



**KOMITE NASIONAL KESELAMATAN TRANSPORTASI
REPUBLIC OF INDONESIA**

PRELIMINARY

KNKT.17.05.19.04

Aircraft Serious Incident Investigation Report

Malaysia Airlines

Boeing 737-800; 9M-MXH

Soekarno-Hatta International Airport, Jakarta

Republic of Indonesia

13 June 2017



2017

This preliminary investigation report was produced by the Komite Nasional Keselamatan Transportasi (KNKT), Transportation Building, 3rd Floor, Jalan Medan Merdeka Timur No. 5 Jakarta 10110, Indonesia.

The report is based upon the initial investigation carried out by the KNKT in accordance with Annex 13 to the Convention on International Civil Aviation Organization, the Indonesian Aviation Act (UU No. 1/2009) and Government Regulation (PP No. 62/2013).

The preliminary report consists of factual information collected until the preliminary report published. This report will not include analysis and conclusion.

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However, the KNKT fully recognizes that the implementation of recommendations arising from its investigations will in some cases incur a cost to the industry.

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ABBREVIATIONS AND DEFINITIONS

AAIB	:	Aircraft Accident Investigation Bureau
AIP	:	Aeronautical Information Publication
AOC	:	Aircraft Operator Certificate
ARFF	:	Aircraft Rescue and Fire Fighting
ATIS	:	Aerodrome Terminal Information Services
ATPL	:	Airline Transport Pilot License
ATS	:	Air Traffic Services
AWOS	:	Automated Weather Observation System
BMKG	:	Badan Meteorologi Klimatologi dan Geofisika
C of A	:	Certificate of Airworthiness
C of R	:	Certificate of Registration
CB	:	Cumulonimbus
CSN	:	Cycle Since New
CVR	:	Cockpit Voice Recorder
FDR	:	Flight Data Recorder
FL	:	Flight Level
GNSS	:	Global Navigation Satellite System
ICAO	:	International Civil Aviation Organization
ILS	:	Instrument Landing System
kg	:	Kilogram
KNKT	:	<i>Komite Nasional Keselamatan Transportasi</i> (National Transportation Safety Committee)
mb	:	Millibars
PBN	:	Performance Based Navigation
PF	:	Pilot Flying
PIC	:	Pilot in Command
PM	:	Pilot Monitoring
SIC	:	Second in Command
TSN	:	Time Since New
UTC	:	Universal Time Coordinated

SYNOPSIS

On 13 June 2017, a Boeing 737-800 aircraft was being operated by Malaysian Airlines on a scheduled passenger flight from Kuala Lumpur International Airport, Malaysia to Soekarno-Hatta International Airport, Jakarta, Indonesia.

The aircraft departed from Kuala Lumpur with flight number MAS 725 and cruised at Flight Level (FL) 390. On board the aircraft were 2 pilots, 4 flight attendants and 61 passengers. In this flight Pilot in Command (PIC) acted as Pilot Flying (PF) and the Second in Command (SIC) acted as Pilot Monitoring (PM). There was no report or record of aircraft technical system abnormality prior to the departure until the time of occurrence. The flight since departure until commenced to approach was uneventful. While approaching to Jakarta the weather was heavy rain and thunderstorm.

At 1308 UTC, the aircraft touched down runway 25R and veered to the right. At approximately 580 meters from the beginning runway, the aircraft travelled out from runway pavement then returned to the runway at approximately 900 meter from the beginning of the runway. The left main landing gear impacted two runway edge lights and the right main landing gear impacted one runway edge light.

During the landing roll, the pilot reported Mayday to Jakarta tower controller that the aircraft skidded off from runway and responded by confirming that the pilot intended to make a go around. The pilot advised that the aircraft was skidded off the runway and continued vacating the runway via taxiway November 4 (N4).

The aircraft stopped on the taxiway N4 with both tires of right main landing gear were burst. The Jakarta tower controller informed that the towing car and Aircraft Rescue Fire Fighting (ARFF) unit were deployed.

The occupants were disembarked on taxiway N4 using passenger stair and at 1425 UTC, the occupants transported to the terminal building by bus. There were no injuries to persons as a result of this occurrence.

The aircraft has minor damaged. The outer tire of the right main landing gear was burst. All other tires damaged over limit. Some punctures found on the left inboard flap and right and left wing body fairings. There were three runway edge lights damaged.

At the time of issuing this preliminary report, the Komite Nasional Keselamatan Transportasi had been informed of safety actions taken by Malaysia Airlines resulting from this occurrence. Komite Nasional Keselamatan Transportasi (KNKT) considered that the safety actions issued by the aircraft operator were relevant to improve safety. In this preliminary report, KNKT consider not to issue safety recommendation.

The investigation is continuing and KNKT plans to complete the investigation within 12 months since the day of the occurrence. Should any further relevant safety issues emerge during the course of the investigation, KNKT will immediately bring the issues to the attention of the relevant parties and publish as required.

Investigation involving Aircraft Accident Investigation Bureau (AAIB) Malaysia that assigned accredited representative according to the ICAO Annex 13.

1 FACTUAL INFORMATION

1.1 History of the Flight

On 13 June 2017, a Boeing 737-800 aircraft was being operated by Malaysian Airlines on a scheduled passenger flight from Kuala Lumpur International Airport, Malaysia¹ to Soekarno-Hatta International Airport, Jakarta² Indonesia.

The aircraft departed from Kuala Lumpur at 1811 LT³ (1011 UTC) with flight number MAS 725 and cruised at Flight Level (FL) 390. On board the aircraft were 2 pilots, 4 flight attendants and 61 passengers. In this flight Pilot in Command (PIC) acted as Pilot Flying (PF) and the Second in Command (SIC) acted as Pilot Monitoring (PM). There was no report or record of aircraft technical system abnormality prior to the departure until the time of occurrence. The flight since departure until commenced to approach was uneventful.

