



SCAAI-1400/2011-EPWA-SP-LPC (rev.1)

## **Accident Description**

Status: **Preliminary Report (rev.1)**

Classification: **Accident**

Date: **1 November 2011**

Time: **13:39 UTC**

Type: **Boeing B-767-300**

Operator: **LOT Polish Airlines**

Registration: **SP-LPC**

Cof A: **ARC valid until 15 May 2012**

Airframe SN: **28658**

Year manufacture: **1997**

Manufacturer: **Boeing Company**

Date of registration: **15 May 1997**

Engines: **2x General ElectricCF6-80C2B6**

Airplane total flight hours: **85429 hours 36 minutes**

Airframe total cycles: **8002**

Passengers/Crew: **221 Passengers, 8 Cabin Crew, 2 Flight Crew, all uninjured**

Captain: **Male, Polish, holder of ATPL(A) licence issued by Polish Aviation Office, valid until 12 February 2013**

First Officer: **Male, Polish, holder of ATPL(A) licence issued by Polish Aviation Office, valid until 21 April 2014**

Aircraft Damage: **Serious**

Location: **EPWA Airport**

Phase of flight: **Landing**

Type of flight: **Commercial**

Departure Airport: **KEWR**

Destination Airport: **EPWA**

Flight number: **LO016**



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## **Occurrence description**

Airplane for flight LO16 took off from Newark (KEWR) on 1 November 2011 at 4:19 (UTC). On the basis of on-board documentation it was determined that prior to the flight the airplane was inspected by the U.S. maintenance organization, acting under a contract with LOT Polish Airlines. As a result of this inspection, the airplane was released for flight. There were no failures including these which would require application of the Minimum Equipment List (MEL).

After take off, during retracting landing gear and flaps a leakage of the hydraulic fluid from the central hydraulic system (installation "C"), what consequently led to pressure drop in this installation. The pressure drop in installation "C" was announced on EICAS (Engines Indications and Crew Alerting System) and recorded by flight data recorder. The system informing the crew about the above hydraulic system malfunction was triggered. After completing the QRH procedure and consultation with the operator's operations centre, the flight crew decided to continue the flight to Warsaw.

During approach for landing at Warsaw-Okęcie aerodrome the flight crew performed the QRH procedure which was connected with using the alternate landing gear extension system. The landing gear was not extended. The crew checked correctness of the procedure and then reported to the air traffic control service (ATC) inability to extend the landing gear and asked operations centre for help.

The airplane was directed to a holding zone. Around 12:25 hrs the flight crew declared EMERGENCY situation. At 12:45, after consultation with the Command Post of Air Operations Centre, it was decided to activate ground alert combat aircraft from an Air Force base to check visually the landing gear.

At 13:06 hrs the pilots of combat aircraft informed the Boeing flight crew that the all landing gear was still in the retracted position. During the flight in the holding zone the flight crew consulted their actions with the operator operations centre.

The crew carried out an attempt to extend the landing gear in the gravitational way, which ended in failure. Due to small fuel quantity and unsuccessful attempts to extend the landing gear, the crew decided to execute an emergency landing with landing gear retracted. The plane landed at Warsaw-Okęcie aerodrome (EPWA), on runway 33 at 13:39. After the airplane came to rest the flight crew carried out evacuation of passengers.



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Warsaw-Okęcie aerodrome – airplane stopping place.





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Photo1. General view of SP-LPC after emergency landing.



Photo 2. View on the left wing of the airplane from the rear main door.



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Photo 3. Left engine of SP-LPC airplane



Photo 4. Right engine of SP-LPC airplane.

Members of the State Commission on Aircraft Accident Investigation arrived at the aerodrome about 15-20 minutes after the evacuation of passengers and crew. They carried out the initial inspection of the aircraft and found that in the cockpit, on P6 panel, the circuit breaker **C829 BAT BUS DISTR** (on A1 position) was in the position „Off”, while the circuit





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breaker **C4248 LANDING GEAR - ALTN EXT MOTOR** (on F6 position) was in the position „On”. Records of on-board recorders (CVR - Cockpit Voice Recorder, FDR - Flight Data Recorder and QAR - Quick Access Recorder) were protected and photographic documentation was made.

