

PRELIMINARY REPORT

*Note: It contains only the initial information about the accident, available on the day of the Report writing
Sent to: ICAO, EASA, Canada*

ACCIDENT

I OCCURRENCE INFORMATION

SCAAI Reference Number

| | | | | 0 | 0 | 6 | 7 | - | 2 | 0 | 1 | 8 | | |

OCCURRENCE PLACE

State/Area

Poland

Exact Location

Warsaw Chopin Airport (EPWA), RWY 11

OCCURRENCE DATE/TIME

Date

| 2 | 0 | 1 | 8 | | 0 | 1 | | 1 | 0 |
Year Month Day

Time (UTC)

| 1 | 8 | | 1 | 9 |
Hour Min

AIRCRAFT

Manufacturer

Bombardier Inc, Canada

Aircraft type

Airplane, DHC-8-402

Registration Marks

| S | P | - | E | Q | G | | | | | | | | | |

State of Registry

Poland

Operator

PLL LOT SA

II – HISTORY OF FLIGHT

AIR TRANSPORT OPERATION

Type of Operation

- | | | |
|--|--|---|
| 1. <input checked="" type="checkbox"/> Passenger | 2. <input type="checkbox"/> Cargo | 3. <input type="checkbox"/> Passenger/Cargo |
| 4. <input type="checkbox"/> Ferry/Positioning | 5. <input type="checkbox"/> Training/Check | 6. <input type="checkbox"/> Other |
| 7. <input type="checkbox"/> Unknown | | |

- | | | |
|---|--|------------------------------------|
| S <input checked="" type="checkbox"/> Scheduled | N <input type="checkbox"/> Non-scheduled | Z <input type="checkbox"/> Unknown |
|---|--|------------------------------------|

ITINERARY

Last Departure point

K R A K Ó W | | | | | | | | | | E P K K | | | | | |
Name in local spelling

Planned Destination

W A R S Z A W A | | | | | | | | | | E P W A | | | | | |
Name in local spelling

Duration of flight (time airborne)

0 1 | 1 2
hour min

III – INJURIES TO PERSONS

Crew	Fatal	Serious	Minor	None	Unknown
	0	0	0	4	0
Passengers				59	0
Others		0	0		

Note: Data available on the day of the Report writing

IV – DAMAGE

Damage

Destroyed Substantial Minor None Unknown

V – METEOROLOGICAL INFORMATION

General weather in the area of occurrence

VMC IMC Unknown

Light conditions

Dawn Daylight Dusk/Twilight
 Night - moonlight Night - dark Unknown

SEQUENCE OF EVENTS

EVENTS

1. After take-off from EPKK and setting the landing gear control lever in UP position, the nose landing gear (NLG) was not retracted fully and remained in a transit position and the NLG door (N DOOR) remained open.
2. During the flight on the EPKK-EPWA route NLG was still in a transit position and N DOOR was open.
3. During the landing approach to EPWA the crew extended the landing gear using the alternate system. The main landing gear (MLG) was fully retracted and locked while the NLG did not change its position.
4. In EPWA the crew performed an emergency landing on RWY11 with NLG in a transit (non-locked) position, which collapsed during the landing roll.
5. When the aircraft came to rest on RWY11, the crew evacuated the passengers. None of the passengers and crew was injured during the evacuation.
6. During a visual inspection of the aircraft by SCAA members and representatives of the Operator, it was found that the NLG elements and the nose part of the aircraft were damaged.

FLIGHT PHASE

Take-off and initial climb

En route flight

Approach to landing

Landing

Evacuation

Visual inspection on the scene

NARRATIVE

Flight LO 3924 of the Bombardier DHC-8-402 airplane, registration marks SP-EQG was planned for 10 January 2018 on EPKK-EPWA route. The crew arrived at the departure airport on time and performed routine activities as provided for in the Operator's Operation Instruction.

After boarding of 59 passengers, the flight crew started the engines and taxied to a runway, then, after a proper clearance, started the take-off procedure. After lift-off the flight crew set the landing gear control lever in the UP position. The MLG was retracted and locked, while the NLG was unlocked from the downlock, but it was not uplocked. Amber N DOOR light (nose door open), red NOSE light (nose gear not uplocked or downlocked) and amber light on the landing gear control lever/handle (gear in transit) illuminated.

