Havarikommissionen
Accident Investigation Board Denmark

Final Report
HCLJ510-2012-148

Serious incident to Eurocopter AS350 B3
Registration OY-HUB
At Nyhavn, Mestersvig, Greenland
On 25 August 2012

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FINAL REPORT

HCLJ510-2012-148	**Serious incident**		
Aircraft:	Eurocopter AS 350 B3	Registration:	OY-HUB
Engines:	Turbomeca Arriel 2B1	Flight:	Charter, VFR
Crew:	1 – No injuries	Passengers:	1 – No injuries
Place:	Mestersvig area, Greenland	Date og time:	25.8.2012 at 17:13 UTC

All times in this report are UTC.

The Aviation Unit of the Accident Investigation Board Denmark (AIB-DK) was notified of the serious incident by the operator on August 25th 2012 at 21:18 hrs.

The European Aviation Safety Agency (EASA), the Bureau d'Enquêtes et d'Analyses pour la sécurité de l'aviation civile (BEA), the European Commission (EC) and the Danish Transport Authority were notified on November 9th 2012.

FACTUAL INFORMATION

History of the flight

The serious incident flight was a charter flight from "Black Corner" camp site. The planned destination was Nyhavn, a small town located in the Mestersvig area on the east coast of Greenland.

After a few minutes of flight, the pilot noticed a powerful vibration and a sudden left yaw movement of the helicopter.

The pilot reduced the airspeed and then observed that a door warning light illuminated.

The flight diverted to the camp and landed without any further incidents.

A visual inspection of the helicopter revealed that the R/H Spacepod door was open and a passenger seat cushion stored in the cargo room was missing.

The serious incident flight took place in daylight and under visual meteorological conditions (VMC).

Injuries to persons

Injuries	*Crew*	*Passengers*	*Others*
None	1	1	0

Personnel information

The pilot - male 37 years – was in possession of a valid Commercial Pilot Licence Helicopter (CPL) (H) issued by the Danish Transport Authority.

Aircraft information

The Eurocopter AS 350 B3 was manufactured in 2010 by Eurocopter France as S/N 4965.

The Airworthines Review Certificate issued by the Danish Transport Authority was valid until June 16th 2013.

The helicopter was modified according to Supplemental Type Certificate (STC) No. SH93-88 issued by Transport Canada.
The European Aviation Safety Agency (EASA) certified the design change by STC No. EASA.IM.R.S.01292.

The STC was about the design change D350-600 Dart Spacepod installation shown on the picture below.

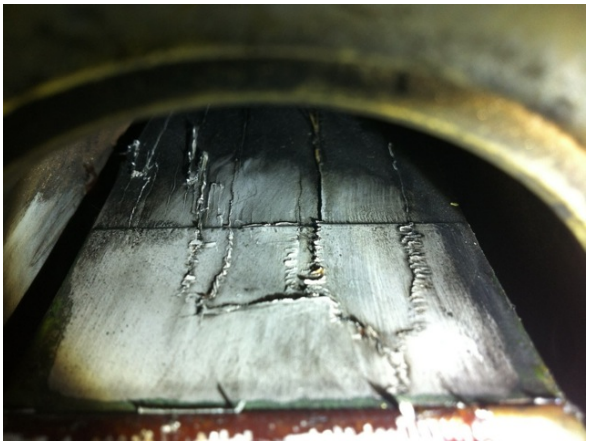
Dart Spacepod – upward opening door – installation.

Meteorological information
CAVOK and the wind was calm.

Examination of the helicopter and the Spacepod installation
Tail rotor examination
The tail rotor longitudinal hank - made of resin-impregnated glass roving - was damaged (delaminated) at the blade root areas.

