Oman Transport Safety Bureau (OTSB)

Final Report

Tyre Failure and Loss of Hydraulics Oman Air Aircraft Boeing 737-8 MAX - A4O-ML at Muscat International Airport (OOMS), Sultanate of Oman.

OTSB Case File No: AIFN-003/05/2025

Name of The Operator: Oman Air
Make and Model of The Aircraft: Boeing 737-8 MAX
Nationality and Registration Marks: Omani, A4O-ML
Location of the Occurrence: Muscat International Airport, 23°35'36'' N058°17'04'' E
State of Occurrence: Sultanate of Oman
Date and Time of Occurrence: 31st May 2025, 05:22:00 UTC

Purpose of the Investigation:

The investigation was conducted by the Air Accident Investigation Section of the Oman Transport Safety Bureau (OTSB) pursuant to Civil Aviation Law 76/2019 Chapter 10, and in compliance with the Civil Aviation Regulation CAR-13.011 - Aircraft Accident & Incident Investigation & Reporting Procedures. The investigation was in conformance with the standards and recommended practices in Annex 13 - Aircraft Accident and Incident Investigation to the Convention on International Civil Aviation Organization (ICAO).

The sole objective of the investigation of an accident and incident is to prevent future aircraft accidents and incidents and not to apportion blame or liability.

Oman Transport Safety Bureau issue the Final Report in accordance with the national and international standards and industry best practice therefore concerned parties are invited to review this report and provide their significant and substantiated comments.

The Final Report will be publicly available at:

http://www.mtcit.gov.om

Oman Transport Safety Bureau

Ministry of Transport Communications and Information Technology

Sultanate of Oman

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Abbreviation	Description
°	Degree
AAI	Air Accident Investigation
AAIS	Air Accident Investigation Section
ACARS	Aircraft Communication Addressing and Reporting System
ACC	Area Control Centre
ALT	Altitude
AME	Aircraft Maintenance Engineer
AMSL	Above Mean Sea Level
ANSIC	Air Navigation Service Incident Coordinator
AOC	Air Operator Certificate
APP	Approach
ATCO	Air Traffic Control Officer
ATC	Air Traffic Control
ATPL	Airline Transport Pilot License
CAA	Civil Aviation Authority
CAL	Civil Aviation Law
C	Celsius
CD	Cabin Director
CPL	Commercial Pilot License
CRB	Crew Rest Break
CSN	Cycles Since New
CVR	Cockpit Voice Recorder
DFDR	Digital Flight Data Recorder
DGMET	Directorate General of Meteorology
ELP	English Language Proficiency
EMPD	Electric Motor Driven Pump
ENG	Engine
ETA	Estimated Time of Arrival
FIR	Flight information Region
FO	First Officer
FL	Flight Level
FOD	Foreign Object Damage
FORDEC	Facts, Options, Risks and Benefits, Decision, Execution and Check
FT	Feet
HST	High Speed Taxiway
HYD	Hydraulic

HYD SYS	Hydraulic System
ICAO	International Civil Aviation Organization
IIC	Investigator-in-Charge
IR	Instrument Rating
KTS	Knots
LE	Leading Edge
MCC	Maintenance Control Centre
MCT	Muscat
MEP	Multi Engine Powerplant
METAR	Meteorological Routine Aerodrome Report
MHz	Megahertz
NM	Nautical Mile
NNC	Non-Normal Checklist
NTSB	National Transportation Safety Board
OA	Oman Airports
OCC	Operations Control Center
OOMS	Muscat International Airport
OTSB	Oman Transport Safety Bureau
PF	Pilot Flying
PM	Pilot Monitoring
PNO	Readjustment pressure
PNZ	loaded service pressure
RDR	Radar
RWY	Runway
R/T	Radiotelephony
SOP	Standard Operating Procedures
TBA	To Be Advised
TLB	Technical Log Book
TWY	Taxiway
UTC	Universal Time Coordinate
Vapp	Approach Speed
Vref	Reference Speed for Landing
VHF	Very High Frequency
VNL	Correction for defective distant, intermediate and near vision
VNAV	Vertical Navigation
WPT	Way Point

Synopsis

On 31st May 2025, at the time 11:49 AM local time (LT), the Oman Transport Safety Bureau (OTSB) was notified of the serious incident via the OTSB email through the Informa Cast notification system by Oman Airports (OA). Subsequently reports about the serious incident were received from Oman Air on 2nd June 2025 at the time 08:33 AM LT and from the Air Navigation Service Incident Coordination- Civil Aviation Authority (ANSIC-CAA) on 3rd June 2025 at 09:30 AM LT.

The serious incident occurred on 31st May 2025 at 05:22:00 UTC and it involved an Oman Air aircraft, Boeing 737-8 MAX with registration A4O-ML and a callsign OMA815. The aircraft was operating as a scheduled passenger flight from Muscat International Airport (OOMS), Sultanate of Oman, to Bangkok Suvarnabhumi International Airport (VTBS), Thailand.

The flight crew of OMA815, stated that at 05:21.00, they lined up on Runway (RWY) 26L for departure and received takeoff clearance from the Tower (TWR) Air Traffic Control Officer (ATCO). The aircraft OMA815 commenced takeoff roll and successfully airborne.

At 05:30:34, after take-off the flight crew of OMA231 contacted TWR ATCO and reported tire debris on the runway. The TWR ATCO informed the Approach (APP) ATCO about the tire debris reported by flight crew of OMA231.
A runway inspection was conducted by Oman Airports Airfield Officer and FOD was confirmed found on the runway and suspected belonging to the aircraft OMA815, which had departed earlier.

During the initial climb, the flight crew of OMA815 reported to the APP ATCO that they have technical issues and have received a low-pressure warning for the No. 1 engine hydraulic pump and the Leading Edge (LE) flaps transit indication light illuminated, followed by a gear disagreement indication light and the left landing gear lights. The flight crew requested to return to OOMS and holding instructions to burn off fuel in order to reduce the aircraft weight.

Oman Airport declared full emergency, and aircraft OMA815 was cleared to land on RWY 26R, the aircraft landed safely and the aircraft was stopped on RWY 26R for inspection before proceeding to the parking area.
The inspection carried out following the aircraft landing safely, revealed that the number 1 left main landing gear tire had failed and decapped during take-off, causing damage to hydraulic system and aircraft structure resulting on low-pressure warning for the No. 1 engine hydraulic pump and the Leading Edge (LE) flaps transit indication light illuminated, followed by a gear disagreement indication light and the left landing gear lights. No injuries were reported.
Following the review of the occurrence, the OTSB classified the occurrence as a Serious Incident

and the Director of OTSB appointed investigator in charge (IIC) and investigation team to institute and conduct investigation. The following parties were notified:

- State of Design and Manufacturer, Aircraft Type, United State of America (USA), National Transportation Safety Board (NTSB);
- International Civil Aviation Organization (ICAO)
- State of Occurrence, State of Operator, and Registry, the Sultanate of Oman Civil Aviation Authority (CAA).

The investigation was conducted in conformance with the ICAO Annex13, CAR 13 and OTSB Investigation procedures as the Sultanate of Oman is the State of Occurrence. The following party was involved in the investigation through appointment of an accredited representative and an adviser:

- State of Design and Manufacturer, Aircraft Type, Boeing, United State of America (USA), National Transportation Safety Board (NTSB).

The Final Report was issued on 16th March 2026 and is public at the below link:

www.mtcit.gov.om

Unless otherwise mentioned, all times in this report are UTC. Local Time in The Sultanate of Oman is UTC plus +4 hours. Photos and figures used in this report were obtained from OA, Oman Air, DGMET, Bridgestone and Boeing and were adjusted from the original for the sole purpose of improving the clarity of the report. Modifications to images used in this Report are limited to cropping, magnification, file compression, or enhancement of colour, brightness, contrast insertion of text boxes.

1. FACTUAL INFORMATION:

1.1 History of Flight:

1.1.1 On the 31st May 2025, Oman Air aircraft with registration marks A4O-ML with callsign OMA815, a Boeing 737-8 MAX departed from Muscat International Airport (OOMS), Muscat, Sultanate of Oman, on an international passenger flight with intended destination Bangkok Suvarnabhumi International Airport (VTBS), Bangkok, Thailand.

1.1.2 It was just after 05:00:00, when the flight crew of OMA815 contacted TWR ATCO requesting clearance for departure, TWR ATCO cleared the flight crew for take-off from RWY 26L. TWR ATCO reported that aircraft OMA815 departed at 05:21:00 from RWY 26L.

1.1.3 At 05:23:13, the flight crew of OMA815 established contact with APP ATCO after departure. The aircraft was radar identified and instructed to climb to flight level (FL) 150 and turn right to heading 040°. Meanwhile, at 05:25:00, the APP ATCO instructed the flight crew to proceed direct to waypoint (WPT) MUSRU and at 05:26:21, the flight crew was cleared to climb to FL250. At 05:26:24, the flight crew acknowledged the clearance and proceeded to WPT MUSRU.

1.1.4 At 05:27:41, the flight crew of OMA231 contacted TWR ATCO requesting clearance for departure by stating “OMA231 ready for departure request E7”. At 05:27:47, TWR ATCO cleared the flight crew for take-off from RWY 26L. At 05:27:55, the flight crew acknowledged the clearance from the ATCO. The flight crew, departed from OOMS to their destination Rajiv Gandhi International Airport (VOHS), India.

1.1.5 At 05:30:28, shortly after airborne, the flight crew of OMA231 contacted the Tower ATCO and indicated that there was some tire debris on the RWY and the TWR ATCO replied by stating “Copied roger”. Oman Airports (OA) operations Airfield Officer (AO) stated that he was positioned near the southern side of RWY 08R/26L, and while the aircraft was rolling for takeoff, observed the Foreign Object Debris (FOD) on the south runway.

1.1.6 At 05:31:12, the flight crew of OMA815 informed APP ATCO that the aircraft had a technical issue and requested to hold at their present position and to stop the climb at 12000 FT. At 05:31:20, the APP ATCO approved the request.

1.1.7 At 05:31:28, the TWR ATCO contacted OA Operations and requested a RWY inspection to be conducted while all departing traffic were put on hold.

1.1.8 At 05:31:33, the TWR ATCO informed the flight crew of OMA211 departing traffic to expect a delay due to a RWY inspection being conducted and at 05:31:38 the flight crew acknowledged.

1.1.9 At 05:32:14, APP ATCO contacted the TWR ATCO and informed that the flight crew of OMA815 are experiencing a technical issue and that the flight crew would hold at their present position in order to assess the situation with the intention to return to OOMS and TWR ATCO acknowledged.

1.1.10 The flight crew of OMA815 started holding from the time 05:32:25 until 07:57:55.

1.1.11 At 05:37:40, TWR ATCO informed APP ATCO, that RWY 26L was blocked due tire debris on the RWY and that OA Operations team were conducting runway inspection to clear the debris.

1.1.12 At 05:44:40, TWR ATCO confirmed APP ATCO that the runway inspection is completed and that the runway was clear.

1.1.13 At 05:47:19, APP ATCO contacted the flight crew of OMA815 to state their intentions. At 05:47:26, the flight crew of OMA815 responded to ATCO by stating that they will go to point LADBA and descend to 7000FT to hold so that they can burn fuel.

1.1.14 At 05:47:37, APP ATCO responded to the flight crew of OMA815 by stating “You can proceed direct to MIGMO if you wish sir” and the flight crew of OMA815 responded by stating “Direct to MIGMO OK”. At 05:47:52, APP ATCO asked the flight crew of OMA815 to confirm if they wished to descend to 7000FT and at 05:47:57, the flight crew of OMA815 responded by stating “Yes, it will be better for us to burn up fuel faster”. At 05:48:03, the flight crew of OMA815 responded to APP ATCO by stating “Continue to MIGMO and hold”. At 05:50:26, the flight crew of OMA815 further contacted APP ATCO by stating “OMA815 over point MIGMU request to descend 7,000FT and request 15 minutes leg time”. At 05:50:33, APP ATCO acknowledged by stating “Approved sir descend 7,000FT”.

1.1.15 At 06:00:02, APP ATCO contacted the flight crew of OMA815 to confirm the technical issue and at 06:00:10, the flight crew responded to ATCO by stating “We have problem with the flight control, hydraulic and the nose gear”. At 06:00:19, the APP ATCO informed the flight crew that the flight crew of OMA231 after departure reported tire debris on the RWY. At 06:00:26, the flight crew responded to ATCO by stating “Yes, we have some hydraulic leakage”.

1.1.16 At 06:00:40, TWR ATCO contacted APP ATCO and informed that it was not just tyre debris also other parts were found as reported by OA Operations during the RWY inspection. At 06:00:43, APP ATCO stated that the flight crew of OMA815 reported hydraulic problem and hydraulic leak.

1.1.17 At 06:08:00, the flight crew of OMA815 informed APP ATCO that the expected approach time is approximately two hours later after burning some fuel. After that, the flight crew contacted APP ATCO and requested an ILS approach for RWY 08L or 26L, if possible, as they planned to perform a very high-speed approach. At 06:08:45, APP ATCO communicated the requests of the flight crew to TWR ATCO and that the flight crew was requesting to use ILS for the north RWY and they will burn fuel for the next 2 hours.

