AA2015-8

AIRCRAFT ACCIDENT
INVESTIGATION REPORT

PRIVATELY OWNED
J A 2 5 3 1

December 17, 2015

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.

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

FUSELARGE DAMAGE DURING LANDING

PRIVATELY OWNED

SCHEMPP-HIRTH DISCUS b

(GLIDER, SINGLE-SEATER),

JA2531

YOMIURI KAZO GLIDING FIELD,

SHINKAWA-DORI, KAZO CITY,

SAITAMA PREFECTURE, JAPAN

AROUND 13:56 JST, FEBRUARY 1, 2015

November 27, 2015
Adopted by the Japan Transport Safety Board

Chairman	Norihiro Goto
Member	Shinsuke Endo
Member	Toshiyuki Ishikawa
Member	Sadao Tamura
Member	Yuki Shuto
Member	Keiji Tanaka

1 PROCESS AND PROGRESS OF THE INVESTIGATION

The Japan Transport Safety Board designated an investigator-in-charge and an investigator on February 1, 2015 to investigate the accident. The occurrence of the accident was notified to the Federal Republic of Germany as the State of Design and Manufacture of the aircraft involved in the accident; however, the State did not designate an accredited representative. Comments were invited from parties relevant to the cause of the accident and relevant State.

2 FACTUAL INFORMATION

2.1 History of the Flight	According to the statement of the pilot, the history of the flight is summarized below. Privately-owned Schempp-Hirth Discus b registered as JA2531 launched from runway 31 of Yomiuri Kazo gliding field in Kazo City, Saitama Prefecture, at around13:50 on February 1, 2015 (Sunday) for familiarization flight with only the pilot on board. After turning right and leaving the traffic pattern at an altitude of about 1, 900 ft (about 580 m), the pilot flew northwards and looked for a vertical updraft but could not

easily find one, therefore turned right at about 3 km north of the gliding field and turned back to the gliding field.

Just before entering the downwind leg, the pilot received information concerning "Wind 330°, 8 m/s, gusts*2 12 m/s" from the "Yomiuri Kazo Flight Service"*1 then entered the downwind leg at an altitude of about 800 ft (about 240 m). The glider maintained a speed of 130 km/h allowing for the gusts, and flew over the Tobu Railway Bridge as the base leg, then started approach to runway 31.

The glider was approaching smoothly while using half of the dive brake*3, then suddenly, the glider shook violently and sank with the same attitude at around an altitude of about 46-66 ft (about 5-20 m). The pilot had a momentary sensation of floating due to inertial force, but because the glider immediately settled down with hardly any change in its attitude, after quickly confirming the speedometer he thought he could land without problem because the speed was 130 km/h.

When the pilot performed the flare maneuver at an altitude of about 16 ft (about 5 m), the nose lifted to the extent that a sense of buoyancy could be felt. Therefore, in order to reduce the nose lift, he slightly eased his force in pulling up the control column with the dive brake kept at about half-open, whereupon the glider suddenly sank nose first, and the pilot again felt a sensation of buoyancy.

Thinking that the glider would collide with the ground, the pilot quickly pulled up the control column, and made a hard landing in this attitude. The canopy (windshield) was broken and blown away on touching down, and the glider dragged a little then immediately stopped.

A witness who was at a point about 50 m from the eastern end of runway 31 stated that, just before landing, the glider lifted then touched down with the front wheel first.

The location of this accident was the Yomiuri Kazo gliding field in Shinkawa-dori, Kazo City (N 36° 9' 44", E 139° 40' 38"), and the date and time of occurrence was around 13:56 on February 1, 2015.

