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***Final report RL 2012: 12e***

**Incident on 18 August 2011 to aircraft HA-LPB at Skavsta airport, Södermanland County.**

Case no: L-85/11

2012-04-10

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Swedish Transport Agency  
Aviation Department  
601 73 NORRKÖPING

### **Final report RL 2012: 12e**

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The Swedish Accident Investigation Authority (Statens haverikommission, SHK) has investigated an incident that occurred on 18 August 2011, at Skavsta airport, Södermanland County, involving an aircraft with registration HA-LPB.

In accordance with Regulation (EU) No. 996/2010 on the investigation and prevention of accidents and incidents in civil aviation, the SHK investigation team hereby submits a final report containing the results of the investigation.

On behalf of the SHK investigation team.

Mikael Karanikas

Stefan Christensen

## General observations

The Swedish Accident Investigation Board (SHK) is a state authority with the task of investigating accidents and incidents with the aim of improving safety. SHK accident investigations are intended to clarify, as far as possible, the sequence and causes, as well as any damages and other consequences, of such events. The results of an investigation shall provide the basis for decisions aiming at preventing similar events from occurring again, or limiting the effects of such an event, as well as for an assessment of the operations performed by the emergency services and, when appropriate, for improvements to these emergency services.

SHK accident investigations thus aim at answering three questions: *What happened? Why did it happen? How can a similar event be avoided in the future?*

SHK does not have any inspection remit, nor is any part of its task to apportion blame or liability concerning damages. Accidents and incidents are, therefore, neither investigated nor described in the report from any such perspectives. Issues of that kind may on the other hand be dealt with by judicial authorities or, for example, by insurance companies.

The task of SHK does not either include as a side issue of the investigation that concerns emergency actions an investigation into how people transported to hospital have been treated there. Measures in support of such individuals by the social services, for example in the form of post crisis management, also are not the subject of the investigation.

Investigations of aviation incidents are governed mainly by Regulation (EU) No 996/2010 on the investigation and prevention of accidents and incidents in civil aviation. The investigation is carried out in accordance with Annex 13 of the Chicago Convention.

## The investigation

On 18 August 2011 SHK was informed of an incident with an aircraft with registration HA-LPB that occurred at Skavsta airport, Södermanland County, on the same day at 21:25.

The incident has been investigated by SHK as represented by Göran Rosvall chairperson until 25 January 2012, Mikael Karanikas thereafter. Stefan Christensen, Investigator in Charge, Staffan Jönsson, Technical Investigator, and Patrik Dahlberg investigator rescue services.

The investigation has been followed by Sven Christiansson from Transportstyrelsen (The Swedish Transport Agency) up to October 2011, after that Matti Riikonen.

Accredited representatives from the Hungarian Transportation Safety Bureau (TSB Hungary), French Bureau of Enquiry and Analysis for Civil Aviation Safety (BEA France), and National Transportation Safety Board (NTSB USA), were appointed and have followed the investigation.

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<i>Aircraft: registration, type</i>	HA-LPB, Airbus A320-233.
<i>Class/airworthiness</i>	Normal, Certificate of Airworthiness and valid ARC
<i>Owner/Holder/Operator</i>	ALS Irish Aircraft Leasing/Wizz Air
<i>Time of occurrence</i>	18/08/2011 at 21:25 during dusk. NOTE: All times are given in Swedish daylight saving time (UTC <sup>1</sup> + 2 hours)
<i>Place</i>	Skavsta airport, Södermanland County, Sweden (pos 58 47, 3N, 016 54, 2E; 43 m above sea level)
<i>Type of flight</i>	Commercial air transport
<i>Weather</i>	According to SMHI's analysis: wind 230°/04 knots, visibility more than 10 km, no clouds below 5,000 feet, temp/dew point 15/13 °C, QNH <sup>2</sup> 1013 hPa
<i>Persons on board:</i>	
<i>crew</i>	6
<i>passengers</i>	159
<i>Injuries to persons</i>	None
<i>Damage to aircraft</i>	None
<i>Other damage</i>	None
<i>Pilot in command:</i>	
<i>Age, licence</i>	39 years, ATPL <sup>3</sup>
<i>Total flying time</i>	8,760 hours, of which 5,365 hours on type
<i>Flying hours previous 90 days</i>	218 hours, all on type
<i>Number of landings previous 90 days</i>	109
<i>Co-pilot:</i>	
<i>Age, licence</i>	41 years, ATPL
<i>Total flying time</i>	8,600 hours, of which 1,200 hours on type
<i>Flying hours previous 90 days</i>	99 hours, all on type
<i>Number of landings previous 90 days</i>	39

### Sequence of events, etc

The aircraft, an Airbus A320, landed at Skavsta airport after a scheduled flight from Budapest. The approach and landing were made in accordance with normal procedures. After landing the aircraft taxied to the terminal for parking at stand 7. When the aircraft had stopped, the pilots commenced their checklist for parking and shut down the engines at around 21:25.