While approaching Jakarta, the Jakarta approach controller instructed the pilot to hold over waypoint BUNIK at FL220 due to traffic and heavy rain over Jakarta. After 30 minutes holding, the Jakarta approach controller instructed the pilot to proceed to waypoint NOKTA and descent to altitude of 11,000 feet.

At 1937 LT⁴ (1237 UTC) at night condition, when the aircraft was approaching waypoint NOKTA, the Jakarta approach controller instructed the pilot to turn the aircraft to heading 150° to conduct Instrument Landing System (ILS) approach of runway 25R. The instruction was declined by the pilot due to the weather condition and considering that the aircraft still had enough fuel for holding the pilot requested to continue the holding over waypoint NOKTA. The Jakarta approach controller approved the request and instructed to descend to 10,000 feet.

At 1251 UTC, the Jakarta approach controller asked the pilot whether ready for approach. The pilot affirmed and decided to make landing approach after considered that the weather condition has improved and there was no report of wind shear from several preceding aircraft which has landed in Jakarta. The Jakarta approach controller instructed the pilot to turn right to waypoint PRIOK and descend to altitude of 2,000 feet.

At 1258 UTC, the Jakarta approach controller issued clearance for ILS approach runway 25R. The pilot acknowledged the clearance and asked the latest visibility to the Jakarta approach controller then responded that the visibility was 1.5 up to 2 kilometers.

At 1304 UTC, the pilot contacted Jakarta tower controller and instructed to continue the landing approach. Four minutes later, the pilot advised that the aircraft was on final and the Jakarta tower controller issued landing clearance to runway 25R. The pilot asked the latest wind condition to the Jakarta tower controller and advised that the wind direction was 200° with velocity of 8 knots.

1 Kuala Lumpur International Airport (WMKK), Malaysia will be named as Kuala Lumpur for the purpose of this report.

2 Soekarno-Hatta International Airport (WIII), Jakarta will be named as Jakarta for the purpose of this report.

3 The 24-hours clock in Universal Time Coordinated (UTC) is used in this report to describe the local time as specific events occurred. Local time in Kuala Lumpur is UTC+8 hours.

4 The 24-hours clock in Universal Time Coordinated (UTC) is used in this report to describe the local time as specific events occurred. Local time in Kuala Lumpur is UTC+7 hours.

At 1308 UTC, the aircraft touched down runway 25R and veered to the right. At approximately 580 meters from the beginning runway, the aircraft travelled out from runway pavement then returned to the runway at approximately 900 meter from the beginning of the runway. The left main landing gear impacted two runway edge lights and the right main landing gear impacted one runway edge light.

During the landing roll, the pilot reported Mayday to Jakarta tower controller that the aircraft skidded off from runway and responded by confirming that the pilot intended to make a go around. The pilot advised that the aircraft was skidded off the runway and continued vacating the runway via taxiway November 4 (N4). The layout of the airport could be found on the appendices of this report.

The aircraft stopped on the taxiway N4 with both tires of right main landing gear were burst. At 1309 UTC, the pilot advised the Jakarta tower controller that the aircraft was on taxiway N4 and unable to move due to tire burst. The Jakarta tower controller reconfirmed to the pilot that the aircraft was unable to move and affirmed. The Jakarta tower controller then instructed an aircraft on approach runway 25R to make a go around since the runway was not clear.

At 1310 UTC, the pilot readvised the Jakarta tower controller that the aircraft was at taxiway N4 and requested towing car. The Jakarta tower controller informed that the towing car and Aircraft Rescue Fire Fighting (ARFF) unit were deployed.

At 1311 UTC, the pilot contacted Jakarta ground controller and informed their aircraft condition and acknowledged.

The occupants were disembarked on taxiway N4 using passenger stair and at 1425 UTC, the occupants transported to the terminal building by bus. There were no injuries to persons as a result of this occurrence.

The aircraft has minor damaged. The outer tire of the right main landing gear was burst. All other tires damaged over limit. Some punctures found on the left inboard flap and right and left wing body fairings. There were three runway edge lights damaged.



Figure 1: The aircraft after the occurrence parked at parking stand R54

1.2 Personnel Information

1.2.1 Pilot in Command

The Pilot in Command (PIC) was 33 years old Malaysian male pilot who had valid Airline Transport Pilot License (ATPL) and qualified for Boeing 737-800 aircraft. The PIC held valid first class medical certificate with limitation shall wear corrective lenses for distant vision. The last line check for the PIC was performed on 4 November 2016 and the last proficiency check was performed on 26 February 2017.

The flying experiences of the pilot were as follows:

Total hours : 6,101 hours 30 minutes
Total on type : 1,396 hours 29 minutes
Last 90 days : 178 hours 15 minutes
Last 60 days : 104 hours 43 minutes
Last 24 hours : 8 hours 24 minutes
This flight : 2 hours 59 minutes

1.2.2 Second in Command

The Second in Command (SIC) was 35 years old Malaysian male pilot who had valid Airline Transport Pilot License (ATPL) and qualified for Boeing 737-800 aircraft. The pilot held valid first class medical certificate with limitation shall wear corrective lenses for distant vision. The last line check for the pilot was performed on 17 May 2017 and the last proficiency check was performed on 17 January 2017.

The flying experiences of the pilot were as follows:

Total hours : 5,562 hours 1 minute
Total on type : 5,138 hours 14 minutes
Last 90 days : 236 hours 55 minutes
Last 60 days : 163 hours 31 minutes
Last 24 hours : 8 hours 24 minutes
This flight : 2 hours 59 minutes

1.2.3 Flight Attendant

All flight attendants in this flight had valid license and qualified for Boeing 737-800 aircraft,

1.3 Aircraft Information

1.3.1 General

The aircraft was manufactured by The Boeing Company in United States of America in 2012 with serial number 40135 and the type/model was Boeing 737-8H6. The aircraft registered 9M-MXH and had valid Certificate of Airworthiness (C of A) and Certificate of Registration (C of R).

The total hour of the aircraft was 19,090 hours 13 minutes and the total cycle was 9,129 cycles. The last major check of the aircraft was 2K check and the last minor check was Q2 check.