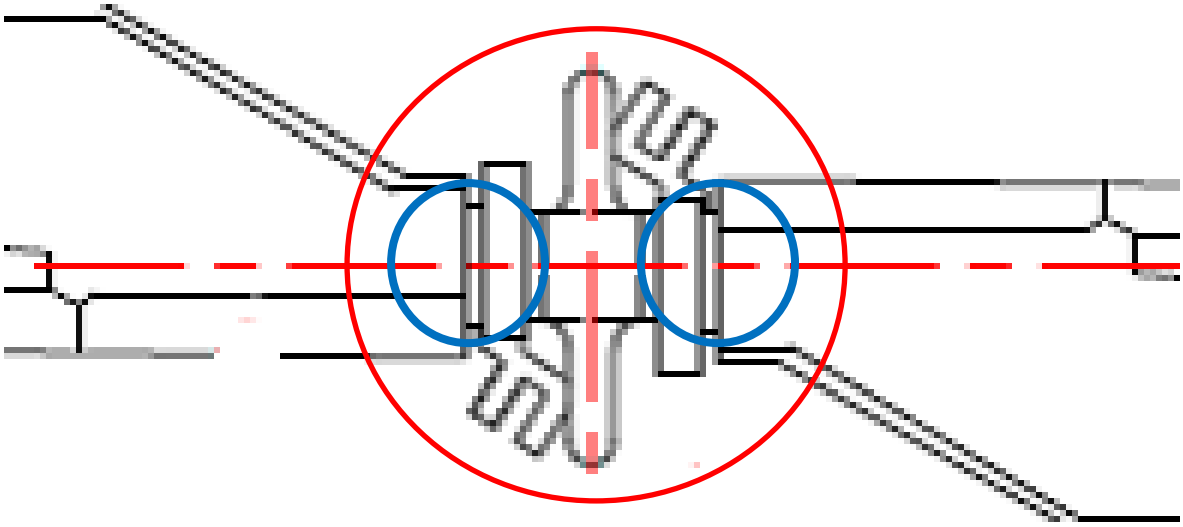
This hank constituted the tail rotor blade spar.

The damage to the hank is shown on the pictures below.



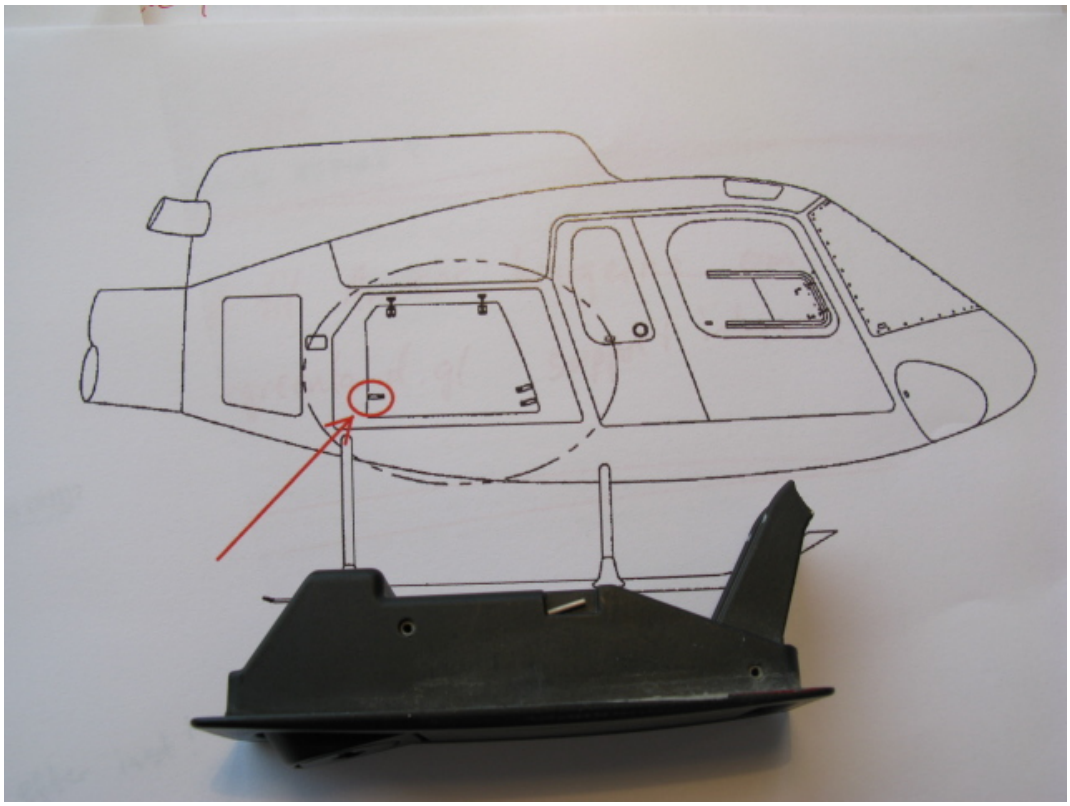
The tail rotor hub, the longitudinal hank and the blade root areas are shown in the red circle on the drawing below.

The damaged areas of the longitudinal hank are marked with blue circles.

