

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

				Reference:	CA18/3/2/0830	
<b>Aircraft Registration</b>	ZU-DHF	<b>Date of Accident</b>	19 February 2011		<b>Time of Accident</b>	1610Z
<b>Type of Aircraft</b>	Tecnam P92-S Echo		<b>Type of Operation</b>		Private	
<b>Pilot-in-command Licence Type</b>		Airline Transport	<b>Age</b>	46	<b>Licence Valid</b>	Yes
<b>Pilot-in-command Flying Experience</b>		Total Flying Hours	4590.0		Hours on Type	158.0
<b>Last point of departure</b>		Kitty Hawk Estate Airfield				
<b>Next point of intended landing</b>		Kitty Hawk Estate Airfield				
<b>Location of the accident site with reference to easily defined geographical points (GPS readings if possible)</b>						
On Runway at Kitty Hawk Estate.						
<b>Meteorological Information</b>		Temperature: 25°C, Wind direction: Southerly, Wind speed:±10 kts, Visibility: good, Dew Point: Unknown, Cloud Cover/Base: CAVOK.				
<b>Number of people on board</b>	2 + 0	<b>No. of people injured</b>	0	<b>No. of people killed</b>	0	
<b>Synopsis</b>		<p>A crew of two pilots (an instructor and a trainee) flew the aircraft on a training flight under visual flight rules (VFR) by day in the vicinity of Kitty Hawk Estate Airfield. They were doing touch-and-go landings from Runway 19. After five successful landings, the pilots had to stop the training flight due to the landing gear sustaining damage. The cause of the damage was determined to be as the result of the bracket and bolts assembly which secures the right side gear leg to the airframe that failed.</p> <p>The aircraft sustained major damage. The pilots did not sustain any injuries.</p>				
<b>Probable Cause</b>						
The main landing gear on the left side failed after being exposed to a firm (hard) landing.						
<b>Contributory Factor</b>						
Poor landing technique by the pilot flying the aircraft. The main landing gear bolts on the right side failed after being strained and overstressed during landing.						
IARC Date				Release Date		

## AIRCRAFT ACCIDENT REPORT

**Name of Owner/Operator** : Superb Flight Training CC  
**Manufacturer** : Tecnam  
**Model** : Tecnam P92-S Echo  
**Nationality** : South African  
**Registration Marks** : ZU-DHF  
**Place** : Kitty Hawk Estate Airfield  
**Date** : 20 February 2011  
**Time** : 1610Z

*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 Saturday, 20 February 2011 at approximately 1550Z, a Tecnam aircraft was flown from Kitty Hawk Estate Airfield (FAWT) to the Pretoria general flying area (GF). There were two pilots (an instructor and a trainee) on board the aircraft. The pilots flew the aircraft on a familiarisation training flight to train the trainee for conversion on the type. The trainee was doing the majority of the actual flying, except for occasional demonstrations by the instructor. On completion of the training in the GF area, the aircraft joined the circuit at FAWT and ended the training flight with circuits and landings. Runway 19 was used due to the direction of the wind.
- 1.1.2 The trainee reported that the first landing was firm, because he abruptly and completely closed the throttle before touchdown. The result was that the aircraft sank unexpectedly, losing direction toward the right side of the centreline, with the nose angle slightly skew to the right. The aircraft touched down, but it was not correctly aligned with the runway centreline. The landing was neither gentle nor smooth. There was some strain put on the landing gear, but not enough to cause it to sustain damage.