1.1.18 At 06:26:09, APP ATCO contacted the flight crew of OMA815 and asked about their expected duration of holding and the flight crew responded that they will take approximately one hour. At 06:39:39, TWR ATCO contacted APP ATCO and informed that the RWY in use has been changed from 26L to 26R.

1.1.19 At 06:52:17, APP ATCO asked the flight crew of OMA815 if there were any hazardous materials on board and the flight crew of OMA815 responded that they were carrying chemical solutions, located in the lower compartment number 4 and APP ATCO informed TWR ATCO accordingly.

1.1.20 At 06:55:53, the flight crew of OMA815 reported to APP ATCO that they had lost hydraulic system A. The flight crew further mentioned that the aircraft had an issue with the main landing gear and Leading Edge (LE) flaps and requested to use the northern runway, as it would be more suitable for high-speed approach landing and the APP ATCO informed TWR ATCO accordingly.

1.1.21 At 07:06:47, APP ATCO asked the flight crew of OMA815 about the status of the nose wheel, and the flight crew responded that all indications were normal.

1.1.22 At 07:31:54, APP ATCO advised the flight crew of OMA815 to report when ready to return to OOMS. At 07:31:56, the flight crew responded that they would be ready to return to OOMS in approximately half an hour and APP ATCO informed TWR ATCO accordingly.

1.1.23 At 07:50:00, OA activated CODE 3 full emergency signal due to fire risk. At 07:57:51, the flight crew of OMA815 informed APP ATCO that they are ready for the approach and APP ATCO initiated the approach procedure. At 08:00:11, the flight crew reported to APP ATCO that the expected touchdown time will be at 08:11:00.

1.1.24 At 08:07:20, APP ATCO informed TWR ATCO that the flight crew of OMA815 would return to MCT, TWR ATCO confirmed the RWY 26R would be blocked when the aircraft lands until engineers have conducted and assessed the aircraft's condition for vacating RWY 26R.

1.1.25 At 08:08:24, the flight crew of OMA815 reported to the APP ATCO that they have established RWY26R localizer at 13 Nautical Miles (NM) maintaining 3000 FT at a ground speed (G/S) of 185 Knots (KTS). APP ATCO subsequently cleared the flight crew for the ILS approach and transferred the flight crew from APP Freq 121.2 Mhz to the TWR Freq 118.825 Mhz.

1.1.26 At 08:08:44, the flight crew of OMA815 contacted TWR ATCO at 11 miles maintaining 3,000FT, G/S=183KTS). At 08:08:50, the TWR ATCO cleared the flight crew of OMA815 to land 030/06 KTS RWY 26R clear to land" and at 08:08:57, OMA815 acknowledged as per figure 1 below.

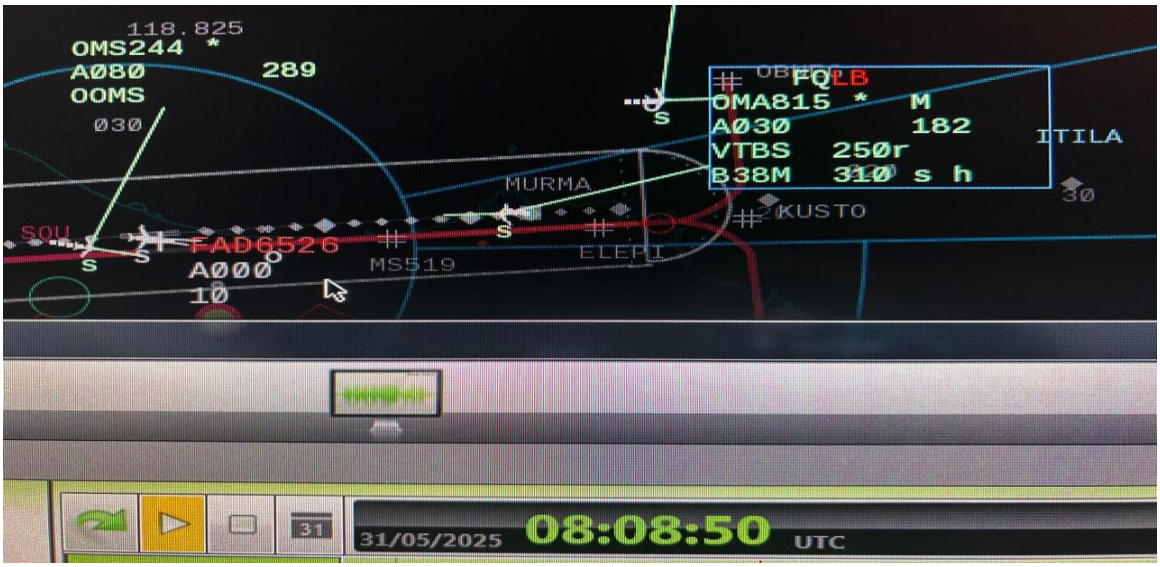


Figure 1 showing aircraft OMA815 at 3000 FT at a speed of 182 KTS cleared to land on RWY 26R

1.1.27 At 08:11:26, TWR ATCO contacted the flight crew of OMA815 to expect to hold on the RWY. At 08:12:45, the aircraft landed safely on RWY 26R and came to a full stop on the runway at 08:13:20.

1.1.28 At 08:13:33, TWR ATCO contacted the flight crew of OMA815 by stating "roger expect to hold if everything is ok vacate via Y4" and at 08:13:39, the flight crew acknowledged accordingly.

1.1.29 At 08:14:14 TWR ATCO instructed the flight crew of OMA815 to contact fire brigade on second box Freq 121.6 and the flight crew acknowledged. At 08:17:42, the flight crew informed the TWR ATCO that they have shut down one engine and waiting for the engineer to conduct the inspection on the aircraft and TWR ATCO replied Roger on the way. At 08:21:22, following the inspection of the aircraft by an engineer, the flight crew stated that they were now ready to taxi out of RWY 26R. At time 08:21:25, the TWR ATCO cleared the

flight crew to vacate the RWY26R via taxiway Yankee (Y) 4 left on Victor (V), Sierra (S) to stand 101 and flight crew readback accordingly.

1.1.30 At 08:22:27, the flight crew of OMA815 informed TWR ATCO that aircraft could not be steered due to a nose wheel steering failure and requested a tow truck to assist in vacating the runway and the TWR ATCO acknowledged.

1.1.31 At 08:25:17, TWR ATCO informed APP ATCO that the south runway is now active for RWY 08R or 26L. At 08:27:00, TWR ATCO switched the runway in use from RWY 26R to RWY 26L after fire personnel reported an oil leak on RWY 26R.

1.1.32 At 08:28:08, the flight crew of OMA815 contacted TWR ATCO asking if they may shut down both engines and if they are going to be towed to the stand. At 08:28:33, TWR ATCO responded to the flight crew by stating “Roger so you will shut down both engines? At 08:28:37, the flight crew responded by stating “Affirm one ready shut down and I think to be pulled by push back truck we need to shut down the second one”. At 08:28:45, TWR ATCO responded by stating “Roger switch it off” and at 08:28:58, TWR ATCO instructed the flight crew to shut down both engines by stating “both engines to be shut down”.

1.1.33 The Aircraft Maintenance Engineer (AME) arranged for the tow truck and aircraft OMA815 was subsequently towed to the parking stand number 308 and stopped at the time 08:48:00.

1.1.34 The estimated flight time from take off including holding for fuel burning and returning back to OOMS to land was approximately 2 hours, 40 minutes, and 20 seconds

1.1.35 The Captain (Capt) was the Pilot Flying (PF) and the First Officer (FO) was the Pilot Monitoring (PM). During the interview the flight crew of OMA815 reported that, after the departure from OOMS during initial climb before flap retraction they got engine ENG no.1 Low Pressure (LP) hydraulic (HYD) PUMP indication light and decided to clean up the aircraft and then to identify and fix the problem. After flap retraction, the flight crew observed Leading Edge (LE) FLAPS transit warning light and gear disagree as left gear showed green and red light simultaneously. After that, the normal after take-off checklist was done. At the time they were approaching ALT 12000FT the flight crew stopped the aircraft from climbing and requested APP ATCO to hold to conduct further analysis.

1.1.36 The flight crew of OMA815 further stated, that they followed the operator’s NNC then take-off checklist and Facts, Options, Risks and Benefits, Decision, Execution and Check (FORDEC). Based on this assessment, the flight crew contacted operator’s Maintenance Control Center (MCC) and explained the situation after which a decision was made to return back to OOMS. The flight crew briefed the Cabin Director (CD), APP ATCO and passengers were also informed about the flight crew`s decision. The flight crew`s concern was that according to the operators NNC the LE FLAPS transit light the approach should be Reference Speed for Landing (Vref) 15KTS plus 15° flaps, which was quite high with current weight of around 79 tons which was 10 tons more than the landing weight.

1.1.37 The flight crew further stated that they contacted the APP ATCO and requested to enter a holding pattern to burnout fuel in order to reduce Vapp and to avoid overweight landing. The flight crew was also in contact with the operator’s MCC and Operations Control Center (OCC) through Aircraft Communication Addressing and Reporting System (ACARS) and via Very High Frequency (VHF). The flight crew were cleared by the ATCO to hold over the WPT MIGMO at 7000FT. While holding, the flight crew stated that they briefed both the cabin crew and passengers. The flight crew had to burn fuel to reduce landing rate, approach speed and landing speed. The flight crew reported that the weight of the aircraft was 79 tons which was 10 tons more than the landing weight.

1.1.38 The flight crew of OMA815 further stated that while holding they decided to increase the fuel burn out time, they extended the landing gear to save time and accelerate fuel burn. At that time, a Low Pressure ENG No. 1 HYD PUMP light illuminated; however, hydraulic system A pressure appeared normal despite its quantity reading zero. When the gear lever was selected down, system A pressure dropped to near zero and the landing gear was not confirmed down and locked. The flight crew then extended the landing gear manually in accordance with the NNC, after which the landing gear was confirmed down and locked.

1.1.39 To further increase fuel burn, the flight crew of OMA815 stated that they extended flaps to 5° and maintained the flying speed at 220 KTS. The flight crew informed the APP ATCO of their estimated time of arrival (ETA) and requested the North RWY, equipped with a precision approach system. The ATCO changed the runway in use to North RWY 26R and instructed the flight crew to report when ready for approach.

1.1.40 After approximately two hours of holding, the Captain briefed the FO, cabin crew, and passengers were also advised of the planned approach and expected touchdown time. The approach was uneventful; however, during the final approach, the TWR ATCO instructed the flight crew of OMA815 to stop on the runway after landing for inspection by ground staff and the fire brigade.

1.1.41 The flight crew of OMA815 reported that they stopped on RWY 26R at TWY Y4 near the High-Speed Exit (HST), where the TWR ATCO instructed them to switch from the tower Freq (118.825 MHz) to the RFFS frequency (121.6 MHz). The fire brigade contacted the flight crew and requested that ENG No. 1 be shut down to facilitate an inspection. The flight crew further stated that they started the Auxiliary Power Unit (APU) and shut down ENG No. 1 until the inspection was completed by the RFFS following the inspection, the TWR ATCO contacted the flight crew and asked whether the aircraft could vacate the runway. The flight crew replied that, despite selecting the Alternate (ALT) Nose Wheel Steering (NWS) switch, the hydraulic quantity in system B was critically low although the hydraulic pressure was still available, making it impossible to vacate the runway using the aircraft's steering system.

1.1.42 The CD stated that after takeoff, all passengers were seated and secured. While the CD was waiting for the seatbelt sign to be switched off and to commence cabin service, the CD reported that they heard a sudden sound of the landing gear extending, which was unusual. The CD instructed all cabin crews to remain secured until further notice. A few minutes later, the Captain called the CD to the flight deck and advised that the aircraft was experiencing technical issues with the hydraulic system, landing gear, and flaps. The Captain further informed the CD that they would not continue to their destination and will return to OOMS but would first need to burn fuel for approximately three hours to reduce the aircraft's weight. The flight crew, both the cabin crew and passengers were briefed and kept updated throughout the flight through the passenger announcement (PA). The CD mentioned that the announcement to brief the passengers was delayed by approximately 10 minutes and the CD had to remind the Captain about the briefing.

1.1.43 The CD stated that approximately after a three-hours flight, the aircraft landed in OOMS and aircraft OMA815 was towed to the allocated parking stand. All passengers disembarked safely without any injuries. Following disembarkation, the cabin crew completed post-flight duties before proceeding to their Crew Rest Break (CRB).

1.1.44 During the Interview, the TWR ATCO reported that aircraft OMA231 departed shortly after aircraft OMA815 and once airborne, the flight crew of OMA231 informed the ATCO about debris located south of RWY 26L. The TWR ATCO relayed the information to the APP ATCO and notified OA Operations to initiate a RWY inspection who subsequently confirmed the presence of debris (rubber fragments) on the RWY.