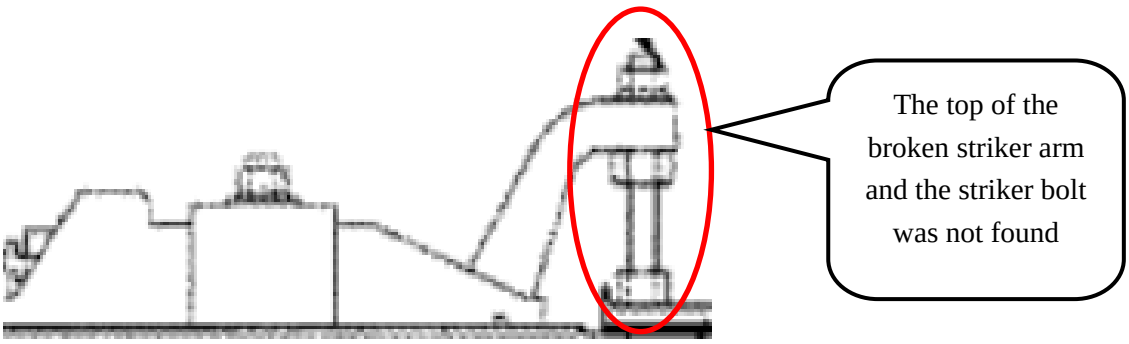


Spacepod installation examination
Examination of the Spacepod door latches revealed the following:

The aft door latch (shown on the picture below) was broken.



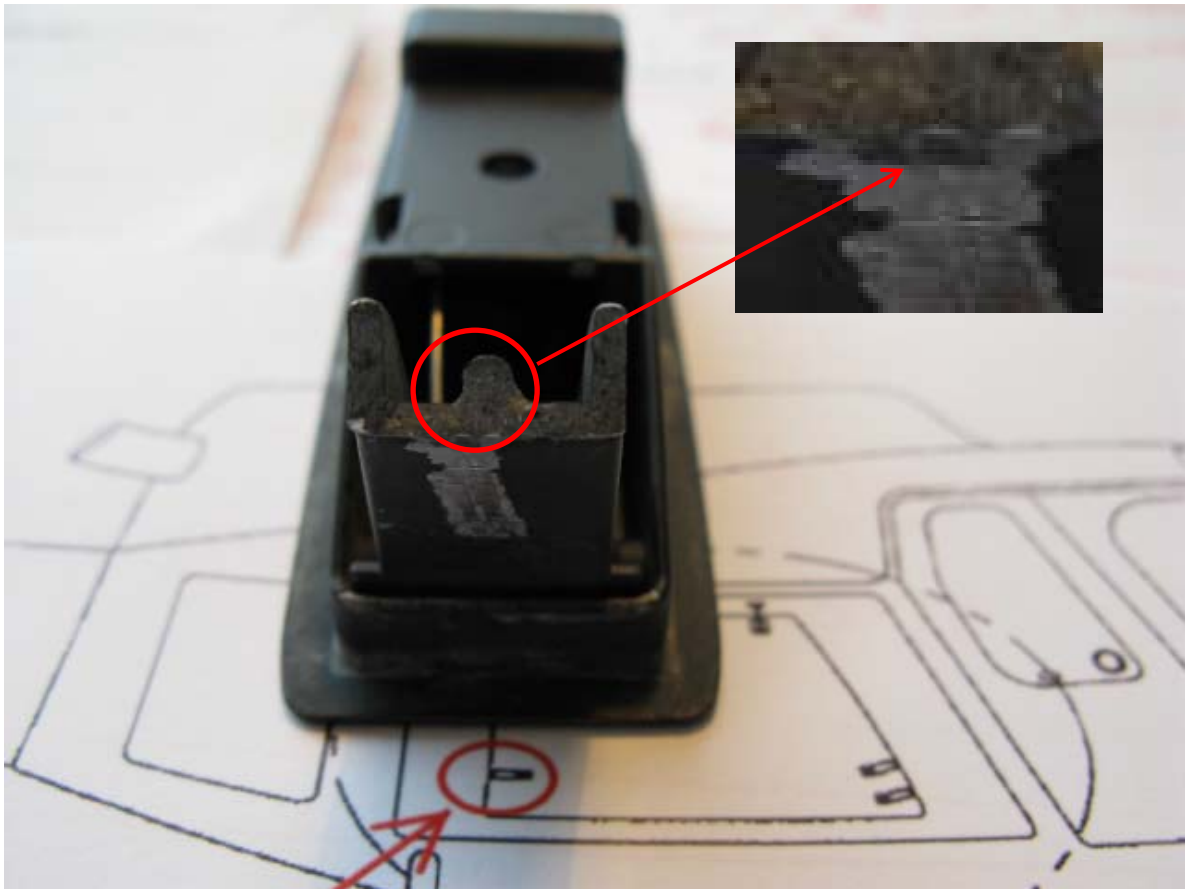
The missing part of the aft door latch is shown in the red circle on the drawing below.