The Captain decided to continue the flight to the destination aerodrome (EPWA). During the EPKK-EPWA flight the crew heard an additional noise generated by the airflow around the open door of the NLG. Except the noise the flight was uneventful.

During the landing approach in EPWA the crew performed the landing gear extension procedure with the alternate system, according to QRH. After completing this procedure MLG was extended and locked (which was confirmed by green lights), while the NLG lights remained unchanged, including the amber light on the landing gear control lever/handle which illuminated.

The flight crew declared an emergency landing and proceeded to the appropriate procedure, and the cabin crew completed their procedures to prepare the cabin and passengers for an emergency landing and evacuation.

After the MLG touchdown the crew maintained direction with rudder, while maintaining the highest possible angle of attack, so that the NLG would touch runway as late as possible. When the nose part of the aircraft touched the ground, the flight crew did not feel the characteristic impact of the NLG, but immediately heard and felt that the nose part of the fuselage contacted the runway.

The airplane came to rest on RWY11 at 19:19 hrs LMT. Immediately after that the crew began to evacuate the passengers. None of the passengers and crew was injured during the evacuation.

After landing the airport services performed their routine operations.

Upon arriving at the scene, members of the State Commission on Aircraft Accidents Investigation inspected visually the occurrence site and the aircraft and secured the flight recorders and aircraft documentation.

When all applicable procedures and activities had been completed, the aircraft was moved to a hangar for further research and examination.

In addition, the SCAA found that on 6 December 2017 a tow bar attached to the SP-EQG NLG was hit by a tow tractor. After the occurrence an applicable inspection was effected, which showed no damage to the NLG.

Detailed information on the damage to the components of the NLG and other technical issues are given in Annex 1 to this Report.

SAFETY RECOMMENDATIONS

Not formulated at this stage

PRZEWODNICZĄCY
Państwowej Komisji
Badania Wypadków Lotniczych

plk dypl. pil. inż. Andrzej Lewandowski

Investigator-in-Charge stamp and signature

**Annex 1 to Preliminary Report,
DHC-8 airplane, SP-EQG,
EPWA, 10 Jan 2018**

Basic findings of the SCAA at an initial stage of the investigation - technical aspects

SERVICE BULLETIN 84-32-153

On 22 Sep 2017 the aircraft manufacturer issued SERVICE BULLETIN 84-32-153. The subject of the Bulletin was: Landing Gear --- Special Inspection and Rectification --- NLG Locking Mechanism.

The Bulletin was applicable to DHC-8 Aircraft Models 401 and 402, all serial numbers with Lower Lock Link 47324-1 (Fig. 1 and 2) that have completed 8000 flight cycles.

The manufacturer informed also that the Bulletin implementation may be done at the operator's discretion and that a Transport Canada Airworthiness Directive is pending.

The implementation of the Bulletin did not require the use of special tools and materials and its estimated direct labour requirement was 2.5 man-hours.

The reason for the Bulletin was: *reports of the bushings on the lock link of the NLG locking mechanism becoming loose. This condition was caused due to insufficient interference fit and results with bushing outer diameter wear/fretting. Dislodged bushing will also cause sealant to break. The broken sealant allows moisture ingress and corrosion that can accelerate free play buildup. Excessive free play at the lock link can result with inability to retract/deploy NLG fully.*

Until the occurrence day the Bulletin has not been completed on any DHC-8-402 operated the Operator.

Damaged element of the Drag Strut locking mechanism

Drag Strut stabilizes the shock strut in either the retracted or the extended position. All NLG loads acting along the airplane longitudinal axis are transmitted by the Drag Strut.

The figures below show the Lower Lock Link P/N 47324-1, which was to be inspected according to SB 84-32-153. In Figure 3 the Lower Lock Link is numbered 140.

P/N 47310-101 and P/N 47309-3 pins numbered 170 and 180 respectively were also damaged.

Some other secondary damage was also found in the nose part of the fuselage, which resulted from the landing with the NLG not locked in the extended position.