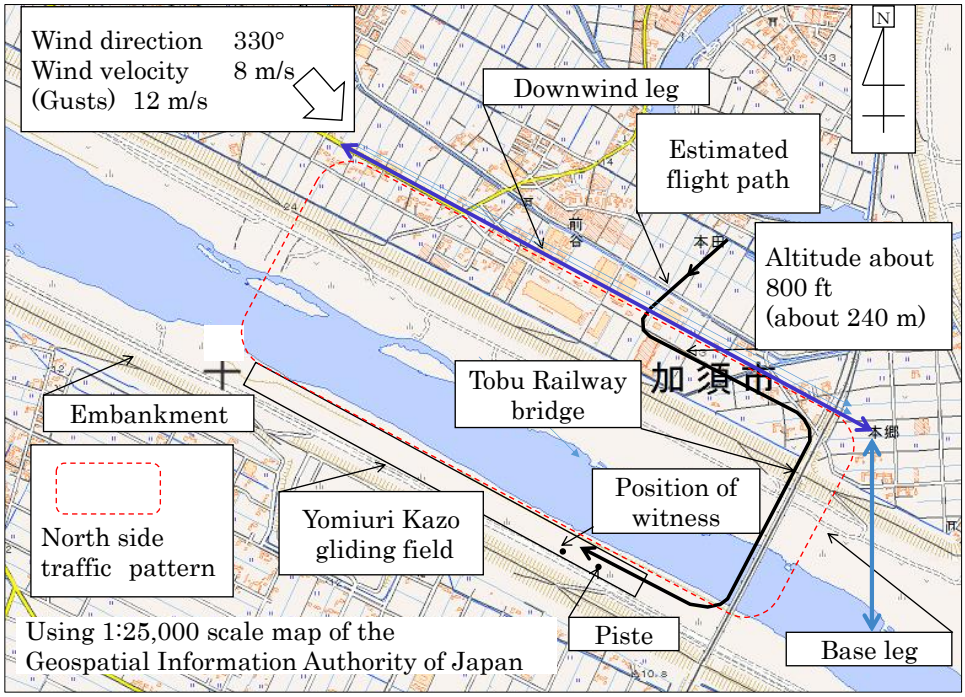

Figure 1 Estimated flight path

2.2 Injuries to Persons	None

2.3 Damage

Extent of damage Substantial
- Canopy Broken
- Fuselage Broken
- Empennage Broken

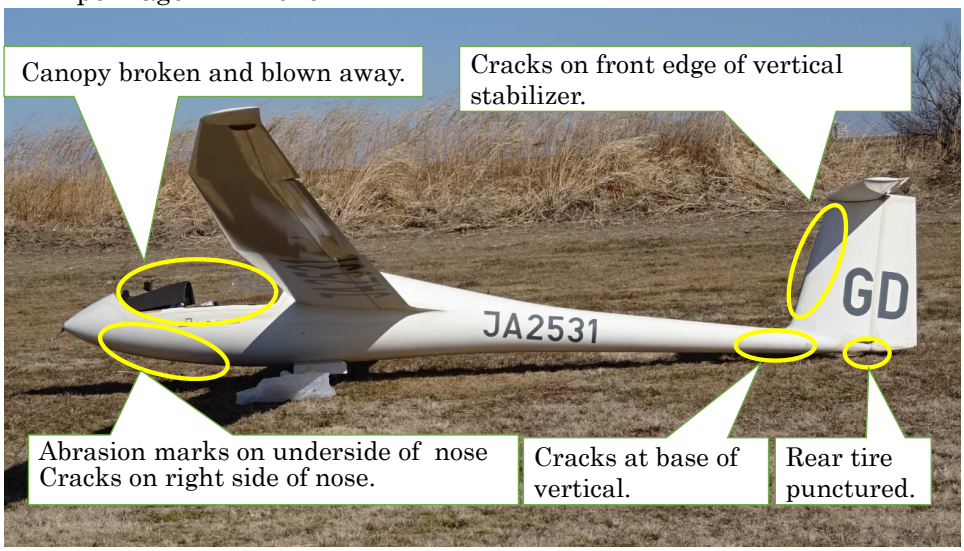

Photo 1 State of damage to the airframe

2.4 Personnel Information

Pilot Male, Age 23

Private pilot certificate (Glider)	October 25, 2011
Type rating for High-class glider	October 25, 2011
Class 2 aviation medical certificate	Validity : November 13, 2015
Total flight time	326 hours and 11 minutes
Total flight time on the type of aircraft	22 hours and 20 minutes

