MINISTRY OF JUSTICE OF THE REPUBLIC OF LITHUANIA
TRANSPORT ACCIDENT AND INCIDENT INVESTIGATION DIVISION

Accident to cargo aircraft Boeing 737-400SF, registered EC-MFE, operated by Swiftair, that occurred on 25 November 2024 near Vilnius International Airport, in Vilnius, the Republic of Lithuania

INTERIM REPORT

No. (A-24/23) 1A-242
20 December 2024

FOREWORD

The safety investigation is conducted in accordance with Annex 13 Aircraft Accident and Incident Investigation to the Convention on International Civil Aviation and Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and repealing Directive 94/56/EC.

The purpose of the safety investigation is to prevent the occurrence of accidents and incidents in the future, rather than establish blame or liability. The safety investigation is conducted independently of any judicial or administrative proceedings, to apportion blame or liability, are not related to them, and have no impact thereupon.

In accordance with Article 5.4.6 of Annex 13 to the Convention on International Civil Aviation, for accidents that draw heightened public attention, the accident investigation authority should publish a written Interim Report within thirty days of the accident containing established factual information and indicating the progress of the investigation.

The safety investigation Interim Report cannot be used as evidence in a judicial or administrative process seeking to apportion blame or liability, because this was not established in the course of the safety investigation, and it is not compatible with the objective of the safety investigation.

The safety investigation Interim Report is based only on the data obtained during the early stage of safety investigation. This information is published to inform the aviation industry and the public of the general circumstances of accident. Extracts may be published without specific permission providing that the source is duly acknowledged, the material is reproduced accurately, and it is not used in a derogatory manner or in a misleading context.

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SUMMARY

Owner	Swiftair
Operator	Swiftair
Manufacturer	The Boeing Company
Aircraft Type	Boeing 737-400SF
Registration	EC-MFE
Place of accident	Near Vilnius International Airport, Vilnius, Republic of Lithuania 54°39'27.86" latitude 025°18'7.31" longitude
Date and Time	25 November 2024 3:28 UTC[1]

Synopsis

On 25 November 2024 at 02:08 hrs the cargo aircraft Boeing 737-400SF, registration EC-MFE, operated by Swiftair, had departed Leipzig/Halle airport (EDDP/LEJ), Germany, with a destination of Vilnius International Airport (EYVI/VNO), Lithuania. The cargo aircraft had a crew of two pilots and two passengers[2]. At 03:28 hrs the Boeing 737-400SF impacted the ground short of runway RNW19 on approach to the Vilnius International Airport (EYVI/VNO). The aircraft was destroyed. The captain was fatally injured, and the co-pilot and two passengers were seriously injured.

Safety investigation

On 25 November 2024 at 4:12, Vilnius International Airport informed the Transport Accident and Incident Investigation Division (TAIID) of the Ministry of Justice of the Republic of Lithuania about the accident of the cargo aircraft Boeing 737-400SF, registration EC-MFE, operated by Swiftair, that occurred near Vilnius International Airport, in Vilnius, the Republic of Lithuania.

In accordance with the provisions of Article 5.1 of Annex 13 to the ICAO Convention on International Civil Aviation and Article 5(1) of Regulation (EU) No. 996/2010 of the European Parliament and of the Council of 20 October 2010 on

[1] The times in this report are in Coordinated Universal Time (UTC). Lithuanian daylight saving time is UTC+2.
[2] They were employees on official travel, therefore there was no requirement to have a flight attendant present.

the investigation and prevention of accidents and incidents in civil aviation and repealing Directive 94/56/EC (hereinafter – Regulation (EU) No. 996/2010), the TAIID immediately initiated an accident safety investigation and appointed the Investigator-in-Charge. The TAIID is the independent structure part of the Ministry of Justice which is independent from the transport and judicial authorities.

In accordance with the Article 4.1 of Annex 13 to the ICAO Convention on International Civil Aviation and the Article 9(2) of Regulation (EU) No. 996/2010, the TAIID without delay notified about the accident the European Commission, European Union Aviation Safety Agency (EASA), the International Civil Aviation Organisation (ICAO), the State of Registry and Operator of the aircraft and the State of Design and Manufacture of the aircraft.

In accordance with the Article 10(1) of Regulation (EU) No. 996/2010, the Civil Aviation Accidents and Incidents Investigation Commission (*Comisión de Investigación de Accidentes e Incidentes de Aviación Civil*, CIAIAC) of the Kingdom of Spain, representing the State of Registry and Operator of the aircraft, appointed Accredited Representative to participate in the safety investigation. He was supported by advisors from the CIAIAC, the Spanish Aviation Safety and Security Agency (*Agencia Estatal de Seguridad Aérea*, AESA) and the operator Swiftair of the aircraft.

In accordance with the Article 4.10 of Annex 13 to the ICAO Convention on International Civil Aviation, the National Transportation Safety Board (NTSB) of the United States, representing the State of Design and Manufacture of the aircraft, appointed Accredited Representative to participate in the safety investigation. He was supported by advisors from the NTSB, the Federal Aviation Administration (FAA), Honeywell International Inc. and the Boeing Company.

In accordance with the Art. 8 of Regulation EU No. 996/2010, the EASA and public agency Transport Competency Agency (*VšĮ Transporto kompetencijų agentūra*, TKA) (as national civil aviation authority) appointed advisers to participate in the safety investigation.

In accordance with the Art. 6(1) of Regulation (EU) No. 996/2010, the TAIID requested the assistance of the German Federal Bureau of Aircraft Accident Investigation (*Bundesstelle für Flugunfalluntersuchung*, BFU). The BFU agreed to provide assistance in accordance with European Network of Civil Aviation Safety Investigation Authorities (ENCASIA) Mutual Support System (EMSS). The EMSS is designed to facilitate mutual support between European Safety Investigation Authorities, ensuring that resources and expertise are shared when needed, particularly in complex or resource-intensive investigations. The BFU appointed Assisting Investigator-in-Charge to participate in the safety investigation. He was supported by advisors from the BFU. This cooperation demonstrates the value of collaboration in maintaining high standards of aviation safety investigations in Europe Union. Also, it shows the close and direct collaboration of Lithuanian and German independent authorities.

The safety investigation is conducting under the provisions of Annex 13 to the ICAO Convention on International Civil Aviation and the Regulation (EU) No. 996/2010. The purpose of the safety investigation is to prevent the occurrence of accidents and incidents in the future, rather than establish blame or liability.

FACTUAL INFORMATION

1.1. History of the flight

The crew was scheduled to operate two cargo flights legs from Leipzig/Halle airport (EDDP/LEJ), Germany, to Vilnius International Airport (EYVI/VNO), Lithuania (Figure 1), and return. In addition to the two flight crew members two passengers were on board.

The co-pilot was the pilot flying for the first sector, and it was night.

Figure 1. Flight Path (GoogleMaps, edited by BFU)

At 02:08 hrs the aircraft took-off from Leipzig Halle airport (EDDP/LEJ). The take-off at RWY26L from Leipzig Halle airport (EDDP/LEJ) and subsequent climb proceeded without event. The aircraft turned right to an easterly heading and climbed to cruising altitude FL 330 which was reached approximately at 02:25 hrs.

At 03:01:42 hrs the crew started the approach briefing. The crew discussed the relevant charts and set frequencies and courses.

At 03:06:25 hrs the crew completed the descent checklist, omitting the landing data step. Then the crew discussed to expect icing, moderate turbulence and clouds below FL 220.

At 03:08:50 hrs Warszawa area control centre (ACC) indicated the frequency of Vilnius ACC 133.305 MHz.

At 03:09:09 hrs the captain tried to contact Vilnius ACC reporting to descend to FL 290, but got no response.

At 03:09:25 hrs the captain made further explanation of Vertical Navigation (VNAV) descent with anti-ice on.

At 03:09:56 hrs the captain tried to contact Vilnius ACC again. After a discussion with the co-pilot about the correct frequency, the captain changed the frequency and radioed Vilnius ACC at 03:10:11 hrs. Vilnius ACC responded and gave the clearance to descent to FL 100.

At 03:12:43 hrs the crew discussed again about anti-ice on in accordance with weather conditions.

