SOUTH AFRICAN CIVIL AVIATION AUTHORITY

*Section/division* **Occurrence Investigation** Form Number: CA 12-12a

# AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Reference: | CA18/3/2/8610 | |
| **Aircraft Registration** | **ZS-CPC** | **Date of Accident** | 22 January 2009 | | **Time of Accident** | 1500Z | |
| **Type of Aircraft** | Extra 300 L | | **Type of Operation** | | Private Flight | | |
| **Pilot-in-command Licence Type** | Airline Pilot | | **Age** | 46 | **License Valid** | Yes | |
| **Pilot-in-command Flying Experience** | Total Flying Hours | | 25 000.00 | | Hours on Type | 254.3 | |
| **Last point of departure** | Kitty Hawk Aerodrome (Boschkop)Gauteng Province | | | | | | |
| **Next point of intended landing** | Kitty Hawk Aerodrome (Boschkop)Gauteng Province | | | | | | |
| **Location of the accident site with reference to easily defined geographical points (GPS readings if possible)** | | | | | | | |
| Gravel road next to Kitty Hawk GPS co-ordinates: S25º52.190E028º26.380 Elevation 4586' AMSL | | | | | | | |
| **Meteorological Information** | Temperature:23˚C Visibility: 10 km, Surface wind 360˚/5 kt. | | | | | | |
| **Number of people on board** | 1 + 1 | **No. of people injured** | 0 | **No. of people killed** | **0** | | |

## Synopsis

The pilot accompanied by a passenger was engaged on a private flight from Kitty Hawk aerodrome to the general flying area (GFA). The pilot stated that after a flight of approximately 10 minutes, he decided to return to Kitty Hawk. During the downwind leg, he reduced the power, but as he attempted to increase power on the base leg, the engine failed to respond and to produce power. The electrical fuel pump was selected on for landing and the propeller at full fine. The fuel selector was still selected to the centre tank that is in fact the main tank on the aircraft type. Although he adjusted the mixture setting, this had little effect to increase the engine power as required. Due to the remaining distanceto the runway at Kitty Hawk was too far, the pilot was unable to reach the runway and decided to carry out a forced landing on a gravel road after he cleared obstacles such as power lines and telephone wires. The aircraft landed heavily on the gravel road between a brick wall and telephone wires.The left landing gear separated from the aircraft causing the aircraft to veer to the left and both the left and right-hand wing impacted vegetation between the road and brick wall. The aircraft came to rest after it swung through approximately 90°.

The pilot and passenger did not sustain any injury during the impact sequence.

## Probable Cause

Unsuccessful forced landing after the engine failed to produce sufficient power during the flight.

Contributory Factors
Spring steel roller pin failure on the idle control lever prevented input to the fuel Injector.

| | | | |
|---|---|---|---|
| IARC Date | | Release Date | |

# AIRCRAFT ACCIDENT REPORT

**Name of Owner/Operator** :Dell G. K
**Manufacturer** :Extra Flugzeugbau GBMH
**Model** :Extra 300 L
**Nationality** :South African
**Registration Marks** :ZS-CPC
**Place** :Gravel road near Kitty Hawk aerodrome
**Date** :22 January 2009
**Time** :1500Z

*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:**



## 1. FACTUAL INFORMATION

### 1.1 History of Flight

1.1.1 The pilot accompanied by a passenger was engaged on a private flight from Kitty Hawk aerodromeat approximately 1450Zto the general flying area (GFA). The pilot stated that after a flight of approximately 10 minutes, he decided to return to Kitty Hawk. During the downwind leg, he reduced the power, but as he attempted to increase power on the base leg, the engine failed to respond and to produce power. The electrical fuel pump was selected on for landing and the propeller at full fine. The fuel selector was still selected to the centre tank that is in fact the main tank on the aircraft type. Although he adjusted the mixture setting, this had little effect to increase the engine power as required.

