AA2018-4

AIRCRAFT ACCIDENT
INVESTIGATION REPORT

FUKUSHIMA MOTOR GLIDER CLUB
J A 2 4 0 6

June 28, 2018

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.

Kazuhiro Nakahashi
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

CRASH DUE TO STALL

FUKUSHIMA CITY, FUKUSHIMA PREFECTURE, JAPAN

AT ABOUT 13:21 JST, AUGUST 27, 2017

FUKUSHIMA MOTOR GLIDER CLUB

HOFFMANN H-36 DIMONA

(MOTOR GLIDER, TWO-SEATER), JA2406

May 25, 2018
Adopted by the Japan Transport Safety Board
Chairman Kazuhiro Nakahashi
Member Toru Miyashita
Member Toshiyuki Ishikawa
Member Yuichi Marui
Member Keiji Tanaka
Member Miwa Nakanishi

1. PROCESS AND PROGRESS OF THE INVESTIGATION

1.1 Summary of the Accident	On Sunday, August 27, 2017, a Hoffmann H-36 Dimona, registered JA2406, operated by Fukushima Motor Glider Club, took off from Fukushima Sky Park and the motor glider crashed while it was flying in the vicinity of Bandai-Azuma Skyline Fudosawa Bridge. The captain was fatally injured and the passenger sustained serious injuries. The aircraft was destroyed.
1.2 Outline of the Accident Investigation	On August 28, 2017, the Japan Transport Safety Board (JSTB) designated an investigator-in-charge and an investigator to investigate this accident. An accredited representative of the Republic of Austria, as the State of Design and Manufacture of the aircraft involved in the accident, participated in the investigation.

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

2. FACTUAL INFORMATION

2.1 History of the Flight

According to the statements of the passenger (private pilot for high-class glider) and the club members of Fukushima Motor Glider Club, and the records of a handheld GPS receiver, the history of the flight is summarized as follows:

At about 13:11 (JST: UTC + 9hrs, unless otherwise stated all times are indicated in JST on a 24-hour clock), the Hoffmann H-36 Dimona, registered JA2406, operated by the club took off from Runway 14 of Fukushima Sky Park (temporary airfield) for leisure flight, with the captain on the left seat and the passenger on the right seat.

Photo 1: The Aircraft

The flight was the second flight of the aircraft by the captain on that day and the original plan was to fly to the southwest direction within nine km radius of Fukushima Sky Park for about an hour.

The situation of take-off of this flight was recorded in the video footage of the Fukushima Flight Association, but no particular anomaly was found.

Powered by engine, the aircraft increased the altitude with a rate of +3 to +5 m/s (+590 to +984 ft/min) taking advantage of updraft. The aircraft occasionally entered downdraft zones and decreased the altitude at a rate of about -2 m/s (-393 ft/min).

About 10 minutes after take-off, the aircraft flew near the north ridge of Fudosawa about 12 km southwest of Fukushima Sky Park (See Figure 2). Its altitude above the ground level then was about 30 m.

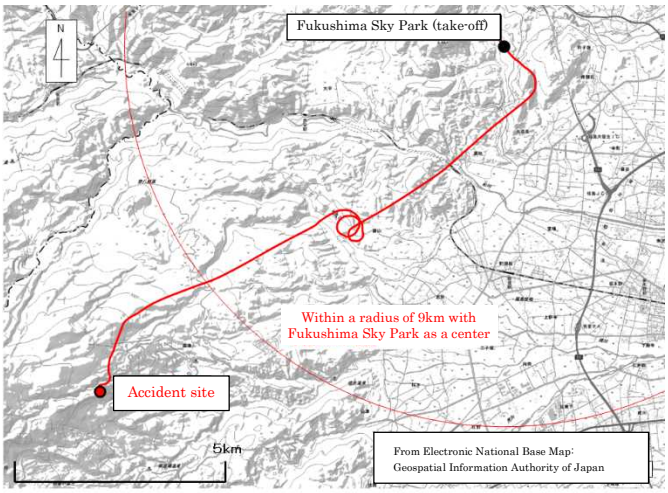

Figure 1: Estimated Flight Route

The aircraft flew near the mountains at low altitude, entered the valley where it fell into an impasse. And when suddenly a slope was looming in front of the aircraft, it made a steep left turn but then it stalled and fell into a left spin and crashed. The engine was running during the flight.