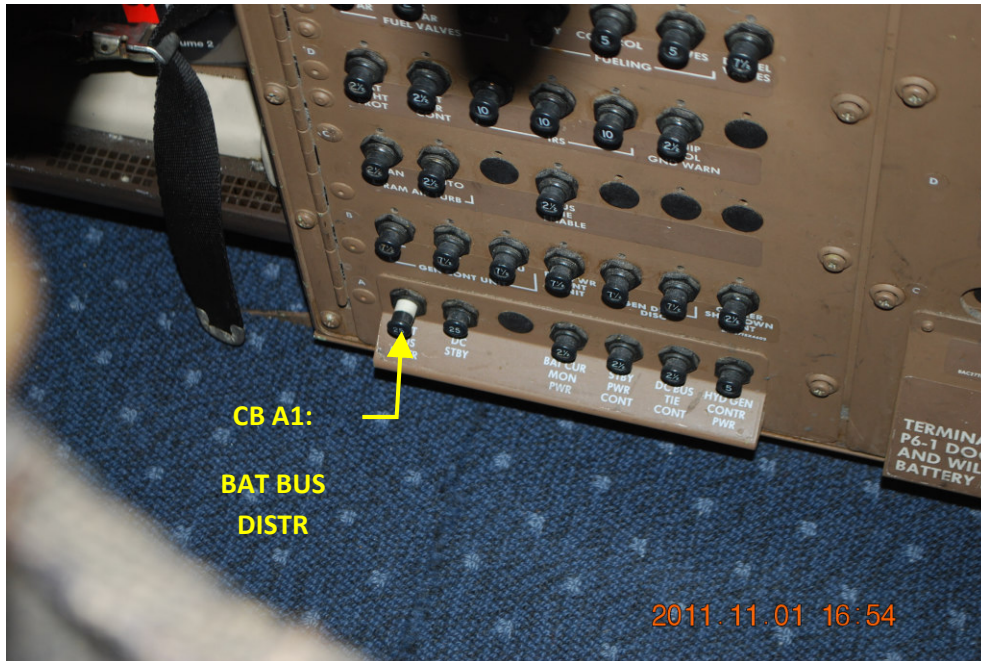


Photo 5. P6-1 circuit breakers panel in the cockpit.



Photo 6. On-board recorders (FDR and CVR) of SP-LPC airplane.



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The circuit breaker C829 (BAT BUS DISTR) indicated on Photo 5 protects several airplane systems including the alternate landing gear extension system. The „Off” position of the circuit breaker was not recorded or indicated by the airplane systems (FDR - Flight Data Recorder and EICAS - Engine Indications and Crew Alerting System).