1.1.2 Due to the remaining distance to Runway 01 at Kitty Hawk was too far to reach, the pilot was committed to carry out a forced landing on a gravel road after he cleared obstacles such as power lines and telephone wires. The aircraft landed heavily on the gravel road between a brick wall and telephone wires. The left landing gear separated from the aircraft during the impact sequence causing the aircraft to veer to the left. Both the left and right-hand wing impacted vegetation between the road and brick wall causing the aircraft to swing through approximately 90° before it came to rest against the brick wall.

1.1.3 The pilot and passenger did not sustain any injury during the impact sequence.

## 1.2 Injuries to Persons

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

## 1.3 Damage to Aircraft

1.3 The aircraft was substantially damaged during the impact sequence.

**FIGURE 1, SHOWS THE WRECKAGE IN VEGETATION AGAINST THE WALL**

## 1.4 Other Damage

1.1.4 The brick wall sustained only minor damage during the impact sequence.

## 1.5 Personnel Information

| | | | | | |
|---|---|---|---|---|---|
| Nationality | South African | Gender | Male | Age | 46 |
| Licence Number | 0270088073 | Licence Type | ATP | | |
| Licence valid | Yes | Type Endorsed | Yes | | |
| Ratings | Designated Examiner, Instructor Grade 1, Test Pilot Class 2 and Instrument Rating. | | | | |
| Medical Expiry Date | 31 July 2009 | | | | |
| Restrictions | None | | | | |
| Previous Accidents | CA18/2/3/7974 | | | | |

Flying Experience:

| | |
|---|---|
| Total Hours | 25 000.00 |
| Total Past 90 Days | 57.00 |
| Total on Type Past 90 Days | 6.00 |
| Total on Type | 254.30 |

## 1.6 Aircraft Information

1.6.1 Airframe**:**

| | | |
|---|---|---|
| Type | Extra 300 L | |
| Serial Number | 023 | |
| Manufacturer | Extra Flugzeugbau GBMH | |
| Date of Manufacture | 1996 | |
| Total Airframe Hours (At time of Accident) | 468.00 | |
| Last MPI (Date & Hours) | 06 October 2008 | 461.90 |
| Hours since Last MPI | 6.10 | |
| C of A (Issue Date) | 31 March 2005 | |
| C of R (Issue Date) (Present owner) | 13 December 2004 | |
| Operating Categories | Standard | |

1.6.2 Engine:

| | |
|---|---|
| Type | Lycoming AEIO-540-L1B5 |
| Serial Number | L-25770-48 A |
| Hours since New | 468.0 |
| Hours since Overhaul | 172.2 |

1.6.3 Propeller:

| | |
|---|---|
| Type | M.T.Propeller MTV-9-B-C |
| Serial Number | 96025 |
| Hours since New | 468.00 |
| Hours since Overhaul | 171.3 |

1.6.4 The owner/pilot operated the aircraft in the recreational operating category. The pilot carried out a pre-flight inspection prior to the flight and found the aircraft to be in a serviceable condition. All aircraft systems were functioning satisfactory and the pilot did not report any defect or malfunction.

1.6.5 Engine Failure Defect: The pilot reported that after he reduced the power on downwind,the engine failed to respond to throttle settings, especially when he attempted to increase the engine power. The aircraft eventually could not maintain altitude and the pilot was committed to execute a forced landing on gravel road.

1.6.6 In order to determine what could have caused the engine not to respond after he reduced the throttle setting, theaircraft including theengine maintenance records were reviewed. According to the maintenance records, the following information was noted:

(i) According to the airframe logbook, the engine was installed on the aircraft on 31 March 2006 at a total of 379.00 engine hours since new.The engine was then subjected to two mandatory periodic inspections (MPI′s) on 29 July 2007 at 424.7 hours and on 06 October 2008 at461.9 hours respectively.

(ii) According to available documentation, the fuel injector serial number 70116001 was partially dismantled, cleaned, inspected and repaired in accordance Manual Form 15-433d, Rev. 1.9.94 on 18 May 2006 and bench tested at an Engine Overhaul Facility.

(iii) On 26 April 2007, an AMO removed the fuel injector, serial number 70116001 and flow divider serial number 0116401 from the engine. The components were then flow checked, nozzles cleaned and flow checked and installed back onto the engine. The Bulletin status and settings were not disturbed and the components tested on a ground run and found satisfactory in all respects.