2.5 Aircraft Information

Type: Schempp-Hirth Discus b
Serial number: 526 Date of manufacture: September 29, 1994
Certificate of Airworthiness No. 2014-11-05,
Validity: March 21, 2015
Category of airworthiness Glider, Utility U
Total flight time 480 hours and 9 minutes
Stall speed 69 km/h
Approach speed with air brakes fully open and landing gear downed
95 km/h

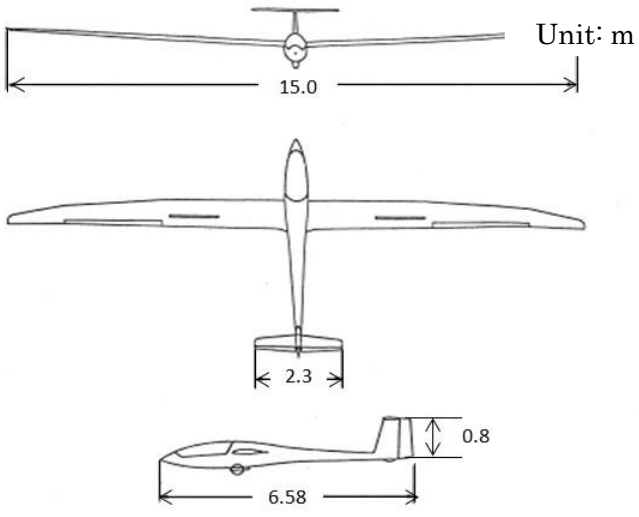

Figure 2 Three Angle View of Schempp-Hirth Discus b

2.6 Meteorological Information

According to the pilot and the witness, the weather was fine and visibility was good at the gliding field. Wind 330°, 8 m/s, gusts 12 m/s when observed at the gliding field at about 13:50. Weather observations at weather stations of the Japan Meteorological Agency located near the accident site at around the time of the accident were as follows.

	Koga (about 6 km NNW of the gliding field)			Tatebayashi (about 15 km WNW of the gliding field)		
Time	Wind direction	Average wind velocity	Maximum wind velocity	Wind direction	Average wind velocity	Maximum wind velocity
13:40	NW	4.7 m/s	9.2 m/s	NW	8.6 m/s	17.5 m/s
13:50	NW	4.1 m/s	9.3 m/s	NW	8.7 m/s	14.7 m/s
14:00	NW	4.8 m/s	12.9 m/s	NW	9.2 m/s	15.3 m/s

2.7 Additional Information

(1) Accident Site Information

The gliding field is a grass gliding field located on the dry riverbed of the Tone River. The runway is 1,350 meters long and 60 meters wide. Its elevation is 17 meters and its takeoff and landing headings are 13/31. There is an embankment about 9 m high located to the south of the gliding field, and according to statements by personnel of the Student Air Federation nonprofit organization that manages the gliding field, air disturbance is prone to occur there when a northwest wind is blowing.

(2) Contact Marks

There was a 1 m-long contact mark (a) at the foreground when looking in the direction of travel of the Aircraft, and a 2 m-long contact mark (b) two meters forward of that. Contact mark (b) grew wider along its length. The glider had stopped about 24 m forward of contact mark (b). (see Photo 2, Figure 4)