After the crash, the passenger tried to make an emergency call for help

	with radio, but it did not work, in addition, his mobile phone was out of the service area. Because fuel was leaking, he turn off the fuel cock and the main switch, and got out of the aircraft. The captain and the passenger were found at 08:02 on the following day and rescued at 10:06. The accident occurred in the vicinity of Bandai-Azuma Skyline Fudosawa Bridge (37° 44' 51" N, 140°16' 48" E) in Fukushima City, Fukushima Prefecture at about 13:21, on August 27, 2017.
2.2 Injuries to Persons	The captain was fatally injured The passenger was seriously injured
2.3 Damage to Aircraft	Extent of Damage: Destroyed - Nose Propeller, engine and cockpit were damaged - Main wings Left wing bent and right wing were broken and separated from the fuselage - Fuselage Bent at the rear part - Tail section Broken off and separated
2.4 Personnel Information	Captain Male, Age 66 Private pilot certificate (Glider) February 13,1974 Pilot competency assessment expiry of practicable period for flight May 4, 2018 Type of rating for motor glider October 14, 1981 Flight instructor certificate (Glider) July 1, 1978 Class 2 aviation medical certificate Validity: August 10, 2018 Total flight time 577 hours 55 minutes Flight time in the last 30 days 1 hour 10 minutes Total flight time on the same type of aircraft 113 hours 16 minutes Flight time in the last 30 days 1 hour 10 minutes
2.5 Aircraft Information	(1) Type: Hoffmann H-36 Dimona; Serial number: 36251; Date of manufacture: August 26, 1987 Certificate of Airworthiness No. 2016-39-02; Validity: October 14, 2017 Engine type: Limbach L2000 EB1.C (2) At the time of the accident, both the weight and the position of the center of gravity (CG) of the aircraft were within the allowable range.
2.6 Meteorological Information	(1) Meteorological observations in the Fukushima Sky Park (elevation 402 m) According to Fukushima Flight Association, meteorological observations around the time of the accident occurrence were as follows: 14:00 Wind direction 150°; Wind velocity 7 kt (3.6 m/s); Visibility 10 km or more; Temperature 30.1 °C; Altimeter setting (QNH) 30.09inHg (2) Wind in the vicinity of the accident site According to the records observed at Azuma-Kofuji volcanic gas monitoring station (elevation 1,460 m), which located about two km southwest of the accident site, the wind direction and wind velocity at the time of the accident were as follows: wind direction south-southeast; wind velocity 1.8 m/s; maximum instantaneous wind velocity 2.6 m/s.

In addition, according to the records of Jododaira Astronomical Observatory (elevation 1,575 m) located about three km west-southwest of the accident site, weak westerly wind was observed on the day when the accident occurred.

(3) Upper wind conditions

According to the Japan Meteorological Agency, the westerly wind was generally observed above 1,500 m or higher over the Tohoku region on the day of the accident.