The engines manufactured in United States of America by General Electrics/Snecma and the type/model was CFM56-7B. The serial number of engine number 1 was 960578 and the engine number 2 was 960587. Both engines were installed on the aircraft since 6 January 2012 and the Time Since New (TSN) of both engines were 19,090 hours 13 minutes and the Cycle Since New (CSN) were 9,129 cycles.

1.3.2 Weight and Balance

The aircraft departed from Kuala Lumpur to Jakarta within the proper weight and balance envelope, as shown in the following table:

Maximum Take-off weight	: 79,015 kg
Actual take-off weight	: 61,816 kg (maximum 79,015 kg)
Maximum landing weight	: 66,360 kg
Estimated landing weight	: 57,305 kg
MAC TOW	: 18.45 %
MAC LDG	: 20.27 %

1.4 Meteorological Information

The meteorological data for Soekarno-Hatta International Airport was provided by meteorology station of *Badan Meteorologi Klimatologi dan Geofisika* (BMKG – Bureau of Meteorology, Climatology and Geophysics). The station utilized Aerodrome Terminal Information Services (ATIS) and Automated Weather Observation System (AWOS) which the display was relayed to the Jakarta air traffic control.

The meteorological report for Soekarno-Hatta International Airport on 13 June 2017 was as follows:

	1230 UTC	1300 UTC	1330 UTC
Wind	300° / 12 knots	270° / 16 knots variable between 250° and 310°	290° / 10 knots variable between 250° and 320°
Visibility (m)	1,600	1,600	2,000
Weather	Heavy rain and thunderstorm	Heavy rain and thunderstorm	Rain with thunderstorm
Cloud ⁵	SCT 015 CB BKN 016	SCT 015 CB BKN 016	SCT 015 CB BKN 017
TT/TD (°C)	24 / 23	23 / 22	22 / 22
QNH (mb)	1012	1,013	1,013
Remarks	CB over the field	CB over the field	CB over the field

⁵ Cloud amount is assessed in total which is the estimated total apparent area of the sky covered with cloud. The international unit for reporting cloud amount for Scatter (SCT) is when the clouds cover 3/8 up to 4/8 area of the sky and for Broken (BKN) is when the clouds cover 5/8 up to 7/8 area of the sky.

The following satellite images were provided by the BMKG at 1200 UTC, 1300 UTC and 1400 UTC. The images indicated that the condition over Jakarta (purple circle) was on dense condition.

