



**Preliminary Report on the Serious Incident involving a Boeing 737-400 aircraft operated by Max Air Limited with nationality and registration marks 5N-MBD which occurred between Take-off at Yola Airport Adamawa State and on landing at Nnamdi Azikiwe International Airport, Abuja Nigeria on 7th May, 2023.**

<b>Registered owner:</b>	Max Air Limited
<b>Operator:</b>	Max Air Limited
<b>Aircraft type and model:</b>	Boeing 737-400
<b>Manufacturer:</b>	The Boeing Company, USA
<b>Year of manufacture:</b>	1997
<b>Nationality and registration marks:</b>	5N-MBD
<b>Serial number:</b>	28704
<b>Location:</b>	Nnamdi Azikiwe International Airport (DNAA), Runway 22 Coordinates: 09°000'25"N, 007°15'47"E.
<b>Date and Time:</b>	7th May, 2023 at about 14:57 h <i>(All times in this report are local time, equivalent to UTC+1 unless otherwise stated)</i>

## **INTRODUCTION**

Nigerian Safety Investigation Bureau (NSIB) was notified of the incident by the Nigeria Airspace Management Agency (NAMA) on 7th May, 2023. Investigators were dispatched to the incident site the same day and commenced post occurrence assessments, under the provisions of Civil Aviation (Investigation of Air Accidents and Incidents) Regulations 2019 and ICAO Annex 13.



The purpose of this preliminary report is to provide details of the initial facts gathered so far including discussions and findings surrounding the occurrence, information gathered from the witness accounts and a post occurrence inspection of the aircraft on the ramp.

**The investigation is ongoing.**



## **1.0 FACTUAL INFORMATION**

### **1.1 History of the flight**

On 7<sup>th</sup> May, 2023, a Boeing 737- 400 aircraft with nationality and registration marks 5N-MBD, operated by Max Air Limited was on a scheduled passenger operation involving six sectors from Malam Aminu Kano International Airport (DNKN). The first three sectors (Kano-Lagos, Lagos-Abuja, Abuja-Yola) were uneventful. The incident flight (Yola-Abuja) was the fourth sector of the day. 5N-MBD departed Kano for Lagos at 07:45 h and arrived Lagos at 09:15 h. The aircraft departed Lagos at 10:20 h and arrived Abuja at 11:35 h.

At 12:10 h 5N-MBD departed Nnamdi Azikiwe International Airport (DNAA) for Yola (DNYO) as NGL1648 and arrived Yola at 13:25 h.

On ground Yola, the Pilot carried out a post flight inspection of the aircraft and reported nothing was abnormal.

At 13:55 h NGL1649 requested for engine start to DNAA and it was granted.

At 14:05 h NGL1649 departed Yola from Runway 17 for Abuja, onboard were 150 persons inclusive of 6 crew and fuel endurance of 03 hours 30 minutes on an Instrument Flight Rules (IFR) flight plan. The Pilot was the Pilot Monitoring (PM) and the Co-Pilot was the Pilot Flying (PF).

According to the flight crew statement, after takeoff the landing gear was left extended for 3 minutes because of the high temperature on ground.

At 14:08 h, Nigerian Air Force personnel from the Air Force Hangar close to runway 35, reported to Yola Control Tower that an object appearing like a tyre fell off from the departing NGL1649. The DATCO promptly informed the Pilot of NGL1649 as well as Kano Area Control (ACC) and Abuja Tower.



According to cabin crew account, the flight purser (L1) and another cabin crew (L2) informed the Pilot that a passenger at seat row 24 informed them about seeing a wheel fall off from the airplane.

According to the Pilot, Yola tower said they would carry out runway inspection and report findings. The instruments and landing gear indications were normal.

At 14:18 h, NGL1649 reported contact with Kano ACC and was asked to continue with the ACC.

At 14:27 h, NGL1649 contacted Abuja Radar and was given clearance as "NGL1649 clear to ABC FL240 expect Radar vectoring ILS Approach Runway 22 QNH 1011 contact time 1327, report release by Kano". NGL1649 acknowledged.

