RNSA

Rannsóknarnefnd samgönguslysa

Final report on aircraft serious incident

Case no.: **18-104F018**

Date: **16. June 2018**

Location: **Keflavik Airport (BIKF)**

Description: **Foreign Object Damage**

1. FACTUAL INFORMATION

Location and time	
Location:	During takeoff at RWY[1] 01 on Keflavik Airport
Date:	16. June 2018
Time[2]:	09:46

Aircraft	
Type:	Boeing 737-800
Register:	EI-FHD
Year of manufacture:	2012
Serial number:	39011
CoA:	Valid
Engines:	Two CFM56-7B26E

Other information	
Type of flight:	Commercial flight
Persons on board:	144 (6 crew and 138 passengers)
Injury:	None
Damage:	The aircraft incurred Foreign Object Damage (FOD) resulting in several system failures
Short description:	During the takeoff run on RWY 01, the Left Main Landing Gear inboard tire burst, which resulted in several system failures due to secondary damage

Commander		
Age:	35 years	
Certificate:	ATPL A	
Ratings:	B737 300-900	
Medical Certificate:	Class 1, valid	
Experience:	Total flight hours:	9,106 hours
	Total flight hours on type:	8,800 hours
	Total flight hours as Commander	5,993 hours
	Last 90 days on type:	170 hours
	Last 24 hours on type:	7.16 hours

[1] Runway
[2] All times in the report are Icelandic local times (UTC+0), unless otherwise stated

First Officer	
Age:	42 years
Certificate:	ATPL
Ratings:	A320 B737 IR (A)
Medical Certificate:	Class 1, valid
Experience:	Total flight hours: 4,630 hours Total flight hours on type: 442 hours Last 90 days on type: 72 hours Last 24 hours on type: 4.33 hours

Aircraft EI-FHD, which had been flown from Madrid Airport to Keflavik Airport earlier in the morning, taxied down taxiway Echo towards RWY 01 on BIKF for its return leg to Madrid. The aircraft entered RWY 01 from taxiway E-1, stopped for a few seconds and then commenced its takeoff run. The First Officer was the Pilot Flying (PF) and the Commander was the Pilot Monitoring (PM).

During the takeoff roll, at Vr[3], an unusual vibration was felt by the flight crew from the nose landing gear. Vibration was also noticed by two cabin crew members, sitting forward of the over wing area. A third cabin crew member, sitting in the aft galley, also reported feeling the aircraft rattle during the takeoff run.

Figure 1: Aircraft EI-FHD taking off from RWY 01 at BIKF

After the aircraft had lifted off and the landing gear was being retracted, the pilots noticed that the antiskid INOP light illuminated.

[3] Rotation speed

The PM performed QRH[4] 14.1 Antiskid Inoperative non-normal check list and the After Take Off Checklist. The climb was continued, with the deviation of a left turn from departure routing to avoid CBs[5].

When the aircraft reached FL100 the PM performed the 10,000 feet checks[6], during which he identified a low quantity (20% remaining) in hydraulic system A of the aircraft (HYD A). The hydraulic pressure of system A was still normal, or 3000 psi. The flight crew suspected a hydraulic leak in the engine-driven pump or its related lines. HYD A ENG 1 LOW PRESSURE light illuminated right after. The flight crew referred to the QRH, HYDRAULIC PUMP LOW PRESSURE non-normal checklist 13.1.

While the flight crew was executing the checklist, ATC[7] informed them that tire rubber had been found on RWY 01 at BIKF after they took off. Initially the flight crew only suspected a tire burst. The flight crew informed ATC of their hydraulic problems. Subsequently in another communication, ATC also relayed information that a metal piece had also been found on the RWY.

The flight crew performed evaluation of the situation, ANTISKID INOP + Tire burst + Loss of HYD A QTY (20% remaining and possible future loss of HYD system A) + metal piece on the RWY. They concluded that the aircraft was possibly damaged in the wheelwell compartment area or the flaps. The flight crew then reviewed other aircraft systems and found no other faults.

The flight crew then reviewed the option of returning to BIKF. When the aircraft took off from BIKF, it had been raining. In addition there was low visibility and CB's in the area, and the airport runways were wet, possibly slippery and loose earth on the side of the runway due to continuous rain (in case of runway excursion).

The flight crew performed various Non Normal performance landing calculation using the EFB, including (Antiskid inop FL40, Loss of HYD system A FL40). Due to tire burst they added margins to these figures.

The flight crew discussed the braking action of the A/C after landing, taking into consideration: difficult aircraft controllability after touch down with tire burst, braking action with no antiskid, ground spoilers inop, thrust reverser deployment at slower rate and thrust

[4] Quick Reference Handbook
[5] Cumulonimbus clouds
[6] See the Appendix for details on the OM B, 2.6.3 the FL100 or 10,000 ft checks
[7] Air Traffic Control

asymmetry during thrust reverser deployment. Possible runway excursion. Possible fire of LDG gear after landing.

This led the flight crew to prefer a long, dry runway with good visibility.

The flight crew therefore concluded, as all other systems were operating normally, that BIKF would not be the best choice for landing with compromised systems. The flight crew therefore decided to continue the flight to Europe, but started looking for diversion options in the United Kingdom or Ireland.

The flight crew called the senior cabin attendant to the flight deck to inform of their technical problems and that they would be diverting, most likely to the UK.

During the flight, the flight crew monitored the aircraft's systems regularly. The hydraulic quantity in hydraulic system A decreased to zero, followed by a loss of hydraulic pressure in hydraulic system A. With the loss of hydraulic system A, the flight crew referred to the QRH, LOSS OF SYSTEM A non-normal checklist 13.3 to 13.5.

According to the QRH non-normal checklist 13.3 and 13.4, with the loss of hydraulic system A, the following systems were affected:

- Landing gear has to be manually extended
    - Cannot be retracted
- Autopilot A inoperative
- Two flight spoilers on each wing inoperative
    - Roll rate and speedbrake effectiveness reduced
- Ground spoilers inoperative
    - Landing distance increased
- Alternate brakes inoperative
- Engine 1 thrust reverser normal hydraulic pressure inoperative
    - Deployment and retraction at slower rate
    - Thrust asymmetry
- Normal nose wheel steering inoperative

The flight crew considered several diversion options, including Glasgow, Prestwick, Edinburgh, Manchester, Dublin, Birmingham and Gatwick. As they got closer to the United Kingdom they contacted ATC, to notify them of their compromised systems, their intentions

and asked for updated weather information at several airports. They also contacted the airline's operation center for input regarding maintenance and ground support.

