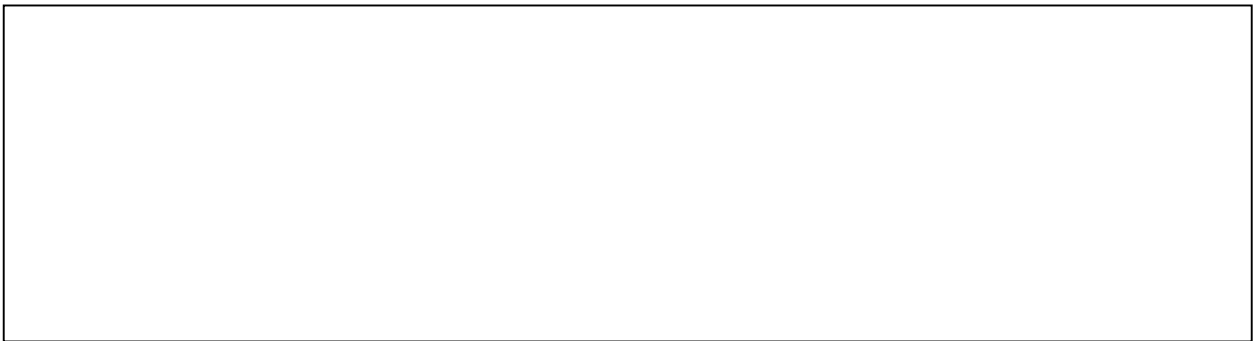


**CANADIAN FORCES  
FLIGHT SAFETY INVESTIGATION REPORT**

**FINAL REPORT**

**FILE NUMBER:** 1010-C-GRGS  
**DATE OF REPORT:** 21 August 2002

**AIRCRAFT TYPE:** Cessna L-19 (C305)  
**DATE/TIME:** 17 June 2001 1842Z  
**LOCATION:** Campbell River British Columbia  
**CATEGORY:** B Category Air Accident



**SYNOPSIS**

The aircraft and crew were participating in the Tow Pilot Conversion Course at the Comox Airport on Vancouver Island. After some circuit work at Comox, the student and instructor flew to nearby Campbell River for more circuit work at a less familiar airfield. On the third touch and go landing at the Campbell River airport, the aircraft experienced a ground loop and exited the runway surface on the right side. The aircraft came to rest on its nose and left wing tip along the right side of the runway, slightly off the paved surface. The student and instructor exited the aircraft unassisted and were not injured. The local emergency vehicles responded to the call from the Flight Service Station and secured the accident site. The Regional Cadet Air Operations Officer contacted DFS and an investigation team assembled in Comox the following day.

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## **1. FACTUAL INFORMATION**

### **1.1 History of the Flight**

The aircraft was being flown in support of the Tow Pilot Conversion Course at 19 Wing Comox. The instructor pilot was a Civilian Instructor (CI) with the Air Cadet organisation. (The expression “Civilian Instructor” denotes a person that is hired by the Cadet organisation but that is not recruited into the Cadet Instructor Cadre (CIC) and does not wear the uniform). The student was a CIC officer and a staff member of the Pacific Region Gliding School. On the day of the accident, the crew performed some circuit work at Comox before proceeding to the Campbell River airport for some more circuit work at a less familiar airfield.

On the third landing on runway 29 at Campbell River, the aircraft experienced a “ground loop” and exited the paved surface on the right. The aircraft came to rest on its nose slightly off the pavement, 500 feet from the threshold (see photo 1). The crew exited the aircraft through the main door and were uninjured.

The Flight Service Station (FSS) operator immediately called in emergency response vehicles from the city of Campbell River using a direct landline. The initial response team arrived within ten minutes and secured the site. Pictures were taken by the airport manager and a local RCMP investigator. The aircraft was then moved away from the site in order to reopen the runway.

The crew returned to Comox by road with the Wing Flight Safety Officer approximately four hours after the accident. They were immediately examined and interviewed by the Wing Surgeon and toxicology samples were obtained.

### **1.2 Injuries to Personnel**

There were no injuries.

