AI2017-5

AIRCRAFT SERIOUS INCIDENT

INVESTIGATION REPORT

OKAYAMA GLIDER CLUB
J A 2 3 3 0

September 28, 2017

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 prevent future accidents and incidents. 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 SERIOUS INCIDENT INVESTIGATION REPORT

CONTINUED HALT OF POWER OF ENGINE DURING FLIGHT

OKAYAMA GLIDER CLUB

SCHEIBE SF25C FALKE (MOTOR GLIDER, TWO-SEATER)

JA2330

THE VICINITY OF KOHNAN AERODROME OKAYAMA PREFECTURE, JAPAN

AROUND 15:10 JST, FEBRUARY 12, 2017

August 28, 2017
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 Serious Incident	On Sunday, February 12, 2017, Scheibe SF25C Falke, registered JA2330, operated by Okayama Glider Club, landed on Kohnan Aerodrome by gliding and halted on a runway, because its engine halted while flying over Okayama City and was unable to restart.
1.2 Outline of the Serious Incident Investigation	This incident falls under the category of "Continued halt (except when the engines are halted with an attempt of assuming the engines of a motor glider) of engines in flight" as stipulated in Item 7, Article 166-4 of Ordinance for Enforcement of the Civil Aeronautics Act (Ordinance of Ministry of Transportation No.56 of 1952) and is classified as an aircraft serious incident. On February 14, 2017, the Japan Transport Safety Board designated an investigator-in-charge and two investigators to investigate this incident. The occurrence of this serious incident was notified to the Federal Republic of Germany as the State of Design and Manufacture of the aircraft

	involved in the serious incident; however, the State did not designated its accredited representative. Comments were invited from parties relevant to the cause of the serious incident and the relevant State.

2. FACTUAL INFORMATION

2.1 History of the Flight	According to the statements of the captain as an instructor, a trainee and Kohnan flight service staffs of Control Tower, the history of the flight up to the time of the serious incident is summarized below. At around 14:45(I) (Japan Standard Time:UTC+9 hours) on February 12, 2017, Scheibe SF25C Falke, registered JA2330 (the aircraft,) operated by Okayama Glider Club took off from the runway 27 of Kohnan Aerodrome, as the captain sat in the right seat with a trainee in the left seat for flight training. The aircraft halted the engine at about 3nm northeast of the Aerodrome and flew about 2,000ft to 3,000ft while using updraft. About 15 minutes later, the trainee restarted the engine to prepare for landing. The aircraft descended by idling and held about 2,000ft at about 3nm northwest of the Aerodrome in order to wait for a turn to land at. The aircraft could hold by using weak updraft while idling below snow clouds. At the time, outside temperature was about 0 ºC, oil temperature was below 40 ºC which is a lower limit of indication on oil temperature gauge and a carburettor heater (hereinafter referred to as the "carb-heat") was not in use. The aircraft was holding for about five minutes and as the trainee advanced a throttle, the engine halted. Pushing a starter bottom in order to restart caused propellers to spin, but the engine rpm did not respond to the advancing of the power lever. The captain tried to restart, but the result was the same, therefore he decided gliding to land at the aerodrome. The captain reported to control tower that he would like to land at first because the engine was halted, and landed on the runway 27 at around 15:15(I) and halted on the runway.