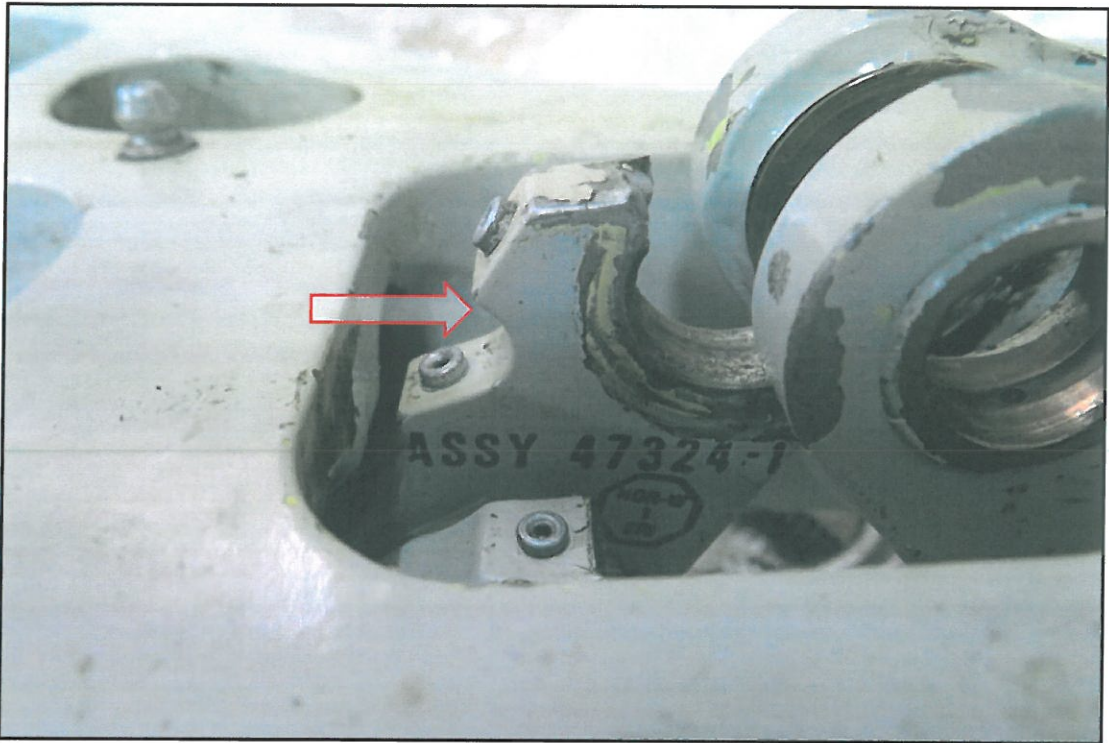


Figure 1. Lower Lock Link 47324-1

