the surface of the mountains in the background might make it hard to recognize the power lines as they were blended into the colors of the surroundings, therefore the PIC lost the sight of the power lines after he looked away from them just for a second.

It is estimated that the PIC recognized visually the power lines above immediately after he started to turn left, so he made the bank steeper and lowered the nose, but he couldn't make it because the glider was too close to the power lines beyond the limits within which he could avoid them safely and collided with the lowest power line on the side of the valley.

3.6 Conditions at the Time of Crash

Judging from the damage conditions of the glider, it is estimated that after the glider collided with the power line, while it lost speed and fell down the mountain slope, it broke several branches of a Japanese red pine, the tallest tree around the crash site, by which the shock was absorbed, and it was cushioned by the surrounding lower trees, then the right wing collided with the trunk of the red pine tree, and just after that it nosedived into the ground covered with leaf mold.

Although the glider was destroyed, it is estimated that the PIC suffered only minor injury because the glider crashed in a condition that the shock was absorbed successively by the airframe other than the cockpit while falling.

3.7 Pre-Flight Preparations by the PIC

It is considered that the power lines could be avoided safely therefore the collision could be avoided, if the PIC had set, during pre-flight preparations, another ground mark before the power lines that could be easily recognized visually.

3.8 Safety Improvement

The “Basic Rules of Slope Soaring” stipulate the general rules on altitude (vertical separation) when approaching or crossing over power lines, and so on (although some of these did not give sufficient consideration to the minimum safety altitude set forth by Japanese Aeronautics Law).

Pilots should take their own skills and the performance of their gliders into consideration, on the basis of these rules, when preparing their flight plans.

In case of this accident, as described in 3.5, maneuver to avoid collision with the power lines could be taken too late if only the power lines themselves are used as a mark to avoid, so to prevent such thing and to make a safer flight, it is necessary to abide by the rules of minimum safety altitude as well as to prepare another ground mark, as described in 3.7, that can be visually recognized easily so as to avoid the power lines safely.

4. PROBABLE CAUSE

It is estimated that this accident was caused by that while making ridge soaring from Mt. Tenno to Mt. Taro the glider had temporarily lost sight of the power lines, flew too close to the power lines, and when recognized visually again the power lines, it took too late evasive maneuver, collided with the power lines and crashed.

