AIRCRAFT INCIDENT SHORT REPORT

CA18/3/2/1198: ZU-BLM, Incident

Date and time	:	06 April 2018, 1101Z
Occurrence type		Incident
Aircraft registration	:	ZU-BLM
Aircraft manufacturer and model	:	Pulsair
Last Point of departure	:	Saldanha Airfield (FASD), Western Cape Province
Next point of intended landing	:	Saldanha Airfield (FASD), Western Cape Province
Location of incident site with reference to easily defined geographical points (GPS readings if possible)	:	Runway 20 (RWY20) clearway (GPS: S 32°57'48.0'' E 017°'58'12.0'')
Meteorological Information	:	FALW 061100Z VRB03KT CAVOK 19/// Q1014=
Type of operation	:	Private
Persons on board	:	1 + 1
Injuries	:	None
Damage to aircraft	:	Bent nose wheel and propeller strike.

All times given in this report is 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 (2011) 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 blame or liability.***

Disclaimer:

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SYNOPSIS

The pilot and passenger took off from Morningstar airfield at 0930Z and landed at FASD. The pilot reported that the aircraft was then parked on the sunny apron for about thirty minutes before he conducted a pre-flight check in preparation for a local flight. The pilot and passenger who was a flight instructor then proceeded with pre take off checks and taxied the aircraft to RWY20. The aircraft took off at 1100Z.

During the climb at approximately 200 feet above ground level (AGL), the aircraft engine started running rough and backfired. The aircraft engine subsequently lost power and stopped. The pilot checked the fuel pump was on and was about to change tanks when realized there was not enough time and elected to land the aircraft. The aircraft landed after the clearway bending the nose wheel and the propeller striking ground. The pilot and passenger were not injured during the forced landing sequence.

A follow up investigation revealed that the aircraft was parked in the sun after the first flight. This resulted in the fuel line being heated up and vaporizing as the engine was not fitted with a return line. This led to interruptions to the fuel flow caused by fuel vapour lock which in turn caused fuel starvation leading to engine power loss and stoppage.

1 FACTUAL INFORMATION

1.1 The pilot reported that the aircraft took off from Morningstar airfield routing direct to Saldanha (FASD) at 0930Z. The aircraft was parked in the sun on the ground for approximately thirty minutes after the flight when the pilot then performed a prefight check before taxiing short of RWY20 for run-up and pre-flight checks. The pilot then lined up on RWY20 for take-off. The aircraft took off and at about 200 feet above ground level (AGL), the aircraft engine backfired losing power and revolutions per minute (RPM). The pilot could not restore full engine power elected to land the aircraft after the clearway ahead.

1.2 The aircraft landed hard on the extended runway centre line collapsing the nose gear and the propeller struck the ground. The aircraft skidded for about 300 metres after RWY20. The two occupants were not injured during the incident sequence and disembarked the aircraft unassisted. The aircraft sustained damage to the nose wheel and propeller. The aircraft was recovered to a hangar where an Aircraft Maintenance Engineer (AME) investigated the cause of the loss in engine power.

1.3 The investigation revealed that the aircraft was parked on the sunny apron after the first flight. This resulted in the fuel line being heated up and vaporizing as the engine was not fitted with a return line. This led to interruptions to the fuel flow caused by fuel vapour lock which in turn caused fuel starvation leading to engine power loss and stoppage.

1.4 The engine manufacturer has published the following maintenance requirements applicable to the Rotax engine. (Abbreviations: SI = service instruction; SB = service bulletin; STI = service technical instruction; ASB = alert service bulletin):

(i) ASB-912-016UL fuel hose, dated 25 May 2012: requesting replacement of pressure fuel hose at pump side part no. 893114.
(ii) ASB-912-060 oil pump bolts 1, dated 26 Jan 2012: checking of pump fixing bolts for correct torque.
(iii) ASB912-059 crankshaft crack, dated 15 November 2011: checking crank power journal (power take-off side).
(iv) SB-912-052[1] governors use, dated 17 October 2008: installation/use of governor.
(v) SB-912-058-UL [1] washer on flywheel, dated 15 April 2011: replacement of washer part no. 944072(flywheel hub).
(vi) SI-912-020[1] fuel line, dated 15 April 2008 running modification on fuel line.
(vii) SI-912-014-r1 [1] non-approved spares, dated 15 April 2008: non-approved modifications or use of unapproved engine components or accessories.

