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Report RL 2002:05e

Incident involving aircraft SE-KUT in the airspace above Umeå, AC County, Sweden, on the 6th of March 2001

Case L-009/01

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.

The report is also available on our Web site: www.havkom.se
Translated by Dennis Lynn Anderson

From the original Swedish at the request of the Board of Accident Investigation. In case of discrepancies between the English and the Swedish texts, the Swedish text is to be considered the authoritative version.

Statens haverikommission (SHK) Board of Accident Investigation

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2002-02-21 L-009/01

Swedish Civil Aviation Administration
601 79 NORRKÖPING

Report RL 2002:05e

The Board of Accident Investigation (Statens haverikommission, SHK) has investigated an aircraft incident that occurred on the 6th of March 2001 in the airspace above Umeå, AC County, Sweden, involving an aircraft with registration SE-KUT.

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.

Olle Lundström

Monica J Wismar Henrik Elinder

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Aircraft: registration, type	**SE-KUT,** SAAB SF 340A
Class/airworthiness	Normal, valid certificate of airworthiness
Owner/Operator	COMMUTER INVEST I ANS, Norway Skyways Express AB, Sweden
Date and time	The 6th of March 2001 at 07:25 hours in daylight. *Note:* All times in the report refer to Swedish Standard Time = UTC + 1 hour
Place of occurrence	In the airspace above Umeå, AC County, Sweden (approx. position 6411N 02111E, 6.400 meters above sea level)
Type of flight	Scheduled traffic
Weather	According to SMHI's analysis: wind 330°/02 knots, visibility > 10 km, cloud cover 1–2/8 stratus with cloud bases at 200 feet and 5–7/8 altostratus with cloud bases at 8,000 feet, temperature/dew point –12/–13 °C, QNH 1005 hPa.
Persons on board: crew	2/1
passengers	15
Injuries to persons	None
Damage to aircraft	Limited
Other damage	None
Commander:	
age, certificate	38 years old. ATPL (Swedish D)
total flying time	6,100 hours, of which 3,734 hours on the type
flying hours previous 90 days	146 hours, all on the type
number of landings previous 90 days	127
Co-pilot:	
age, certificate	39 years old, CPL with Instrument Rating (Swedish B)
total flying time	5,700 hours, of which 2,600 hours on the type
flying hours previous 90 days	82 hours, all on the type
number of landings previous 90 days	71
Cabincrew:	Employed since 2000

The Board of Accident Investigation (SHK) was notified on the 6th of March 2001 that an incident an aircraft with registration SE-KUT had taken place in the airspace above Umeå, AC County, Sweden, on that same day at 07:25 hours.

The incident has been investigated by SHK represented by Olle Lundström, Chairman, Monica J Wismar, Chief Investigator-Flight Operations and Henrik Elinder, Chief Technical Investigator-Aviation.

The investigation has been followed by The Swedish Civil Aviation Administration through Gun Ström.

Summary

The aircraft flew Skyways Express AB's scheduled route between Sundsvall/ Härnösand airport and Luleå/Kallax airport with the commander as the flying pilot. Just after the aircraft had reached the maintaining flightlevel, the pilots noticed a strong odor reminiscent of burned plastic but they did not observe any smoke. Both pilots donned their oxygen masks and informed Air Traffic Control that they had "smoke in the cabin" and that they were requesting a descent and landing at the nearest airport as soon as possible. The air traffic controller provided them with radar vectors to a straight-in approach to runway 14 at Umeå airport.

When they had left their cruising altitude the co-pilot initiated procedures in accordance with the emergency checklist but he found it irrelevant and difficult to follow. During the flight there were no indications of fire or smoke. The commander removed his oxygen mask when there were a few minutes of the flight remaining in order to easier facilitate a brief information to the passengers over the passenger address system (PA).

SHK establish in the investigation that a control unit, called (FPCDU[1]), was afflicted with type-related fault which could cause the odor of a fire and that the manufacturer measures have been taken in order to overcome the problem.

The incident was caused by overheated electronics in the control unit FPCDU.

Recommendations

None.

