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AVIATION AND MARITIME INVESTIGATION AUTHORITY  
Námestie slobody 6, P.O.BOX 100  
810 05 Bratislava

# FINAL REPORT

on safety investigation of an aviation accident

of aircraft type **Z-226 MS**

registration mark **OM-MFN**

Reg. No: **SKA2019002**

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The investigation of occurrence has been conducted pursuant to Art. 18 of the Act No. 143/1998 on Civil Aviation (Civil Aviation Act) and on Amendment of Certain Acts and in accordance with the Regulation (EU) No. 996/2010 of the European Parliament and of the Council on investigation and prevention of civil aviation accidents and incidents, governing the investigation of civil aviation accidents and incidents.

The final report is issued in accordance with the Regulation L 13 that is the application of the provisions of ANNEX 13 Aircraft Accident and Incident Investigation to the Convention on International Civil Aviation.

The exclusive aim of investigation is to establish causes of accident, incident and to prevent their occurrence, but not to refer to any fault or liability of persons.

This final report, its individual parts or other documents related to the investigation of occurrence in question have an informative character and can only be used as recommendation for the implementation of measures to prevent occurrence of other accidents and incidents with similar causes.

## A. INTRODUCTION

Aircraft type: Z-226 MS  
Registration mark: OM-MFN



Operator/owner: Slovak National Aeroclub of Gen. M. R. Štefánik /  
Aeroclub Košice  
Operation type: general aviation/sports and recreational flying  
Take-off site: Krakow Pobiednik Wielki airport / EPKP  
Planned landing site: Senica airport / LZSE  
Incident site: cadastral territory of Prieipasné  
Flight phase: landing  
Incident location: N 48°42'41.3", E 17°33'45.2"  
Incident date and time: 23 June 2019 13:00

Note: All time data in this Report is reported in UTC time.

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## **B. INFORMATION SUMMARY**

On 23 June 2019 the pilot was performing a flight with an aircraft type Z-226 MS, registration mark OM-MFN (hereinafter referred to as "OM-MFN") on the route from EPKP to LZSE. There was another person on board during the flight.

Before approaching LZSE, the pilot tried to transfer fuel from the rear tank to main tanks twice in order not to overload the airframe during landing.

Since the pilot failed to restore the engine power, the pilot decided to make an emergency landing into terrain on an area near Prieprasné. The OM-MFN sustained major damage during the emergency landing. The pilot and the other person on board did not suffer any injuries.

The district Police department in Brezová pod Bradlom reported the accident to the Aviation and Maritime Investigation Authority of the Ministry of Transport and Construction of SR.

A committee was set up to investigate the causes of the accident:

Ing. Juraj Gyenes	Chairman of the Safety Investigation Committee
Ing. Ladislav Dospiva	Member of the Safety Investigation Committee

The Report has been issued by:

Aviation and Maritime Investigation Authority  
of the Ministry of Transport and Construction of the Slovak Republic.

## **C. MAIN PART OF THE REPORT**

- 1 FACTUAL INFORMATION
- 2 ANALYSIS
- 3 CONCLUSIONS
- 4 SAFETY RECOMMENDATIONS

### **1 FACTUAL INFORMATION**

#### **1.1 History of the flight**

The flight in question was a second flight for the pilot on the above-stated date. The pilot performed pre-flight preparation together with other pilots of three aircraft who had a flight planned from EPKP to LZSE. The flight was planned as a VFR flight (according to visual flight rules) without a flight plan. The pre-flight preparation consisted of assessing the meteorological conditions at LZSE and at aerodromes along the planned route and assessing radar information about significant cloudiness.

Due to expected storms, the OM-MFN tanks were filled up to the maximum. When taking over the OM-MFN, the pilot checked the fuel amount (main tanks – 70 l, rear tank – 35 l) and the oil amount (9 l).

The OM-MFN took off from EPKP at 12:50. Three other aircraft took off before OM-MFN with approximately 10 km distance between them. OM-MFN was flying below scattered clouds at 250-300 m AGL. According to the pilot's report, they did not experience any precipitation up to the border of Dubnica nad Váhom. After passing this point, they were encountering showers and storms for the rest of the flight.

