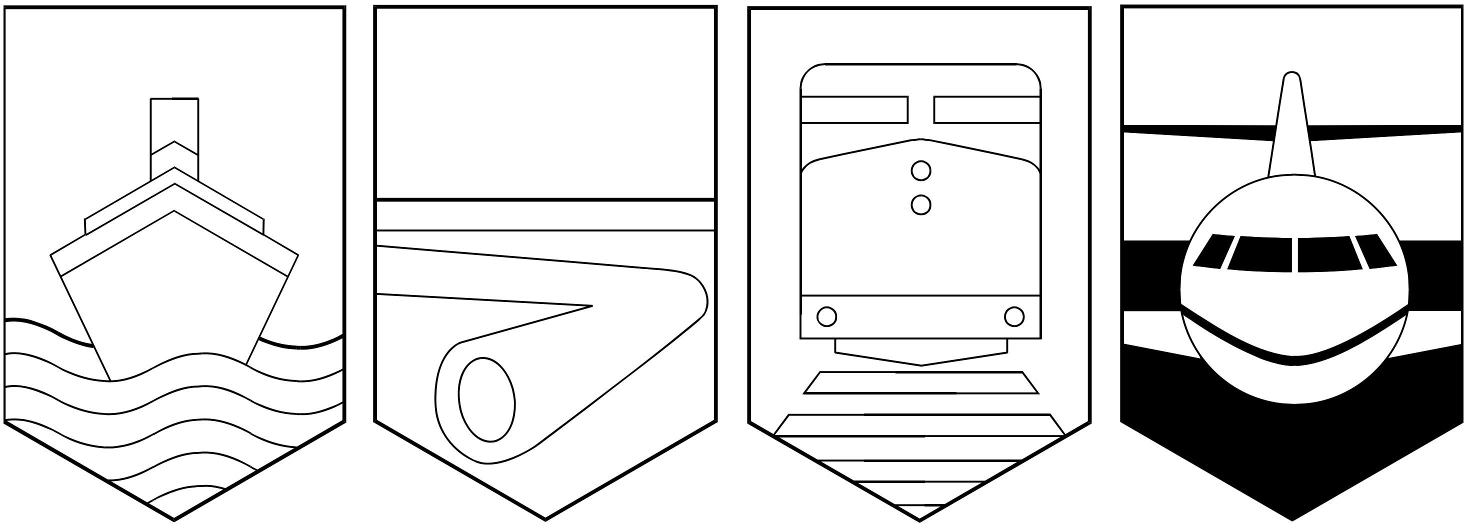
Transportation Safety Board of Canada
Bureau de la sécurité des transports du Canada



AVIATION OCCURRENCE REPORT

COLLISION WITH SNOWBANK

TRURO FLYING CLUB
CESSNA AIRCRAFT COMPANY C152 C-GREJ
DEBERT, NOVA SCOTIA
17 DECEMBER 1994

REPORT NUMBER A94A0242

Canada

MANDATE OF THE TSB

The Canadian Transportation Accident Investigation and Safety Board Act provides the legal framework governing the TSB's activities. Basically, the TSB has a mandate to advance safety in the marine, pipeline, rail, and aviation modes of transportation by:

- conducting independent investigations and, if necessary, public inquiries into transportation occurrences in order to make findings as to their causes and contributing factors;
- reporting publicly on its investigations and public inquiries and on the related findings;
- identifying safety deficiencies as evidenced by transportation occurrences;
- making recommendations designed to eliminate or reduce any such safety deficiencies; and
- conducting special studies and special investigations on transportation safety matters.

It is not the function of the Board to assign fault or determine civil or criminal liability. However, the Board must not refrain from fully reporting on the causes and contributing factors merely because fault or liability might be inferred from the Board's findings.

INDEPENDENCE

To enable the public to have confidence in the transportation accident investigation process, it is essential that the investigating agency be, and be seen to be, independent and free from any conflicts of interest when it investigates accidents, identifies safety deficiencies, and makes safety recommendations. Independence is a key feature of the TSB. The Board reports to Parliament through the President of the Queen's Privy Council for Canada and is separate from other government agencies and departments. Its independence enables it to be fully objective in arriving at its conclusions and recommendations.