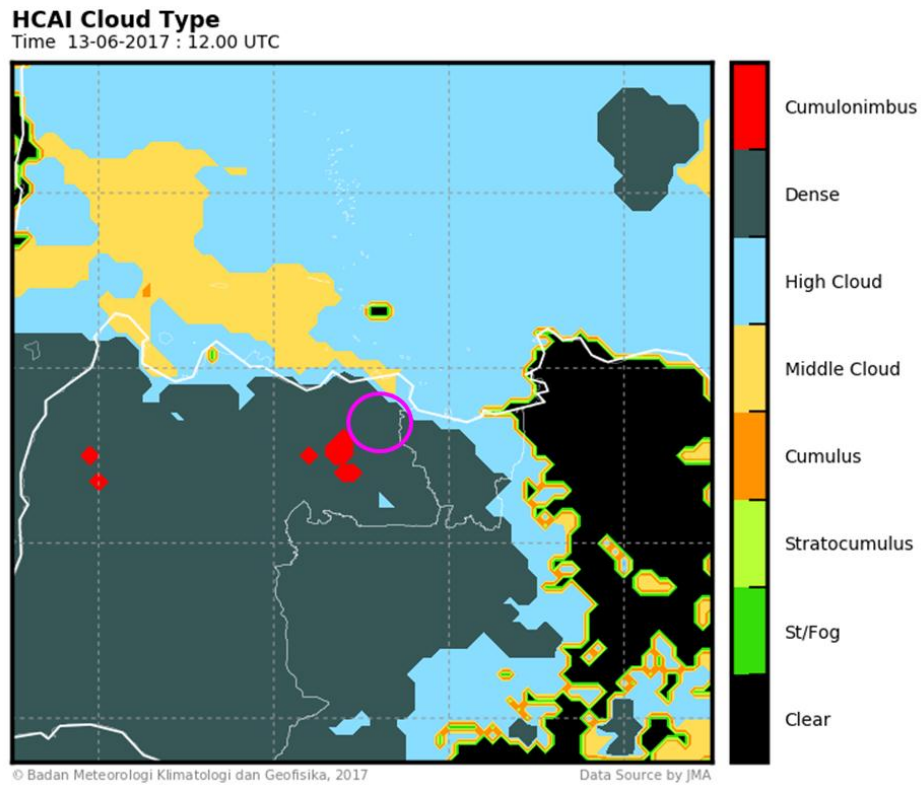


Figure 2: Satellite image at 1200 UTC

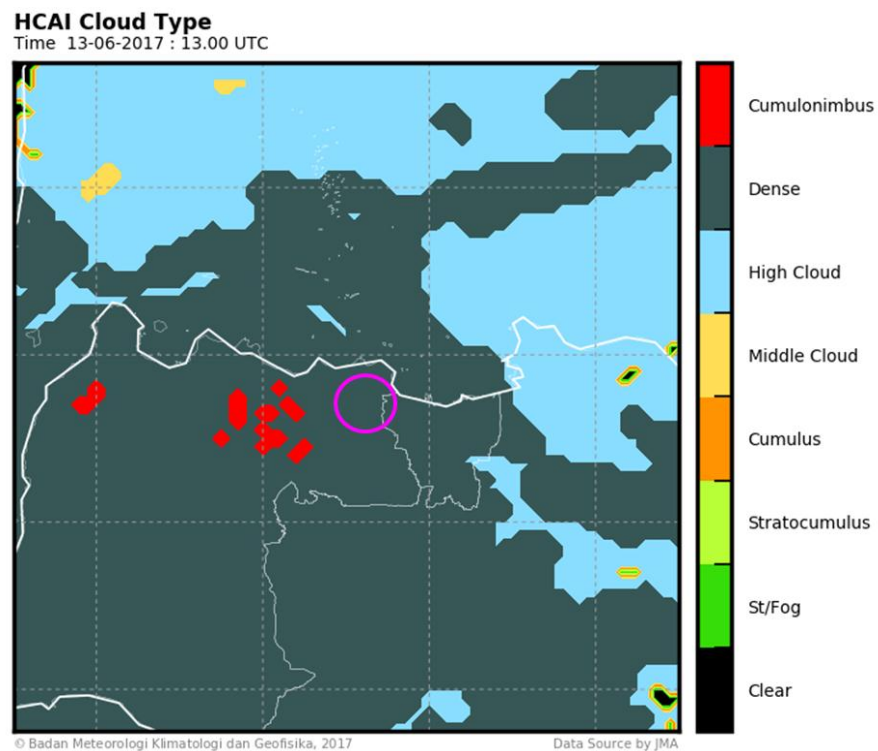


Figure 3: Satellite image at 1300 UTC

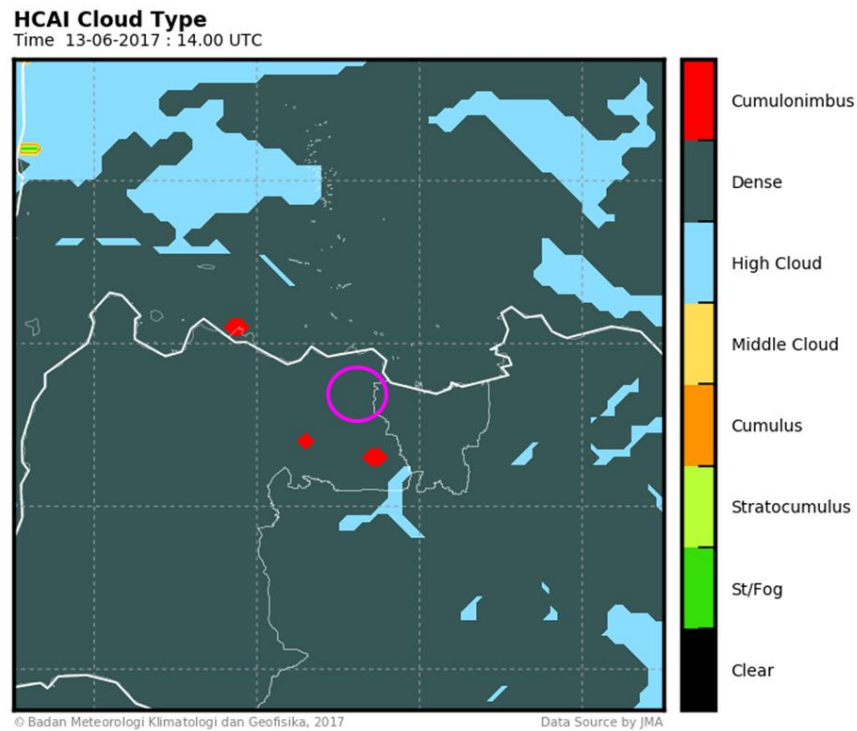


Figure 4: Satellite image at 1400 UTC

1.5 Aids to Navigation

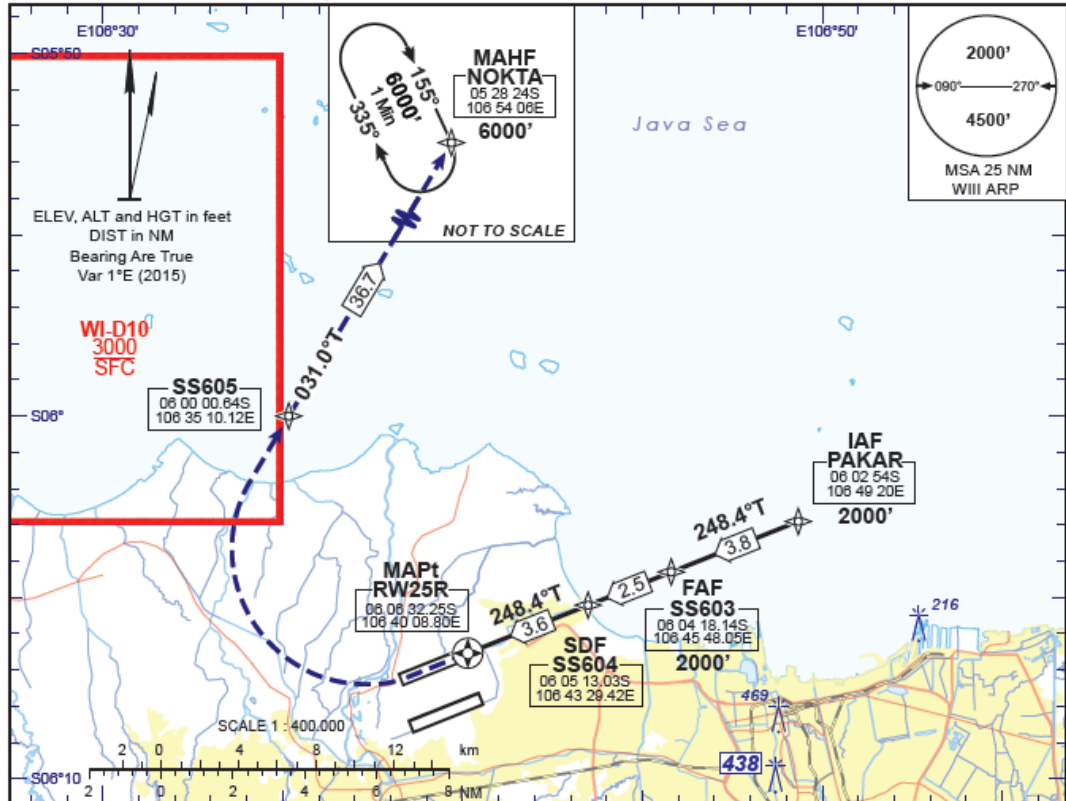
The Runway 25R of Soekarno-Hatta International Airport was equipped with Instrument Landing System category 1. In addition, the runway installed approach light, runway edge light and runway centreline light. There was no record or report of system malfunction for the ILS, approach light and the runway edge light. The runway centreline light of Runway 25R was unserviceable since 5 May 2017 due to working in process and this information was disseminated through NOTAM number A1550/17.

