



Investigation report

C4/2007L

Microlight emergency landing in Petsmo on 24 June 2007

Translation of the original Finnish report

F-JZUH

BMW LAZER IPSOS

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SUMMARY

An accident occurred at 11:20 Finnish time on Saturday, 24 June 2007 at Petsmo. A privately owned BMW Lazer Ipsos weight-shift controlled microlight aircraft (a.k.a. ultralight or ML), registration F-JZUH, was badly damaged in a forced landing. The aircraft was manufactured by Metallerie Jacques Chapelet. On 26 June 2007, Accident Investigation Board Finland (AIB) appointed an investigation commission C4/2007L for this incident. Investigator Ismo Aaltonen was named Investigator-in-Charge with Investigator Toni Mäkelä as member of the commission.

The microlight had departed Pori airport (EFPO) at 09:24 with the intention to fly to Kokkola (EFKK). The route took the ML to the north, along the coast of the sea. The altitude varied between 200–400 m. The engine suddenly stopped west of Petsmo village (approximately 20 km north of Vaasa airport). The pilot decided to make an emergency landing in the only possible open space nearby, which was a marsh. Judging by the markings on the ground, touchdown was normal. However, the surface was so soft that the microlight rolled twice and was badly damaged. The pilot was seriously injured but the passenger escaped without injuries.

Subsequent test and research revealed that the generator's drive belt snapped during the flight. Ignition, fuel injection and the fuel pump all require electricity to function. After the generator belt snapped, engine systems got their electricity from the battery. Approximately one hour after the generator failure the battery was drained enough to stop the engine.

The pilot was not sufficiently informed of the microlight's electrical system. He was not aware of the significance of the generator warning light, nor of the battery voltage indicator. It is possible that he did not detect that the telltale light was on because of the bright sunshine. In this case, battery voltage indication is the only sign of generator failure.

The investigation commission issued no recommendations because pilots themselves are mainly responsible for weight-shift controlled microlight operations. However, the investigation commission urges weight-shift controlled microlight instructors and pilots to pay attention to the following: as regards flight safety, it is essential that the pilot be sufficiently familiarized/trained on the aircraft's systems and emergency procedures at the very onset of flight training.



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GLOSSARY OF TERMS

Abbreviation	Description
AccRep	Accredited Representative
AIB	Accident Investigation Board
BEA	Le Bureau d'Enquêtes et d'Analyses
GPS	Global Positioning System
ML	Microlight
MTOW	Maximum Takeoff Weight
MWE	Manufacturer's Weight Empty

SYNOPSIS

An accident occurred at 11:20 Finnish time on Saturday, 24 June 2007 at Petsmo. A privately owned BMW Lazer Ipsos weight-shift controlled microlight aircraft registration F-JZUH, was badly damaged in a forced landing. The aircraft was manufactured by Metallerie Jacques Chapelet.

The microlight (ML) had departed Pori airport (EFPO) at 09:24 with the intention to fly to Kokkola (EFKK). Approximately one hour before the accident the generator drive belt snapped. The pilot did not notice this and, hence, continued the flight as per his original plan. When battery voltage fell to approximately 9 volts the engine stopped. The pilot decided to make an emergency landing on a marsh. However, the surface was so soft that the ML rolled twice.

On 26 June 2007, Accident Investigation Board Finland (AIB) appointed an investigation commission C4/2007L for this incident. Investigator Ismo Aaltonen was named Investigator-in-Charge with Investigator Toni Mäkelä as member of the commission. All times in this report are Finnish time. Reference material is archived at the AIB. The investigation commission conducted an accident scene investigation and preliminary test and research on 24-26 June 2007. Witnesses were interviewed on 25-26 June 2007.

Since the ML was registered to France, pursuant to international treaties the French accident investigation authority (BEA) was informed of the accident. BEA appointed a liaison person to the investigation.

The investigation commission made no recommendations.

The draft final report was dispatched to the Finnish Aeronautical Association and to pilot for comment. AIB received the comments by the requested deadline.

The investigation was completed on 25.8.2010.



1 FACTUAL INFORMATION

1.1 History of the flight

The pilot had flown the weight-shift controlled microlight from France to Finland through Poland and Estonia, intending to fly to Nordkapp. For the purpose of cross-country flying, he had navigation charts, an aviation-equipped GPS as well as Jeppesen charts. As per his account, corroborated by GPS data, the pilot had crossed the Gulf of Finland at the altitude of 1000–1200 m, mainly for safety purposes. The ML arrived in Turku on 21 June. The following evening the pilot continued to Pori (EFPO), landing at 20:07. The accident flight departed EFPO at 09:24, following Finland's western coastline towards Kokkola (EFKK). His altitude varied between 200 and 400 metres.