Transportation Safety Board of Canada
Bureau de la sécurité des transports du Canada

Aviation Occurrence Report

Collision with Snowbank
Truro Flying Club
Cessna Aircraft Company C152 C-GREJ
Debert, Nova Scotia
17 December 1994

Report Number A94A0242

Synopsis

The student pilot was on his second solo flight practising touch-and-go landings on runway 10 in the Cessna 152, C-GREJ. The aircraft touched down 51 feet short of the runway and hit an 18-inch-high frozen snowbank at the runway threshold. The aircraft's nose landing gear separated from the aircraft, and the aircraft slid to a stop on the runway, 231 feet from the threshold.

The student pilot reported that he could see sparks around the outside of the aircraft and that a fire had started in the vicinity of the rudder pedals before the aircraft came to a stop. The student used the fire extinguisher, with little effect, and then exited the aircraft without assistance. The aircraft was destroyed by fire.

The Board determined that the student pilot did not properly monitor the aircraft's approach profile and touched down short of the runway. Contributing factors to this occurrence were the lack of emphasis on flying a standard approach profile during the first solo flights and confusion regarding how to correct deviations from the desired approach profile.

Ce rapport est également disponible en français.

Table of Contents

1.0 Factual Information

1.1 History of the Flight

The student pilot was flying the C-152, C-GREJ, on his second solo flight, practising touch-and-go landings on runway 10. The aircraft touched down 51 feet short of the runway and went through a frozen snowbank about 18 inches high, at the edge of the runway threshold. The nose landing gear separated from the aircraft, and the aircraft slid to a stop on the runway, 231 feet from the threshold.

The student pilot reported that he could see sparks around the aircraft and that a fire had started in the vicinity of the rudder pedals before the aircraft came to a stop. The student used the fire extinguisher, with little effect, and then exited the aircraft without assistance. The aircraft was destroyed by fire.

This incident occurred at 1430 Atlantic standard time, during the hours of daylight, at latitude 45°25'N and longitude 063°27'W.

1.2 Injuries to Persons

	Crew	Passengers	Others	Total
Fatal	-	-	-	-
Serious	-	-	-	-
Minor/None	1	-	-	1
Total	1	-	-	1

1.3 Damage to Aircraft

The aircraft was destroyed by fire.

1.4 Other Damage

None.

1.5 Personnel Information

1.5.1 Student Pilot

	Student Pilot
Age	23

	Student Pilot
Pilot Licence	SPP[1]
Medical Expiry Date	01 Dec 96
Total Flying Hours	23.9
Hours on Type	11.9
Hours Last 90 Days	11.9
Hours on Type Last 90 Days	11.9
Hours on Duty Prior to Occurrence	5
Hours Off Duty Prior to Work Period	18

1.5.2 *Flight Instructor*

The student pilot's flight instructor attained a class four instructor's rating in April 1993 and upgraded to a class three rating in September 1994. At the time of the occurrence, he had about 350 hours as a flying instructor and had sent about 10 student pilots on their first solo flights.

The flying instructor and the student pilot had flown together on 11 flights during the 30 days prior to the occurrence, for a total of 10.4 hours. The flying instructor reported that the student pilot had demonstrated above average flying ability for his level of experience. During the dual instructional flight prior to the student's first solo flight, the student had demonstrated to the instructor the ability to consistently make safe take-offs and landings.

1.6 *Aircraft Information*

Manufacturer	Cessna Aircraft Corporation
Type	C-152
Year of Manufacture	1979
Serial Number	15282939
Certificate of Airworthiness (Flight Permit)	Valid
Total Airframe Time	5,320.9 hr
Engine Type (number of)	Lycoming O-235-L2C (1)

[1] See Glossary for all abbreviations and acronyms.

Propeller Type (number of)	McCauley 1A103 (1)
Maximum Allowable Take-off Weight	1,670 pounds
Recommended Fuel Type(s)	100LL
Fuel Type Used	100LL

The aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures.

1.7 *Meteorological Information*

The Debert Airport weather throughout the day of the occurrence was reported as ceiling and visibility okay (CAVOK), with light winds from 100 degrees magnetic.

The weather during the two weeks prior to the occurrence had been generally clear and cold with very little precipitation.