1.1.45 The APP ATCO reported that after aircraft OMA815 was handed over from the TWR ATCO the aircraft was instructed to hold in order to burn fuel due to reported hydraulic issues. The flight crew of OMA815 requested clearance to land on RWY 26R and the APP ATCO provided a direct routing to WPT MURMA. Meanwhile, three inbound aircraft (OMS244, FDB94F, and OMA604) were placed in holding patterns until the TWR ATCO confirmed that aircraft OMA815 had vacated the runway and that operations at OOMS had reverted to RWY 26L. At 08:12:45, the flight crew landed safely on RWY 26R.

1.1.46 During the interview, the AME who performed the flight servicing on the aircraft OMA815 prior to the serious incident was interviewed. The AME stated that aircraft OMA815 arrived from Riyadh International Airport to Muscat International Airport (OOMS) at the time 03:05:00 UTC and was parked at Bay 101. The AME conducted a walk-around inspection and completed the transit check, during which no anomalies were detected. The aircraft was deemed serviceable for continued operation, and all tires were found to be in good condition. The AME further mentioned that they conduct daily checks on every flight before and after landing. This is done by using the tire pressure gauge and is compared with the reading in the cockpit from Multi-Function Display (MFD) which is also captured in the Digital Flight Data Recorder (DFDR). There is either cold tire pressure maintenance which is done within 3 hours after landing or hot pressure maintenance condition, which is done within an hour after the aircraft lands. All these pressures are required to be recorded in the Technical Log Book (TLB). The aircraft had spent 2 hours and 17 minutes on the ground before the serious incident flight. This means that tire pressure readings were categorise as cold.

1.1.47 The AME further stated that both the hydraulic fluid was within the system quantity level limit and the system also provides the flight crew of OMA815 with the indications in the cockpit of the levels or quantity of the hydraulic fluid.

1.1.48 After landing, AME stated that visual inspection was carried out after shutting down left engine (LH ENG), the AME observed that wheel #1 was de-capped and HYD fluid was leaking from top of the LH main landing gear.

1.1.49 Both the left-hand main tire and the brakes for wheels No.1 and No.2 were replaced and the aircraft was towed to the hanger for further inspection.

1.2 Injuries to Persons:

1.2.1 No injuries reported.

Injuries	Pilot	Crew	Pass.	**Total on Board**	Other
Fatal	-	-	-	-	-
Serious	-	-	-	-	-
Minor	-	-	-	-	-
None	2	5	145	**152**	-
Total	2	5	145	**152**	-

Note: Other means people on the ground

1.3 Damage to Aircraft:

1.3.1 Damages were sustained on the number 1 main wheel tire, brake assemblies of main wheel number 1 and 2, access panels, left hand kruger flap number 2, left hand inboard aft flap, left hand inboard main flap, panels, left hand landing gear lower inner door, inboard pushrod assembly and hydraulic tubes, tube assembly-LDG Up, pulley, bracket assembly holding cable pulley, bracket holding cable pulley refer to the figure 2 & 3 below. After the landing, the Aircraft was inspected, and it was found that the No. 1 main wheel tire (left outboard tire) tread had completely peeled (decapped) off the tire. However, the tire was still inflated and had a tire pressure of 201 Pound-forced Per Square Inch (PSI) after the serious incident.

Figure 2 showing damages on the number 1 main wheel tire.

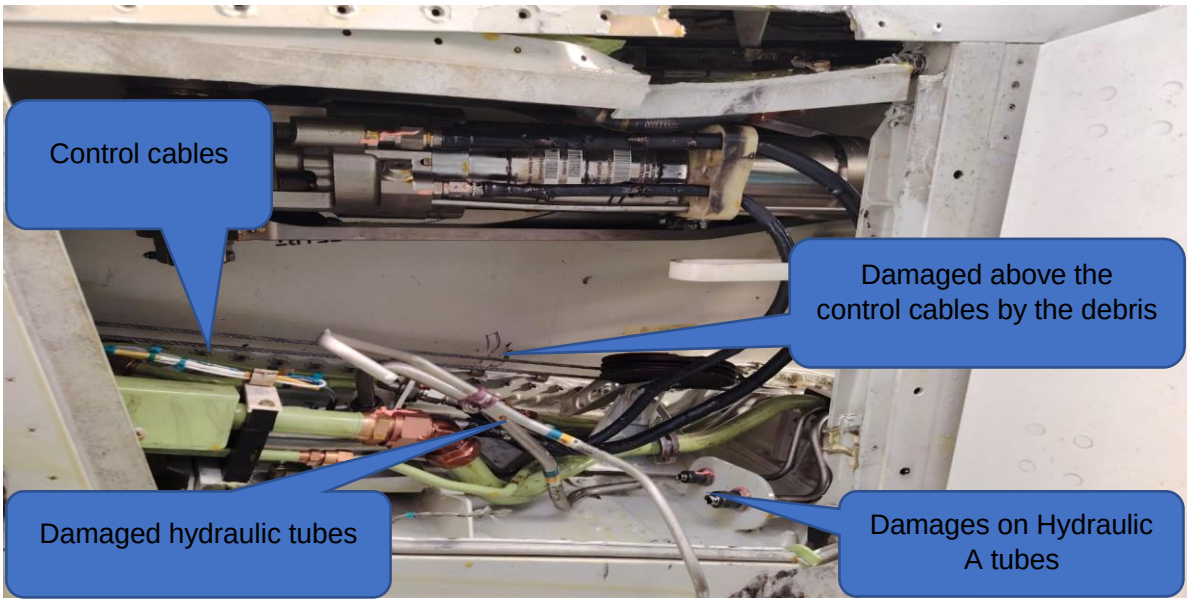


Figure 3 shows the damages on hydraulic tubes.

1.3.2 The Aircraft sustained damages to the hydraulic A tubes inside the top left main wheel panel, and minor damage to shroud above the flight control cables.

1.4 Other Damage:

1.4.1 No other damages were reported

1.5 Personnel Information:

1.5.1 Captain – Pilot Flying (PF):

Nationality	Ukrainian		
Medical Validity	1st Apr 2026	Licence Type	Airline Transport Pilot Aeroplane (ATPL)
Licence Validity	28th Feb 2030	Type Endorsed	B737
Ratings	B737, IR, MEP		
English Language Proficiency	Level,	4	
	Issue Date	26th Apr 2023	
	Expiry Date	25th Apr 2026	
LPC Issue Date	28th Mar 2025	OPC Issue Date	22nd Sep 2024
LPC Expiry Date	30th Apr 2026	OPC Expiry Date	31st Oct 2025
Restrictions	VML		

Flying Experience:

Total Hours	13163:27
Total Flying Hours on Type	8149:21
Total Past 24 Hours	03.45
Total Past 7 Days	21:22
Total Past 30 Days	89:22
Total Past 90 Days	201:41

1.5.1.1 The PF medical assessment was conducted on 19th March 2025 and was issued on 20th March 2025. The PF was issued a Class one (1) medical certificate with an expiry date of 1st April 2026.

1.5.1.2 First Officer (FO) - Pilot Monitoring (PM):

Nationality	Omani		
Medical Validity	04th Aug 2025	Licence type	Airline Transport Pilot Aeroplane (ATPL)
Licence Validity	31st Aug 2029	Type Endorsed	B737
Ratings	B737, IR, MEP		
English Language Proficiency	Level	5	
	Issue Date	22nd Oct 2020	
	Expiry Date	21st Oct 2026	
LPC Issue Date	03rd Mar 2025	OPC Issue Date	12th Sep 2024
LPC Expiry Date	31st Mar 2026	OPC Expiry Date	30th Sep 2025
Restrictions	VDL		

Flying Experience:

Total Hours	2218:21
Total Past 24 Hours	03:45
Total Past 7 Days	15:44
Total Past 30 Days	34:37
Total Past 90 Days	159:45

1.5.2.1 The PM medical assessment was conducted on 18th July 2024 and was issued on 18th July 2024. The PM was issued a Class one (1) medical certificate with an expiry date of 3rd August 2025.

1.5.3 Cabin Director (CD)

Nationality	Omani		
Medical validity	12th Feb 2026	Licence type	Cabin Attendant
Licence validity	30th Apr 2026	Type endorsed	B737-8 MAX
Ratings	B737; B787; A330		
Restrictions	VNL		

Flying Experience:

Total Hours	5474.62
Total Flying Hours on Type	2141:14
Total Past 24 Hours	03:48
Total Past 7 Days	18:39
Total Past 30 Days	84:10
Total Past 90 Days	208:15

1.5.3.1 The CD medical assessment was conducted on 11th February 2024, on and issued on 11th February 2024 with an expiry date of 28th February 2026. The CD was issued a Class three (3) Crew Medical.

1.5.4 Tower Air Traffic Controller (TWR ATCO):

Nationality	Omani		
Medical valid	23rd December 2025	Licence type	Air Traffic Controller
Licence valid	30th April 2029	Type endorsed	Yes
English Language Proficiency		Level	4
		Expiry Date	10th March 2027
Ratings	ADC		
Restrictions	Nil		

1.5.4.1 The TWR ATCO last proficiency checks were conducted on 24th February 2025.

1.5.4.2 The TWR ATCO was issued with Level 4 – Operational in the Test of English for Aeronautical Communication. The test was conducted on 26th March 2025.

1.5.4.3 The TWR ATCO medical assessment was conducted on 22nd August 2023 and was issued on 23rd August 2023 due to the ATCO medical condition. The ATCO was issued a Class three (3) medical certificate with an expiry date of 23rd December 2025.

1.5.5 Approach Traffic Controller Officer (APP ATCO):

Nationality	Omani		
Medical valid	28th May 2026	Licence type	Air Traffic Controller
Licence valid	30th April 2029	Type endorsed	Yes
English Language Proficiency		Level	5
		Expiry Date	15th March 2029
Ratings	APP, APP RDR, ACC, ACC RDR		
Restrictions	VDL, SSL		

1.5.5.1 The APP ATCO last proficiency check was conducted on 2nd December 2024.

1.5.5.2 The APP ATCO was issued with Level 5 – Operational in the Test of English for Aeronautical Communication. The test was conducted on 26th March 2025.

1.5.5.3 The APP ATCO medical assessment was conducted on 28th May 2023 and was issued on 29th May 2023 due to the ATCO medical condition. The ATCO was issued a Class three (3) medical certificate.

1.5.6 Aircraft Maintenance Engineer (AME):

Nationality	Omani		
Licence type	CAT-B1		
Licence valid	01st Apr 2026	Type endorsed	B737-8(MAX)
Ratings	B737-8(MAX) / B737-800/900(NG) / B787-8/9		

1.6 Aircraft Information:

1.6.1 The Boeing 737-8 MAX is a narrow-body, twin-engine jet airliner and the latest fourth-generation iteration of the renowned Boeing 737 family. It stands out for its exceptional fuel efficiency, achieved through cutting-edge engines and refined aerodynamics. The aircraft also boasts a modernized cabin featuring the Boeing Sky Interior, offering enhanced comfort for passengers. Designed to serve both short-haul domestic routes and longer international flights, the Boeing 737-8 MAX combines versatility with performance. The typical seating configuration accommodates up to 189 passengers in a single-class layout or a two-class arrangement with 18 business-class and 150 economy seats. Powered by advanced CFM LEAP-1B engines.

Airframe:

Manufacturer/Model	Boeing 737-8 MAX	
Serial Number	63360	
Year of Manufacture	26th April 2022	
Total Airframe Hours (At Time of Serious Incidents)	9694:57	
Last Inspection (Date & Hours)	31st May 2025	9688.36
Last Inspection Airframe Cycles (CSN)	4001	
Airframe Hours Since Last Inspection	6.21	
Type of inspection preformed	Aircraft Daily Check	
CRS Issue Date	31st May 2025	
C of A (Issue Date & Expiry Date)	26th April 2022	26th April 2026
C of R (Issue Date)	26th April 2022	
Operating Category	Passenger Aircraft	
Type of Fuel Used	JET A-1	

Engine 1:

Manufacturer/Model	CFM / LEAP-1B
Serial Number	603344
Part Number	LEAP-1B27
Hours Since New	9694.57
Hours Since Overhaul	TBO not yet reached
Hours since last shop visit	N/A
Cycles Available Before Next Shop Visit	543
Oil type	Eastman Turbo oil 2197

Engine 2:

Manufacturer/Model	CFM / LEAP-1B
Serial Number	603347
Part Number	LEAP-1B27
Hours Since New	9694:57
Hours Since Overhaul	TBO not yet reached
Hours since last shop visit	N/A
Cycles Available Before Next Shop Visit	706
Oil type	Eastman Turbo oil 2197

1.6.2 Details and History of the Damaged Tire:

	Details and History of Damaged Tire					
Part Number	Serial Number	Description	Tire Manufacturer	Last Repair	Cycles Since New	Cycles Since Retreating
APR04450	221AM457	H44.5X16.5R21	Bridgestone	16/12/2024	396	236

Aircraft reg	Installation date	Removal date	Cycles
A4O-ME	17th -July-2022	07th -Sep-2022	Installed at 0 and removed at 160
A4O-ML	R1 on 13th -Mar-2025	31st -May-2025	Installed at 160 removed at 396

1.6.2.1 The manufacturer (Bridgestone) reported that the tire was manufactured in February 2021.

1.6.2.2 The tire was installed as new on 17th July 2022 and removed on 7th September 2022 due to a leak at 160 cycles.

1.6.2.3 The tire had been retreated once prior to the serious Incident and was certified serviceable on 16th December 2024.

