

**ORIGINAL**



**MINISTÉRIO DAS OBRAS PÚBLICAS, TRANSPORTES E COMUNICAÇÕES**

**GABINETE DE PREVENÇÃO E INVESTIGAÇÃO DE ACIDENTES COM AERONAVES**

## **FINAL ACCIDENT REPORT**

**PRIVATE**

**EXTRA 300L**

**D-EMCK**

**Cabo Raso**

**Cascais**

**09<sup>th</sup> July 2008**



**FINAL ACCIDENT REPORT Nr. 12/ACCID/2008**

## NOTE

This report states the technical findings regarding the circumstances and probable causes which led to this accident.

In accordance with Annex 13 to the International Civil Aviation Organisation Convention, Chicago 1944, Council Directive 94/56/EC, 21<sup>st</sup> NOV 1994, and article 11<sup>th</sup> n<sup>o</sup> 3 of Decree-Law n<sup>o</sup> 318/99, 11<sup>th</sup> AUG 1999, the sole purpose of this investigation is to prevent aviation accidents. It is not the purpose of any such incident investigation and the associated investigation report to apportion blame or liability.

The only aim of this technical report is to collect lessons which may help to prevent future accidents.

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## SYNOPSIS

On the 9<sup>th</sup> of July 2008, by 12:12 UTC<sup>1</sup>, the aircraft EXTRA, model 300L, with Germany registration D-EMCK, privately owned, was engaged on an acrobatic training flight, at low altitude, when it suffered an engine stoppage, which forced an emergency landing on a road leading to Guincho.

The pilot, the only people on board, suffered no injuries.

The aircraft sustained substantial damage .



Picture nr 1. D-EMCK aircraft

(photo by José Jorge)

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<sup>1</sup> - Universal Time Coordinated. All times referred in this report are UTC times. By that date, local time in mainland Portugal was one hour plus than UTC.

## 1. FACTUAL INFORMATION

### 1.1 History of the Flight

On accident previous day, with another pilot in command, the aircraft flew from Maia back to Tires aerodrome. After the flight, the aircraft was refuelled with 30 litres of aviation gaso-line<sup>2</sup> and stored in the hangar.

In the morning of the accident, D-EMCK pilot submitted a flight information advice for a local flight with 00:20 duration and declaring an endurance of 01:00.

By 12:00, the aircraft took-off from Tires and proceeded to the area of Cabo Raso at an altitude of 1000ft. On board of the aircraft was an experienced pilot with the intent of performing an aerobatic training at low altitude, in preparation for public aerobatic exhibitions.

When the aircraft reached training area, the pilot reported its position to Tires Tower Control and performed preparation checklist for aerobatics (which included selecting fuel selector valve to “acro” tank).

After two level turns, continued with some left “aileron’s roll”, climbing, recovering with “split s” and levelling at 1000ft, when, unexpectedly, aircraft engine stopped.

The pilot rechecked procedures: magnets in “both”, mixture “rich”, propeller pitch “fine”, fuel selector “central/acro” (later in “wing” tanks) and booster pumps “on”. As the engine didn’t restart, the pilot had to make a forced landing on the road to Guincho.

The landing was planned for a zone without car traffic and avoiding light poles. Anyway, the aircraft collided with three automobiles, parked on road side, pivoted and came to a halt in about 30 metres.

The pilot left the aircraft by himself.

### 1.2 Injuries

The pilot suffered no injuries.

### 1.3 Aircraft Damage

Right wing was separated by its root and was severely damaged, particularly on its leading edge. The fuselage showed several crushing. Landing gear main legs were broken. Propeller blades were damaged. Right wing fuel tank was destroyed.

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<sup>2</sup> Fuelling company has no registry of refuelling this aircraft on that day. Even so, the fuelling officer on duty confirmed he did the refuelling, supervised by the pilot.



Pictures nr. 2,3,4,5.

### 1.4 Other Damage

The aircraft caused damages to three automobiles.