1.8 *Aerodrome Information*

The Debert Airport is a public-use certified aerodrome. The airport has three runways; the favoured runway, 10/28, is asphalt covered, and measures 5,000 feet long by 150 feet wide.

The airport operator is the Nova Scotia Business Capital Corporation; it contracts the Truro Flying Club to manage the airport. A local company provides snow clearing service, normally using a plough truck. Only runway 10/28 is ploughed for its full length. When significant snowbanks have built up inside the runway edge lights, a snowblower is used to blow the snow out beyond the runway edge lights.

At the time of the occurrence, there were three-foot-high snowbanks along the sides of the runway from a storm about 14 days earlier. There was a smaller snowbank, about 18 inches high, at the runway threshold. As the temperature was generally well below freezing, these snowbanks were well frozen. The remainder of the runway surface was bare and dry.

Effective 19 January 1995, Transport Canada, Aerodrome Standards, cancelled the Debert Aerodrome Certificate, No. 8730, for failing to maintain the conditions and standards required by the Aerodrome Certificate and Aerodrome Operations Manual.

1.9 *Wreckage and Impact Information*

The aircraft touched down in a nose-high attitude on the two main landing gear, 51 feet short of the runway threshold. The nose landing gear contacted the ground just prior to the snowbank.

The aircraft struck the snowbank at a speed of about 40 knots. The nose landing gear was torn from the aircraft and was found 15 feet beyond the snowbank. The left main landing gear wheel separated from the aircraft, and the strut collapsed but remained attached to the airframe. The aircraft slid straight ahead in a left-wing-low attitude and came to a stop 231 feet from the runway threshold.

1.10 *Fire*

The impact with the snowbank also caused the carburettor fuel supply line fitting to fail. Fuel flowed from the gravity feed fuel system and was ignited by sparks created during the aircraft's slide along the runway. The student reported that there were flames in the vicinity of the rudder pedals before the aircraft came to a stop.

The aircraft was equipped with a three-and-a-half pound fire extinguisher containing halon 1211 for fire types A, B, and C. The student removed the extinguisher and sprayed the fire prior to exiting the aircraft, then sprayed the rest of the extinguisher contents around the engine cowling when he got out of the aircraft.

The student reported that he took about 15 seconds to exit the aircraft, and by then the cabin interior was obscured by smoke, and the windscreen was aflame and melting. Shortly after he exited the aircraft, the right wing fuel tank exploded. The student proceeded to walk back to the flying club building; when he turned back to look at the aircraft, about two minutes later, the entire aircraft structure was collapsing.

The Debert Volunteer Fire Department responded about five minutes after receiving a call from the Truro Flying Club, but the aircraft had been completely destroyed.

The student pilot did not close the fuel shutoff valve prior to exiting the aircraft.

1.11 Private Pilot Flight Instruction

1.11.1 General Flight Training Course Requirements

Transport Canada (TC) requires that all Flight Training Units (FTU) conduct all flight training courses in accordance with the appropriate Flight Instructor Guide (FIG), Flight Training Manual (FTM), and Pilot Decision-Making Manual published under the authority of the Minister or in accordance with training programs approved by the Minister.

These manuals are written to be general in nature, describing the various techniques popular in flight training. They must also take into consideration the wide variety of conditions in which flight training can take place, i.e., type of FTU, type of training aircraft, and geographic location.

1.11.2 Power-on and Power-off Approach Procedures

An average private pilot student acquires about 15 flying hours prior to his or her first solo. Students normally start flying approaches to the runway during the first couple of lessons. During the lessons up to the first solo, a flying instructor will have covered many procedures with a student, including power-on and power-off approaches to a runway. In exercise eight, "Descending," the FTM states as follows:

> Most routine descents and approaches to landings are power assisted to control the rate of descent for passenger comfort and meet the speed and spacing demands of airport and circuit procedures.

Power-off approaches are an important part of a student's training. This is the technique a student must use in the event of an engine failure in the airport traffic circuit. Prior to the first solo, a student must have demonstrated the ability to consistently conduct a forced landing from any point in the circuit. In exercise eighteen, "Approach and Landing," the FTM states as follows:

> In addition to practising power-assisted approaches, at every opportunity you should practise landings from full glides, with the engine throttled back to idling. This type of approach is very necessary to develop the judgement and planning required for forced landing procedures.

