



**Australian Government**

**Australian Transport Safety Bureau**

# In-flight engine fire warning involving Fairchild SA227, VH-SEZ

near Avalon Airport, Victoria, 3 September 2017

**ATSB Transport Safety Report**  
Aviation Occurrence Investigation  
AO-2017-089  
Final – 10 May 2018

Released in accordance with section 25 of the *Transport Safety Investigation Act 2003*

#### **Publishing information**

**Published by:** Australian Transport Safety Bureau  
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#### **Addendum**

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# In-flight engine fire warning involving Fairchild SA227, VH-SEZ

## What happened

On 3 September 2017, a Fairchild SA227-AC aircraft, registered VH-SEZ, was operating Sharp Airlines flight SH843 from Portland to Essendon, Victoria. The first officer was pilot flying (PF) and the captain was pilot monitoring (PM).<sup>1</sup>

About 46 NM east of Portland, overhead Warrnambool, and in the cruise at flight level (FL) 170,<sup>2</sup> the left engine fire warning lights on the annunciator and fire warning panels started to momentarily illuminate. At 1608 Eastern Standard Time,<sup>3</sup> the flight crew contacted air traffic control (ATC) advising that they required a clearance to descend to 9,000 ft and that they would require a direct track to Essendon.

The fire warning lights continued to flicker and then both remained illuminated. As a result, the flight crew assessed that there was an engine fire. They conducted the memory checklist for in-flight engine fire, which included:

- shutting down the left engine
- feathering<sup>4</sup> the left propeller
- shutting off the left fuel supply and hydraulic system
- discharging the fire retardant.

The fire warning lights then extinguished.

The captain looked over his left shoulder at the left engine and could not see any smoke, flames or scorch marks. The flight crew then declared a MAYDAY<sup>5</sup> to ATC, and reported that they had experienced an engine fire and that the fire was extinguished.

The captain made a public address to the passengers, explaining that they had shut down the left engine due to suspected fire and asking any passengers who had seen smoke or flames to come forward and let him know. No one reported any visual indication of fire.

The flight crew assessed their options for landing, considering both Warrnambool and Avalon Airports. Although they were nearer to Warrnambool Airport, the runway there was shorter and narrower and the wind was gusty, so the crew elected to divert to Avalon Airport. The flight crew reported that a tailwind en route to Avalon and the presence of emergency services also influenced their decision.

At 1613, the flight crew advised ATC that they required direct tracking to Avalon Airport. They received a clearance to do so.

As the aircraft tracked to Avalon, and about 5 minutes after the fire warning lights had extinguished, the lights started to flicker and then came back on to a steady warning. By that time,

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<sup>1</sup> Pilot Flying (PF) and Pilot Monitoring (PM): procedurally assigned roles with specifically assigned duties at specific stages of a flight. The PF does most of the flying, except in defined circumstances such as planning for descent, approach and landing. The PM carries out support duties and monitors the PF's actions and the aircraft's flight path.

<sup>2</sup> Flight level: at altitudes above 10,000 ft in Australia, an aircraft's height above mean sea level is referred to as a flight level (FL). FL 170 equates to 17,000 ft.

<sup>3</sup> Eastern Standard Time (EST): Coordinated Universal Time (UTC) + 10 hours

<sup>4</sup> Feathering: the rotation of propeller blades to an edge-on angle to the airflow to minimise aircraft drag following an in-flight engine failure or shutdown.

<sup>5</sup> MAYDAY: an internationally recognised radio call announcing a distress condition where an aircraft or its occupants are being threatened by serious and/or imminent danger and the flight crew require immediate assistance.

the crew had tested the integrity of the fire warning loop, discharged the bottle of fire retardant and shut down and secured the left engine.

ATC advised the crew that Runway 36 at Avalon had an occasional 5 kt tailwind and Runway 18 had an occasional tailwind of 9 kt. The flight crew responded that they would require Runway 36. When the aircraft was about 15 NM from Avalon, the captain took over the pilot flying role. ATC provided heading guidance to the flight crew, and the aircraft landed at Avalon at about 1626.

After landing, firefighters advised that there was no sign of fire in the engine. Consequently, there was no need to conduct an emergency evacuation and the passengers and crew disembarked normally.

### ***Engineering inspection***

Engineering examination did not identify any signs of fire, smoke or heat damage in the left engine bay. Engineers inspected the four left engine fire sensor probes and all appeared to be functioning normally, but they replaced the lower rear sensor due to cracking of the ceramic insulator.

On the fire extinguisher control panel, each engine has a button and a tri-coloured light – red for fire, green to indicate system integrity of the fire loop, and yellow to indicate a bottle of fire retardant had been discharged and was empty. After the crew pressed the fire button, the empty (yellow) light did not illuminate. This was despite the fact that the fire bottle pressure gauge was indicating zero, after being full pre-flight, and there was indication of discharge into the engine. The yellow light did illuminate when the bulb was tested however, which indicated an issue with the circuit.

Engineers found that the logic control unit in the fire extinguisher control assembly had failed, resulting in erroneous illumination of the engine fire warning. The logic module was replaced, along with the fire extinguisher control panel.

### ***Approach and landing***

The captain commented that two out of their six cyclic biannual simulator checks included fire warnings, engine shutdowns and single engine actions. In this occurrence, the engine shutdown, diversion and single-engine approach and landing were consistent with the simulator training. There were no issues with controlling the aircraft or with its performance.

## **Findings**

These findings should not be read as apportioning blame or liability to any particular organisation or individual.

- The fire extinguisher control logic module failed, resulting in an erroneous engine fire warning.

## **Safety message**

This incident highlights the importance of well-designed simulator training and robust threat and error management procedures. The captain commented that it was important to treat fire warnings as legitimate indications of fire. Additionally, the declaration of an emergency alerts air traffic control and enables the provision of appropriate assistance.

## General details

### Occurrence details

Date and time:	3 September 2017 – 1600 EST	
Occurrence category:	Incident	
Primary occurrence type:	Technical – Systems - Fire protection	
Location:	near Avalon Airport, Victoria	
	Latitude: 38° 02.37' S	Longitude: 144° 28.17' E

### Aircraft details

Manufacturer and model:	Fairchild industries SA227-AC	
Registration:	VH-SEZ	
Operator:	Sharp Aviation	
Serial number:	AC-637B	
Type of operation:	Air transport low capacity – Passenger	
Persons on board:	Crew – 2	Passengers – 8
Injuries:	Crew – 0	Passengers – 0
Aircraft damage:	Nil	

## About the ATSB

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; and fostering safety awareness, knowledge and action.

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 operations involving the travelling public.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. 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.

## About this report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.