- 1.1.3 The trainee controlled the second landing better and the touchdown was softer on the runway. The nose of the aircraft was again pointed slightly to the right, but the angle was fairly small. The pilot brought the aircraft to a halt and he back tracked to the threshold. A minor vibration started to develop on the aircraft, which the pilot thought was coming from the landing gear or brakes. The two pilots decided to stop the aircraft in the turning circle to visually inspect the landing gear and brakes. They found that the landing gear and brakes were serviceable.
- 1.1.4 The pilots completed two more landings which they described to be generally smooth, straight and correctly positioned on the runway. The fifth landing was meant to be a touch-and-go, but shortly after touchdown a vibration was felt on the airframe. The vibration turned into what felt like a wobble and gradually became worse during the landing roll on the runway as the landing speed was decreasing. The aircraft started to pull to the left and the trainee pilot applied opposite right rudder, pulled the control stick back and then to the right. No brake was applied until the throttle was fully closed. When the aircraft was approaching the taxiway "November," the instructor told the trainee to do an engine shutdown. The propeller stopped instantly in a horizontal position. The aircraft came to a stop with its left wingtip lowered and touching the grass on that side of the taxiway. The left main gear appeared to have pivoted around the inboard retaining bolt and it was folded in underneath the fuselage. The nose gear was bent slightly to the right.
- 1.1.5 The pilots checked the left main gear and found that the main gear retaining bracket and two outboard bolts were missing. During a runway inspection, they found the bracket and bolts. The aircraft sustained major damage in the accident. The instructor and trainee did not sustain any 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 major damage.

## 1.4 Other Damage

- 1.4.1 None.

## 1.5 Personnel Information

### Instructor

Nationality	South African	Gender	Male	Age	46
Licence Number	0270127236	Licence Type	Airline Transport		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Instructor Grade 1, Test Pilot Class 2, Night, Instrument, MNPS/RVSM, Flight Test – Multi & Single Engine Piston.				
Medical Expiry Date	31 July 2011				
Restrictions	Corrective lenses for near vision				
Previous Accidents/Incidents	<ul style="list-style-type: none"> <li>08 October 2006, training flight at Kitty Hawk, avoiding overrunning runway, the pilot did runway excursion in a different aircraft.</li> <li>25 August 2007, training flight at Kitty Hawk, hard landing in a different aircraft.</li> </ul>				

### Flying Experience:

Total Hours	4590.0
Total Past 90 Days	56.7
Total on Type Past 90 Days	8.9
Total on Type	158.0

### Trainee

Nationality	South African	Gender	Male	Age	40
Licence Number	0270510985	Licence Type	Commercial		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Instructor – Grade 2, Night, Flight Tests – Multi & Single Engine Piston, Instrument Rating.				
Medical Expiry Date	30 June 2012				
Restrictions	None				
Previous Accidents/Incident	None				

### Flying Experience:

Total Hours	230.0
Total Past 90 Days	10.0
Total on Type Past 90 Days	2.3
Total on Type	2.3

## 1.6 Aircraft Information

### Airframe:

Type	Tecnam P92-S Echo	
Serial Number	799	
Manufacturer	Tecnam	
Date of Manufacture	December 2003	
Total Airframe Hours (At time of Accident)	2500.1	
Last MPI (Date & Hours)	16 December 2011	2399.3
Hours since Last MPI	100.8	
Authority to Fly (Issue Date)	15 December 2010	
C of R (Issue Date) (Present owner)	21 November 2006	
Operating Categories	Training School Authority to Fly	

### Engine:

Type	Rotax 912 ULS
Serial Number	4429226
Hours since New	1371.3
Hours since Overhaul	101.0

### Propeller:

Type	Tonini GT -2/173/VVR-FW 101 SRTC
Serial Number	1435
Hours since New	1371.3
Hours since Overhaul	N/A

1.6.1 The Tecnam P92-S Echo is an all-metal, high wing, two-place, single-engine airplane equipped with tricycle landing gear. This aircraft was designed and built in Italy. The aircraft was certified as a Non-Type Certified Aircraft (NTCA) in South Africa.

1.6.2 Immediately after the occurrence, the pilots checked the aircraft and they found that the main gear on the left side had failed. The two outboard bolts of the main gear had broken during the training flight. The Approved Person who had maintained the aircraft reported that the bolts were fitted and in use for a duration of approximately 300 hours. There is no time or calendar limit placed on the bolts.

## 1.6 Meteorological Information

1.6.1 The weather information in the column was submitted by the pilot in a questionnaire.

Wind direction	Southerly	Wind speed	±10 kts	Visibility	Good
Temperature	25°C	Cloud cover	CAVOK	Cloud base	CAVOK
Dew point	Unknown				

## 1.8 Aids to Navigation

- 1.8.1 The aircraft had standard navigation equipment fitted which was approved for the type. Additional instrumentation and equipment was approved by the SACAA on the aircraft equipment list. The navigation equipment was in a serviceable condition.
- 1.8.2 The aircraft was operating at Kitty Hawk Estate Airfield. The airfield has no aids to navigation equipment installed.