Selection of the best diversion option included a long (3 km or longer) and dry runway, very good visibility and high ceiling. The flight crew also considered operational aspects, such as the diversion airport being close to their flight route, fire services, airport traffic, medical facilities and maintenance. They were also worried that they might block the runway after landing, so they did not want the busiest airport. They also included in their decision making their own familiarity with the airport and that the area around the selected runway was clear of obstacle in case of runway excursion.The flight crew calculated the landing distance on the EFB[8] using specific weather data from the selected airports to have a more detailed idea of the runway margin available.

Once the flight crew had considered all the above information, they made the decision to divert to Birmingham Airport in the United Kingdom.

The weather information the flight crew received from ATC for Birmingham was as follows:

- METAR 16 1050 190°/10 knots, varying between 160° and 260°, visibility 10km+, clouds broken at 2800 feet, temperature +17°C, dew point +11°C and QNH of 1012 HPa.

The pilots also discussed the loss of hydraulic system A and what systems would not work during the landing as a result of that. They also discussed that they did not know the status of the wheels, only that they had a tire blown.

The flight crew contacted ATC, declared a distress status (PAN – PAN), stated their intention to divert to Birmingham and notified ATC that they would be upgrading to an emergency status (MAYDAY – MAYDAY – MAYDAY) for the approach and landing at Birmingham Airport.

The flight crew called the senior cabin attendant to the flight deck to update that they would be diverting to Birmingham. They discussed different scenarios after landing, the applicable procedure per the Operations Manual and the need to perform an emergency briefing for the passengers. It was decided that the Commander would address the passengers in English, followed by a Passenger Announcement by the senior cabin attendant in Spanish. The senior cabin attendant then went back into the cabin and briefed

[8] Electronic Flight Bag

the rest of the cabin crew. The Commander briefed the passengers, followed by a PA by the senior cabin attendant.

The Commander contacted ATC and informed that they might need to enter a hold for manual extension of the landing gear. He requested ILS RWY 15 at Birmingham Airport and informed ATC that they might be unable to vacate the runway after landing.

Then the Commander took over as the PF and the First Officer became the PM.

The flight crew contacted ATC and upgraded to emergency status (MAYDAY – MAYDAY – MAYDAY) and squawked 7700. The flight crew then performed the QRH deferred items descent checklist (antiskid in-operational and loss of hydraulic system A). Meanwhile the cabin crew secured the cabin and performed SOS demonstration.

The aircraft entered a holding pattern over waypoint CHASE. The flight crew then performed the QRH deferred items approach checklist and then manually extended the landing gear.

The flight crew then requested updated weather information from ATC, which provided the following weather update for Birmingham Airport:

- Birmingham 12:20 weather, surface wind 210°/10 knots, visibility 10km+, clouds broken at 3000 feet, temperature +17°C, dew point +10°C and the runway is dry-dry-dry and QNH 1011 HPa.

After the landing gear extension the flight crew received three green lights on the aft overhead panel for the LH MLG[9], RH MLG[10] and the NLG[11]. However on the center panel, only two green lights illuminated, for the RH MLG and the NLG. From this, the flight crew deduced that they had all three landing gears down and locked and that they had damage on the LH MLG.

The flight crew then reviewed the landing technique to be used. The Commander intended to land on the RH MLG first due the compromised LH MLG. They also discussed landing distance, manual speed brake deployment, symmetrical braking action, reverse thrust

[9] Left Hand Main Landing Gear
[10] Righ Hand Main Landing Gear
[11] Nose Landing Gear

usage, possible scenarios like fire or runway excursion and possible evacuation of the aircraft. The flight crew started the APU.

When the aircraft was fully configured for the landing with the flaps at 40, the Commander flew the aircraft down a long final approach. The flight crew asked ATC to verify if the three landing gears were in the down position using binoculars. ATC confirmed that all three landing gears were down. About thirty seconds before the landing the PM notified the cabin to brace for impact.

When the aircraft landed, it first landed on the RH MLG as the Commander had intended before it also came down on the LH MLG followed by the NLG. During the landing, the left wing ground spoilers did not deploy. In addition tire debris was released from the LH MLG after it touched down on the runway.

Figure 2: The landing (RH MLG) at Birmingham Airport

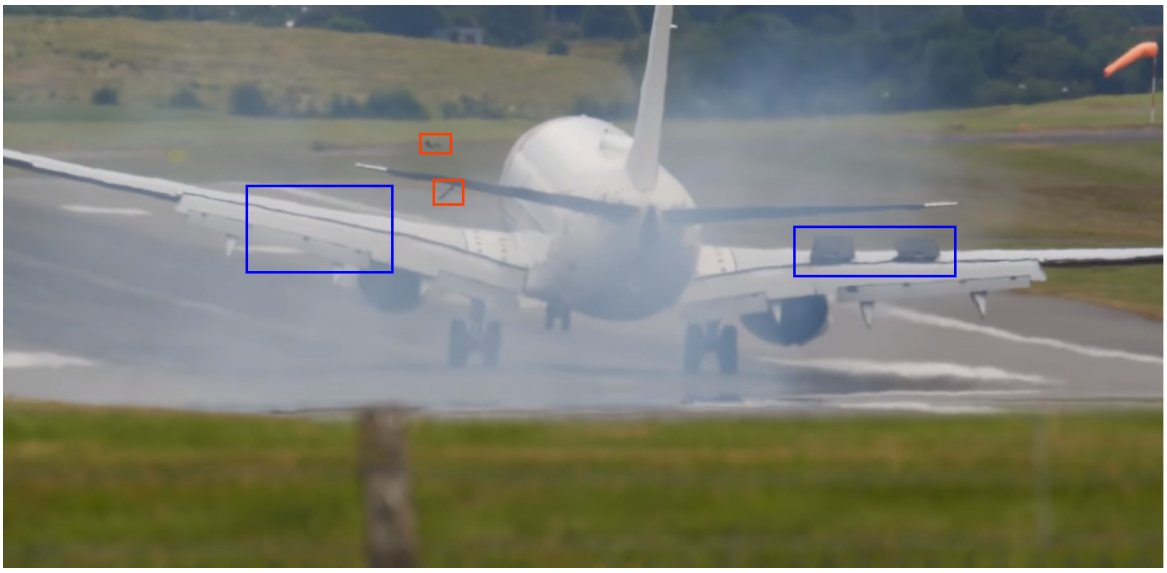

Figure 3: Spoilers on Left wing did not deploy (blue) and tire debris flying (red)

The aircraft came to stop on the runway. The flight crew set the APU on buses and shut down the engines. The fire brigade sprayed fire extinguishing agent onto the main landing gear.

