



Australian Government

Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY INVESTIGATION REPORT

Aviation Occurrence Report – 200600160

Final

**Electrical System Event – 15 km SSW
Lismore Aerodrome, NSW
16 January 2006
VH-ORX
Saab SF340B**



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Electrical System Event – 15 km SSW Lismore Aerodrome, NSW – 16 January 2006 – VH-ORX, Saab SF340B

Prepared by

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Abstract

On 21 January 2006, at 1155 Eastern Daylight-saving Time, a Saab AB SF340B aircraft (Saab 340), registered VH-ORX, departed Lismore Aerodrome, NSW, on a scheduled regular public transport flight to Sydney, NSW. On board were 3 crew and 21 passengers. Shortly after passing 8,000 ft on climb, the crew received a master caution warning indicating that there had been numerous system failures. After conducting failure management procedures the crew elected to return to the departure aerodrome. While en-route to the departure aerodrome they received another master caution indicating a hydraulic failure. The crew then diverted to Coolangatta Aerodrome where an uneventful landing was completed.

Subsequent investigation revealed that the K9 circuit breaker had been tripped. The investigation by the operator revealed that it was possible to inadvertently trip the circuit breaker when moving a navigation folder for use.

As a result of the occurrence the operator issued an Operations Notice to flight crew advising that items are not to be stored on the circuit breaker panel and that all circuit breakers are to be checked correctly during failure management procedures.

THE AUSTRALIAN TRANSPORT SAFETY BUREAU

The Australian Transport Safety Bureau (ATSB) is an operationally independent multi-modal Bureau within the Australian Government Department of Transport and Regional Services. ATSB investigations are independent of regulatory, operator or other external bodies.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations. Accordingly, the ATSB also conducts investigations and studies of the transport system to identify underlying factors and trends that have the potential to adversely affect safety.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and, where applicable, relevant international agreements. The object of a safety investigation is to determine the circumstances to prevent other similar events. The results of these determinations form the basis for safety action, including recommendations where necessary. As with equivalent overseas organisations, the ATSB has no power to implement its recommendations.

It is not the object of an investigation to determine blame or liability. However, it should be recognised that an investigation report must include factual material of sufficient weight to support the analysis and findings. That material will at times contain information reflecting on the performance of individuals and organisations, and how their actions may have contributed to the outcomes of the matter under investigation. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. While the Bureau issues recommendations to regulatory authorities, industry, or other agencies in order to address safety issues, its preference is for organisations to make safety enhancements during the course of an investigation. The Bureau is pleased to report positive safety action in its final reports rather than make formal recommendations. Recommendations may be issued in conjunction with ATSB reports or independently. A safety issue may lead to a number of similar recommendations, each issued to a different agency.

The ATSB does not have the resources to carry out a full cost-benefit analysis of each safety recommendation. The cost of a recommendation must be balanced against its benefits to safety, and transport safety involves the whole community. Such analysis is a matter for the body to which the recommendation is addressed (for example, the relevant regulatory authority in aviation, marine or rail in consultation with the industry).

FACTUAL INFORMATION

History of the flight

On 21 January 2006, at 1155 Eastern Daylight-saving Time, a Saab AB SF340B aircraft (Saab 340), registered VH-ORX, departed Lismore Aerodrome, NSW, on a scheduled regular public transport flight to Sydney, NSW. On board were 3 crew and 21 passengers.

Shortly after departure, while passing 8,000 ft on climb the crew received 'master caution' and 'centre warning panel' notifications that there had been numerous system failures including:

- loss of the pilot in command's flight instruments
- left main bus failure
- left essential bus failure
- inverter failure
- avionics vent warnings.

The crew reported that they carried out failure management procedures, which included checking their respective circuit breaker panels, and shortly after received information from air traffic control (ATC) that the aircraft's radar transponder had failed. The crew acknowledged this call and notified ATC that they had an electrical abnormality. Air traffic control requested that the crew remain at 8,000 ft. The crew replied that they were now levelling off at 12,000 ft.

Following the initial failure management procedures, the crew discussed what systems and functions had been rendered inoperative by the failures and a decision was made to return to Lismore. The crew advised ATC of their situation and the aircraft was manoeuvred for the diversion back to Lismore. Once the aircraft was tracking towards Lismore, the crew noticed that the cloud cover would require an instrument approach prior to landing. They also noticed that the cloud cover was less to the east of Lismore and consequently decided to track to the east to remain clear of cloud. Shortly after, the crew received another 'master caution' warning, this time notifying them of a hydraulic system malfunction. The initial actions for this failure necessitated the immediate lowering of the landing gear using the alternate extension system. The crew carried out this action and decided to divert to Ballina as it had a longer runway than Lismore. The crew advised ATC that they would be diverting to Ballina because of the problems that they were experiencing. The crew also briefed the flight attendant and the passengers of the diversion.

En-route to Ballina, the crew assessed numerous system failure checklists to determine what systems and instruments were affected by the electrical and hydraulic failures. Following this, the crew advised ATC that they had decided to divert to Coolangatta as the runway there was longer than Ballina and there were emergency services at the field. They also declared a PAN¹ to ATC. The crew then briefed the flight attendant of their latest diversion and that prior to landing the

¹ A radio call indicating uncertainty or alert.

flight attendant should prepare the cabin for an emergency landing. They also briefed the flight attendant that there would be a 'BRACE, BRACE' call issued prior to touchdown.

The crew continued to action checklists during the flight to Coolangatta and were required to orbit east of the coast for approximately 10 minutes while all the required checklists had been completed. The aircraft was then tracked for a straight-in approach to runway 32 at Coolangatta. After landing, the aircraft was taxied clear of the runway and marshalled to an area where it was shut down and the crew and passengers disembarked.

Following shutdown, the aircraft was inspected by maintenance engineers and the crew, and it was discovered that the K9 circuit breaker had tripped. The K9 circuit breaker provides electrical overload protection to a number of systems, including the left main and essential electrical busses, the pilot in command's flight instruments and the radar transponder. Maintenance personnel inspected the aircraft and could not detect any electrical system malfunction that would have resulted in the K9 circuit breaker being tripped.

Subsequent investigation by the operator has revealed that the pilot-in-command, as well as other crews, were in the habit of storing their navigation document folder in the area adjacent to the circuit breaker panel. The operator's investigation revealed that it was possible to trip the K9 circuit breaker by snagging it on the navigation folder when the folder was being removed for use. The pilot-in-command reported that he had moved the folder shortly before the initial 'master caution' warning. Information from the aircraft manufacturer indicated that the circuit breaker could be tripped by as little as 0.75 lb-force².

Safety Action

Following this occurrence the flight crew involved underwent simulator training during which the incident was duplicated. The company advised the ATSB that the crew reported that undergoing this training assisted in understanding the chain of events and gave them the opportunity to reflect on the event.

The operator issued an Operations Notice to all flight crews following this occurrence. This Notice contained information regarding the need to ensure that all circuit breakers are checked correctly during failure management procedures. It also advised flight crews that under no circumstances are any items to be stored near circuit breaker panels.

The Notice also contained information on the benefits of ensuring that all crew member communication is adequate and is carried out in an appropriate manner.

² Equivalent to 0.34 kilogram-force.