

AI2021-2

**AIRCRAFT SERIOUS INCIDENT
INVESTIGATION REPORT**

**SAPPORO CITY FIRE DEPARTMENT AIR CORPS
J A 1 7 A R**

February 18, 2021

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.

TAKEDA Nobuo
Chairperson
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

January 22, 2021



Adopted by the Japan Transport Safety Board

Chairperson	TAKEDA Nobuo
Member	MIYASHITA Toru
Member	KAKISHIMA Yoshiko
Member	MARUI Yuichi
Member	NAKANISHI Miwa
Member	TSUDA Hiroka

Company Name	Sapporo City Fire Department Air Corps
Type, Registration Mark	Agusta AW139 (Rotorcraft) JA17AR
Incident Class	Unintentional Drop of Object suspended to the Rotorcraft exterior. Article 166-4, item (xv), of the Ordinance for Enforcement of the Civil Aeronautics Act (Ordinance of Ministry of Transport No. 56 of 1952) prior to revision by the Ministerial Ordinance on Partial Revision of the Ordinance for Enforcement of Civil Aeronautics Act (Ordinance of Ministry of Land, Infrastructure, Transport and Tourism No. 88 of 2020)
Date and Time of the Occurrence	February 16, 2020 around 15:54 JST (JST: UTC+9 hours; unless otherwise stated, all times are indicated in JST in this report on a 24-hour clock)
Site of the Incident	Ishikari City in Hokkaido (43°12' 38" N, 141°18' 53" E)

1. PROCESS AND PROGRESS OF THE INVESTIGATION

Summary of the Serious Incident	The Rotorcraft took off from Ishikari Temporary Airfield and while approaching from the west side of the Airfield for rescue training, dropped weights attached to the hoist over the national forest.
Outline of the Serious Incident Investigation	<p>The Japan Transport Safety Board (JTSB) designated an investigator-in-charge and an investigator on February 17, 2020, to investigate this serious incident.</p> <p>An accredited representative and an adviser of the Republic of Italy, as the State of Design, and accredited representative of the United States of America, as the State of Manufacture of the rotorcraft involved in the serious incident, participated in this investigation.</p> <p>Comments were invited from parties relevant to the cause of the accident and the relevant States.</p>

2. FACTUAL INFORMATION

Aircraft Information	
Aircraft type: Agusta AW139	
Serial number: 41519;	Date of manufacture: August 6, 2016
Certificate of airworthiness: No. TO-2019-236;	Validity: August 19, 2020

Personnel Information

Captain:	Male, Age 48	
Commercial Pilot Certificate (Rotorcraft)		December 9, 1998
Pilot competence assessment (Rotorcraft)		
Expiry of practicable period for flight		December 12, 2020
Type rating for Multi-engine turbine land (AB139)		December 12, 2016
Class 1 aviation medical certificate	Validity:	August 5, 2020
Total flight time		3,781 hours 9 minutes
Total flight time on the type of aircraft		338 hours 40 minutes

Meteorological Information

Weather conditions at 16:00 on the day of the serious incident at Ishikari Automated Meteorological Data Acquisition System of the Japan Meteorological Agency (about 5 km southeast of the serious incident site) South-southeast wind 1.8 m/s, Temperature -2.4°C

Details of the Incident and Related Information

(1) History of the flight

The Rotorcraft took off from the Ishikari Temporary Airfield and conducted hoist rescue training simulating Airfield as a rescue site. It was scheduled to conduct six hoist trainings, and at its sixth run, on the approach from the west, Rotorcraft opened the right

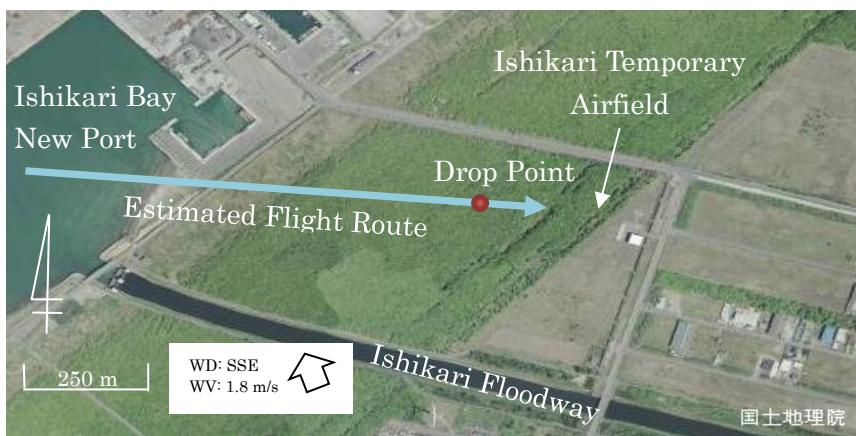


Fig. 1: Estimated flight route

cabin door, and when rescue member positioned weights on the hoist hook hole and released them outside, weights came off from hoist hook hole and dropped from altitude 180 ft (55 m). The weights were found in the national forest located about 250m on the west side of the Airfield. There were no damage to human or any object on the ground.