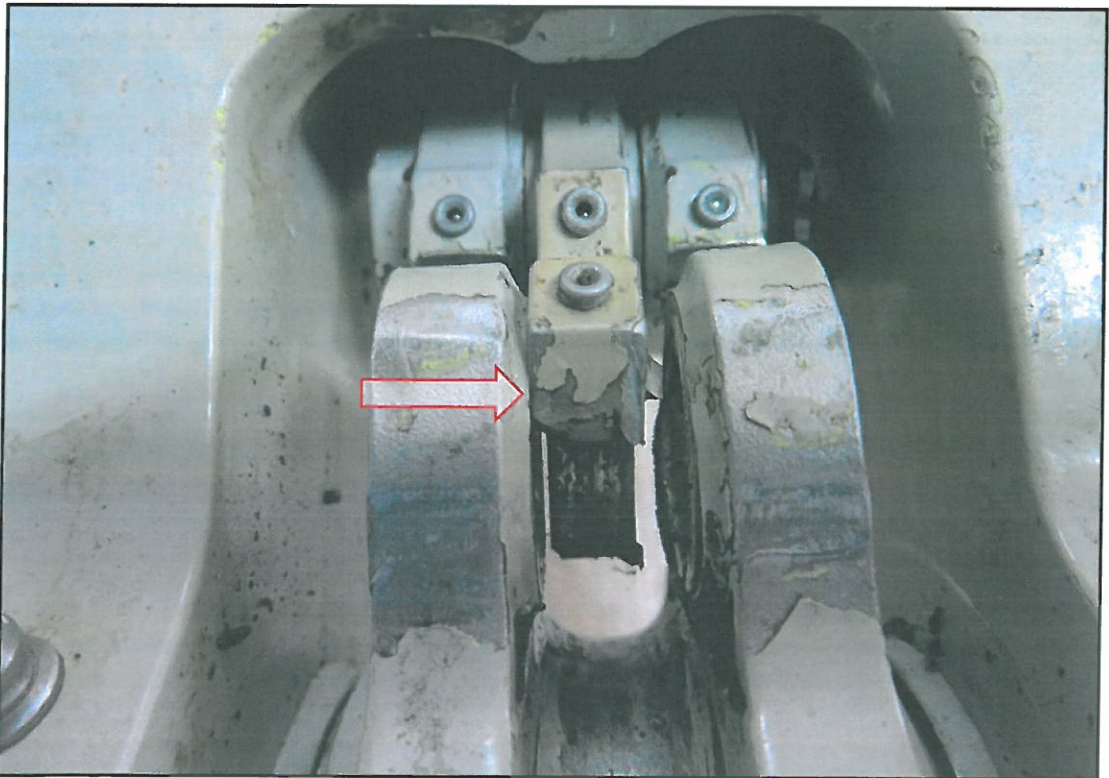
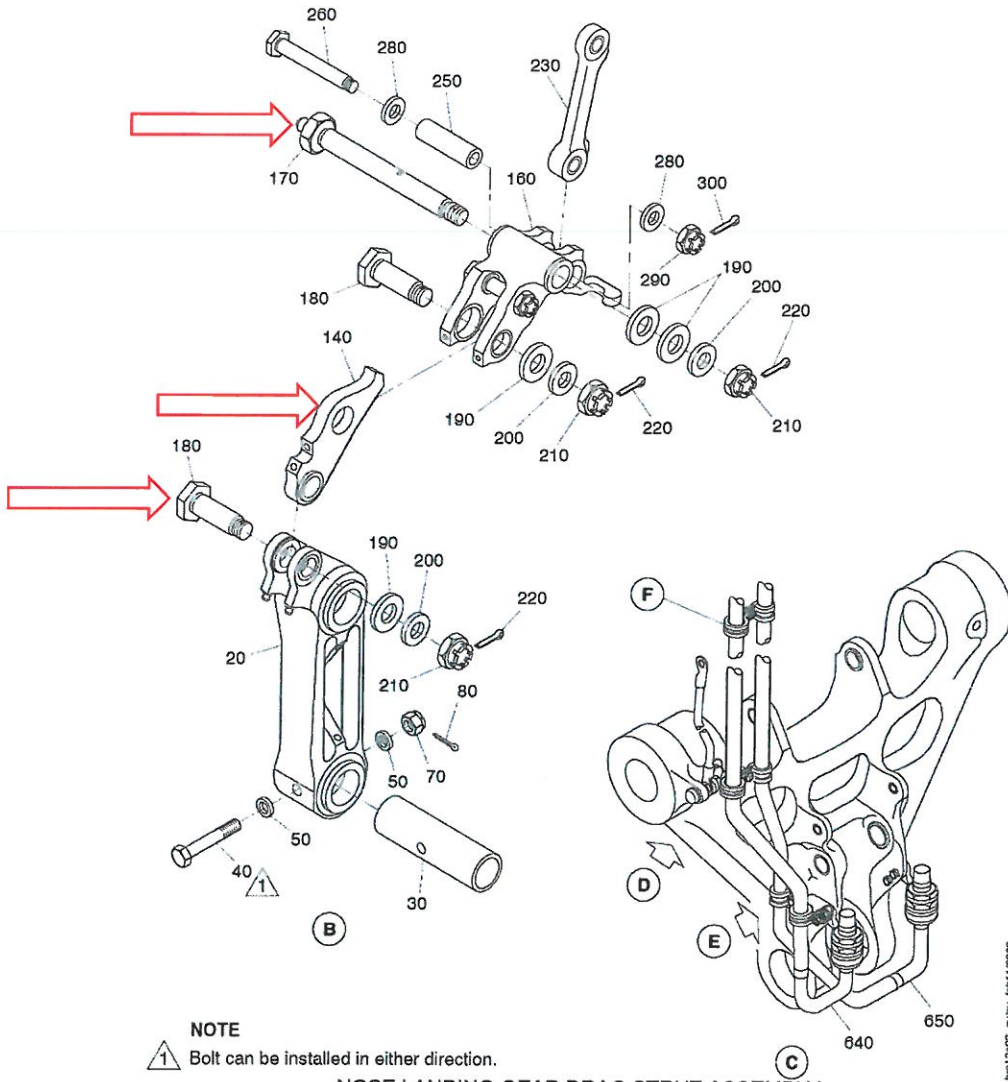