The runway 25R has Performance Based Navigation (PBN) approach guidance facilities, which utilized RNAV (GNSS) approach. The instrument approach chart provided by Directorate General of Civil Aviation on Aeronautical Information Publication (AIP) Volume II showed on the following figure.

ATIS : 126.85
 Jakarta ARR : 125.45
 Jakarta APP : 119.75 (West) / 123.75 (South) / 127.9 (East)
 Soekarno-Hatta TWR1 : 120.25
 Soekarno-Hatta TWR2 : 118.2
 AD ELEV : 34 ft
 Height related to MSL

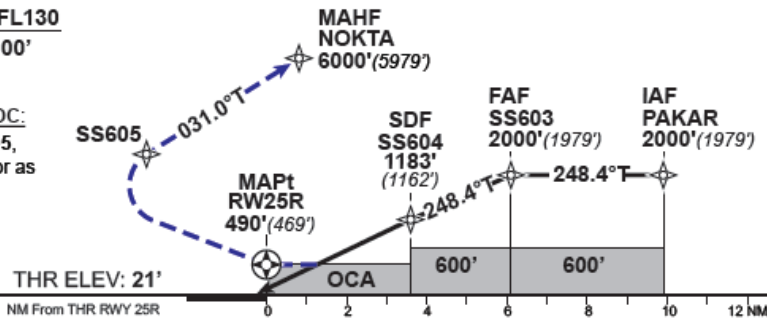
WIII AD 2.24-11K
JAKARTA /
 Soekarno Hatta Intl
RNAV (GNSS) RWY 25R
 CAT A/B/C/D

AIP INDONESIA (VOL II)
INSTRUMENT APPROACH
CHART - ICAO



TRANSITION LEVEL : FL130
 TRANSITION ALT : 11000'

MISSED APPROACH PROC:
 Turn RIGHT direct to SS605,
 then to NOKTA at 6000 ft or as
 instructed by ATC .



O C A (H)	A	B	C	D	Distance FAF to MAPt : 6.1 nm						
LNAV	490' (469')				Ground Speed (knots)	90	100	120	140	160	180
Vis. LNAV	2700 m				Time (min : sec)	4:04	3:39	3:03	2:36	2:17	2:02
Circling	680' (646')		1040' (1006')		Rate of Descent (ft / min)	474	527	632	737	843	948
Vis. Circling	2900 m		4000 m	5000 m	Notes :						

Directorate General of Civil Aviation

AIRAC AMDT 59
 Publication Date : 05 JAN 17
 Effective Date : 02 MAR 17

Figure 5: The RNAV approach chart published in AIP Volume II

1.6 Communications

All communications between Air Traffic Services (ATS) and the crew were normal as recorded on ground based automatic voice recording equipment and Cockpit Voice Recorder (CVR) for the duration of the flight. The quality of the recorded transmissions was good.

The excerpt of the communication will be included in the final report.

1.7 Aerodrome Information

Airport Name	: Soekarno-Hatta International Airport
Airport Identification	: WIII
Airport Operator	: PT. Angkasa Pura II (Persero)
Airport Certificate	: 003/SBU-DBU/VII/2015, valid up to 7 July 2020
Coordinate	: 06° 07' 25" S; 106° 39' 40" E
Elevation	: 34 feet
Runway Direction	: 07L/25R (68.38°/248.38°) 07R/25L (68.38°/248.38°)
Runway Length	: 3,600 meters (07L/25R) 3,660 meters (07R/25L)
Runway Width	: 60 meters for both runways
Surface	: Asphalt concrete for both runways

1.8 Flight Recorders

1.8.1 Flight Data Recorder

The aircraft was fitted with L-3 Aviation Recorders Flight Data Recorder (FDR) FA2100 model with part number 2100-4045-22 and serial number 000749789. The recorder was transported to KNKT recorder facility for data downloading process. The FDR recorded 1,275 parameters and approximately 97.7 hours of aircraft operation, which was containing 38 flights including the accident flight.