At 14:51 h Yola ATC informed Abuja Tower about the earlier report and to inform NGL1649 that nothing was found on the ground.

At 14:52 h, NGL1649 contacted Abuja Tower and was cleared to continue approach and to report 4 miles.

At 14:53 h, Tower cleared NGL1649 to land with "Surface-wind calm runway 22".

According to the Pilot, the landing was normal but after the airplane started decelerating he noticed the wing port side was dropping lower than normal, he applied full aileron control to keep the wing from dropping until the lift decayed. Thrust reverser and minimal braking was used to stop the aircraft on the runway.

At 14:57 h, Abuja ATC informed NGL1649 "be advised, it appears you have smoke around your aircraft. We have called fire watch room."

The aircraft came to a stop between Link A5 and A6 about 2900 m from the threshold of runway 22. There was no injury to passengers and crew.

The incident occurred at 14:57 h in daylight Visual Meteorological Condition (VMC).

### 1.2 Injuries to persons

Injuries	Crew	Passengers	Total in the aircraft	Others
<b>Fatal</b>	Nil	Nil	Nil	Nil
<b>Serious</b>	Nil	Nil	Nil	Nil
<b>Minor</b>	Nil	Nil	Nil	Nil
<b>None</b>	6	144	150	Nil
<b>TOTAL</b>	6	144	150	Nil

### 1.3 Damage to aircraft

The aircraft was slightly damaged.



Figure 1: Boeing 737-400, 5N-MBD on the runway after the occurrence.



**Figure 2:** Damage to the No. 1 main landing gear wheels of 5N-MBD

#### **1.4 Other damage**



**Figure 3:** Debris of No. 2 main wheel tyre with No.2 wheel impact marks on the runway.



**Figure 4:** No. 1 Main brake assembly impact marks on the runway

## 1.5 Personnel information

### 1.5.1 Pilot

Nationality:	Nigerian
Age:	55
License type:	Airline Transport Pilot License (Aeroplane)
License validity:	Valid till 6 <sup>th</sup> July,2024
Aircraft ratings:	B737 300-900, F28, F100, BAC 1-11
Medical certificate:	Valid till 1 <sup>st</sup> March, 2024
Instrument rating:	Valid till 23 <sup>rd</sup> February, 2024
Proficiency check:	Valid till 23 <sup>rd</sup> August, 2023
Total flying time:	15000 h



5N-MBD

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Total on type:	8000 h
Total on type (PIC):	8000 h
Last 90 days:	150 h
Last 28 days:	43 h
Last 24 hours:	Nil

### 1.5.2 Co-Pilot

Nationality:	Nigerian
Age:	39
License type:	Commercial Pilot License (Aeroplane)
License validity:	Valid till 14 <sup>th</sup> January, 2025
Aircraft ratings:	B737/300/400/500
Medical certificate:	Valid till 10 <sup>th</sup> July, 2023
Instrument rating:	Valid till 15 <sup>th</sup> April, 2024
Proficiency check:	Valid till 15 <sup>th</sup> October, 2023
Total flying time:	1502 h
Total on type:	1056 h
Last 90 days:	130 h
Last 28 days:	72 h
Last 24 hours:	Nil





### 1.5.3 Engineer 1 (Head of Maintenance)

Nationality:	Nigerian
Age:	68
License type:	Aircraft Maintenance Engineer's License
License validity:	Valid till 16 <sup>th</sup> January, 2027
Aircraft type ratings:	B737-300/400/500, B747-400

### 1.5.4 Engineer 2 (Maintenance Engineer who performed replacement of No. 1 brake assembly on the 5<sup>th</sup>)

Nationality:	Nigerian
Age:	47
License type:	Aircraft Maintenance Engineer's License
License validity:	Valid till 7 <sup>th</sup> December, 2026
Aircraft type ratings:	B737CL, B747-400

The Engineer has been working as a mechanic/technician for 25 years. Attended Nigerian College of Aviation Technology (NCAT), Zaria for Technician Course and Air Force Institute of Technology (AFIT) for Initial License Preparatory Course (ILPC) and thereafter obtained NCAA Aircraft Maintenance Engineer's License (AMEL). He obtained B737 maintenance type certificate from aero contractors.

