

<b>AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY</b>
---

				Reference:	CA18/2/3/9058	
<b>Aircraft Registration</b>	<b>ZS-ISD</b>	<b>Date of Accident</b>	10 July 2012		<b>Time of Accident</b>	0745Z
<b>Type of Aircraft</b>	Piper PA34-200		<b>Type of Operation</b>	Training		
<b>Pilot-in-command Licence Type</b>	Commercial	<b>Age</b>	23	<b>Licence Valid</b>	Yes	
<b>Pilot-in-command Flying Experience</b>	Total Flying Hours	2100.0		Hours on Type	58.0	
<b>Last point of departure</b>	Port Alfred Aerodrome (FAPA) Eastern Cape					
<b>Next point of intended landing</b>	Port Alfred Aerodrome (FAPA) Eastern Cape					
<b>Location of the accident site with reference to easily defined geographical points (GPS readings if possible)</b>						
On Runway 28L at Port Alfred Aerodrome (FAPA) Eastern Cape						
<b>Meteorological Information</b>	Wind: 300°/10 km, Visibility: 9999, Temperature: 20°C, Cloud Cover and Cloud Base: CAVOK,					
<b>Number of people on board</b>	1 + 1	<b>No. of people injured</b>	0	<b>No. of people killed</b>	0	
<b>Synopsis</b>						
<p>On 10 July 2012 at approximately 0545Z, the Instructor and Student departed from Port Alfred Airport (FAPP) to the General Flying Area (GFA) Area on a training flight.</p> <p>The instructor stated that after they had completed the training exercises that lasted approximately 2 hours, the undercarriage was selected down for landing back at Port Alfred aerodrome. The two green down and locked lights illuminated for the nose and right hand main landing gear only but no light for the left main landing gear. The undercarriage was then recycled in an attempt to lower the undercarriage with the emergency extension system, but failed to change this condition. A fly pass was then executed at Port Alfred aerodrome and the ATC confirmed that the right hand main landing gear and the nose gear including left main landing gear were extended.</p> <p>An emergency was then declared. During a normal approach for landing onto Runway 28 with the left main landing gear in an unsafe condition, the aircraft touched down first on the right hand main landing gear, but as the left hand main landing gear touched the runway surface, it collapsed. The aircraft then veered to the left for approximately 100 metres and off the runway onto the grass area before it came to rest.</p> <p>The aircraft sustained minor damage to the left wing under-surface and left hand engine propeller blades. The instructor and student sustained no injuries.</p>						
<b>Probable Cause</b>						
Emergency landing with left landing gear in unsafe condition. (collapsed)						
Contributory Factor: Bracket attached to undercarriage down lock mechanism failed.						
IARC Date		Release Date				
CA 12-12a	<b>25 MAY 2010</b>			Page 1 of 11		



## AIRCRAFT ACCIDENT REPORT

**Name of Owner/Operator** : 43 Air School (Pty) Ltd  
**Manufacturer** : Piper Aircraft Corporation  
**Model** : PA34-200  
**Nationality** : South African  
**Registration Marks** : ZS-ISD  
**Place** : Port Alfred Aerodrome  
**Date** : 10 July 2012  
**Time** : 0745Z

*All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.*

### **Purpose of the Investigation :**

*In terms of Regulation 12.03.1 of the Civil Aviation Regulations (1997) this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and **not to establish legal liability.***

### **Disclaimer:**

*This report is given without prejudice to the rights of the CAA, which are reserved.*

## **1. FACTUAL INFORMATION**

### **1.1 History of Flight:**

- 1.1.1 On 10 July 2012 at approximately 0545Z, the Instructor and Student departed from Port Alfred Airport (FAPP) to the General Flying Area (GFA) Area on a training flight.
- 1.1.2 The instructor stated that after they had completed the training exercises that lasted approximately 2 hours, the undercarriage was selected down for landing back at Port Alfred aerodrome. The two green down and locked lights illuminated only for the nose and right hand main landing gear, but no light for the left main landing gear.
- 1.1.3 The instructor then recycled the undercarriage and attempted to lower the undercarriage with the emergency extension system, but failed to change this condition. A fly pass was then executed at Port Alfred aerodrome and the ATC confirmed that the right hand main landing gear and nose landing gear as well as the left main landing gear were extended.
- 1.1.4 An emergency was then declared. During a normal approach for landing onto Runway 28L with the left main landing gear in an unsafe condition, the aircraft touched down first on the right hand main landing gear, but as the left hand main landing gear touched the runway surface, it collapsed. The aircraft then veered to

the left for approximately 100 metres and off the runway onto the grass area before it came to rest.