Approximately one hour before the accident the ML's generator drive belt snapped. The pilot did not notice this and, therefore, continued the flight.

An eyewitness close to the accident site observed that the ML's engine smoked and sputtered and finally stopped in the air. Since he could not make it to any other suitable open areas, the pilot selected a marsh as his emergency landing spot. At the end of the flight he made a 180° turn to the right towards the marsh. Judging by the markings on the ground, touchdown was normal. However, the surface was so soft that the emergency landing failed and microlight tumbled twice. The pilot was seriously injured but the passenger escaped without injuries. The pilot has no recollection of the final phases of the flight, nor of the emergency landing.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal			
Serious	1		
Mild/no injuries		1	

1.3 Damage to aircraft

The aircraft was badly damaged.

1.4 Other damage

There was no other damage.

1.5 Personnel information

Pilot: Age 61.

Licences: Microlight licence, valid.

Flying experience	Last 24 h	Last 30 days	Last 90 days	Total hours and landings
All types	3 h 59 min 1 landing	Unavailable	Unavailable	3000 h
Type in question	3 h 59 min 1 landing	Unavailable	Unavailable	Unavailable

1.6 Aircraft information



Figure 1. The pod (fuselage) after the accident

Chapelet LAZER BMW is a factory-manufactured, single four-stroke piston engine, two-seat, weight-shift controlled microlight aircraft. The accident aircraft was fitted with an Ipsos 16.9 type wing. Minimum airspeed is 42 km/h and maximum allowable airspeed is 140 km/h. Cruise speed is approximately 110 km/h.

Microlight aircraft:

Registration	44-AKL / F-JZUH
Owner and operator	Private
Manufacturer	JACQUES CHAPELET, Artisan métallier
Type	LAZER BMW
Year of manufacturer	Not known
Permit to fly	Valid until 27.8.2008

Wing:

Model	Ipsos 16.9
Area	17 m ²
Wing span	10.40 m

Engine:

Type	BMW R1100cc
Manufacturer	BMW /Chapelet
Running time	766 h
Power	80 hp / 6300 rpm
Ignition	Electronic
Fuel injection	Electronic
Fuel pump	Electric
Propeller	Three blade NeuForm composite propeller

Weight and balance:

At the time of the departure the ML's weight was close to the maximum takeoff weight (MTOW). The aircraft's MTOW was 450 kg. Manufacturer's Weight Empty (MWE) is approximately 239 kg.

The investigation commission estimates that the takeoff mass was within the allowable range.

Electrical system

The ML had a BMW R1100 engine, fitted with electronic ignition and fuel injection as well as an electric fuel pump. The battery was a 12 V / 14 Ah maintenance-free motorcycle battery.

As regards engine instrumentation, the Volt meter receives electric power when the master switch is ON. There is a red generator warning light which comes on when the generator drive belt snaps or when generally the generator does not produce electricity caused by other reasons.

The generator warning light is on before start or during a generator failure. Then, the voltage meter indicates battery terminal voltage. When the generator no longer produces electric power, the engine takes its power directly from the battery. Battery charge drops as a result of power consumption and battery load.



Figures 2 and 3. Generator warning light and Volt meter

1.7 Meteorological information

The weather enroute was good. Since Pori and Vaasa airports were closed at the time of the accident, weather forecasts are not available. Weather had no role in the accident. Although it was possible that sunlight reduced visibility of the warning light.



1.8 Aids to navigation and radars

The ML had a recording GPS device.

1.9 Communications

Communications played no part in the incident.

1.10 Aerodrome information

The marsh which was selected for the emergency landing is *Siklaxmossen*, 1.7 kilometres northwest from Petsmo village and 20 kilometres north of Vaasa (EFVA) airport. The surface was dry, albeit soft. The elevation of the accident site is six metres above mean sea level and its coordinates are: 63° 13.943' N, 21° 45.621' E.

1.11 Flight recorders

There were no flight recorders in the ML. Nevertheless, the GPS data recorded on the flight was provided to the investigation.

1.12 Wreckage and impact information

After the accident the police photographed the wreckage and impact markings. On 24.6.2007 the pod and the wing were transported to Vaasa airport for more detailed examination. An investigator from AIB arrived at Vaasa airport on 25.6.2007 in order to conduct the test and research. Accident site investigation relied on police photography.

Judging by marks on the pod and on the ground the aircraft touched down on its rear wheels, at which time also the belly of the pod made contact with the ground. As the nose wheel hit the surface, it ploughed into the marsh for the distance of approximately 2 m. As a result of this, the pod tumbled twice.