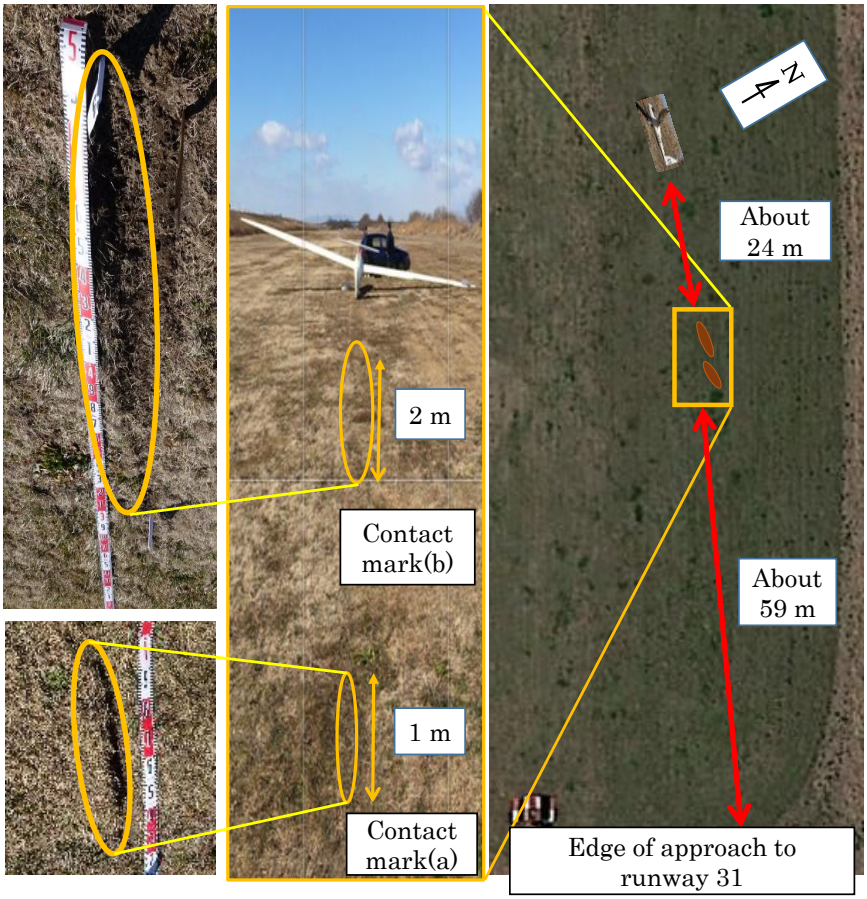

Photo 2 Contact marks

(3) Flight regulation standards at the gliding field
(excerpt from "Student Air Federation – Yomiuri Kazo gliding field – Field Minimums")

・ *Wind direction and wind velocity are to be judged by the pilot except when there are restrictions in flight manual, but takeoff and landing must not be attempted under conditions of a tailwind component exceeding 2 m/s.*

・ *When wishing to land on runway 31 over Tobu Railway Bridge, the railway bridge shall be passed at 250 ft or above.*

・ *When wind velocity is 8 m/s or more, flight over the railway bridge shall be prohibited.*

(4) Relationship between wind velocity and approach speed

"Basic Glider Operations" by Kakuichiro Harada (published by Hobun Shorin, May 15, 1969, page 94) includes the following description concerning the relationship between wind velocity and approach speed.

The standard for approach speed is supposed to be set at a speed of (stall speed x 1.5) + (wind velocity x 1/2).

(5) Maneuver to recover from excessive flare

"Kaze wo Kike (Listen to the Wind) – Glider Pilot's Flight Manual Basics" by Mitsuru Marui (published by Kantosha, September 15, 1992, p.88-p.89) includes the following descriptions concerning maneuvers to recover from excessive flare. (In this report, Figure 3 has been compiled by the Japan Transport Safety Board from a partially revised version of a diagram in this book.)

a. *If the dive brake is closed at the peak of the ascent, the glider will continue to climb and the situation will deteriorate further. This is particularly dangerous b*ecause, *with the dive brake closed, the recovery operation to halt the sink by fully opening** (sic) the dive brake is no longer possible if the sink speed is too high just before touchdown.* (**A mistake for "fully closing")

b. *If the stick (control column) is pushed forward at the peak of the ascent, at the peak the glider will eventually generate the necessary lift in the extremely unstable condition of small speed plus large angle of attack. If at this point the stick (control column) is pushed forward and the angle of attack made smaller, lift will be rapidly lost and the glider will start to sink. Because there is no spare altitude for speed to recover even if adopting a nose-down attitude at this time, it will not be possible to perform flare and this could result in a hard landing.*

c. *The correct way is to keep both the stick (control column) and the dive brake as they are. The glider will eventually start to sink, at which point it will suffice to repeat flare. If necessary, the sink can be halted by closing the dive brake just before touchdown.*

