



AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/9011	
Aircraft Registration	ZS-NLR	Date of Accident	6 February 2012		Time of Accident	1605Z
Type of Aircraft	Dromader PZL-M18A		Type of Operation		Other Aerial Work	
Pilot-in-command Licence Type		Commercial Pilot	Age	68	Licence Valid	Yes
Pilot-in-command Flying Experience		Total Flying Hours	15 515,6		Hours on Type	1 800,0
Last point of departure		Pearly Beach aerodrome, (Western Cape province)				
Next point of intended landing		Andrew's aerodrome near Struisbaai, (Western Cape province)				
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)						
Farm Duinefontein in the Overberg district (GPS position; South 34°37'24.7" East 019°28'14.1")						
Meteorological Information		Surface wind: 225°/ 3kt, Temperature: 28°C, Visibility: +10 km				
Number of people on board	1 + 0	No. of people injured	1	No. of people killed	0	
Synopsis						
<p>On 6 February 2012, four aircraft were based at Pearly Beach aerodrome near Gansbaai and were on standby at the aerodrome to be utilized in fire-fighting operations. During the course of the morning they conducted several flights, dropping water on raging fires in the area. They remained on standby until approximately 1545Z when they were released to return to Andrew's aerodrome near Struisbaai, which was their home base. Bomber 13 took off first and was followed by Spotter 7, who circled overhead the aerodrome waiting for Bomber 9 to take-off. The last aircraft to depart was a helicopter which waited for the fixed wing aircraft to depart first. The helicopter pilot observed Bomber 9 accelerate down runway 30 and approximately three quarters down the runway the aircraft became airborne. Shortly thereafter the aircraft sank back towards the runway, touching down on the right main wheel where after it rotated back into the air, followed by a steep roll to the right. The pilot was unable to correct the aircraft attitude prior to the right wing making contact with indigenous vegetation, followed by ground impact. The helicopter pilot then flew across to the accident site and broadcast a Mayday call to Spotter 7 and Bomber 13 informing them that Bomber 9 had crashed. The pilot of the accident aircraft managed to exit the aircraft unassisted. Emergency personnel responded quickly and paramedics attended to the pilot on the scene where after he was airlifted to a private hospital in Hermanus where he was kept overnight under observation.</p>						
Probable Cause						
<p>Due to limited control stick movement in the lateral plane, induced by the control stick locking mechanism that made contact with the control stick during take-off the aircraft rolled to the right on take-off, followed by ground impact.</p> <p>Contributory factor: Inadequate pre-flight inspection.</p>						
IARC Date				Release Date		
CA 12-12a		25 MAY 2010		Page 1 of 18		



AIRCRAFT ACCIDENT REPORT

Name of Owner : FFA Assets (Pty) Ltd
Name of Operator : Working on Fire
Manufacturer : Polskie Zaklady Lotnicze (PZL) - Mielec
Model : Dromader M18A
Nationality : South African
Registration Marks : ZS-NLR
Place : Farm Duinefontein, Overberg district
Date : 6 February 2012
Time : 1605Z

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:

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1. FACTUAL INFORMATION

1.1 History of Flight

1.1.1 Four aircrafts were being utilized in a fire-fighting operation on 6 February 2012 and were based for the day at the Pearly Beach aerodrome in the Overberg district near Gansbaai. The aircraft ZS-NLR, which was flying under the call sign, Bomber 9, was one of the aircraft. During the course of the morning all the aircraft were dispatched and water were dropped on raging fires in the area. After returning from each flight the fire-bombing aircraft was refuelled and approximately 1 700 litres of water was uplifted into the hopper tank of Bomber 9 after its last flight.

1.1.2. The aircraft remained on standby until approximately 1545Z the afternoon. The four aircraft were then cleared to return to their home base, which was at Andrew's aerodrome near Struisbaai. En route to their home base they were requested to drop their last load of water on a smouldering fire that they had fought the previous day. The aircraft, Bomber 9 was number three for take-off, with a helicopter still on the ground, waiting for the three fixed wing aircraft to depart.

1.1.3 According to the helicopter pilot, he observed the aircraft taking off and noted Bomber 9 accelerates along runway 30. Approximately three quarters down the runway the aircraft became airborne. However, shortly thereafter, the aircraft sank back towards the runway, touching down on the right main wheel – with a puff of smoke as the tyre touched the runway. The aircraft then rotated back into the air, followed by a steep roll to the right, just clearing the power lines that ran parallel to the runway at a height of approximately 15 feet above ground level (AGL).