The Transport Canada FTM and FIG do not specifically state what type of approach a student should be doing during the first solo flights. Most flying instructors understand this to be a normal, power-assisted approach.

1.11.3 Effect of Wing Flaps

The use of wing flaps and their effect on the approach profile is also demonstrated to student pilots. The greater the flap deflection, the steeper the approach angle and the better the pilot's view of the runway. A power-assisted approach using flaps gives a student a very different visual perspective of the runway than a power-off glide approach without using any flaps. Appendix A depicts a pilot's perspective of a runway, approaching with and without flaps.

The instructor reported that he had briefed the student on the standard circuit procedure using a power-assisted approach and full-flap deflection. The instructor used a written standard circuit procedure to brief the student; this written procedure was not provided to the student, and it is not normally distributed to student pilots. The instructor also stated that it was his practice to demonstrate to students different flap settings and their associated attitudes.

The student reported after the occurrence that he had the impression that approaches could be either power-on or power-off, using flaps as required. According to the student pilot, it was his understanding that full flap was used on final if the aircraft was high on the approach. During the student's first solo flight, he had performed mainly power-off approaches, with and without flaps, using power if necessary. During the occurrence flight, the aircraft had been high on the first three approaches, requiring the use of flaps. The last approach to the runway was low and flat, so the student did not use any flaps.

1.11.4 Approach Profile Estimation

Safely landing an aircraft consists of permitting it to contact the ground, within a predetermined touchdown zone, at the lowest possible vertical speed and the lowest horizontal speed consistent with adequate control. The method of maintaining the desired approach profile to a touchdown point taught by most flying instructors is outlined in exercise eight, "Descending," in the FTM. A specific point on the runway, the flare point, is selected where the approach path ends and the landing flare begins. The FTM states as follows:

> The point on the ground may be the point of flare at an aerodrome or the touchdown point of a forced landing. If the selected spot on the ground remains stationary in relation to a fixed point on your windshield, the aircraft will subsequently touch down at the selected spot on the ground.

A second philosophy of approach profile judgement outlined in exercise eighteen, "Approach and Landing," of the FTM is as follows:

> One method of achieving this [the visual maintenance of the desired approach slope at a constant angle] is by using the perspective phenomenon. A runway appears to change its shape as the pilot's observation point changes. For example, seen from final approach a runway will appear wider at the approach end than at the opposite end. When a constant approach angle is maintained, the apparent configuration of a runway will also remain constant.

> If the approach angle is made steeper, the runway will appear to grow longer and narrower. If the approach angle is made more shallow the runway appears to grow shorter and wider.

1.11.5 Approach Profile Correction

There are two basic methods that flying instructors use to teach student pilots how to correct deviations from the desired approach profile to a runway. Both of these methods accomplish the same objective by applying the principle that aircraft attitude plus engine power equals performance.

One method teaches the student to pitch the aircraft up and down as necessary to stay on the desired approach path, aiming the aircraft at the desired flare point on the runway. With each significant attitude change, engine power must be adjusted to maintain the desired approach speed.

Another method teaches the student to stay on the desired approach path by increasing or decreasing power as necessary to change the aircraft's descent rate. The student controls the airspeed by pitching the aircraft's nose up or down. If the aircraft is below the approach profile but moving at the desired airspeed, then the speed is maintained while power is increased to decrease the rate of descent until the desired approach profile is regained. Students are cautioned that significant nose-up pitch movements can lead to a stalled condition. The student pilot and his instructor reported that this was the method they used to make approach profile corrections.

1.11.6 First Solo Flight

According to the FIG, a pilot's first solo flight is an important step in the student's flying career. It is a never-to-be-forgotten experience and the instructor should treat it as such. In most cases, a student's second solo flight is not done on the same day as the first.

The first solo should be conducted with sufficient daylight, suitable weather, and reasonable winds and traffic conditions to permit this flight to be carried out with a minimum of distractions. This reduces the number of variables the student must deal with, making the whole experience more enjoyable and safer. First solo flights are recognized as a confidence builder for students as they realize that they can indeed fly the aircraft without the help of an instructor.