Detailed inspection of the aircraft revealed the following damage:

- LH inboard main wheel tire burst
- Four (4) broken spoiler cables
- Downlock sensor system wire cut
- Air-ground sensor system wire cut
- Fuel temperature system wire cut
- Two (2) landing retract/extract hydraulic line broken
- Four (4) tubes to heat exchanger broken
- Three (3) tubes for brake/shimmy damper broken
- One (1) tube for engine driven pump pressure supply dented
- One (1) tube from shut off valve broken
- Flow regulator valve missing from LH wheel well for hydraulic system A
- Aileron pulley broken in wheel well
- Three (3) spoiler pulleys broken
- Fixed trailing edge panel punctured
- Support brackets for hydraulic pipes including fairleads damaged
- Dents on both main and aft inboard flaps
- Dent on LH horizontal stabilizer

Figure 4: The inboard wheel assembly from the LH MLG

Figure 5: Damage in the left wheel well

Subsequent to the serious incident both RWY 01 at Keflavik Airport and RWY 15 at Birmingham Airport were inspected and all debris found on or around the runways removed. The ITSB received the located debris from Keflavik Airport along with information about where it was located.

Figure 6: Objects located at or next to RWY 01 at Keflavik Airport after the serious incident

Figure 7: Tire rubber debris found at Keflavik Airport after the takeoff

2. ANALYSIS AND CONCLUSIONS

As the serious incident occurred at Keflavik Airport, the ITSB led the investigation[12].

The UK AAIB provided two investigators for on-site investigation support in Birmingham and one of them acting as the UK ACCREP to the investigation. The flight recorders were removed from the aircraft and taken to the UK AAIB in Farnborough, where they were downloaded and analyzed.

Detailed analysis of the FDR data revealed that the aircraft started its takeoff run on RWY 01 at BIKF airport at 9:46:14. The aircraft became airborne shortly before the point where RWY 10/28 crosses RWY 01/19. According to the FDR data, this was at 9:46:34[13].

The analysis of the flight recorders confirmed that hydraulic system A started to loose hydraulic quantity at 9:46:50.

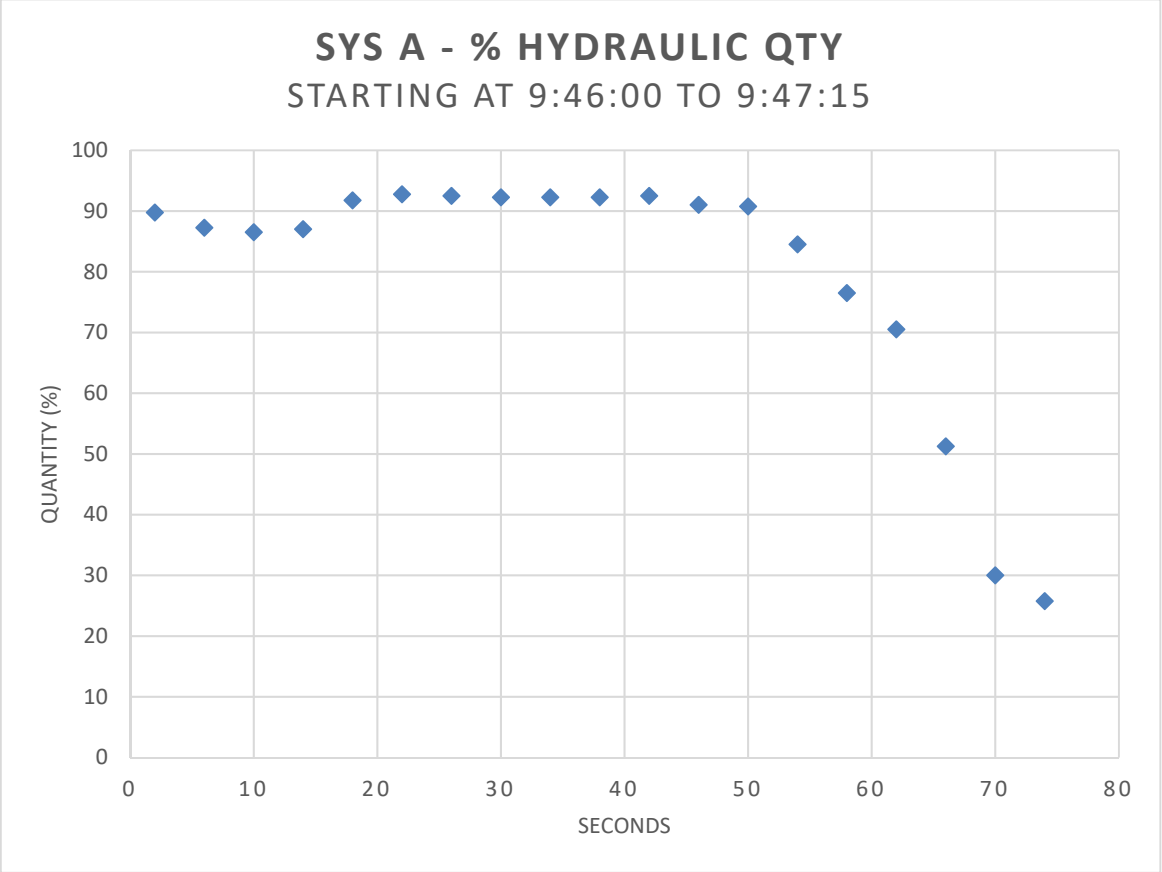

Figure 8: Hydraulic system A leakage started at 9:46:50

[12] Investigator-In-Charge from the ITSB
[13] According to BIKF airport camera 19-3, takeoff was at 9:46:57 (ITSB uses the FDR for timing)