The Engineer resumed duty at about 13:00 h on the 5<sup>th</sup> May, 2023. 5N-MBD arrived DNKN and chocks on at 22:55 h. Maintenance entry on tech log No. 0037675 indicated No.1 brake



worn to limit and was replaced in accordance with Aircraft Maintenance Manual AMM 32-42-32 PG401. The work was tested satisfactory and signed at 23:16 h.

## **1.6 Aircraft information**

### **1.6.1 General information**

Type:	Boeing 737-400
Manufacturer:	The Boeing Company, USA
Year of manufacture:	1997
Serial number:	28704
Certificate of Airworthiness:	Valid till 18 <sup>th</sup> February, 2024
Certificate of insurance:	Valid till 20 <sup>th</sup> June, 2023
Certificate of registration:	Issued 27 <sup>th</sup> August, 2021
Total airframe time:	38480:51 h
Total Landing Cycles:	44192

On the 5<sup>th</sup> May, 2023 maintenance entry on tech log No. 0037675 indicated No.1 brake worn to limit and was replaced in accordance with Aircraft Maintenance Manual 32-42-32 PG401. The work was tested satisfactory and signed at 23:16 h.

The aircraft arrived Yola chocks on at 13:25 h and chocks off at 13:55 h for departure indicating a turnaround of 30 minutes.



On the 08<sup>th</sup> May, 2023 the search team at Yola airport discovered the object that fell off from the aircraft as the No. 1 main wheel assembly. It was located by the personnel of the Federal Airports Authority of Nigeria (FAAN) about 1000 m from threshold of runway 35.

### 1.6.2 Engines

<b>Engine</b>	<b>Number 1</b>	<b>Number 2</b>
Manufacturer	CFM International, USA	CFM International, USA
Type/Model	CFM 56-3C1	CFM 56-3B1
Serial number	727474	858470
Time Since New	52104:34	47369:15
Cycles Since New	32075	31985

Fuel Used: Jet A1

### 1.7 Meteorological information

<b>DNAA</b>	<b>1300Z</b>	<b>1400Z</b>	<b>1500Z</b>
Wind:	230/05	210/04	200/06
Visibility:	9999	9999	9999
Weather:	Nil	Nil	Nil
Cloud:	FEW014	SCT015	SCT015
Temp/Dew:	34/22	35/22	35/23



QNH:	1012	1011	1010
<b>DNYO</b>	<b>1300Z</b>	<b>1400Z</b>	<b>1500Z</b>
Wind:	270/04	360/06	030/08
Visibility:	9999	9999	9999
Weather:	Nil	Nil	Nil
Cloud:	SCT015	SCT015	SCT015
Temp/Dew:	39/20	40/20	40/18
QNH:	1010	1009	1008

### 1.8 Aids to navigation

The status of the navigational aids at Nnamdi Azikiwe International Airport on the day of the occurrence was as follows:

"ABC" VOR/DME	116.3 MHz	- 'Serviceable'
"IAB" ILS/DME	109.3 MHz	- 'Serviceable'
"IAC" ILS/DME	111.9 MHz	- 'Serviceable'
MSSI Wind Indicator		- 'Serviceable'
Aerodrome Beacon		- 'Serviceable'
Radar & FPL Monitor		- 'Serviceable'



ALDIS Lamp & AFL Display - 'Serviceable'

## 1.9 Communication

The status of the communication equipment at Nnamdi Azikiwe International Airport on the day of the occurrence was as follows:

VHF 118.6 Mhz Tower Primary Frequency - 'Serviceable'

VHF 118.6 MHZ Tower Secondary Frequency - 'Serviceable'

VHF 127.9 MHZ App/Radar Primary Frequency - 'Serviceable'

VHF 119.8 MHZ App/Radar Secondary Frequency - 'Serviceable'

VHF 121.9 MHZ Ground Frequency - 'Serviceable'

VHF 127.05 MHZ ATIS Frequency - 'Serviceable'

VHF 121.5 MHZ Emergency Frequency - 'Serviceable'

Frequentis Smartstrip Main & Backup - 'Serviceable'

Voicecom 1,2, & 3 - 'Serviceable'

Panasonic Table Phone & Techno Mobile - 'Serviceable'

There was effective communication between the Air Traffic Controllers at both Yola and Abuja airports with NGL1649.