The pilot further states that he was surprised at the angle at which the aircraft was climbing out and wondered by himself why the pilot of Bomber 9 did not dump the load, as a fully laden Dromader would normally need to climb straight ahead to gain altitude. As the aircraft continued on its right arch, he realized that an accident was imminent. Seconds later there was the inevitable bang and a cloud of dust.

He immediately embarked into his helicopter and became airborne as soon as possible and called Mayday, advising Spotter 7 and Bomber 13 that Bomber 9 had crashed. Ground support personnel responded to the scene by road. Once airborne he flew overhead the wreckage to ascertain whether the pilot of Bomber 9 was still in the cockpit and the possibility of a post-impact fire. The pilot of Bomber 9 then disembarked from the cockpit. The helicopter pilot landed as close as possible to the scene, and advised the other aircraft that the pilot of Bomber 9 appeared to be fine. Once on the ground he performed a physical check on the pilot. Apart from bleeding to his face he had no other serious injuries. He then escorted him to the helicopter where they waited for paramedics to arrive. Following their assessment, the pilot was flown by helicopter to a private hospital in Hermanus.

1.1.4 The pilot that was flying ZS-NLR (Bomber 9) description of the occurrence was as follows:

"I was doing fire fighting operations from Pearly Beach aerodrome on 06-02-2012 and on the last take-off I found the control stick not able to move in the lateral plane.

As the aircraft left the ground it started rolling to the right. When trying to move the stick to the left it was stuck and wouldn't move to the left. With the aircraft rolling to the right I pulled up as there were wires next to the runway and I was trying to avoid that. On pulling up the aircraft kept on rolling to the right and I applied full left rudder to try and stop the roll, to no avail. As I looked down I saw the control stick lock has moved back and that the control stick was moving against it. At that moment I released the pressure on the left rudder to kick the control lock away but the aircraft struck the ground at that moment, right wing low, and crashed."

1.1.5 In a follow-up interview with the pilot two days after the accident he could recall that the aircraft lifted off and then shortly thereafter sank back onto the runway with the right main wheel making contact with the surface where it became airborne and started to bank to the right. Whilst his attention was focused on the take-off, looking outside, he was not able to recall observing the control lock mechanism making contact with the control stick as you need to physically look down into the cockpit to make such an observation. It was only when he eventually looked down in the cockpit that he saw the control stick locking mechanism jammed on the left of the control stick.

1.1.6 The pilot was wearing a pilot flying suit and helmet. He suffered from a severe blow to the right of his head, which shattered his helmet. It is believed that the helmet assist in saving his life, preventing him from sustaining severe head injuries. He was attended on scene by paramedics as he was bleeding from his face. It was decided that he should be taken to hospital for a detailed check up and was flown by helicopter to a private hospital in Hermanus where he underwent a series of tests and X-rays.

1.1.7 The accident occurred during daylight conditions at a geographical position that was determined to be South 34°37'24.7" East 019°28'14.1 " at an elevation of approximately 42 ft above mean sea level (AMSL).

1.2 Injuries to Persons

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

1.3 Damage to Aircraft

1.3.1 The aircraft was extensively damaged during the impact sequence.



Figure 1. A view of the wreckage with the engine and propeller ripped off.

1.4 Other Damage

1.4.1 Apart from some damage being caused to indigenous vegetation no other damage was caused.

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	68
Licence number	0270047087	Licence type	Commercial		
Licence valid	Yes	Type endorsed	Yes		
Ratings	Agricultural rating				
Medical expiry date	30 November 2012				
Restrictions	Must wear corrective lenses, Hypertension protocol				

Flying Experience:

Total hours	15 515,6
Total past 90-days	16,4
Total on type past 90-days	16,4
Total on type	1 800,0

During an interview with the pilot two days after the accident he indicated that he was not fatigued at the time of the accident flight. He was well familiar with this type of operation and from a nutritional perspective he had a well balanced breakfast that morning. He also took along with him for the day; sandwiches, fruits, coffee and water, which he was able to consume at his leisure throughout the day. He had flown a total of 1,1 hours during the course of the morning. According to available records he had not flown the day before the accident but had flown 3,3 hours on the 4th of February 2012. Prior to that his last flight was on 14 January 2012.