1.1.5 The aircraft sustained minor damage to the left wing under-surface and left hand engine propeller blades. The instructor and student sustained no injuries.

## 1.2 Injuries to Persons

Injuries	Pilot	Crew	Pass.	Other
Fatal	-	-	-	-
Serious	-	-	-	-
Minor	-	-	-	-
None	1	1	-	-

## 1.3 Damage to Aircraft

1.3.1 The aircraft sustained minor damage to the left hand wing under surface and left engine propeller blades.



Figure 1, shows aircraft with left main landing gear collapsed.

## 1.4 Other Damage

1.1.4 There was no other damage sustained.

## 1.5 Personnel Information

### 1.5.1 Pilot-in-command (Instructor)

Nationality	South African	Gender	Male	Age	23
Licence Number	0272240391	Licence Type	Commercial		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Night, Instrument, Instructor, Flight Test Single and Multi Engine Ratings				
Medical Expiry Date	31 March 2013				
Restrictions	None				
Previous Accidents	None				

### 1.5.2 Flying Experience:

Total Hours	2100.0
Total Past 90 Days	177.4
Total on Type Past 90 Days	23.9
Total on Type	58.0

## 1.6 Aircraft Information

### 1.6.1 Airframe:

Type	Piper PA34-200	
Serial Number	34-7250147	
Manufacturer	Piper Aircraft Corporation	
Date of Manufacture	1972	
Total Airframe Hours (At time of Accident)	13180.0	
Last MPI (Date & Hours)	13172.0	25 June 2012
Hours since Last MPI	8.0	
C of A (Issue Date)	9 December 2010	
C of R (Issue Date) (Present owner)	43 Air School (Pty) Ltd	
Operating Categories	Part 141	

### 1.6.2 No 1 Engine:

Type	Lycoming IO-360-CIE6
Serial Number	RL496251A
Hours since New	3866.0
Hours since Overhaul	1909.0

### 1.6.3 No 2 Engine:

Type	Lycoming IO-360-CIE6
Serial Number	RL69467A
Hours since New	7646.0
Hours since Overhaul	1909.0

1.6.4 No 1 Propeller:

Type	Hartzell HC-C2YK-2CEUF
Serial Number	AU13737B
Hours since New	1352.0
Hours since Overhaul	TBO not reached

1.6.5 No 2 Propeller:

Type	Hartzell HC-C2YK-2CEUF
Serial Number	AU12603B
Hours since New	1352.0
Hours since Overhaul	TBO not reached

1.6.1 The aircraft was registered on 31 August 2010 on the South African Civilian Register and issued with a Certificate of Registration (CoR). The South African Civil Aviation Authority (SACAA) Airworthiness Department inspected the aircraft and issued a Certificate of Airworthiness (CoA) on 9 December 2011. The Certificate of Airworthiness was valid at the time of the accident with the expire date being 8 December 2012.

1.6.2 According to the CoA, the aircraft was restricted for use on Flight Training Operations, which was in accordance with the provisions of Civil Aviation Regulation (CAR) Part 141.

1.6.3 Fuel Status: The Instructor concluded that the aircraft was refuelled to full capacity prior to the training flight. After approximately 2.0 hours training exercises in the GFA area, approximately 500lbs of fuel still remained on board the aircraft during the emergency landing.

1.6.4 Maintenance: According to the owner/operator, a mandatory periodic inspection (MPI) was carried out on the aircraft on 5 June 2012 which also included an inspection of the undercarriage in accordance with manufactures and applicable regulations. After the MPI was complete, the responsible AMO issued a Certificate of Release to Service (CRS) and certified that the aircraft and all its equipment were serviceable in all respects for further flight. The Operator thereafter conducted normal training operations without any undercarriage defects or malfunctions until the day of the accident.

1.6.5 Part Failure: The aircraft was recovered from the accident site to the facility of the Responsible AMO for further inspection to determine the probable cause of the left main landing gear failure. During the inspection the AMO established that the L/H main gear bracket P/No. 67031-02 had failed during operation. According to the AMO, the bracket had no serial number stamped on it and was the original part since manufacturing. The bracket hours since installation on the aircraft was thus 6371.0 hours.

