

## Investigation Report.

Status: **Final**  
Date: **27 JAN 08**  
Time: **11.30 UT**  
Type: **Piper PA 18-150 (180 HP)**  
Operator: **Royal Verviers Aviation**  
Registration: **OO-OAW**  
C/N : **4828**  
msn : **18-5346**  
Manufacturing Date: **1957**  
Engine(s): **Lycoming O-360-A4P**  
Crew: **Fatality: 0 / Occupants: 1**  
Aircraft Damage : **Total Loss**  
Location: **EBTX.**  
Phase: **Landing.**  
Nature: **Aerial works, glider towing**  
Departure Airport: **EBTX**  
Destination Airport: **EBTX**  
Flight Number: **N/A**

### **Narrative:**

The aircraft OO-OAW was used for the aerotow of gliders on the airfield of Theux (EBTX) for the Royal Verviers Aviation ASBL.

The pilot performed the pre-flight check before initiating the first of the 2 towings that were planned for the day.

The pilot noticed that the LH Tank was full, and the RH Tank was nearly empty; the aircraft had been used the day before. He noticed also that the temperature and humidity indicated a possible icing condition.

The pilot performed the engine run-up, using the carburettor heating. The fuel tank selector was on "both", as per procedure.

The towing of the glider occurred normally, and the glider was released at 3000 ft. The aircraft came back to the airfield, for the release of the tow cable. This release was done at 300 ft, followed by a climb at 500 ft.

The aircraft came back in the approach circuit, and the landing configuration was set (full flaps, carburettor heating off). The aircraft was at the normal approach altitude (1000 ft) in the base leg.

Upon turning for the final approach, the pilot noticed that the aircraft was slightly too low, and wanted to increase the power; the engine did not respond to the gas lever input. The pilot checked that the carburettor heater was OFF.

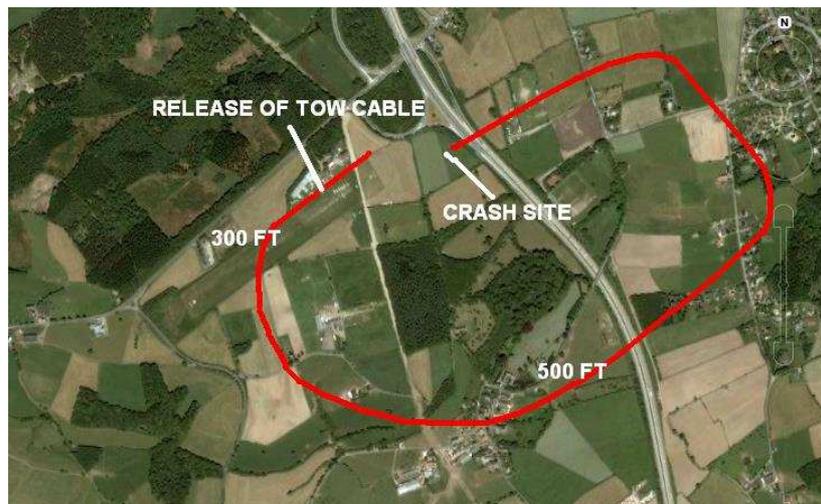
REF: AAIU (Belgium) 2008-3.

The aircraft, at that point, was going down, aiming at the tree line bordering the airfield.

The pilot tried to reduce the speed as much as possible, in the hope of going through the tree tops without too much damage.

Upon hitting the tree, the left wing hit a bigger tree trunk, and the aircraft veered to the left. All efforts of the pilot to keep the aircraft straight were unsuccessful. The aircraft rotated 180° during its fall down and crashed on the nose and undercarriage five meters behind the tree line.

The pilot broke a foot, and was hurt on his back. He exited the aircraft on his own, after cutting the fuel feed and magneto's. A member of the rescue team set the main switch to the 'off' position.



**Flight Path**

**Enquiry.**

**Pilot**

Sex: Male

Age: 55 years-old

Nationality: Belgian

Licence: PPL (A), first issued on 15/07/1976; delivered 15/01/2007, valid until 17/01/2009

The pilot had a total of 1103 FH, as Pilot in command on Single Engine aircraft, from which more than 350 FH on Piper PA-18, and 50FH on the OO-OAW. During the last 6 months, he flew 22,2 FH.