### **1.3 Damage to Aircraft**

The aircraft received B Category damage. The left landing gear leg and wheel were damaged when the aircraft bounced up and landed sideways on the runway. The landing gear leg was bent inward allowing the wheel hub to make contact with the ground (see photos 2 and 3). There was also extensive structural damage to the landing gear attachment points inside the fuselage. The left wingtip and the nose areas were damaged when the aircraft came to rest on its nose (see photos 4 and 5). The aircraft has since been repaired by a local contractor and has been returned to service.

#### 1.4 Collateral Damage

The accident occurred on the runway at a public airport. The left wheel hub caused some minor gouges into the runway surface and the propeller and left wingtip left some minor scars in the grass. No fuel or other hazardous materials were released from the aircraft. No commercial traffic was delayed. No claim against the Crown has been filed and it is unlikely that one will be filed.

#### 1.5 Personnel Information

The instructor pilot is a retired military pilot now employed by the Pacific Region Gliding School as a Civilian Instructor. He has accumulated over 1300 hours on the C305 and has been instructing on it for several years.

The student is a CIC officer who was going to be employed by the Pacific Region Gliding School as a tow pilot for the summer. This student had accumulated 138 hours on aircraft (76 hours Pilot in Command) at the start of the Tow Pilot Conversion Course.

	<b>Instructor</b>	<b>Student</b>
Rank	CI	Lt
Currency/Category valid	Yes	Yes
Medical Category valid	Yes	Yes
Total Flying Time (Hrs)	6500	148
Pilot in Command (Hrs)	N/A	76
Flying hours on type	1360	10.1
Flying hours last 30 days	17	16
Duty time last 24 hrs	8	8

#### 1.6 Aircraft Information

The aircraft was serviceable prior to the accident. All maintenance and inspections were up to date. The weight and balance was within limits.

#### 1.7 Meteorological Information

Actual weather conditions for the Campbell River airport at the time of the accident were as follows:

CYBL 171800Z 22002KTS 20SM FEW045 FEW270 16/06 A3023 RMK CU1CI0  
SLP237 56010 SKY1

CYBL 171900Z 34005KTS 20SM FEW040 SCT260 17/07 A3022 RMK CU2CI0  
SLP233 SKY24

The winds on landing, as reported by FSS, were:

First landing:	300 degrees at 5 Knots
Second landing:	180 degrees at 5 Knots
Third landing:	Calm

### **1.8 Aid to Navigation**

Not applicable

### **1.9 Communications**

The aircraft is equipped with a standard panel mounted aviation VHF radio. This radio was serviceable during the flight and the pilots made all the appropriate radio transmissions as confirmed by FSS recordings.

### **1.10 Aerodrome Information**

The Campbell River airport is uncontrolled and is serviced by a Flight Service Station on site. The single asphalt runway is 150 feet wide by 5 000 feet long and is oriented 11-29. The airport is located in a flat area with a mountain range to the West and the Strait of Georgia to the East.

### **1.11 Flight Recorders**

The aircraft was neither equipped nor required to be equipped with any type of flight recording device. Radio transmissions and telephone conversations on the FSS frequencies are recorded in accordance with Nav Canada procedures. A copy of the recording for the relevant period of time around the accident was obtained from FSS personnel. These recordings were of good quality and proved invaluable in determining the time of the accident, the exact wind readings and the emergency response procedures.

### **1.12 Wreckage and Impact Information**

The accident was confined to the first 500 feet of the runway. The aircraft came to rest in the soft grass area immediately to the right of the runway and remained intact during the accident.

### **1.13 Medical**

An ambulance responded to the emergency but was not required since the crew was uninjured. The crew was later transported to the Wing Hospital in Comox for examination by a flight surgeon and for toxicological sampling. The toxicology report for the instructor was negative whereas the student tested positive for antihistamines.

## **1.14 Fire, Explosives Devices, and Munitions**

Not applicable

## **1.15 Survival Aspects**

Once the accident occurred the FSS Operator initiated the airport Emergency Response Plan using a dedicated landline to alert the city Emergency Services. Once the FSS operator confirmed that there were no injuries or fire he used a dedicated radio frequency to inform the emergency services vehicles that the situation was no longer urgent. The respondents arrived on station within ten minutes of the accident and secured the site.