## 1.7 Meteorological Information

1.7.1 The weather information was obtained from the pilot questionnaire.

Wind direction	300°	Wind speed	10 kts	Visibility	9999
Temperature	20°C	Cloud cover	CAVOK	Cloud base	CAVOK
Dew point	Unknown				

## 1.8 Aids to Navigation

1.8.1 The aircraft was equipped with standard navigational equipment that was approved for the type aircraft. The flight crew did not report any defect or malfunction with the navigation equipment during the training flight.

1.8.2 The aircraft was subjected to an emergency landing at Port Alfred Airport (FAPA). There were no defects experienced with the available navigational aids at the aerodrome prior or at the time of the accident. All the navigational aids were in a serviceable condition.

## 1.9 Communications.

1.9.1 A Transmitter, VHF King KY 97A radio communication equipment was installed on the aircraft. The flight crew did not report any defects or malfunctions with the aircraft radio communication equipment prior to and during the flight and whilst communicating with the ATC controller. The radio communication equipment was in a serviceable condition.

1.9.2 The ATC activated the crash alarm and Aerodrome Rescue and Fire Fighters (ARFF) services were dispatched to assist the crew during the landing.

## 1.10 Aerodrome Information

Aerodrome Location	Port Alfred Airport Eastern Cape	
Aerodrome Co-ordinates	S33° 35' 00' E026° 53' 00"	
Aerodrome Elevation	275ft AMSL	
Runway Designations	10L/28R	10R/28L
Runway Dimensions	1800m x 24m	1800m x 24m
Runway Used	28L	
Runway Surface	Grass	
Approach Facilities	NDB PA232.5	

## 1.11 Flight Recorders

1.11.1 The aircraft did not have any Flight Recorders (Cockpit Voice Recorders and Flight Data Recorders) installed, nor was it required in terms of applicable regulations.

## **1.12 Wreckage and Impact Information**

1.12.1 During an emergency landing with the left hand main landing gear in an unsafe condition, the aircraft touched down first on the right hand main landing gear, but as the left hand main landing gear touched the runway surface, it collapsed. The aircraft then veered to the left for approximately 100 metres and off the runway onto the grass area before it finally came to rest. The aircraft sustained minor damage to the left wing under-surface and left hand engine propeller blades.

## **1.13 Medical and Pathological Information**

1.13.1 None.

## **1.14 Fire**

1.14.1 There was no evidence of any pre-or post impact fire.

## **1.15 Survival Aspects**

1.15.1 The accident was considered to be survivable. The aircraft was still intact after the accident and sustained only minor damage to the left wing under surface. The instructor and student were properly restrained with the aircraft safety harnesses and sustained no injuries due to the very low impact forces involved.

## **1.16 Tests and Research**

1.16.1 The aircraft maintenance organisation (AMO) conducted an inspection on the aircraft to determine the cause of the left hand main landing gear failure to extend and to lock down properly.

- The AMO established that the spring attachment bracket on the left hand main landing gear down-lock mechanism fractured , due to a crack that developed. As a result, there was no spring tension and the left hand main landing gear could not lock down positively in the down-lock position causing the main landing gear collapsed during landing.
- The AMO also established that the bracket that fractured due to a crack that developed during operation was the original part since manufacturing. The bracket hours on the aircraft was calculated as 6371.0 hours since installation on the aircraft. See bracket with crack below:

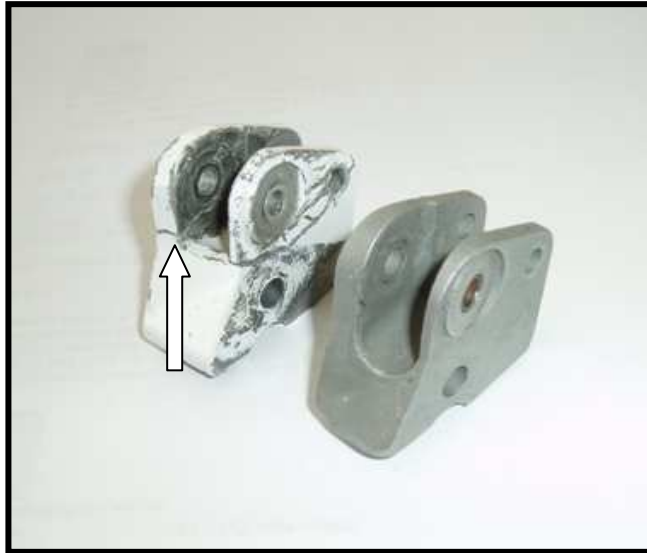


Figure 2, shows the landing gear bracket that failed.