Picture nr. 6



Picture nr. 7

### 1.5 Pilot

Pilot references, as follow:

Personal		Licenses		Flight Experience	
Sex:	Male	Type:	ATPL(A)	Total:	--
Age:	36	Validity:	06-05-2009	Last 30 days:	49:35
Nationality:	Portuguese	Limitations:	Nil	Last week:	21:40
				Last 24 hours:	--

## 1.6 Aircraft

### 1.6.1 General

The aircraft was a monoplane, low wing, equipped with a six cylinders engine developing 300HP at 2700RPM, with fuel injection, a variable pitch and constant speed propeller, conventional non-retractable gear, with capacity for two people, 950kg MTOM and following references:

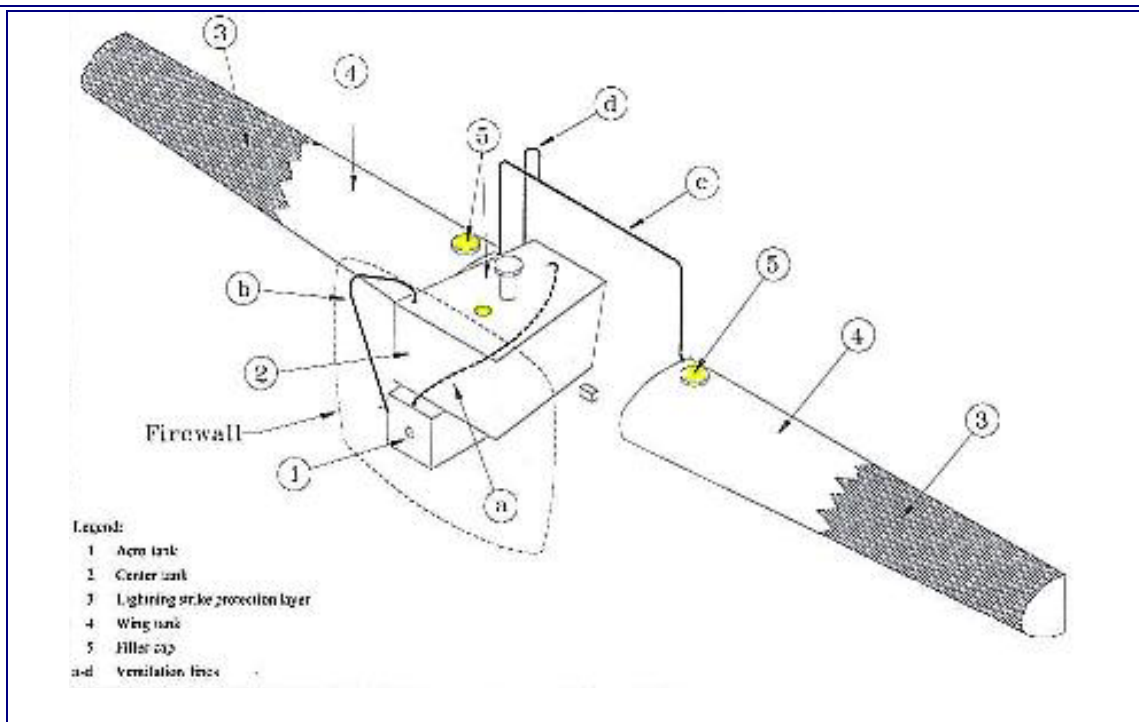
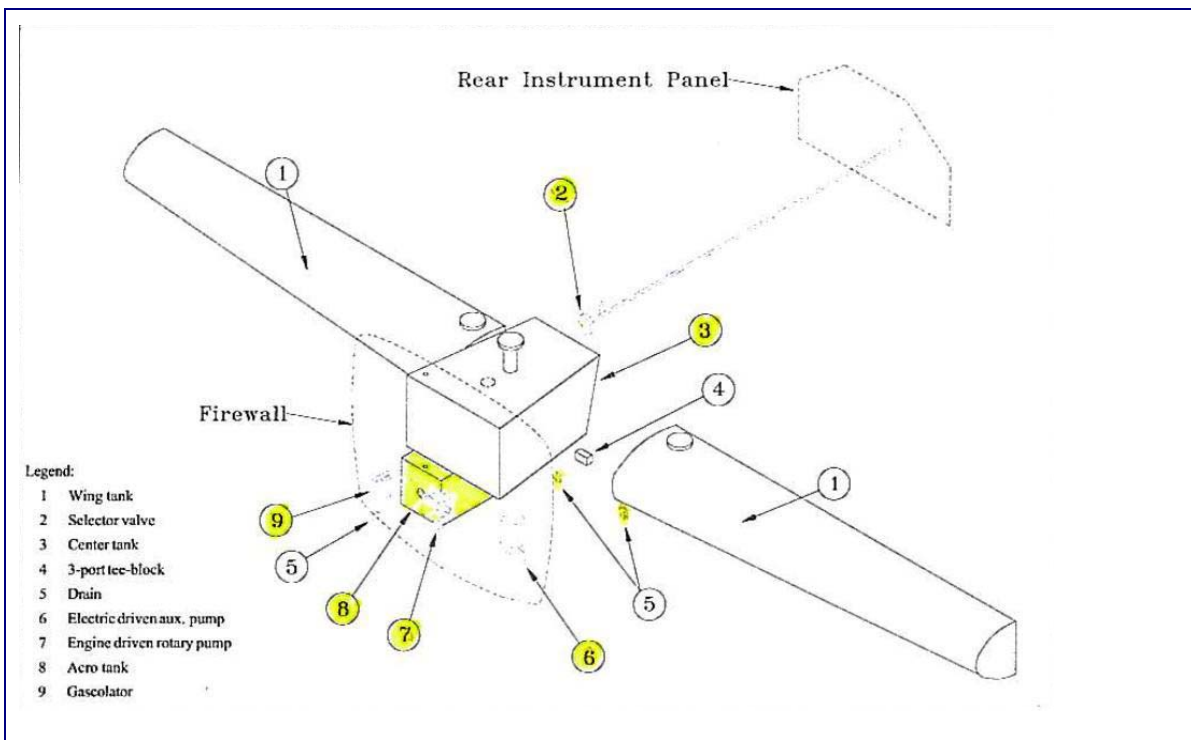
Reference	Airframe	Engine	Propeller
Manufacturer:	Extra	Lycoming	MTV-14-B-C/C 190-17
Model:	300L	AEIO-540L1B5	
Serial Number:	117	L-27622-48A	
Year of manuf:	2000	2000	
Time Since New:	273:00	273:00	
Time Since Overhaul:	15:30	15:30	
Last Inspection:	12/06/2008	12/06/2008	14/04/2008