Figure 1 Estimated Flight Route

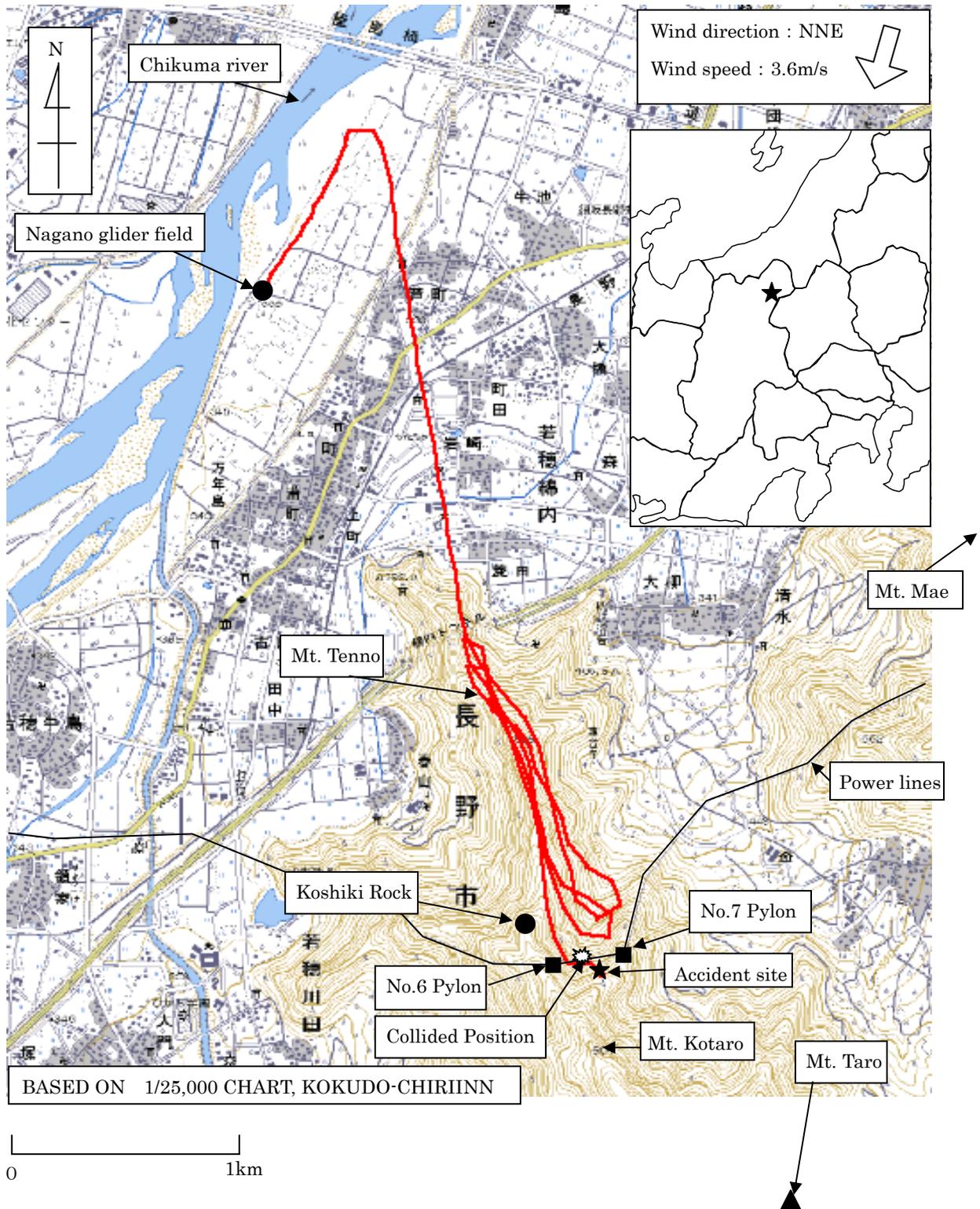


Figure 2 Collided Position of the POWER LINE

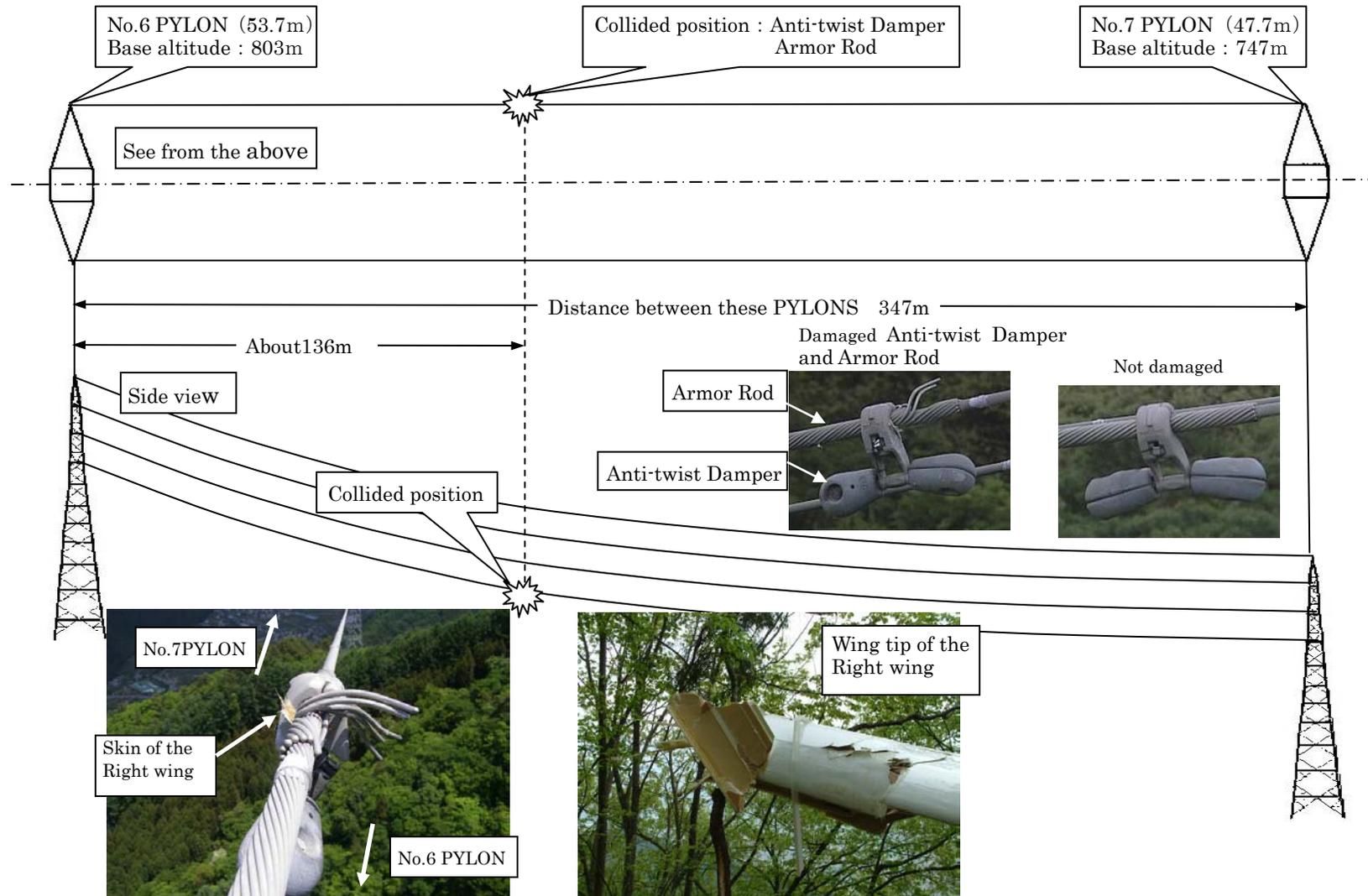
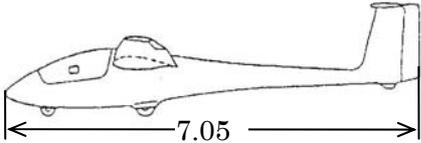