1.6.7 Engine Accessory Component Defect: During the engine examination,it was established that the engine was malfunctioning due to the Precision Air motive RS & RSA Fuel Metering System/Fuel Injector, Model: RSA – 10AD1, Part Number 2524318-10, serial number 70116001 spring steel rolled locking pin on the fuel injector had subsequently failed (fractured) during operation and prevented furtherthrottle lever input of the fuel injection system.

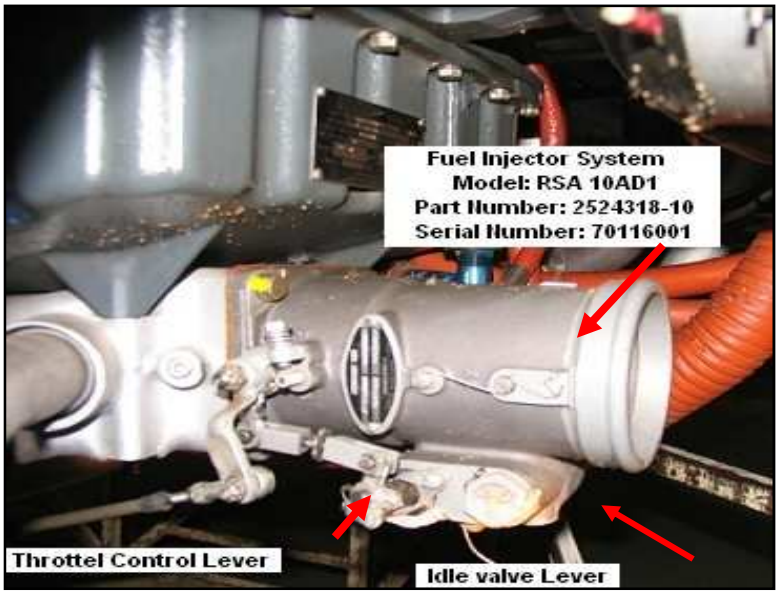


**FIGURE 2: SHOWS THE FUEL INJECTOR INSTALLED TO THE ENGINE**

1.6.7.1 The Maintenance History of the engine fuel components were reviewed in order to determine if there was some evidence ofwhat may have been the cause of theapplicable component becoming defective. The maintenance records showed that the following maintenance was carried out:

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(i) To comply with airworthiness directive (AD 2009-02-03) requirements, the component was taken to a component overhaul facility for maintenance during the last MPI. The responsible AMO issued a certificate relating to maintenance of an aircraft (CRMA), stating that the Fuel Metering System/Fuel Injector was removed from the engine for fuel flow check maintenance purposes.

(ii) The component total time since new (TTSN) was 461.9 hours at the time.

(iii) The maintenance carried out were nozzles cleaning and flow check performed on the flow divider and fuel injector. After the maintenance was completed, the component was tested and found to be satisfactory in all respects.

(iv) The components were re-fitted on the engine, followed by a ground run and it was then certified serviceable on 26 April 2007.

1.6.8 Component – Part Failure: During the Fuel Metering System/Fuel Injector System investigation, it was established that the spring steel rolled locking pin had failed/fractured during normal throttle operation.