When the engines were shut down the ground staff observed flames and a glow from engine number one (the left engine) and smoke from engine number two. The staff called for help from the airport fire brigade who quickly moved out to the aircraft. When the rescue unit arrived at the aircraft, there was smoke from both the engines and the leading fire officer called air traffic control and ordered the serious incident alarm to be activated.

<sup>1</sup> UTC: Universal Time Co-ordinated.

<sup>2</sup> QNH: Refers to the atmospheric pressure at sea level.

<sup>3</sup> ATPL: Airline Transport Pilot Licence

The staff also drew the pilots' attention to the incident. In accordance with QRH<sup>4</sup> the pilots initiated cranking of the engines, which means that only the starter motor runs with the intention of ventilate out any remaining fuel. This procedure was performed on both engines, whereby the previously visible flames and smoke disappeared.

The alarm was received by SOS Alarm at 21: 27, and from there the municipal rescue services and an ambulance were dispatched to the scene two minutes after having received the alarm. On the way to the incident location, the municipality's emergency services established contact with the leading fire officer at the airport fire brigade and were told that there was no visible fire or smoke. At 21:39 the municipality's emergency services were at the scene of the incident along with an ambulance and the police, at the same time, the passengers were leaving the aircraft normally. The rescue units remained on alert and the rescue operation was suspended at 22:12.



Fig.1. The aircraft after the incident. Photo: SHK

Staff from SHK arrived at Skavsta after the incident to interview the pilots, and a technical inspection of the engines was carried out. At the time, it was decided that the aircraft flight recorders (DFDR-Digital Flight Data Recorder) should be removed for investigation.

During the interviews with the pilots it transpired that no faults or malfunctions had been observed in the cockpit while the engines were being shutdown. No messages relating to fire had been indicated on the screen for the aircraft's electronic warning system. The pilots were of the opinion that what had occurred was something that could sometimes occur when switching off the engine type (IAE V2527E-A5) in question.

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<sup>4</sup> QRH: Quick Reference Handbook (emergency checklist).

The routine technical investigation carried out of the aircraft in the presence of representatives of the accident commission indicated no visible damage or traces of fire.

The only sign of oil or a fuel leak that could be identified was a small residue in the lower part of the rear outlet of engine number 1, see Figure 2. The other parts of the engine inspected at this time showed no visible signs of damage, discoloration of the outlet areas or traces of fire. Inspection was carried out in accordance with regulations 78-10-00-200 and 71-00-00-860-010 of the aircraft's AMM<sup>5</sup>.



Fig. 2. Engine no 1: Area at rear outlet with traces of burned oil or fuel residue. Photo: SHK

Following inspection, both engines were started and were run for five minutes at idle, under the supervision of the accident commission. The running of the engines was carried out in accordance with prescribed procedures and showed no deviations from normal values. Also, the shutdown of the engines was carried out without any deviations or malfunctions.

The recordings in the aircraft's DFDR were read out by the laboratory technicians at SAAB, and were then analysed by the accident commission. This analysis included data both from the last flight – with the shutdown of the engines – as well as from the time the engine was test run. No faults or malfunctions could be deduced from the registrations on the flight data records. Nor were there any discrepancies observed when compared with normal registered values which may explain the chain of events which were observed by the ground staff at the airport.

The incident, with visible flames, primarily from the rear parts of the engine, is referred to as "tail-pipe fire" and can occur at startup or shutdown of turbofan engines. The most common reason is that small amounts of fuel or oil, for some reason, had been gathered in the rear of the outlet part of the engine and then ignited. Flames in this part of the engine do not normally generate a fire warning in the cockpit, which explains why the pilots are often not aware of the incident.

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<sup>5</sup> AMM: Aircraft Maintenance Manual.

As a result of the incident, SHK contacted the European representative for the type certificate holder. History of reported “tail pipe fires” for the engine type (all versions of the model V2500), only point to nine cases during the period from 2000 to 2011. It has not always been possible to clarify why these incidents have occurred, but the type certificate holder believes that the most likely causes are oil leakage from parts in the bearing housing and leakage of fuel from separate parts of the system e.g. fuel pipes or valves.

### **Conclusion**

Incidents of “tail-pipe fire” to varying degrees are not an uncommon feature of turbofan engines. The frequency varies with the type of engine, but is most common during start-up. The phenomenon in itself, however, is not categorized as serious, but seen rather as a relatively “normal” element of the operation cycle of certain engine types.

However, what may constitute a serious consequence of such an event is that witnessing such an incident can be very dramatic. The sight of flames in an aircraft engine can create strong reactions in humans, and can sometimes cause panicky and uncontrolled emergency evacuations of aircraft with injury risks as a result (see SHK report RL 2011:10).

The measures that took place at the airport in connection with the incident can be considered a reasonable reaction to events. Visible flames to the extent reported normally leads to this type of operation. The reason why the alarm was activated at the airport was an expected consequence of the instructions the staff must follow in the event of incidences such as this.

In this incident, the direct reason as to why open flames occurred could not be established. No damage or engine malfunctions were found. Taking into account the combustion residues found at the outlet from engine No. 1, it is most probable that an oil leakage caused the flames. Aviation fuel which is burned, normally leaves no trace in the form of combustion residues.

### **Recommendations**

None