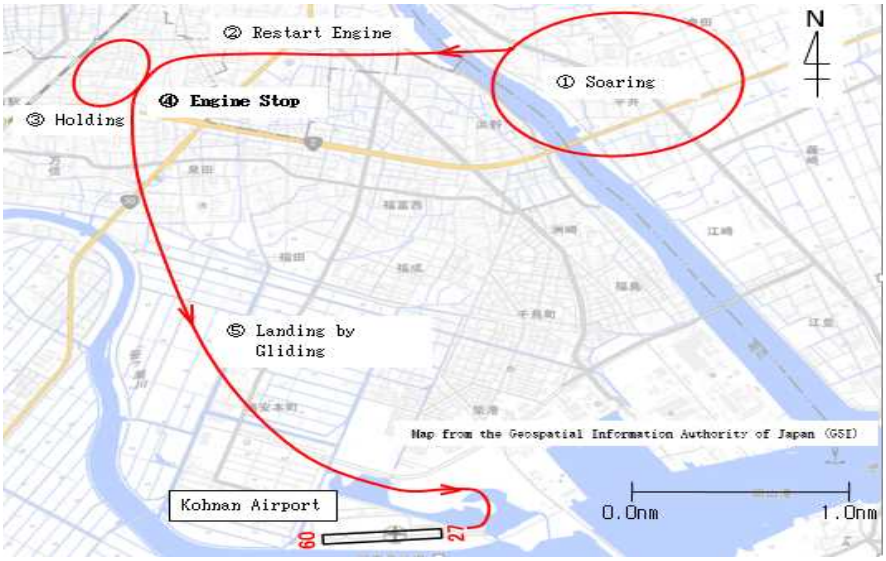
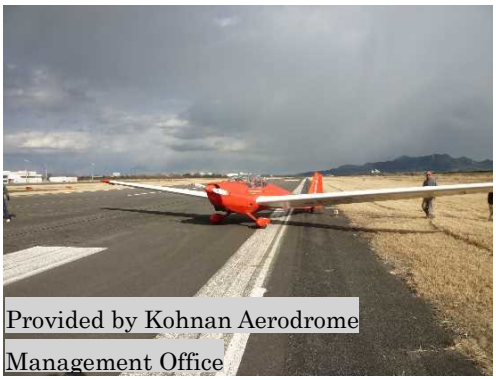


Figure 1 Estimated Flight Route



Provided by Kohnan Aerodrome Management Office

Photo 1 The aircraft after landing

This serious incident occurred at about 15:10(I) on February 12, 2017, at the point with an altitude of about 2,000ft, about 3nm northwest of Kohnan Aerodrome (34° 38‘ N, 133° 54‘ E).

2.2 Injuries to persons	None
2.3 Damage to Aircraft	No Damage
2.4 Personnel information, etc.	(1) the captain; Male, Age 65 Private pilot certificate (glider) August 25, 1973 Type of rating for High-class glider August 25, 1973 Type of rating for Motor glider July 16, 1979 Flight Instructor certificate (glider) January 17, 1980 Class 2 aviation medical certificate Validity; March 22, 2017 Pilot competency assessment Expiration date of piloting capable period January 19, 2018 Total flight time 2,394 hours 40 minutes Flight time in the last 30 days 4 hours 35 minutes Total flight time on the type of aircraft 2,127 hours 30 minutes Flight time in the last 30 days 4 hours 0 minute

	(2) the trainee; Male, Age 65 Private pilot certificate (glider) October 30, 1973 Type of rating for High-class glider October 30, 1973 Class 2 aviation medical certificate Validity; June 8, 2017 Pilot competency assessment Expiration date of piloting capable period June 29, 2018 Total flight time 88 hours 54 minutes Flight time in the last 30 days 1 hours 5 minutes Total flight time on the type of aircraft 37 hours 35 minutes Flight time in the last 30 days 1 hours 5 minutes
2.5 Aircraft information	(1) Aircraft Type Scheibe SF25C Falke Serial number 44350 Date of manufacture April 11, 1984 Certificate of airworthiness No.2016-36-01 Validity; August 18, 2017 Category of airworthiness Motor Glider Utility U Total flight time 3,088 hours 25 minutes Flight time after the periodic inspection (50-hour Inspection) 5 hours 40 minutes It is highly probable that at the time of the serious incident occurrence, the weight and balance of the aircraft was within the allowable range. (2) Engine Engine Type Limbach L1700EA1 Serial number 1913 Date of manufacture October 16, 2015 Total use time 100 hours 25 minutes (3) Fuel and lubricating oil The fuel in use was a high-octane gasoline which is recommended in the flight manual. The lubricating oil was automobile oil SAE10W/40 in the same manner.
2.6 Meteorological information	(1) General weather forecasts Okayama Local Meteorological Observatory announced the general weather forecast at 10:32(I) on the day of the serious incident as follows; Winter pressure pattern was covering Okayama prefecture, and there were places where it snowed at the northern part. On 12th, the winter pressure pattern would stay, (omitted) it would be cloudy in the southern part, and there were expected to snow or rain at some places by the evening. (2) Meteorological information at Kohnan Aerodrome weather report; 15:17(I) Wind direction 270 º (variable between 210 º and 340 º)