[1] FPCDU - Flat Panel Control Display Unit

1 FACTUAL INFORMATION

1.1 History of the flight

On the 6th of March 2001 the aircraft flew Skyways Express AB's scheduled route number JZ 150 between Sundsvall/Härnösand airport and Luleå/Kallax airport. The takeoff took place from Sundsvall at 06:47 with the commander as the flying pilot and the flight was cleared to climb to flight level (FL) 210 (6,400 meters). Just after the aircraft had reached FL 210, the pilots noticed a strong odor reminiscent of burned plastic but they did not observe any smoke. The cabin attendant, who was in the aircraft galley immediately aft of the cockpit, also sensed the odor despite the fact that the door to the cockpit was closed. She reported this to the pilots.

Both pilots donned their oxygen masks. They informed Air Traffic Control that they had "smoke in the cabin" and that they were requesting a descent and landing at the nearest airport as soon as possible. At this time the aircraft was approximately 18 NM[2] north of Umeå airport and the air traffic controller provided them with radar vectors to a straight-in approach to runway 14 at Umeå.

When they had left their cruising altitude the co-pilot initiated procedures in accordance with the emergency checklist. After having accomplished the first items under the heading "Avionic or Electrical Smoke or Fire" (see section 1.17.2), he felt that the checklist was not relevant and that it was difficult to follow. He then continued troubleshooting of his own accord and turned off (among other things) the Engine Bleed Air in an attempt to localize the fault, which produced no results. Subsequently he chose to use the applicable items in the normal checklist.

There was a risk of icing conditions in the approach area and scattered clouds with low bases. Therefore the pilots chose to deviate from the emergency checklist and not, as is prescribed therein, shut down the electrical supply to certain systems, as they considered these to be necessary for the approach.

During the flight there were no indications of fire or smoke. As it is difficult to communicate with the oxygen mask donned the commander removed his oxygen mask when there were a few minutes of the flight remaining in order to easier facilitate a brief information to the passengers over the passenger address system (PA). At that time he could still discern a stinging burnt odor in the cockpit. He suffered sensations of discomfort in his throat for a few days after the incident.

The cabin attendant was informed that they were going to land as soon as possible and the commander requested that she prepare the cabin. She prepared and checked the cabin and found nothing abnormal at that time. The cabin was not prepared for an emergency landing.

The landing was accomplished without problems. Subsequent to the landing the commander determined that the situation was under control and taxied the aircraft in to the assigned parking position, where the passengers disembarked.

The commander later debriefed the passengers more comprehensively when they had been assembled inside the terminal building. The airport personnel assisted the passengers until the next aircraft arrived that could be used for onward transportation. None of the passengers exhibited any apprehension.

The incident took place at the approximate position of 6411N 02111E, 6,400 meters above sea level.

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[2] NM – Nautical Mile (1,852 meters)

1.2 Injuries to persons

	Crew	*Passengers*	*Other*	*Total*
Fatal	–	–	–	–
Serious injuries	–	–	–	–
Minor injuries	–	–	–	–
None	3	15	–	18
Total	3	15	–	18

1.3 Damage to aircraft

Limited.

1.4 Other damage

None.

1.5 The crew

1.5.1 The commander

The commander was 38 years old at the time and held a valid Airline Transport Pilot License (Swedish D).

Flying hours previous	*24 hours*	*90 days*	*Total*
All types	2	146	6,100
This type	2	146	3,734

Number of landings this type previous 90 days: 127.
Flight training on the type concluded in April of 1995.
Latest PC (proficiency check) carried out 2000-08-24 in the SAAB 340 simulator.

1.5.2 The co-pilot

The co-pilot was 39 years old at the time and held a valid Commercial Pilot License with Instrument Rating (Swedish B).

Flying hours previous	*24 hours*	*90 days*	*Total*
All types	0	82	5,700
This type	0	82	2,600

Number of landings this type previous 90 days: 71.
Flight training on the type concluded in December of 1996.
Latest PC carried-out 2000-10-19 in the SAAB 340 simulator.