The crew did not inform Abuja ATC of any abnormality about the flight.



### 1.10 Aerodrome information

The Nnamdi Azikiwe International Airport, Abuja (DNAA) has aerodrome reference points 09o00'25"N, 007o15'47"E and elevation 1123 ft with runway orientation 04/22. The runway has a length of 3610 m and a width of 60 m with asphalt/concrete surface and a blast pad of 65 m at both ends.

### 1.11 Flight recorders

The aircraft is fitted with Solid-State Flight Data Recorder (FDR) and Cockpit Voice Recorder (CVR) with the following particulars:

<b>Recorders</b>	<b>Flight Data Recorder</b>	<b>Cockpit Voice Recorder</b>
<b>Manufacturer</b>	Honeywell, USA	Honeywell, USA
<b>Model</b>	SSFDR	SSCVR
<b>Part Number</b>	980-4700 042	97896
<b>Serial Number</b>	1544	CVR 120-05667

The FDR and CVR were retrieved and downloaded at the Flight Safety Laboratory of Nigerian Safety Investigation Bureau (NSIB), Abuja, Nigeria. The CVR was found to be overwritten.

### 1.12 Wreckage and impact information

The aircraft landed on runway 22 and while on the landing roll, No. 2 main wheel tyre burst at about 2400 m and continued for another 100 m where No. 1 brake assembly and No. 2 wheel assembly surface contact was observed on the runway. The aircraft continued

veering off to the left of centerline and stopped at about 2900 m on the runway. There was evidence of severe fire damage on No. 2 main wheel assembly.



**Figure 5:** Debris of the No.2 main wheel tyre



**Figure 6:** Damaged No. 2 main wheel assembly





**Figure 7:** No.1 brake assembly with the roller bearings after the wheel fell off



### **1.13 Medical and pathological information**

Not applicable.

### **1.14 Fire**

There was evidence of fire on the No. 2 main wheel assembly.

### **1.15 Survival aspect**

Not applicable.

### **1.16 Test and Research**

### **1.17 Organization and management information**

#### **1.17.1 Max Air Limited**

Max Air Limited (Max Air), a registered airline with head office and main operational base located in Kano holds an Air Operator Certificate (AOC) with number: MAX/AOC/06-13/01 issued in accordance with the requirements of the existing Nigeria Civil Aviation Regulations (Nig. CARs). It is authorized to conduct passenger and cargo, scheduled operations and charter flight operations. The airline operates a fleet of Boeing 747, Boeing 737 aircraft and an EMB 135 Legacy.

##### **1.17.1.1 Max Air Limited Safety Management System (SMS)**

*Safety Management System (SMS).* —A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

Max Air SMS Manual is approved by NCAA in accordance with Sub-Section 9.3.1.2 of the Nig.CARs.



### **1.17.2 Nigerian Civil Aviation Authority**

NCAA is the government agency saddled with the regulation and oversight of aviation activities in Nigeria. The NCAA is established by the Nigerian Civil Aviation Act (2022) which enables the Director-General of NCAA to make regulations in aviation. The current regulations are as enshrined in the Nigeria Civil Aviation Regulations (Nig. CARs) 2015. Relevant sections of the Nig. CARs guide activities of personnel and service providers in the aviation industry. Oversight activities are achieved by continuous and periodic audits by inspectors of the NCAA.