**767-200/300 SYSTEM SCHEMATIC MANUAL**

**WIRING DIAGRAMS**  
24-54-71  
24-54-72

POWER	SYSTEM	SCHEM REF				
BUS	CB	GRID LVC	PWL LVC	NOMENCLATURE	DIAG	SH
BAT (PRIM)	C829	B7	P6-1	CHILLER SHUTDOWN CONT	23-33-01	-
BAT (PRIM)	C829	B1	P6-1	L GEN CONT UNIT	24-11-01	-
BAT (PRIM)	C829	B2	P6-1	R GEN CONT UNIT	24-11-02	-
BAT (PRIM)	C829	B3	P6-1	APU CONT UNIT	24-20-03	1
BAT (PRIM)	C829	B5	P6-1	L GEN DRIVE DISC	24-11-01	-
BAT (PRIM)	C829	B6	P6-1	R GEN DRIVE DISC	24-11-02	-
BAT (PRIM)	C829	B4	P6-1	BUS PWR CONT UNIT	24-40-01	-
BAT (PRIM)	C829	A5	P6-1	STBY PWR CONT	24-33-01	-
BAT (PRIM)	C829	A6	P6-1	DC BUS TIE CONT	24-32-01	-
BAT (PRIM)	C829	A7	P6-1	HYD GEN CONT PWR	24-20-05	-
BAT (PRIM)	C829	C2	P6-1	RAN ATR TURB - AUTO	29-00-06	-
BAT (PRIM)	C829	A4	P6-1	BAT CUR MON PWR	24-31-01	-
BAT (PRIM)	C829	F6	P6-1	LANDING GEAR - ALTN EXT MOTOR	32-30-01	3
BAT (PRIM)	C829	C22	P11-4	PASS ADSR	23-31-01	1
BAT (PRIM)	C829	C25	P11-4	INTERPHONE - CABIN SERVICE	23-42-01	1
BAT (PRIM)	C829	C25	P11-4	INTERPHONE - CAPT/OBS	23-31-01	1
BAT (PRIM)	C829	C26	P11-4	INTERPHONE - F/O - DUAL PWR	23-31-01	3
BAT (PRIM)	C829	C33	P11-4	TRIM AIR	21-61-01	-
BAT (PRIM)	C829	C19	P11-4	EMUP ECOL - VIBR	21-58-02	1
BAT (PRIM)	C829	A25	P11-4	PACU FLOW CONT - R	21-50-02	1
BAT (PRIM)	C829	B26	P11-4	FIRE DETECTION - CARGO 1	26-16-01	2
BAT (PRIM)	C829	B20	P11-4	FIRE DETECTION - LEFT ENG 1	26-11-01	1
BAT (PRIM)	C829	B22	P11-4	FIRE DETECTION - RIGHT ENG 1	26-11-02	1
BAT (PRIM)	C829	B24	P11-4	FIRE DETECTION - APU 1	26-15-01	-
BAT (PRIM)	C829	B21	P11-4	FIRE DETECTION - LEFT ENG 2	26-11-01	1
BAT (PRIM)	C829	B23	P11-4	FIRE DETECTION - RIGHT ENG 2	26-11-02	1
BAT (PRIM)	C829	B25	P11-4	FIRE DETECTION - APU 2	26-15-01	-
BAT (PRIM)	C829	B27	P11-4	FIRE DETECTION - CARGO 2	26-16-01	2
BAT (PRIM)	C829	B29	P11-4	OVERHEAT DETECT - LEFT ENG 1	26-11-01	1
BAT (PRIM)	C829	B30	P11-4	OVERHEAT DETECT - LEFT ENG 2	26-11-01	1
BAT (PRIM)	C829	B31	P11-4	OVERHEAT DETECT - RIGHT ENG 1	26-11-02	1
BAT (PRIM)	C829	B32	P11-4	OVERHEAT DETECT - RIGHT ENG 2	26-11-02	1
BAT (PRIM)	C829	B19	P11-4	FIRE SWITCH UNLOCK	26-11-01	1
BAT (PRIM)	C829	B34	P11-4	APU - REMOTE FIRE INH	26-15-01	-

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D280T234

**24-54-03**

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The electrical systems connected with C829 (A1) „BAT BUS DISTR” circuit breaker  
On 2 November the place of hydraulic fluid leakage was identified (see Photo 7 and 8).





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Photo 7. View of the hydraulic hoses of the right main landing gear of SP-LPC airplane





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Photo 8. Damaged hydraulic hose of the right main landing gear of SP-LPC airplane.

After lifting the aircraft from the runway, in agreement with this operation manager, a test of the landing gear extension with the alternate landing gear extension system was carried out. After connecting the ground power unit, setting C829 (A1) BAT BUS DISTR circuit breaker in the position „On” and activation of the alternate landing gear extension system, the landing gear was extended. The aircraft was towed to the operator's technical base.