1.6.2.4 The manufacturer (Bridgestone) inspected and approved the repaired tyre on 16th December 2024, and issued authorized release certificate for the retreaded tire.

1.6.2.5 The tire was installed on the aircraft on 13th March 2025 at 160 cycles. The serious incident happened on 31st May 2025 and the tire had a total of 396 cycles since new.

1.6.2.6 The tire had been in service for 88 days and 236 cycles since it was fitted on the aircraft on the 13th March 2025.

1.6.2.7 The tire was installed on the incident aircraft on 13th March 2025, that was 149 days after it was certified and released for service on the 16th December 2024.

1.6.2.8 According to the Technical Logs, for the last three months, there were no defects recorded relating to the affected tire.

1.6.3 Details of the Tire Pressures:

Records of Tire Pressures as per the Dates:							
Tech Log Number	Defect	Action Taken	Destination	Date	NLG	MLG 1 & 2	MLG 3 & 4
977674	Nil	N/A	IST - MCT	28 May 2025	183/187	216/232	224/228
971855	Nil	N/A	KWI - MCT	30 May 2025	188/190	210/213	211/211
971858	Loss of A system	N/A	MCT - MCT	31 May 2025	N/A	N/A	N/A
971859	Main Wheel #1 found Decapped.	Main Wheel #1 replaced	MCT - MCT	31 May 2025	N/A	N/A	N/A
971860	Main Wheel #1 found Decapped.	Main Wheel #1 replaced	MCT - MCT	31 May 2025	N/A	N/A	N/A

1.6.3.1 Between 28th May 2025 and 31st May 2025, the aircraft conducted 13 flights. All required daily checks were conducted within 48 hours and recorded in the aircraft technical logbook.

1.6.3.2 **The following information was extracted from Bridgestone Aircraft Tires; Tire Specification and Maintenance Manual (40TA24E December 2022 Version):**

1.6.3.2.1 **Inflation Pressure Control:**

1.6.3.2.1.1 It is recommended that inflation pressure of each aircraft tire be checked daily, and that the pressure gauge be calibrated regularly. Maintaining correct tire inflation pressure is the most important factor in any preventive maintenance program.

1.6.3.2.1.2 **A. Pressure Readjustment After Installing Tire on Aircraft:**

1.6.3.2.1.2.1 PNZ (loaded service pressure) shall be used instead of the PNO, if the aircraft is on the ground. PNZ is specified as add 4% to the PNO, to adjust the target pressure considering increase by small shrink of tire gas chamber due to vertical loading.

- Aircraft on Jacks: Readjustment pressure is PNO
- Aircraft on Wheels: Readjustment pressure is PNZ

Note:

- Aircraft on Jacks: Readjustment pressure is PNO.
- Aircraft on Wheels: Readjustment pressure is PNZ.

1.6.3.2.1.3 **B. Pressure Control in Service:**

1.6.3.2.1.3.1 The pressure check should be done exclusively with “cold tire”; tire temperature is within a range of ambient temperature. If the tire is not operated for successive 3 hours or longer, the tire is granted as the “cold tire”, unless otherwise exposed to direct sun light for a significant time period.

1.6.3.2.1.4 **C. Normal Pressure Loss During Service:**

1.6.3.2.1.4.1 Slight pressure loss occurs with aircraft tires due to natural leakage of small amount of gas. Permissible range of the loss is 5% or less within 24 hours. A small amount of gas diffusion through the “vent holes”; artificial holes situated at the lower sidewall, is a normal mechanism to bleed off trapped air, preventing internal separation or blistering. However, such air leakage should not be detectable by hand.

1.6.3.3 The following information was extracted from Oman Air Approved Maintenance Schedule:

1.6.3.3.1 All A/C of the type Boeing 737 MAX-Nose and Main Landing Gear Tire Inflation Check:

Functionally check nose and main landing gear tires for proper inflation.

Service as required.

Effectivity Notes:

Interval: 48 elapsed clock hours.

1.6.3.3.2 Nose and Main Landing Gear Tires and Wheels:

Inspect (General Visual) the nose and main landing gear tires and wheels for condition and wear.

Effectivity Notes:

Interval: 48 elapsed clock hours.

1.6.3.3.3 The operator has Boeing B737 MAX maintenance daily line check list signed by both the engineer and the inspector after each daily check list conducted within 48 elapsed clock hours.

1.6.3.3.4 The operator has Boeing B737 MAX maintenance daily line check on tire pressures that cold tires are done with more than 2 hours cooling time. The hot tire pressures are conducted within less than 2 hours cooling time.

1.6.3.3.5 The AME reported that they either conduct a cold tire pressure within 3 hours or hot condition (no time to conduct tire pressure) which is done within an hour. All these pressures are recorded in the technical log book.

1.6.3.3.6 The tire pressure readings of the serious incident flight were recorded in the FDM. The tire pressures recorded in the FDM were as follows:

	FDM Records of Tire Pressures on 31st May 2025 at the Time 05:16:25:						
ITEM	Defect	Action Taken	Destination	Date	NLG	MLG 1 & 2	MLG 3 & 4
DATA	N/A	N/A	MCT- VOHS	31st May 2025	199/204	233/256	239/244

1.6.3.3.8 The weather temperature on the FDM was 38°C on the day and time of the serious incident.

1.6.3.3.9 The operator reported that the tire pressures are checked during aircraft daily checks and are subjective to the aircraft ground time or time spend on the ground before the next departure flight. There was no tire pressure servicing recorded in the aircraft technical logbook on and on the last daily aircraft checks.

1.6.4 Following the loss of hydraulic A system, the LE flaps transit light came on, main wheel #2 replaced due to Main Wheel #1 tire Decapping and Both #1 and #2 brake assemblies were replaced.

1.7 Meteorological Information:

1.7.1 METAR report for Muscat Airport OOMS shows stable weather conditions with clear skies over Muscat airport and across the region on 31st May 2025.

1.7.2 The weather information below was provided by the Directorate General of Meteorology (DGMET) - Meteorological Routine Aerodrome Report (METAR) on the 31st May 2025 at 05:50 UTC):

Wind Direction	020°	Wind Speed	03 KTS	Visibility	CAVOK
Temperature	42°C	Cloud Cover	Sky Clear	Cloud Base	Sky Clear
Dew Point	18°C	QNH	1000HPA		

1.7.3 According to Directorate General of Meteorology (DGMET) office, satellite imagery indicates stable weather conditions with clear skies over Muscat FIR. No significant clouds or convection has been observed, therefore no warnings have been issued.

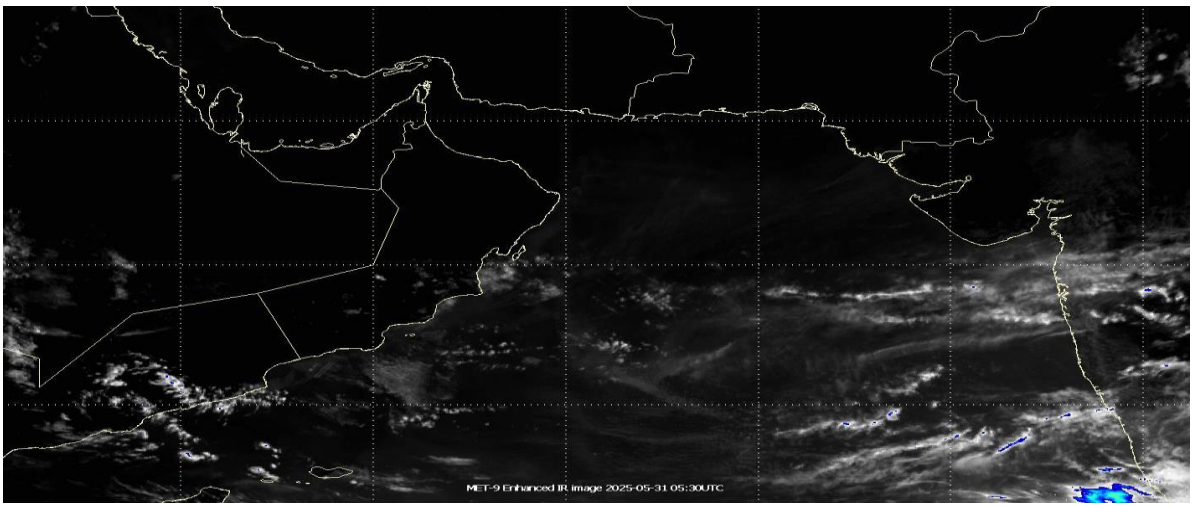


Figure 4 showing satellite image at 05:30Z on 31st May 2025 at OOMS (Source: DGMET).

1.8 Aids to Navigation

1.8.1 The aircraft was equipped with standard navigational equipment as approved by the Sultanate of Oman CAA. There were no defects reported or records indicating that the navigation system was unserviceable prior to the serious incident.

1.9 Communication:

1.9.1 The aircraft was equipped with a standard communication system as approved by the Sultanate of Oman CAA. There were no defects reported or records indicating that the communication system was unserviceable prior to the serious incident.

1.9.2 There were no issues with the ATCO radio frequency communication at the time of the serious incident.

1.9.3 The communication between the ATCO and the flight crew was normal and according to the established procedures.

1.10 Airport Information:

1.10.1 Departure / Destination Aerodrome:

Aerodrome Location	Muscat International Airport (OOMS)	
Aerodrome Status	Licensed	
Aerodrome GPS coordinates	23°35′36″N 058°17′04″E	
Aerodrome Elevation	25 feet (ft) Above Mean Sea Level AMSL	
Runway Headings/Designations	08R/26L	08L/26R
Dimensions of Runway Used	4080 x 60 M	4000 x 60 M
Heading of Runway Used	26L	
Surface of Runway Used	Asphalt	
Approach Facilities	ILS, RNP, VOR, Runway Lights, PAPI's	
Category for Rescue Fire Fighting	10	

1.10.2 Oman Airports conducted 3 runway inspections in the last 2 days before the incident and one (1) on the day of the serious incident at OOMS and all were clear of FOD:

Date	Time	Time	Time	Time	
29 May 2025	07:25 LT which 12:25 UTC	15:25	20:30	04:30 on 30th May 2025	Nothing to report
30 May 2025	07:25	15:25	19:15	05:00	Nothing to report
31 May 2025	07:10	15:25	19:15	05:00	Nothing to report

1.10.2.1 There were no reports of FOD at OOMS prior to the aircraft OMA815 take-off. OA operations conducted runway inspection and found the runway satisfactory with no FOD. There is evidence of reported tire damage incidents (nose and main wheels, see tables below) that were discovered in MCT as a result of suspected FOD, however these incidents are not directly linked to the serious incident being investigated.

Below is the tire damages that were discovered in MCT with aircraft operating from different airports with the same destination airport being MCT (Source: Oman Air).

Some of the reported tire damages prior to the incident aircraft:

No	Aircraft Reg	Station	Sector	A/C Model	Arrival date	Wheel Position
1	A4O-SE	MCT	CGK-MCT	B787-9	06-Mar-2025	Main Wheel 08
2	A4O-SH	MCT	BKK-MCT	B787-9	28-Mar-2025	Main Wheel 06
3	A4O-SI	MCT	KUL-MCT	B787-9	09-Apr-2025	Main Wheel 08

Some of the reported tire damages post the incident aircraft:

No	Aircraft Reg	Station	Sector	Flight No.	Arrival date	Arrival Time
1	A4O-MA	MCT	SLL-MCT	WY 906	29-Oct-2025	12:09 UTC
2	A4O-MF	MCT	DEL-MCT	WY 246	01-Nov-2025	14:50 UTC
3	A4O-BT	MCT	DXB-MCT	WY 612	01-Nov-2025	21:52 UTC

1.10.2.2 Oman Airports Operations provided OTSB investigation team with 6 CCTV surveillance camera footage. The investigation team noted from the CCTV recordings that, during the take-off of aircraft OMA815 it was not clearly visible to see the wheels and the decapping as the cameras are positioned far from where the aircraft lifted off. The footage of the CCTV showed that the take-off flight was normal. The aircraft's landed and contacted the runway surface with all the MLG wheels.

1.11 Flight Recorders:

1.11.1 The aircraft was fitted with the Digital Flight Data Recorder (DFDR), the Cockpit Voice Recorder (CVR), Flight Data Monitoring (FDM) and Quick Access Recorder (QAR). All were downloaded and made available to OTSB to assist in the investigation. OTSB relied on the QAR and ATS recordings for the investigation.

1.11.2 The QAR data analysis shows the aircraft OMA815 beginning its Flaps 1 takeoff roll on MCT RWY 26L. At approximately time 1058 seconds, the hydraulic system A fluid quantity parameter began to gradually decrease. The data indicates that lift off occurred at approximately time 1062 seconds. Just after lift off, at approximately time 1065 seconds, the landing gear lever was moved to UP; at approximately time 1073 seconds, the recorded landing gear data indicate that the left main gear did not transition consistent with the right main gear and nose gear, possibly indicating that the left main gear failed to fully retract.