1.5 The above service bulletin and service instructions were published to facilitate the safe use of the engine. There was no information recorded in the engine log book which indicated that the aircraft had complied with the servicing publications. Two of the bulletins concerned the fuel line modification (SI-912-020[1] fuel line, dated 15 April 2008) and fuel hose replacement request (ASB-912-016UL fuel hose, dated 25 May 2012) respectively. The fuel line modification (SI-912-020[1]) included the modification of the intake manifold, which required machining of the attachment for flexible fuel lines. It gave a further instruction to replace the manifold if necessary to allow for the modification. The system involved a fuel return line and rerouting of fuel lines.

1.6 **Research**

Reference: Rotax Operator's Manual 912 LSU, Chapter 7(7.2) Fuel System

Figure 1 *below shows the flow of fuel from fuel tank (1) via a coarse filter (2) the fire*

cock (3) and fine filter (4) to the mechanical fuel pump (5). From the pump, fuel passes on via the fuel manifold (6) to the two carburettors. The return-line diverts fuel flows back to the fuel tank and suction side of the fuel system.

NOTE: The return line serves to avoid formation of vapour lock.

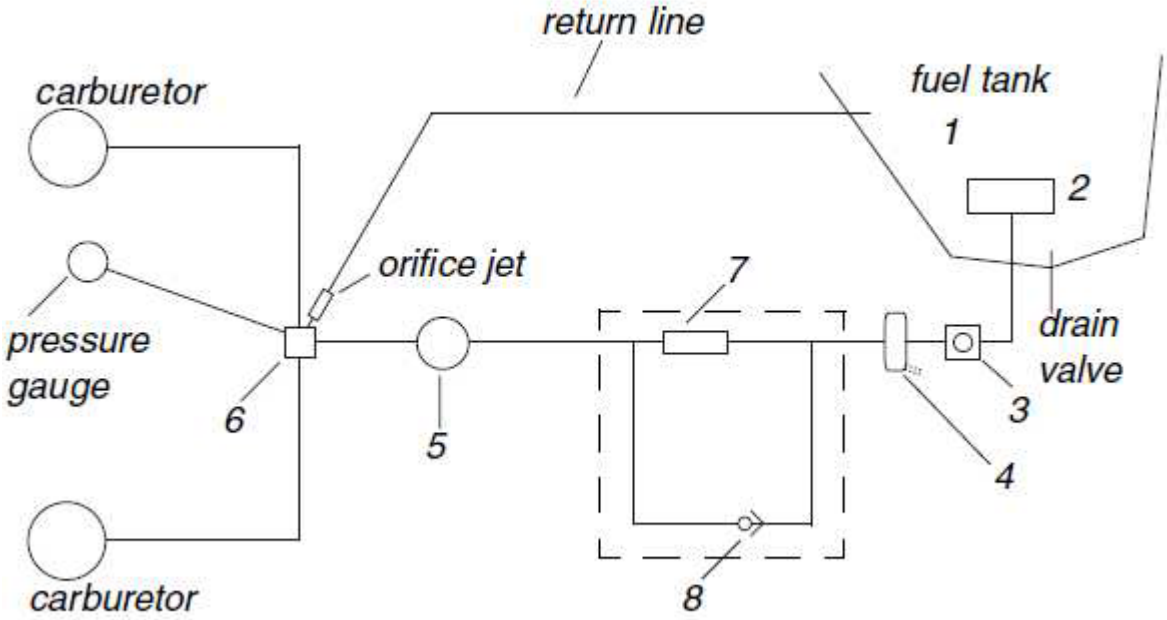

Figure 1: Shows the fuel system diagram.

Figure 2: The aircraft after recovery.

1.7 **Engine running rough**

1.7.1 Reference: Rotax 912 Series, Aircraft Engine M M, Chapter 05-50-00, p5 Rev. 3, October 1/2005

Engine failure may be caused by the failure of the ignition system, or a fault in the carburettor may be the reason (fuel supply, contamination in float chamber or float needle valve, float chamber venting, false air intake due to defective carburettor flange, engine temperature too low, too lean carburettor jetting due to conditions prevailing in intake silencer).

According to the Rotax Operator's Manual, one of the causes for rough running is a false fuel-air mixture. This occurs when the fuel pipelines are subjected to high temperature without proper insulation. The heat causes fuel to vaporise, affecting the balance of the fuel-air mixture.

4 PROBABLE CAUSE/CONTRIBUTING FACTOR

4.1 The aircraft had an unsuccessful forced landing following an inflight engine stoppage probably due to fuel starvation as a result of vapour lock in the fuel line.

5 SAFETY RECOMMENDATION

5.1 None.