Aircraft incident to SE-KPE during approach to the Malmö/Sturup airport, M county, Sweden, on 03 December 1999

Micro-summary: **On approach, this Saab 340 was hit by lightning, causing dual generator electrical failure.**

Event Date: **1999-12-03 at 1701 UTC**

Investigative Body: **Swedish Accident Investigation Board (AIB), Sweden**

Investigative Body's Web Site: **http://www.havkom.se/**

Cautions:

1. Accident reports can be and sometimes are revised. Be sure to consult the investigative agency for the latest version before basing anything significant on content (e.g., thesis, research, etc).

2. Readers are advised that each report is a glimpse of events at specific points in time. While broad themes permeate the causal events leading up to crashes, and we can learn from those, the specific regulatory and technological environments can and do change. ***Your company's flight operations manual is the final authority as to the safe operation of your aircraft!***

3. Reports may or may not represent reality. Many many non-scientific factors go into an investigation, including the magnitude of the event, the experience of the investigator, the political climate, relationship with the regulatory authority, technological and recovery capabilities, etc. It is recommended that the reader review all reports analytically. Even a "bad" report can be a very useful launching point for learning.

4. Contact us before reproducing or redistributing a report from this anthology. Individual countries have very differing views on copyright! We can advise you on the steps to follow.

ISSN 1400-5719

Report RL 2000:32e

Aircraft incident to SE-KPE during approach to the Malmö/Sturup airport, M county, Sweden, on 03 December 1999

Case L-106/99

Statens Haverikommission (SHK) investigates accidents and incidents with regard to safety. The sole objective of the investigations is the prevention of similar occurrences in the future. It is not the purpose of this activity to apportion blame or liability.

Translated by Bob Arnesen
From the original Swedish report at the request of the Board of Accident Investigation (SHK).

In case of discrepancies between the English and the Swedish texts, the Swedish text is to be considered the authoritative version.

The report is also available on our Web site: www.havkom.se

2000-09-29 L-106/99

Swedish Civil Aviation Administration

601 79 NORRKÖPING

Report RL 2000: 32e

The Board of Accident Investigation (Statens haverikommission, SHK) has investigated an aircraft incident that occurred on 03 December 1999 during approach to the Malmö/Sturup airport, M county, Sweden, involving an aircraft with registration SE-KPE.

In accordance with section 14 of the Ordinance on the Investigation of Accidents (1990:717) the Board herewith submits a final report on the investigation.

Ann-Louise Eksborg

Monica J Wismar Henrik Elinder

Report RL 2000:32e

L-106/99

Finalized 2000-09-29

Aircraft; registration and type	**SE-KPE**, Saab SF340A
Class/ airworthiness	Normal, airworthy
Owner/operator	ABN Amro Leasing, ABN Amro Bank AB, Box 7335, 103 90 Stockholm/ Highland Air/ Skyways AB, Box 1537, 581 15 Linköping
Time of occurrence	1999-12-03, at 1801 hours, in darkness *Note:* All times are reported in Swedish normal time = UTC + 1 hour
Place	Approx. 17 km. north of the Malmö/Sturup airport, M county, (pos. 5539N 1321E, 823 m or 2700 feet above sea level)
Type of flight	Scheduled flight
Weather	METAR for the Malmö/Sturup airport at 1800 hrs. : wind 200° at 28 knots gusting to 40 knots, visibility 7 km in rain and haze, clouds 3–4/8 at 700 ft. and 5–6/8 at 900 ft., temp. +6° C, dew point +5° C, QNH 976 hPa.
Persons on board; crew	2/1
passengers	17
Injuries to persons	None
Damage to aircraft	Limited
Other damage	None
Commander:	
age, certificate	52 years, ATPL
total flying time	11015 hours, of which 5985 hours on type
flying hours previous 90 days	175 hours, of which all on type
number of landings previous 90 days	123
Co-pilot:	
age, certificate	28 years, Commercial with Instrument Rating
total flying time	2100 hours, of which 200 hours on type
flying hours previous 90 days	185 hours, of which all on type
number of landings previous 90 days	130

The Board of Accident Investigation (SHK) was notified on 07 December 1999 that an incident with an aircraft with registration SE-KPE had occurred during the approach to the Malmö/Sturup airport at 1801 hrs on 03 December 1999, M county, Sweden.

The incident has been investigated by SHK represented by Ann-Louise Eksborg, chairman, Monica J Wismar, Chief investigator flight operations, and Henrik Elinder, Chief technical investigator (aviation).