At 03:17:27 hrs Vilnius ACC instructed the crew to change frequency to Vilnius Aerodrome Control Centre (VACC) Vilnius approach air traffic controller on 120.705 MHz. During this radio transmission, at 03:17:30 hrs, the Cockpit Voice Recorder (CVR) recorded an audible double click. At 03:17:32 hrs the captain read back the radio frequency correctly. The Flight Data Recorder (FDR) data shows that at 03:17:34 hrs the HYD SYS B ELEC pump and HYD SYS B EDP both went into the OFF position. At 03:17:35 hrs the HYD SYS ENG R indicated low pressure (Appendix B). The autopilot, which was engaged in CMD B, disconnected and an aural alert was triggered. A master caution light was also triggered but was immediately cancelled by the crew. Two additional attempts were made to re-engage the autopilot B, however they were both unsuccessful (Appendix B). The co-pilot flew the aircraft from this point forward with autopilot disengaged and auto-thrust engaged.

According to the CVR the captain made two attempts to contact VACC Vilnius approach air traffic controller. The captain switched to the previous frequency of Vilnius ACC and at 03:18:19 hrs asked to confirm 118.705 MHz as frequency of VACC Vilnius approach air traffic controller. Vilnius ACC corrected the frequency to 120.705 MHz.

At 03:18:47 hrs the captain established radio contact to VACC Vilnius approach air traffic controller.

At 03:20:01 hrs the captain recognized that the autopilot was disconnected at about the same time as he attempted to engage engine anti-ice switches. The point was not further discussed by the crew. FDR data show that the anti-ice switches were not engaged at this time (Appendix B).

At 03.22:42 hrs the crew accomplished the approach checklist, but no the landing checklist was accomplished.

At 03:22:57 hrs the co-pilot asked if anti-ice is on. The captain confirmed.

At 03:23:44 hrs the crew discussed measures to reduce speed, the captain deployed the speed brakes and advised the co-pilot to raise the nose.

At 03:24:29 hrs the captain stated for flaps 5. The CVR recorder an audible several clicks, which were most likely coming from a flap handle movement. FDR data show that the actual flap position remained at flaps zero (flaps up) (Appendix B).

At 03:26:15 hrs the aircraft reached the final approach phase (Figure 2). At the same time the co-pilot asked the captain for gear down and flaps 15. The captain stated that there were still very fast and that the co-pilot has to reduce speed first.

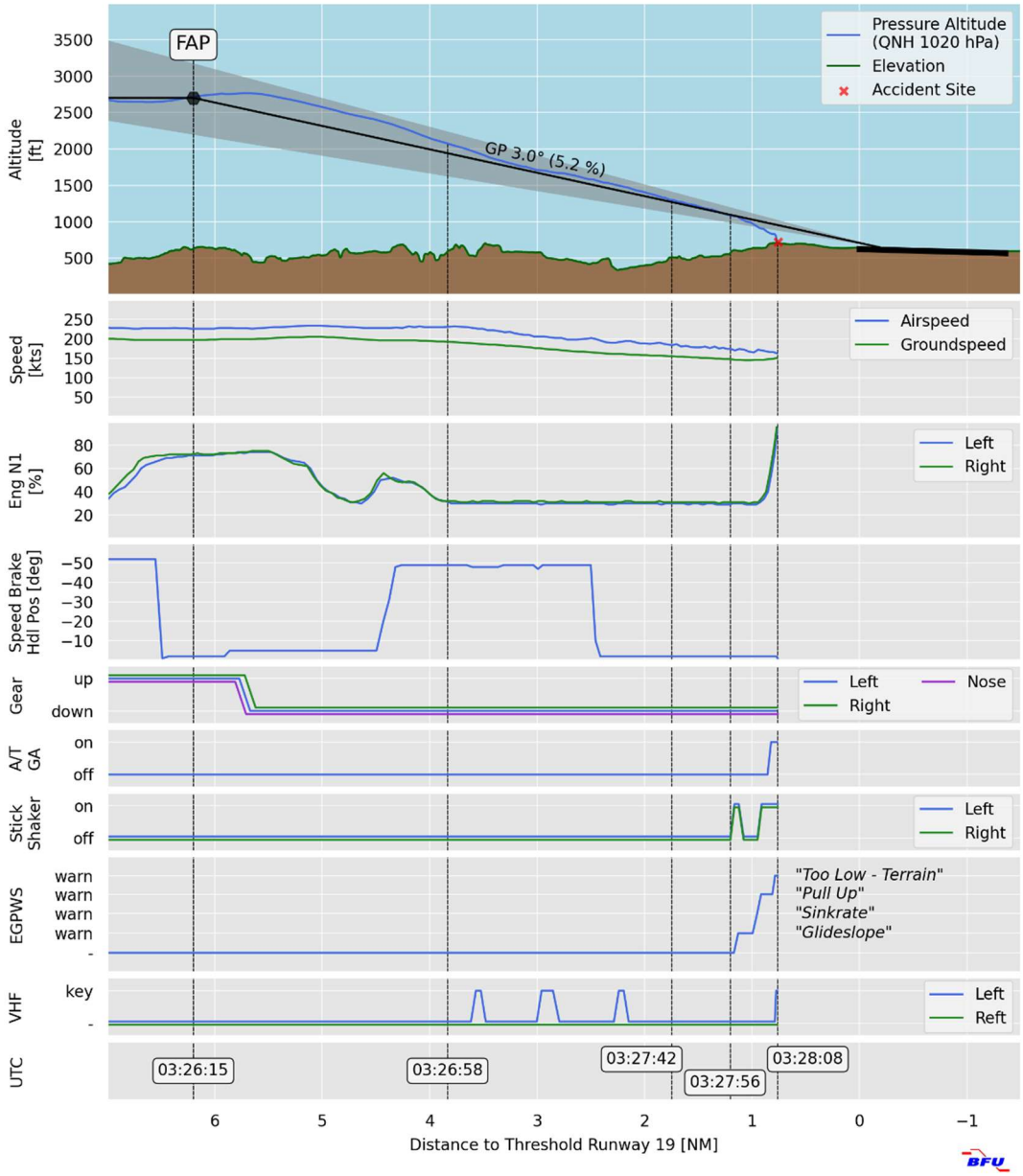


Figure 2. FDR overview plot of the final approach phase of the flight

At 03:26:58 hrs VACC Vilnius approach air traffic controller contacted the crew and stated for "Postman one eight delta, four miles from touchdown, contact tower, one one eight two zero five". According to the CVR the captain responded to the radio call for change to tower frequency "one one eight zero five, postman one eight delta", but was transmitted "zero five, postman one eight delta". The crew was not on VACC Vilnius approach air traffic controller or VACC Vilnius aerodrome air traffic controller frequency from the point on (Figure 2). The captain made two more attempts to contact VACC Vilnius aerodrome air traffic controller on the incorrect frequency.

At 03:27:42 hrs the captain stated that the runway is in sight and the co-pilot should further reduce speed (Figure 2). This happened simultaneously with the captain recognizing that he selected the wrong frequency.

At 03:27:56 hrs the co-pilot recognized that flaps are retracted (Figure 2). Immediately after, the stick shaker activated and a "Sink Rate, Pull Up" warning was triggered by the enhanced ground proximity warning system (EGPWS). At 03:28:02 hrs the crew called for go around. The auto throttle was set to Go-Around (GA) mode and the engines accelerated to above 90% N1 at impact (Appendices B and C).

At 03:28:07 hrs a "too low – terrain" warning was triggered by the EGPWS. One second later the aircraft impacted into the ground (Figure 2).

1.2. Injuries to the persons

The crew were citizens of the Kingdom of Spain. One passenger was citizen of the Federal Republic of Germany, and the second one passenger was the citizen of the Republic of Lithuania (Table 1).

Table 1. Injuries to the persons

Injuries	Crew	Passengers	Total in the aircraft	Others
Fatal	1		1	
Serious	1	2	3	
Minor				Not applicable
None				Not applicable
Total	2	2	4	

1.3. Damage to aircraft

The aircraft was destroyed.

1.4. Other damage

Damage to the houses, trees and ground.

