



GOVERNMENT OF INDIA

CIVIL AVIATION DEPARTMENT

**FINAL INVESTIGATION REPORT ON
INCIDENT OF FLIGHT WITH EXTENDED LANDING GEAR TO M/s AIR
INDIA, A-320 AIRCRAFT VT-EXE ON 22.07.2017 ENROUTE
KOLKATA -NAGPUR.**

O/o Dy. Director General of Civil Aviation (ER)

Air Safety Directorate, NSCBI Airport,

Kolkata – 700052

INDEX

Topic No.	Description	Page No.
	Title page	i
	Index	ii
	Fore word	iii
	List of Abbreviation used in the Report	iv
	Preliminary Information	1
	Synopsis	1
1.	Factual Information	2
1.1.	History of flight	2
1.2.	Injuries to persons	3
1.3.	Damage to aircraft	3
1.4.	Other damages	3
1.5.	Personnel information	4
1.6.	Aircraft information	6
1.7.	Meteorological information	9
1.8.	Aids to navigation	9
1.9.	Communication	9
1.10.	Aerodrome information	9
1.11.	Flight recorders	10
1.12.	Wreckage and impact information	11
1.13.	Medical and pathological information	11
1.14.	Fire.	11
1.15.	Survival aspects	11
1.16.	Test & research	11
1.17.	Organisational & management information	11
1.18.	Additional information	12
1.19.	Useful and effective investigation techniques	14
2.	Analysis	14
2.1	Maintenance aspects	14
2.2	Operational aspects	14
2.3	Circumstances leading to the incident.	15
3.	Conclusion	16
3.1	Findings	16
3.2	Probable cause of the incident	17
4.	Safety recommendations	17

FOREWORD

This document has been prepared based upon the evidences collected during the investigation and opinion obtained from the experts. The investigation has been carried out in accordance with Annex 13 to the convention on International Civil Aviation and under Rule 13(1) of the Aircraft (Investigation of Accidents and Incidents), Rules 2012.

The investigation is conducted not to apportion blame or to assess individual or collective responsibility. The sole objective is to draw lessons from this incident which may help to prevent such future incidents.

LIST OF ABBREVIATIONS USED IN THE REPORT

AP	Auto Pilot
AT	Auto Thrust
ATC	Air Traffic Control
ATPL	Airline Transport Pilot Licence
BARO	Barometric altitude
CAS	Calibrated/corrected air speed
CB	Cumulonimbus clouds
CVR	Cockpit Voice Recorder
DFDR	Digital flight data recorder
DME	Distance Measuring Equipment
DGCA	Directorate General of Civil Aviation
DP	Dew Point
DVOR	Doppler Very High Frequency Omni Range
ECAM	Electronic Centralized Aircraft Monitoring
FCOM	Flight Crew Operations Manual
FDTL	Flight and Duty Time Limitation
FMS	Flight Management System
FSR	Flight Safety Report
hPa	Hecto pascal (unit of atmospheric pressure)
ILS	Instrument Landing System
kt	Knots (unit of air speed)
L/G	Landing Gear
MCDU	Multifunction Control Display Unit
PDR	Pilot Defect Report
PF	Pilot Flying
PFR	Post Flight Maintenance Report
PIC	Pilot In-Command
PM	Pilot Monitoring
QRH	Quick Reference Handbook
RA	Rain
RH	Right Hand
SOP	Standard Operating Procedure
SSCVR	Solid State Cockpit Voice Recorder
SSFDR	Solid State Flight Data Recorder
UTC	Coordinated Universal Time
V _{LE}	Maximum Speed with the Landing Gear extended
V _{LO} extension	Maximum Speed at which the Landing Gear may be extended
V _{LO} retraction	Maximum Speed at which the Landing Gear may be retracted
VHF	Very High Frequency
VOR	Very High Frequency Omni Range

**FINAL INVESTIGATION REPORT ON
INCIDENT OF FLIGHT WITH EXTENDED LANDING GEAR TO M/s
AIR INDIA, A-320 AIRCRAFT VT-EXE ON 22.07.2017 ENROUTE
KOLKATA -NAGPUR.**

1.	Aircraft	Type	Airbus-A-320-214
		Nationality	Indian
		Registration	VT-EXE
2.	Owner		CALC-20 Aircraft Limited,
	Operator		Air India Ltd.
3.	Pilot-in-Command		ATPL Holder
	Extent of Injuries		Nil
4.	First Officer		CPL Holder
	Extent of Injuries		Nil
5.	Date & Time of Incident		22.07.2017; 0433 UTC
6.	Place of Incident		Enroute Kolkata-Nagpur
7.	Last point of departure		Kolkata Airport
8.	Intended place of landing		Mumbai Airport
9.	No. of Passengers		99
	Extent of Injuries		Nil
10.	Type of Operation		Scheduled Air Transport
11.	Phase of Operation		Cruise
12.	Type of Incident		Fuel , Other

(All timings in the report are in UTC unless or otherwise specified)

Synopsis:-

M/s. Air India Airbus A-320 aircraft VT-EXE, flight no. AIC-676 (Kolkata to Mumbai) of 22.07.2017 departed from Kolkata at 0433 UTC. There were 99 passengers, 02 flight crew and 05 cabin crew on board the aircraft. It was raining during departure. The aircraft was climbing

very slowly and climbed FL 240. After an hour in to flight, the flight crew noticed that the onboard fuel was insufficient for reaching Mumbai. The flight crew then diverted the aircraft to Nagpur. During approach to Nagpur and preparing the aircraft for landing, the flight crew realized that the aircraft was flying with its landing gears extended. The aircraft landed safely at Nagpur. There was no injury to any passenger or crew member. On ground, the aircraft was inspected for fuel leak. There was no fuel leak. The aircraft was then refuelled and released for onward flight to Mumbai. The aircraft landed safely at Mumbai.

