

FINAL REPORT

CESSNA 172R, REGISTRATION 9V-FCI

AIRCRAFT VEERING OFF RUNWAY

SELETAR AIRPORT

27 JUNE 2011

AIB/AAI/CAS.076

**Air Accident Investigation Bureau of Singapore
Ministry of Transport
Singapore**

27 January 2012

The Air Accident Investigation Bureau of Singapore

The Air Accident Investigation Bureau (AAIB) is the air accidents and incidents investigation authority in Singapore responsible to the Ministry of Transport. Its mission is to promote aviation safety through the conduct of independent and objective investigations into air accidents and incidents.

The AAIB conducts the investigations in accordance with the Singapore Air Navigation (Investigation of Accidents and Incidents) Order 2003 and Annex 13 to the Convention on International Civil Aviation, which governs how member States of the International Civil Aviation Organisation (ICAO) conduct aircraft accident investigations internationally.

In carrying out the investigations, the AAIB will adhere to ICAO's stated objective, which is as follows:

"The sole objective of the investigation of an accident or incident shall be the prevention of accidents and incidents. It is not the purpose of this activity to apportion blame or liability."

Table of Contents

SYNOPSIS	3
1 FACTUAL INFORMATION	4
1.1 History of the flight	4
1.2 Injuries to persons	5
1.3 Damage to aircraft	5
1.4 Other damage	6
1.5 Personnel information	6
1.6 Aircraft information	7
1.7 Meteorological information	7
1.8 Medical and pathological information	7
1.9 Tests and research	7
1.9.1 Brake system	7
1.9.2 Rudder	7
1.9.3 Nose wheel steering	7
1.9.4 Crosswind landing technique	8
2 DISCUSSION	8
2.1 Crosswind landing	8
2.2 Recovery from aircraft veering during ground roll	9
3 SAFETY ACTION	9
4 SAFETY RECOMMENDATION	9

SYNOPSIS

On 27 June 2011 at about 11.50 a.m., a Cessna 172R aircraft momentarily veered off the left edge of the runway after landing on Runway 21 in Seletar Airport. The aircraft went onto the grass patch, hit a taxiway signboard before returning to and stopping on the runway. The pilot, a student of a flying college, was the only person on board the aircraft and he was not injured. The left horizontal stabiliser and the right aft of the fuselage were damaged.

The Air Accident investigation Bureau of Singapore classified this occurrence as a serious incident. The probable cause of the aircraft's veering is the pilot's mishandling of the aircraft in a crosswind landing. After the aircraft started to veer, the rudder input applied by the pilot was not sufficient to correct the veering and bring the aircraft back to the runway centreline.

AIRCRAFT DETAILS

Aircraft type	: Cessna 172R
Operator	: Singapore Flying College
Registration	: 9V-FCI
Number and type of engines	: 1 x Lycoming IO-360-L2A
Type of flight	: Training

1 FACTUAL INFORMATION

All times used in this report are Singapore times. Singapore time is eight hours ahead of UTC (Coordinated Universal Time).

1.1 History of the flight

- 1.1.1 At 11.50 a.m. on 27 June 2011, a Cessna 172R aircraft from a local flying college, piloted by a student pilot, momentarily veered off the left edge of the runway after landing on Runway 21 in Seletar Airport. The aircraft went onto the grass patch and hit the Echo Taxiway signboard before returning to and stopping on the runway. **Figure 1** is a sketch of the aircraft's ground path.