Figure 2. Lower Lock Link 47324-1

ILLUSTRATED PARTS CATALOG



NOTE
 Bolt can be installed in either direction.

NOSE LANDING GEAR DRAG STRUT ASSEMBLY
 FIGURE 1 (SHEET 2 OF 4)

PSM 1-84-4 - MASTER
 EFFECTIVITY:
 See Effectivity Page 1 of 32-21-06, FIG. 1

32-21-06

FIG. 1
 Page 1
 Apr 05/2009

Figure 3. NLG Drag Strut locking mechanism. Red arrows indicate the damaged components

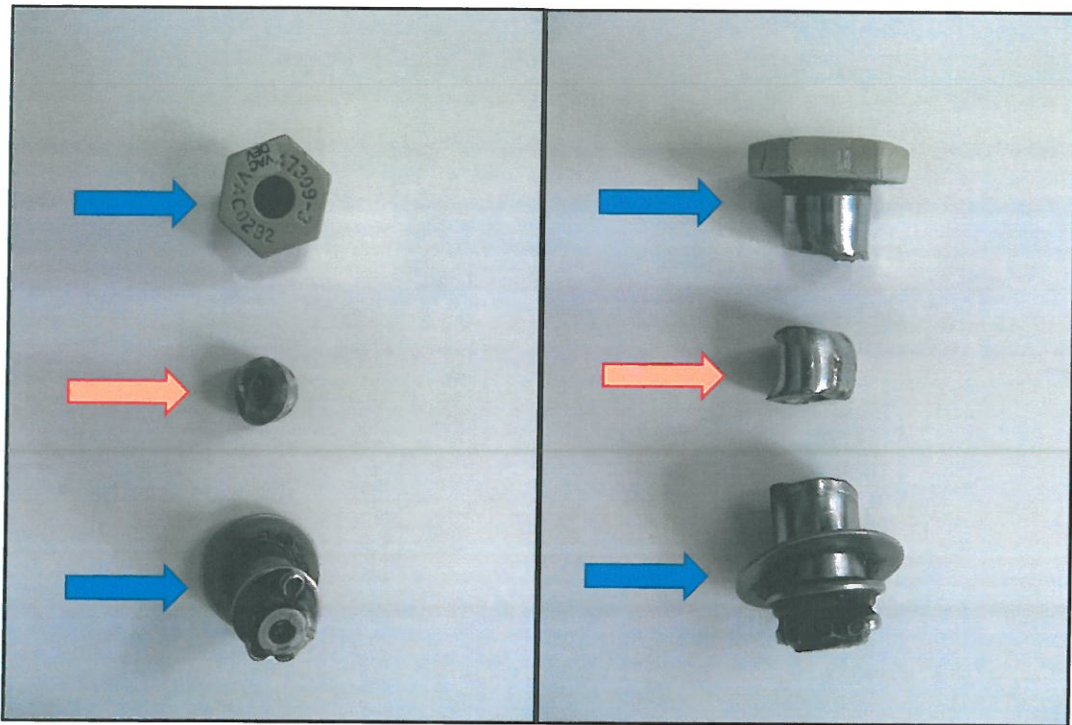


Figure 4. Damaged pin, P/N 47309-3 (the red arrows indicate the part of the pin which was found on the accident site and the blue arrows indicate the parts removed from the Lower Drag Strut (P/N 47313-1).