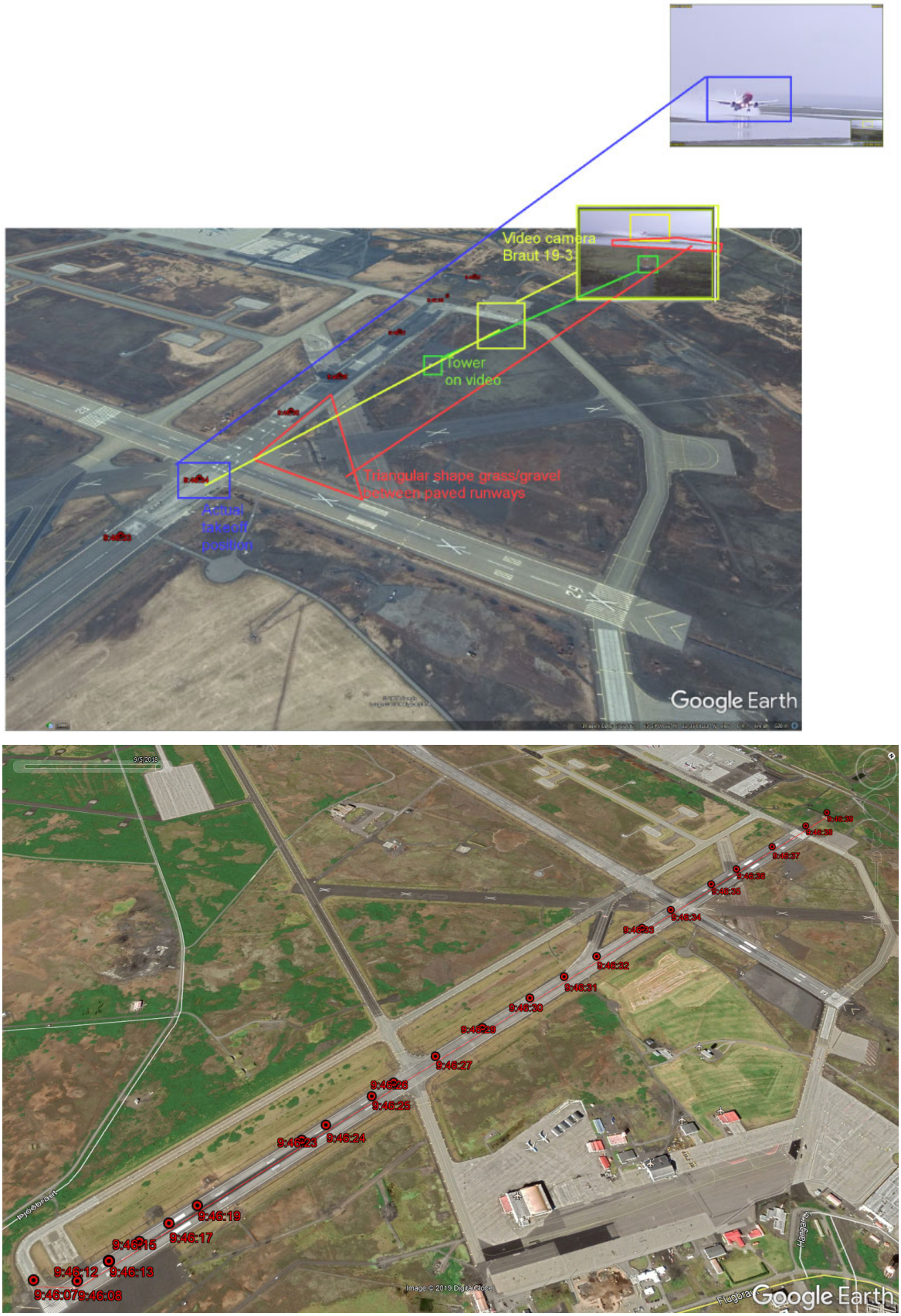

Figure 9: The takeoff run and the liftoff (9:46:34) of aircraft EI-FHD at Keflavik Airport

The crew of aircraft EI-FHD reported abnormal vibration during the aircraft's takeoff run at RWY 01 at BIKF airport. In addition, inspection of RWY 01 and its surrounding area revealed debris on the left side of RWY 01 between taxiway S-2 and high speed RWY taxiway A-1.

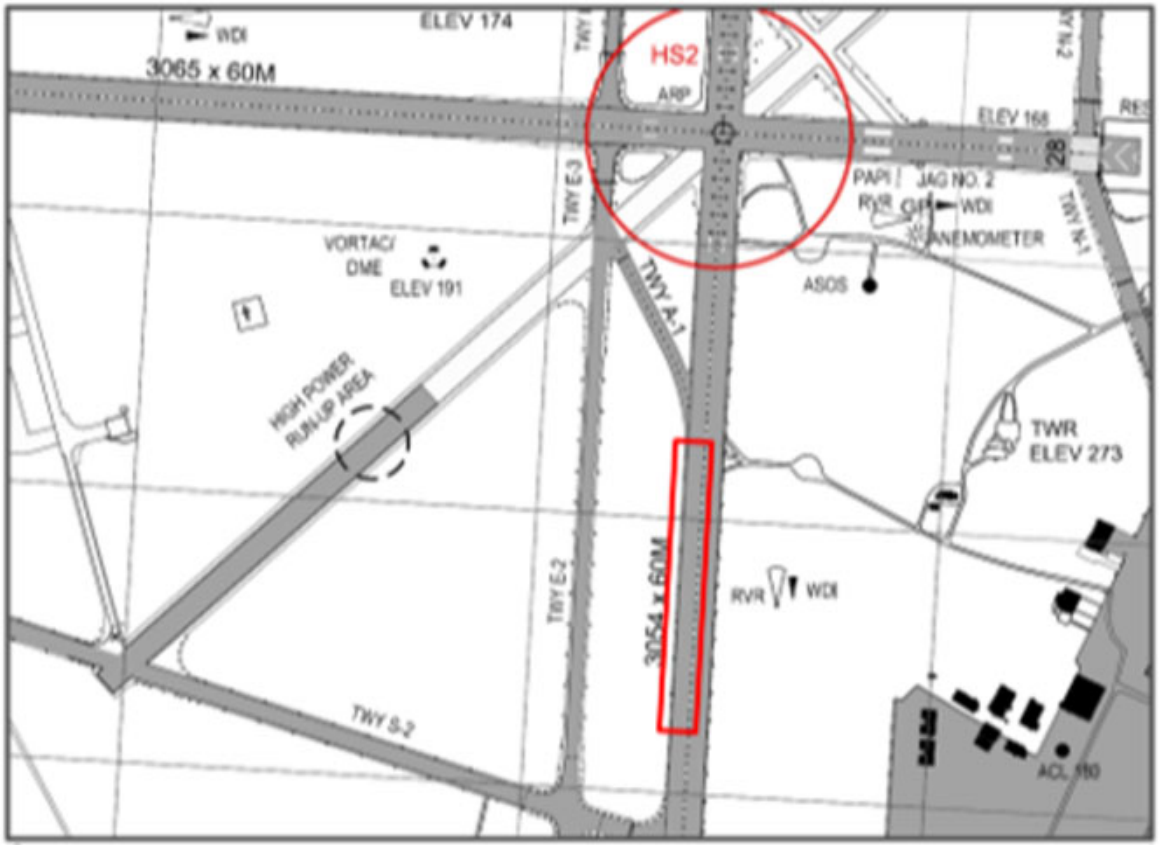

Figure 10: Debris located at left side of RWY 01 as shown in the red rectangular box

According to the FDR data, the aircraft passed this area of the runway during its takeoff run between 9:46:27 and 9:46:32.