**Aircraft**

**Airframe**

Manufacturer: Piper Aircraft Corporation

Type: Piper PA-18-150

Serial Number: 18-5346

Built year: 1959

Registration: OO-OAW

Certificate of Registration: 4828

Airworthiness Inspection: Performed on 11 January 2008.

Total Flight Hours: 5829:10 FH.

TSO: 1531:10 FH

**Engine**

Manufacturer: Lycoming

Type: O-360-A4P

Serial: L-36958-36A

Power: 180HP

TT: 1305:14 FH

**Propeller**

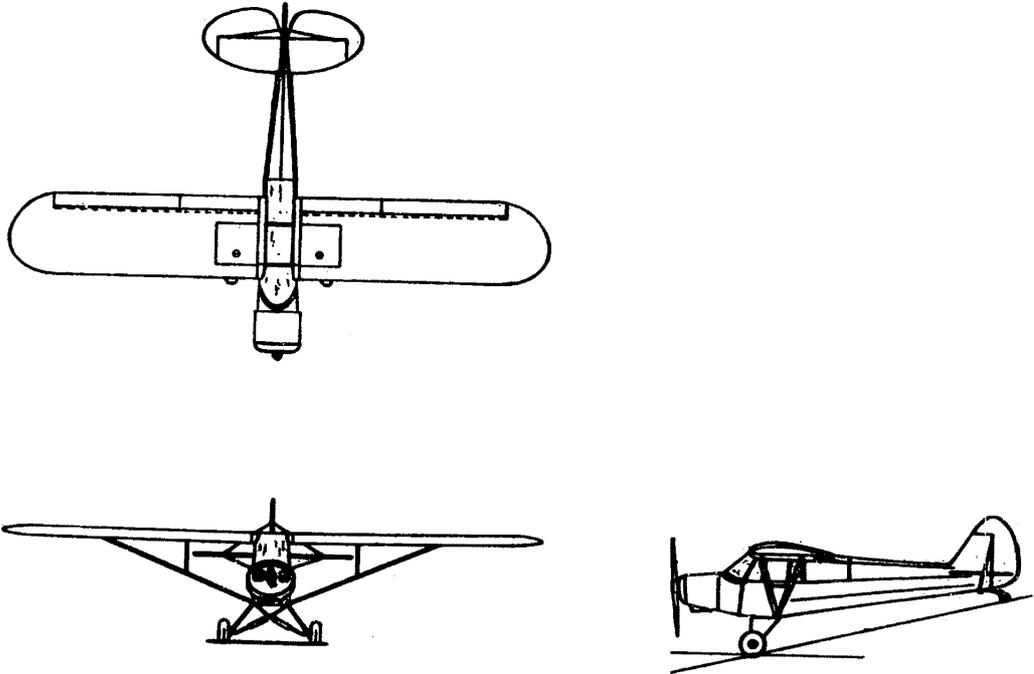
Manufacturer: Sensenich

Type: 76EM8-0-57

Serial: 33403K

**Owner**

Royal Verviers Aviation ASBL.



**Maintenance.**

The aircraft was maintained in accordance with an approved maintenance programme ref:230202 9/99.

The aircraft was modified in accordance with FAA STC SA-00035-NY; installation of a 180HP engine, including modifications in the fuel system.

The yearly airworthiness inspection was performed on 11 January 2008. During this inspection, the aircraft was found complying with all applicable requirements.

**Meteorological conditions.**

The meteo conditions did not influence the conditions of the accident.

### **Impact information.**

On the crash site, the aircraft was found resting on its undercarriage and nose. The initial impact was at an angle of more than 30°, on the engine compartment. The aircraft bounced back to the right.

The LH wing was half separated from the fuselage and shows signs of impact with trees.

The engine compartment is twisted up and left. The metallic propeller shows no significant damage.

The undercarriage is torn backwards.

The airframe structure is bent upward and sideways.

The pilot had selected both Tanks before take-off, and did change the selection during the flight; he assumed he selected the LH Tank.