### **1.15.1 Crash Survivability**

The crash was survivable. The cockpit maintained its survivable volume and was undamaged. The deceleration forces that the crew were subjected to were well within the tolerance level of the human body.

### **1.15.2 Life Support Equipment**

The four-point harness used by the crew effectively restrained them and prevented injury.

### **1.15.3 Emergency Transmitters**

The aircraft was equipped with a standard aviation Emergency Locator Transmitters (ELT). The transmitter was not activated during the accident.

## **1.16 Test and Research Activities**

Nil.

## **1.17 Organisational and Management Information**

All training, administrative and maintenance files were reviewed and found to be in order. A review of the crew's log books indicated that the student did not have the required number of Pilot in Command hours required to qualify for the Tow Pilot Conversion Course.

## **2. ANALYSIS**

### **2.1 The Aircraft**

The aircraft was fully serviceable prior to the accident. All inspections were up to date and all maintenance records were in order.

All conventional landing gear equipped aircraft (tail draggers) are susceptible to a phenomenon called "ground looping". On the ground, if yaw is allowed to develop past a certain point, the aircraft becomes unstable around the vertical axis and the tail will want to continue to yaw further. Past this "point of no return", there is little the pilot can do to control the aircraft. At low speed, a ground loop can lead to a full 360<sup>0</sup> turn or more. At higher speeds, the landing gear is usually damaged early in the ground loop and the aircraft may not complete a full 360<sup>0</sup> turn and may pitch and/or roll, causing further damage.

The L-19 landing gear design uses a spring gear and has a narrow track. This gives the aircraft a stronger tendency to ground loop than other conventional landing gear equipped aircraft with wider track and requires the pilot to be more alert on landing and to not "let the aircraft get away from him".

The fact that tail dragger aircraft require more skill to land than tricycle aircraft was recognized by the Air Cadet National Leadership long ago with the implementation of minimum experience requirements. In the case of the L-19, this minimum requirement was set at 150 hours "Pilot in Command" time before commencing the tow pilot conversion course.

## **2.2 The Airport**

The Campbell River airport, being located between a mountain range and open water, can be the subject of peculiar local wind phenomena, especially with light winds. It is not uncommon, at airports in mountainous terrain, for the wind indicators at either end on the runway to point in different directions. In this case, with the reported winds being light and variable, the aircraft probably experienced a slight quartering tailwind from the right over the runway threshold. This is corroborated by witnesses at the runway hold position who stated that the wind indicator showed this slight quartering tailwind. It is believed that this slight quartering tailwind initiated the ground loop by pushing the tail to the left.

## **2.3 The Ground Loop**

Evidence on the runway indicated that the aircraft bounced five times. The initial touchdown occurred on the runway centreline. At this point, the aircraft bounced and yawed slightly to the right in the quartering tailwind. The student did not adequately correct for the right yaw before the second touchdown and the aircraft bounced a second time and yawed further to the right. On the third contact with the runway, the aircraft was yawed sufficiently to the right to cause the left main landing gear to bend inward under the side load (see photo 2) and allow the left wheel hub to make contact with the pavement (see photo 3). By then, the instructor had taken control of the aircraft and although he was able to prevent the aircraft from yawing further to the right, he was not able to recover the aircraft before it exited the runway on the right and pitched forward (see photo 1).

## **2.4 The Student**

A review of the student's logbooks indicated that she did not have the minimum of 150 hours of Pilot In Command (PIC) time required to attend the Tow Pilot Conversion Course. In fact, at the time of the accident, she only had 148 hours of total flying time (76 hrs PIC). She started the course with only 138 total hours. Discussions with the Regional Staff indicated that she did not have the required flying experience at the time of her application for the Conversion Course but that she was expected to reach the required minimum before the start of the course since she was actively flying at a local club. No final verification of the student's hours was done at the beginning of the course. The Regional Staff also indicated that their application form was ambiguous as to the flying times required for the course. This form has since been redrawn and is now quite explicit. An application is now subjected to two additional levels of review before a candidate is accepted on the course.