1.6 Aircraft Information

The Dromader PZL-M18A is a low wing aircraft equipped with a single radial piston engine. It is primarily utilized in the agricultural and fire-fighting environment.



Figure 2. A photo of the aircraft ZS-NLR taken some time prior to the accident.

Airframe:

Type	Dromader PZL-M18A	
Serial number	1Z014-18	
Manufacturer	Polskie Zaklady Lotnicze (PZL) - Mielec	
Year of manufacture	1990	
Total airframe hours (At time of Accident)	2 050,0	
Last MPI (hours & date)	2 021,4	6 September 2011
Hours since last MPI	28,6	
C of A (Issue date)	13 July 2005	
C of A (Expiry date)	12 July 2012	
C of R (Issue date) (Present owner)	25 March 2009	
Operating categories	Restricted Part 137	

Engine:

Type	Kalisz ASZ-62IR-M18
Serial number	K180426180D
Hours since new	1 768,7
Hours since overhaul	186,7

Propeller:

Type	Hamilton Standard 23E50
Serial number	MFGFA 4045
Hours since new	Unknown
Hours since overhaul	195,7

1.7 Meteorological Information

1.7.1 Weather information was obtained from the pilot's questionnaire.

Wind direction	225°	Wind speed	3 kt	Visibility	+10 km
Temperature	28°C	Cloud cover	None	Cloud base	None
Dew point	unknown				

1.8 Aids to Navigation

1.8.1 The aircraft was equipped with standard navigational equipment approved for the aircraft type.

1.9 Communication

1.9.1 The aircraft was equipped with a VHF radio that was serviceable at the time of the flight.

1.10 Aerodrome Information

1.10.1 The aircraft took-off from Pearly Beach aerodrome, which was an unlicensed aerodrome located approximately 20 km to the east of Gansbaai in the Western Cape province. The pilot had conducted several landings and take-offs from the aerodrome during the course of the past few days prior to the accident flight.

Aerodrome location	Pearly Beach aerodrome	
Aerodrome co-ordinates	S 34°37'50.32" E 019°28'36.6 4"	
Aerodrome elevation	49 ft	
Runway designations	12/30	
Runway dimensions	800 x 8 m	
Runway used	30	
Runway surface	Asphalt	
Approach facilities	None	
Aerodrome status	Unlicensed	



Figure 3. Photo was taken from the threshold of runway 30 in the direction of take-off.

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 to be fitted to this type of aircraft in accordance with the regulations.

1.12 Wreckage and Impact Information

1.12.1 The aircraft took-off from runway 30 at Pearly Beach aerodrome. The aircraft first impacted with indigenous vegetation in a right wing low attitude approximately 805 m from the threshold of runway 12 in a northerly direction.