The position of the fuel selector valve was changed by the rescue team, and put in the 'off' position.

There was plenty of fuel present in the LH Tank. The RH Tank was empty.

The fuel connection to the carburetor was opened, and there was fuel present in the line. This condition could have been influenced by the post-impact actions needed to secure the wreckage.

### **Survival aspects**

The pilot was attached with the belly straps; he did not use the shoulder harness. He was projected forward, and hit the instruments board, the windscreen and the central windshield post. The pilot broke his foot, and was further hurt on the cervical and lumbar vertebrae.

The pilot seat held its place during impact.

## Test and Research.

### Detailed inspection.

The aircraft was inspected in the workshops of the Royal Verviers Aeroclub.

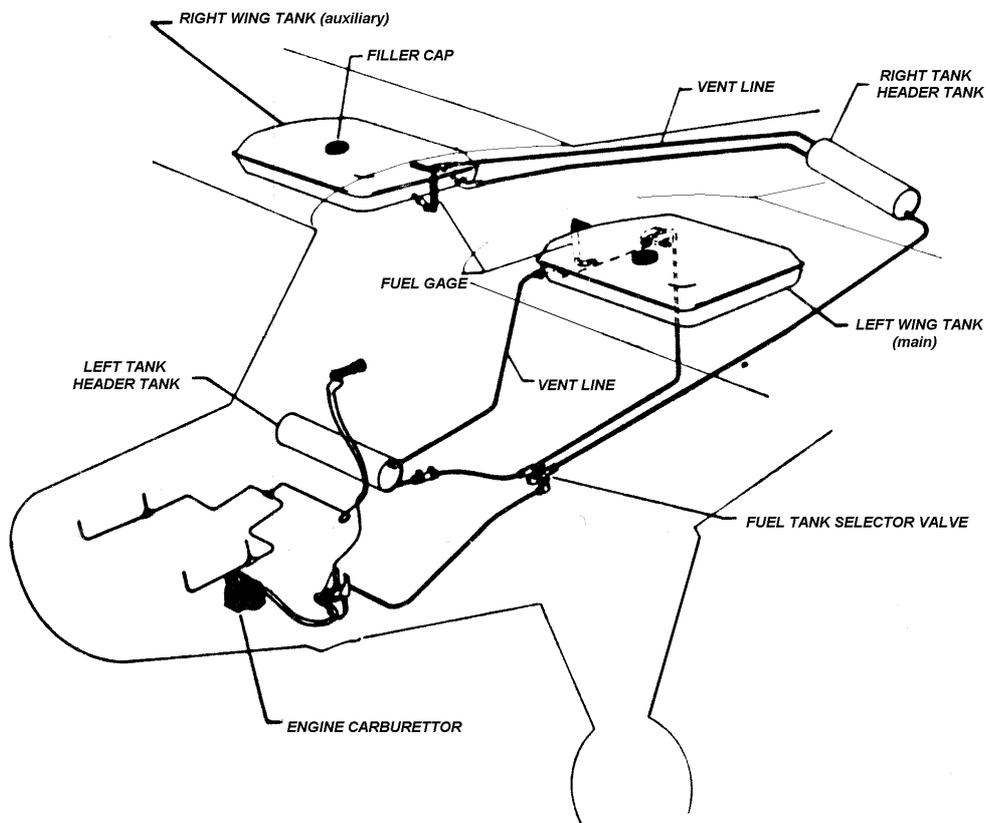
In particular, the engine and its system were scrutinized.

- There was no mechanical blockage of the engine.
- The magneto's produced energy to the spark plugs.
- The spark plugs showed a normal condition.
- There was no obstruction visible in the air intake.
- The carburetor showed no apparent sign of failure.
- Engine control cables showed no discontinuity.

The investigation team could not identify a condition that would have led to the failure of the engine.

The rest of the aircraft and aircraft systems were verified, and no apparent failure was found.

### Aircraft Fuel System



REF: AAIU (Belgium) 2008-3.