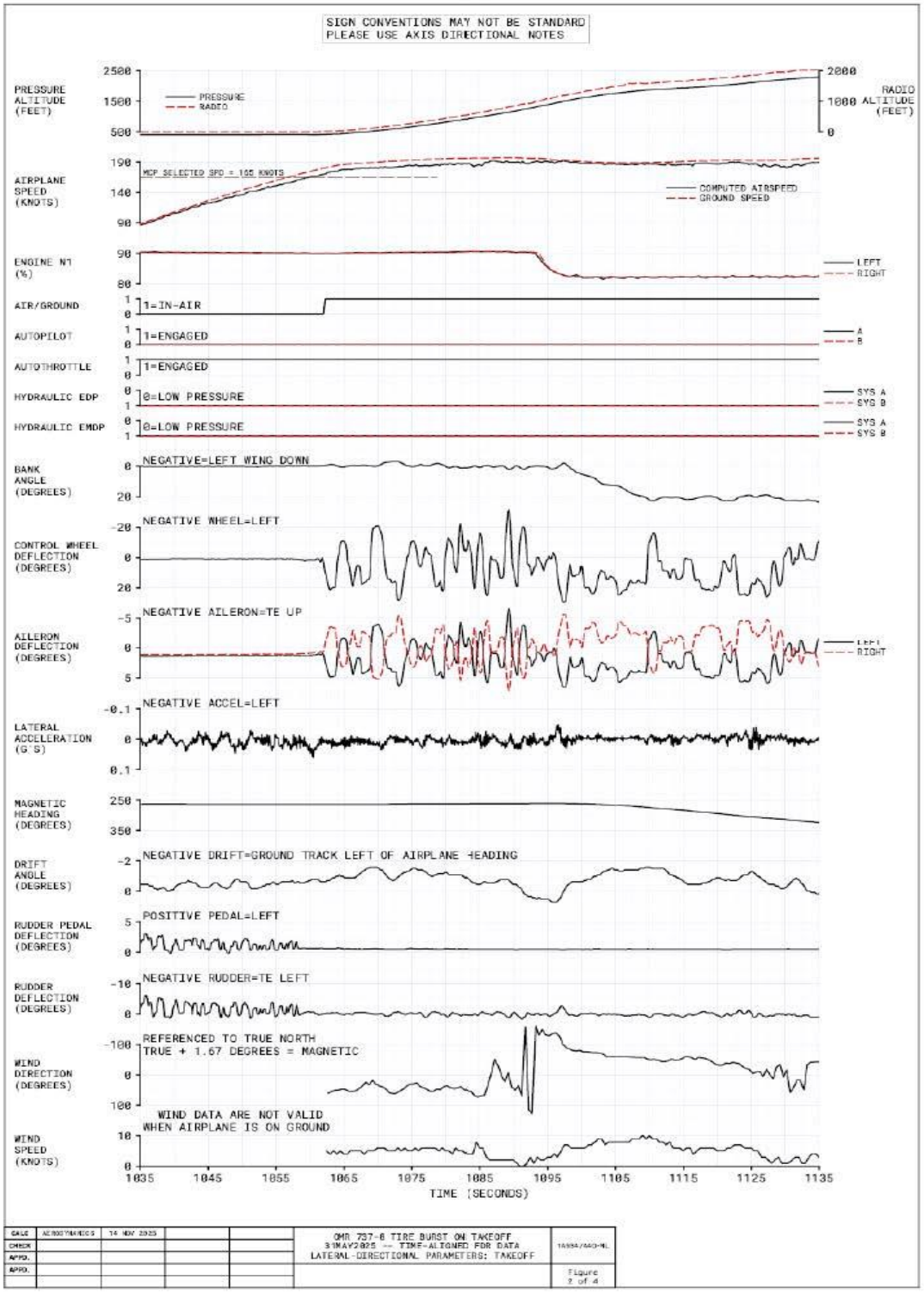


Figure 5 showing parameters on take- off (Source: Boeing)

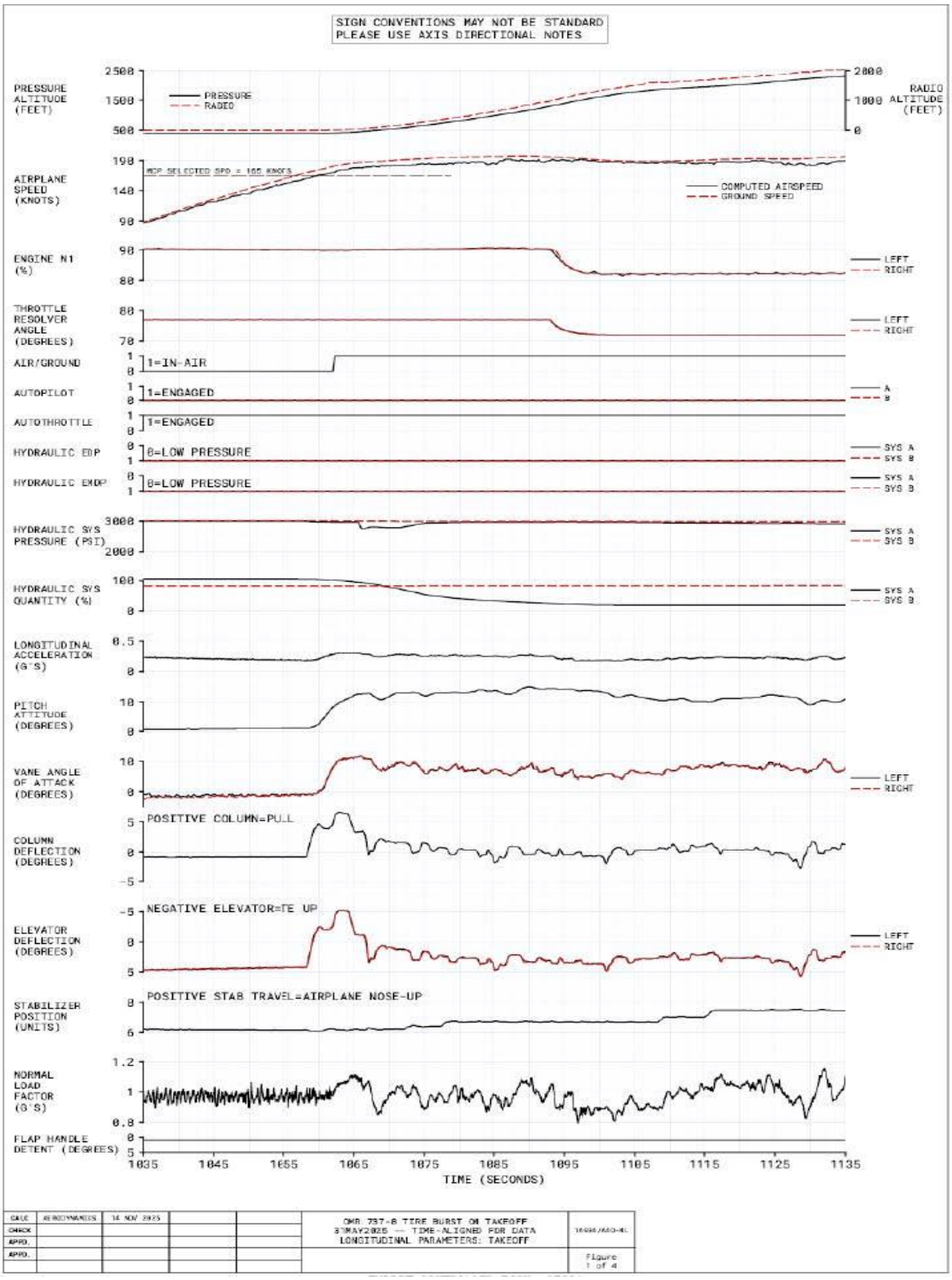


Figure 6 showing Hydraulic System A Pressure dropping (Source: Boeing)

1.12 Wreckage and Impact Information:

1.12.1 The flight crew of OMA815 took off from RWY 26L, shortly thereafter airborne, the flight crew of OMA231 reported to APP ATCO that there was presence of tyre debris on the runway. The airfield duty officer also observed the debris while OMA231 rolling for take-off and then called TWR controller as well. The aircraft OMA815 sustained damages on the wheel tires of wheel 1 only and there were reported structural damages to the following: main wheel No.1 de-capped, access panel above left hand (LH) landing gear, hydraulic tubes were also broken and ruptured, the left hand inboard (LH INBD) aft flap, left hand inboard main flap, left hand Kruger Flap No.2, left hand landing gear lower inner door, inboard pushrod assembly, tube assembly holding cable pulley, bracket holding cable pulley, the left hand engine driven pump also damaged and the left-hand engine cowling, inboard tire and brake No.1 were also damaged. Refer to figures 7-11 below.

Figure 7: showing Number 1 Mainwheel door damages at the parking bay after landing back.

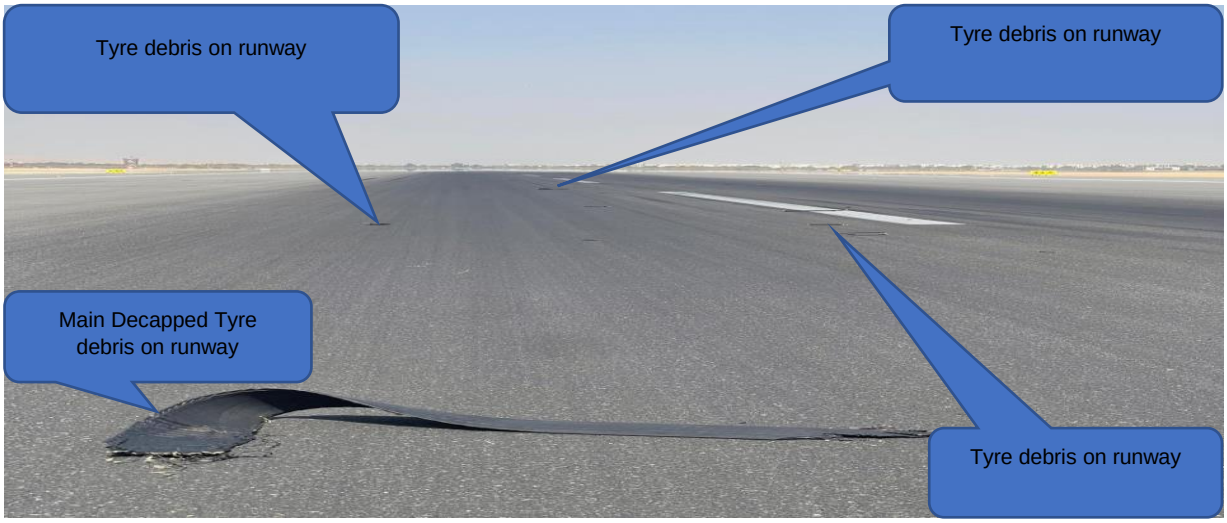


Figure 8: showing evidence of Main Wheel tire number 1 de-capped threat from the tire (Source: Oman Airports).

Figure 9: showing evidence of Main Wheel tire debris after tire de-capping (Source: Oman Airports).

Figure 10: showing evidence of damaged access panel and its hinges above left hand (LH) (Source: Oman Airports).

Figure 11: showing evidence of debris found on the runway during the inspection (LH) (Source: Oman Airports).

1.13 Medical and Pathological Information:

1.13.1 Not relevant to the serious incident.

1.14 Fire:

1.14.1 Not relevant to the serious incident.

1.15 Survival Aspects:

1.15.1 Not relevant to the serious incident.

1.16 Tests and Research:

1.16.1 The damaged tire was sent to the tire manufacturer (Bridgestone) for further inspection and examination:

1.16.1.1 OTSB Representative visited the facility and the box was found still sealed with the serial number and part number details matching the records when shipped.

1.16.1.2 Examination and testing of the tire was done within the tire carcass, broken cords, porosity and voids and fatigue) and pressure machines for puncture holes detection and the tests were found satisfactory.

1.16.1.3 The tire was tested for internal scanning and puncture pressure and external inspection which was satisfactory.

1.16.1.4 The tire materials were tested for tension and strength and was found that it has the same fabric material as the manufacturer's specifications and requirements.

1.16.1.5 Reconstruction of the tire using debris was done which pointed to some evidence leading or pointing towards FOD being a root cause.

1.16.1.6 Retreading procedures and fabric material testing was inspected in the presence of the OTSB representative and evidence showed that the same fabric materials were used in rethreading this damaged tire.

1.16.1.7 Evidence of the work job card for the work which was done on the damaged tire was inspected and found aligned with details of the damaged tire. This confirmed that the tire was properly retreaded when last repaired on 16 December 2024 following the tire leak in 2022.

1.16.1.8 **Bridgestone Aircraft Tire Inspection Findings and Analysis (BRIDGESTONE AIRCRAFT TIRE (EUROPE), S.A.):**

1.16.1.8.1 Previous retread records:

- The review of the previous retread records shows that all the retreading steps have been done with no deviation.
- The tire has been certified R1 with no known defect.