## **2.5 The Instructor**

Both instructors who flew with the student are retired military pilots with extensive experience instructing on the L-19. They were not aware that she did not have the required minimum flying times to attend the course. In fact, they were so impressed by her performance on the course that they assumed she had a lot more experience than she actually had. This excellent performance by the student may have lulled the instructor into a false sense of security and led him to "lower his guard" at a critical moment in the flight. In the incipient stages of the ground loop, the instructor attempted to regain control of the aircraft but his hands were not close enough to the controls to recover in time. Once the instructor took control of the aircraft he was able to prevent it from yawing further to the right but the ground loop had progressed to a point that was not recoverable.

## **2.6 Helmets**

This is the second accident in two years where a tow aircraft was overturned or almost overturned. We were fortunate in both cases that the deceleration forces were not sufficient to cause injuries. Had these forces been stronger, it is quite possible that the pilots might have had their head injured while flailing around in the cockpit, especially in the L-19 where the flap motor is just above and behind the front pilot's head. The use of flying helmets in the tow aircraft would significantly reduce the risk of head injury in accident and also in normal operations.

## **2.7 Medical Aspects**

The student used "over the counter" antihistamines for a spider bite two days before the accident. Although it does not seem that the drug played a part in this accident, it was noted that she had flown two flights on the day that she took the



medication and three more solo flights the following day. Had she been prescribed this medication by a flight surgeon, she would have been restricted from flying for 48 hours.

Although private pilots are authorized to self medicate, CIC officers, when flying Cadet aircraft, are arguably subject to the rules of the B-GA-100-001, Canadian Forces Flying Orders, and the A-CR-CCP-242, Air Cadet Gliding Manual. These documents prohibit aircrew from using any drug without the supervision of a flight surgeon or Civil Aviation Medical Examiner.

Circulation of the Draft for Comment version of this report highlighted that CIC Officers do not consider themselves subject to the B-GA 100. Cadet CIC Officers are, however, considered military pilots and the B-GA-100 applies to all military pilots. It is, nevertheless, understood that not all provisions of the B-GA 100 make sense for CIC pilots, and the National Cadet Office is presently working with 1 CAD to clarify the issue.

### **3. CONCLUSIONS**

#### **3.1 Findings**

3.1.1 The aircraft was serviceable prior to the accident.

3.1.2 The student and instructor were properly licensed and current.

3.1.3 The winds were reported by the Flight Service Station to be light and variable at the time of the accident. Witnesses indicated that there was a slight quartering tailwind over the runway threshold.

3.1.4 The student did not have the minimum required flying times to attend the Tow Pilot Conversion Course.

3.1.5 The instructors were not aware of the fact that the student did not have the required flying experience to attend the course.

3.1.6 The instructors were impressed by the performance of the student, thus assumed she had more experience than she actually had.

3.1.7 The instructor's hands were not near the controls during the landing.

3.1.8 The instructor could not take control of the aircraft before the ground loop had developed to a point that was no longer recoverable.

3.1.9 The instructor and student were not injured in the accident and exited the aircraft through the main door.

3.1.10 This is the second accident in two years where there was potential for head injury.

3.1.11 The student used over the counter antihistamines for a spider bite without the supervision of a Flight Surgeon or Canadian Aviation Medical Examiner, contrary to the B-GA-100 and the A-CR-CCP-242.

3.1.12 There is some ambiguity over whether B-GA 100, Canadian Forces Flying Orders, applies to CIC pilots.

## **3.2 Causes and Contributing Factors**

### **3.2.1 Causes**

This accident was caused by the student not adequately controlling the aircraft yaw on landing and allowing a ground loop to develop. The instructor's hands were not near the controls and, although he was able to prevent the aircraft from yawing further to the right, he was not able to recover it before exiting the runway surface.

### **3.2.2 Contributing Factors**

The presence of a slight quartering tailwind over the runway threshold initiated the ground loop. The fact that the student did not have the required minimum experience did not allow her to recognize the impending ground loop in time and to instinctively take corrective action.

