

**Aviation Safety Investigation Report  
200403209**

**Fairchild Industries Inc SA226-T**

**30 August 2004**

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**NOTE: All air safety occurrences reported to the ATSB are categorised and recorded. For a detailed explanation on Category definitions please refer to the ATSB website at [www.atsb.gov.au](http://www.atsb.gov.au).**

**Occurrence Number:** 200403209  
**Location:** 28km W Mount Mcquoid, VOR  
**Date:** 30 August 2004  
**Highest Injury Level:** Nil  
**Injuries:**

**Occurrence Type:** Serious Incident  
**Time:** 1825 EST

	Fatal	Serious	Minor	None
Crew	0	0	0	1
Ground	0	0	0	-
Passenger	0	0	0	7
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>

**Aircraft Details:** Fairchild Industries Inc  
SA226-T  
**Registration:** VH-SSL  
**Serial Number:** T-210  
**Operation Type:** Charter Passenger  
**Damage Level:** Minor  
**Departure Point:** Bankstown NSW  
**Departure Time:** 1810  
**Destination:** Glen Innes NSW

**Approved for Release: 24 October 2005**

#### FACTUAL INFORMATION

At 1810 Eastern Standard Time on 30 August 2004, a Fairchild Industries Inc. SA226-T Merlin III aircraft, registered VH-SSL, departed Bankstown, NSW on a charter flight to Glen Innes, NSW with the pilot and seven passengers on board.

The pilot reported that he manually flew the aircraft in instrument meteorological conditions during the climb to flight level (FL)160. On levelling at the cruise level, he noticed that the aircraft was flying in a slightly right-wing low attitude. The pilot said that he applied left rudder trim to level the wings and engaged the autopilot. About 2 ½ minutes later, the autopilot suddenly disengaged without warning. The aircraft then rolled rapidly to the right and entered a steep spiral descent. A review of air traffic control radar data indicated that about 50 seconds later, the aircraft levelled at 5,200 ft. After the pilot regained control of the aircraft, he reported that he noticed that the right fuel tank gauge reading was 350 kg (437.5 L) greater than the left fuel tank gauge reading, and that the aircraft was 'very heavy on the right hand side'. The pilot then climbed the aircraft to FL130 and diverted to Tamworth, NSW without further incident. There were no reported injuries to any of the aircraft's occupants.

The aircraft's fuel system included a cross-flow valve that allowed pilots to balance the fuel between the aircraft's fuel tanks if needed. The Merlin III Aircraft Flight Manual contained the aircraft operating checklists. The BEFORE STARTING ENGINES and DESCENT checklists required that the fuel system cross-flow valve switch be closed. The pilot reported that during the diversion to Tamworth he used the cross-flow valve to reduce the fuel imbalance. A subsequent engineering examination revealed no defects in the aircraft's fuel tanks, fuel vent systems, the cross-flow system, and the cross-flow valve.

The pilot reported that he conducted the last flight in the aircraft a few days before the occurrence flight. The fuel remaining on board the aircraft after that flight was 500 L, and the right fuel tank contained about 150 L less than

the left fuel tank. The pilot believed that he might have used the fuel cross-flow valve during that flight. When the aircraft was refuelled before the occurrence flight, 700 L of fuel was added to the right tank and 550 L to the left tank to give a total fuel load of 1,750 L. The pilot reported that after the refuelling ‘the gauges were pretty well reading the same’.

## ANALYSIS

The pilot reported that the fuel in the aircraft’s left and right tanks was symmetrically loaded before the occurrence flight commenced. Once established in the cruise, the pilot used rudder trim to correct a right-wing low condition. That suggested that the cross-flow valve was open at the time, and had allowed the transfer of fuel from the left fuel tank to the right fuel tank to create that condition. The use of rudder trim to level the aircraft’s wings would have resulted in the aircraft being in a skid to the right. That would have further contributed to the transfer of fuel from the left fuel tank to the right fuel tank. Consequently, when it could no longer trim against the increasing fuel load in the right wing, the autopilot disengaged without warning.

The fuel load asymmetry could only have resulted from the fuel system cross-flow valve having been in the open position during the flight. However, the investigation was unable to determine whether it had been open at the commencement of the occurrence flight, or if it was inadvertently opened at some stage before the autopilot was engaged.

## SAFETY ACTION

As a result of the occurrence, the aircraft operator issued an urgent memo to all of its Merlin III pilots that outlined the circumstances of the occurrence. The memo reminded pilots to ensure that fuel was balanced and the aircraft was in trim before engagement of the autopilot. The memo also advised pilots to ‘...keep a vigilant scan of the (aircraft) fuel gauges for any imbalance.’