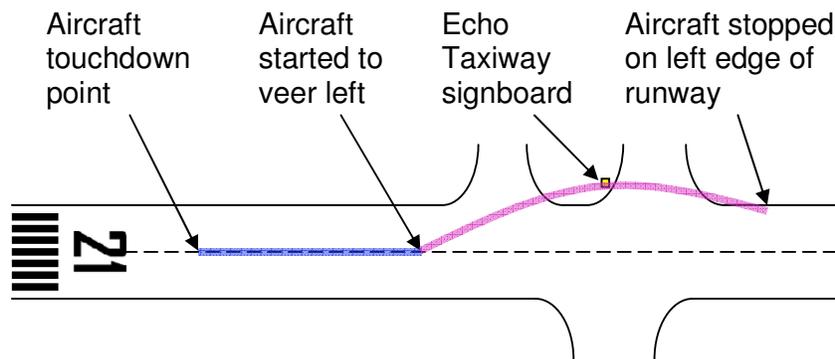


Figure 1: Ground path of the aircraft *(Not drawn to scale)*

- 1.1.2 Prior to the incident flight, the pilot performed a dual flight sortie with an instructor. The sortie was to practise touch-and-go landings in preparation for the student pilot's subsequent solo flight.
- 1.1.3 After this earlier sortie which took about 45 minutes, the instructor disembarked. The pilot then performed the next sortie as the solo pilot.
- 1.1.4 After performing one touch-and-go landing, the pilot informed the Air Traffic Control (ATC) tower that he would be landing following the next approach and would be vacating the runway after landing.
- 1.1.5 During the approach to land on Runway 21, ATC tower informed the pilot that the wind condition was 7 knots from 120° (i.e. the wind was from the left and perpendicular to the approach). The pilot acknowledged this information.

1.1.6 After touchdown, the aircraft rolled down the runway along the centreline and suddenly veered left. According to the pilot, he attempted to steer the aircraft back towards the runway centreline by applying about 20 - 30% of full right rudder¹ but to no avail. He subsequently applied 40 - 50% of full right rudder but the aircraft continued to veer left. As the aircraft was entering the grass patch the pilot applied full right rudder. The aircraft subsequently hit the Echo Taxiway signboard before returning onto the runway.

1.2 Injuries to persons

1.2.1 The student pilot was the only person on board the aircraft at the time of the incident. He was not injured.

1.3 Damage to aircraft

1.3.1 The aircraft's left horizontal stabiliser hit the Echo Taxiway signboard and was damaged (see **Figure 2**). The right aft of the fuselage was also damaged (see **Figure 3**).



Figure 2: Damage of horizontal stabiliser



Figure 3: Damage of right aft fuselage

¹ The pilot applied only 20 - 30% of full right rudder initially because he was wary of losing control of the aircraft if too much right rudder was applied. Although the student pilot gave an estimation of the percentage of the rudder input, it is important to note that the actual amount of control input cannot be measured.

1.4 Other damage

1.4.1 The Echo Taxiway signboard was dislodged from the stand (see **Figure 4**). **Figure 5** shows the repaired Echo Taxiway signboard.



Figure 4: Echo Taxiway signboard damage



Figure 5: Repaired Echo Taxiway signboard

1.5 Personnel information

1.5.1 Pilot

Age : 23 years
Gender : Male
Type of licence : Student Pilot's Licence
Valid till : 30 April 2013
Aircraft rating : Nil
Total flying time : 16 hours 10 minutes
Total on this type : 16 hours 10 minutes
Total last 90 days : 16 hours 10 minutes
Total last 30 days : 6 hours 50 minutes
Total last 7 days : 3 hours 25 minutes
Total last 24 hours : Nil
Instrument rating : Nil
Medical class : Class Two
Medical limitation : Nil