(2) Research of the hoist and weights

Weights are used to prevent unwanted swing when lowering the hoist hook. They weigh 2.27 kg each and two weights (total 4.54 kg) were stacked and used.

After the serious incident, it was confirmed that there were no damage to hoist hook and weight hook and functioned normally.



Fig. 2: Fallen weights



Fig. 3: Weight hook



Fig. 4: Hoist hook

Weight and weight hook were not part of Rotorcraft Type design.

(3) Mechanism of the weight hook

The weight hook can be opened by squeezing levers on the both side and remains open. When you insert object to hook, the object pushes the guide and close the hook. The weight hook consists of two hook-shaped parts that are overlapped symmetrically and attached with a shaft, and the spring is pushing the two parts to close from both sides. As seen in Fig. 5, when the hook is closed, the spring force is applied in a direction to close, and when it is open, the force is applied in a direction to open. When you connect the weight to the hoist hole it is difficult to visually confirm situation of the weight hook whether it is open or closed for the weight hook works inside the hole.

The weight hook is mainly used as mountain-climbing gear, a weight manufacturer apart from the hook manufacturer used the hook in their product.

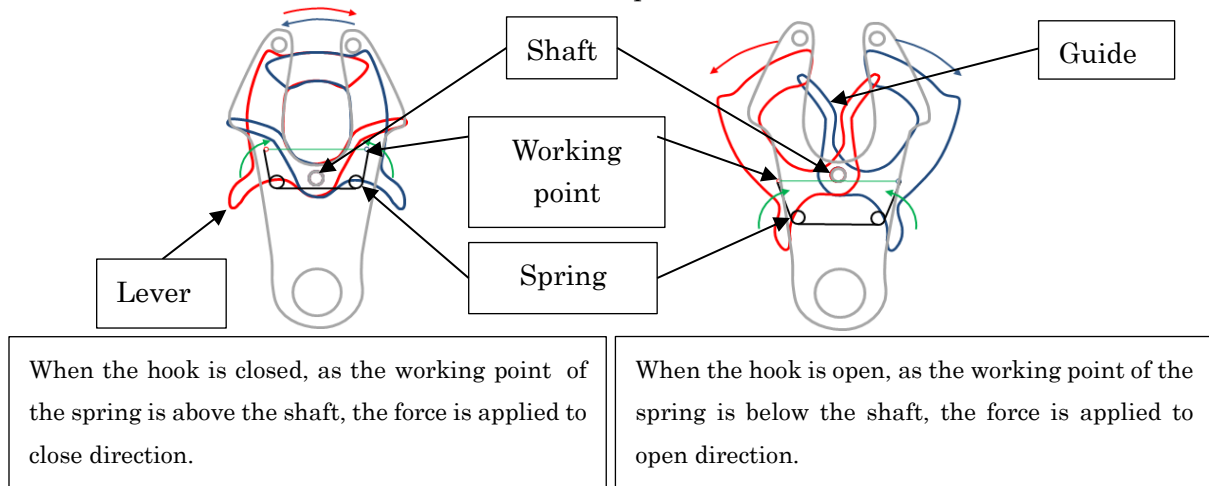


Fig. 5: Mechanism of the weight hook

(4) Usage experience of the hook

The weights were purchased by Sapporo City Fire Department Air Corp about one month before the serious incident, and they had only been used a few times. The mechanism of the weight hook was different from traditional Karabiners which was normally used. Upon introducing the weights, rescue members conducted familiarity training to confirm their usability and installation certainty, but did not anticipate the possibility that the weight hook may be disengaged.

(5) Situation of the hook at the time of the serious incident

When the serious incident occurred, video was recording how the weights were released. Fig. 6 shows the situation just before the hoist hook and the weights were released outside of the Rotorcraft. The enlarged weight hook shows that the lever on one side can be seen, but the other side cannot. In addition, the black upper part of the hook seems to be open on its right side. From this, it was confirmed that one side of the hook was open when the weights were released.

Fig. 7 show that the rescue member was putting his hands on the lever when hooking the weights to the hole. The instruction manual of the hook manufacturer, describes a warning that it should never hold the lever during connection. However, when they purchased the weight, no manual was attached.