Photo 9. Start of lifting of SP-LPC airplane.



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Photo 10. SP-LPC airplane plane lifted up by crane and airbags.



Photo 11. Extended right main landing gear after lifting SP-LPC airplane.



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Photo 12. Extended nose landing gear of SP-LPC airplane.

On 4 November members of SCAAI Investigating Team participated in disassembly of the damaged hose of the hydraulic system „C” (central) and secured the hose to carry out tests. The hydraulic hose together with photographic documentation was sent to the laboratory of National Transportation Safety Board (NTSB).





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Photo13. Damaged hydraulic hose of the landing gear extension system of SP-LPC airplane.



Photo14. Damage to the hydraulic hose of the landing gear extension system of SP-LPC airplane.

In order to determine the role of C829 BAT BUS DISTR circuit breaker, functional tests were carried out on airworthy airplanes of the same model (SP-LPB and SP-LPA).



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The aims of the tests were:

- verifying whether the position „Off” of the circuit breaker is in any way indicated in the cockpit on EICAS and/or recorded by FDR;
- checking whether setting this circuit breaker in the position „Off” has any influence on other systems operation both before and after starting the engines.

Visual inspection of individual elements of the alternative system of landing gear extension was made. Condition of all load limiters (indicators) of this system did not raise any objections (NLG / MLG LOAD limiters).



Photo 15. Load Limiter of the nose alternate landing gear extension system.



Photo 16. Load Limiter of the main left alternate landing gear extension system.



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Photo 17. Load Limiter of the main right alternate landing gear extension system.



Photo 18. Electric motor of alternate landing gear extension system.

Functional tests of entire electrical installation of alternate landing gear extension system are being conducted. In this case the Commission took into account recommendations of the airplane manufacturer.

## **Other information**

### ***Weather conditions:***

METAR EPWA 011230Z 14004KT 100V180 9999 SCT015 BKN043 13/10 Q1022 NOSIG

METAR EPWA 011300Z 14005KT 100V170 9999 SCT015 BKN043 13/10 Q1022 NOSIG

METAR EPWA 011330Z 13004KT 090V160 9999 SCT016 BKN043 12/10 Q1022 NOSIG

The last information on weather conditions transmitted to the flight crew by TWR controller - wind from the direction of 120° at the speed of 5kts.





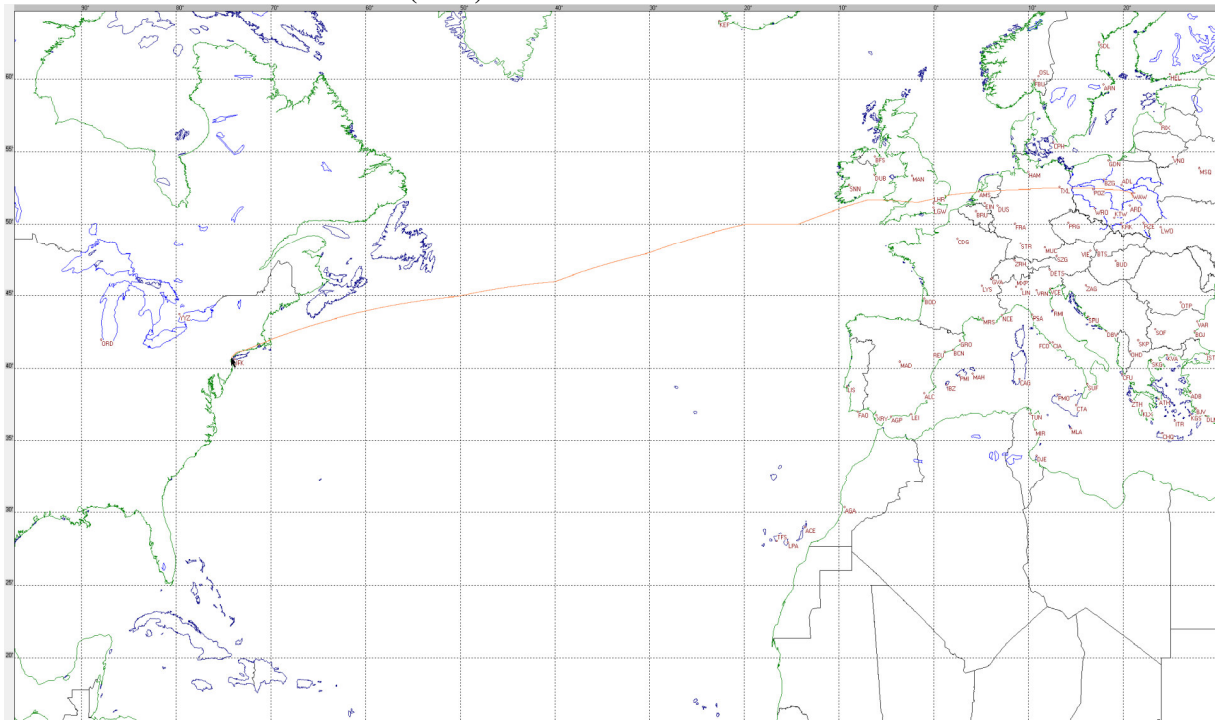
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**FDR data**