The ITSB therefore analyzed the FDR data from the takeoff run to see if something abnormal was recorded during that period.

Figure 11: Aircraft in area of interest between 9:46:27 and 9:46:32

As the ITSB was interested in any unusual movement during the takeoff run the lateral acceleration of the aircraft was graphed over the takeoff run. Lateral acceleration peaks were noted as can be seen on the graph in Figure 12.

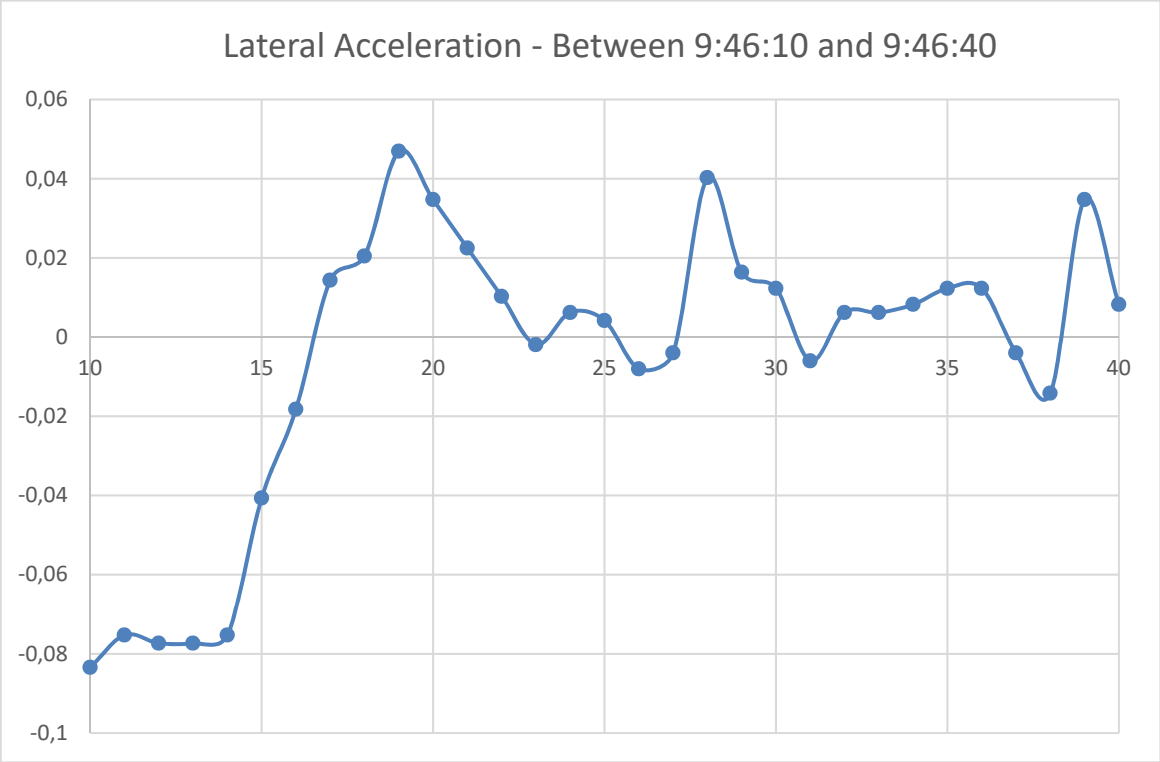

Figure 12: The lateral acceleration of the aircraft during the takeoff run

Weather data around the time of the takeoff period of the aircraft was investigated. The wind was very light (< 10 m/sec) in the area and it is unlikely to have caused the fluctuations in the lateral acceleration during the takeoff run of the aircraft.

The ITSB then compared the lateral acceleration to the rudder input parameter, to see if some of the lateral acceleration could be explained by the aircraft swinging left or right due to rudder input.

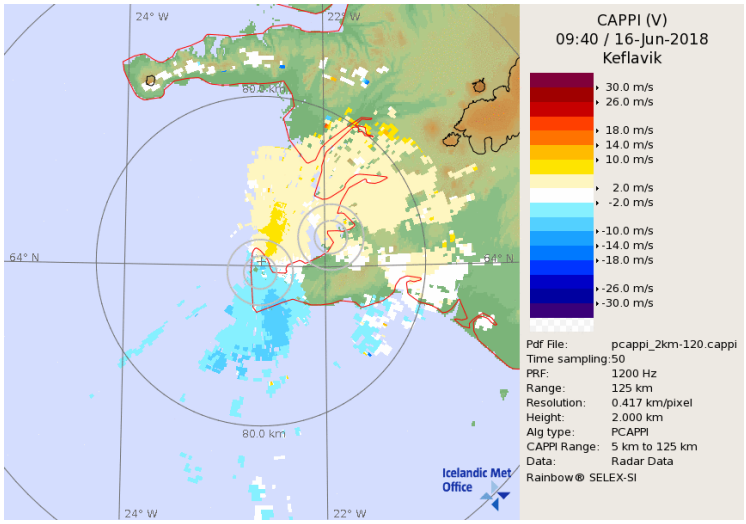

Figure 13: Wind around BIKF Airport at 9:40

The rudder input explained some of the lateral acceleration (seen in green in Figure 14). It could however not explain the lateral acceleration in the area where the debris was located between taxiway S-2 and high speed RWY taxiway A-1 (seen in red in Figure 14).