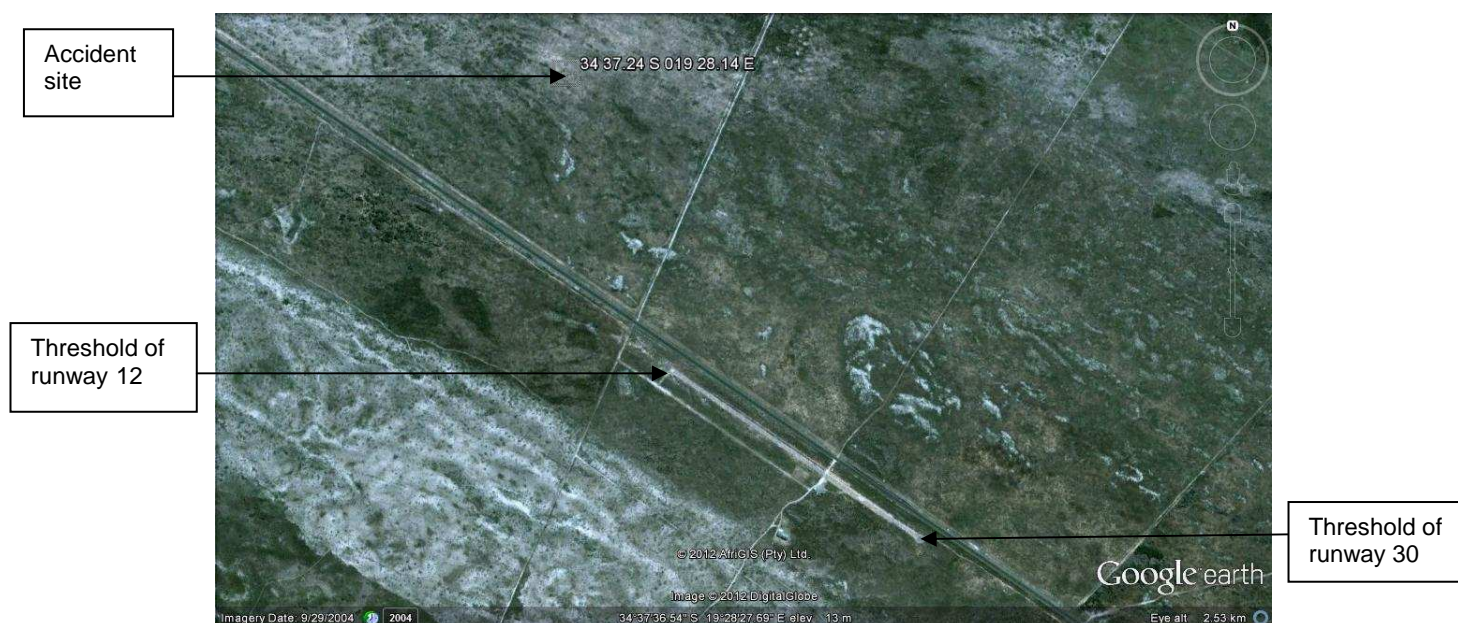


Figure 4. The Google Earth map indicates the accident site in relation to the runway (point of departure).

Approximately 30 m after the first point of impact the propeller struck the ground. During the impact sequence the propeller and driveshaft assembly failed and the propeller assembly separated from the engine attachment and came to rest approximately 15 m further on. The engine attachments also failed in overload mode and as a result the engine was projected in the direction of impact, coming to rest approximately 90 m further on. Several pieces of the exhaust as well as the carburettor assembly were found along the impact line in the direction the engine was projected.



Figure 5. A view of the engine and the propeller respectively.

1.12.2 Following ground impact the aircraft ground looped coming to rest approximately 92 m from the first point of impact facing in a southerly direction. The undercarriage broke off and the aircraft came to rest on its lower fuselage. The aft fuselage, including the empennage were substantially damaged during the impact sequence and were found to have bent towards the right (when viewed from the aft position).



Figure 6. A photo of the right wing which was substantially deformed during the impact sequence.

1.12.3 The right wing, especially the outer section displayed evidence of ground impact and was severely deformed. Both wing structures remained attached to the airframe structure. The hopper tank which consists mainly of a glass fibre structure, located between the engine and the cockpit was found to have fractured at several places. According to the pilot, he was soaked in water that spilled from the hopper tank into the cockpit area during the impact sequence. The water in the hopper

tank was not dumped by the pilot prior to impact. The cockpit/cabin area remained intact.

1.13 Medical and Pathological Information

1.13.1 Not applicable.

1.14 Fire

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

1.15 Survival Aspects

1.15.1 The pilot was wearing a pilot's flying suit and helmet at the time of the flight. He was properly restrained by making use of the aircraft equipped four point safety harness.

1.15.2 During the impact sequence the pilot had suffered a substantial blow to the right-hand side of his head. It is believed that if he was not wearing a helmet he could have sustained serious head injuries beyond that of human tolerance. The helmet was fractured on the right-hand side as a result of the impact. The cockpit/cabin area remained intact (no distortion were noted).

1.15.3 The helicopter pilot that was the last of the four aircraft to have departed from Pearly Beach aerodrome saw the aircraft going down. He then flew to the accident site and landed as close as possible to the scene. The pilot of the accident aircraft remained conscious and exited from the wreckage un-assisted and was walking towards the helicopter. Shortly thereafter paramedics arrived on the scene and conducted an assessment on the pilot. He was bleeding from his face and it was decided to fly him by helicopter to a private hospital in Hermanus, where he underwent a series of medical tests including X-rays. He was kept overnight under observation and was discharged the following morning.

1.16 Tests and Research

1.16.1 None considered necessary.

1.17 Organizational and Management Information

1.17.1 The operator was in possession of a valid air operating certificate (AOC) that was issued by the regulating authority on 31 January 2012 with an expiry date of 6 February 2013. The aircraft was duly authorised to operate under the AOC.