	Wind velocity 5kt, Prevailing visibility 30km Cloud Amount 1/8 to 2/8, Type Cumulus, Cloud base 2,000ft Amount 5/8 to 7/8, Type Cumulus, Cloud base 3,500ft Temperature 7 ºC, Dew point -4 ºC Altimeter setting (QNH) 30.19inHg (3) Weather condition over Okayama City Visual observation of 15:00(I) by Okayama Local Meteorological Observatory (at about 3km north of the serious incident site) was as follows; The weather was cloudy, the cloud amount was 9/10 of a whole sky and there were cumulus at low-level. According to the radar-echo chart around the time of the serious incident occurrence, clouds of cumulus system had sparsely passed through the sky above Okayama city from northwest to southeast. According to the routine aviation weather observation of 12:00(I) at Okayama Airport (at about 13km northwest of the serious incident site), rainfall phenomena were observed in the vicinity of Okayama Airport. Furthermore, based on the lower bad weather forecast diagram at 12:00(I) of the day, an outside temperature over Okayama Airport at 2,000ft was predicted to be 0ºC up to 15:00(I). According to statements of multiple pilots who were flying over Okayama City below 3,000ft at that time and Kohnan Flight Service staffs, they saw snow cloud, and phenomena of light snow and rainfall in some places from northwest of Kohnan Aerodrome to north (Okayama City) and to east to be confirmed, and it was a state of the atmosphere that required attention to ice accretion. (4) Other meteorological information Aviation weather considers the airspace where the difference between an outside temperature and dew point is less than 3 ºC as a wet area where generates rain, snow or fog and indicated it as WET AREA in an upper weather chart.
2.7 Additional information	(1) Carburettor Icing 14. Cold weather flying / maintenance and risk of carburettor icing of Flight Manual Section 4; Normal Operating Instructions has the following descriptions; “Especially when flying in the winter it is important to check that the oil temperature does not fall below 70 ºC while the engine is running, otherwise there will be a risk of carburettor icing. (Omitted) carburettor icing can occur when humidity is high (especially near clouds and when the air temperature is between -10 ºC & +18 ºC. (Omitted) carburettor icing can also occur when the engine is idling for long gliding. Pull “carburettor heat” therefore in advance.” (2) Characteristic and remarks of carburettor icing of the aircraft Because when carburettor icing (hereinafter referred to as “carb-

ice") occurred at Venturi-type carburettor which is generally used in an engine of aircraft, as results it could not keep an appropriate air/fuel ratio and the engine would have malfunctions, therefore pilots could recognize the occurrence of carb-ice.

On the other hand, the carburettor of the aircraft has different structure, when carb-ice occurred at the piston part which controls the fuel flow, and the engine operates as it has operated unless throttle positions are changed, therefore a pilot has a hard to find out the occurrence of carb-ice.

And if throttle position was changed under this situation, the engine causes malfunctions due to the changes of air/fuel ratio, then for the first time the pilot could suspect the occurrence of carb-ice.

(3) Inspecting status of the engine

On the day after the occurrence of this serious incident, a restart of the engine was tried at the apron and it was confirmed by the captain that he restarted the engine normally and faced no abnormality during the test run after those.

Furthermore, at the initial investigation, the engine was inspected, but no abnormality was found including for the test run.

(4) Experience of carburettor icing

The captain had not experienced the carb-ice for the last twenty some years, and at the time of this serious incident occurrence, he could not think of possibility of carb-ice occurrence.

(5) Prediction of the occurrence of carburettor icing

Civil Aviation Authority of New Zealand has introduced "Carburettor Icing Chart" which is able to predict an occurrence of the carb-ice based on outside temperature and dew point.