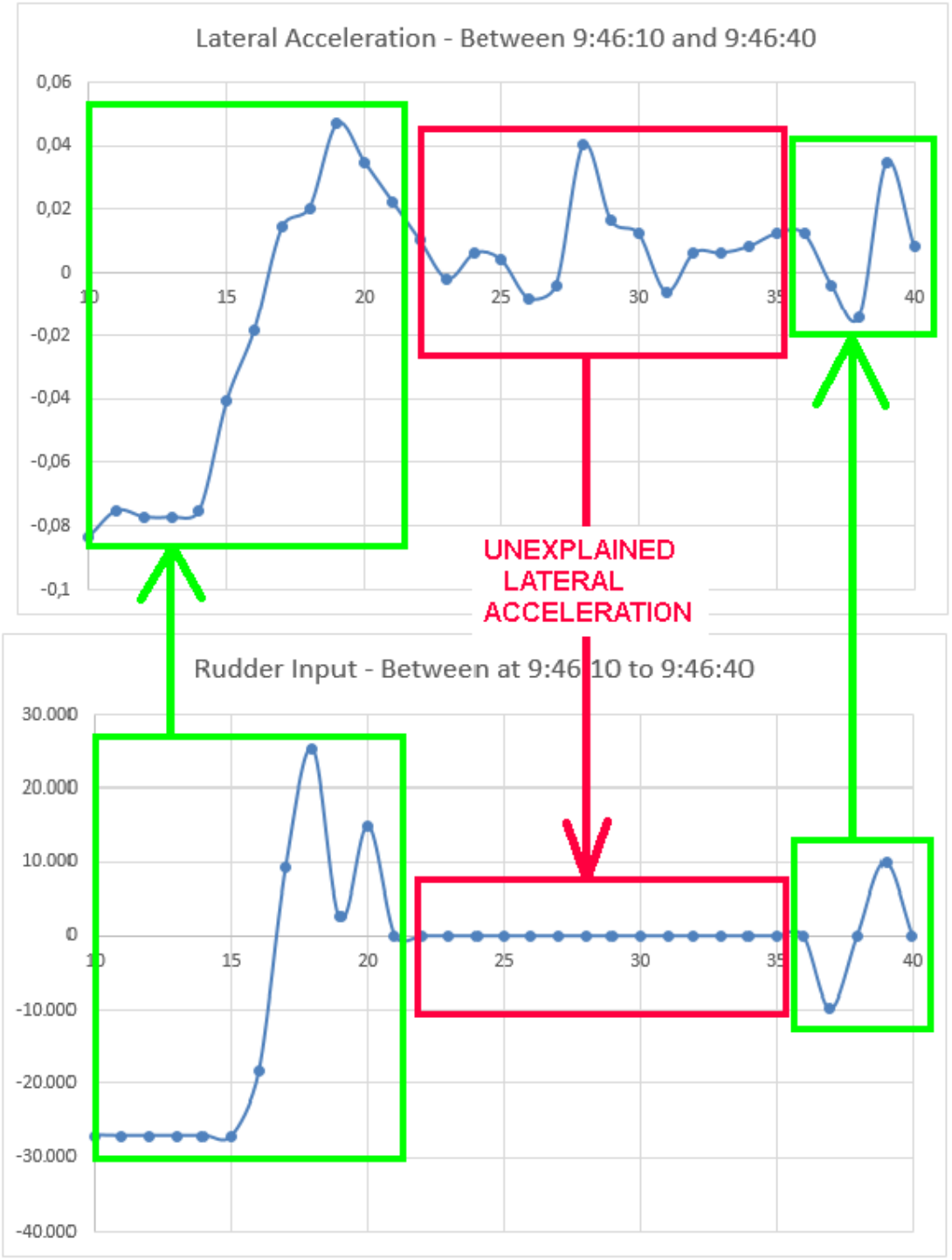

Figure 14: Unexplained lateral acceleration as the aircraft passed the area of the debris

The ITSB believes that a tire rupture by debris on the runway may have caused the lateral acceleration in the red box in Figure 14.

The damaged tire (LH inboard) was assessed by the ITSB and the UK AAIB and compared with information from the tire manufacturer.

Figure 15: Tire and tire debris reassembled in a jig

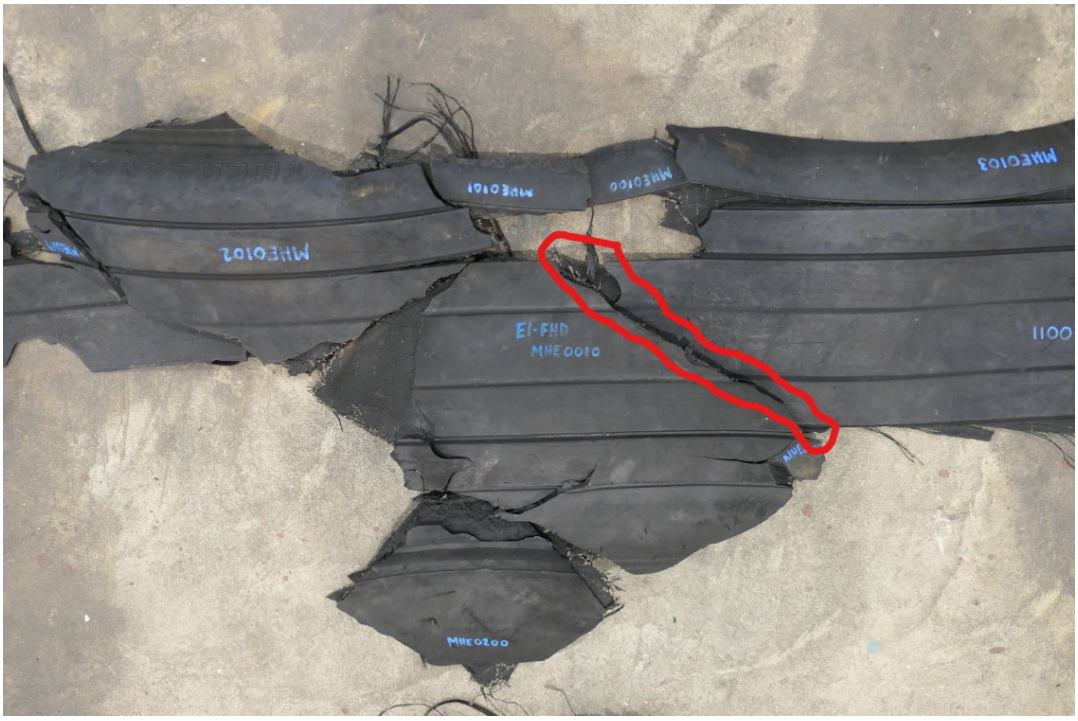

Figure 16: Probable initial failure – Recovered from landing gear wheel well

According to a tire care and maintenance document[14] from the tire manufacturer, the damage to the tire in Figure 4, most closely resembles two kinds of damage:

- Thrown Tread
  - Caused by partial or complete loss of thread down to tread fabric ply or casing plies
  - Can happen if the tire deflates

- Impact Break
  - Could be caused by extreme hard landing (not the case here)
  - Could be caused by a penetration by a foreign object

Impact Break
Rupture of tire casing in tread or sidewall area, usually from extremely hard landing or penetration by a foreign object.
Action: Remove from service.

Thrown Tread
Partial or complete loss of tread down to tread fabric ply or casing plies.
Action: Remove from service. If analysis is required or requested, obtain tread pieces for submission. If the tire deflated, remove axle mate if applicable.

Investigation of the tire debris revealed the probable initial failure to have occurred by Foreign Object Damage (FOD).