1.5. Personnel information

1.5.1. The captain

The captain was a 48-year-old citizen of the Kingdom of Spain. He held part FCL Airline Transport Pilot License ATPL(A) issued by the Spanish State Aviation Safety Agency (*Agencia Estatal de Seguridad Aérea*, AESA) on 28 August 2015. The licence contained B737 300-900 and IR(A) ratings valid until 31 October 2025 and English language proficiency (level 5) valid until 30 November 2029. The captain had part MED class 1 medical certificate issued by AESA and valid until 14 November 2025. His last medical examination took place on 5 November 2024 (no limitations).

The captain had been working for the operator since 2011 where he had had previously flown in the ATR fleet occupying First officer and Captain positions (Captain since 2016). Since 2021, the captain has been flying the B737 as a Captain. Additionally, the captain held the position of Commercial Manager within the operator.

The captain did his last recurrent simulator training on 5 September 2024 and last operator proficiency check was performed on 6 September 2024.

The captain had a total of 5432:38 flight hours, of which 1298:08 flight hours were on the type of aircraft involved in the accident. Table 2 shows a summary of his flight experience.

Table 2. The captain's flying experience

	hours
Total	5432:38
ATR captain	1946:55
ATR first officer	1629:44
B737 captain	1298:08
Previous before Swiftair	557:51
During last year	315:17
In the last 90 days prior to the accident	121:13
In the last 30 days prior to the accident	55:11
In the last 7 days prior to the accident	15:37
In the last 24 hours prior to the accident	01:20

1.5.2. The co-pilot

The co-pilot was a 34-year-old citizen of Kingdom of Spain. He held part FCL Commercial Pilot License CPL(A) issued by AESA on 14 February 2023. The licence contained B737 300-900 and IR(A) ratings valid until 30 September 2025, SEP (land)/SP rating valid until 30 September 2026, FI(A) (restricted SEP) certificate valid until 31 May 2026 and English language proficiency (level 6). The co-pilot had part MED class 1 medical certificate issued by AESA and valid until 22 September 2025 with VDL limitation (shall wear corrective lenses and carry a spare set of spectacles). His last medical examination took place on 20 August 2024.

The co-pilot worked in operator since 28 February 2024.

The co-pilot did his last recurrent simulator training on 19 September 2024 and last operator proficiency check was performed on 20 September 2024.

He had a total of 520:17 flight hours, of which 190:38 flight hours were on the type of aircraft involved in the accident. Table 3 shows a summary of his flight experience.

Table 3. The co-pilot's flying experience

	hours
Total	520:17
B737 co-pilot	190:38
Previous before Swiftair	329:39
During last year	193:04
In the last 90 days prior to the accident	70:11
In the last 30 days prior to the accident	29:14
In the last 7 days prior to the accident	3:15
In the last 24 hours prior to the accident	01:20

1.5.3. Vilnius approach air traffic controller

The approach controller was a 43-year-old citizen of Lithuania. She held Air Traffic Controller licence issued on 1 June 2023 by the Transport Competences Agency (TKA) of the Republic of Lithuania in accordance with Commission Regulation (EU) 2015/340. The licence contained the following ratings: Aerodrome Control Instrument (ADI) first issued 2 March 2005, Approach Control Surveillance (APS) first issued 11 November 2005, Tower Control/Aerodrome Radar Control

(TWR/RAD) first issued 2 March 2005, Ground Movement Surveillance (GMS) first issued 28 April 2021. All ratings for EYVI (Vilnius) airport were valid until 31 July 2026. It also showed a Lithuanian language proficiency (level 6) and an English language proficiency (level 4) valid until 29 August 2026. The approach controller had class 3 medical certificate issued on 5 September 2024 by the TKA in accordance with Part-ATCO.MED and valid until 22 September 2025.

1.5.4. Vilnius tower air traffic controller

The tower controller was a 38-year-old citizen of Lithuania. He held air traffic controller licence issued on 20 August 2024 by the TKA in accordance with Commission Regulation (EU) 2015/340. The licence contained following ratings: Aerodrome Control (ADC) first issued 19 February 2016, Approach Control Surveillance (APS) first issued 19 February 2016, Aerodrome Control Surveillance (SUR) first issued 19 February 2016. All ratings for EYVI (Vilnius) airport were valid until 1 October 2027. It also showed a Lithuanian language proficiency (level 6) and an English language proficiency (level 4) valid until 4 September 2027. The tower controller had class 3 medical certificate issued by the TKA in accordance with Part-ATCO.MED on 17 May 2023 and valid until 9 June 2025.

1.6. Aircraft information

1.6.1. General

The Boeing 737-400 is a twin engine short-to-medium-range narrowbody airliner launched in 1985. The Boeing B737-400, S/N 24445, was built in 1993. It had a wingspan of approximately 28.9 meters and a length of approximately 35.2 meters. The aircraft was equipped with two CFM56-3C1 jet engines.

In 2015, it has been converted from passenger into freighter configuration Boeing 737-400SF according to supplemental type certificate (STC) ST01827LA issued by the FAA and approved by the EASA (10015732).

This cargo conversion consisted of the installation of an 86"x140" cargo door on the left side of the fuselage, and modification of main deck to a Class E cargo compartment. After conversion the aircraft was able to carry ten 88”x125” AAA full height containers or pallets plus one AEP/AEH, with pallet weights up to 8,000 lbs. The forward end of the cargo compartment was closed with a 9 g barrier with sliding door. According to the STC the maximum take-off mass was 68,038 kg and the maximum landing mass was 56,245 kg.

Prior the accident flight the aircraft accumulated 63,573 flight hours and 43,745 flight cycles.

The aircraft was maintained in according with EASA Part-M. in accordance with Commission Regulation (EU) No 1321/2014[3]. The latest maintenance actions were:

- Daily Check on 25 November 2024, 01:00 UTC
- A-Check on 16 November 2024 and on 13 October 2024
- C-Check on 8 December 2022

There were no relevant deferred defects recorded prior to the accident flight.

According to the load sheet the actual take-off mass for the accident flight was 59,782 kg and the calculated landing mass 55,814 kg with a CG at 17.1 % mean aerodynamic chord. The calculated stabilizer trim position was 3.94 with flaps 5 and 3.09 with flaps 15.

According to the load sheet found in the flight deck there were no last-minute changes.

According to the Notification to Captain – Summary Sheet the aircraft was carrying 200 kg of dry ice and 362 kg of Lithium-Ion batteries.

[3] Commission Regulation (EU) No 1321/2014 of 26 November 2014 on the continuing airworthiness of aircraft and aeronautical products, parts and appliances, and on the approval of organisations and personnel involved in these tasks.

1.6.2. Hydraulic system

According to the Maintenance Manual provided by the type certificate holder, the aircraft is equipped with three separate hydraulic systems. They are called system A, system B and standby system.

The pressure source for each of the A and B systems consists of one Engine-Driven Pump (EDP) and one Electric Motor-Driven Pump (EMDP). The EDP is directly coupled to the engine accessory gearbox and runs all the time that the engine is running. When an ELEC pump switch is ON, the respective EMDP runs continuously. The output of the EDP can be shut off by a depressurization valve on the pump. This valve closes the pump outlet port when the engine pump switch on the hydraulic control panel is moved to OFF.

The pressure source for the standby system is an EMDP. The standby EMDP is turned on automatically if system A or B fails (either system pressure is less than 1200 psig and main gear wheel speed is greater than 60 knots) during take-off or landing, or it can be turned on manually by setting either the FLT CONTROL A, or FLT CONTROL B, switch to STB RUD, or the ALTERNATE FLAPS switches to ARM, on the overhead flight control panel P5 (Figure 3).

A Power Transfer Unit (PTU) operates automatically if pressure from the B EDP is less than 2400 psig, flaps are greater than 0 but less than 15, and the aircraft is in the air. The PTU consists of a hydraulic motor connected to a hydraulic pump. The motor is driven by system A hydraulic pressure and the pump supplies pressure to the leading-edge devices using system B hydraulic fluid.