9M-MXH Boeing 737-8H6

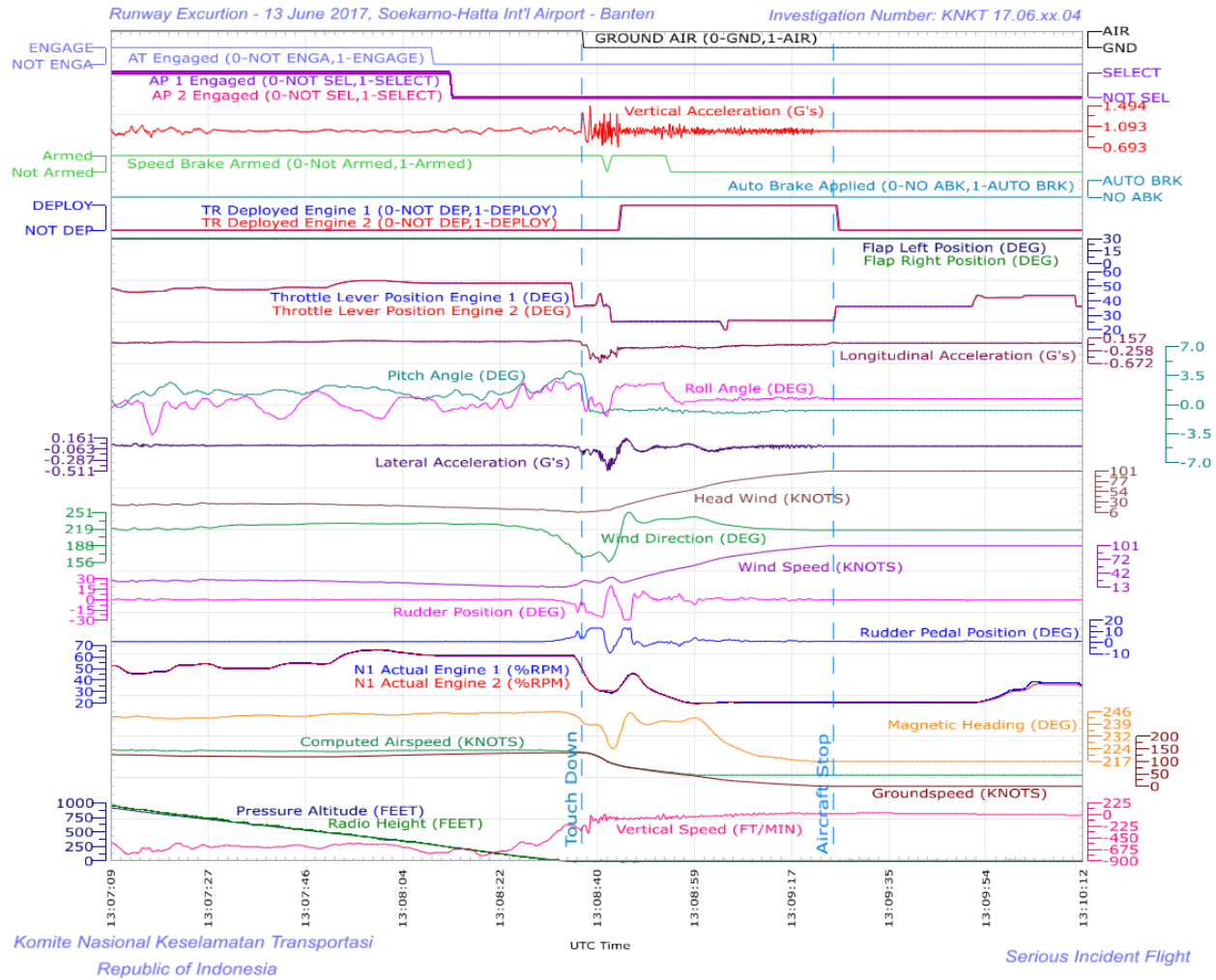


Figure 6: The selected FDR parameters taken from 1,000 feet until the aircraft stopped

The FDR graph showed (figure 6) significant parameters to be analyzed for the final report such as vertical acceleration, wind condition, aircraft attitude and aircraft speed.

1.8.2 Cockpit Voice Recorders

The aircraft was fitted with L-3 Aviation Recorders Cockpit Voice Recorder (CVR) FA2100 model with part number 2100-1025-22 and serial number 000744569. The recorder was transported to KNKT recorder facility for data downloading process. The CVR recorded 2 hours 4 minutes of good quality recording data. The significant excerpts from the CVR will be included in the final report.

1.9 Wreckage and Impact Information

The investigation conducted runway observation after the occurrence. The observation found right main landing gear mark travelled out from runway pavement at about 580 meters from the beginning runway 25R. The left main landing gear mark travelled out from runway pavement found at about 730 meters from beginning runway. The left landing gear marks travelled back to the runway pavement at about 900 meters from the beginning runway and followed by the right main landing gear at about 960 meters.

The outer tire of the right main landing gear found burst.



Figure 7: The burst outer tire of right main landing gear

Three runway edge lights found broken. The first broken runway edge light located at about 783 meters, the second at about 902 meters and the third at about 964 meter from the beginning runway 25R.

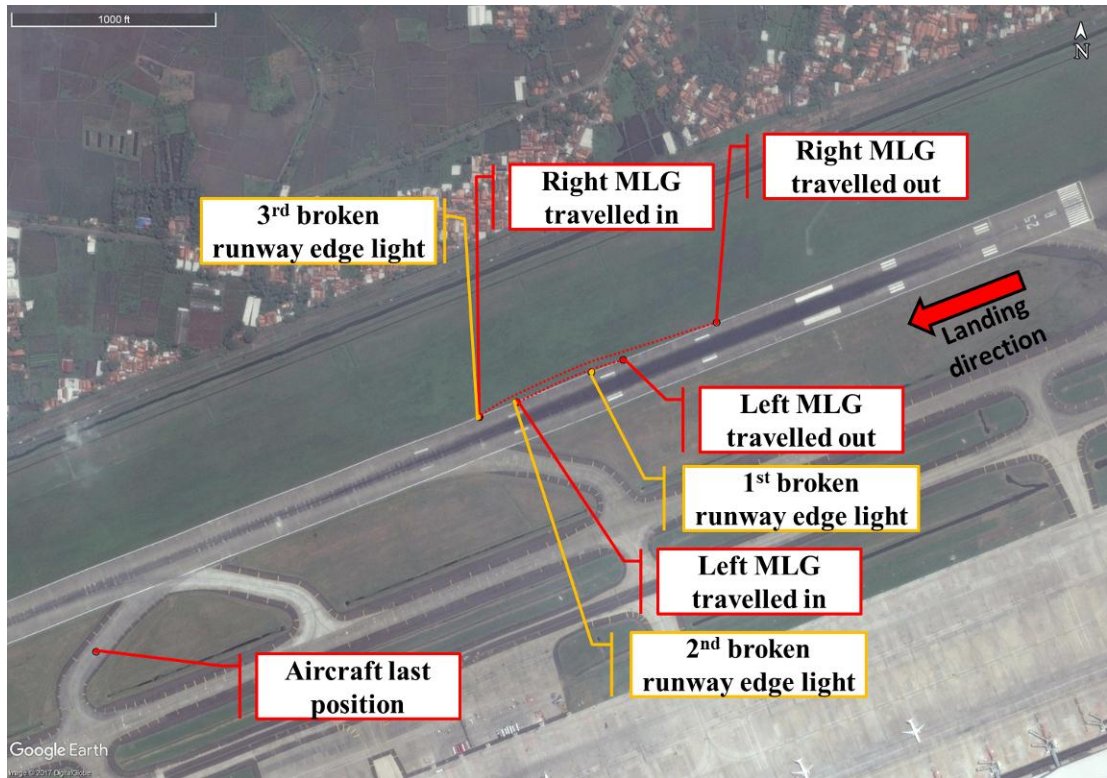


Figure 8: The position of marks and damage lights.