Of the debris that was located on RWY 01 and to the left of it, between taxiway S-2 and high speed RWY taxiway A-1 (excluding the tire pieces), the ITSB could explain the following items as being from aircraft EI-FHD:

- 9 cm long metal cylinder
  - The ITSB believes that this is the missing flow regulator valve from LH landing gear wheel well for hydraulic system A
  - The ITSB believes that this is secondary damage due to the ruptured tire

[14] Goodyear Aircraft Tire Care & Maintenance, page 30 and 34

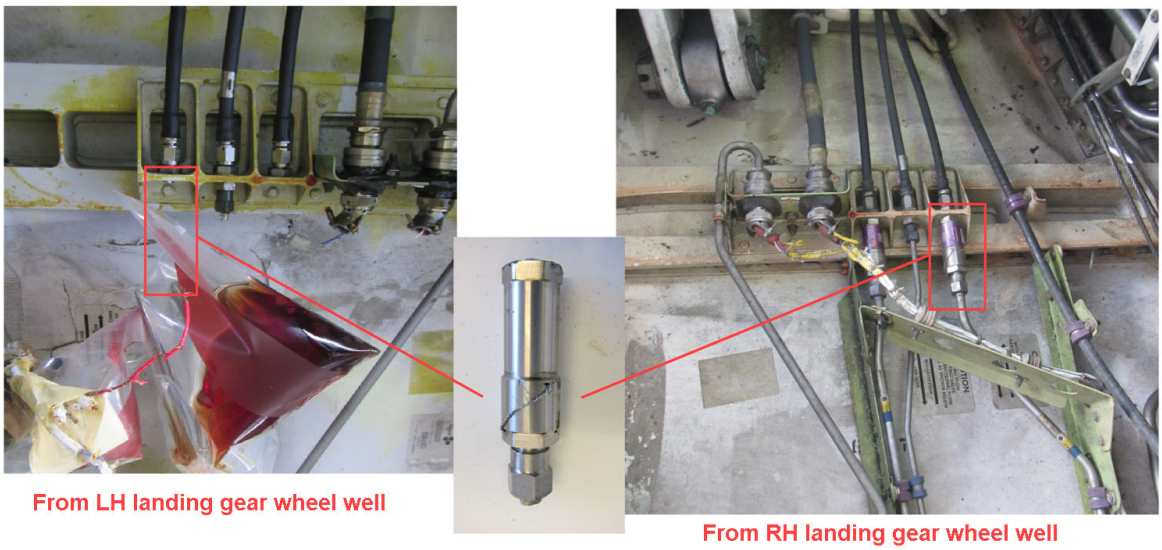

Figure 17: Regulator valve for hydraulic system A missing in LH landing gear wheel well

- Screw
  - The ITSB believes that this belongs to one of the fairings near the left wheel well which was found to have a missing fastener
  - The ITSB believes that this is secondary damage due to the ruptured tire

- Small electrical wire joint
  - The ITSB suspects this to be from the broken wires in the left wheel well of the aircraft
  - The ITSB believes this to be secondary damage due to the ruptured tire

- Part of metalic joint
  - The ITSB suspects this to be from the broken brackets in the left wheel well of the aircraft
  - The ITSB believes this to be secondary damage due to the ruptured tire

The ITSB could not explain the following debris found and therefore considers them as foreign objects to aircraft EI-FHD:

- 16 cm long plastic part (in two pieces)
    - The ITSB could not identify this plastic part

- 9.5 cm long metalic PIP pin
    - The ITSB could not identify this PIP pin as part of the aircraft

- Bi-hex bolt
    - The ITSB could not identify this bi-hex bolt as being missing from the aircraft

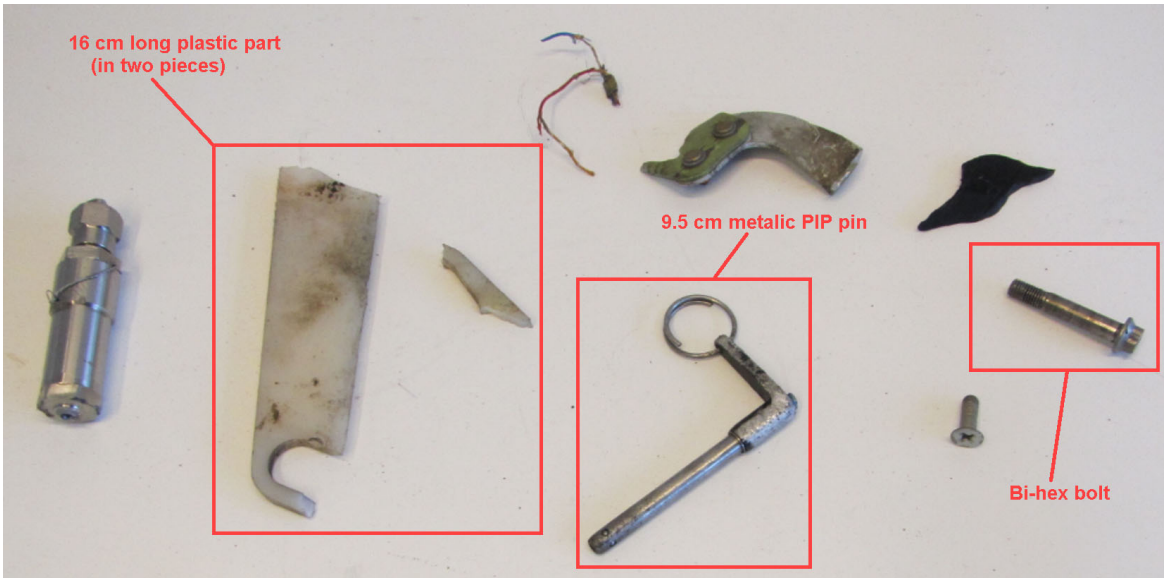

Figure 18: Unidentified objects shown in red boxes

The ITSB believes that the cause of the serious incident to be that the aircraft incurred Foreign Object Damage (FOD).

The ITSB also believes the FOD occurred as it ran over debris during its take off roll, most likely when it passed between taxiway S-2 and high speed taxiway A-1 on RWY 01 at Keflavik Airport.

According to Isavia runways and taxiways at Keflavik Airport are inspected at least 3 times a day for contamination, including Foreign Objects.

In Keflavik Airport Operation Handbook, Chapter 15.3, it states:

15.3 FOD, FOD PREVENTION, INCLUDING APRON CLEANING/SWEEPING.
Foreign objects (FOD) on the movement area:
Objects found that may have fallen from an aircraft are investigated to identify the aircraft and take appropriate steps, including among others, reporting of the incident to the Icelandic Transportation Safety Board (Rannsóknarnefnd Samgönguslysa RNSA). Airport Operations maintain a log of all activity in this field. Furthermore, all occurrences are listed in Opscom. .....If any suspicion arises that an object is from an aircraft, it shall be reported immediately to Airport Operations at Háaleitishlaði no.25, together with details of the location and time the object was found. Such finding is recorded in Opscom.