The strong performance of the student on the course combined with the instructor being unaware of her low experience lulled the instructor into a false sense of security and led him to lower his guard during a critical phase of flight.

## **4. SAFETY MEASURES**

### **4.1 Safety Measures Taken**

4.1.1 The Regional Cadet Air Operations Officer has since reminded instructors to ensure that they not let their guard down, especially when a student is performing well. Student pilots with low experience can very quickly mishandle the aircraft when faced with a difficult situation.

4.1.2 The student, who completed the tow pilot conversion course before her lack of flying time was confirmed, has since been temporarily removed from the pilot roster until she gains enough experience to meet the minimum requirements.

4.1.3 The Regional Cadet Air Operations Officer has since had the pilot application form redrawn in order to more explicitly outline the minimum requirements to be considered for the Tow Pilot Conversion Course. An application is now subjected to two additional levels of review before a candidate is accepted on the course.

4.1.4 The National Cadet Office is working with 1 CAD to clarify the issue of applicability of B-GA 100 Orders to CIC pilots.

## **4.2 Further Safety Measures Recommended**

It is recommended that:

4.2.1 All Regional Cadet Air Operations Officer ensure that students' qualifications are checked at the beginning of courses to ensure that candidates that were expected to meet the minimums before the start of the course did get the additional experience they required.

4.2.2 All Regional Standards Officers regularly remind their instructors that even strong students can very quickly bring an aircraft to the point where immediate action is required to recover. Keeping one's hands close to the controls, especially during critical phases of flight, is the best way to ensure that one can quickly recover from such mishandling.

4.2.3 All Regional Cadet Air Operations Officers regularly remind all their pilots of the medical requirements outlined in the B-GA-100 and the A-CR-CCP-242. More specifically the requirement to consult a Flight Surgeon or a Canadian Aviation Medical Examiner before taking any medication, including over the counter drugs. These two reminders should occur, as a minimum, at the beginning of each flying season.

4.2.4 DAEPM (TH) and DRDC Toronto/ALS (DCIEM) research the feasibility of procuring and approving a helmet for use in the Air Cadet tow aircraft. Such helmet need not meet the same specification as other CF helmets but should provide a comfortable level of protection at a reasonable price. A long interval between inspections would also be an asset.

## **5. DFS Comments**

Tail dragger aircraft like the L-19 and the Scout are renowned for their propensity for ground looping, and even experienced pilots are sometimes caught. Extreme vigilance during the landing phase of flight in these aircraft is a constant requirement for all who fly them. Nevertheless, this is another accident where the instructor was slow to take control. My comments in the Flight Safety Accident Investigation report after a Jet Ranger accident in Portage in Oct 99 are still applicable: For instructors, the question of when to guard the controls is as

