

**ACCIDENT**

<b>Aircraft Type and Registration:</b>	Morane Saulnier MS.894A Rallye Minerva, G-HHAV	
<b>No &amp; Type of Engines:</b>	1 Franklin 6A-350-C1 piston engine	
<b>Year of Manufacture:</b>	1970	
<b>Date &amp; Time (UTC):</b>	18 June 2010 at 1000 hrs	
<b>Location:</b>	Perranporth Airfield, Cornwall	
<b>Type of Flight:</b>	Private	
<b>Persons on Board:</b>	Crew - 1	Passengers - None
<b>Injuries:</b>	Crew - None	Passengers - N/A
<b>Nature of Damage:</b>	Nose gear, engine mount, wings and propeller damaged	
<b>Commander's Licence:</b>	Private Pilot's Licence	
<b>Commander's Age:</b>	52 years	
<b>Commander's Flying Experience:</b>	4,430 hours (of which 200 were on type) Last 90 days - 1 hour Last 28 days - 1 hour	
<b>Information Source:</b>	Aircraft Accident Report Form submitted by the pilot and further enquiries by the AAIB	

**Synopsis**

Following a touch-and-go at Perranporth Airfield, the aircraft suffered a sudden power loss whilst climbing through 400 ft agl. The pilot executed a forced landing in a field during which the aircraft's wings, engine mount, nose landing gear and propeller were damaged. Subsequent engineering examination of the aircraft did not positively identify the reason for the engine failure although an electrical fault was identified in the left magneto primary lead that was sufficient to prevent the left magneto from functioning.

**History of the flight**

After completing pre-takeoff checks that included engine run-up checks, during which all engine indications and

both left and right magneto rpm drops were normal, the pilot departed from Perranporth Airfield with the intention of conducting general handling exercises before returning to the airfield for circuits. On returning to the airfield approximately 25 minutes after taking off, the aircraft completed one circuit to a touch-and-go on Runway 27, following which the pilot applied full power to initiate a climb back into the circuit.

At approximately 400 ft agl during the climbout, two or three loud "pops" were heard from the engine, immediately followed by a total loss of power. The pilot declared a MAYDAY and having insufficient height to land back on the airfield, turned downwind

to the south-east towards an area of lower sea cliffs and small fields whilst retaining the option of ditching. The pilot selected a 90 m grass field to land in that was approximately 500 m from the airfield boundary. During the landing roll he elected to steer the aircraft left into a stone boundary wall to arrest the landing, rather than continuing directly ahead and risking a head-on collision with the end boundary wall.

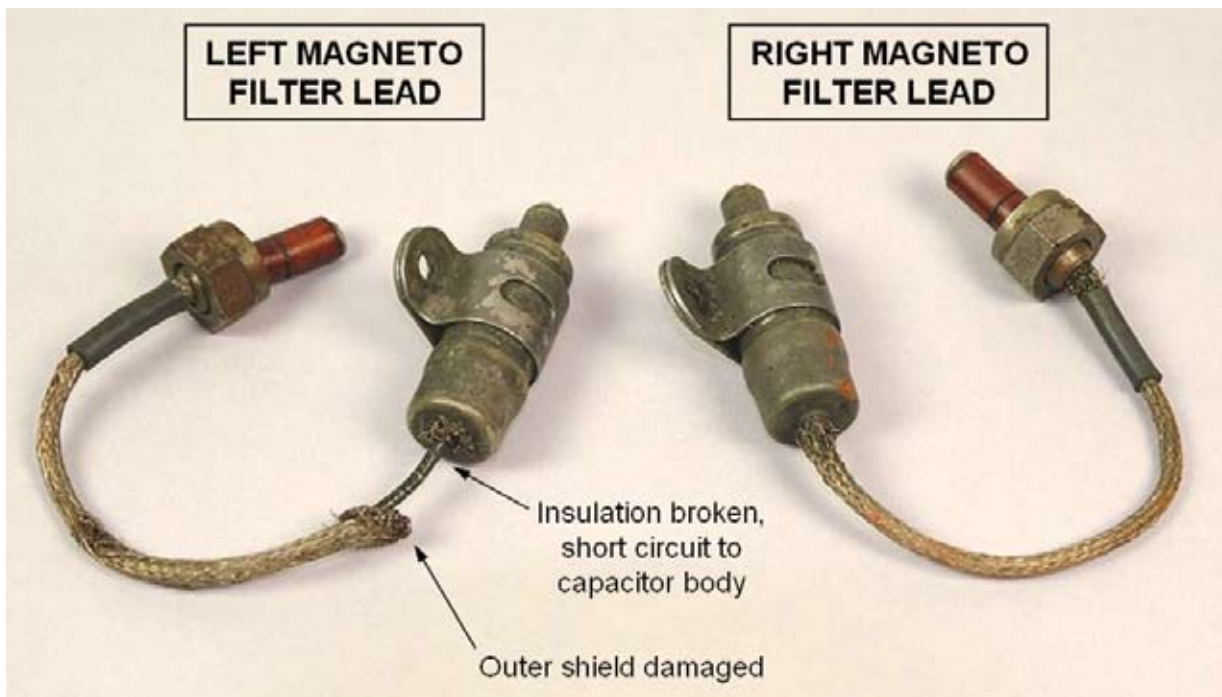
The aircraft came to rest on a heading of approximately 270°M having rotated anti-clockwise through 150°, with the starboard wing and nose of the aircraft touching the boundary wall. The aircraft sustained damage to the left and right wings, engine mount, nose landing gear leg and propeller. A small amount of fuel leaked from the left wing fuel filler cap but there was no fire. The pilot was uninjured and exited the aircraft by sliding the canopy rearwards, as normal.