The Hydraulic Control Panels are on the P5 overhead panel and contain the pump select switches and system warning lights. The pump select switch for each EDP and EMDP is an ON/OFF toggle switch and is accompanied by a pump low pressure light. The P5 panel also includes overheat lights, which are illuminated when an overheat is detected from the EMDP case drain fluid. Furthermore, the P5 panel has warning lights for low pressure and low fluid quantity in the standby system.

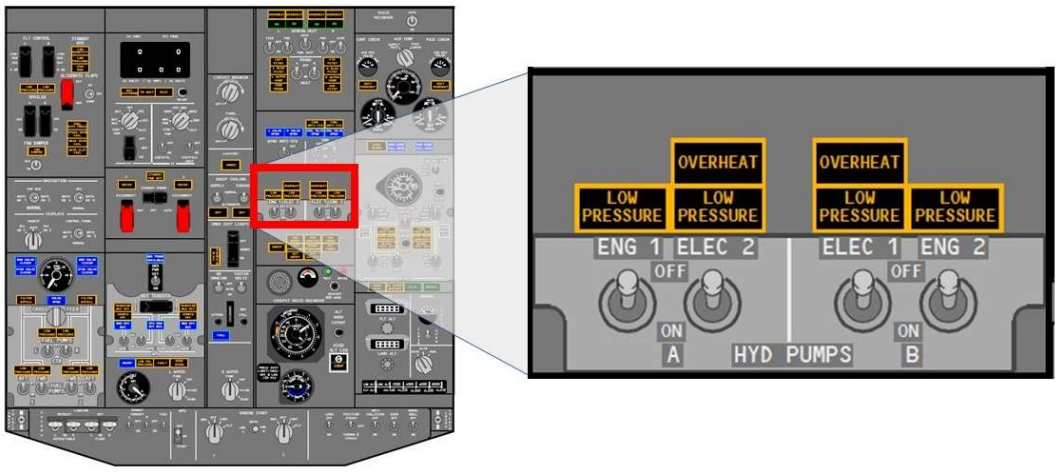


Figure 3. Location of hydraulic pump select switches on the Overhead Panel P5 (Image Copyright © Boeing. Reproduced with permission, modified)

1.6.3. Hydraulic distribution

According to the Crew Operations Manual provided by the type certificate holder the following components are powered by the hydraulic system A:

- ailerons
- rudder / yaw damper
- elevator and elevator feel

- flight spoilers (one on each wing)
- ground spoilers
- alternate brakes
- No. 1 thrust reverser
- autopilot A
- normal nose wheel steering
- landing gear
- power transfer unit (PTU)

Furthermore, the following components are powered by the hydraulic system B:

- ailerons
- rudder / yaw damper
- elevator and elevator feel
- flight spoilers (one on each wing)
- leading edge flaps and slats / autoslats
- normal brakes
- No. 2 thrust reverser
- autopilot B
- trailing edge flaps

Furthermore, the following components are powered by the hydraulic Standby system:

- Leading edge flaps and slats / autoslats
- Standby rudder
- No. 1 and No. 2 thrust reversers

Either A or B hydraulic system can power all flight controls with no decrease in airplane controllability.

1.6.4. Engine inlet cowl anti-icing system

The engine inlet cowl anti-icing system is a thermal system using engine hot bleed air from the 5th and 9th stages of the high-pressure compressor (HPC) section. The function of the system is to maintain ice free inlet cowl surfaces during flight and ground operations.

Each engine anti-ice system operates independently. Each valve is pneumatically operated and electrically controlled by a switch located on the P5 overhead panel (Figure 4). The associated valve position indicator lights and warning lights are located adjacent to the switches.

Figure 4. Location of Engine Anti-Ice Switches on the Overhead Panel P5 (Image Copyright © Boeing. Reproduced with permission, modified)

1.7. Meteorological information

Vilnius Aviation Meteorological Station of the Lithuanian Hydrometeorological Service (LHMS) under the Ministry of Environment recorded meteorological conditions at the time of the accident. The station is 649 ft above sea level and 2 km south of the accident site.

At the time of the accident wind was from direction 170° with the speed of 17 knots, visibility more than 10 km, overcast clouds with ceiling at 700 ft above aerodrome level, air temperature was 01 °C, dew point -1 °C, atmospheric pressure at sea level 1020 hPa.

EYVI airport METAR and TAF information provided in Table 4 and Table 5, and Automatic Terminal Information Service (ATIS) provided in Table 6.

Table 4. METAR/SPECI from EYVI, Vilnius (Lithuania) 25/11/2024

Time UTC	Code
01:21:24	250120Z 18016KT 9999 OVC011 01/M01 Q1020 NOSIG=
01:51:06	250150Z 17016KT 9999 OVC010 01/M01 Q1020 NOSIG=
02:21:25	250220Z 17016KT 9999 OVC009 01/M01 Q1020 TEMPO OVC005=
02:52:16	250252Z 17019KT 9999 OVC008 01/M00 Q1019 TEMPO OVC005=
03:21:22	250320Z 17017KT 9999 OVC007 01/M01 Q1020 TEMPO OVC005=
03:51:06	250350Z 17015KT 9999 OVC008 01/M00 Q1020 TEMPO OVC005=
04:21:22	250420Z 17015KT 9999 OVC008 01/M00 Q1020 NOSIG=

Table 5. TAF from EYVI, Vilnius (Lithuania)

Time UTC	Code
242300Z 2500/2524	17013KT 9000 BKN010 OVC015 TEMPO 2500/2506 16015G25KT 5000 -DZ BR OVC005 PROB30 TEMPO 2500/2502 -FZDZ TEMPO 2506/2509 18015G25KT BKN005 BECMG 2509/2511 SCT015=

Table 6. Vilnius airport ATIS messages

Load date / time	ATIS message
2024-11-25 02:52:42	This is Vilnius information “U” at 0252 UTC; expect own navigation for ILS Z approach; runway in use 19; condition report at 0300 UTC, runway condition codes 5 5 5 all part 100 percent wet, runway chemically treated; transition level 60; flock of birds in the vicinity; wind runway 19 touchdown 170 degrees 19 kt; visibility runway 19 touchdown 10 kilometres; clouds OVC at 800 ft; temperature 01; dew point minus 00; QNH 1019 hectopascals; trend tempo clouds OVC at 500 ft; acknowledge information “U” on 120,705 for arrivals and 118,205 for departures
2024-11-25 03:21:49	This is Vilnius information “V” at 0320 UTC; expect own navigation for ILS Z approach; runway in use 19; condition report at 0300 UTC, runway condition codes 5 5 5 all part 100 percent wet, runway chemically treated; transition level 60; flock of birds in the vicinity; wind runway 19 touchdown 170 degrees 17 kt; visibility runway 19 touchdown 10 kilometres; clouds OVC at 700 ft; temperature 01; dew point minus 01; QNH 1020 hectopascals; trend tempo clouds OVC at 500 ft; acknowledge information “V” on 120,705 for arrivals and 118,205 for departures

LHMS provided wind forecast information at the time of arrival. Winds were forecasted southern directions – at FL 020 – 40 kt (Figure 5) and at FL 025 – 35 kt (Figure 6).