1.17.2 The aircraft was maintained by an approved aircraft maintenance organisation (AMO), who was in possession of a valid AMO approval certificate.

1.18 Additional Information

1.18.1 On-site investigation

During the on-site investigation, which commenced on the morning of 8 February 2012 the investigator interviewed the pilot at the accident site where he was able to explain the accident sequence.

The control stick locking mechanism, which is a metal constructed device in a V-shape lock into the top of the control stick by means of a pin and a hole on the control stick (see figure 7). The locking mechanism is attached to the airframe at two pivot points, which is secured by a locking pin on either side. Once the control lock mechanism is disconnected from the control stick, the pilot/person performing the task then needs to rotate it downwards and forward, into the stowed position (see figures 8 and 9). The locking mechanism was equipped with a spring on the right-hand side. The sole purpose of the spring is to pull the locking mechanism into the stowed position and keep it there (see figure 10 for picture of the spring and it position). The spring that was secured to this mechanism showed signs of severe wear. Due to the V-shape of the locking mechanism it was possible to install a transponder unit in the lower cockpit area, which was done on this aircraft. When the mechanism is in the stowed position it was able to slide pass the transponder unit on both sides as can be seen in figure 8 and 9.

The control lock mechanism was designed with a build in safety device, to ensure the pilot remove the mechanism prior to flight. The design is such that it restricts the pilots hand and he or she is therefore unable to get proper hold of the control stick as displayed in figure 7.

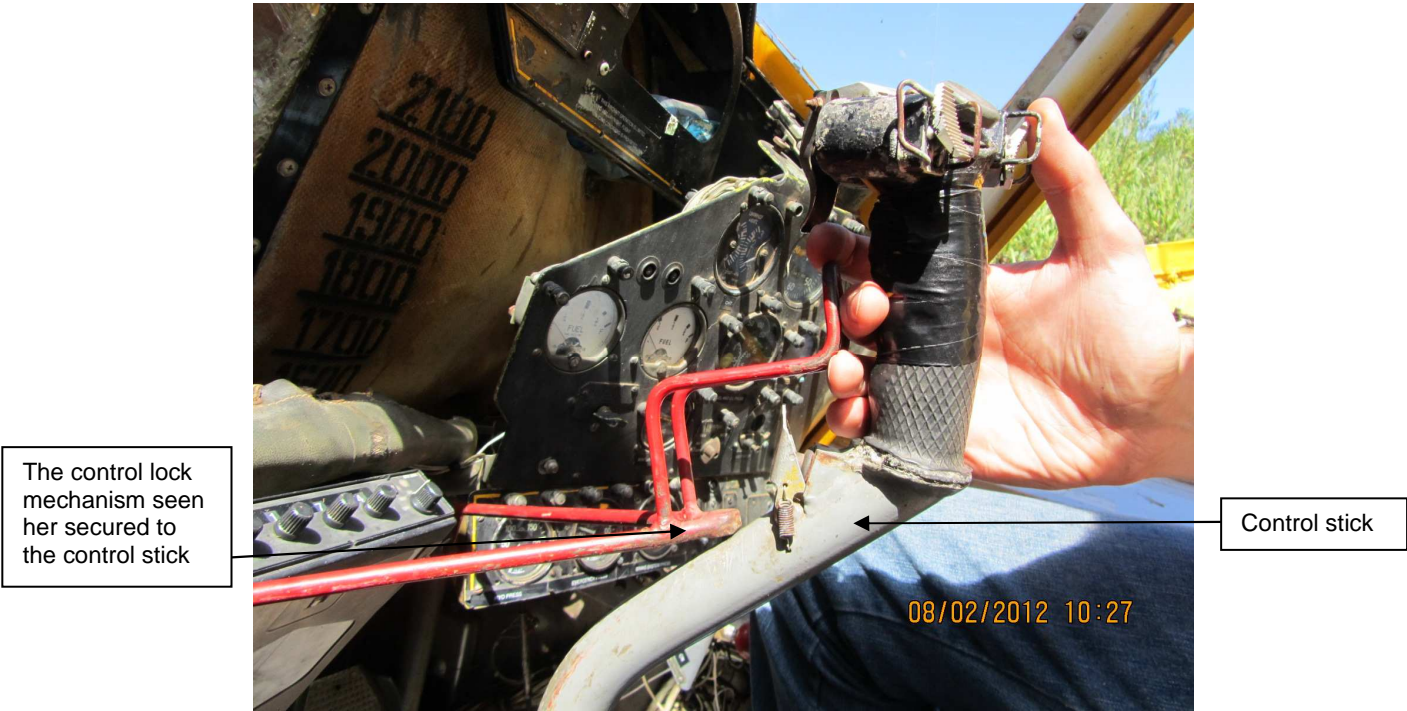


Figure 7. A photo of the control stick in the locked position with the control lock mechanism secured.