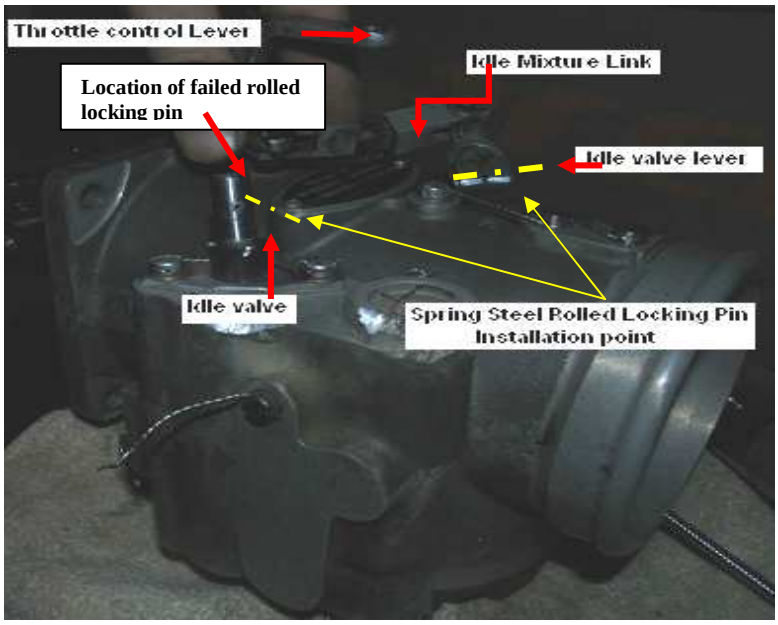


**Figure 3: shows location of spring steel rolled locking pin installation point on fuel injector**

**FIGURE 4: SHOWS THE SPRING STEEL ROLLED LOCKING PIN FAILURE**

1.6.8.1 In order to assist in determining the cause of the spring rolled locking pin failure/fractured, the identified part maintenance records were reviewed. The maintenance carried out was as follows:

(i) The spring rolled pin was installed during maintenance after a similar incident

occurred at an air show. The aircraft was reported to have executed a successful forced landing at the time.

(ii) The spring rolled pin (figure 4above) indicated that the spring rolled locking pin started to fracture for some time and eventually fractured when the pilot reduced the throttle setting prior to the accident.

1.6.9 Fuel Status: The aircraft is classified as an aerobatic type aircraft and the main fuel tank is actually the centre tank with a capacity of 75 litres. The aircraft departed from Kitty Hawk Airfield with 60 litres of Aviation Gasoline (Avgas). The fuel remaining on board the aircraft was approximately 45 litres that was sufficient for the planned flight.

## 1.7 Meteorological Information

1.7.1 The weather information in the column below was obtained by the pilot's questionnaire

| | | | | | |
|---|---|---|---|---|---|
| Wind direction | 360° | Wind speed | 05 kt | Visibility | 10 km |
| Temperature | 23° | Cloud cover | CAVOK | Cloud base | CAVOK |
| Dew point | unknown | | | | |

## 1.8 Aids to Navigation

1.8.1The aircraft was fitted with standard navigation equipment which was approved for the type. Other additional navigation equipment installed was included on the approved equipment list. The pilot reported that all the navigation equipment was serviceable prior and during the flight.

## 1.9 Communications.

1.9.1 The aircraft was operated in an uncontrolled airspace. The pilot was required to broadcast his intentions on VHF frequency 120.65 MHz in the area. The aircraft had a Becker GS 2000 type VHF radio communication equipment installed. The radio communication equipment was found to be in a serviceable condition.

## 1.10 Aerodrome Information

1.10.1 The location of the accident site during the forced landing was on a short gravel road outside Kitty Hawk aerodrome boundary. The wreckage was located at GPS co-ordinates: S25˚52.190 E028˚26.380 and elevation was 4637 feet above ground level (AGL).

## 1.11 Flight Recorders

1.11.1 The aircraft was not equipped with a Flight Data Recorder (FDR) or a Cockpit Voice Recorder (CVR), nor was it required by regulation.

## 1.12 Wreckage and Impact Information

1.12.1 The aircraft approached Kitty Hawk aerodromein a northerly direction with the intention to land on RWY 01whenthe engine failed to produce power after he reduced the power. He was then committed to execute a forced landing on a gravel road after he cleared obstacles such as power lines and telephone lines in his flight path ona heading of 37.18 degrees on the north-westerly side of Kitty Hawk aerodrome. The location of the accident side was approximately 0.53 nautical miles away from the threshold of RWY01.