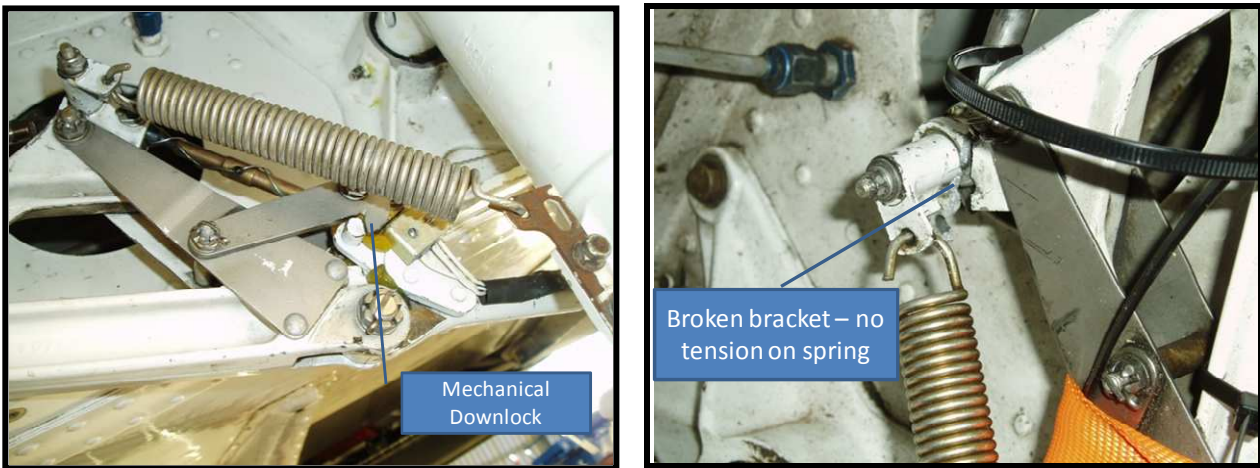


Figure 3, shows the affected left hand main landing gear down lock spring and bracket.

- The inspection further identified that the mechanical malfunction was caused by the bracket that failed. The fracture lines on the bracket were clearly visible that it originated on its corners.
- Note: The AMO's that conducted maintenance work on the Piper Arrow fleet at Port Alfred stated that sometimes during hard landings, the brackets were found to be fractured or damaged and had to be replaced.

1.16.2 There are currently new types of bracket available which is approved for installation. The difference between the new and old type bracket are as followed:

- (i) The old bracket has a 90° corner at which the fracture originates from.
- (ii) The new bracket is milled round and far more deeply than the old bracket. This allows far more free movement of the hydraulic arm which lowers and raises the undercarriage.

1.16.3 According to the aircraft file, the aircraft was involved in an incident on 26 October 2010 during a training flight where the aircraft landed with its wheels retracted,



“belly landing”. The SACAA did not conduct an on-site investigation. The pilot reporting that he could not recall checking if he had three green lights indicating that the undercarriage was down and locked and safe for landing. After the incident, the aircraft was recovered to the AMO for repairs. According to the AMO CRMA, the following was done:

- (i) Sheet metal work to the airframe belly structure.
- (ii) Strip, repair and re-assemble L/H and R/H flaps.
- (iii) Nose door hinges on door and nose section.

## **1.17 Organizational and Management Information**

1.17.1 The Instructor and student were engaged on a training flight when the left hand main landing gear failed to lock down positively due to a mechanical malfunction.

- (1) Aviation Training organisation (ATO) responsible for the training flight had a valid ATO Approval Certificate, issued under Part 141. The PA34-200 aircraft, registration: ZS-ISD was included as one of the aircraft authorised to be used for training.
- (2) The Instructor was also included on the ATO Manual of Procedure amongst the list of Flight Training Personnel authorised to conduct training on behalf of the ATO. There were no anomalies identified during the investigation with the organisation and management of the ATO relevant to the accident.

1.17.2 The aircraft was maintained by an approved aircraft maintenance organisation (AMO). The AMO was appropriately rated to conduct Schedules and unscheduled maintenance on the aircraft.