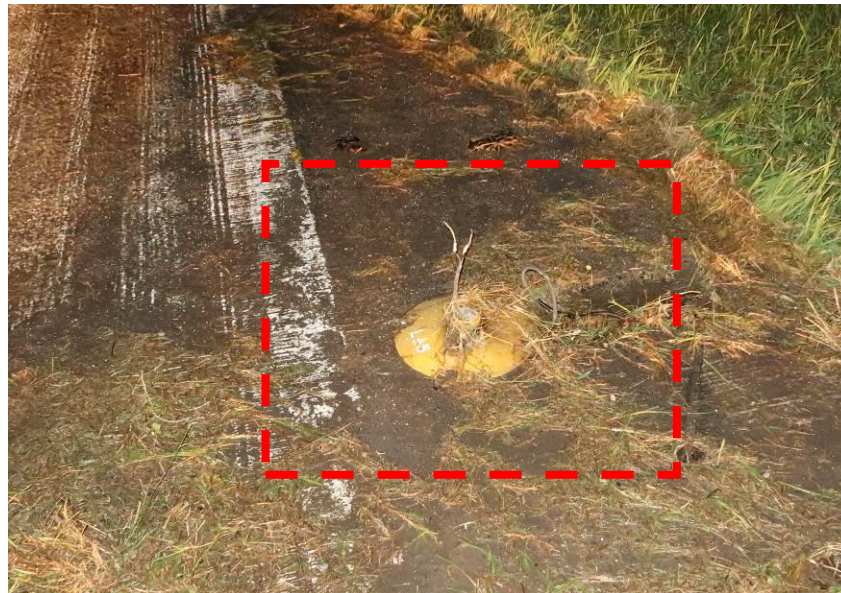


Figure 9: The third broken runway edge light

1.10 Organizational and Management Information

1.10.1 The Aircraft Operator

Aircraft Owner	:	MSN International Aircraft 40135 Ltd
Address	:	190 Elgin Avenue, George Town, Grand Cayman KY1-9005, Cayman Islands
Aircraft Operator	:	Malaysia Airlines Bhd.
Address	:	Flight Operations Division, 2 nd floor, East Wing, Flight Management Building, Kuala Lumpur International Airport, 6400 Sepang

The Malaysia Airlines had a valid Aircraft Operator Certificate (AOC) number 55 which approved to conduct scheduled passenger flight operation.

1.11 Additional Information

The investigation is continuing and KNKT plans to complete the investigation within 12 months since the day of the occurrence. Should any further relevant safety issues emerge during the course of the investigation, KNKT will immediately bring the issues to the attention of the relevant parties and publish as required.

Investigation involving Aircraft Accident Investigation Bureau (AAIB) Malaysia that assigned accredited representative according to the ICAO Annex 13.

1.12 Useful or Effective Investigation Techniques

The investigation was conducted in accordance with the KNKT approved policies and procedures, and in accordance with the standards and recommended practices of Annex 13 to the Chicago Convention.

2 FINDINGS⁶

According to factual information during the investigation, the Komite Nasional Keselamatan Transportasi identified initial findings as follows:

- The pilots held valid licenses and medical certificates.
- The aircraft had valid Certificate of Airworthiness (C of A) and Certificate of Registration (C of R).
- There was no report or record of aircraft system malfunction prior to the accident.
- The aircraft departed from Kuala Lumpur to Jakarta within the proper weight and balance envelope.
- The weather during landing phase was heavy rain with thunderstorm.
- There was no record or report of system malfunction for the ILS, approach light and the runway edge light. The runway centreline light of Runway 25R was unserviceable since 5 May 2017 due to working in process.
- Several tire marks were found on the runway and at about 580 meters there was right main landing gear mark travelled out from runway pavement followed by left main landing gear mark at about 730 meters from beginning runway. The left landing gear marks travelled back to the runway pavement at about 900 meters from the beginning runway and at about 960 meters for the right main landing gear.
- The aircraft has minor damaged. The outer tire of the right main landing gear was burst. All other tires damaged over limit. Some punctures found on the left inboard flap and right and left wing body fairings. There were three runway edge lights damaged.

⁶ Findings are statements of all significant conditions, events or circumstances in the accident sequence. The findings are significant steps in the accident sequence, but they are not always causal, or indicate deficiencies. Some findings point out the conditions that pre-existed the accident sequence, but they are usually essential to the understanding of the occurrence, usually in chronological order.

3 SAFETY ACTION

At the time of issuing this preliminary report, the Komite Nasional Keselamatan Transportasi had been informed of safety actions taken resulting from this occurrence.

On 22 June 2017, the Malaysia Airlines issued memorandum to all flight crew to remind the hazards in adverse weather operations during the takeoff and landing. The detail of the memorandum is available on appendices of this report.

4 SAFETY RECOMMENDATIONS

Komite Nasional Keselamatan Transportasi (KNKT) considered that the safety actions issued by the aircraft operator were relevant to improve safety. In this preliminary report, KNKT consider not to issue safety recommendation.

Should any further relevant safety issues emerge during the course of the investigation, KNKT will immediately bring the issues to the attention of the relevant parties and publish as required.

5 APPENDICES

5.1 Memorandum to All Malaysia Airlines Flight Crew

MEMORANDUM

To : All Flight Crew
From : Chief Pilot Training
Ref : FO/CPT/219/2017
Date : 22 June 2017

HAZARDS IN ADVERSE WEATHER OPERATIONS DURING TAKEOFF AND LANDING

Adverse weather hazards are present during all phases of flights. It is important to note that these hazards are much more present during takeoff and landing.