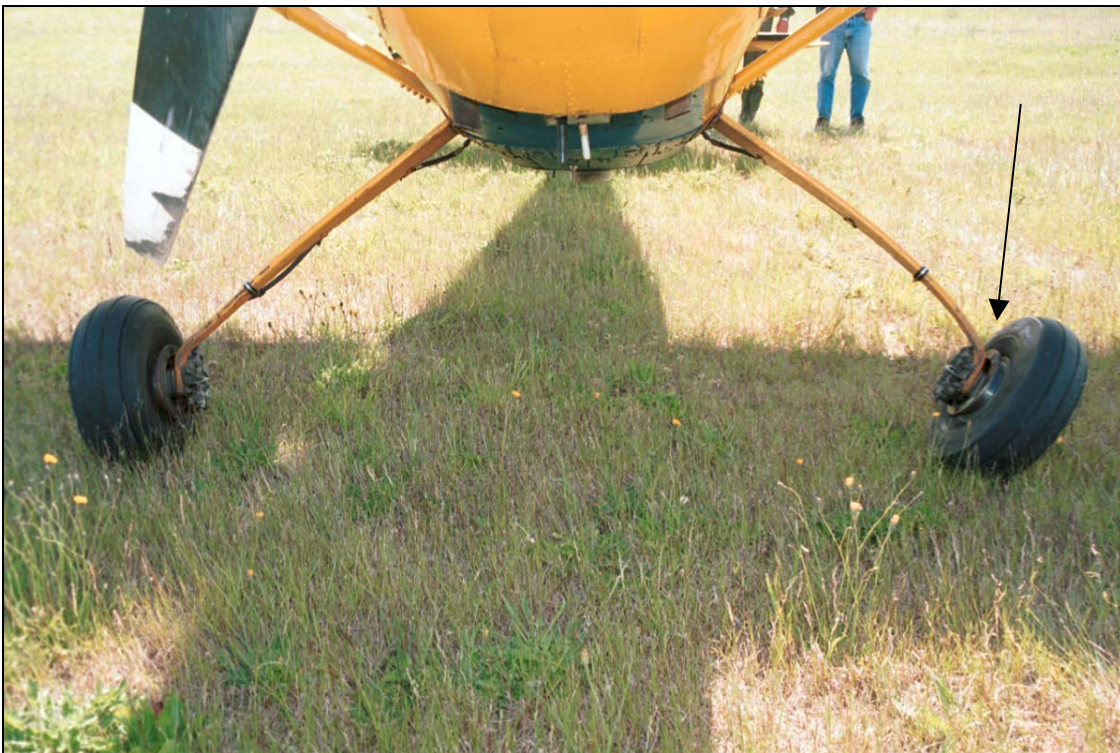
old as flying instruction itself. History is replete with examples of accidents which could have been avoided had the instructor been able to react more quickly, and these accidents tend to happen in cycles. As an instructor's personal knowledge of students making dangerous control inputs fades, he or she tends to become less vigilant about the possibility. Student confidence undoubtedly suffers more with an accident than through instructors staying close to controls. There's little doubt in my mind as to which side of the question instructors should err.