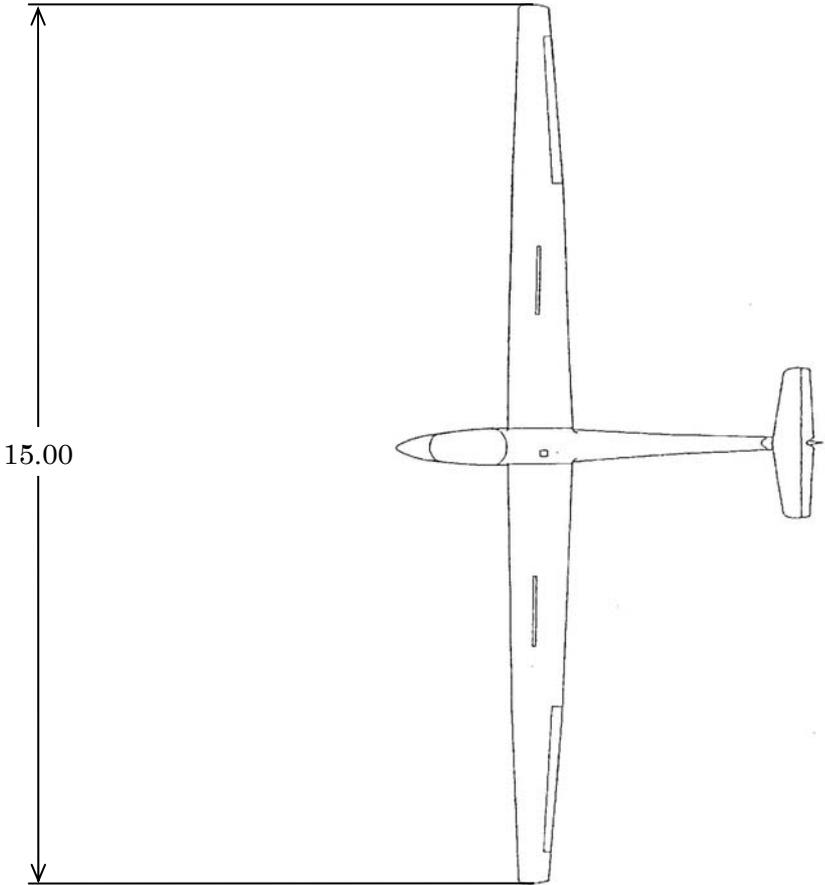
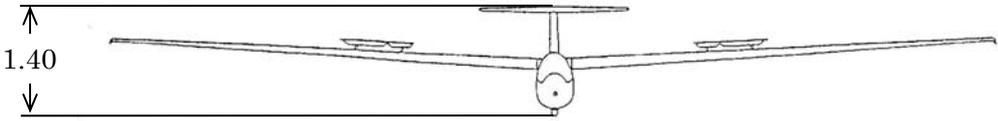


Figure 3 Three views of
ALEXANDER SCHLEICHER ASK 23B

UNIT : m



Photograph 1 THE GLIDER



Photograph 2 THE GLIDER