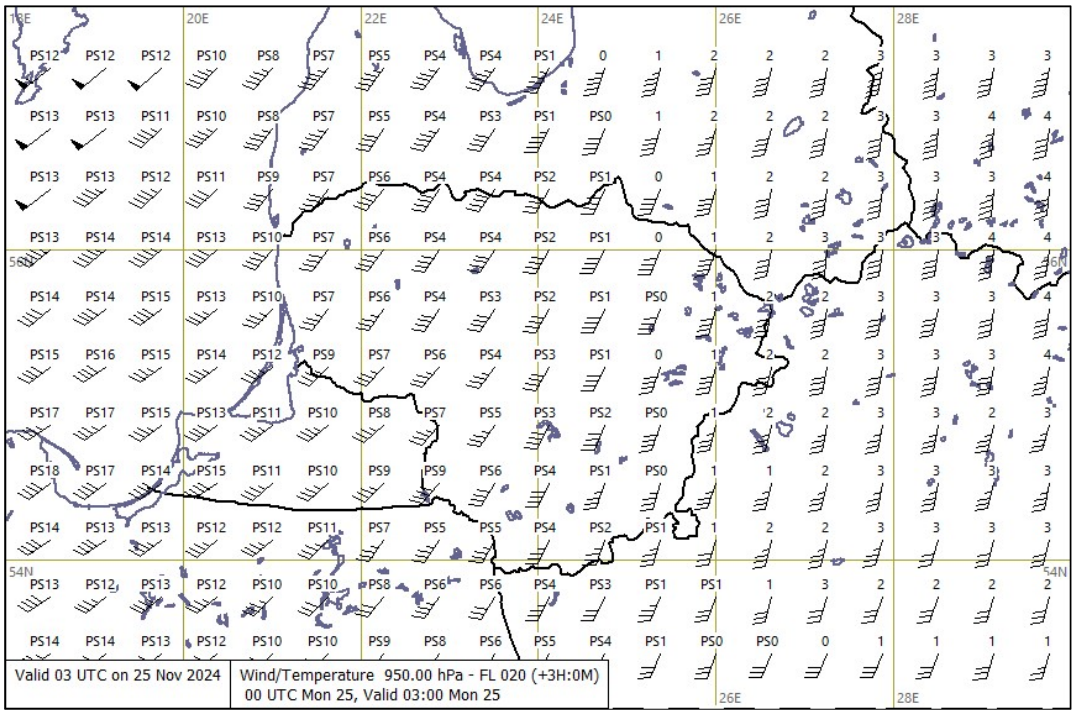


Figure 5. Wind forecast at FL 020 (source LHMS)

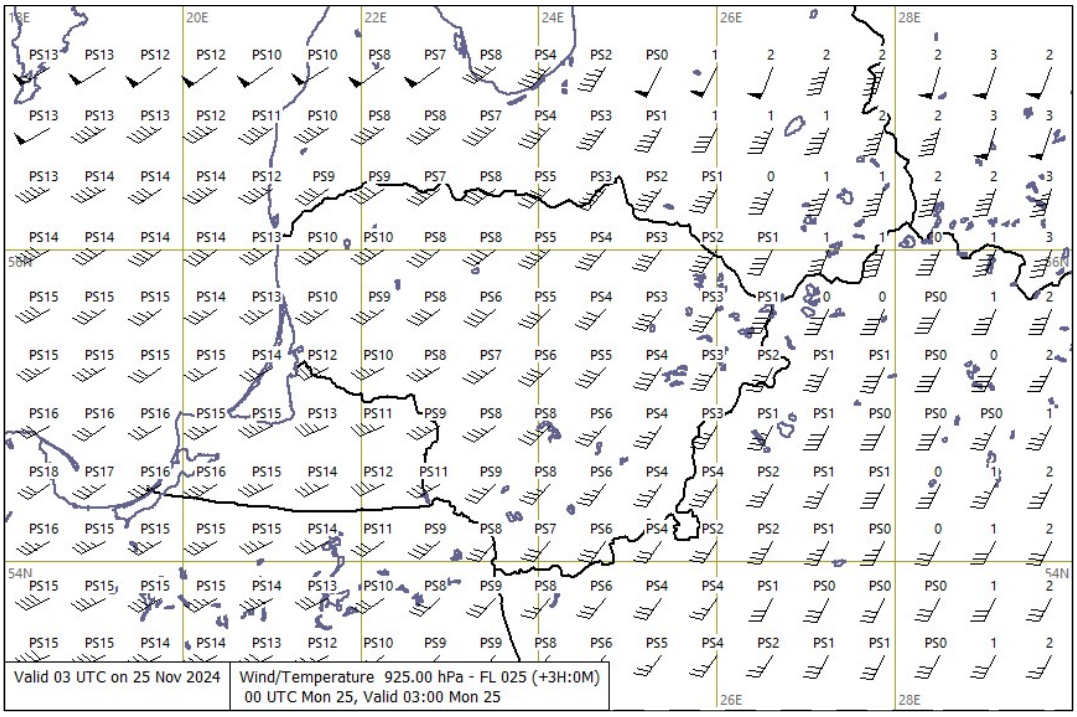


Figure 6. Wind forecast at FL 025 (source LHMS)

1.8. Aids to navigation

Not applicable at the time of Interim Report.

1.9. Communications

During the flight, the crew maintained radio communication. The transmissions were recorded and obtained during the safety investigation.

1.10. Aerodrome information

Vilnius International Airport is located 5,9 kilometres south of Vilnius city centre and has one asphalt construction runway running south as RWY19 and RWY01 north direction.

At the time of the accident RWY19 was in use.

RWY19 is approved for Category I ILS operations and has a Landing Distance Available (LDA) of 2515 m, is 50 m wide and has a threshold elevation of 649 ft. RWY01 has the same runway physical characteristics in regard of distances, nevertheless is approved for Category II ILS operations and has a threshold elevation of 595 ft. Instrument Approach Chart of Vilnius International Airport is provided in Appendix A.

Runway is equipped with approach light system with LED technology lights according to the Alpha – Ata scheme and PAPI visual approach landing indication system (on the right and left sides of the runway), threshold lights, touchdown zone lighting, centre line lighting and runway edge lighting. RWY19 and RWY01, the approach light system is supplemented with fleeting impulse lights. RWY01 supplemented with a second 150 m light horizon and approach side strip lights, additionally installed side threshold horizons and touchdown zone lights for category II operations.

1.11. Flight recorders

The aircraft was equipped with two flight recorders, a flight data recorder (FDR) and a cockpit voice recorder (CVR) (Table 7).

Table 7. Flight recorder information

	FDR	CVR
Manufacturer	Honeywell	Honeywell
Model	SSFDR	SSCVR
Part Number	980-4700-042	980-6022-001
Serial Number	7359	9942
Memory Type	Solid State	Solid State
Memory Size	36 MB	79 MB

The FDR receives and records a total of 321 flight parameters. A minimum of 25 hours flight data is stored within the Crash Survivable Memory Unit (CSMU).

The CVR receives and records audio data from the captain's, the first officer's and the optional third crew member's microphones and headphones, as well as ambient noise within the cockpit.

The audio from the headsets is compressed and stored for a minimum of 30 minutes recording time on three individual narrow band 8 kHz audio channels. The ambient audio recording is compressed and stored for a minimum of 2 hours on a wide band 16 kHz audio channel. The recorder stores an additional narrow band 8 kHz audio channel for a minimum of 2 hours containing the sum of the three narrow band audio channels.

The equipment and installation fulfil the regulatory requirements for flight recordings for Commercial Air Transport (CAT) operations in accordance with Regulation (EU) No 965/2012[4].

The recorders (Figure 7) were found at the accident site at the expected positions within the airframe (see chapter 1.12.1 for details).

Figure 7. Recorders after recovery from the accident site, CVR shown at the top and FDR shown at the bottom (source and copyright TAIID).

The recorders were sealed and transported to the German Federal Bureau of Aircraft Accident Investigation (BFU) flight recorders laboratory in Brunswick, Germany for inspection, repair, download and further analysis. The damaged chassis of both recorders were removed from the CSMU and the connectors to the memory boards were checked visually and electrically. No damages were found, and all electrical tests met the target values.

Then, replacement chassis were mounted to the CSMU's and the download of the recorded data was performed according to the manufacturer's specification.

The recorded data from both recorders was successfully retrieved. The download contains all data (flight data and audio) from the event flight until the aircraft impacted ground.

Data from the FDR was analysed and relevant parts plotted. The plots are shown in Figure 2 and Appendices B and C.

All recorded CVR channels meet the expected audio quality. The speech intelligibility for conversations between the crew members and with ATC were evaluated as "good" acc. to the ICAO Doc 10104[5] intelligibility scale.

On the recorded audio from the ambient microphone aural warnings, clicks and other background noises are distinguishable from each other.

[4] Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council.
[5] ICAO Doc 10104 Manual on Flight Recorder System Maintenance (FRSM), 1st Edition, 2020.

1.12. Wreckage and impact information

1.12.1. Description of the accident site

When approaching the accident site from the northeast, the first impact mark on the top of a tree was found at 54°39'28.19"N 025°18'7.81"E (used as reference point – RP, Figure 8). The RP was 1575 m from the threshold of Runway 19 of Vilnius Airport. The bearing from the RP to the threshold was 201.5°.