1.16.1.8.2 **Failed tire inspection results:**

1.16.1.8.2.1 Crown area:

- The separation surface is mainly at the top casing ply surface, and not at the tire recapping surface.
- The Inboard shoulder is still firmly attached to the casing.
- There was no sign of any pre-existing separation or bulge in the casing prior to the tread detachment.

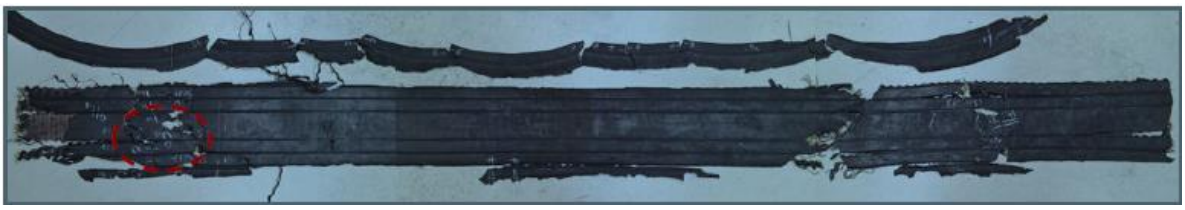


Figure 12 shows the reconstruction of the recovered the tread debris (Source: Bridgestone).

- Nearly all tread pieces were recovered. At one point on the crown surface numerous small pieces detached from the casing, followed by the detachment of one huge piece. It is probable that the area of the small tread pieces was the starting point for the tread separation.
- There are some signs of rubber compression on the multiple tread debris, possibly due to an impact with a blunt object.
- Beneath the area of the small tread pieces some large separation striations are highlighted, indicating the direction of the sudden tread detachment from this point.
- Some small pieces are missing at a suspected starting point in the center crown area.

Figure 13 shows signs of rubber compression on the multiple tread debris (Source: Bridgestone).

Figure 14 shows the area with multiple detached pieces of tread (Source: Bridgestone).

1.16.1.8.2.2 **Examination Results:** Following the thorough inspection performed on the failed tire, the manufacturer concluded that the incident has been caused by an impact from a blunt FOD at a point in the centre crown area. The investigation highlighted that there was no retreading quality issue, casing fatigue in the crown, no sign of any internal separation before the tread separation nor any other manufacturing deficiency in the tire. The evidence suggests that an impact caused a sudden detachment of tread pieces in a small area, followed by the detachment of the remaining tread in one huge piece. This tire failure is considered as operational related.

1.17 Organizational and Management Information:

1.17.1 Oman Air:

1.17.1.1 Flight OMA815 was scheduled international passenger flight.

1.17.1.2 The operator, Oman Air was issued an Air Operating Certificate (AOC) by the State of Registry and State of Operator, the Sultanate of Oman CAA on 20th October 2022. The AOC is valid until suspended or revoked as per the Sultanate of Oman Regulations. The certificate certifies that the Oman Air (S.A.O.C) is authorized to perform commercial air operations as defined in the operations specifications, in accordance with the operations specifications, in accordance with the operations manual and the CAR-OPS-1of the Sultanate of Oman Regulations.

1.17.1.3 The Operator implemented Safety Management System (SMS) in regard to this serious incident, whereby occurrences are reported to the relevant authorities as and when they occur and they are reviewed, categorized, classified and investigated to identify the need for any gaps, risk assessment and risk management, remedial action that are required to be taken by the organization.

1.17.2 Oman Airports (OA):

1.17.2.1 The Oman Airports as the Aerodrome Operator have implemented SMS which includes all its operations in regard to this serious incident, whereby occurrences are reported to the relevant authorities as and when they occur and they are reviewed, categorized, classified and investigated to identify the need for any gaps, risk assessment and risk management and remedial action that are required to be taken by the organization.

1.17.2.2 The Operator has Foreign Object Debris (FOD) Management Plan and Standard Operating Procedure (SOP) in place which describes an airfield operation procedure for the safe operation of the airports. The work performance is in accordance to a scheduling plan and that is provided whenever necessary.

1.17.3 Directorate General Air Navigation (DGAN) – Source MCT TWR MATSOP Chapter 8:

1.17.3.1 The DGAN has a provision of Information in respect of aerodrome conditions and the operational status of associated facilities. A Letter of Agreement (LOA) is established between DGAN and Oman Airports which covers, among others, Provision of Information in respect of aerodrome conditions and the operational status of associated facilities at Muscat International Airport. The LOA also set forth the responsibilities of each party for the provision of information.

1.17.3.2 OMAN AIRPORTS Responsibilities:

1.17.3.2.1 Oman Airports Operations shall keep Muscat Tower advised of the following as soon as practicable:

a) Results of airfield inspections.

b) Any other pertinent information that may affect the safety of aircraft operations at Muscat International Airport.

1.17.3.2.2 Aerodrome Inspection:

a) Oman Airports shall conduct regular inspection as per the Muscat aerodrome manual (Routine Daily Inspection, Advanced Inspection and Other serviceability inspections). The prime objective of these inspections is the detection of anything that could prove hazardous to aircraft operations, such as:

i. Foreign object damage (FOD).

1.17.3.3 MUSCAT TOWER Responsibilities:

1.17.3.3.1 Muscat Tower controllers shall:

a) On receipt of information indicating a lighting fault, take such action as is warranted to safeguard any affected aircraft or vehicles, and inform the Oman airports to have the fault rectified;

b) Provide essential information on aerodrome conditions to every aircraft, except when it is known that the aircraft already has received all or part of the information from other sources. The information shall be given in sufficient time for the aircraft to make proper use of it, and the hazards shall be identified as distinctly as possible;

c) Relay essential information on aerodrome conditions to Muscat APP.

1.17.3.2 The DGAN as air navigation service provider have implemented Safety Management System (SMS) which includes all its ATS units, whereby occurrences are reported to the relevant authorities as and when they occur and they are reviewed, categorized, classified and investigated to identify the need for any gaps, risk assessment and risk management and remedial action that are required to be taken by the organization.

1.18 Additional Information:

1.18.1 The following information was extracted from Oman Air QRH **737 Flight Crew Operations Manual D6-27370-MAX-OMR (P2) May 15, 2023:**

LOSS OF SYSTEM A		
FLT CONTROL A	**A HYD ENG 1**	**PUMPS 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 STEER 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.

1.18.2 **Alternate Flap Extension:**

During flap extension, set the flap lever to the desired flap position.
230K maximum during alternate flap extension.
ALTERNATE FLAPS master switch . . . . . ARM
Note: The landing gear configuration warning may sound if the flaps are between 10 and 15 and the landing gear are retracted.
Note: Depending on initial flap position, the amber LE FLAPS TRANSIT light can stay illuminated until the flaps approach the flaps 15 position.

Note: Operation within the lower amber airspeed band may be needed until the LE FLAPS TRANSIT light extinguishes.

If flap asymmetry occurs, release the switch immediately. There is no asymmetry protection.

ALTERNATE FLAPS
position switch . . . . . .Hold DOWN to extend flaps to 15 on schedule
As flaps are extending, slow to respective maneuvering speed.

1.18.3 **Approach Checklist:**

Altimeters . . . . . .
Manual Gear Extension
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
ENGINE START switches. . . . . CONT
Speedbrake . . . . . **DOWN detent**
Landing gear . . . . . Down
Flaps . . . . . **15, Green light**
Note: SPEEDBRAKE alert will annunciate on landing even with the speed brake lever UP.

LOW PRESSURE	**STANDBY HYDRAULIC LOW PRESSURE**

Condition: The standby hydraulic pump pressure is low.
Note: With a loss of hydraulic system A or B, the thrust reverser on the affected side is inoperative.
Note: With a loss of hydraulic system A and B, the rudder is inoperative.

LOW QUANTITY	**STANDBY HYDRAULIC LOW QUANTITY**

Condition: The standby hydraulic quantity is low.
1 Continue normal operation.

1.18.4 **Gear Down:**

This section contains performance for airplane operation with the landing gear extended for all phases of flight.

Note: The Flight Management System (FMS) does not contain special provisions for operation with landing gear extended. As a result, the FMS will generate inaccurate enroute speed schedules, display non-conservative predictions of fuel burn, estimated time of arrival (ETA), maximum altitude, and compute overly shallow descent path. An accurate estimated time of arrival is available if current speed or Mach is entered into the VNAV cruise page. Estimates of fuel remaining at waypoints or the destination may be computed by the crew based on current fuel flow indications, but should be updated frequently.

1.18.5 LANDING GEAR – GENERAL DESCRIPTION-The information is extracted from BOEING 737-7/8/8200/9/10 SYSTEM DESCRIPTION SECTION:

1.18.5.1 General Description:

Hydraulic system A normally supplies pressure to the landing gear extension and retraction. Hydraulic system B supplies pressure for retraction only.

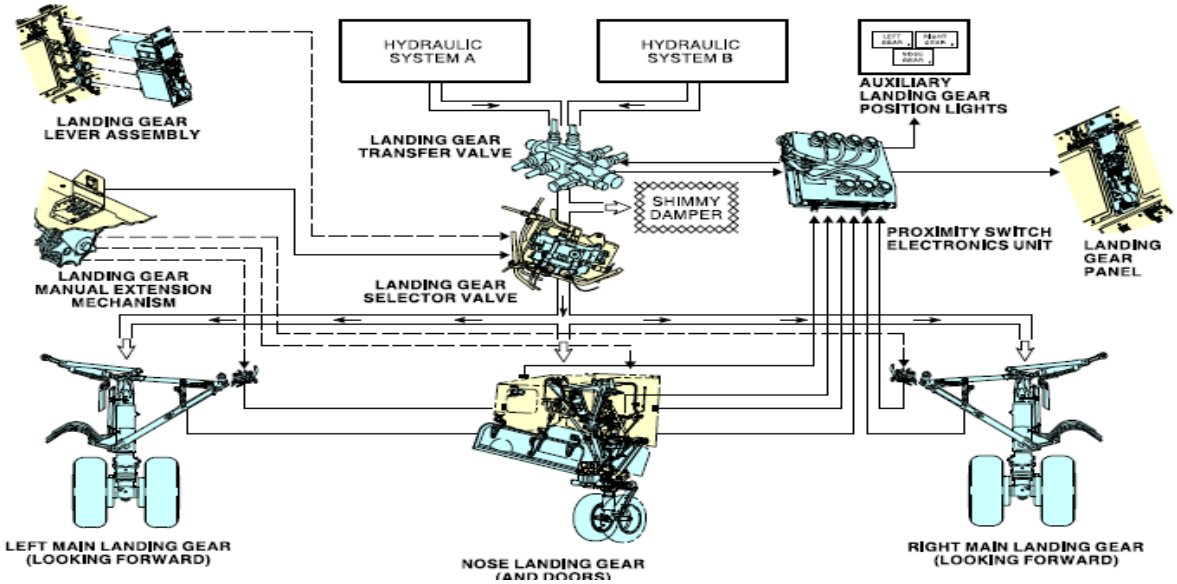


Figure 15 showing the General Description of the Landing Gear (Source Operator: MM)

The landing gear transfer valve receives electrical signals from the proximity switch electronics unit (PSEU). The landing gear transfer valve changes the pressure source of the landing gear from hydraulic system A to hydraulic system B.

You move the landing gear control lever assembly to control landing gear extension and retraction. The control lever module sends an electrical signal to the selector valve.

The selector valve also gets an electrical input from the manual extension system. This operates a bypass valve in the selector valve to connect the landing gear retraction to the hydraulic system return. This lets the manual extension system extend the landing gear.

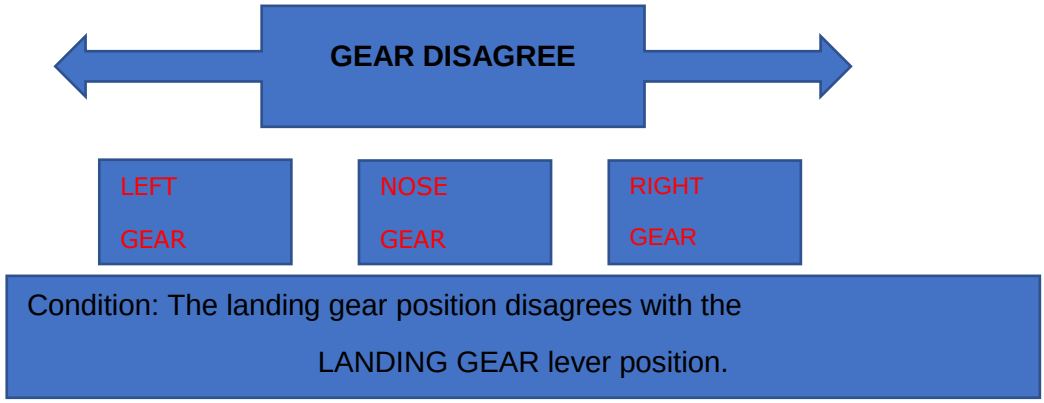
Landing gear lights show the position of the landing gear. The PSEU receives landing position signals from sensors on the landing gear. The normal and auxiliary lights are controlled by the PSEU.