The pilot also stated in his report that before approaching LZSE he tried to transfer fuel from the rear fuel tank to main fuel tanks twice (however, fuel from the rear fuel tank is designed to be transferred based on gravity, while the transfer period is at least 45 minutes while descending) in order not to overload the airframe during landing by bringing the OM-MFN from a horizontal flight at 300 m AGL to a slight descending ended by the pilot at 150 m AGL.

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After the second attempt to transfer the fuel and after climbing to 300 m AGL, engine revolutions dropped according to the pilot's report and the engine started operating irregularly (as if the fuel feed was interrupted). At that time, the OM-MFN was flying in a valley at 300 m AGL in a rain shower above the area where the pilot later performed the emergency landing.

The pilot continued gliding and tried to restore the regular engine power by switching the fuel tap and using a manual fuel pump.

Since the engine power could not be restored, according to the pilot's report, the pilot decided to make an emergency landing into terrain. As the pilot could not land in the valley in the direction of the flight, he decided to land on an area on the left side. Having approached to the intended landing area, he found out that such area was not flat but inclined. The pilot did not extend the flaps during approach. Before touching the ground, the pilot only decreased the speed without significant levelling (the speedometer got stuck at 140 km/h).

After the aircraft landed on a wet uneven terrain, the main landing gear legs tore off, the engine stopped working, the propeller, the bottom part of the fuselage and both wing parts were damaged.

The pilot and the other person on board did not suffer any injury during the emergency landing.

The pilot reported the occurrence on the "Senica operations" frequency 123.605 MHz to inform the pilots of the aircraft flying in front of him. Then the pilot reported the accident by telephone to the aircraft operator and to the emergency line 155.

Time of day: Day

Flight rules: VFR

## 1.2 Injuries of persons

Injury	Crew	Passengers	Other persons
Fatal	-	-	-
Serious	-	-	-
Minor	-	-	-
No injuries	1	-	1

## 1.3 Damage to the aircraft

The OM-MFN aircraft sustained major damage during the accident.

## 1.4 Other damage

No circumstances have been reported to the Aviation and Maritime Investigation Authority which might lead to any other claims for compensation of damage against a third party.

## 1.5 Personnel information

### Pilot:

citizen of the Slovak Republic, aged 45;

holder of the airline transport pilot license for aeroplanes issued by the Irish Aviation Authority / IAA on 15 August 2013.

### Licenses

Boeing 737 300-900

marked valid until 30 April 2020

Boeing 777/787

marked valid until 31 August 2019

valid only for aircraft registered in China

SEP(L)

marked valid until 30 September 2019

ME IR(MPA)

IR valid for MPA

TRI(A) type rating instructor – B737 300-900 SIM ONLY

marked valid until 30 April 2022

### Medical certificate

class 1	marked valid until 3 June 2020
class 2	marked valid until 3 June 2021
LAPL	marked valid until 3 June 2021

### Flight experience

Total number of flight hours on all types of aircraft	13,630 hours 52 minutes
Total number of flight hours clocked in the last 90 days:	212 hours 48 minutes
Total number of flight hours clocked in the last 30 days:	64 hours 5 minutes
Total number of flight hours on the type Z-226	239 hours 52 minutes
Total number of flight hours on the type Z-226 clocked in the last 90 days:	5 hours 15 minutes
Total number of flight hours on the type Z-226 clocked in the last 30 days:	5 hours 15 minutes

## 1.6 Aircraft information

Type:	Z-226 MS
Registration mark:	OM-MFN
Serial number:	158
Year of manufacture:	1958
Manufacturer:	Moravan a.s., Otrokovice, Czech Republic
Engine:	M137A, serial No: 762409

Total flight hours: 3847 hours 22 minutes

Airworthiness Certificate No. 2900 issued by the Civil Aviation Authority of the Slovak Republic on 9 April 2008.

The Airworthiness Verification Certificate No 2900/03 was issued by AIR K – Service s. r. o., a continuing airworthiness management organization residing at Smetanova 1841, 765 02 Otrokovice, Czech Republic, on 21 April 2019 and it was marked valid until 20 April 2020.

As of the airworthiness verification day, the airframe had flown 3829 hours 26 minutes.