2.7 Additional Information

(1) Geographic features in the vicinity of the accident site

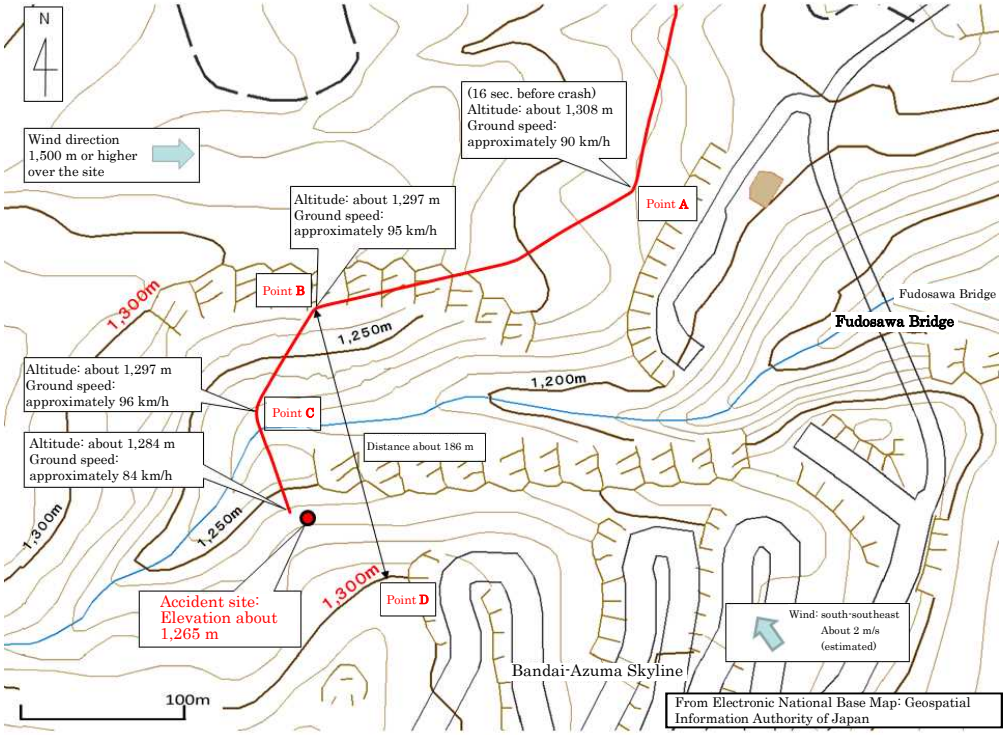

Figure2: Geographic features in the vicinity of the accident site and estimated flight route

Fudosawa in the vicinity of the accident site is a narrow and deep valley that extends from west to east with ridges of about 1,300 m high on the both sides, and that is located about three km east of Issaikyozan mountain (elevation 1,949 m) in the Azuma Mountain Range.

The altitude of the Point B in the Figure 2, where the aircraft commenced to make a left turn from the north side of the valley is about 1,297 m above sea level. Beside, there are mountains higher than 1,300 m high, ranging in the west.

There was the distance of 186 m between the Point B and the Point D which is located on the slope to the opposite side of the Point B.

Photo 2: The Accident Site and the Aircraft

(2) Accident site

The accident site was a slightly flat shelf-like place at elevation about 1,265 m, located along the southern slope of the valley in mountainous regions.

(3) Details of damage

Surrounded by many trees, the crashed aircraft got stuck nearly vertically into the ground with standing upside down and its upper side of the fuselage facing to the northwest; its nose part in which the propeller was severely damaged was buried in the ground; its engine cowl and the cockpit were crushed and damaged.

The left main wing was bent at about 300 cm from the wing tip. The right main wing caught between two trees next to the fuselage had scraped off twigs and barks; it was damaged, torn off at the wing root, and fallen off the cliff.

The rear part of the fuselage was bent toward the nose from the root of the vertical stabilizer in suspending from the fuselage; its rudder and elevator were fractured.

As for the control system, the control rod was ruptured and stuck, and did not work. The elevator trim was in the neutral position.

The throttle lever was found in close to the cruise position as if it had been pushed back by the impact of the accident.

There was no abnormality in the ignition plug of the engine, and no water was detected in the fuel.

(4) Stall

The Flight Manual of the aircraft has the following description in Chapter 2, Limitations 2-10-1, Airspeed indicator:

"In the case of straight horizontal flight at 78 km/h or higher, this aircraft does not fall into a stall condition. In the case of performing a turning flight or applying a significant acceleration, air current will come off from the wing surface, and therefore, it is better to increase the speed when taking a bank angle of about 30° or larger."

Besides, in Chapter 3, Emergency Operation 3-1, Stall condition, it has the following description:

"When a rudder is used suddenly and largely, air current will come off from the wing surface of the aircraft and the aircraft sinks."

In 3-2, Recovery from a stall condition, it is stated as a precaution that *"When the air current separates from the wing surface and an aircraft falls in a complete stall condition, it will be in a state of nose-down at a steep angle, and the descending speed accelerates rapidly. At this time, the altitude loss before returning to the level flight is about 40 m (about 131 ft)."*

(5) Flight in the vicinity of the accident site

According to the club members' statements, usually they fly in the

	vicinity of the accident site at high altitude, but never flew at an altitude close to the mountain's surface. No one stated that he had such a flight experience with the captain. (6) Notification of flight plan Any aircraft shall report its flight plan to the Minister of Land, Infrastructure, Transport and Tourism pursuant to the provision of Paragraph 2 of Article 97 of Civil Aeronautics Act; however, it shall be unnecessary in cases where the aircraft flies over the area within nine km radius from the place of departure and lands at a location within the above-mentioned area (Article 205 (1) of the Ordinance for Enforcement of the Civil Aeronautics Act (Ordinance of the Ministry of Transport No. 56 of 1952). At first, the plan was to fly through the air area within nine km radius from the place of departure, however, the captain changed the first plan during the flight, consequently he flew over the area nine km or more away from the place of departure, and thus the flight plan must be reported to the MLIT; however, the report was not performed.