3. SAFETY RECOMMENDATIONS

The ITSB issues the following safety recommendation to Isavia:

18-104F018 T01

Review regularly the FOD program and procedures associated, to ensure that runways are as far as possible clear of debris.

The following board members approved the report:

- Geirþrúður Alfreðsdóttir, chairman
- Bryndís Lára Torfadóttir, board member
- Gestur Gunnarsson, board member
- Hörður Arilíusson, deputy board member
- Tómas Davíð Þorsteinsson, deputy board member

Reykjavík, 11. June 2020

On behalf of the Icelandic Transportation Safety Board

Ragnar Guðmundsson
Investigator-In-Charge

4. APPENDIX

OM B
2.6.3 At FL100 or 10.000 ft.

PM:
Check:
 Fuel Qty & pumps in use (see note)*
 Hydr. Qty & Pressure
 Aircond. Diffpress, cabin alt, packs & bleeds.
 Fasten Seat Belt sign.....AUTO (on the CMDR's order)
 VHF 2 normally on 121.5 MHz with sufficient volume

CMDR:
Lights.....OFF (Landing, Turnoff, logo and wing lights –
For all models up to YT273).
Lights.....OFF (Landing, Turnoff, Taxi, & Logo and Wing lights –
For all models YT294 and onwards).
(if PF and manual flight, order the PM to turn off lights)
Order PM to set fasten seat belt sign to AUTO (flight conditions permitting)

*Note: If automatic shut off relay is not installed for centre tank pumps:
Either A) or B) below:
A) If the centre tank fuel pump switches were OFF for take off and the centre tank contains more than 500 kg position both centre tank switches ON above FL 100 or after pitch attitude has been reduced to begin acceleration to a climb speed of 250 KIAS or greater.
During climb or cruise position both centre tank fuel pump switches OFF when centre tank fuel quantity reaches 500 kg.
B) For aircraft where Alternate Method of Compliance (AMOC) to AD 2001-08-24 and AD 2002-24-51 is approved:
Follow procedure in OM B 1.8.1.3.2

ANTISKID INOP

ANTISKID INOPERATIVE

Condition: An antiskid system fault occurs.

Caution! Locked wheel protection is not available.

1 AUTO BRAKE select switch. . . . . OFF

The autobrake system is inoperative.

2 Do **not** arm the speedbrakes for landing. Manually deploy the speedbrakes immediately upon landing.

Automatic speedbrake extension may be inoperative.

3 Check the Non–Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

4 **Checklist Complete Except Deferred Items**

Deferred Items

Landing Procedure Review

Use minimum braking consistent with runway length and conditions to reduce the possibility of a tire blowout.

Do **not** apply the brakes until the nose wheel is on the ground and the speedbrakes have been manually deployed.

Brake initially using light steady pedal pressure. Increase pressure as ground speed decreases. Do **not** pump the brakes.

▼ Continued on next page ▼

▼ANTISKID INOPERATIVE continued▼

Descent Checklist

Pressurization . . . . . LAND ALT ___

Recall . . . . . Checked

Autobrake . . . . . **OFF**

Landing data . . . . . VREF ___, Minimums ___

Approach briefing . . . . . Completed

Approach Checklist

Altimeters . . . . . ___

Landing Checklist

YC412, YK196, YR311

ENGINE START switches . . . . . CONT

Speedbrake . . . . . **DOWN detent**

Landing gear . . . . . Down

Flaps . . . . . ___, Green light

■ ■ ■ ■

LOW PRESSURE

HYDRAULIC PUMP LOW PRESSURE

Condition: The hydraulic pump pressure is low.

1 HYD PUMP switch (affected side) . . . . . OFF

Note: Loss of an engine-driven hydraulic pump and a high demand on the system may result in an intermittent illumination of the LOW PRESSURE light for the remaining electric motor-driven hydraulic pump.

■ ■ ■ ■

LOSS OF SYSTEM A

FLT CONTROL	A HYD PUMPS	
A	ENG 1	ELEC 2
LOW PRESSURE	LOW PRESSURE	LOW PRESSURE

Condition: Hydraulic system A pressure is low.

1 System A
FLT CONTROL switch . . . Confirm . . . . STBY RUD

2 System A
HYD PUMP switches (both) . . . . . OFF

3 Check the Non–Normal Configuration Landing Distance tables in the Performance Inflight-QRH chapter or other approved source.

4 NOSE WHEEL STEERING switch . . . . . ALT

5 Plan for manual gear extension.

Note: When the gear has been lowered manually, it cannot be retracted. The drag penalty with gear extended may make it impossible to reach an alternate field.

▼ Continued on next page ▼

▼LOSS OF SYSTEM A continued▼

Note: Inoperative Items

Autopilot A inop
Autopilot B is available.

Flight spoilers (two on each wing) inop
Roll rate and speedbrake effectiveness may be reduced in flight.

Normal landing gear extension and retraction inop
Manual gear extension is needed.

Ground spoilers inop
Landing distance will be increased.

Alternate brakes inop
Normal brakes are available.

Engine 1 thrust reverser normal hydraulic pressure inop
Thrust reverser will deploy and retract at a slower rate and some thrust asymmetry can be anticipated during thrust reverser deployment.

Normal nose wheel steering inop
Alternate nose wheel steering is available.

6 **Checklist Complete Except Deferred Items**

Deferred Items

Descent Checklist

Pressurization . . . . . LAND ALT ___

Recall . . . . . Checked

Autobrake . . . . . ___

Landing data . . . . . VREF ___, Minimums ___

▼ Continued on next page ▼

▼LOSS OF SYSTEM A continued▼

Approach briefing . . . . . Completed

Approach Checklist

Altimeters . . . . . ___

Manual Gear Extension

LANDING GEAR lever. . . . . OFF

Manual gear extension handles. . . . . Pull

The uplock is released when the handle is pulled to its limit.

The related red landing gear indicator light illuminates, indicating uplock release.

Wait 15 seconds after the last manual gear extension handle is pulled:

LANDING GEAR lever . . . . . DN

Landing Checklist

YC412, YK196, YR311

ENGINE START switches . . . . . CONT

Speedbrake . . . . . ARMED

Landing gear . . . . . Down

Flaps . . . . . ___, Green light

■ ■ ■ ■