From the RP, the accident side extended in the direction of 210° for about 235 m to the southernmost aircraft part, which was the LH Engine (point 15, Figure 8). A house was located next to the LH Engine. This house was severely damaged from both the impact and subsequent fire. The fragments of the aircraft and cargo were spread over a corridor with a width of approximately 50 m.

The elevation at the RP was 665 ft MSL[6]. The terrain to the southwest sloped upward for 60 m to an elevation of 705 ft. After that the terrain flattened.

There was a group of trees 35 m southwest of the RP (point 3, Figure 8) whose crowns were cut on their western side at an angle of approximately 55° relative to horizontal.

The first impact mark on the ground was found at 54°39'27.86"N 025°18'7.31"E (point 2, Figure 8). It had a length of approximately 45 m and was oriented at approximately 200°. Within this mark, the first identifiable fragments from the aircraft structure were found (RH wingtip and RH horizontal stabilizer tip and one flap actuator).

A part representing approximately two-thirds of the RH Engine inlet cowling (point 4, Figure 8) was found 112 m, 218° from the RP. The RH Engine (point 5, Figure 8) was found separated from the Pylon at the northern section of the accident site without its cowling 155 m, 219° from the RP.

The LH tip of the Horizontal Stabilizer (point 6, Figure 8) was found 156 m, 206° from the RP. The Vertical Fin with the Rudder attached (point 7, Figure 8) was found next to the Horizontal Stabilizer.

The aft part of the fuselage (point 8, Figure 8) from the very end to STA 900 including door 2L was found 172 m, 207° from the RP. A large section of the crown area (9 x 3 m) forward of STA 900 was found next to it.

The FDR (point 8, Figure 8) was found within the aft fuselage section, still installed in its rack. The CVR (point 9, Figure 8) was found in the adjacent part of crown area, still installed in its rack. The rack and chassis of the CVR were bent, while the FDR showed no obvious damage.

The RH Main Landing Gear (point 10, Figure 8) was found 168 m, 210° from the RP.

Door 2R (point 11, Figure 8) was found 175 m, 216° from the RP.

A large (5 x 2 m) fragment from the RH skin of the fuselage including the two RH overwing emergency exit frames (point 12, Figure 8) and adjacent crown area was found 184 m, 215° from the RP.

[6] According to Google Earth™ data.

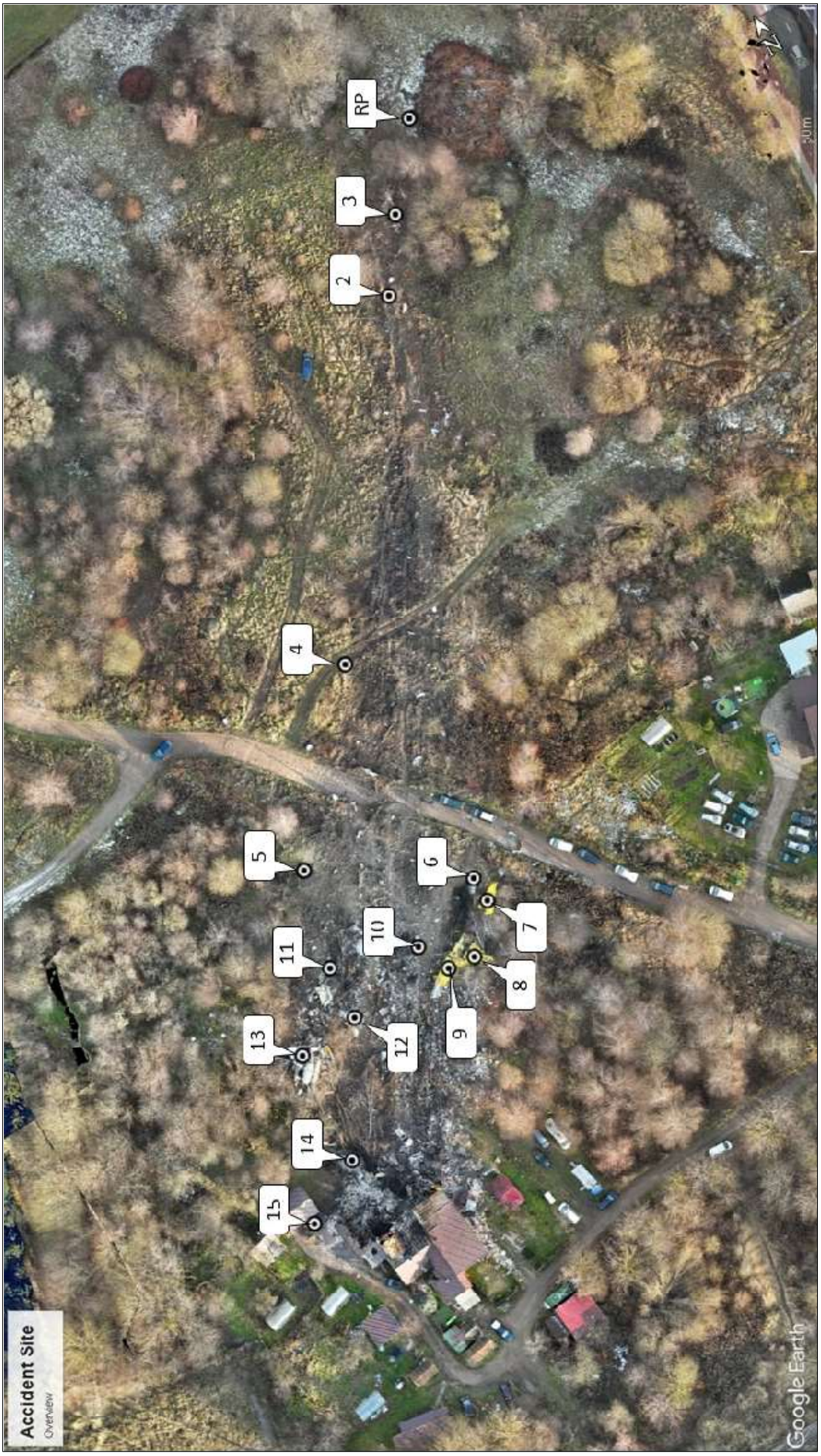


Figure 8. Accident site overview (source BFU/TAIID)

The front of the fuselage (point 13, Figure 8) was found 194 m, 217° from the RP resting on its left side. This included the Flight Deck, E&E Bay, and Nose Landing Gear from the forward pressure bulkhead to approximately STA 360. The section of fuselage containing the Main Cargo Door and terminating just forward of the Wing Box was lying next to the Flight Deck.

The LH Wing Root (point 14, Figure 8) including the center Wing Box were found 214 m, 214° from the RP. The LH Main Landing Gear was found within this section. Additionally, out-board portions of the LH Wing were buried beneath rubble from northern wall of the house.

The LH Engine (point 15, Figure 8) was found with its Pylon still attached 226 m, 216° from the RP at the southern end of the accident site leaning against the garage with an attached carport. Metal columns supporting the roof of the carport remained undisturbed.

The engine fire bottles were found still attached to their mounting structure on the center Wing Box. The APU Fire Bottle was found within the Empennage still attached to its mounting structure. Two more fire bottles were found within the wreckage area.

Two crew oxygen bottles and two portable oxygen bottles were located in the wreckage.

Indications of ground fire start approximately 67 m, 212° from the RP and extend throughout the accident scene to the house. The areas that appear to have burned hottest were observed near the LH Wing.

1.12.2. Examination at the accident site

1.12.2.1. Flaps

Five (of eight) trailing edge flap actuators (ball screw and ball nut) were found in the wreckage. Flap actuators 2-4 were located, still attached to the left wing. Three trailing edge flap actuators from the right wing were found near the area of the initial impact, along the wreckage path; each actuator was found separated from its wing structure.

As an estimate of the flap position at the time of impact, the distance between the yoke and the ball nut was measured for each of the found ball screw and ball nut combinations. The measurements determined that all recovered trailing edge flap screws which had an accompanying ball nut were in a flap retracted position.

The guard for the Alternate Flap OFF/ARM Switch was found in place with the anti-tamper wire intact.