The pressure for nose wheel steering comes from the nose landing gear extension pressure only. Hydraulic system A normally supplies pressure to the nose gear steering through the landing gear control system.

The landing gear control system also provide normal or alternate hydraulic pressure to these systems:

- Main landing gear shimmy damper
- Gear retract brake system

1.18.6



Note: Do not exceed the gear EXTEND limit speed (270K/.82M).
Do not use Flight Management Computer (FMC) performance predictions with gear extended.

1 Choose one:

LANDING GEAR lever is **UP:**

►►**Go to step 2**

LANDING GEAR lever is **DN:**

►►**Go to step 6**

2 Choose one:
All red and green landing gear indicator lights are illuminated:
Open and close the manual gear extension access door. Verify the door is fully closed.

►►**Go to step 3**

Any other combination of landing gear indicator lights is illuminated:
►►**Go to step 5**

235K maximum

3 LANDING GEAR lever. . . . . DN, then UP
4 Choose one:
All landing gear indicator lights extinguish:

■ ■ ■ ■

Any red landing gear indicator light is illuminated:

►►**Go to step 5**

5 Flight with gear down increases fuel consumption and decreases climb performance. Refer to the Gear Down performance tables in the Performance Inflight section.

■ ■ ■ ■

6 Check landing gear indicator lights.
Note: If a green landing gear indicator light is illuminated on either the center main panel or the overhead panel, the related landing gear is down and locked.
7 Choose one:

All landing gear indicate down and locked and one or more red landing gear indicator lights are also illuminated:

►►**Go to step 8**

Any landing gear is not down and locked:
►►Go to the Manual Gear Extension checklist on page 14.14

■ ■ ■ ■

8 Verify landing gear lever is fully in the DN detent.

9 Choose one:

All red landing gear indicator lights extinguish:

■ ■ ■ ■

One or more red landing gear indicator lights stay illuminated:

GROUND PROXIMITY GEAR
INHIBIT switch . . . . . .GEAR INHIBIT

Land normally.

■ ■ ■ ■

1.18.7 The following information is extracted from Oman Air Operations Manual:

1.18.7.1 Communication between Flight Crew and Cabin Crew:

Effective communication between crew members is the key tool in the exchange of timely information under normal and abnormal operating conditions. A successful operation of the flight depends on proper communication of the entire crew members. The crew members shall be familiar with each other's emergency duties, in order to achieve positive response throughout the emergency.

1.18.7.2 Passenger Briefing Procedures:

Oman Air provides briefings on safety matters and also provides a safety briefing card on which picture type instructions indicate the operation of emergency equipment and exits likely to be used by passengers, in each seat pocket for the information of passengers.

1.18.7.3 Cockpit Communication:

Safety is dependent on good communication. Good communication leads to improved task sharing and better decision making. Any time a crew member intends to make any adjustments or changes, he must advise the other crew member of his intentions/decisions and get an acknowledgement. Acknowledgement here means an intelligent verbal response and not a nod of head etc. Both the pilots should monitor the active ATC frequency unless one pilot is operationally required to communicate on another frequency. If at any time a pilot changes to another frequency, he shall inform the other pilot of the same. At all times, one pilot shall monitor the active ATC frequency.

1.19 Useful or Effective Investigation Techniques:

1.19.1 None.

2. ANALYSIS:

2.1 General:

2.1.1 From the available evidence, the following analysis were made with respect to the serious incident. This shall not be read as apportioning blame or liability to any organization or individual. The Investigation collected data from various sources for the purpose of determining the causes and contributing factors that led to the serious incident. This analysis covers the tire damage and the consequence damages, the effect on aircraft systems due to the loss of hydraulic system A. This part of the report explains the significance and contributing factors related to the serious Incident. The Analysis also contains safety concerns that may not be contributory to the serious incident but are significant in improving the operational practices related to the servicing and recording of the tire pressures.

2.1.2 The aircraft is owned and operated by Oman Air the operator is properly licensed by the Sultanate of Oman, CAA. The OTSB investigation team noted that the Operator, Oman Air, the Service Provider, DGAN and Airport Operator, OA have implemented SMS, whereby occurrences are reported to the relevant authorities as and when they occur and they are reviewed, categorized, classified and investigated to identify the need for any remedial action that are required to be taken by the organization. The SMS system also covers the just culture which encourages the reporting of occurrences and errors. OTSB investigation team concluded that there was no organizational factor which could have contributed to the serious incident.

2.1.3 The communications between the TWR ATCO and Oman Airports Airfield Officer, flight crew of OMA815 and both the TWR and APP ATCOs were clear and were all able to communicate effectively, confirm and verify the instructions and clearances, therefore communication was not a factor to the serious incident.

2.1.4 The communications between the flight crew of OMA815, the cabin crew and passenger briefings were effective. The flight crew of OMA815 followed operator's SOPs throughout the flight until the aircraft was landed safely.

2.2 Flight operations:

2.2.1 Flight crew Qualifications:

2.2.1.1 The flight crew of OMA815 and the cabin crew were all qualified to operate the aircraft. At the time of the serious incident, both the flight crew and the cabin crew medical certificates were valid. The flight crew and the cabin crew were well rested prior to undertaking the flight.

2.2.2 Operational procedures:

2.2.2.1 The flight crew of OMA815, stated that while the aircraft was taking off from RWY 26R and while climbing, the APP ATCO was contacted and informed that the aircraft is experiencing technical problem, engine (ENG) No.1 low pressure hydraulic (HYD) PUMP indication. After flap retraction the flight crew got leading edge (LE) flaps transit light and gear disagree message as left gear showed green and red light simultaneously on the Flight Management Display (FMD). After take-off the flight crew of OMA815 followed the checklist and conducted FORDEC before deciding to return to OOMS. The flight crew contacted the APP ATCO and requested clearance for a holding pattern in order to burnout fuel to reduce the weight for Approach Speed (Vapp) and to avoid overweight landing.

2.2.2.2 The flight crew of OMA815 followed the aircraft's QRH and the operator's SOP for hydraulic system failure procedures including the non-normal checklist for loss of hydraulic system A pressure. After the loss of hydraulic system, A, the PF requested to enter into the hold. The intention was to have sufficient time for the flight crew to understand the problem, make decisions, conduct the necessary failure briefing, and take appropriate action. The PF also briefed the FO and the cabin crew including the passengers on the situation and the decision to return to OOMS.

2.2.2.3 The abnormalies observed and reported by the flight crew of OMA815 corroborate with the QAR data in that the. the landing gear and LE flaps were not fully retracted after lift-off which was found to be as a result of the loss of hydraulic pressure of system A and B.

2.2.2.4 The communications with relevant parties were conducted in accordance with the Operator's procedures. The PF transferred the control of the aircraft to the PM, when he performed communications with the APP ATCO, the Operator's MCC and OCC through ACARS and VHF. The PF performed these as considered necessary. Nevertheless, high alertness and situational awareness were maintained by both flight crew throughout the flight.

2.2.2.5 The flight crew of OMA815 carried out NNC one by one, then they followed after take-off checklist and FORDEC. Based on this assessment, the flight crew of OMA815 decided that the best option was to return back to OOMS, but according to LE FLAPS transit light NNC the approach should be Vref 15 KTS plus 15° flaps, which was quite high with current weight of around 79 tons.

2.2.2.6 The flight crew of OMA815 followed and operated the flight in accordance with the Operator's SOP. The flight crew carried out all necessary checklists, including the non-normal checklist, for the loss of hydraulic system A and the tire failure procedures and managed to landed the aircraft safely. The flight crew made a correct decision to return to OOMS following thorough assessment of the technical problem. The OTSB conclude that the flight crew handling of the technical problem was not a factor to the serious incident.

2.2.3 Weather:

2.2.3.1 The flight crew of OMA815 did not observe any cloud on the weather radar system, and or any deviation from flight plan. The wind according to the METAR reports was calm. Weather was considered to be clear and normal at the time of the serious incident and none of the flight crew of OMA815 reported challenges with the weather including the approach and landing weather, as a result, the OTSB investigation team concluded that weather was not a factor into the serious incident.

2.2.4 Air traffic control:

2.2.4.1 Both the ATCOs held valid licenses with Class 3 medical certificate at the time of the serious incident. TWR ATCO and APP ATCO provided pertinent information to the flight crew in relation to the flight and the track. Both the ATCOs exercised the privileges of their ATCO licenses as required by CAR.ATCO.A.015 which states that, “the exercise of the privileges granted by a license shall be dependent on the validity of the license, ratings, endorsements including ELP and the medical certificate.”

2.2.4.2 The OTSB investigation team established that there were 5 aircraft on the APP Frequency (Freq) 121.2 Mhz, the ATCOs actions to provide and broadcast or coordinate communications to the incident aircraft including the vectoring did not create workload for the ATCOs at OOMS, therefore there was no evidence of any traffic congestion at the time of the serious incident.

2.2.5 Communications:

2.2.5.1 The communications between the flight crew of OMA815 and both the ATCOs were clear with the correct phraseology and clear instructions by both the ATCOs and the flight crew including providing information to both the ATCOs by the flight crew. Both the ATCOs were efficient in coordinating and communicating with the flight crew and other aircraft which were halting for taking off and for arrivals until the runway inspection was conducted, and cleared for any FOD on the runway. Therefore, OTSB investigation team determined that communication between the ATCOs and the flight crew, neither the communication between the PF and PM was not a factor to the serious incident.

2.2.6 Aids to navigation:

2.2.6.1 The navigational system onboard aircraft OMA815 was found to be serviceable, no defects reported or recorded and operated as required at the time of the serious incident. Therefore, OTSB investigation team determined that the navigational aid was not a factor to the serious incident.

2.2.7 Aerodrome:

2.2.7.1 Oman Airports AO was positioned close to South RWY of 08R/26L observing take off and landings of aircraft when he observed FOD fly over while aircraft OMA231 was on take-off roll. The AO conducted runway inspection in coordination with TWR ATCO during which he found FOD (tire debris) on the south RWY 26L which was reported to APP ATCO by flight crew of OMA231.

2.2.7.2 The OTSB investigation team was provided with 6 CCTV surveillance camera footage however due to the distance from the location of cameras and where the serious incident occurred it was not clearly visible to see the wheels and the tire decap.

2.2.7.3 The manufacturer's tire decap examination and analysis report suspected that a blunt FOD at the point in the centre crown area possibly from the aerodrome impacted initiation of the tread separation and indicated the direction and the sudden tread detachment from a point in the center crown area. However, the OTSB could not establish the evidence to support the conclusion of the blunt FOD as a cause for tire decap, this is due to the fact that OA conducted airport RWY inspection prior to aircraft OMA815 taking off, and there was no FOD found on the RWY. However, post the incident/ post take off, another RWY inspection was conducted by OA, and FOD was found which was traced as coming off from aircraft OMA815.

2.2.7.4 OTSB found that there were aircraft that took off using the same RWY 26L used by aircraft OMA815, none of the aircraft that took off prior to the incident aircraft reported FOD on the RWY. Therefore, OTSB concludes that although no FOD was identified during the runway inspection that was conducted prior to the incident flight, it is probable that the FOD could have existed and was not detected during the runway inspection, this is not based on factual information, however is based on circumstances around the aerodrome where several aircraft tires were damaged as a result of alleged FOD within the aerodrome. Therefore, it is probable that the aerodrome was a factor to the serious incident.

2.3 Aircraft:

2.3.1 The aircraft OMA815 was issued with valid Certificate of Airworthiness (CoA) and Certificate of Registration (CoR), the maintenance records of the aircraft did not reveal any abnormality in the maintenance standard requirements. The aircraft was certified and maintained in accordance with existing regulations and approved procedures. There was no pre-existing defects or conditions that contributed to the serious incident.

2.3.2 The abnormalities observed and reported by the flight crew of OMA815 in the cockpit related to landing gear and LE flaps corroborate with the manufacturers QAR analysis report that the landing gear and LE flaps were not all completely retracted after lift-off. After the discrete parameters for both the hydraulic system A engine driven pump (EDP) and electric motor driven pump (EMDP) began to indicate LOW PRESSURE, and the recorded fluid quantity reached zero percent, the flight crew decided to return to OOMS, and they advised APP ATCO that they are experiencing technical problem and would like to hold to burn fuel and thereafter return to OOMS. After the flight crew burned fuel and they were cleared by APP ATCO to land, the aircraft returned to land safely at OOMS on Runway 26R without further incident. Post serious incident inspections indicated that the number 1 left main landing gear tire had failed and decapped, causing damage to multiple systems.

2.3.3 The flight crew of OMA815 stated that as they lowered the landing gear lever down they observed that the pressure in system A had dropped to almost zero and landing gear were not confirmed down and locked. The Boeing Manual states that "Hydraulic system A normally supplies pressure to the landing gear extension and retraction. The flight crew decided to extend the landing gear manually due to hydraulic system A experienced a loss of hydraulic pressure caused by the damaged hydraulic tubes which were severed by tire debris that came off the number 1 left main landing gear tire that decapped.