The investigation was followed by the Swedish Civil Aviation Administration represented by Max Danielsson.

History of the flight

Skyways flight JZ 965 was on a regular flight between the Örebro and Malmö/Sturup airports on the 03 December 1999. The commander was the flying pilot for the leg and the flight experienced moderate turbulence. Lightning had been reported by other aircraft in the Malmö area but the crew was unable to see any storm activity on their weather radar.

After the crew had received clearance to commence an ILS[1] approach to runway 17 at Sturup and was established inbound on the LLZ[2], the aircraft was hit by lightning, causing both engine driven electrical generators to trip off. The aircraft was at an altitude of 2700 ft. approximately, and 9 nautical miles from the runway. All instruments except for the standby flight instruments and the emergency lighting ceased to function and the crew was unable to communicate with Air Traffic Control (ATC).

The crew continued the approach using the standby instruments while trying to reset the generators by cycling the switches from ON to OFF-RESET and then back to ON, with no success. By using a similar procedure with the radio they were however able to re-establish contact with ATC, and informing them of the difficulties they were experiencing and ask for radar vectors during the approach. The commander decided to continue the approach using the standby instruments and land as soon as possible after making some small turns to see that they were indeed indicating properly and giving correct information.

When extending the landing gear the crew was unable to get three green down-and-locked indications, even though the lamps tested correctly. They tried to retract and extend the gear several times, but the result was the same. It was first when the emergency gear extension procedure was used that the crew was able to get three green safe indications. The flight was at this point at 2000 ft. established on the ILS.

The air traffic controller asked the flight if they were declaring an emergency, which the crew confirmed. The controller then alerted all the concerned parties as outlined in their instruction booklet "Green Checklist-Risk for Accident".

When the aircraft was struck by lightning the cabin had already been prepared for landing and the cabin attendant was seated with her seat belt fastened at her station. She contacted the pilots and received information about what had happened and that the flight would shortly be landing. This information was then passed on to the passengers.

The pilots made visual contact with the runway at a height of about 1000 ft. and carried out an uneventful landing. After landing they were finally able to reset both engine driven generators. All instruments began to then function normally except for the EFIS[3] screens, which had a somewhat paler colour scheme. After having reached their parking stand the commander informed the passengers about what had happened and made sure that no one had been injured.

A visual inspection of the aircraft showed a 40–50 cm long crack in the upper part of the nose radome.

The aircraft type is equipped with two independent electrical systems, each consisting of a generator and a battery, with each generator having automatic overvoltage protection. The two systems are normally connected through a Bus Tie Relay, which opens and disconnects the two systems from each other automatically should an electrical fault arise in one of the systems, thus protecting the remaining and intact system. The first action in

---

[1] ILS – Instrument Landing System
[2] LLZ – Localizer, ILS runway centerline
[3] EFIS - Electronic flight instrumentation system

the malfunction checklist for the loss of both generators is to manually open the Bus Tie Relay.

Lightning strikes have on earlier occasions caused the overvoltage protectors to automatically disconnect both generators on this aircraft type. Experience has shown that the generators can be reset to ON after a period of about 15 seconds. The aircraft manufacturer is producing a modification that will reduce the risk for unnecessary generator disconnects.

After the incident the landing gear system was found to be without fault. No proper explanation has been found to explain why the crew did not get a correct down-and-locked green indication during the first attempts to extend the gear. The aircraft is equipped with an electrical hydraulic pump that is normally driven through power from the generators.

Conclusions

A double generator failure during flight has serious consequences for flight safety. All electricity needed to power the remaining standby and emergency systems is then provided from the aircraft batteries for a limited amount of time only. When a fault occurs in flight, as in this incident, the normal procedure is to follow the malfunction checklist provided onboard.

The fault occurred in connection with a lightning strike during the final part of an instrument approach. In this case the crew would have had to initiate a go-around and conceivably proceed to a holding pattern to find the time to correctly perform the malfunction checklist.

SHK finds it understandable that the crew chose to continue the approach and land as soon as possible after having first determined that the standby instruments were functioning correctly, given that the batteries would provide power for a limited time only and that a successful completion of the malfunction checklist was uncertain. A manual disconnect of the Bus Tie Relay would in this case not have solved the problem.

The problem experienced in extending the landing gear was most probably caused by too low pressure in the hydraulic system, as a result of the power loss to the electrically driven hydraulic pump.

Based on the circumstances it was correct to declare an emergency.

The incident was caused by both the aircraft's generators being automatically disconnected after a lightning strike.

Recommendations

None.