### Engineering examination

Following the accident the owner arranged to have the propeller straightened sufficiently to enable the engine to be ground run. With both primary leads ('p-leads') removed from the magnetos the engine was run successfully.

The ignition starter switch was electrically tested and was in a serviceable condition. No electrical short circuit was detected between the magneto p-leads and airframe ground between the ignition switch and the magneto filter lead terminals.

The left magneto filter lead (Figure 1) was in poor condition, exhibiting fraying of the outer shield material. The lead's insulation had failed at the exit of the filter capacitor body, and thus was electrically short-circuited to earth via the capacitor outer body.



**Figure 1**

Left and right magneto filter leads

Some of the shield material exhibited evidence of melting and fusing to the capacitor body consistent with high current flow.

The right magneto filter lead also exhibited damage to the shield material at the capacitor body exit but the insulation remained intact and no short circuit to airframe earth was detected.

Both magnetos were removed from the aircraft for examination at an approved overhaul facility, were tested and declared serviceable.

#### **Maintenance requirements for the magneto wiring harness**

Prior to the accident flight the aircraft had not flown in the preceding 10 months, during which it had been subject to both an annual check in November 2009 and a six month check in June 2010. The aircraft operated with an EASA Certificate of Airworthiness and was therefore subject to the maintenance requirements contained in CAP 766 – *Light Aircraft Maintenance Programme – Aeroplanes*.

Task 55 of CAP 766 contains the following magneto related maintenance requirement, to be performed at an interval of 150 hours, or annually, whichever occurs, see Figure 2.

CAP 766 defines ‘Inspect’ as:

#### *Inspect (INSP)*

*An ‘inspection’ is a visual check performed externally or internally in suitable lighting conditions from a distance considered necessary to detect unsatisfactory conditions/ discrepancies using, where necessary, inspection aids such as mirrors, torches, a magnifying glass etc. Surface cleaning and removal of detectable cowlings, panels, covers and fabric may be required to be able to satisfy the inspection requirements.’*

#### **Analysis**

As both left and right magnetos functioned correctly during the pre-takeoff checks, it is probable that the electrical short circuit between the left magneto filter lead and airframe ground occurred during the accident flight, caused by the poor condition of the lead. The electrical grounding of the left magneto filter lead inhibited the left magneto from functioning, leaving the aircraft with only the right magneto system to supply ignition to the engine. The right magneto was subsequently tested and shown to be serviceable.

Following the accident, the aircraft’s engine successfully started with both magneto filter leads removed from the magnetos, demonstrating that the engine was capable of running. However, it has not been possible to determine

Task No	Task Description	Task Nature	Task Interval	Qualifying Mechanic		Qualifying Inspector	
				LH	RH	LH	RH
<i>Ignition:</i>							
55	<i>Magnetos, harnesses, leads, switches, starting vibrators, contact breakers, cooling system and ventilators.</i>	<i>INSP</i>	<i>150 FH</i>				

**Figure 2**

Excerpt from CAP 766 Task 55

the reason why the engine stopped producing power despite appearing to have a serviceable right magneto.

Inspection of the condition of the magnetos and their associated leads and harnesses was required at the annual check performed in November 2009 and the aircraft had not operated between that annual check and the accident flight, showing that the condition of the magneto filter leads was not discovered at the annual check.

Following the engine failure, the pilot's forced landing options were limited to either ditching in the sea or landing in a field between the airfield and the sea cliffs; this area consists of steeply sloping scrubland and small fields that reduced the probability of successfully carrying out a forced landing without damaging the aircraft.

## Conclusions

Whilst the reason for the aircraft's engine failure was not be positively identified, a short circuit of the left magneto primary lead at the exit of the magneto filter lead capacitor body was discovered during engineering examination of the aircraft's ignition system. This fault was sufficient to prevent the left magneto from functioning. Attention is drawn to the ignition harness maintenance requirements contained in CAP 766 (*Light Aircraft Maintenance Programme*) which requires inspection of the magneto harness for unsatisfactory condition at either a 150 flying hour check, or annual check, whichever occurs first.