## 1.9 Communications

- 1.9.1 The aircraft was fitted with an Icom – IC A200 type radio equipment. The radio equipment was in a serviceable condition.
- 1.9.2 The aircraft was being operated in uncontrolled airspace. The pilot was required to broadcast his intentions on frequency 120.65 MHz. The pilot reported that he did not experience any communication problem.

## 1.10 Aerodrome Information

- 1.10.1 The aerodrome information included in the column below was taken from the Airfields Directory for Southern Africa.

Aerodrome Location	Kitty Hawk Estate Airfield	
Aerodrome Co-ordinates	S25°51'42.0" E028°26'49.0"	
Aerodrome Elevation	4586 feet	
Runway Designations	01/19	
Runway Dimensions	810 m x 18 m	
Runway Used	19	
Runway Surface	Tar	
Approach Facilities	None	

## 1.11 Flight Recorders

- 1.11.1 The aircraft was not fitted with a flight data recorder (FDR) and cockpit voice recorders (CVR), nor were these required by regulation.

## 1.12 Wreckage and Impact Information

- 1.12.1 The pilots were doing touch-and-go landings on Runway 19 at Kitty Hawk Estate Airfield. The main landing gear on the left side failed and sustained damage during the landing sequences. During the sequence of events, the left side main gear strut/arm moved rearward underneath the fuselage. The aircraft started to veer off to the left side due to the condition of the main gear. The aircraft came to a stop approximately 150 metres from the threshold of Runway 19.

1.12.2 The aircraft was examined by the pilots to determine the cause of the landing gear failure. The evidence shows that two bolts on the left side of the main gear had failed. The broken bolts were installed to a bracket plate that secured the left side gear strut/arm to the airframe. The pieces of broken bolts were found approximately 200 metres away from the threshold of Runway 19.



Figure 1, shows two left side landing gear bolts that had failed.

Figure 2, shows damage caused to the fuselage.

1.12.3 The aircraft sustained damage to the left side of the fuselage on the belly, left side main gear and nose landing gear.

### **1.13 Medical and Pathological Information**

1.13.1 None.

### **1.14 Fire**

1.14.1 There was no pre- or post-impact fire.

## **1.15 Survival Aspects**

1.15.1 The accident was considered to be survivable. The cockpit and cabin area of the aircraft was intact after the accident. The occupants were properly restrained with the aircraft safety belts and harnesses. The occupants evacuated from the aircraft without injury.

## **1.16 Tests and Research**

1.16.1 The broken bolts were not submitted for metallurgical examination. However, the bolts were shown to a metallurgical specialist who visually inspected them. The metallurgical specialist's observation was that the bolts had failed as a result of being overstressed in operation. The metallurgical specialist recommended that it would be a waste of money to have the bolts examined in this regard. The bolts needed to be inspected periodically in order to check their condition and avoid this type of failure.

## **1.17 Organisational and Management Information**

1.17.1 The aircraft was utilised for training flights by an approved Aviation Training Organisation (ATO). The ATO had an Approval Certificate, issued in accordance with Part 141 and Subpart 1 & 2 to conduct Part 61 aviation training.

1.17.2 The Approval Certificate which the SACAA had issued to the ATO was invalid. The SACAA had made an administrative error with the spelling of the month and date of issuance, suggesting that the certificate would become valid from **16 November 2011**.

## **1.18 Additional Information**

1.18.1 According to the aircraft maintenance organisation (ATO) responsible for maintenance of the aircraft, the bolts that had failed were type M8/60 8.8 high-tensile steel material. The bolts were on condition items, because the manufacturer did not make service information regarding the bolts available in the Aircraft Maintenance Manual (AMM). The bolts fitted on the aircraft were not supplied by the aircraft manufacturer. The manufacturer only requires that the operators or owners of the aircraft should use a similar type: M8/60 8.8 bolts on the aircraft.