Typically, when a student pilot is ready to fly solo, he or she is allowed to complete one circuit. On the day of the occurrence, the student had flown a .7-hour dual instructional flight followed by a .9-hour first solo flight, during which he practised mainly power-off approaches with or without flaps. Following a two-hour break, the student began his second solo flight of the day, landing short of the runway on the fourth circuit.

The FIG does not provide guidance on the length of time for the first solo; however, it does indicate that the pre-solo flight should not exceed 45 minutes in order to keep fatigue at a minimum.

1.11.7 Subsequent Solo Flights

A student pilot's second solo flight could be several days or even weeks after the first. The lesson plan for the dual flight conducted just prior to the second solo flight in the FIG states as follows:

> The instructor should determine that the student is competent to handle the aircraft under current and anticipated traffic and weather conditions before authorizing additional solo circuits.

Competency is assessed through a review of circuit procedures. The flying instructor did not conduct a dual competency check with the student prior to authorizing the second solo flight. The instructor reported that traffic and weather conditions had not changed since the first solo about three hours earlier, so he did not feel that a dual check was necessary. The instructor stated that, in the past, he had always conducted a dual competency check with his students on subsequent flights.

1.12 Pilot's Actions

The student pilot reported that, when he established the aircraft on the final approach to the runway, he was sure that the aircraft was on the approach profile necessary to reach the normal flare point located about 1,000 feet beyond the runway threshold. He also said that, throughout the approach, he continued to monitor the airspeed indicator, which showed him that the aircraft was maintaining 65 knots, the normal approach speed. He did not realize that the aircraft was below the desired approach profile, and he was surprised when the aircraft touched down short of the runway threshold.

Normal peripheral cues which would have helped the pilot judge the aircraft's height, such as the apparent speed at which ground texture was passing the aircraft, the apparent size of ground texture and known objects on the ground, and the constant relation between the predetermined flare point and a fixed point on the windshield, were not attended to.

The student pilot reported that he was excited by the first solo experience and that he did not feel fatigued at the time of the occurrence. Some time later, having reflected upon the events leading up to the occurrence, he stated that fatigue may have contributed to his not recognizing that the aircraft was low.

2.0 Analysis

2.1 Introduction

The analysis will attempt to explain why the student pilot did not properly monitor and correct the aircraft's approach profile, and will examine the following factors: standard approach technique, approach profile correction, flight instruction, and fatigue and the solo flight.

2.2 General

During the first few hours of solo flying, student pilots are challenged with a multi-variable situation, flying an aircraft in an environment where they do not yet have a great deal of experience or competence. How well they are able to deal with these variables depends in part on how good are the rules, guidelines, procedures, and checklists with which they are provided. Until a student gains some experience, variables which compete for an individual's attentional resources should be kept to a minimum.

2.3 Standard Approach Technique

Even though the instructor reported that he had taught the student that the standard approach was with power and flaps, the student had the impression that an approach with power and flaps was not required for his solo circuits. In fact, he believed that a standard approach was one usually conducted with power-off, using flaps as necessary. As a result of this impression, the student pilot's approaches were not consistent. Some approaches were high and steep, requiring the use of flaps. Some approaches were low and flat, so no flaps were used. The inconsistency and change of visual perspective on each of the student's approaches increased the number of variables the student was required to deal with and did not allow for consistent practice for skill development.

Naturally, it is important for a student pilot to practice approaches from power-off glides and to see the effect of flaps on the approach angle. The Transport Canada FTM is written to reflect the importance of power-off glides, the fact that most routine approaches are power-on, and to show the variety of other options available to students and instructors. If the FTM and the FIG specifically stated that only normal, power-assisted approaches were to be done during the first solo flights and the reasons why, the student pilot in this occurrence might not have flown a variety of approaches during his solo flights. In addition, had the flying school provided the student with a written procedure, he might have had a better understanding of the standard circuit procedure.

2.4 Approach Profile Correction

The student was taught to correct deviations from the desired approach profile by increasing or decreasing power, thereby changing the aircraft's descent rate. He was instructed to be careful not to pitch the aircraft's nose up if the airspeed was correct because this could stall the aircraft, causing it to crash. The student reported that he continued to monitor the airspeed, which remained at 65 knots, indicating that this was where his attention was focused during the approach.