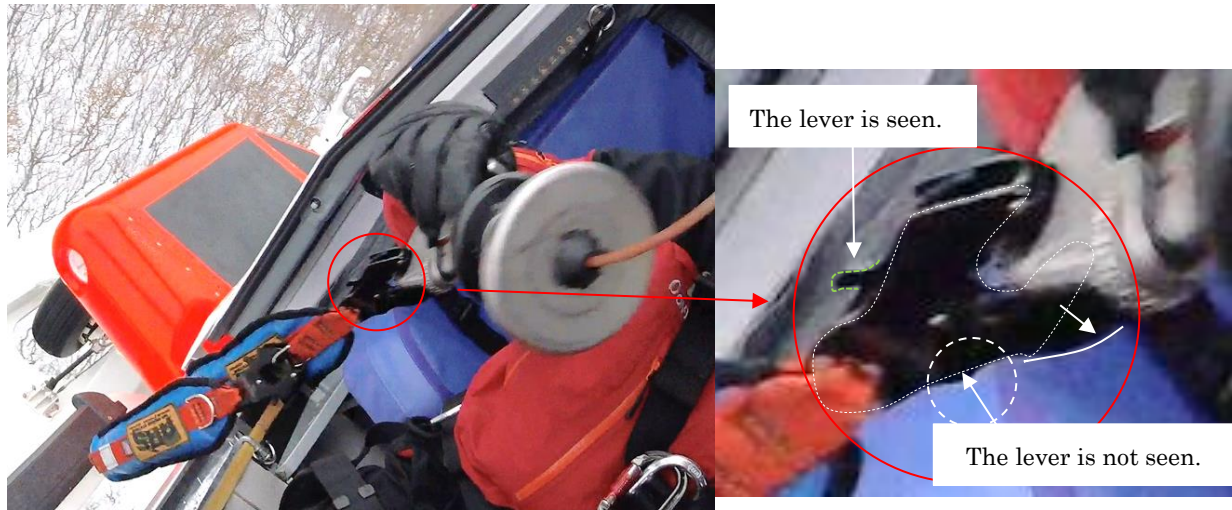


Fig.6: Condition of the hook just before being released

In addition, it was confirmed from the video, when the rescue member hooked the weight and released outside, he did not make sure that the weights were certainly hooked on the hoist hook hole.

According to the rescue member, he understood that it was necessary to confirm that the weights were certainly hooked by applying tension, but he omitted unconsciously.



Fig. 7: Situation at weight installation

(6) Verification by reproduction experiment

Based on the video, checking whether the weights may hang with right side hook open, it was found that weights were able to hang as seen in Fig. 8. If the weight was put outside in this state, weights would sway to the left, and therefore, the weight hook would turn clockwise as arrow indicates. It was confirmed due to the shape of the hook tip, the hoist hook opened the left side of the weight hook, so both sides of the hook were opened, and weights were unhooked.

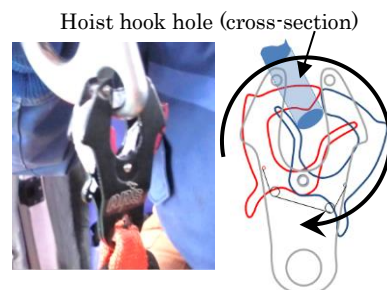


Fig. 8: Hook condition at verification

3. ANALYSIS

When the rescue member hooked weights on the hoist hook, almost certainly one side of the weight hook was open. And when weights were released to the outside of the Rotorcraft, it is presumed that the turning force applied to the weight hook as the weights swayed, and the both sides of the weight hook opened and weights dropped.

As the rescue member had his hands on the lever when he hooked weights on the hoist hook, may contributed to the fact that weights hung on the hoist hook with the one side of the hook open, and he did not confirm whether the hook was certainly closed.

It is difficult to visually confirm the open/close state of the weight hook; therefore, it is necessary to ensure that the hook is closed by applying tension to the weight.

It is considered that the rescue member did not sufficiently confirm the weight installation

condition, however, as they started to use this weight shortly before this incident, and the weights had never been disengaged, at its initial check by several rescue members, the team could not anticipate disengagement of weights. In addition, the rescue member understood that it was necessary to confirm by applying tension upon weight installation, it is possible that as he tried to install quickly, he omitted unconsciously.

When introducing new equipment, it is necessary to confirm in advance, the usage including appropriate selection, and should sufficiently identify the risk factors.

4. PROBABLE CAUSES

The JTSCB concludes that the probable cause of this serious incident was the weight hook was almost certainly not properly closed when attached on the hoist hook, and at the timing weights with the hoist hook were released outside of the Rotorcraft, the hook opened and weights dropped.

5. SAFETY ACTIONS

After this serious incident, Sapporo City Fire Department Air Corps took following safety actions.

- They suspended to use this weight.
- Revised the confirmation procedures when positioning the weight on the hoist hook as follows.
 - 1) The weight installation work shall be done inside the aircraft by the jumpmaster.
 - 2) After the weight installation, it shall be confirmed by applying tension
 - 3) The connection state of weights shall be double-checked by the jumpmaster and the hoist operator, and fall prevention rope shall be removed after this check and weight to be released outside of the Rotorcraft.