Figure 8. A photo of the control lock mechanism in the forward or “stowed” position.



Figure 9. A photo of the control lock mechanism in the forward or “stowed” position.



Figure 10. A photo of the control lock spring that assist in securing the device once unlocked.

As stated by the pilot that once he looked down into the cockpit he noticed that the control lock mechanism was jammed on the left-hand side of the control stick as can be seen in the illustration in figure 11. Due to limited lateral movement on the control stick the aircraft immediately started to roll to the right after take-off. By the time the pilot made the observation, the right wing collided with indigenous vegetation and the aircraft impacted with the ground. According to the pilot from the time the aircraft became airborne until ground impact was a matter of seconds.

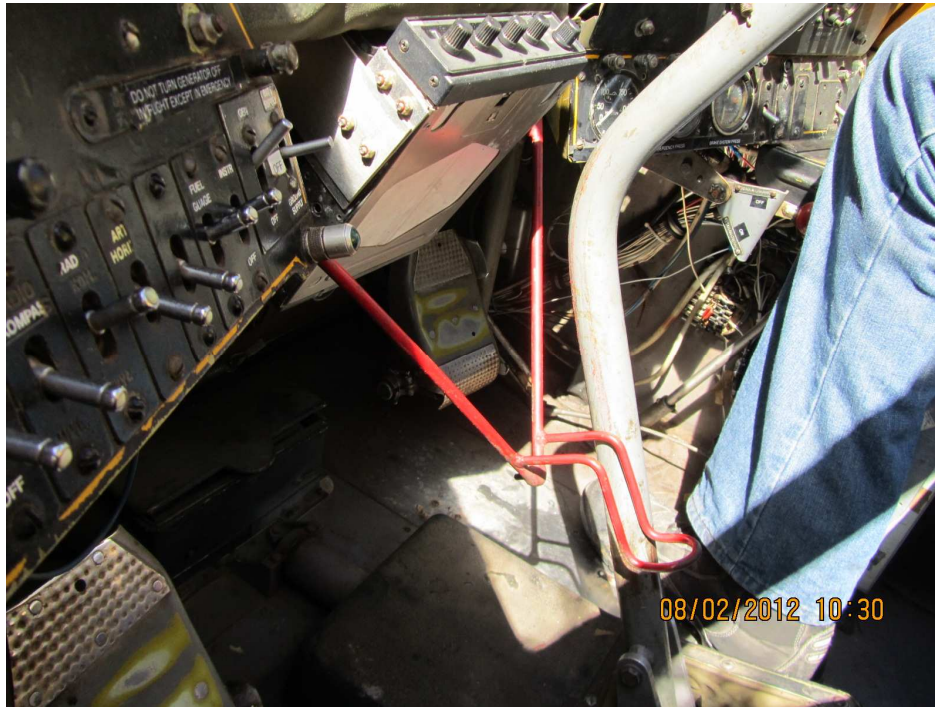


Figure 11. Photo of the control lock mechanism positioned on the left-hand side of the control stick.

1.19 Useful or Effective Investigation Techniques

1.19.1 None.

2. ANALYSIS

2.1 Pilot

The pilot was the holder of a valid commercial pilot's licence and had the aircraft type endorsed on his licence. He was well familiar with the aircraft type as well as the operational requirements associated with it. The intended flight was therefore nothing out of the norm for the pilot. During an interview with the pilot, he indicated that he was well rested and he did not fly the previous day, the probability of fatigue was not considered to have contributed to the accident. Prior to the accident flight he had flown 1,1 hours during the course of the morning, no defects or malfunctions were reported with the aircraft during this period.