1.5.3 Other crew members

A cabin attendant was included in the crew. She was employed by the company in the beginning of the year 2000 and completed her latest emergency training on the 23rd of January 2001.

1.5.4 *The pilots' work schedules*

During the week prior to the occurrence the pilots had the following work schedules:

	Commander	*Number of flights*	*Co-pilot*	*Number of flights*
2001-02-28	14:25–20:45	4	05:30–16:40	6
2001-03-01	14:25–01:20	2+1 passive	15:50–20:30	4
2001-03-02	13:00–22:00	Standby	05:30–16:40	4
2001-03-03	Day off	Meeting	07:50–10:10	passive
2001-03-04	Day off	–	Day off	
2001-03-05	07:10–17:25	3	Day off	

1.6 The aircraft

THE AIRCRAFT

Manufacturer:	SAAB Aircraft AB
Type:	SAAB SF 340
Serial number:	340A-87
Year of manufacture:	1987
Gross weight:	Maximum allowable 12,700 kg, actual 11,200 kg
Center of gravity:	Within allowable limits, 28 % MAC
Total flight hours:	16,830 hours
Number of cycles:	23,079
Flying hours since latest periodic check:	586 hours
Fuel uplifted prior to the event:	Jet A1

ENGINE

Engine manufacturer:	General Electric	
Engine model:	CT7-5A2	
Number of engines:	2	
Engine	*Nr 1*	*Nr 2*
Total operating time:	19,552	21,386
Operating hours since latest overhaul:	2,926	5,286
Cycles after overhaul:	4,078	7,136

PROPELLER

Propeller manufacturer:	Dowty
Operating hours since overhaul:	
Propeller 1	2,476 hours
Propeller 2	5,367 hours

The aircraft had a valid Certificate of airworthiness.

1.7 Meteorological information

According to SMHI's analysis: wind 330°/02 knots, visibility > 10 km, cloud cover 1–2/8 stratus with cloud bases at 200 feet and 5–7/8 altostra-

tus with bases at 8,000 feet, temperature/dew point –12/–13 °C, QNH 1005 hPa.

1.8 Aids to navigation

The aircraft was radar vectored for approach to runway 14 at Umeå airport, which is equipped with ILS[3]. The aircraft was equipped for instrument flight.

1.9 Communications

The co-pilot declared an emergency to the air traffic controller in the tower, who in turn initiated the warning alarm according to the ”Green Checklist”. Radio communications are presented in appendix 2.

1.10 Aerodrome data

Umeå airport had operational status in accordance with the Swedish AIP (Aeronautical Information Publication).

1.11 Flight recorders

1.11.1 Flight Data Recorders (FDR, QAR)

FDR- and QAR-data have not been analyzed.

1.11.2 Cockpit Voice Recorder (CVR)

CVR-registration has not been analyzed.

1.12 Incident site

The incident occurred in the airspace immediately north of Umeå at an altitude of 6,400 meters.

1.13 Medical information

Nothing has been found that would indicate that the physical or mental condition of the pilots was impaired prior to or during the flight.

1.14 Fire

There was no fire.

1.15 Survival aspects

A normal landing was accomplished at the nearest airport. Those on-board were not exposed to any serious danger.