### 1.6.2 Fuel System

There were two independent fuel systems installed:

- Two tanks in the wings with 120lts (60+60) capacity and
- Central /acrobatic tank (interconnected) with 51lts capacity (42 on central plus 9 on acrobatic tank) being 5.5 no usable fuel.

A fuel selector valve, one fuel indicator for central tank and another one for wing tanks, independent drain and vent systems, one filter, an engine driven fuel pump and an electrical auxiliary fuel pump, able to feed the engine at maximum power and replace mechanical pump in case of failure, were other fuel system parts.



1.6.3 Labels in cockpit (relating fuel system operation)

**WING TANK**

**MUST BE EMPTY FOR ACROBATICS**

**ACRO & CENTER TANK**  
**SHOWS “ZERO” IN LEVEL FLIGHT BELOW 11L (2.9 US GAL)**  
**UNUSABLE FUEL 5.5 l (1.5 US GAL).**

**THE REMAINING FUEL IN LEVEL FLIGHT**  
**CANNOT BE USED SAFELY WHEN INDICATOR READS “ZERO”.**

### 1.7 Meteorology

Sky clear with north-westerly light wind

### 1.8 Navigation Aids

Not applicable.

### 1.9 Communications

Two way communications with Tires aerodrome

### 1.10 Place of the Accident

The aircraft landed on national road N247, connecting Cascais to Guincho beach. There was a traffic lane on each way with lighting poles on both sides. There were also some cars parked on seaside.

### 1.11 Flight Recorders

Not applicable.

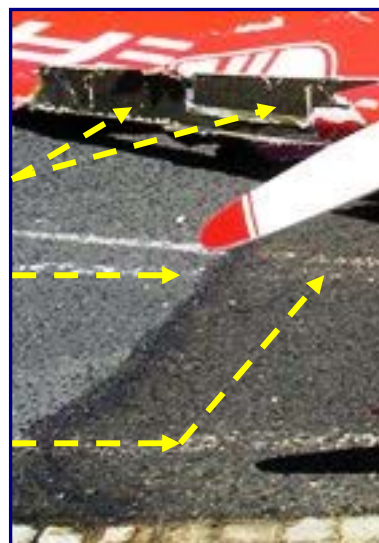
### 1.12 Wreckage & Impact

The aircraft came to a halt facing south.

Right wing leading edge and respective fuel tank were destroyed when the aircraft collided with a car.

There was some fuel spillage from right wing tank.

There were some marks on the asphalt from landing gear legs dragging.



Picture nr. 9 – Right wing.

### **1.13 Medical or Pathological**

Not applicable.

### **1.14 Fire**

There was no fire.

### **1.15 Survival Aspects**

Not applicable.

### **1.16 Tests & Research**

1.16.1 The following tests have been performed:

Inspection and static test of Lycoming AEIO-540L1B5, s/n L-27622-48A engine;

Inspection and checking of ignition system;

Inspection and checking of fuel system condition, fuel flow capacity, cleanliness of tanks, filter and fuel lines, search for the presence of water and other polluting substances in fuel;

Checking of acro/central tank sealing;

Checking of fuel selector valve operation;

Checking of fuel indicator's precision of indication.