The accident flight; The airborne distance, from take-off to ground impact was between 800 to 900 m. The time span to have covered this distance was most probably in the region of 20 to 30 seconds. It should be noted that at this stage of

the flight the pilot's attention was focused on the take-off, and outside observations. As he realized that he had a control related problem, he quickly glanced inside the cockpit and then observed the control lock mechanism stuck on the left-hand side on the control stick, restricting the control stick lateral movement. In an attempt to correct the situation, he had to remove his left foot from the left rudder pedal and kick the mechanism forward. Before he could take the intended corrective action, the right wing of the aircraft impacted with indigenous vegetation and crashed.

2.2 Aircraft

The fact that the control lock mechanism was able to make contact with the control stick during flight could be attributed to the fact that the control lock mechanism was most probably not adequately secured or checked in the pre-flight once the pilot had released the device from the control stick. The absence of a proper locking device to secure the control lock mechanism should be regarded as a latent shortcoming on this aircraft.

The fact that the aircraft was flown for twenty one (21) years without a similar type of problem being reported does not indicate that the method of stowing the control lock mechanism should be regarded as a failsafe design. The design incorporates a spring, for which the primary purpose is to pull the control lock mechanism down and away from the control stick once the mechanism is released by the pilot, and to keep it in the 'stowed' position during flight.

On the accident aircraft the spring was installed, however, it was found to be in an advance state of wear if compared to that of a new spring. The service life of the spring in question could not be determined as it was an on conditions item. The probability remain that the spring was never replaced since the aircraft was introduced into service, as a new aircraft.

With the spring tension below standard, it is possible that the control lock mechanism could have swung/rotated backwards (towards the control stick) and made contact with the control stick at the time when the aircraft sank back onto the runway as the right main wheel made contact with the runway surface. As the lock mechanism swung/rotated backwards it was possible to jam on the side of the control stick as displayed in figure 11 on page 15 of this report, and as explained by the pilot during the on-site investigation and in a follow-up statement.

3. CONCLUSION

3.1 Findings

- 3.1.1 The pilot was the holder of a valid commercial pilot licence and had the aircraft type endorsed in his logbook.
- 3.1.2 The pilot was the holder of a valid aviation medical certificate that was issued by a CAA accredited medical examiner.
- 3.1.3 The pilot was flying with appropriate safety gear including a helmet at the time of the accident.
- 3.1.4 Once the pilot observed the control lock mechanism jammed against the control stick there was not sufficient time in an attempt to remove it (kick is forward).
- 3.1.5 The pilot was admitted to hospital following the accident. He was kept overnight for observation and was discharged the following morning.
- 3.1.6 The aircraft was in possession of a valid Certificate of Airworthiness.
- 3.1.7 Prior to the flight the hopper tank was filled with approximately 1 700 litres of water. The pilot did not dump the hopper load prior to ground impact.
- 3.1.8 The aircraft had approximately 750 litres of fuel onboard at the time of impact.
- 3.1.9 The retaining spring that was installed on the control lock mechanism to assist in stowing the device was found to be in advance state of wear.
- 3.1.9 There was no alternate locking device installed on the control lock mechanism to ensure the device was secured when in the stowed position apart from the spring, located at the swivel point on the top right-hand side.
- 3.1.10 The aircraft collided with indigenous vegetation approximately 805 m from the threshold of runway 12.
- 3.1.11 Fine weather conditions prevailed at the time which was not considered to have had any bearing on the accident.

3.2 Probable cause/s

- 3.2.1 Due to limited control stick movement in the lateral plane, induced by the control stick locking mechanism that made contact with it on take-off, the aircraft rolled to the right, followed by ground impact.

3.3 Contributory factor:

- 3.3.1 Inadequate pre-flight inspection.

4. SAFETY RECOMMENDATIONS

- 4.1 An urgent safety recommendation was compiled following the on-site investigation, which was forwarded to the Director of Civil Aviation for his consideration, with reference to the proper stowage of the control stick locking mechanism. (see content below).

“It is recommended that the Director of Civil Aviation, in the interest of aviation safety consider the following safety recommendation as a priority in order to prevent a re-occurrence of this type of accident.

That the SACAA Airworthiness Division issues an Emergency Service Directive that will ensure that all aircraft equipped with this kind of control lock be equipped with a proper mechanism that will ensure that once the control lock had been removed from the control stick the control lock is secured and locked in such a way that it cannot be moved unless the control lock securing mechanism has been released to allow for such movement.”

5. APPENDICES

5. None.

Compiled by:

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J.P. Grobbelaar

For: Director of Civil Aviation

Date: 6 September 2012