R.E.K. Harder  
Colonel  
Director of flight Safety

**Annex A: Photographs**



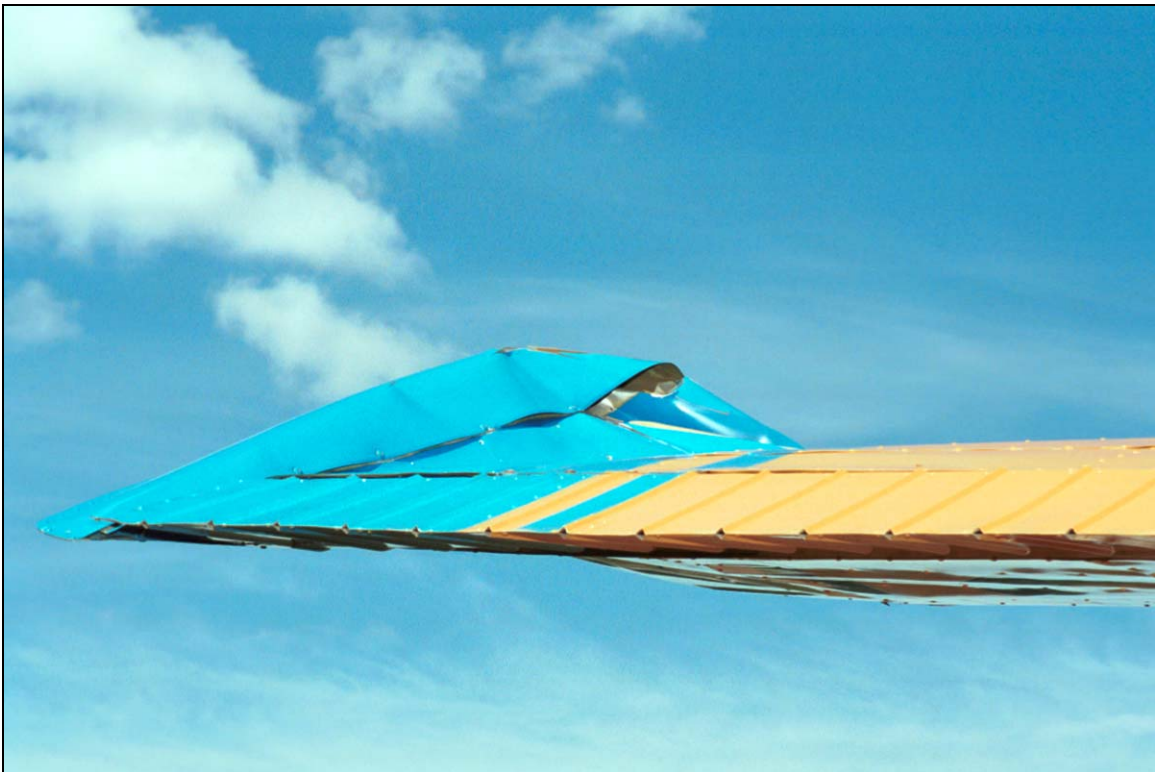
**Photo 1 Final Resting Place**



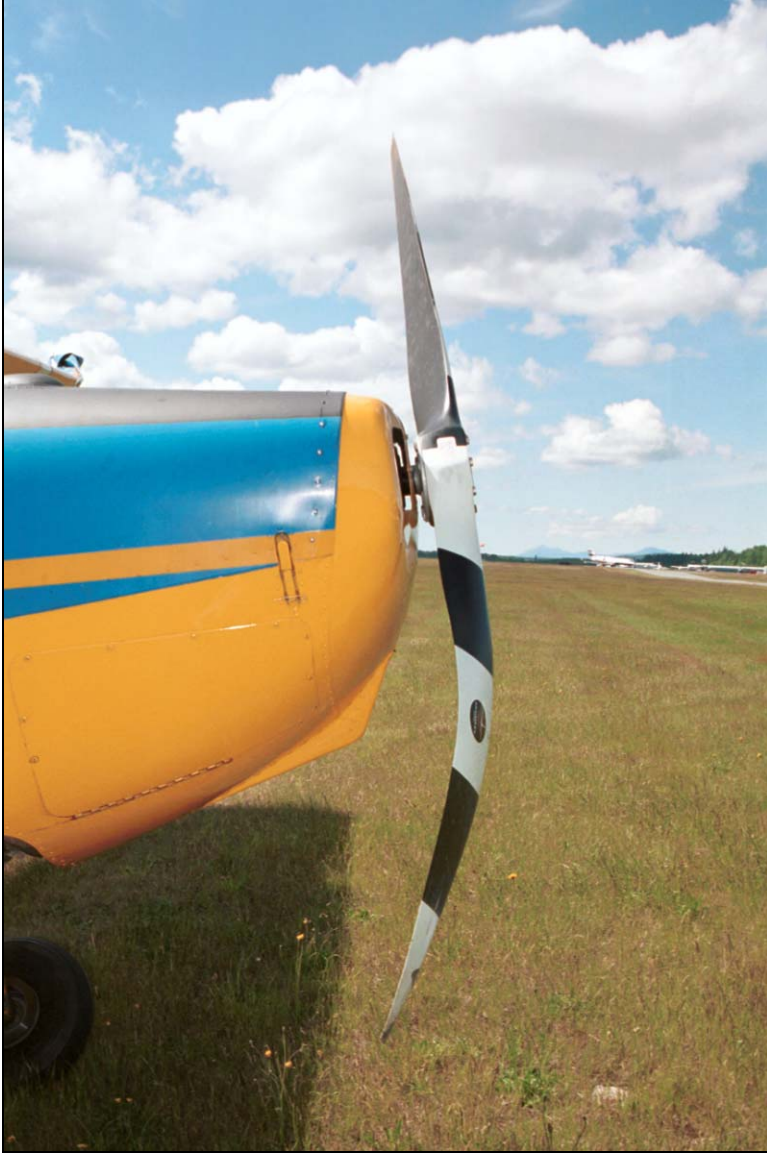
**Photo 2: Landing gear leg damage**



**Photo 3: Wheel damage**



**Photo 4: Left wingtip damage**



**Photo 5: Propeller damage**