1.16.2 The following results were obtained:

Ignition system operated normally;

The engine started and run normally (tested until 2200RPM);

Fuel selector valve showed no abnormalities;

Fuel quantity indicator showed correct readings;

There were no fuel leakages in central/acro tank;

Fuel was not contaminated.

### **1.17 Organizational & Management**

Nil

### **1.18 Additional Information**

Aerobatics must be performed with fuel selector in acro tank and empty wing tanks.

## 2. ANALYSIS

### 2.1 Flight Progress

On the eve of accident date, the aircraft flew from Maia aerodrome to Tires aerodrome, where it was refuelled with 30 litres of gasoline, in the presence of the pilot who performed that flight, being sheltered in the hangar, after that. After refuelling the aircraft should have 57 litres of fuel on board, being 51 on central/acro tank (full) and the other 6 litres divided by wing tanks. This distribution of fuel was adequate for the next aerobatic mission, fore-casted for the next day.

On accident's day, by 12.00, the aircraft took-off from Tires runway and proceeded to working area where some vertical development manoeuvres were performed. Everything was going normal until 12:12, approximately, when engine stopping occurred.

The pilot reacted immediately performing engine in flight restarting procedures. As the engine refused to start, the pilot had to land the aircraft on the road to Guincho.

In spite of several obstacles presence on landing place, which were difficult to surround, pilot proficiency limited accident effects to material damages to the aircraft and some cars parked on road side.

### 2.2 Fuel on board the aircraft

Refuelling company official granted he was the one who made such the refuelling. However there was no registry of refuelling of the aircraft with registration D-EMCK.

Those 57 litres of fuel, expected to be aboard the aircraft on the beginning of the flight, should be enough for one hour flying.

Following this reasoning, the pilot filled a flight information advice, deposited with Tires flight dispatch, where he referred one hour endurance.

This way, when the engine stopped, it was supposed to have about 47 litres of fuel on board (on central/acro tank)<sup>3</sup> which should be enough for 48 minutes flying.

Aircraft engine was fed from central/acro tank, which constituted an independent fuel system from wing fuel tanks.

Research on accident site detected fuel spillage under the right wing (picture nr. 9). Such leakage was due to right wing tank damage and confirmed there was some fuel in wing (interconnected) tanks. The fact that both tanks are interconnected and the aircraft was banking to the right (right wing on the ground) allowed wing residual fuel to flow out.

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<sup>3</sup> - Wing tanks should be empty by that time (*wing tanks must be empty for acrobatics*)

The aircraft was removed to a maintenance facility in Tires aerodrome where some tests and central/acro tank fuel measurements were performed, getting the following results:

- Fuel filter drain debited no fuel;
- There was no usable fuel on central/acro tank;
- Tests to sealing of central/acro tank and respective fuel lines showed no leaks;
- Test to fuel selector valve operation showed no abnormal behaviour;

Fuel indicator calibration was checked.

Fuel contamination tests showed negative.

### 2.3 Engine research

Engine inspection and static check were performed.

Ignition system was inspected & checked.

Engine started and run normally on test bench.

### **3. CONCLUSIONS**

#### **3.1 Findings**

Based on what has been exposed, we may conclude that:

- 1<sup>st</sup> The flight has been cleared;
- 2<sup>nd</sup> The pilot was duly qualified to operate the aircraft and acted according his capacity and competence;
- 3<sup>rd</sup> Aircraft Airworthiness Certificate was valid and there was no knowledge of any restriction or limitation to its operation;
- 4<sup>th</sup> Aircraft engine had an unintentional in flight failure;
- 5<sup>th</sup> Pilot couldn't restart the engine and had to land the aircraft on a road;
- 6<sup>th</sup> The landing caused serious damage to the aircraft;
- 7<sup>th</sup> There were no personal injuries reported;
- 8<sup>th</sup> The engine was tested in bench and performed regularly;
- 9<sup>th</sup> Fuel tanks were found empty;
- 10<sup>th</sup> Sealing test performed didn't found leakages in central/acro tank and respective fuel lines;
- 11<sup>th</sup> Test of fuel indicator confirmed normal indications;
- 12<sup>th</sup> Fuel selector valve was operating normally.

#### **3.2 Causes of the Incident**

##### **3.2.1 Primary Cause**

The incident was caused by engine stoppage in flight, presumably due to fuel starvation.

**4. SAFETY RECOMMENDATIONS**

No safety recommendations were issued.

Lisbon, 12<sup>th</sup> of December 2008

The Technical Investigator



António Alves

The Investigator in Charge,