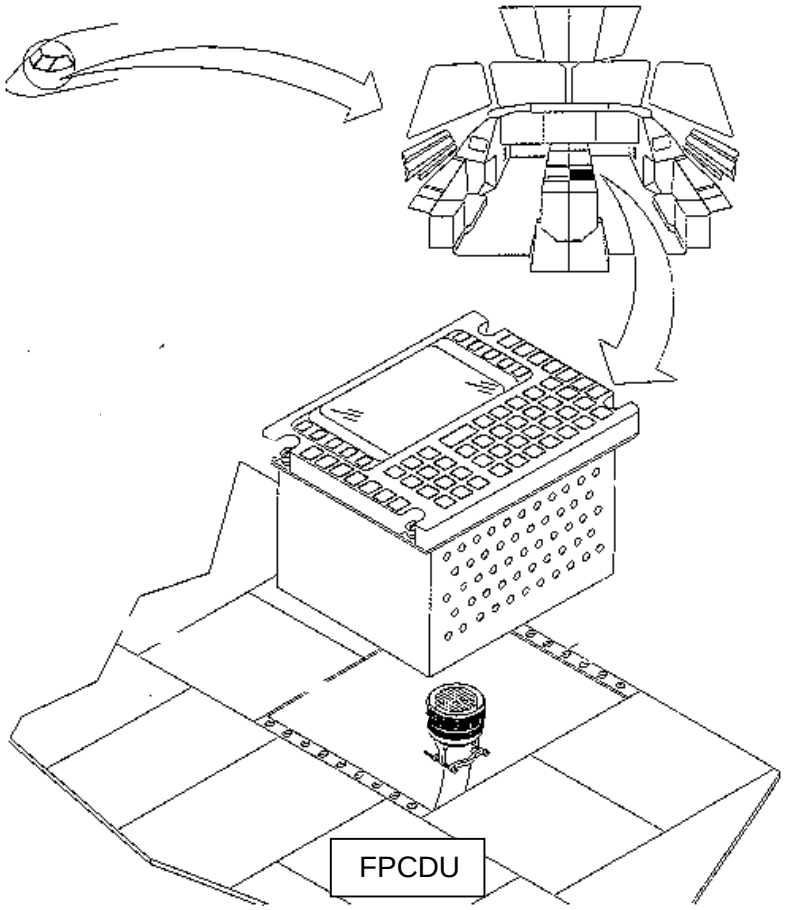
1.16 Tests and research

After consultation with SHK, technicians from the airline company and the aircraft manufacturer performed trouble shooting of the aircraft's electrical

[3] ILS – Instrument Landing System

system within the cockpit. After more than two days of trouble shooting no fault had been found that could explain the burnt smell.

However, later the burnt smell was localized to a control unit called the FPCDU[4], which is installed in the center console placed between the pilot seats. The FPCDU is an electronic control unit for a number of the aircraft systems. The unit was replaced and sent to the manufacturer, Universal Avionics, for trouble shooting. Subsequent to this replacement no burnt odor was experienced and the aircraft was returned to service.



On the 11th of June 2001 Universal Avionics issued a non-compulsory Service Bulletin on the FPCDU (SB No 1117.XX-34-2698) that recommends retrofit of the unit with a latter version (Model 8). The stated intention with this is to diminish the risk of a component failure within the unit.

On the 29th of June 2001 Universal Avionics issued a compulsory (”Alert”) Service Bulletin on the FPCDU (SB No 1117.XX-34-2699) that prescribes specified periodical functional testing of the unit. The stated intention is preemptive identification of a possible component failure in the unit which can result in the (”--- odor characteristic of hot electrical equipment”).

The measure is also prescribed in the aircraft manufacturer’s SAAB 340 Service Newsletter No SN 340-0112, issued on the 31 st of December 2001.