2.3.4 Following the serious incident, OTSB requested that the decapped tire be quarantined by the operator, as it was the subject of an OTSB investigation. The tire was examined by the OTSB investigation team and was found to have been retreaded on 16 December 2024 and installed on the incident aircraft on 13 March 2025. The tire had been in service for 88 days and had accumulated 236 cycles since installation. The investigation team decided to send the tire to the manufacturer, Bridgestone, for further examination and analysis.

2.3.5 The manufacturer's tire decap examination and analysis report indicated that a blunt foreign object debris (FOD) impact in the center crown area was suspected to have initiated the tread separation. The report also identified the direction of the impact and the sudden tread detachment originating from the center crown area. The report further makes a finding that the tire retread that was performed on the 16th December 2024 was done in accordance with the manufacturer's specifications.

2.3.6 OTSB could not establish evidence to support the conclusion that a blunt FOD was the cause of the tire decap. This is because the airport operator (OA) conducted a runway inspection prior to aircraft OMA815's departure, and no FOD was found on the runway. However, following the incident and after takeoff, another runway inspection was conducted by OA, during which FOD was found and subsequently traced to aircraft OMA815. Therefore, it can be concluded that it is probable that the blunt FOD damage occurred at a previous aerodrome prior to the aircraft's arrival at OOMS, and that the damage was not either visible or detected during the routine preflight tire inspection at OOMS.

2.3.7 The operator indicated that they followed their SOP with regards to the tire pressure monitoring which was taken within the 48 hours before the serious incident happened and was still within the 48 hours elapsed clock hours as per their approved maintenance schedule and is conducted as per the operators B737 MAX maintenance line check list for all A/C of the type 737MAX.

2.3.8 According to the AME, the pressure of all the tires were also checked after the serious incident, and it indicated that all the tire pressures were within limits. The investigation team also reviewed the aircraft technical log book, the tire pressure checks were recorded in the technical logbook and they were found within the limit. Inspections of the aircraft during the preflight inspection conducted by the operator prior to the serious incident, indicated that there were no issues related to tires conditions and pressures. Therefore, OTSB concludes that the tire pressure was not a factor into the serious incident.

2.3.9 According to the FDM the temperature on the day of the serious incident was 38°C, this was considered normal for manufacturer's maximum surface temperature operations of 107 degrees. Therefore, OTSB concludes that the surface temperature on the day of the incident was not a factor to the serious incident.

2.4 Human Factors:

2.4.1 The flight crew of OMA815, stated that while the aircraft took off the runway during the climb, the flight crew of OMA815 contacted the APP ATCO that the aircraft experienced low pressure engine (ENG) No.1 hydraulic (HYD) PUMP light. After flap retraction the flight crew of OMA815 reported that the LE flaps transit light and gear disagree and the left gear showed green and red light simultaneously.

2.4.2 The flight crew of OMA815 followed the checklist and conducted NNC before deciding to return to OOMS and requested APP ATCO for holding pattern in order to burnout fuel to reduce the weight and to compensate for the Approach Speed (Vapp) to avoid overweight during landing. Therefore, the flight crew followed correct procedures and made a correct decision to return to OOMS following technical problems with the aircraft.

2.4.3 The communications between the flight crew, CD, the TWR ATCO and APP ATCO which included the passenger briefings was clear with the correct phraseology by both the ATCOs and the flight crew including providing and sharing information to the OA Operations.

2.4.4 The communications between the flight crew of OMA815 and both the ATCOs was clear and the flight crew and both the ATCOs were able to communicate effectively, confirm and verified the instructions and clearances until the aircraft landed safely and parked to its designated stand.

2.4.5 The maintenance practice followed by operator's maintenance engineer with respect to tire pressure checks, were found to be in conformance with the manufacturer's maintenance procedures and the operator's procedures.

2.4.6 Therefore OTSB concludes that Human factor was not a factor into the serious incident.

2.5 Survivability:

2.5.1 Rescue fire service response: Although OA operations conducted the RWY inspections following the incident and the RFFS was on site, there were no Rescue and Fire services required, therefore Rescue and Fire was not a factor to the serious incident as there was no fire during and after the serious incident.

3. CONCLUSION:

3.1 General:

From the available evidence, the following findings, causes and contributing factors were made with respect to this incident. These shall not be read as apportioning blame or liability to any organization or individual.

To serve the objective of this investigation, the following sections are included in the conclusion heading:

- **Findings —** are statements of all significant conditions, events, or circumstances in this incident. The findings are significant steps in this incident sequence, but they are not always causal or indicate deficiencies.

3.2 Findings:

3.2.1 The flight crew of OMA815 were properly licensed to conduct the flight. Their licenses were valid and issued by the sultanate of Oman CAA.

3.2.2 Both flight crew members of aircraft OMA815 operated the flight in accordance with the Operator's SOP. They carried out all necessary checklists, including the NNC, for the loss of hydraulic system A.

3.2.3 Both flight crew members of aircraft OMA815 maintained sufficient situational awareness during the Incident flight.

3.2.4 The flight crew of OMA815 informed the ATCO, CD, and also the Operator's MCC and OCC, of the hydraulic system A failure and the decision to return to OOMS.

3.2.5 The CD was properly licensed to conduct the operation on the aircraft. The license was valid and issued by the sultanate of Oman CAA.

3.2.6 Aircraft was properly registered and issued with CoA and CoR by the sultanate of Oman CAA and both certificates were valid at the time of the serious incident.

3.2.7 The aircraft was airworthy when dispatched for the flight prior to the serious incident.

3.2.8 The APP ATCO and TWR ATCO were issued with ATC license to conduct ATS responsibilities by the sultanate of Oman CAA and was valid at the time of the serious incident.

3.2.9 Both ATCOs provided instructions and managed departures and arrivals traffic at the departure airport.

3.2.10 Both AMEs were properly licensed to conduct the maintenance on the aircraft. Their licenses were valid and issued by the sultanate of Oman CAA.

3.2.11 There was no evidence that incapacitation or physiological factors that affected the flight crew OMA815, AMEs and ATCOs performance.

3.2.12 OA conducted 3 RWY inspections two days before and one on the day of the serious incident at OOMS and all were clear of FOD.

3.2.13 The OA Airfield Officer observed and identified a FOD on the southern portion of Runway (RWY) 26L as aircraft OMA231 was on take-off roll and immediately reported to TWR ATCO.

3.2.14 OTSB investigation team was provided with 6 CCTV surveillance camera footage however due to the distance from the incident it was not clearly visible to see the wheels and the decapping as the cameras are positioned far from where the aircraft lifted off.

3.2.15 TWR ATCO relayed all the communication from both Oman Airports Airfield Officer and the flight crew of OMA231 to both the APP ATCO and the flight crew of OMA815.

3.2.16 The tire manufacturer concluded that tire failure serious incident has been caused by an impact from a blunt FOD at a point in the centre crown area.

3.2.17 The tire manufacturer could not determine the root cause for the center tread rib loss.

3.2.18 The OTSB could not find evidence that support manufacturer's conclusion of blunt FOD, however based on the circumstances around the MCT aerodrome, reported tire damage as a results of FOD, it is probable that the FOD might have occurred at MCT aerodrome and the FOD was either not visible or detected during the runway inspection conducted prior to the incident flight.

3.2.19 OTSB further find that it is probable that the FOD could have occurred at previous aerodrome prior to the aircraft arriving at OOMS and the damage was either not visible or not detected during routine pre-flight maintenance inspection.

3.2.20 The number 1 mainwheel tire was installed on aircraft registration A40-ME as new on 17th July 2022 and removed on 7th September 2022 due to a leak at 160 cycles since new.

3.2.21 The number 1 mainwheel tire had been retreated once prior to the serious incident and was certified serviceable on 16th December 2024.

3.2.22 The number 1 mainwheel tire was installed on the aircraft registration A4O-ML on 13th March 2025 at 160 cycles. The serious incident happened on 31st May 2025 and the tire had a total of 396 cycles since new.

3.2.23 The number 1 mainwheel tire had been in service for 88 days and 236 cycles since it was fitted on the aircraft prior to the serious incident.

3.2.24 When the number 1 mainwheel debris went into the wheel well, the rotating peeled portion of the center tread damaged components and severed hydraulic tubes for hydraulic system A, consequently, the aircraft lost its hydraulic quantity and system pressure A.

3.2.25 The number 1 mainwheel tire tread pieces and debris were recovered following the serious incident.

3.2.26 The damaged number 1 mainwheel tire remained inflated following the decapped and was deflated after the advice by the manufacturer before packaging.

3.2.27 The operator maintains a B737 MAX daily line maintenance checklist was completed daily check, conducted within 48 elapsed clock hours before the serious incident.

3.3.28 The maintenance checklist includes tire pressure checks classified or categorized as either cold tire pressure checks, performed after more than 2 hours of cooling time, or hot tire pressure checks, performed within less than 2 hours of cooling.

3.2.29 The tire pressure readings taken prior to the serious incident flight were recorded in the aircraft technical logbook.

3.2.30 The tire pressure readings of the serious incident were also recorded as 227 PSI in the FDM on 31st May 2025 at the Time 05:16:25.

3.2.31 The tire pressure readings of the damaged tire was checked post the incident and found to be 201 PSI within the limit.

3.2.32 The aircraft landed from Riyadh International Airport at the time 03:05 UTC and the serious incident happened at 05:22:00. The aircraft had spent 2 hours and 17 minutes on the ground before the serious incident flight.

3.2.33 The weather temperature on the FDM was 38°C on the day and time of the serious incident.

3.2.34 The temperature from FDR was 39°C which is 3°C less than the one provided by DGMET.

3.2.35 The weather temperature provided by the DGMET was 42°C on the day and time of the serious incident.

3.3 Cause:

3.3.1 The OTSB investigation team, determined that the cause of the serious incident was as a result of the number 1 mainwheel tire decap during take-off roll, and tire debris causing damage to the upper access panel and severing hydraulic tubes resulting in multiple hydraulic system failures and subsequently the flight crew decided to do air turn back and landed the aircraft safely.

3.4 Contributing Factors:

3.4.1 Blunt FOD and the origin of FOD could not be determined.

3.4.2 Severed hydraulic tubes of hydraulic system A resulting in loss of hydraulic pressure.

4. SAFETY RECOMMENDATIONS:

4.1 General:

The safety recommendations listed in this report are proposed according to paragraph 6.8 of Annex 13 to the Convention on International Civil Aviation and are based on the conclusions listed in heading 3 of this report. The OTSB expects that all safety issues identified by the investigation are addressed to the receiving States and organizations/entities.

4.2 Safety Recommendations:

4.2.1 Operator-Oman Air:

4.2.1.1 The manufacturer's examination and analysis report suspected blunt FOD that caused the damage to the main wheel tire, the runway inspection conducted by OA prior to the incident flight revealed that there was no FOD on the RWY as well as during the pre-flight inspection (No FOD was found embedded in the aircraft tires at the time of the pre-flight inspection) prior to the aircraft OMA815 taking-off. Therefore, is probable that the FOD could have occurred at previous aerodrome prior to the aircraft arriving at OOMS, and during routine tire inspection, the damage was either not visible or not detected before the incident flight.

4.2.1.1.1 Therefore, it is recommended that the operator should use the serious incident to bring awareness to maintenance engineers and reinforcing human-factors awareness to reduce the risk of missed tire damage during routine maintenance checks.

Safety Actions taken by Oman Air following the serious incident:
Oman Air issued a Safety Bulletin (WY/ES/SB/2025/03) to all engineering personnel (Including outside Oman stations) requesting them to be cautious while performing inspection tasks, raise any concerns or difficulties encountered and propose improvements to reduce incidents.

Oman Air issued a Safety Bulletin (WY/GS/SB/2025/03) – December 2025 to all engineering personnel requesting to be aware of and to report FOD at the aircraft stand likely falling onto the ramp during loading and offloading operations that can pose hazards that can damage aircraft, injure personnel and lead to costly delays.

4.2.2 **Oman Airports (OA):**

4.2.2.1Based on the circumstances around the MCT aerodrome, reported tire damages as a result of FOD, it is probable that the FOD might have occurred at MCT aerodrome and the FOD was either not visible or detected during the runway inspection conducted prior to the incident flight.

4.2.1.2.2 OTSB therefore recommend that Oman Airports MCT Aerodrome should consider more stringent methods including the use of advanced technology if deemed necessary for aerodrome (runway, taxi-way and ramp) FOD detection especially in areas that the FOD will not be easily visible or detected during runway inspections.

Safety Actions taken by Oman Airports following the serious incident:

Review and enhancement of FOD management plan by establishing additional FOD collectors and magnetic bars; FOD awareness walk every Thursday and FOD walk every quarter;

Introducing technology and system improvements such as aircraft movement tracking and Artificial Intelligence (AI) monitoring for apron staff performance;

Governance and control measures by establishing airside Committee (quarterly) and FOD management committee (MoC).

5. APPENDICES:

5.1 None.

This report is issued by:
Director of Oman Transport Safety Bureau (DOTSB)