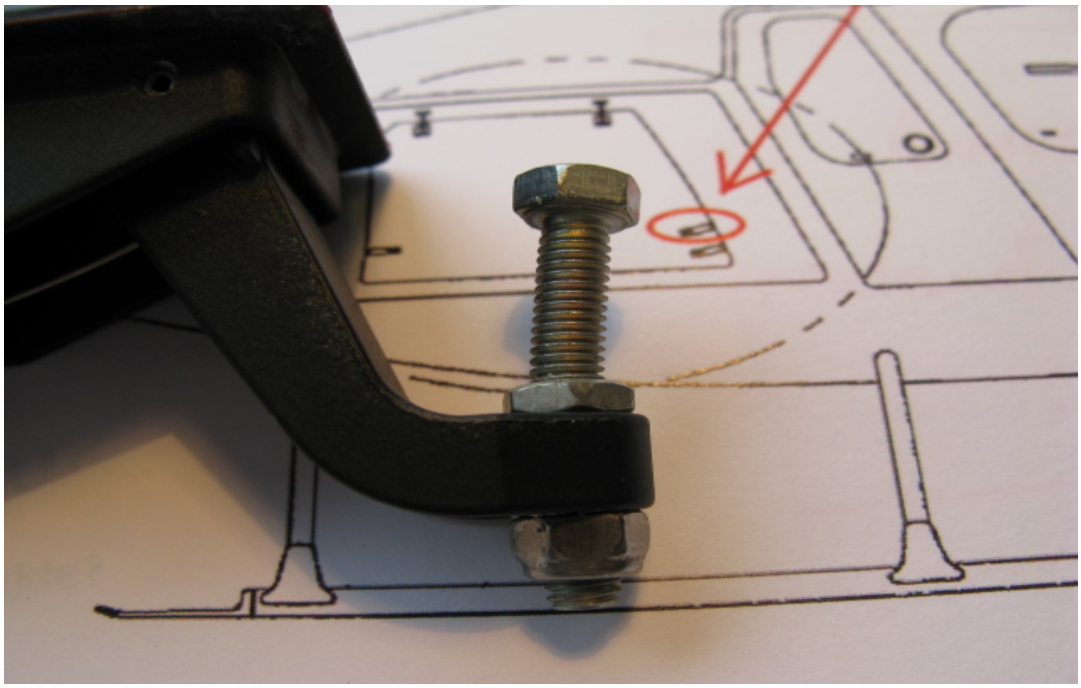
There was a scratch mark on the remaining part of the door latch striker arm (picture below).

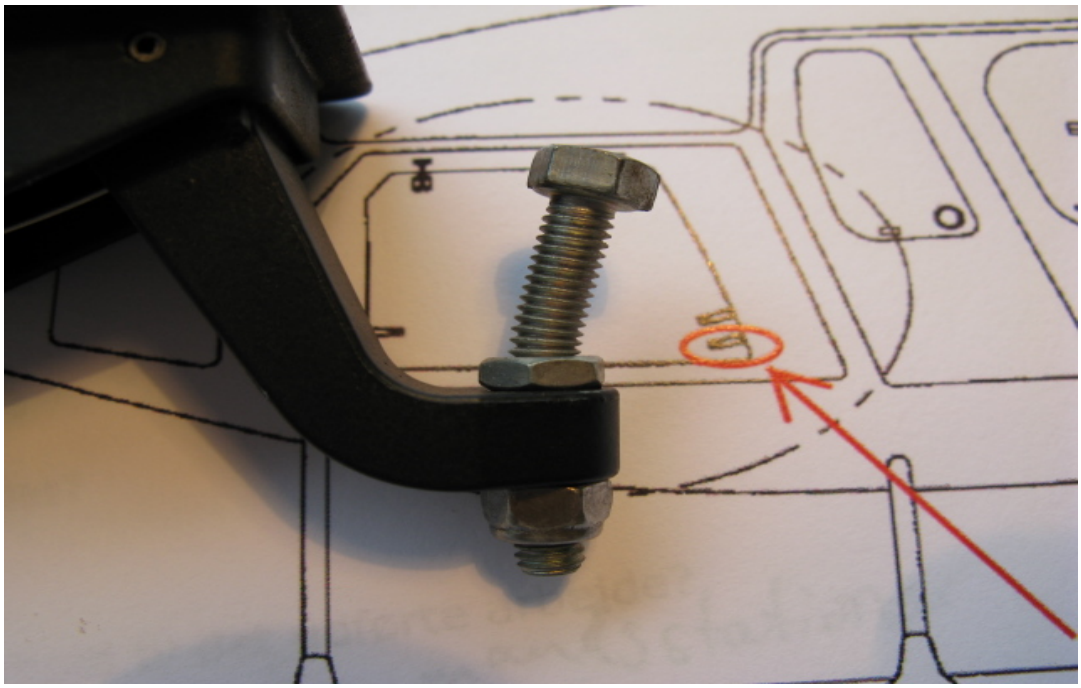
The fracture initiation point is shown in the red circle.