The flight deck flap handle assembly was dislocated axially from the flap handle gates. The flap handle was found to be in a position forward of the Flap Zero selection. A witness mark was noted on the forward half of the Flap Zero gate. A smaller, second witness mark was noted on the Flap 15 gate.

1.12.2.2. Hydraulic Power

The Flight Deck Hydraulic Pressure Indicators for System A and B showed approximately 3000 psi and 0 psi, respectively. Both Hydraulic Quantity Indicators on the flight deck were recovered. As the Hydraulic Quantity Indicators were rotated, their needles moved freely. However, during laboratory examination of the indicators, a clear impact mark from the indicator on the scale of System B was visible. It indicated a Hydraulic Fluid Level close to full (blue dot).

Both the gated switches for the Engine-Driven and Electric Motor-Driven Hydraulic Pumps for System B on the overhead Panel P5 were found OFF; however, the switches for System A were ON (Figure 9). The switch for the Engine-Driven Hydraulic Pump for System A was deformed to the left.

Figure 9. Position of the hydraulic pump select and anti-ice switches on the P5 (source TAIID).

1.12.2.3. Anti-Icing system

The Wing Anti-Icing Switch and both Engine Anti-Icing Switches were found in the OFF position (Figure 9).

1.12.2.4. Landing gear

Each of the three landing gear – two main landing gear and one nose landing gear – were identified in the wreckage. The nose landing gear was extended; however, it was not possible to determine if it was fully extended and locked. The position of the retraction beam of the RH landing gear was down and locked, and the torque link was broken. It was not possible to determine the position of the LH retraction beam. The landing gear handle on the Flight Deck was found in the down position.

1.12.2.5. Cargo and accessory compartments

The Main Cargo Door was found closed. The 9G Net was found and no anomalies were observed. The Forward Rigid Barrier was broken at several of the attachment points to the fuselage; however, no evidence of cargo impact was identified on the surface of the Forward Rigid Barrier facing the main cargo deck.

The Aft Pressure Bulkhead was found breached and crushed. Most of the systems bulkhead penetrations (for flight control cables, wiring, fuel line, etc.) were found to be still intact and continuous. The insulation blankets on the surface facing the main cargo deck were mostly in place but had lost several attachment points. The impact damage to the Aft Pressure Bulkhead made it impossible on-site to conclusively determine if the cargo shifted aft into the Bulkhead, however, no evidence of a cargo shift was observed.

1.12.2.6. Powerplant

Both engines appear to have been producing power at impact, since many fan and turbine blades of both engines were found to be bent or broken off. The LH Thrust Reverser Translating Sleeves were found in the forward, stowed position. The RH Thrust Reverser Translating Sleeves were found to be ripped off and the actuators were dispersed across the accident site. The Thrust Levers on the Flight Deck were found in the fully forward position.

1.13. Medical and pathological information

The captain was fatally injured. The post-mortem and toxicologic examination of the captain was carried out by the Vilnius Division of the State Forensic Medicine Service. The results of these are not yet available at the time of Interim Report.

The co-pilot and both passengers sustained serious injuries and were brought to hospitals for further treatment. At the time of Interim Report, the co-pilot could not be interviewed due to his medical condition.

1.14. Fire

Closed circuit television video recordings available and information from witness statements indicate that immediately after the impact the aircraft caught fire. The fire affected the wings and mid and aft part of the fuselage. A number of residential buildings and cars south of the wreckage site were also damaged by fire. The fire has been extinguished by the fire brigades of the city and the airport.

Examination of the aircraft interior revealed no evidence of in-flight fire, including soot and melted parts, prior to impact. After the fuselage was moved with the crane, the interior and exterior of the aircraft was examined around the outflow valve, and no evidence of soot or heat damage was found.

All three fire handles on the centre pedestal in the Flight Deck were found in the stowed position.

1.15. Survival aspects

1.15.1. Observation of the accident and rescue and firefighting operations

The loss of height of the aircraft and the fire after the impact have been observed by the air traffic controllers of Vilnius airport according to their statements. The air traffic controllers called search and rescue and the airport fire brigade using the direct line available at the working station. They informed the airport fire brigade about the registration of the aircraft, the position of the accident site and that it was a cargo aircraft. The airport fire brigade deployed several fire trucks to the accident site.

At 03:30 hrs the Emergency Response Centre received a notification that an explosion had occurred in the city of Vilnius near a shop at Liepkalnio str. 102 A north of the airport. Police, city firefighters and rescue personnel were deployed to the accident site.

At the accident site the rescue personnel found one of the two passengers outside of the wreckage. In Lithuanian language his informed the rescue personnel that there were three other occupants on board the aircraft. The firefighters recovered the three persons from the wreckage.

1.15.2. Damage to the forward fuselage

The forward fuselage including the flight deck and the area behind flight deck and lavatory was damaged but did not show evidence of fire (Figure 10).

Figure 10. Aerial view of the front part of the fuselage including flight deck (source TAIID)

The captain was seated on the left-hand pilot's seat, the co-pilot occupied the right-hand pilot's seat (Figure 11). The two passengers were seated on the left-hand side of the forward cabin next to each other on two aft facing cabin attendant seats close to door 1L.

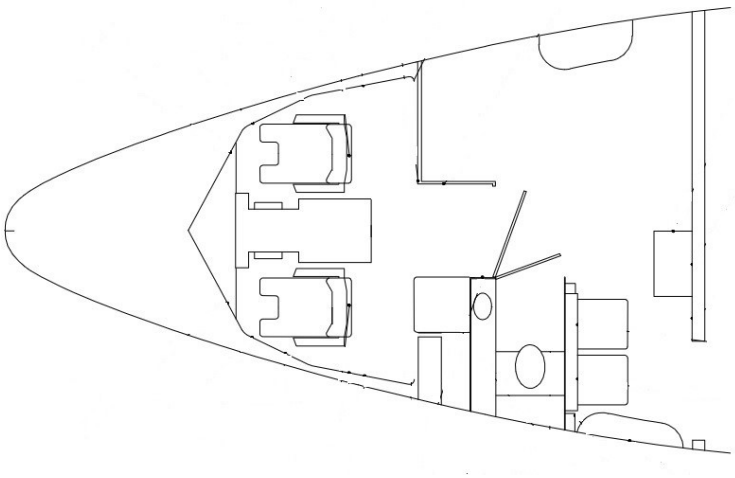


Figure 11. Flight deck and cabin layout & seating diagram (Operator / TAIID)

1.15.3. Damage to the residential buildings and escape of its occupants

According to the statements of witnesses and the reports of police and firefighters the occupants of the residential building were able to escape from the residential building on their own.

More than one third of the residential buildings were damaged by impact of wreckage parts and fire (Figure 8).

1.16. Test and research

Not applicable at the time of Interim Report.

1.17. Organizational and management information

Not applicable at the time of Interim Report.

1.18. Additional information

The operator had an Air Operator Certificate (AOC) issued by AESA. The AOC included the permission for commercial passenger and cargo operation in accordance with Regulation (EU) 2018/1139[7].

According to the Operations Manual Part A and B the operator had a fleet of different types of aircraft, such as Boeing 737-300, -400 and -800, Boeing 757-200. The operator had 8 Boeing (CL) 737-300 and 737-400 and 7 Boeing (NG) 737-800.

Also, the operator had 4 ATR42, 17 ATR72 and 2 Airbus A321.

1.19. Useful or effective investigation techniques

Not applicable at the time of Interim Report.