## 1.7 Meteorological information

On 23 June 2019 the weather in the Carpathian region was influenced by a cold front in connection with a low-pressure area, the centre of which was moving from the Scandinavian region to the Barents Sea.

On 23 June 2019 it was mainly cloudy to overcast with Cumulus to Cumulonimbus, to a lesser extent also Altocumulus, prevailing in the Prieipasné area from 10:00 to 13:00. Numerous showers and storms were passing across the above-stated area from north-east to south-west in the above-mentioned time period. An intensive storm started in the Prieipasné area at about 10:50. During the storm, the precipitation intensity reached the level of a catastrophic downpour for a short time, while hail may have occurred as well. The storm activity ended approximately at 11:15. After the storm, showers with mild to light rain continued until 13:00 in the above-mentioned area. Air temperature was rising gradually from 20°C at 07:00 to 23°C at 10:00. During the storm, it dropped to 17°C and later it started rising again. The prevailing wind direction was west to north-west and the wind speed was up to 3 m/s. During the storm, the wind speed increased temporarily, gusting locally to 21 m/s. Horizontal visibility was changing based on the course of the weather with the lowest visibility ranging from 1 to 5 km during heavy rain.

It was cloudy to overcast with showers with light to mild rain in the Prieipasné area on 23 June 2019 at around 13:00. Cumulus to Cumulonimbus, to a lesser extent also Altocumulus, prevailed. At that time the air temperature was around 19°C and light to mild westerly wind was blowing at 3 m/s. Horizontal visibility was 10 to 15 km. The rainfall during the storm and the subsequent showers reached 30 to 35 mm.

On 23 June 2019 at 12:00 the air flow in free atmosphere above the Prieipasné area was as follows: North-eastern wind was blowing at the speed of about 10 m/s at 1,500 above the sea level. At such altitude the air temperature was approximately 11°C. At lower altitudes the wind speed was not changing while the prevailing wind direction was still north-east to north. At 500 above the sea level the wind direction was influenced by the local orthography and westerly to north-westerly wind was blowing at such level with the speed



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of up to 4 m/s. As it was gradually getting warmer in the morning, the wind speed and direction were influenced by heat convection.

In wider surroundings of Prieprasné, i.e. in the regions of Dolné Považie, Myjavská pahorkatina, Small Carpathians and Záhorie, intensive storms occurred around noon and in the afternoon, possibly with hail, with wind gusting to 21 m/s at certain locations. Storms were passing from north-east to south-west in this region.

#### 1.8 Aids to navigation

The aircraft was equipped for VFR flights.

#### 1.9 Communications

The aircraft was equipped with an on-board radio station enabling bidirectional radio connection of the flight with all aeronautical stations at all times.

#### 1.10 Aerodrome information

The pilot planned to land at LZSE. LZSE is a non-public national airport located 3.8 km to the south-west of Senica.

#### 1.11 Flight recorders

The aircraft was not equipped with any flight recorder to record flight parameters or with any other recording devices.

#### 1.12 Wreckage and impact information

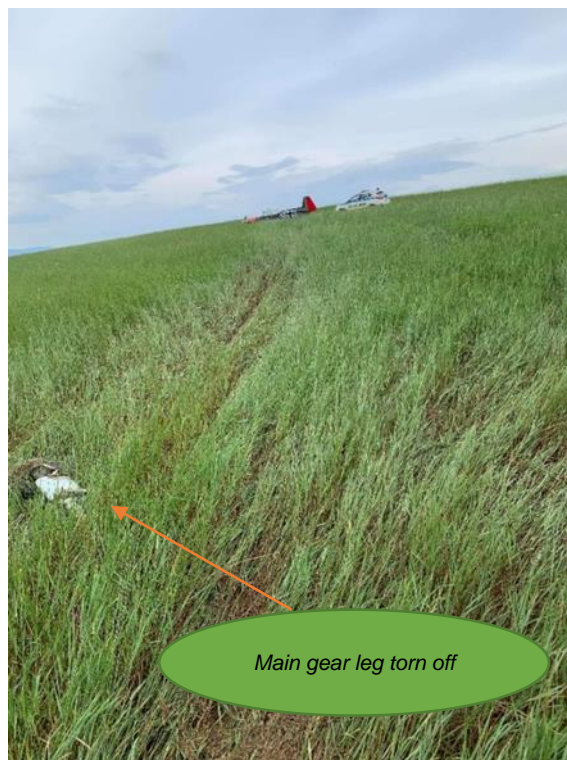
The accident site is located in the cadastral territory of Prieprasné and it may be delimited with coordinates as follows:

N 48°42'41.3"

E 17°33'45.2"



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**1.13 Medical and pathological information**

N/A

**1.14 Fire**

None.