## **1.18 Additional Information**

1.18.1 According to the PA34-200 (Seneca Manual), the undercarriage system is hydraulically operated. An electrically powered reversible pump which is controlled by the gear selector switch provides hydraulic pressure. The retraction/extension takes 6 to 8 seconds. The undercarriage is held up by hydraulic pressure and if there is a leak in the system, the undercarriage will extend and down hooks engage which are held in place by springs until released by hydraulic pressure. Therefore three green lights will illuminate when the undercarriage is down and locked. But if one, two or all of the green lights do not illuminate when the undercarriage is selected down, any of the following conditions exist:

- (i) The undercarriage or affected landing gear is not down and locked.
- (ii) The light bulb possibly burned out.
- (iii) There is a malfunction in the undercarriage system.

## **1.19 Useful or Effective Investigation Techniques**

1.19.1 None.

## **2. ANALYSIS**

- 2.1 The instructor and student took off normally from Port Alfred Aerodrome (FAPA) on a training flight in the general flying area (GFA). After the training flight was conducted, the instructor selected the undercarriage to the down position and achieved two green 'down and locked' lights for the right hand main landing gear and for the nose landing gear respectively but no light for the left hand main landing gear, showing that an unsafe condition exists for landing. The undercarriage was recycled with the normal system and lowered with the emergency extension system, but failed to change this condition that existed. The instructor then declared an emergency with the possibility that the left hand main landing gear was not positively locked down.
- 2.2 The ATC controller concluded the right hand main landing gear and nose gear as well as the left hand main landing gear was in the down position during a fly pass at the tower. The instructor then landed the aircraft on the right hand main landing gear first, but as the left main landing gear touched the runway surface, it subsequently collapsed. The aircraft veered to the left for approximately 100 metres and off the runway onto the grass area.
- 2.3 The aircraft was recovered from the accident site to the facility of the AMO for an inspection. The AMO discovered that a bracket attached to the left hand side main landing gear down lock mechanism had failed. Due to the failure of the bracket, the spring tension of the mechanical down lock was affected and was free to move out of the down lock position.
- 2.4 It is reasonable to assume that the bracket that failed was submitted to some impact forces during a previous incident during wheels up "belly" landing.

## **3. CONCLUSION**

### **3.1 Findings**

- 3.1.1 The instructor and student pilot were licensed on the aircraft type and in possession of valid aviation medical certificates with no restrictions..
- 3.1.2 This was a training flight flown under visual flight rules (VFR) by day.
- 3.1.3 The left hand main landing gear green 'down and locked' light failed to illuminate when the undercarriage was selected to the down position down lock position, showing that an unsafe condition exists for landing.
- 3.1.4 The ATC controller concluded the right hand main landing gear and nose gear as well as the left hand main landing gear was in the down position during a fly pass at the tower.
- 3.1.5 The instructor carried out an emergency landing and landed the aircraft on the right hand main landing gear first. The left hand main landing gear subsequently collapsed as it contacted the runway surface. The aircraft veered to the left for approximately 100 metres and off the runway onto the grass area.

3.1.6 The aircraft sustained minor damage to the left hand wing under-surface and left hand engine propeller strike.

3.1.7 The instructor and student pilot did not sustain any injuries.

3.1.8 The aircraft was recovered to an AMO for further examination to determine the cause of the left hand main landing gear failure. It was established that the mechanical down lock bracket fractured due a crack that developed over time, rendering the tension spring attached to bracket ineffective to insure the gear in the down lock position.

3.1.9 The aircraft was submitted to a wheels up "belly" landing incident two years ago. The possibility is that the bracket may have sustained some damage during that incident which caused it to eventually fail.

### **3.2 Probable Cause/s**

3.2.1 Emergency landing due to mechanical landing gear failure.

### **3.3 Contributory Factor: 1.6 and 3.19**

3.3.1 Bracket attached to undercarriage down lock spring mechanism failed.

Mechanical failure

## **4. SAFETY RECOMMENDATIONS**

4.1 SACAA to develop an urgent maintenance program for aircraft older than a certain age.

## **5. APPENDICES**

5.1 None.

Compiled by:

.....

**For: Director of Civil Aviation**

Date: .....

Investigator-in-charge: .....

Date: .....

Co-Investigator: .....

Date: .....