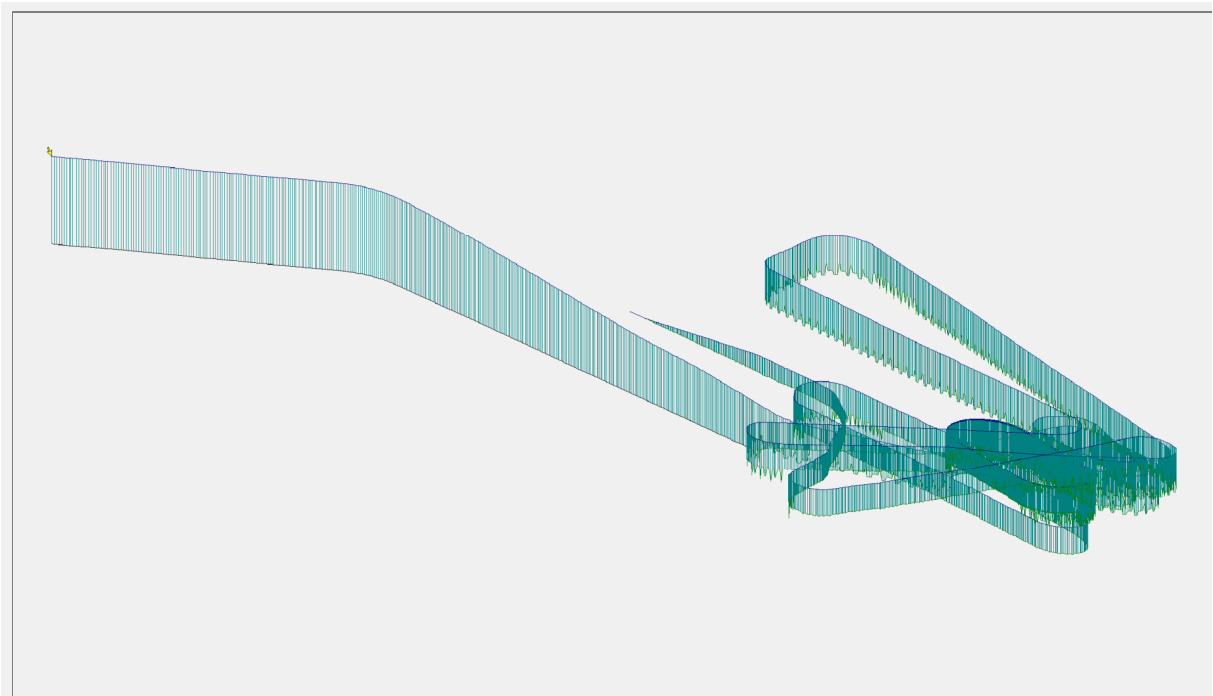
- 03:58:11 –engines start for flight LO016,
- 04:11:03 – beginning of taxing,
- 04:19:08 – line up on RWY 04L and beginning take off procedure,
- 04:19:51 – take off and initial climb,
- 04:19:55 – beginning of landing gear retraction, RALT=39[ft],
- 04:20:08 – end of landing gear retraction, RALT=480[ft], pressure in the central hydraulic installation HYDPRC=2600[psi], hydraulic liquid quantity in the central installation - HYDQTC=105,1[%],
- 04:21:07 – beginning of flaps retraction (flaps from position 5 to 1),
- 04:21:11 – flaps in position 1,
- 04:21:47 – continuation of flaps retraction (flaps from position 1 to 0),
- 04:21:51 – flaps in position 0,
- 04:22:11 – indication of low pressure in the central hydraulic system, PRALT=3852[ft], gross weight of the airplane GW=162,57[t], geographical coordinates: N40 48 42, W74 5 17
- 04:22:14 – drop of hydraulic fluid quantity in hydraulic system „C”, HYD QTC =10.6 [%] (parameter registered in interval 1/64Hz)
- 04:36:28 – cruise altitude FL310,
- 05:08:01 – cruise altitude FL330,
- 06:09:05 – cruise altitude FL340,
- 09:18:08 – cruise altitude FL370,
- 11:32:19 – cruise altitude FL350,
- 11:44:17 – beginning of descent to landing at WAW,
- 12:18:03 – abandoning of approach to landing at WAW and diverting to a holding zone,
- 13:30:20 – end of holding and beginning of final approach,
- 13:38:23 – touchdown,
- 13:38:43 – end of FDR recording.