The steel keel tube under the pilot bent approximately 15 degrees to the right. The steel mast snapped at the height of the passenger's head. The tube joining the front of the pod and the mast had broken at its front joint. The fibreglass front cowling was damaged. The compass had dislodged and the GPS was found 30 m from the wreckage.

The wing's left leading edge tube was torn at the nose triangle. The mast had come loose and the wing's training edge cables were torn. The upper and lower ribs were bent.



Figure 3. Accident site and markings on the ground

1.13 Medical and toxicological information

The police administered a breathalyser test on the pilot and the passenger. Both showed zero blood alcohol.

1.14 Fire

There was no fire.

1.15 Rescue operations and survival aspects

The accident occurred at 11:20 and the Emergency Response Centre was informed of the accident at 11:49. A total of five rescue units came to the scene; the first one arrived at 12:08. The passenger of the ML guided the rescue personnel to the accident site.

1.16 Test and research

On 25.6.2007 the investigation commission ran a test on the engine using a new battery and the engine performed quite normally.



2 ANALYSIS

The generator drive belt snapped approximately one hour before the engine stopped. The drive belt is under cover at the front of the engine and it cannot be inspected without first removing the cover. The manufacturer states that it is possible to fly the ML for about an hour on battery power alone.

The French Civil Aviation Authority has not established any maintenance or inspection requirements for weigh-shift controlled ML engines. Instead, the owner or operator carries out the maintenance as required. In Finland one shall adhere to the manufacturer's maintenance or inspection regulations. Should no such regulations exist, the general maintenance and inspection rules established by the Finnish Aeronautical Association shall be followed.

If the generator fails while the engine is still running, there are two ways to detect this: the generator warning light comes on and the Volt meter indicator drops to indicate the remaining battery voltage. The pilot of the accident flight did not detect either of the above. Instead, he continued the flight until the engine began to sputter.

When it comes to warning lights and the electrical system the pilot knew that two red lights always come on before the engine is started and that the lights go off when the engine is running. He did not know that the left warning light on the instrument panel was the oil pressure light and the right one the generator warning light. Neither did he know how long the engine runs on battery power alone. There are no warning light placards on the instrument panel. The pilot did not notice that the warning light came on. It is possible that sunlight reduced visibility of the warning light.

The pilot had plenty of flying experience on two-stroke weight-shift controlled microlights. It is the impression of the investigation commission that the pilot was not aware of the significant difference between two-stroke engine and four-stroke engine instrument indications. With two-stroke ML engines one monitors, among other things, the exhaust or cylinder head temperature and engine RPM. With regard to the four-stroke ML engine in question, one shall monitor the generator warning light, oil pressure warning light, Volt meter, oil temperature and engine RPM.

In Finland pilots receive 50 hours of class instruction on weight-shift controlled ML aircraft basic courses, 10 of which on aircraft operations and maintenance. There are no training requirements with regard to conversion from two-stroke MLs to four-stroke ones. The type training provider shall explain the differences in systems.

Pilots flying aircraft equipped with dissimilar electrical systems must be aware of their respective characteristics as well as mutual differences.



3 CONCLUSIONS

3.1 Findings

1. The pilot's licence was valid.
2. The Permit To Fly was valid.
3. The aircraft's equipment and navigation gear carried onboard were sufficient for the safe conduct of flight.
4. The generator drive belt snapped approximately one hour before the emergency landing.
5. The pilot did not detect the malfunction in the electrical system (contributing causal factor).
6. There were no warning light reference plates on the instrument panel (contributing causal factor).
7. The pilot did not notice that the warning light came on (contributing causal factor).
8. The engine type in question requires electrical power to function (contributing causal factor).
9. When the engine stopped, the pilot selected a marshy area for the emergency landing (contributing causal factor).
10. The surface of the landing site was soft (contributing causal factor).
11. The pilot was seriously injured.
12. The pilot's breathalyser test showed zero blood alcohol.
13. In the opinion of the investigation commission, the pilot was insufficiently informed of the aircraft's systems (contributing causal factor).
14. In France there are no maintenance or inspection requirements for weight-shift controlled microlight aircraft engines.

3.2 Probable cause

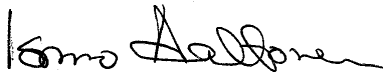
The probable cause was the snapping of the generator drive belt. Contributing causal factors are listed in the section "findings".

4 RECOMMENDATIONS

The investigation commission issued no recommendations. However, the investigation commission urges weight-shift controlled microlight instructors and pilots to pay attention to the following:

As regards flight safety, it is essential that the pilot be sufficiently familiarized/trained on the aircraft's systems and emergency procedures at the very onset of flight training.

Helsinki 25.10.2010



Ismo Aaltonen



Toni Mäkelä