In contrast to the above procedure, the procedure of changing pitch to correct deviations from the desired approach profile emphasizes "aiming" the aircraft at the flare point and adjusting power to maintain speed; this procedure allows pilots to detect the flare point moving up or down in relation to the aircraft reference point. It is possible that, had the student been taught to correct deviations from the desired approach profile by making pitch changes rather than power changes, his scan would have included the flare point, and he might have recognized his situation sooner.

2.5 The Flight Instructor's Actions

It is apparent that the flight instructor was confident in the student pilot's ability to fly solo. According to the flight instructor's assessment, the student pilot had demonstrated above average flying ability for his flying experience. Because of the student pilot's proficiency, the instructor allowed the student pilot's first solo to consist of several circuits, and he permitted the student to resume flying after a two-hour break without conducting a dual competency check. The fact that the student pilot believed that the standard approach profile was a power-off procedure with or without the use of flaps, despite being briefed on a different standard circuit procedure, and that he seemed overly focused on airspeed to the exclusion of other cues, suggests that the student's understanding of the proper procedure was inadequate.

2.6 Student Pilot's Actions

The student pilot had been taught to control the airspeed by changing the aircraft pitch attitude and to avoid pitching the nose up abruptly so as not to stall the aircraft. Since he believed that the final approach was good because the airspeed was good, he continuously referred to the airspeed indicator. The fact that he did not want to pitch up the aircraft's nose and that he failed to attend to any of the normal peripheral cues which would have alerted him to the aircraft's low height indicates that his attention was focused on the airspeed indicator.

Focusing attention onto only one aspect of a task can be a result of dealing with a new situation in which one lacks experience or understanding.[2] Because of his inexperience in the approach and his misunderstanding of the standard circuit procedure, the student pilot continuously and inappropriately monitored the airspeed indicator to the exclusion of other cues. His over-reliance on good airspeed as an indicator of a good approach and the inappropriate zero-flap approach put him in a situation for which he had neither experience nor training.

Focused attention can also be exacerbated by fatigue.[3] The student pilot stated that he was excited by his first solo and did not feel fatigued at the time of the occurrence; however, people are generally poor judges of their own level of fatigue. Furthermore, fatigue can be masked by a number of factors, including excitement.[4] It is possible that fatigue, due to the amount of flying and the inconsistency in the type of approaches flown, might have also contributed to the student pilot's overattending to the airspeed indicator to the exclusion of other cues. Given the excitement of going solo and his lack of flying experience, it is unlikely that the student would have recognized the effects of fatigue on his performance.

2.7 First Solo Flight

---

[2] J. Ernsting and P. King, eds., *Aviation medicine.* (London: Buttersworths', 1988)

[3] R.C. Graeber, "Aircrew fatigue and circadian rhythmicity," *Human factors in aviation* eds. E.L. Weiner and D.C. Nagel (San Diego, CA: Academic, 1988). 305-344.

[4] M.R. Rosekind et al., "Alertness management in long-haul flight operations," *Proceedings of the Thirty-Ninth Corporate Aviation Safety Seminar* (St. Louis, MO: Flight Safety Foundation, 1994)

Although the FIG advises that the pre-solo flight should not exceed 45 minutes in order to minimize the effects of fatigue, there is no guidance provided for the recommended length of time for a first solo flight. In this occurrence, the student's first solo flight lasted 54 minutes (.9 hour), which was considerably longer than the typical first solo flight of one circuit. Given that concern is expressed in the FIG regarding the development of fatigue during the pre-solo flight, it follows that flight instructors should be provided with guidance regarding the effects of fatigue during a first solo flight.

2.8 Fuel Shutoff Valve

It is possible that the aircraft would not have been destroyed by the fire if the student pilot had closed the fuel shutoff valve prior to exiting the aircraft.

3.0 Conclusions

3.1 Findings

1. The student pilot was certified and qualified for the flight in accordance with existing regulations.

2. The flying instructor was certified in accordance with existing regulations.

3. The student pilot had completed a dual pre-solo check flight and a solo flight that day, prior to the occurrence flight.

4. The instructor did not conduct a dual competency check with the student pilot prior to authorizing the student's second solo flight.