3. ANALYSIS

3.1 Involvement of Weather	Yes
3.2 Involvement of Pilots	Yes
3.3 Involvement of Aircraft	None
3.4 Analysis of Findings	(1) Effect of air flow near Fudosawa At the time of the accident, it is probable that the south-southeasterly wind blew at the ridge on the south side of Fudosawa (Bandai-Azuma Skyline side) and that the updraft occurred on the south slope of the ridge from the effect of solar radiation. It is somewhat likely that there existed the downdraft which blew over the ridge and down into the valley. Besides, 1,500 m or higher over the Tohoku region, the westerly wind blew, and the vicinity of Fudosawa located on the downwind side of the Azuma Mountain Range was in a complicated air current condition such that the downdraft was generated. (2) Flight route in the valley. It is probable that the aircraft fell into a state of dead end with no escape by entry into the valley from the Point A, because the subsequent flight route after the Point A indicated that the ground altitude was low. It is somewhat likely that the captain might think that an updraft could exist near the north side of Fudosawa, or, he might judge that he could leave this area by using the power of the engine, however, it could not be determined why he entered into Fudosawa with no sufficient altitude because the captain was fatally injured in this accident. From the Point B, the aircraft made a left turn at an altitude of 1,297 m and headed to the south slope of the valley. It is probable that the captain made

this left turn to fly toward the south slope of the valley by judging that it was impossible to avoid a collision with the slope of 1,300 m in the west side of the Point B. However, there was also a slope of 1,300 m in the vicinity of the Point D on the southern slope.

When the captain commenced to make a left turn from Point B to the valley, it is probable that he considered he could turn around short of the south slope, however, in order to make a successful 180° turn between Points B and D (186 m) at a ground speed of 95 km/h at the time of starting to turn, with a calculation under the condition with no wind, it requires a steep turn at a bank angle of about 40° or larger.

In case of flying in mountainous regions with visual flight rules, it is important to make careful systematic preparations by conducting preparatory research for understanding regional characteristics such as topography and air current, and to comply with the minimum safe altitude. It is also important to fly at a sufficiently safe altitude by taking into consideration the possible occurrence of unexpected downdraft, and to choose routes with sufficient leeway in view of the escape paths and turning radius for turning back in case of emergency.

(3) Process and progress of the crash

From the Point C up to the time when the record of the portable GPS receiver stopped, the aircraft descended about 13 m and ground speed decreased from 96 km/h to 84 km/h.

Judging from the position of the throttle lever when the aircraft crashed, it is highly probable that the engine output was set at a cruising power or higher, but it is probable that the reason why the ground speed was decreased when the aircraft descended in the valley is that the captain pulled the control stick in his attempt to stop the descent when he encountered the unexpected downdraft.

Besides, it is probable that the captain tried to make a steep left turn in a decreased speed caused by pulling the control stick in order to avoid a collision with the approaching slope in the vicinity of Point D. At this time, it is somewhat likely that the captain tried to make a steep turn by all of a sudden applying fully the left rudder or by establishing a deep bank angle, or by trying both of them.

It is probable that these caused the stall and the aircraft fell into the left spin and started rotation in a state where its nose was facing downward largely; it could not be recovered and crashed into the slope of the valley.

(4) Importance of notification of flight plan

After the crash, the radio of the aircraft was out of order. In addition, the mobile phone was out of the service area. Therefore, the passenger could not make a rescue request. If a flight plan is not notified and an accident occurs in a mountainous region, it is impossible to specify the accident occurrence location, which makes search and rescue operations extremely difficult. In order to perform search and rescue operations promptly in case that the accident occurs, the flight plan must be appropriately notified by radio or other

	methods, if the notification of the flight plan is necessary due to the reasons such as the change of the flight plan during flight.

4. PROBABLE CAUSES

In this accident, it is highly probable that the aircraft entered into the valley at insufficient altitude and when it approached the mountain slope, the captain made a steep turn to avoid a collision with the slope, but with the insufficient airspeed the aircraft stalled and fell into the spin and crashed.

5. SAFETY ACTIONS

As a response to this accident, the Fukushima Motor Glider Club has taken the measures to prevent recurrence of similar accidents as follows:

(1) To make known thoroughly club rules, operation manuals and rules related to the flight in Fukushima Sky Park once again.

(2) To reconfirm the safety management thoroughly under the leadership of club instructors, to make an effort to maintain and improve aircraft pilotage skills.

(3) Prior to the start of the flight, to provide a briefing for the day to share safety information among all the members participating.

(4) To review the communication system in an emergency and to have close communication among the club members to share safety information.

(5) To newly establish a meeting for safety and hold every year at the time of a regular meeting of the club so that the measures to prevent recurrence can be confirmed.