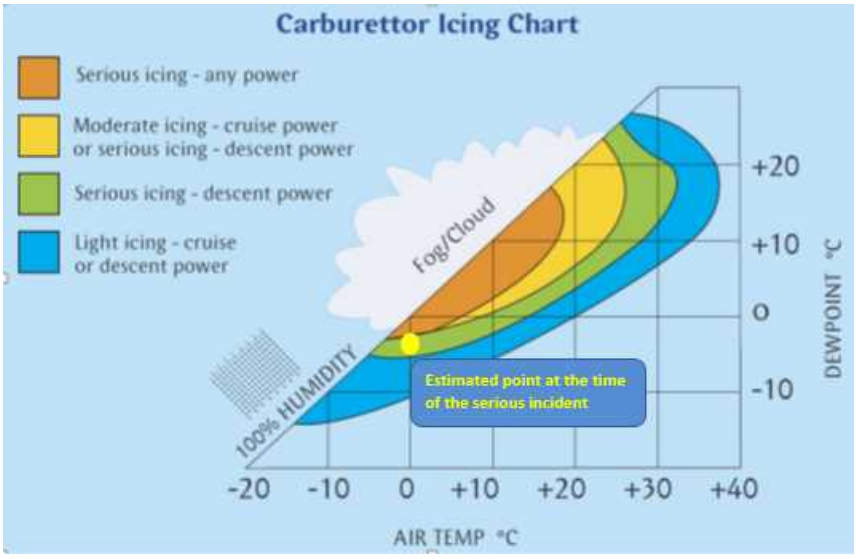


Figure 2: Carburettor Icing Chart (partially revised)

CIVIL AVIATION AUTHORITY OF NEW ZEALAND "Winter Flying" 2005 p11

3. ANALYSIS

3.1 Involvement of weather	Yes
3.2 Involvement of pilot	Yes
3.3 Involvement of equipment	None
3.4 Analysis of known items	(1) The atmospheric condition around the time of the serious incident occurrence At the time of the serious incident occurrence, since the Chugoku region was under the winter weather pattern which is high atmospheric pressure to the west and low atmospheric pressure to the east and based on the statements of the captain and the lower bad weather forecast diagram, it is highly probable that the outside temperature at 2,000ft over Okayama City was approximately 0 ºC. Also, around the time of the serious incident occurrence, multiple pilots had confirmed that they had seen snow clouds and local snowing/rainfall phenomena, was flying with care of icing, and since the aircraft was flying near snow clouds, it is probable that the dew points around the aircraft at 2,000ft was from 0 ºC to -3 ºC. Furthermore, applying 0 ºC for outside temperature and -3 ºC for dew point as conditions to the Figure 2 Carburettor icing chart, it fell into the range of serious carb-ice occurrence at descent power. Based on these, it is highly probable that the aircraft was flying through the airspace where was at high risk of the carb-ice. (2) As for the reason that the engine halted and was unable to restart The aircraft had normally completed the restart of the engine to return to the aerodrome, descended by idling and was holding to wait for a turn to land at. According to the captain, the oil temperature at the time was 40 ºC or less. It is highly probable that it was far below 70 ºC of the temperature where was at the high risk of the carb-ice. About five minutes later, when the trainee opened the throttle, the rpm of the aircraft engine halted without following. It is highly probable that the carb-ice occurred because the aircraft was flying by idling without using carb-heat through the airspace at low temperature and high humidity. As for the reason that the engine halted, it is highly probable that because changing the throttle position in the state with occurrence of carb-ice resulted in inability to keep the appropriate air/fuel ratio. Also, why the engine was not able to restart, it is probable that because of the continuous carb-ice occurrence, the engine could not obtain an appropriate air/fuel ratio to start. After the landing, it is highly probable that the test run of the

	engine had no abnormality because the carb-ice was dissolved due to the temperature at ground. (3) As for the reason that the carb-heat was not used It is probable that the captain could not find the occurrence of the carb-ice because he did not sense the malfunction of engine and the propeller was spinning during the descent and holding by idling. Furthermore, it is probable that the captain could not remember to turn on the carb-heat in advance because he was not aware that the possible occurrence of carb-ice as he did not have experienced the carb-ice recently.

4. PROBABLE CAUSES

In this serious incident, it is highly probable that the engine halted and could not restart due to the carburettor icing occurrences during the flight of the aircraft.

As for the reason of occurrences of the carburettor icing, it is probable that the carburetor heater was not used while the aircraft executed descent by idling at the low oil temperature, was holding at the airspace of serious carburettor icing risk.

5. SAFETY ACTION

Upon receiving the occurrence of the serious incident, Okayama Glider Club where the captain belongs is implementing the following safety action;

(1) Recheck the club rules and the flight manual relating use of the carb-heat, engine halt and restart.
(2) Inform all relevant parties about additional instructions concerning the restart of engine.
(3) Promote to use the check sheet to check items for the confirmation by the captain before departure.
(4) Revise the checklist.
(5) Revise the syllabus for training.