[7] Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91

ABBREVIATIONS

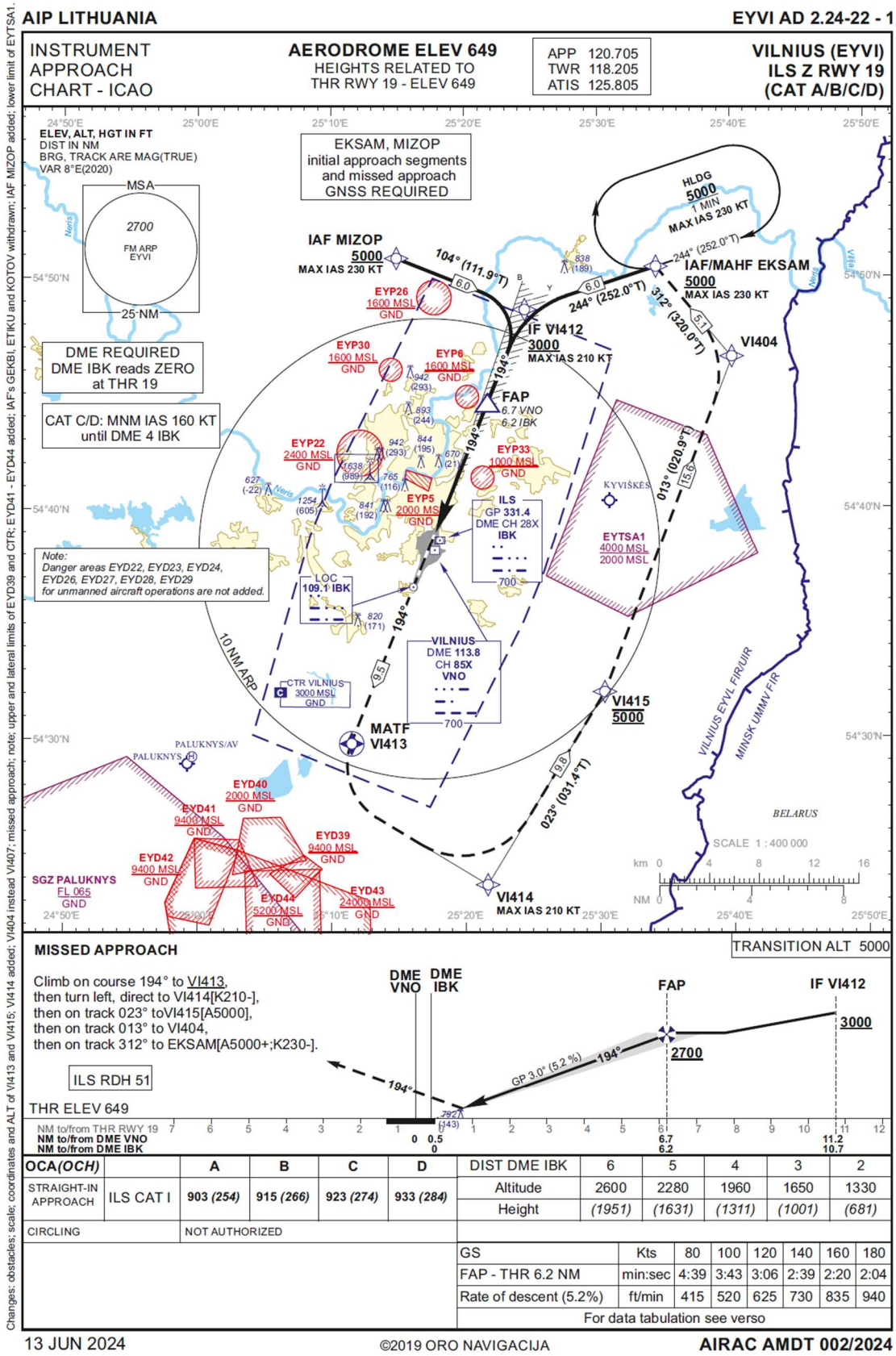
AESA Spanish Aviation Safety and Security Agency
BFU Bundesstelle für Flugunfalluntersuchung (German Federal Bureau of Aircraft Accident Investigation)
CAT Commercial Air Transport
CIAIAC Civil Aviation Accidents and Incidents Investigation Commission (Spain)
CSMU Crash Survivable Memory Unit
CVR Cockpit Voice Recorder
EASA European Union Aviation Safety Agency
FAA Federal Aviation Administration
FAP Final Approach Point
FDR Flight Data Recorder
ICAO International Civil Aviation Organization
NTSB National Transportation Safety Board (USA)
TAIID Transport Accident and Incident Investigation Division
TKA Transport Competency Agency (Lithuania)

APPENDICES

Appendix A	Instrument Approach Chart of Vilnius International Airport
Appendix B	FDR overview plot of the last minutes of the flight
Appendix C	FDR overview plot of the final approach phase of the flight

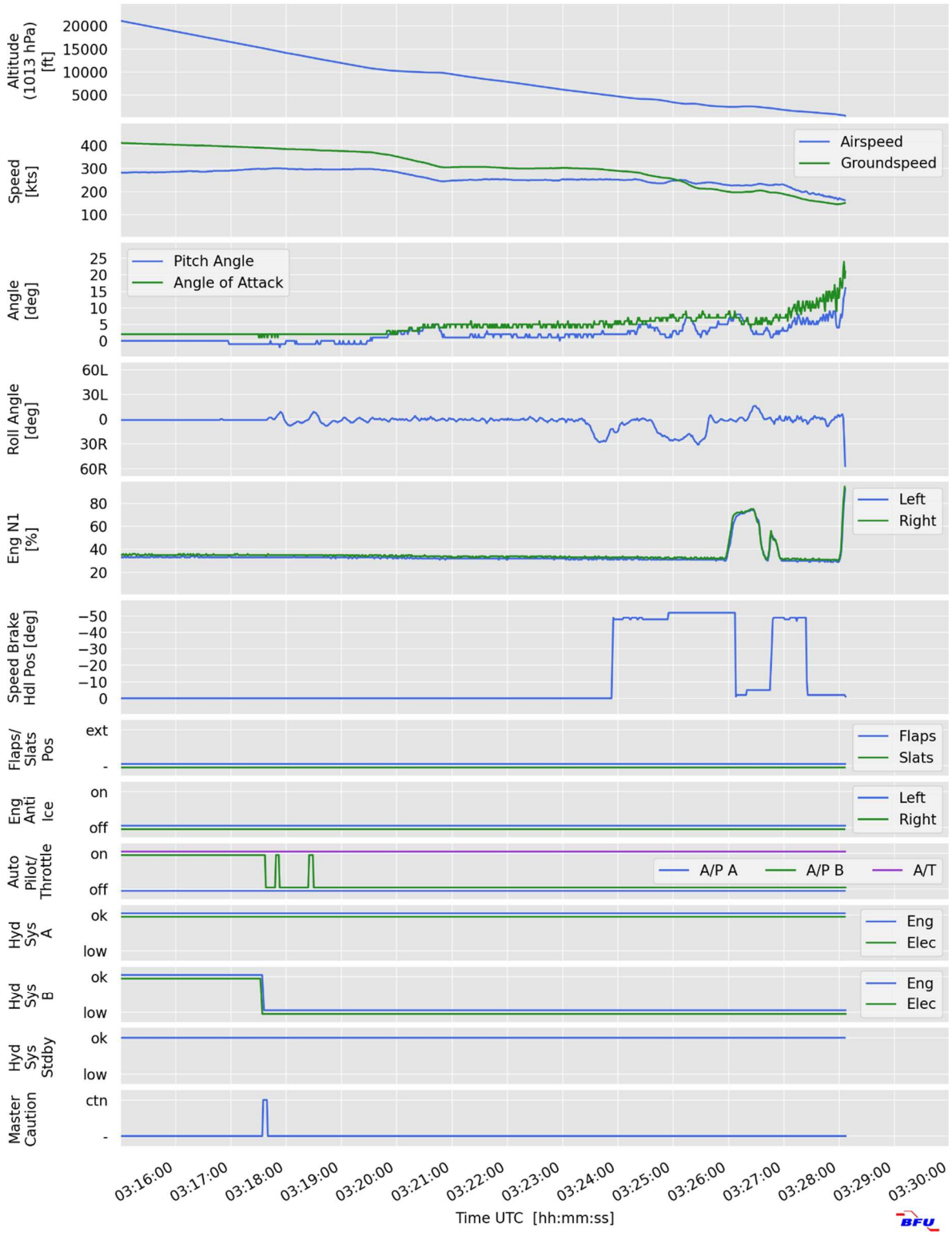
Appendix A

Instrument Approach Chart of Vilnius International Airport



Appendix B

FDR overview plot of the last minutes of the flight



Appendix C

FDR overview plot of the final approach phase of the flight