5. The aircraft touched down 51 feet short of the runway.

6. The aircraft struck a frozen snowbank and the nose wheel was torn off.

7. The student pilot did not close the fuel shutoff valve prior to exiting the aircraft.

8. The student pilot did not consistently fly a normal, power-assisted approach during his solo circuits.

9. The student pilot focused his attention on the airspeed indicator, and did not properly monitor his approach profile.

3.2 Causes

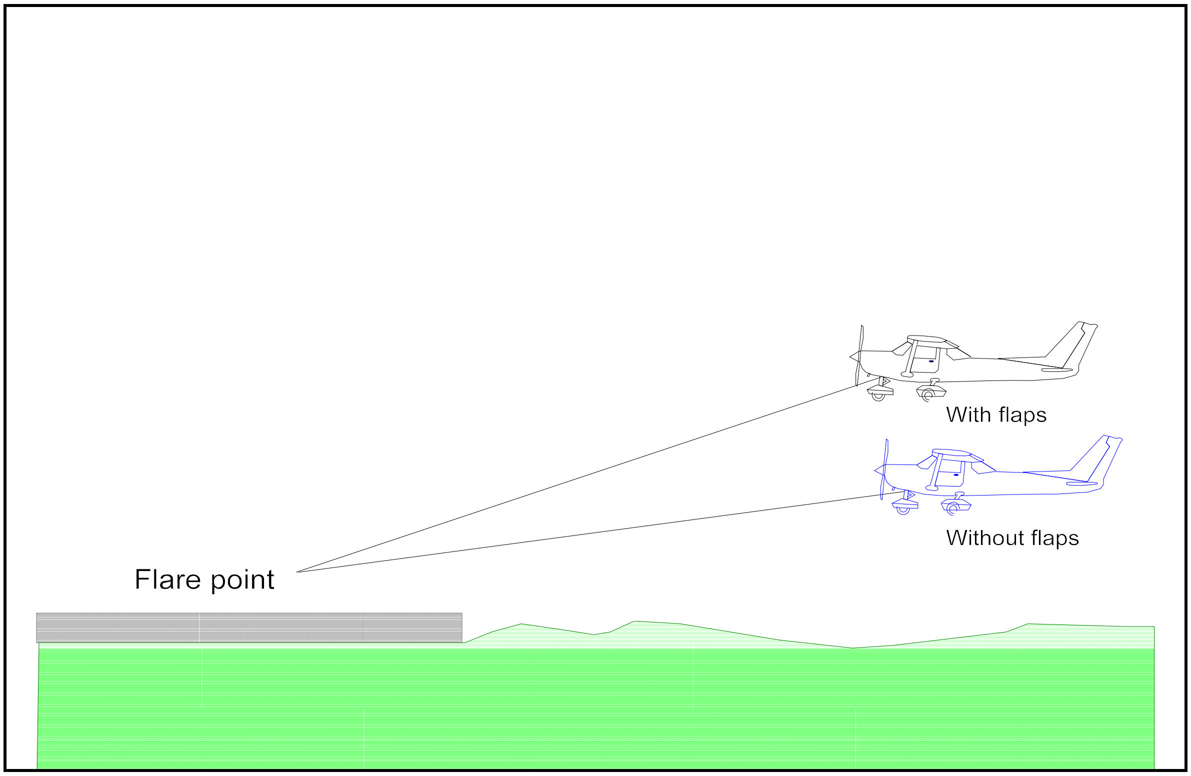
The student pilot did not properly monitor the aircraft's approach profile and touched down short of the runway. Contributing factors to this occurrence were the lack of emphasis on flying a standard approach profile during the first solo flights and confusion regarding how to correct deviations from the desired approach profile.

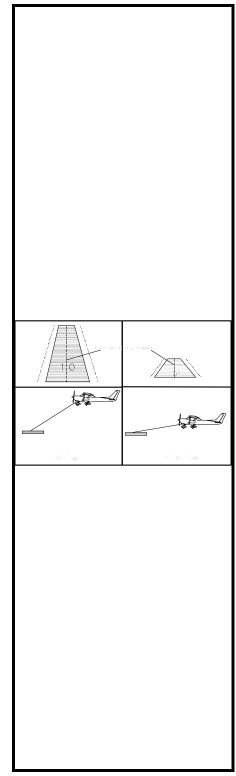
4.0 Safety Action

The Board has no aviation safety recommendations to issue at this time.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board, consisting of Chairperson John W. Stants, and members Zita Brunet and Maurice Harquail, authorized the release of this report on 08 February 1996.