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

1.19.1 None.



## 2. ANALYSIS

- 2.1 The instructor and trainee pilot were engaged on a training flight in the vicinity of Kitty Hawk Estate Airfield. Both pilots had valid licences and were type rated on the aircraft. The pilots had valid aviation medical certificates and had no medical condition which may have prevented them from flying the aircraft on the day. The trainee pilot was flying the aircraft when the accident occurred. The two pilots were performing touch-and-go training exercises from Runway 19. After four successful landings on the runway, the pilots realised that the aircraft was developing a vibration. They stopped the aircraft and visually inspected it to determine the origin of the vibration. During their inspection, there was evidence found which indicated that the main gear leg on the left side had failed. The two bolts that secure the main landing gear leg on the left side of the airframe were broken. The debris of the broken bolts was found lying on Runway 19, which was approximately 200 metres away from the threshold.
- 2.2 The broken bolts were handed to a metallurgical specialist for examination. The metallurgical specialist visually inspected the broken bolts and concluded that the failure was due to overstress exposure during operation. The evidence found indicates that the bolts are on condition items. Furthermore, there is no known calendar time limit for the bolts. The only information available was the type of bolt to be used.
- 2.3 The AMO decided to conduct inspections annually when the aircraft are being maintained. A visual inspection will be conducted to determine the condition of the bolts. If no anomaly can be identified, the bolts will be re used until the next maintenance inspection. In this case the bolts were already installed and in use for 300 hours and nothing had been observed during the last inspection. Also, the bolts fitted on the aircraft were the recommended type but had not been supplied by the aircraft manufacturer.
- 2.4 In the light of the information above, it was determined that the investigation should look closely at the landing sequences on that day. The trainee pilot, who was the pilot flying, did report that the aircraft sank unexpectedly during one of the landing sequences, causing the aircraft to have a firm (hard) landing on the runway. This resulted in the aircraft losing direction towards the right side of the runway with the nose angle slightly skew to the right. The landing was neither gentle nor smooth. It is the opinion of the investigator that the landing gear was probably strained or overstressed during the landing. It resulted in the bolts sustaining damage and they eventually broke after the second landing on the runway. This is the time when the pilots felt the vibration on the fuselage.

### **3. CONCLUSION**

#### **3.1 Findings**

- 3.1.1 There were two pilots (an instructor and a trainee) on board the aircraft when the accident occurred.
- 3.1.2 The instructor had a valid Airline Transportation Licence (ATPL), type and instructor rating. He had a valid aviation medical certificate and had no medical condition which may have prevented him from flying the aircraft on the day.
- 3.1.3 The trainee pilot had a valid Commercial Pilot's Licence (CPL), type and instructor rating. He had a valid aviation medical certificate and had no medical condition which may have prevented him from flying the aircraft on the day.
- 3.1.4 The aircraft was flown on an uneventful training flight from Kitty Hawk Estate Airfield to Pretoria general flying (GF) area and back.
- 3.1.5 When the aircraft returned to Kitty Hawk Estate Airfield, the pilots continued with circuits and landing training exercises at the airfield, using Runway 19.
- 3.1.6 During the fifth landing on the runway, the left main landing gear failed. The cause of the landing gear failure was that two bolts had broken.
- 3.1.7 The debris of the broken bolts were found on the runway. The identified parts had separated from the aircraft during one of the landings.
- 3.1.8 After a visual inspection was conducted on the broken bolts, it was determined that the bolts had failed due to strain or overstress during a firm (hard) landing.
- 3.1.9 The bolts had been installed and had been in use for approximately 300 hours on the aircraft at the time of the accident.
- 3.1.10 The bolts were on condition items, implying that the owners/operator was not obligated to replace them until their condition deteriorated.
- 3.1.11 At the time of the accident, the MPI had expired.

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

- 3.2.1 The main landing gear on the left side failed after being exposed to a firm (hard) landing.

Contributory Factors:

- 3.2.2 Poor landing technique by the pilot flying.
- 3.2.3 The right side main gear leg bolts were subjected to strain or were overstressed during the landing and failed.

**4. SAFETY RECOMMENDATIONS**

4.1 None.

**5. APPENDICES**

Compiled by:

.....

**For: Director of Civil Aviation**

Date: .....

Investigator-in-charge: .....

Date: .....

Co-Investigator: .....

Date: .....