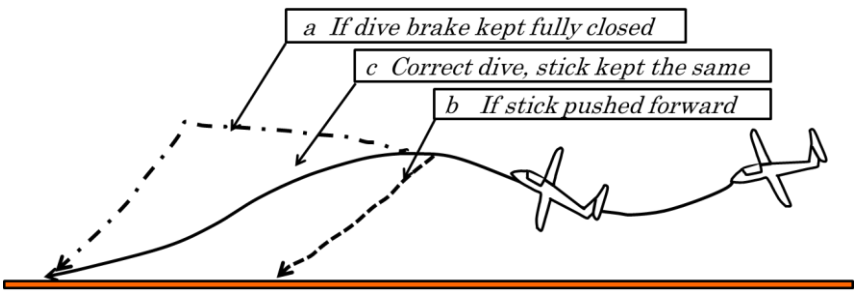

Figure 3 Recovery operation in cases of excessive flare

*1 "Yomiuri Kazo Flight Service" is a service whereby surface wind direction, wind velocity and other necessary data for flight are transmitted to aircraft by the Aircraft Aids Aeronautical Station at Yomiuri Kazo gliding field.
*2 "gusts" refers to a phenomenon whereby wind velocity changes irregularly in a short period.
*3 "dive brakes" are boards built into the main wings, which are used to reduce lift and altitude when airborne. They work by protruding at an angle from the main wings.

3 ANALYSIS

3.1 Involvement of weather	Yes
3.2 Involvement of Pilot	Yes
3.3 Involvement of Aircraft	No
3.4 Analysis of Findings	(1) Sudden sink of the glider during approach Both average wind velocity and maximum wind velocity had intensified from about 13:50 in nearby Koga and Tatebayashi, and it is highly probable that wind had also intensified at the gliding field. The gliding field is skirted by an embankment about 9 m high on the south side and the Tobu Railway bridge on the east, and it is probable that when a northwest wind blows, air disturbance is topographically prone to occur. It is somewhat likely that topographical air disturbance caused the glider to suddenly sink at an altitude of about 49 ft (about 15 m) during its landing approach. (2) Condition of the glider at touchdown It is probable that the main wheel touched down before the tail wheel with the glider's nose somewhat dropped. (Figure 4) Due to the large speed of descent, it is somewhat likely that the tire was compressed and the underside of the cockpit touched the ground, and the nose lifted in reaction to this, causing the tail wheel section to touch the ground and drag for about 24 meters. (3) Involvement of the pilot The pilot had received information concerning "Wind 330°, 8 m/s, gusts 12 m/s" from the Yomiuri Kazo Flight Service, and it is highly probable that it was generally appropriate to set the base leg and approach speed to 130 km/h. It is somewhat likely that the pilot, after starting the final approach, continued the same approach even when the glider suddenly sank, and performed the flare maneuver at an altitude of about 16 ft (about 5 m). Though the glider's normal landing approach speed is 95 km/h, the pilot set the approach start speed at 130 km/h allowing for the gusts, and it is somewhat likely that his speed was about the same just before performing the flare maneuver. Although it is normal to reduce speed in stages and perform flare just before touchdown, it is probable that the pilot was somewhat late in starting to reduce speed, and that he applied somewhat large force in pulling up the control column, as a result of which the nose lifted so as to create a sensation of buoyancy. It is also somewhat likely that gusts had some influence at this time. After this, it is somewhat likely that the pilot eased his force in pulling up the control column and tried to reduce the nose lift, but as a result only succeeded in pushing down the control column. It is probable that the pilot's action caused the angle of attack to reduce, lift to be suddenly lost and the glider to go into nose drop.