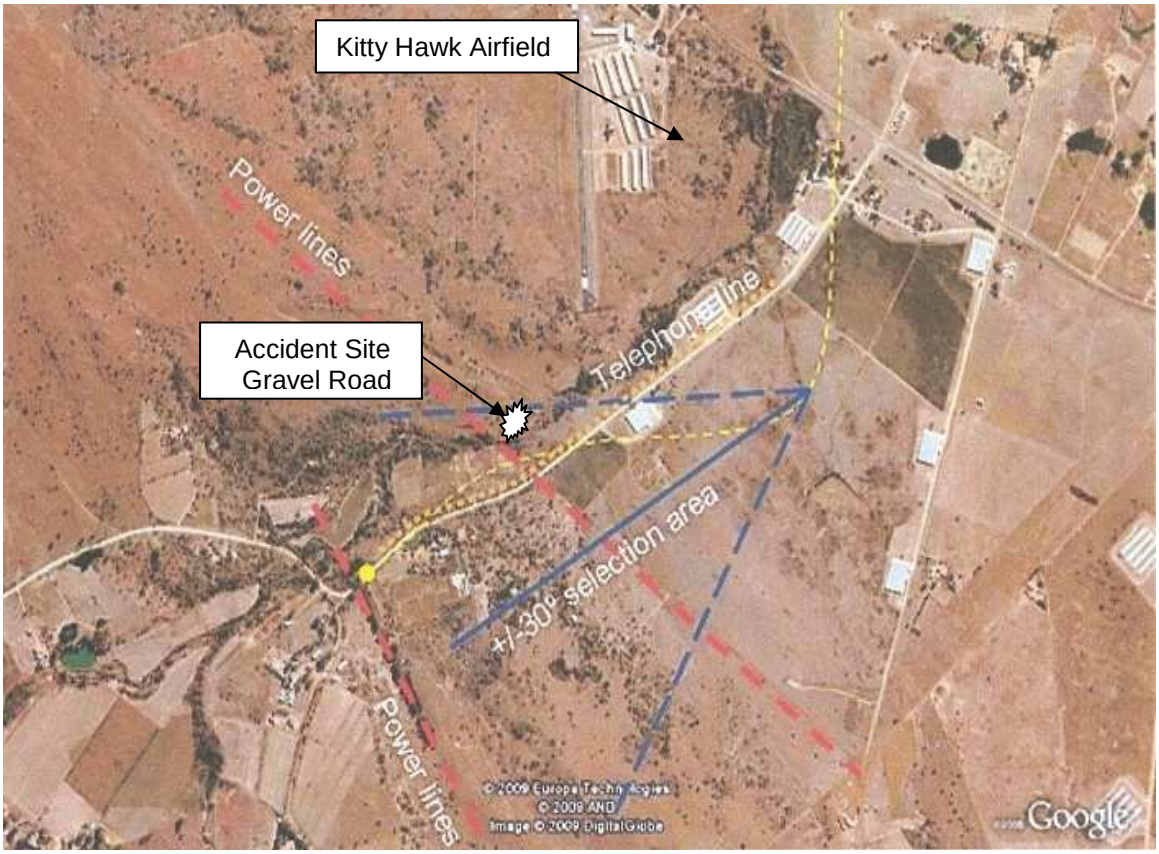


Figure 5, shows location of accident site, airfield and obstacles.

1.12.2 The aircraft landed heavily onto the gravel road during the forced landing causing the left main landing gear to separate from the aircraft during the impact sequence. The aircraft then skiddedon the gravel road causing a ground scrape mark of approximately 30 metres on the gravel road. The aircraft subsequently veered the left andboth wings impacted vegetation at the left side of the road. The aircraft eventually came to a rest approximately 100 to 150 metres down the road from where it touched down. The aircraft came to rest with its nose against a brick wall, facing 90 degrees with the road.

Figure 6 & 7, shows the ground scrape marks and wreckage facing at an angle of 90 degrees against the brick wall.

1.12.3 The aircraft sustained substantial ground impact damage in the accident. The notable damage caused to the undercarriage, wings and propeller.

Figure 8 & 9, shows extent of damage caused to the wings.

Figure 10, shows extend of damage caused to Propeller

## 1.13 Medical and Pathological Information

1.13.1 None.

## 1.14 Fire

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

## 1.15 Survival Aspects

1.15.1 The accident took place on a gravel road between a brick wall on the left and power lines and telephone lines on the right. The emergency services rendered no assistance after the accident occurred. The accident was considered survivable, as the damage caused to the cockpit/cabin area of the aircraft was of such a nature that no injury was inflicted to both occupants.