The fracture initiated from a pressure mark in the aluminum casting which is shown at the segment of the picture.



The forward upper and lower door latch adjustable striker bolts were bended as shown on the pictures below (latches shown upside down).





The door latches were not protected against objects stored in the cargo room (foreign object damage).

The striker bolts could catch objects between the striker bolt and the striker arm when closing the door.

Organizational and management information

The pilot who did the pre-flight check arrived the same day from leave. At that time, the Spacepod door was closed.

The pilot did not open the door.

The operator had experienced problems related to incorrect locked Spacepod doors in the past.

As a consequence hereof, the operator desided to modify the installation on its AS 350 fleet.

The operator was of the opinion, that the forward opening door type if opening in flight would stay closed as a result of the airflow force during forward flight.

All helicopters in the fleet exept OY-HUB was modified before the year 2012 season. The installation was modified to the forward opening door type as shown on the picture below.

Additional information

The picture of the door latch shown below was taken from the inside of the cargo room of another AS 350 than OY-HUB.

As illustrated, the door latches were unprotected against foreign object damage.

The red arrows show impact marks created when the door latch is opened and the striker arm is forced open by the spring.

This type of impact marks were not found on the door latches of OY-HUB.

ANALYSIS

The pilot was properly licenced.

The helicopter had a valid Airworthines Review Certificate.

The Spacepod door opened after a few minutes of flight. Therefore, the AIB-DK concludes that the Spacepod door was not sufficiently locked before the flight.

The investigation could not determine the extent of the insufficient locked door latches before the flight.

However, it can be concluded that the pre-flight check performed before the flight did not reveal that the Spacepod door was not sufficiently locked.

The AIB-DK can not exclude that some of the door latch damages (bended bolts) were caused by the door forced open by the air flow around the helicopter in flight.

The investigation revealed, that it was possible for the door latch striker bolts to catch objects between the striker bolt and the striker arm when closing the door latch.

The AIB-DK is of the opinion that this scenario most likely damaged the aft door latch striker arm (foreign object damage).

It could not be determined for certain that the insufficient locking was caused by a foreign object damage.

The AIB-DK could not determine when the aft door latch striker arm broke. It is possible that this happened when the door was forced open.

The in flight opening of the Spacepod door caused a foreing object damage to the tail rotor. This was probably caused by the missing seat cushion or parts hereof.

In this case the foreign object damage caused a powerful vibration and a sudden left yaw movement of the helicopter.

The AIB-DK is of the opinion that forward opening Spacepod doors will not completely reduce the risks of foreign object damage.
Because if a forward opening door opens in flight objects might still be sucked out of the the cargo room. How much the forward opening door type will open in flight will be a result of the forward airspeed of the helicopter against the force of the door opening gas cylinder.

CONCLUSIONS

As a consequence of the in flight opening of the right hand Spacepod door, the tail rotor suffered from foreign object damage which led to a powerful vibration and a sudden left yaw movement of the helicopter.

Contributing factors to the serious incident was insufficient locking of the Spacepod door and an ineffectual performed preflight check.

SAFETY RECOMMENDATIONS

The AIB-DK issued no recommendations based on this investigation.

Safety initiatives taken during the investigation

The operator of the serious incident helicopter has been in contact with the Spacepod manufacturer with the aim of a protection of the door latch installation against foreign objects.