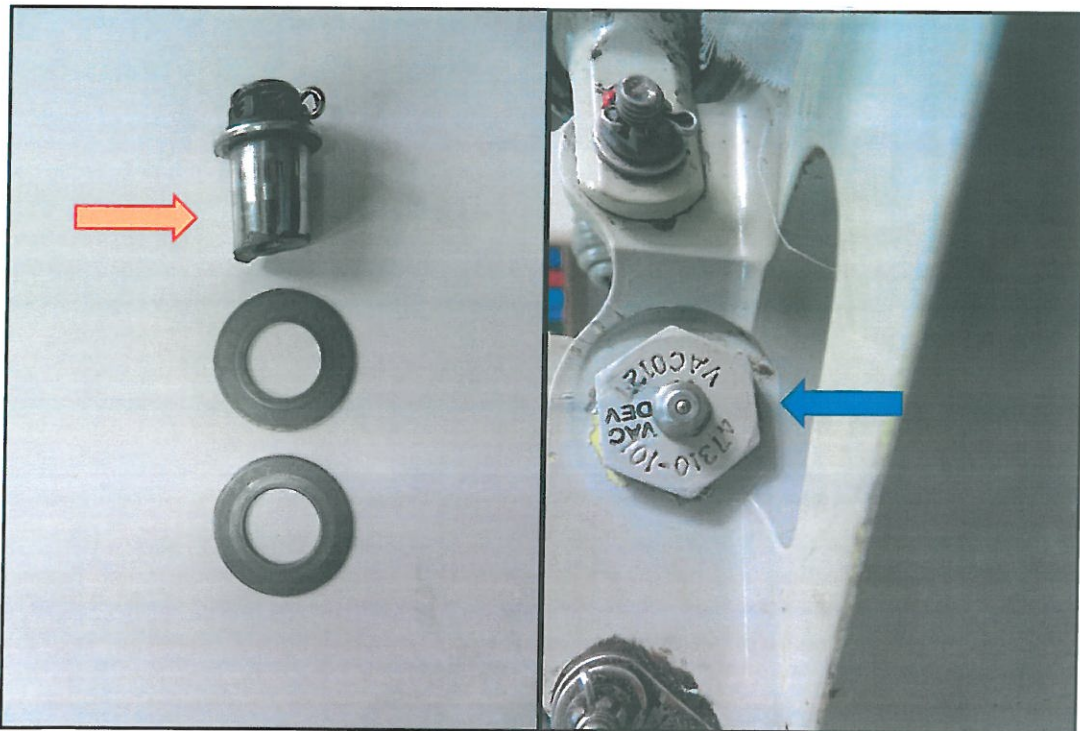


Figure 5. Damaged pin, P/N 47310-101 (the red arrow indicates the part of the pin which was found on the accident site and the blue arrow indicates the part which remained in its seat in Upper Lock Link (P/N 47320-3).

Airworthiness Directive No CF-2018-01

On 10 Jan 2018 Transport Canada issued AIRWORTHINESS DIRECTIVE No CF-2018-01 effective from 24 Jan 2018. The subject and applicability of AD CF-2018-01 was the same as SB 84-32-153. The AD directly referred to SB 84-32-153 imposing its implementation and stating that: *No person shall conduct a take-off or permit a take-off to be conducted in an aircraft that is in their legal custody and control, unless the requirements of CAR 605.84 pertaining to ADs are met.*

After the accident of 10 January 2018, SB 84-32-153/AD CF-2018-01 were accomplished on 9 out of 10 airplanes of DHC-8-402 Operator's fleet (with the exception of the accident airplane). On all checked aircraft the Lower Lock Links did not meet the technical requirements and were replaced with new ones.

Occurrence to SP-EQG involving NLG

On 6 Dec 2017 at EPKT, prior to the SP-EQG pushback, when a tractor was being attached to a tow bar, the tractor hit the tow bar which had already been attached to the airplane. The tractor was operative and the incident occurred as a result of human error.

The impact was felt by the crew and the Captain required additional check of the NLG. The pushback procedure was abandoned.