**1.15 Survival aspects**

It was not necessary to perform any search or rescue with SAR equipment.



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#### 1.16 Tests and research

Samples of operating fluids were examined:

AVGAS 100LL kerosene sample - sent for testing to VÚRUP, a.s.; test result: the AVGAS 100LL kerosene sample meets the requirements of the ASTM D 910 standard in all parameters tested;

TOTAL D100 engine oil sample - sent for testing to MOL-LUB, spoločnosť pre výrobu, distribúciu a servis mazív, s.r.o.; test result: all oil characteristics are satisfactory.

#### 1.17 Organizational and management information

N/A

#### 1.18 Additional information

On 25 June 2019

The Safety Investigation Committee inspected the aircraft and removed and partially dismantled the engine at LZSE.

The following was discovered during the visual inspection:

- the aircraft was transported from the accident site and placed on a trailer with wings dismantled in the hangar of the Aeroclub Senica;
- the fuel from the tanks was pumped out by the technical staff of the Aeroclub Košice to plastic containers (35 l) and secured against mishandling in the Aeroclub Senica hangar;
- damage to the lower part of the wing, fuselage, landing gear legs torn off and major damage to the propeller.

The following was discovered after partial disassembly of the engine:

- fuel presence in fuel filter cups and fuel nozzles of the engine;





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- no impurities which may have affected the engine function were detected during the oil filter visual inspection;



- **presence of water (drops) in exhaust apertures of the first three cylinder heads;**
- remains of grass in the engine intake manifold.

Conclusion:

- aircraft tanks contained such an amount of fuel which was sufficient to perform the flight to LZSE;
- **the engine was working until the propeller hit the ground.**

The removed engine was transported to the Aeroclub Košice.

On 15 July 2019

The OM-MFN engine was installed into fuselage of an aircraft type Z-226 MS, registration mark OM-MQK.

The Safety Investigation Committee conducted an engine test at the Košice airport / LZKZ with members of the Aeroclub Košice present.

Low oil pressure in the oil system was detected during the first start (after the accident). After venting the oil system (during a second start), all operational parameters of the engine reached the prescribed values.

#### 1.19 Useful or effective investigation techniques

Common investigation methods were applied.

## **2 ANALYSIS**

### **Pilot activity**

According to the pilot's report, after the second attempt to transfer fuel, the engine performance decreased and the engine was operating irregularly. At that time the aircraft was flying in a rain shower what may have caused the engine performance to decrease (water sucked into the engine - detected after the engine disassembly). Since the pilot did not manage to restore the engine power according to his report, he decided to perform an emergency landing into terrain.

### **3.1 Findings**

- the pilot had valid licenses to perform flights in the particular aircraft category;
- at the time of the accident the pilot was not under the influence of alcohol or narcotic drugs which could have reduced the pilot's attention during the flight and when dealing with the critical situation;
- the aircraft met airworthiness conditions before the critical flight according to the available documentation;
- the aircraft was not equipped with a flight data recorder to record the flight parameters so the flight analysis is based on witness reports and on the documentation provided;
- the fuel system of the aircraft contained a sufficient amount of fuel of suitable quality;
- the oil system of the engine contained a sufficient amount of fuel of suitable quality;
- the engine was working until the propeller hit the ground;
- the pilot's decision to transfer fuel was not justified due to a lack of time left from the decision to transfer fuel until landing at LZSE.
- the meteorological conditions may have had an impact on the occurrence of the accident.

### **3.2 Cause of the accident**

Mishandled emergency landing in unsuitable meteorological conditions which was performed on a wet and inclined terrain at a higher speed and with insufficient levelling before touching the ground.

## **4 SAFETY RECOMMENDATIONS**

The Final Report on safety investigation of the aviation accident does not contain any recommendations.

In Bratislava, on 26 November 2019