Therefore, it is probable that the pilot again pulled up the control column in attempting nose lift, but because there was not enough altitude, could not lift the nose sufficiently, causing the glider to make a hard landing. (Figure 4)

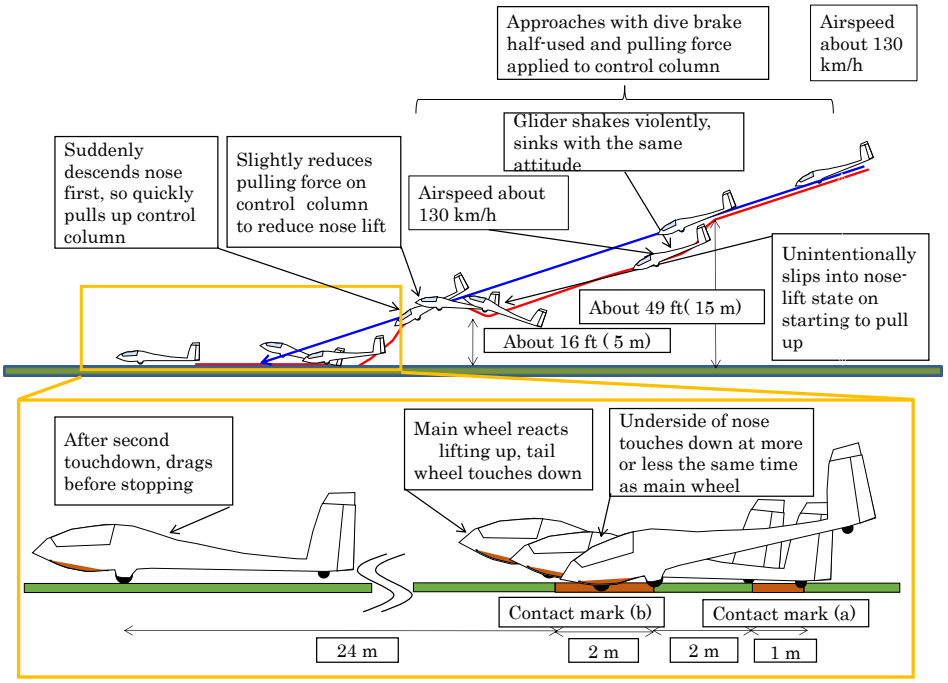

Figure 4 Estimated approach and touchdown situation

4 PROBABLE CAUSES

It is probable that this accident occurred because the pilot, in attempting to control the nose of the glider, which had unintentionally gone into nose lift just before landing, eased his force in pulling up the control column, causing a state of sudden nose drop to occur and the glider to make a hard landing, resulting in the damage to the airframe.

It is probable that the unintentional nose lift of the glider occurred because the pilot was somewhat late in starting to reduce speed and because his force in pulling up the control column was somewhat large. It is also somewhat likely that gusts had some influence at this time.

It is somewhat likely that the sudden nose drop occurred because the pilot eased his force in pushing down the control column and attempted to reduce nose lift, but only succeeded in pushing down the control column.

5 ACTIONS TAKEN

Preventive actions taken by the Student Air Federation nonprofit organization:

1 When air current is bad, a pilot who has already finished flying should be sure to convey that information to the pilot who is flying next.

2 The pilot flying next should submit a pre-flight report to the piste and confirm information regarding safety, etc. A report should also be made to the piste after flying.

3 Flight services by the piste consist not only of providing traffic information and information on wind direction, wind velocity, gusts, etc., but sometimes also include advice on flight paths, pass angles and other aspects of flying.

4 Depending on the situation, instructors may advise licensors on the feasibility of flying, or may in some cases place restrictions on flying.

5 Instructors should make a comprehensive judgment on moving up to the next level of aircraft, taking account of flying experience, the recent situation of flights and flying skill.

6 At regular monthly meetings, information on particularly unusual cases should be shared and discussed, and steps taken to improve safe operation.