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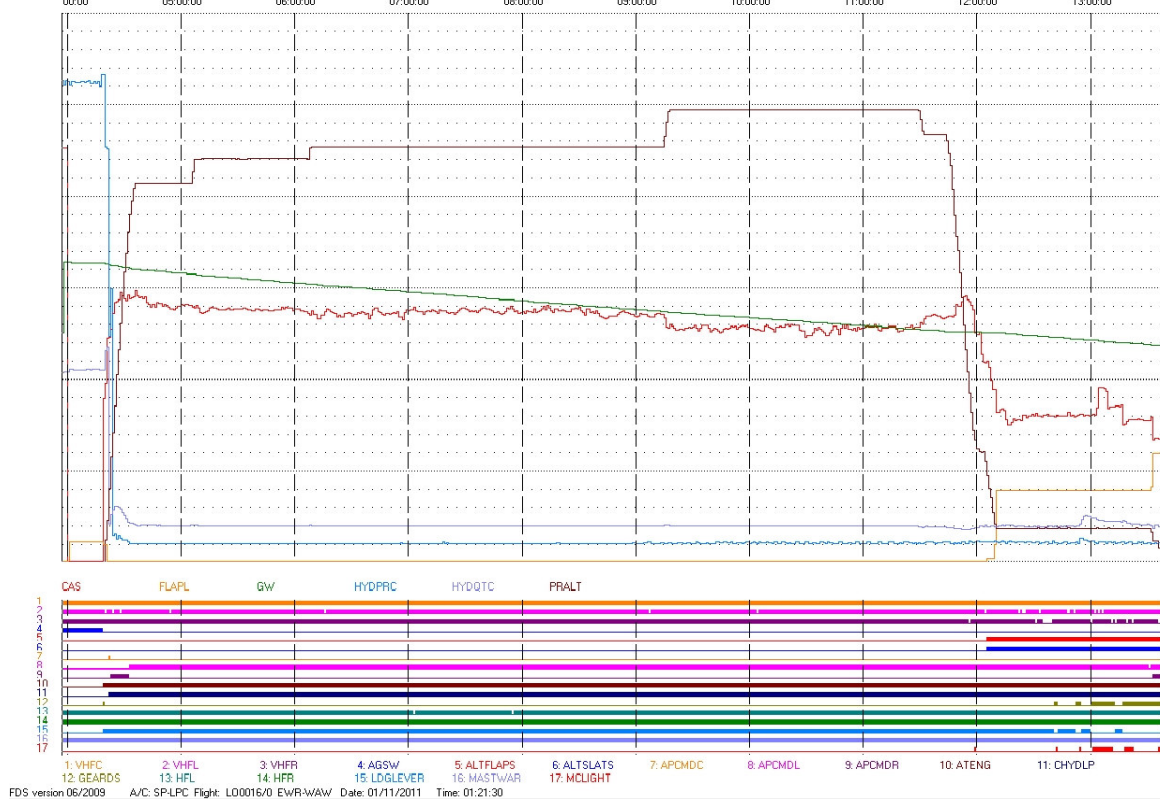
Flight route of SP-LPC airplane based on FDR recording.