Operations Manual Part A (OM-A) 8.3.9 states in general that airplane operation in adverse weather conditions may require additional considerations due to the effects of extreme temperatures, precipitation, turbulence, and windshear.

One of the main weather phenomena associated with the hazards mentioned above is thunderstorm. **Never regard a thunderstorm lightly. Avoiding thunderstorms is the best policy.**

As operating technical crew, we are faced with these hazards almost daily. OM-A describes some of the hazards associated with thunderstorm activities below;

1. turbulence,
2. windshear,
3. gust,
4. microburst,
5. strong crosswind,
6. pressure changes which affect altimeter reading,
7. engine water ingestion,
8. sudden reduction in visibility with heavy rain and
9. slippery or contaminated runway.

When significant thunderstorm activity is approaching within 15 nm of the airport, the Commander should consider conducting the departure or arrival from different direction or delaying the take-off or landing. In the terminal area, thunderstorms should be avoided by no less than 3 nm. Use all available resources and information for the management of threats.

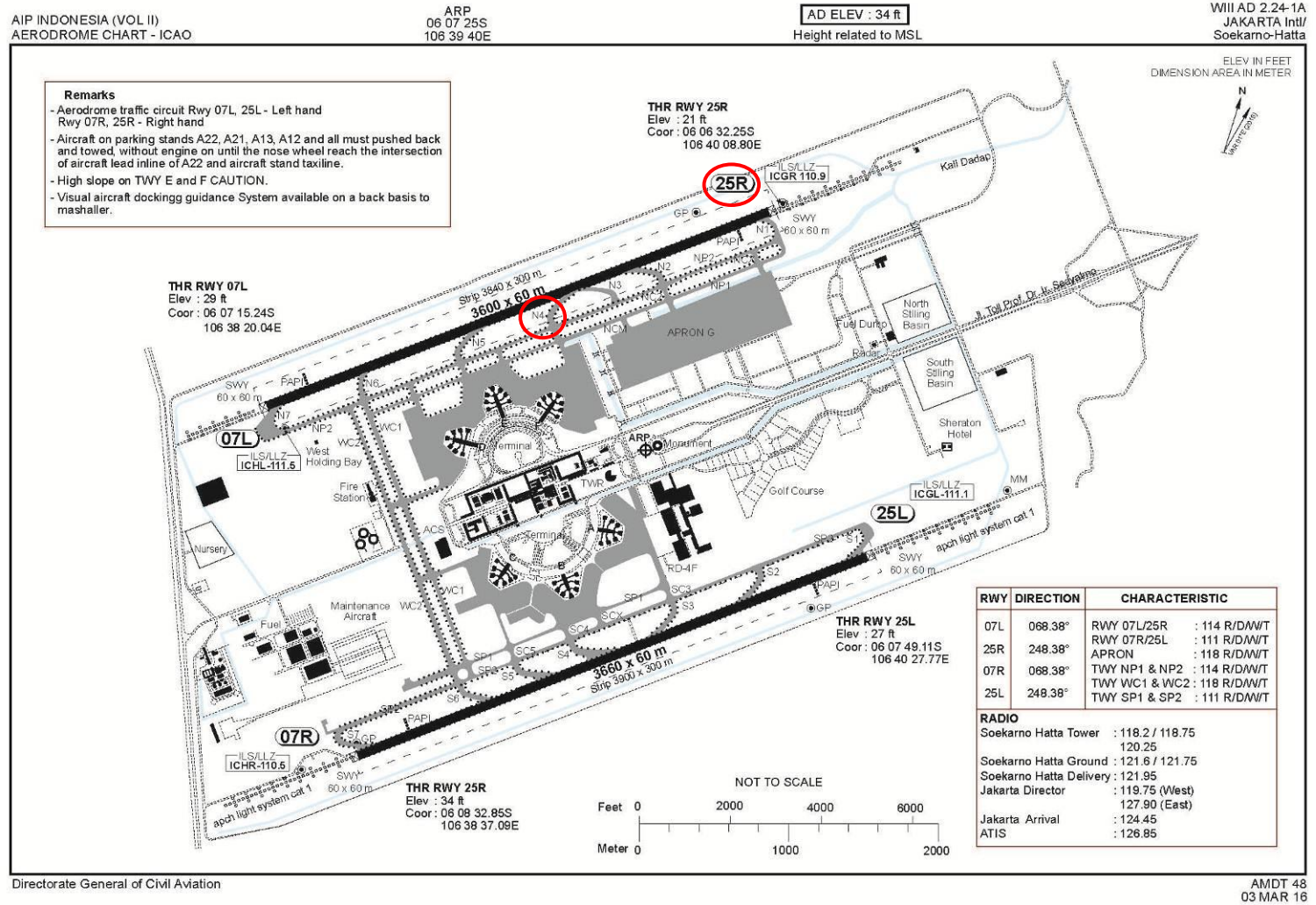
Flight crew are to use procedures as specified in the respective fleet OM-B (FCTM) for proper techniques during flare and touch down during crosswind landing on slippery runway. Touch down should be firm enough with main gears touching down on the centre of the runway.

If the commander feels it is unsafe to continue the landing rollout, A go-around is to be executed at any time, even after touchdown but before thrust reverser selection.

In summary, operations with adverse weather within the vicinity of the aerodrome is to be carefully considered. Proper identification of threats and managing the risks involve is an important aspect of decision making. Delaying the departure or approach may be the safest course of action. A “go-around minded” attitude must always be in the operating crew’s thought for all approaches.

Safe flying,

5.2 Soekarno-Hatta International Airport Layout



KOMITE NASIONAL KESELAMATAN TRANSPORTASI REPUBLIK INDONESIA

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website 1 : <http://knkt.dephub.go.id/webknkt/> website 2 : <http://knkt.dephub.go.id/knkt/>

email : knkt@dephub.go.id