Appendix A - Approach Perspective





Appendix B - Glossary

AST	Atlantic standard time
CAVOK	ceiling and visibility - OK
FIG	Flight Instructor Guide
FTM	Flight Training Manual
FTU	Flight Training Unit
hr	hour(s)
LL	low lead
SPP	student pilot permit
TC	Transport Canada
TSB	Transportation Safety Board of Canada
°	degree(s)
'	minute(s)

TSB OFFICES

HEAD OFFICE

HULL, QUEBEC*
Place du Centre
4th Floor
200 Promenade du Portage
Hull, Quebec
K1A 1K8
Phone (819) 994-3741
Facsimile (819) 997-2239

ENGINEERING
Engineering Laboratory
1901 Research Road
Gloucester, Ontario
K1A 1K8
Phone (613) 998-8230
24 Hours (613) 998-3425
Facsimile (613) 998-5572

*Services available in both official languages

REGIONAL OFFICES

ST. JOHN'S, NEWFOUNDLAND
Marine
Centre Baine Johnston
10 Place Fort William
1st Floor
St. John's, Newfoundland
A1C 1K4
Phone (709) 772-4008
Facsimile (709) 772-5806

GREATER HALIFAX, NOVA SCOTIA*
Marine
Metropolitain Place
11th Floor
99 Wyse Road
Dartmouth, Nova Scotia
B3A 4S5
Phone (902) 426-2348
24 Hours (902) 426-8043
Facsimile (902) 426-5143

MONCTON, NEW BRUNSWICK
Pipeline, Rail and Air
310 Baig Boulevard
Moncton, New Brunswick
E1E 1C8
Phone (506) 851-7141
24 Hours (506) 851-7381
Facsimile (506) 851-7467

GREATER MONTREAL, QUEBEC*
Pipeline, Rail and Air
185 Dorval Avenue
Suite 403
Dorval, Quebec
H9S 5J9
Phone (514) 633-3246
24 Hours (514) 633-3246
Facsimile (514) 633-2944

GREATER QUÉBEC, QUEBEC*
Marine, Pipeline and Rail
1091 Chemin St. Louis
Room 100
Sillery, Quebec
G1S 1E2
Phone (418) 648-3576
24 Hours (418) 648-3576
Facsimile (418) 648-3656

GREATER TORONTO, ONTARIO
Marine, Pipeline, Rail and Air
23 East Wilmot Street
Richmond Hill, Ontario
L4B 1A3
Phone (905) 771-7676
24 Hours (905) 771-7676
Facsimile (905) 771-7709

PETROLIA, ONTARIO
Pipeline and Rail
4495 Petrolia Street
P.O. Box 1599
Petrolia, Ontario
N0N 1R0
Phone (519) 882-3703
Facsimile (519) 882-3705

WINNIPEG, MANITOBA
Pipeline, Rail and Air
335 - 550 Century Street
Winnipeg, Manitoba
R3H 0Y1
Phone (204) 983-5991
24 Hours (204) 983-5548
Facsimile (204) 983-8026

EDMONTON, ALBERTA
Pipeline, Rail and Air
17803 - 106 A Avenue
Edmonton, Alberta
T5S 1V8
Phone (403) 495-3865
24 Hours (403) 495-3999
Facsimile (403) 495-2079

CALGARY, ALBERTA
Pipeline and Rail
Sam Livingstone Building
510 - 12th Avenue SW
Room 210, P.O. Box 222
Calgary, Alberta
T2R 0X5
Phone (403) 299-3911
24 Hours (403) 299-3912
Facsimile (403) 299-3913

GREATER VANCOUVER, BRITISH COLUMBIA
Marine, Pipeline, Rail and Air
4 - 3071 Number Five Road
Richmond, British Columbia
V6X 2T4
Phone (604) 666-5826
24 Hours (604) 666-5826
Facsimile (604) 666-7230