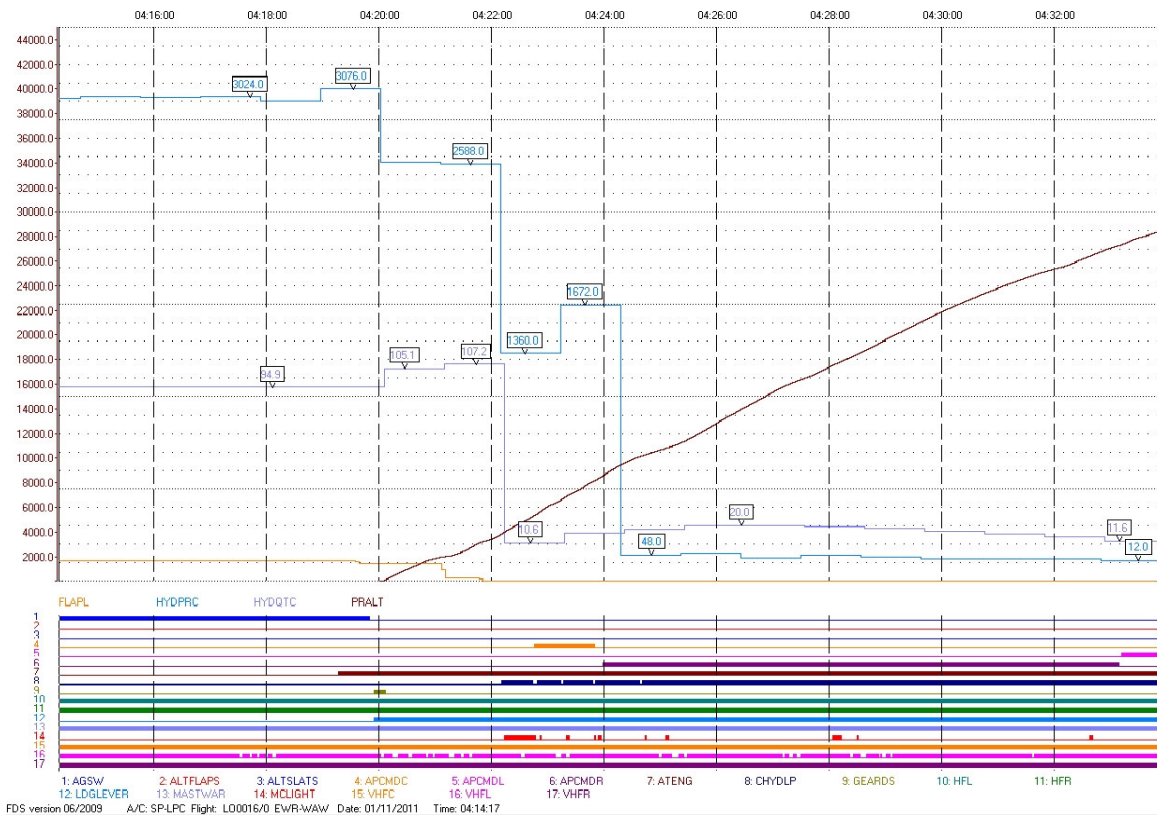
3D view of LO016 flight in the holding zone in the area of EPWA aerodrome.