A ground engineer performed NLG inspection according to the manufacturer's service documentation: *TASK 05-50-51-210-801 Inspection After Rough Towing* and *TASK 32-21-00-210-801 General Visual Inspection of the Nose Landing Gear.*

As a result of the inspection no damage to NLG was found - the plane was released to service. The planned departure was delayed for about 3 hours.

WOW and WOFW sensors

MLG and NLG legs are equipped, among others, with proximity sensors (WOW¹ type for MLG and WOFW² type for NLG), which inform about weight or lack of weight on a particular leg.

The status of the particular sensor is recorded by FDR³ and QAR⁴. The QAR recordings are periodically downloaded and analyzed for exceeding permissible operating parameters.

As for landing gear, hard landings, i.e. the landings where vertical acceleration on MLG exceeded a permissible value during touchdown, are subject to automatic analysis.

¹ Weight-On-Wheels

² Weight-Off-Wheels

³ Flight Data Recorder

⁴ Quick Access Recorder

The aircraft check procedure is initiated by a Captain report or detection of a hard landing during FDM⁵ analysis of the parameters recorded.

An additional analysis of the recorded parameters showed that there have been numerous cases of landings where the NLG sensor was activated first and only then the MLG sensors.

The data from 1 Jan 2017 to the day of the accident were analyzed. As for SP-EQG airplane, out of 2854 landings in the analyzed period, 69 of such cases were found, including one from the day of the accident. The common feature for the aforementioned landings, in addition to the sequence of the NLG and MLG loading, was the negative pitch angle.

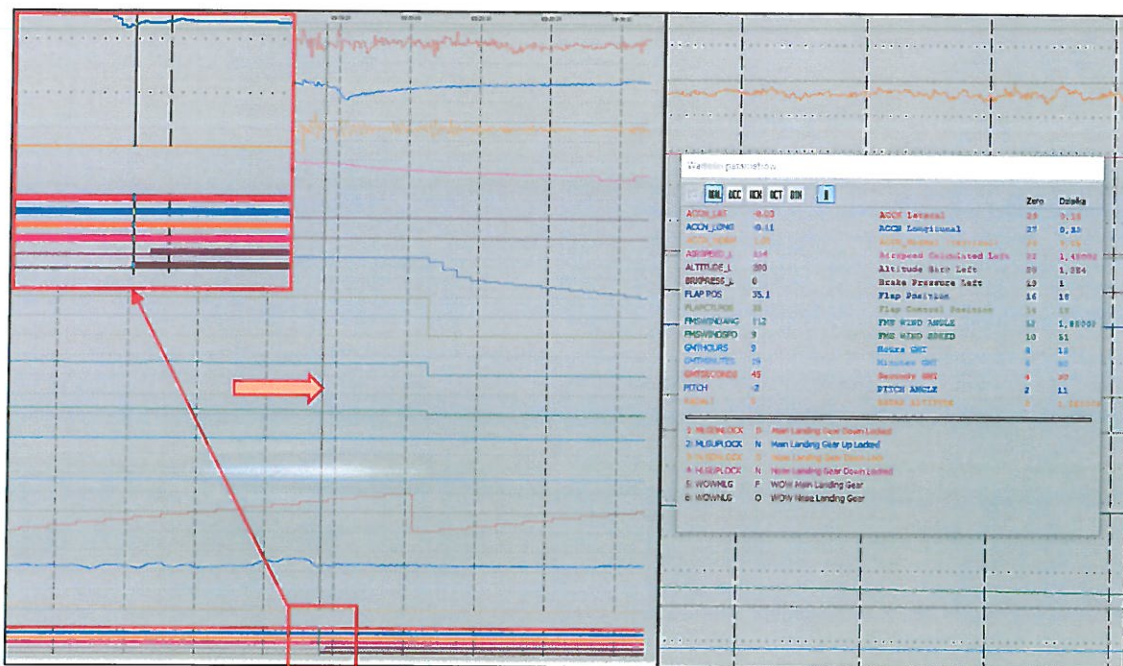


Figure 6. Graphic presentation of FDR recording. The red frame at the top left shows the time of NLG loading (horizontal brown line at the bottom of the frame). The time of the MLG loading is shown by the purple line (the second from the bottom). The values of selected parameters at the time of NLG loading are shown in the frame on the right.

⁵ Flight Data Monitoring