1.15.2 The pilot and passenger were properly secured by the shoulder harnesses equipped on the aircraft.

## 1.16 Tests and Research

1.16.1 The engine of the aircraft was examined during the investigation to determine that all engine systems were intact and in a serviceable condition. There was no anomaly related to the operation of the engine, other than the fuel injector component lever attachment steel roller pin that fractured which contributedto the loss of power.

1.16.2 The fuel injector component was removed from the wreckage for examination and taken to a component overhaul facility to assist with the examination. The fuel injector component was first visually inspected for notable damage and found in a satisfactorily condition. The fuel injector was then functional tested as per applicable manufactures requirements. The results of the test bench indicated that the fuel injector was serviceable prior to the accident.

1.16.3 Evidence showed that the spring steel roller pin fractured at the idle control lever attachment. The fractures pieces of spring steel roller pin was then removed from the idle control lever installation and visually inspected. According to the type of failure, the spring steel roller pin started to fracture during operation some time ago and finally fractured when the pilot reduced the setting on the throttle lever. The evidence found indicated the following:

(i) The spring steel roller pin was installed before to the clamping securing screw was tightened.

(ii) The tightening of the clamp screw caused that the idle control lever hole to exert pressure on the roll pin which eventually resulted in it being deformed.

(iii) Due to the stress pressure exerted on the roller pin it developed hair thin cracks and after some time it eventually failed.

## 1.17 Organizational and Management Information

1.17.1 The owner/pilot normally operated the aircraft mainly on aerobatic operations in air show or other commercial competitions. He flew the aircraft on a private flight on the day of the accident. As such he was not required to issue the passenger with a ticket for the flight. There was no anomaly identified with the owner/pilot management and organisation role of the aircraft which may have contributed in the accident.

1.17.2 The aircraft was maintained by an approved aircraft maintenance organisation (AMO).The AMO was authorised to conduct maintenance on the type. The AMO complied with the aircraft manufacture maintenance requirements and also complied with applicable regulation ensuring that the aircraft is serviceable and airworthy. There was no anomaly identified with the management and organisation of the AMO which may have contributed in the accident.

1.17.3 The AMO who conducted maintenance on the aircraft prior to the accident was not involved with the maintenance installation of the fuel injector component and/or spring steel roller pin.

## 1.18 Additional Information

1.18.1 The pilot was accompanied by a passenger on the flight. The passenger submitted a statement which was found to correlate with that of the pilot; however, the passenger did say that the pilot executed aerobatic (e.g. loops, stall turns, a hammerhead, inverted flying, slow and quick rolls etc.) manoeuvres with the aircraft during the flight. The passenger then heard the pilot saying to him at the time of the engine problem: “We have a problem, we have a problem!” After 3 to 5 seconds, the passenger saw trees tops appearing but higher than the aircraft, followed by a sudden hard bump. The passenger could not see the ground from where he was seated in the aircraft, but felt the left wing struck an object and as a result the aircraft yawed to the left over bushes. When the aircraft came to a halt, the pilot and passenger evacuated the aircraft.

## 1.19 Useful or Effective Investigation Techniques

1.19.1 None.

## 2. ANALYSIS

2.1 The pilot accompanied by a passenger departed Kitty Hawk aerodrome on a private local flight in the general flying area. The take off from Kitty Hawk was uneventful and after flying for approximately 10 minutes, the pilot joined the circuit for a right downwind for landing onto Runway 01. During the downwind leg he reduced the powerand was turning on base leg for approach for landing onRunway 01. During the base leg, he attempted to increase power but the engine failed to respond to throttle demand. Although he adjusted the mixture setting, this had no effect on the engine power.

2.2 As the pilot was unable to remain airborne and to reach Kitty Hawk safely, he was committed to carry out a forced landing on a gravel road after he cleared power lines and telephone wires obstacles in his flight path. The aircraft landed heavily on the gravel road between a brick wall on the left and telephone wires on the right. The left landing gear separated from the aircraft during the impact sequence causing the aircraft to veer to the left.