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L0016 flight of SP-LPC airplane based on FDR recording.



Pressure drop in SP-LPC central hydraulic system after take off – based on FDR recording





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## Evacuation

Evacuation was initiated by the cabin crew immediately after the airplane came to rest on the runway. Escape slides were used for evacuation. They were activated after opening main doors on the left and right sides in front and back of the airplane. Additional way of evacuation were two windows located on the left side of the airplane, over the wing. Two other evacuation windows, located on the right side of the airplane over the wing, were not opened and not used for evacuation. All passengers and cabin crew left the airplane. Evacuation procedure lasted about 90 seconds. The last person to evacuate was the First Officer, who after checking the airplane board, left it via the rear left door. The head of cabin crew and the Captain remained on the board until fire fighters arrived. None of the passengers and crew suffered injuries.

## ETOPS<sup>1</sup>

LOT Polish Airlines held the necessary authorizations of the President of the Civil Aviation Office to perform B767 flights according to ETOPS rules. This is contained in the Air Operator Certificate (AOC). Before departure from Newark the airplane was released for flight by technical staff of a certified maintenance organization contracted by the Carrier. This is confirmed in the relevant technical documentation of the airplane.

## Authorizations and ratings of the flight crew and the cabin crew

### CPT

- has worked for LOT Polish Airlines since 16.11.1981
- TR B767 – valid until 30.06.2012
- IR – valid until 30.06.2012
- Medical Certificate I Class valid until 27.01.2012
- Operator Proficiency Check (OPC) – performed on 21.09.2011, valid until 31.05.2012
- Line Check (LC) performed on 15.05.2011, valid until 31.05.2012

Rating for CAT II/IIIA approaches – issued 09.04.2010

Total flight time: 15 980 hrs 36 min.

Flight time as a Commander: 14007 hrs 36 min.

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<sup>1</sup> ETOPS – (Extended Range Operations with two-engine airplanes), the abbreviation related to possibility of extending range of the twin-engine aircraft operations beyond the set area (60 minutes), the maximum duration of flight to the nearest aerodrome with one engine inoperative.



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Flight time on B-767: 13307 hrs 08min.  
Flight time as a Commander on B-767: 12432 hrs 51min.  
Flight time over last 90 days: 213 hrs 48min.  
Flight time over last 28 days: 78 hrs 31min.  
Flight time over last 24 hours: 9 hrs 46 min.  
The last flight prior to the occurrence – on 30.10.2011.

**First Officer**

- has worked for PLL LOT S.A. since 01.10.1996
- TR B767 – valid until 30.11.2011
- IR – valid until 30.11.2011
- Medical Certificate I Class valid until 20.04.2012
- Operator Proficiency Check (OPC) – performed on 05.04.2011, valid until 30.11.2011
- Line Check (LC) performed on 12.10.2010, valid until 30.11.2011

Rating for CAT II approaches – issued 04.03.2009.

Total flight time: 9431 hrs 16 min.  
Flight time as a Commander: 835 hrs 45 min.  
Flight time on B-767: 1981 hrs 9 min.  
Flight time as a Commander on B-767: -  
Flight time over last 90 days: 224 hrs 7 min.  
Flight time over last 28 days: 42 hrs 15 min.  
Flight time over last 24 hours: 9 hrs 46 min.  
The last flight prior to the occurrence – on 30.10.2011.

The flight crew and the cabin crew held appropriate authorizations and ratings to perform the flight.