- 1.6 Aircraft information
 - 1.6.1 The aircraft had valid certificate of airworthiness.
 - 1.6.2 The maximum demonstrated crosswind component for the aircraft type was 15 knots.
- 1.7 Meteorological information
 - 1.7.1 According to the meteorological forecast issued at 12 noon on 27 June 2011, the wind condition from 12 noon to 1 p.m. was forecast to be 7 knots from 180° and gusting up to 10 knots.
- 1.8 Medical and pathological information
 - 1.8.1 The pilot underwent a medical and toxicological test after the occurrence. The test revealed no abnormality.
- 1.9 Tests and research
 - 1.9.1 Brake system
 - 1.9.1.1 The brake system was serviced on 20 June 2011. The dual flight performed by the pilot and the instructor was the first flight following the servicing. No abnormality was observed during the dual and solo flights.
 - 1.9.1.2 The brake system was found to be operating normally during post-occurrence inspection and test.
 - 1.9.1.3 There was no evidence that the wheels of the aircraft were locked during the landing roll.
 - 1.9.2 Rudder
 - 1.9.2.1 No abnormality of the rudder system was observed during the dual and solo flights.
 - 1.9.2.2 The rudder system was found to be operating normally during post-occurrence inspection and test.
 - 1.9.3 Nose wheel steering
 - 1.9.3.1 No abnormality of the nose wheel steering system was observed during the dual and solo flights.

- 1.9.3.2 The nose wheel steering system was found to be operating normally during post-occurrence inspection and test.
- 1.9.4 Crosswind landing technique
 - 1.9.4.1 When landing in crosswind conditions, input controls to the rudder and ailerons should be maintained through the flare and all the way through the landing ground roll. The amount of input controls has to be constantly adjusted according to the dynamic flight conditions such as change in wind speed and direction, runway condition, aircraft speed, rate at which the aircraft is veering, etc. The Flight Training Manual highlighted a common mistake among pilots which is that they tend to relax on the controls by bringing ailerons back to neutral once the aircraft is on the ground.
 - 1.9.4.2 During practical training, instructors demonstrate the use of rudder pedals to steer the aircraft on ground, at both taxi speed and higher speed, to let students be familiar with controlling the aircraft in normal taxiing/take-off conditions. Students are required to demonstrate proficiency prior to their solo flights. However, there was no practical training or simulation on how to control an aircraft in a non-normal condition, such as veering after landing.
 - 1.9.4.3 When interviewed by the investigators, the pilot was able to describe the crosswind landing technique. He said he might have inadvertently reduced the input controls to the ailerons and rudder when the aircraft was rolling.

2 **DISCUSSION**

2.1 Crosswind landing

- 2.1.1 The aircraft approached and landed on Runway 21 in a crosswind condition. The ATC tower had informed the pilot that the wind condition was 7 knots from 120° (i.e. the wind was from the left and perpendicular to the approach path) and the pilot had acknowledged this information.
- 2.1.2 The student pilot was able to touch down and control the aircraft down the runway along the centreline.

2.1.3 The pilot recalled that he might have inadvertently reduced the input controls to the ailerons and rudder during the landing ground roll. Such relaxing of the controls could have resulted in the aircraft's veering to the left. After the aircraft started to veer, the weather-cock effect² could have compounded the situation by causing the aircraft to veer towards the wind direction (i.e. towards left).

2.2 Recovery from aircraft veering during ground roll

2.2.1 Student pilots of the flying college were told by their instructors to apply rudder as required to recover from a veering situation. According to the pilot, he applied 20 - 30% of full right rudder initially, mindful that an excessive rudder input might cause a loss of control. The input was not sufficient and the pilot tried 40 - 50% of full right rudder which apparently was still insufficient to correct the veering. Only then did he apply full right rudder. By this time, the aircraft had exited the paved runway surface on the left hand side.

2.2.2 The flying college did not have any systematic way of training student pilots to control the aircraft in non-normal situations. Without such training, the student pilots were left on their own to decide how to respond to non-normal situations such as veering.

3 SAFETY ACTION

3.1 Following the incident the flying college has reminded its instructors to emphasise to their students the proper application of the crosswind landing technique and to look out for common mistakes by the trainees.

4 SAFETY RECOMMENDATION

4.1 It is recommended that the flying college enhance its training to enable its students to more effectively control an aircraft after it starts veering off the runway during the landing roll.

² The weather-cock effect is the aircraft's tendency to turn and face the direction of the wind.