The Piper PA-18 is equipped with 2 Fuel Tanks (capacity 18 USG). A small (approx. 2 quarts) header tank which serves to maintain constant fuel flow regardless of the normal attitude of the airplane is included in the installation of each fuel tank. The header tank for the left fuel tank is located forward of the instrument panel; for the right tank it is concealed behind the rear seat.

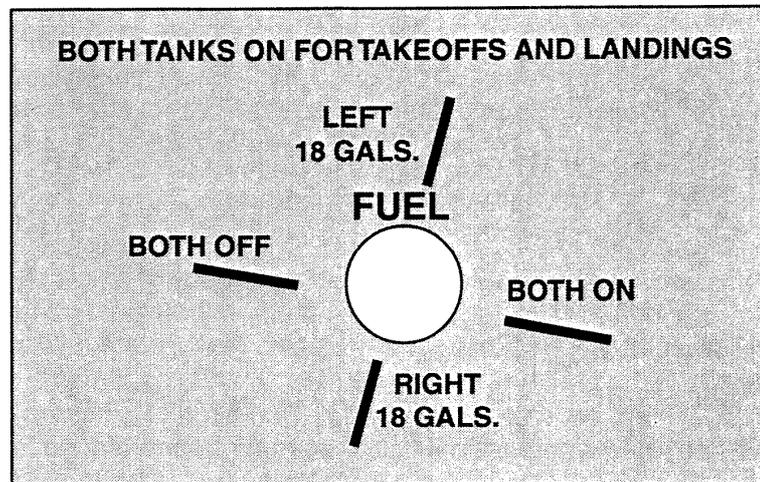
Fuel indicator gauges are installed in the upper cabin panels, and are visible from either seat. The fuel tank selector valve is mounted on the left cabin panel near the front seat.

The engine is fed through a line going from the fuel tank selector valve to the carburettor.

2 different STCs can be used for the installation of a 180 HP engine in order to replace the original 150 HP engine. Both these modifications introduce a change of the fuel system, and changes in the Aircraft Flight Manual.

**For the STC fitted on OO-OAW**, (Penn Yann Aero Service, FAA STC SA-00035-NY), the changes to the fuel system include:

- modifying the Fuel Filler Caps of both tanks (vented caps)
- modifying the Fuel Selector Valve, to interconnect the left and right fuel tank, to create a "both tank" selection for feeding the engine.



REF: AAIU (Belgium) 2008-3.

**For the other STC** (David Johnson FAA STC SA36RM) the changes to be introduced in the fuel system are evenly important. These changes include:

- improving the fuel flow coming from the LH Fuel Tank, by replacing the 3/8" fuel line of the LH fuel tank by a 1/2" line.
- modifying the Fuel Filler Caps of both tanks (vented caps)
- limiting the usable fuel quantity in the LH Tank (9 USG).



These changes are reflected in a dedicated supplement in the Aircraft Flight Manual.

In Belgium, both configurations of modified PA18 "180 HP" exist, and there is a limited number of aerotow-qualified pilots. This means that this situation may lead to confusions in the fuel tank selection.

### **Causes.**

The actual cause of the engine failure could not be determined. However, the statement of the pilot, and the findings made on the wreckage may be consistent with a fuel starvation.

The aircraft would have taken off on "BOTH ON" fuel tanks. During flight, the RH Tank would have been selected. Since the RH Tank was nearly empty during the pre-flight check, the level would decrease rapidly. Upon release of the glider, the engine would have been put in idle. In these conditions, a fuel starvation may pass unnoticed, until the pilot would have opened the throttle.

This possible fuel starvation may have been influenced by the following factors:

- possible confusion between the different configurations of fuel tank selector valve. This, as well as other major differences between aircraft of the same type, may give the pilot a false feeling of confidence. (Same Piper PA-18, but possible different fuel system configurations, different propellers).
- unreliable and imprecise fuel quantity measuring system (gauges).

### **Safety Recommendations.**

1. To Belgian aeroclubs users of Piper PA-150 equipped with a 180hP engine.

Take note of the conclusions of this report, in order to make all concerned pilots sensitive against:

- the possible big differences that may exist between aircraft of the same type.
- the importance of taking sufficient safety margin, also in matter of fuel management.

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