[4] FPCDU - Flat Panel Control Display Unit

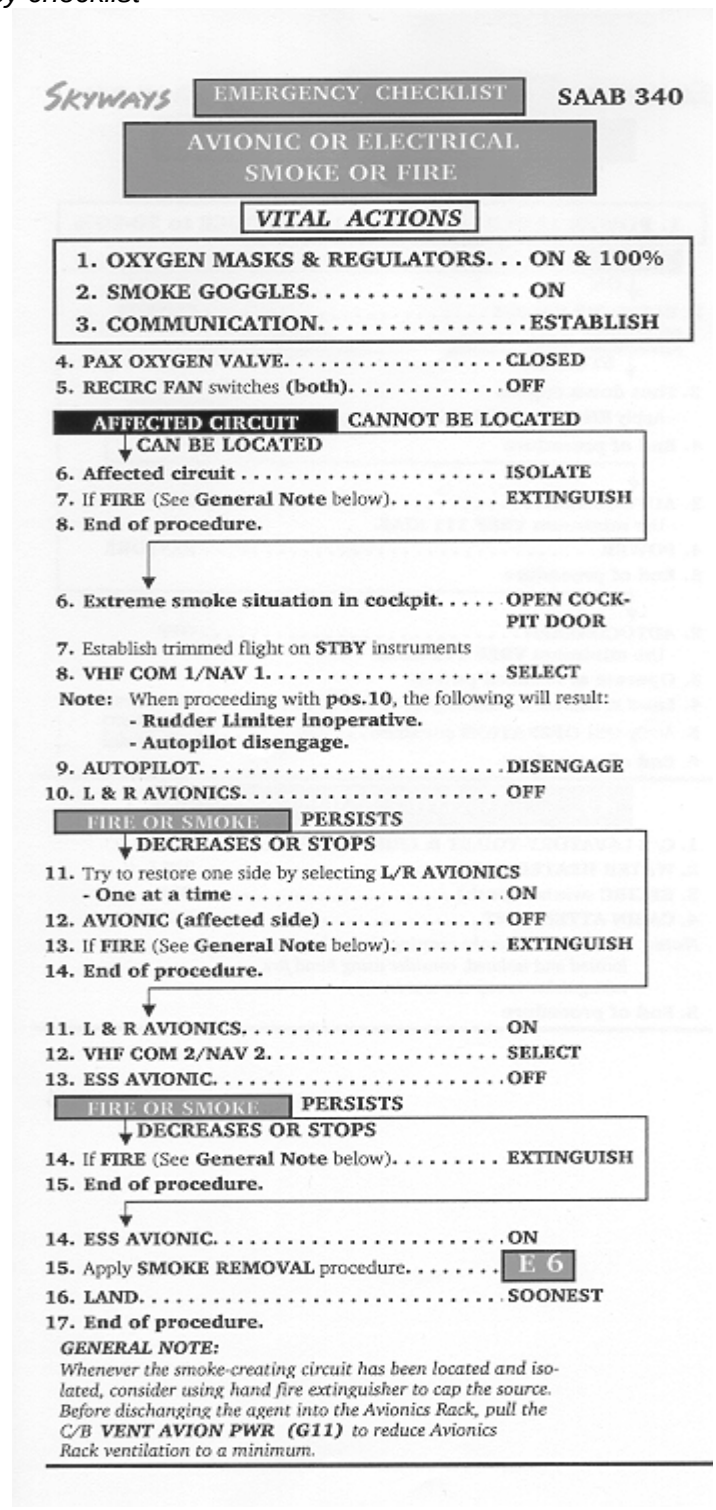
1.17 Organizational and management information

1.17.1 General

Skyways Express AB is an aviation company with headquarters in Linköping, Sweden. The company holds an operational license (AOC[5]) in accordance with JAR-OPS[6] 1. The company is a division of Skyways Holding AB with approximately 1,000 employees and pursues scheduled and non-scheduled air traffic with 46 aircraft of the types Embraer EMB-145, Fokker F27 MK050 and SAAB SF340.

[5] AOC – Air Operator Certificate
[6] JAR-OPS - Joint Aviation Requirements - Operations

1.17.2 Emergency checklist



SKYWAYS EMERGENCY CHECKLIST SAAB 340

AVIONIC OR ELECTRICAL SMOKE OR FIRE

VITAL ACTIONS

1. OXYGEN MASKS & REGULATORS. . . ON & 100%
2. SMOKE GOGGLES. . . . . ON
3. COMMUNICATION. . . . . ESTABLISH
4. PAX OXYGEN VALVE. . . . . CLOSED
5. RECIRC FAN switches (both). . . . . OFF

AFFECTED CIRCUIT CANNOT BE LOCATED

CAN BE LOCATED

6. Affected circuit . . . . . ISOLATE
7. If FIRE (See General Note below). . . . . EXTINGUISH
8. End of procedure.

6. Extreme smoke situation in cockpit. . . . . OPEN COCKPIT DOOR
7. Establish trimmed flight on STBY instruments
8. VHF COM 1/NAV 1. . . . . SELECT

Note: When proceeding with pos.10, the following will result:
- Rudder Limiter inoperative.
- Autopilot disengage.