2.3 The forced landing was unsuccessful due to the fact that the aircraft landed heavily on the gravel road. Following the hard landing, the left main landing gear separated during the impact sequence. The aircraft skidded for approximately 30 metresfinally swung through 90℃to the left and impacted vegetatio n and the brick wall before it came rest.

2.4The wreckage was recovered to Kitty Hawk aerodrome. The engine was examined to determine the cause of the engine power problem. It was established that the fuel injector idle control lever, spring steel roller pin had fractured/sheared at the idle control lever position causing outer end of the control shaft to rotate freely around the shaft with no input to the fuel injector when a demand of power was required. The engine subsequently remained at idle power

2.5 The fuel injector was removed from the engine for further examination. The fuel injector was tested on a test bench and found serviceable in all respects. The maintenance documentation of the aircraft was reviewed during the investigation to determine if improper maintenance could have caused the fuel Injector spring steel roller pin to fail.It was established that the fuel injector was maintained properly in accordance with manufacturer's requirement and regulations.

2.6Pieces of spring steel roller pin were removed from the idle control lever and control shaft for examination. It was established that the spring steel roller pin was installed before to the clamping screw was tightened. The investigator is of the opinion that the clamping was done to facilitate proper positioning of the roller pin in the hole of the control shaft. The tightening of the clamp screw caused the idle control lever hole to exert pressure on the roll pin which eventually resulted in it being deformed. Due to the noticeable stress pressure exerted on the roller pin it eventually developed hair thin cracks and started to fracture.

# 3. CONCLUSION

## 3.1 Findings

3.1.1 The pilot had a valid Airline Transport Pilot License (ATPL). The aircraft type rating was endorsed on his license.

3.1.2 The pilot had a valid aviation medical certificate with no waivers. He did not have any medical condition which may have prevented him from flying the aircraft on the day.

3.1.3 The pilot accompanied by a passenger flew the aircraft on a private flight under visual flight rules (VFR) by day.

3.1.4 The pilot performed a pre-flight inspection and he was satisfied with the condition of the aircraft hence the decision to continue with the flight.

3.1.5 The private flight in the general flying area (GFA)thatlasted approximately 10 minutes was uneventful until during the approach for landing back at Kitty Hawk when the enginethrottle movement failed to produce sufficient power.

3.1.6 The pilot was committed to a forced landing but it unsuccessful when the aircraft landed heavily on the gravel road causing the left main landing gear to separate from the aircraft during the impact sequence and the aircraft sustained substantial damage.

3.1.7 The wreckage was recovered to Kitty Hawk aerodrome for further examination to determine the cause of the throttle movement problem.

3.1.8 During the engine examination, the Fuel Management System/Fuel Injector was tested and found satisfactory. However evidence showed that the spring steel roller pin fractured at the idle control lever attachment. The fractures pieces of spring steel roller pin was then removed from the idle control lever installation and visually inspected. According to the type of failure, the spring steel roller pin started to fracture due to fatigue during operation some time ago and finally fractured when the pilot reduced the setting on the throttle lever.

3.1.9 The maintenance documentation of the aircraft was reviewed during the investigation to determine if there was any evidence of improper maintenance that attributed to the engine throttle lever movement, fuel Injector malfunctioning and/or spring steel roller pin failure. None were found.

3.1.10 The aircraft was maintained by an approved aircraft maintenance organisation (AMO). The AMO was appropriately rated to carry out maintenance on the aircraft type.

### 3.2 Probable Cause:

3.2.1 Unsuccessful forced landing after the engine failed to produce sufficient power during flight.

### 3.3 Contributory Factors:

3.3.1 Spring steel roller pin fractured on the idle control lever prevented input to fuel Injector on power demand.

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## 4. SAFETY RECOMMENDATIONS

4.1 None

## 5. APPENDICES

5.1 No appendices attached to this report.

Compiled by:

Jeremiah Visser
..... Date: ……..
**For: Director of Civil Aviation**

Investigator-in-charge: ……. Date: ……..

Co-Investigator: ……..……. Date: ……