## 2.0 INITIAL FINDINGS

1. The flight crew were licensed and qualified to conduct the flight.
2. The aircraft had a valid Certificate of Airworthiness.
3. At 12:10 h 5N-MBD departed Nnamdi Azikiwe International Airport (DNAA) for Yola (DNYO) as NGL1648 and arrived Yola at 13:25 h.
4. The aircraft was on ground Yola for about 30 minutes before the turn around for Abuja.
5. According to the flight crew, after takeoff the landing gear was left extended for 3 minutes to allow cooling due high temperature on ground Yola.
6. At 14:08 h, Nigerian Air Force personnel from the Air Force Hanger close to runway 35, reported to Yola Control Tower that an object appearing like a tyre fell off from the departing NGL1649.
7. Yola DATCO promptly informed the Pilot of NGL1649 as well as Kano Area Control (ACC) and Abuja Tower.
8. The flight purser (L1) and another cabin crew (L2) informed the Pilot that a passenger at seat row 24 informed them about seeing a wheel fall off from the airplane.
9. The Pilot mentioned that instruments and landing gear indications were normal.
10. At 14:51 h Yola ATC informed Abuja Tower and NGL1649 that nothing was found after the runway inspection.
11. According to the Pilot, the landing was normal but after the airplane started decelerating he noticed the port side wing was dropping lower than normal, he applied full aileron control to keep the wing from dropping until the lift decayed.
12. Thrust reverser and minimal braking was used to stop the aircraft on the runway.



13. At 14:57 h, Abuja ATC informed NGL1649 "be advised, it appears you have smoke around your aircraft. We have called fire watch room", the Aerodrome Rescue and Fire Fighting Services (ARFF) and emergency services were alerted.
14. The aircraft came to a stop between Link A5 and A6 about 2900 m from the threshold of runway 22.
15. The port wheel assembly was located by personnel of the Federal Airports Authority of Nigeria (FAAN) about 1000 m from threshold of Runway 35 Yola airport on 08th May, 2023.
16. The roller bearings on the wheel assembly of No. 1 main wheel had discoloration and was burnt out.
17. The CVR recording was found to be overwritten.
18. Max Air Limited stated that they were unaware of the NCAA All Operators Letter (AOL) (NCAA/FSG/AOL/19/03) in respect of continuous overwriting of Cockpit Voice Recorder (CVR) Information.
19. There was wrong tech log entry of the serial number of the incident aircraft.
20. The quality control department did not supervise the maintenance action of the brake unit and wheel change on 5N-MBD conducted on 5<sup>th</sup> May 2023.
21. The crew did not take adequate measures to confirm the information about the missing wheel assembly.
22. There was severe fire damage on the No. 2 main wheel assembly.
23. After the replacement of the wheel brake on the 5<sup>th</sup> May 2023, an aircraft mechanic crosschecked the work performed by the engineer.
24. The Yola ATC Voice Recording System (VRS) did not record any communication between the Pilot and the duty controller on the day of the occurrence.



## Immediate Safety Recommendations

1. Max Air Limited Quality Assurance should ensure maintenance activities are supervised and monitored in accordance with Maintenance Control Manual.
2. NCAA should;
  - (a) Conduct regular safety management system (SMS) assessments to evaluate the capability of Max Air limited to effectively manage safety.
  - (b) Ensure that the PMI and POI of Max Air Limited increase surveillance and oversight to ensure maintenance and flight operations are carried out in accordance with NCAA *Technical Guidance Material (TGM) Volume IV (Airworthiness Inspector's Handbook) Chapter 23 (Continuing Surveillance) and TGM Volume III Flight Operations Inspector's Handbook Chapter 30 (Continuing Surveillance)*.
3. Max Air Limited should ensure that flight crew display good situational awareness and airmanship at all times during conduct of flight operations in accordance with Max Air ops manual.
4. NCAA should invoke the relevant sections of Nig.CARs 2015 in accordance with IS 1.3.3 Legal Enforcement Actions to non-compliant operators with the AOL (NCAA/FSG/AOL/19/03) on continuous overwriting of Cockpit Voice Recorder (CVR) Information.
5. NCAA should ensure FAAN/NAMA provide uninterrupted power supply in order to avoid vulnerability of their operational equipment.

## Further Investigations

1. Inspection of the roller bearing and other accessories.
2. Retrieval of pertinent document from Max Air limited and other stakeholder.
3. Pertinent factors leading to drafting of the final report.