9. AUTOPILOT. . . . . DISENGAGE
10. L & R AVIONICS. . . . . OFF

FIRE OR SMOKE PERSISTS

DECREASES OR STOPS

11. Try to restore one side by selecting L/R AVIONICS - One at a time . . . . . ON
12. AVIONIC (affected side) . . . . . OFF
13. If FIRE (See General Note below). . . . . EXTINGUISH
14. End of procedure.

11. L & R AVIONICS. . . . . ON
12. VHF COM 2/NAV 2. . . . . SELECT
13. ESS AVIONIC. . . . . OFF

FIRE OR SMOKE PERSISTS

DECREASES OR STOPS

14. If FIRE (See General Note below). . . . . EXTINGUISH
15. End of procedure.

14. ESS AVIONIC. . . . . ON
15. Apply SMOKE REMOVAL procedure. . . . . E 6
16. LAND. . . . . SOONEST
17. End of procedure.

GENERAL NOTE:
Whenever the smoke-creating circuit has been located and isolated, consider using hand fire extinguisher to cap the source. Before discharging the agent into the Avionics Rack, pull the C/B ***VENT AVION PWR (G11)*** *to reduce Avionics Rack ventilation to a minimum.*

1.17.3 Steps taken for the avoidance of smoke emission on-board

During the year of 2001 the company has introduced new routines concerning maintenance and engine wash. When the aircraft are taken in for technical maintenance, a dust removal process is carried out within the instrument and avionics panel bay areas; dust that can cause a burning odor when heated. Subsequent to the engine wash, a engine test run is performed in order to burn-off any possible residue from the cleaning agents that can cause smell and smoke from the airconditioning system.

2 ANALYSIS

The smell of smoke or fire from an unknown source during flight shall always be treated as a serious incident. The pilots therefore acted correctly in donning their oxygen masks, declaring an emergency and requesting to land at the nearest suitable airport. Thereafter the crew is considered to have acted in a correct manner, with considerable assistance from air traffic control personnel, in performing the landing at Umeå airport and in informing the passengers of the situation.

The pilots felt that they received little support from the emergency checklist. This occurrence once again shows how difficult it is to create relevant emergency instructions when confronted with the smell of fire without visible fire or smoke. These problems have earlier been discussed in SHK´s Report C 1999:8. In that report the Swedish Civil Aviation Administration is recommended to "ensure that valid emergency checklists for heavy aircraft are user friendly regarding measures to be taken in case of smoke, smell of fire and similar situations *(C 1999:8 R2)*"

Concerning the pilots' difficulties when speaking on the radio with the oxygen mask on, SHK has as recently as on the 24th of August 2001, in Report RL 2001:23, which deals with an incident in which the pilots also found use of the oxygen mask to be problematic, made (among others) the following recommendation:

" The Swedish Civil Aviation Administration is recommended to take the necessary action to ensure that aircraft with pressurised cabin used for commercial purposes are equipped with oxygen masks and smoke goggles that are both functional, easy-to-use and quick donning, and that pilots receive both initial and regular re-current training in their proper use, including the necessary hands-on training *(RL 2001:23 R1)*".

As is evident from section 1.16, a type-related fault existed within the control unit (FPCDU) at the time of the incident, which could cause the odor of a fire. After this unit was exchanged no smell of fire has been evident in the aircraft. This therefore confirms that the odor of fire was caused by a failure within the FPCDU in the aircraft. In view of the fact that the problem has been attended by the manufacturer and measures have been taken in order to overcome the problem, SHK sees no occasion to issue any recommendation.

3 CONCLUSIONS

3.1 Findings

a) The pilots were qualified to perform the flight.
b) The aircraft had a valid Certificate of Airworthiness.
c) The crew's actions when the smell of fire arose were correct.
d) The control unit FPCDU was afflicted with a type-related fault, which could cause the odor of a fire.
e) The manufacturer has taken measures to overcome the fault.

3.2 Causes of the incident

The incident was caused by overheated electronics in the control unit FPCDU.

4 RECOMMENDATIONS

None.