As per the DGCA, India, vide Order No.AV 15024/19/2017-AS dated 10.08.2017 the occurrence was investigated under Rule 13 (1) of Aircraft (Investigation of Accidents and Incidents), Rules 2012 by an Inquiry Officer. The incident of ‘flight with extended landing gear’ occurred due non-adherence to ‘standard operating procedure’ on the part of both the flight crew after take-off.

1. Factual Information

1.1. History of flight:

1.1.1. M/s. Air India Airbus A-320 aircraft VT-EXE, was scheduled to operate flight no. AIC-676 (Kolkata-Mumbai) on 22.07.2017. The aircraft had previously operated flight no. AIC-675 (Mumbai - Kolkata) of 22.07.2017. The same set of flight crew was to fly the return flight AIC-676. Transit check on the aircraft was carried out by an approved AME and the aircraft was accepted by pilot. Fuel on-board before departure was 10.8 tons. It was raining in Kolkata at the time of departure. There were 99 passengers, 02 flight crew and 05 cabin crew on board the aircraft.

1.1.2. The aircraft took-off from Kolkata at 0433 UTC. The flight crew carried out the mandatory “after take-off checklist” and continued to destination. The flight crew deviated from the flight path to avoid weather, with due approval of the Kolkata ATC. The ‘engine anti-ice’ and ‘wing anti-ice’ system were switched ON due flight through icing conditions.

1.1.3. The flight crew was unable to achieve climb to the planned altitude enroute and also the planned speed. The flight crew then re-programmed the flight plan in to FMS to solve the

problem, but it remained unsolved. Then the flight crew had turned OFF the anti-ice system in anticipation to improve the climb performance and speed, however this did not improve the performance. The flight crew did not receive any warning or caution messages from the Electronic Centralised Aircraft Monitoring (ECAM) system.

1.1.4. After an hour into the flight, the flight crew observed that the fuel quantity remaining on arrival at destination was below the planned fuel, which would result in insufficient fuel at destination. The flight crew then decided to divert. Bhubaneswar was the planned alternate airport for diversion. As it was raining in Bhubaneswar as well as in Kolkata; the flight crew decided to divert to Nagpur. The flight crew requested Kolkata ATC to inform Nagpur ATC about their diversion to Nagpur.

1.1.5. The aircraft arrived over Nagpur. The flight crew began to carry out ‘approach’ check list. While configuring the aircraft during the approach checks, the flight crew realized that landing gears were in extended position and were not retracted after take-off from Kolkata. The aircraft landed safely at Nagpur at 0631 UTC. The flight crew reported in PDR that the reason for diversion was insufficient fuel. The AME carried out inspection for fuel leak. There was no fuel leak and no abnormality detected in the aircraft. The aircraft was refuelled and released for onward flight to Mumbai. The aircraft landed safely at Mumbai airport.

1.2 Injuries to persons:

Injuries	Crew	Passengers	Others
Fatal	Nil	Nil	Nil
Serious	Nil	Nil	Nil
Minor/None	Nil/07	Nil/99	

1.3 Damage to aircraft:

There was no damages to the aircraft.

1.4 Other damages:

Nil

1.5 Personnel information:

The details of the licences and ratings of flight crew are as given below:-

1.5.1. Pilot- in-Command:

Age	34 yrs , Female
Type of licence	ATPL holder
Date of Issue	04/07/2011
Valid upto	03/07/2020
Category	Aeroplane
Aircraft Ratings	A319/A320/A321 – PIC
Date of Endorsement as PIC	26/08/2015
Date of last Annual Medical Exam	03/08/2016
Medical Exam validity	14/08/2017
FRTTO Licence issued on	06/11/2006
FRTTO Licence valid up to	05/11/2021
Instrument Rating	26/04/2017
Flying Hours Experience	5991:03 hrs
Total flying experience in last 180 days	434:35 hrs
Total flying experience in last 30 days	93:49 hrs
Total flying experience in last 7 days	30:16 hrs
Total flying experience in last 24 hrs.	07:18 hrs

The PIC underwent Pre-flight Medical Examination in the morning of 22.07.2017 in Mumbai.

1.5.2. First Officer:

Age	28 yrs, Female
Type of licence	CPL holder
Date of Issue	26/03/2013
Valid upto	25/03/2018
Category	Aeroplane
Aircraft Ratings	A319/A320/A321 –Co-Pilot
Date of Endorsement as Co-Pilot	29.10.2015 (A-320) 22.11.2016 (A-319/A-321)
Date of last Annual Medical Exam	10/01/2017
Medical Exam validity	18/01/2018
FRTTO Licence valid up to	25/03/2018
Instrument Rating	14/10/2016
Flying Hours Experience on Type	446:52 hrs
Total flying experience in last 180 days	341:30 hrs
Total flying experience in last 30 days	55:10 hrs
Total flying experience in last 7 days	14:29 hrs
Total flying experience in last 24 hrs.	07:18 hrs

The first officer underwent Pre-flight Medical Examination in the morning of 22.07.2017 in Mumbai.

1.6 Aircraft information:

1.6.1. Aircraft Information:

AIRCRAFT:- VT-EXE	
Manufacturer	AIRBUS, France
Type	A320-214
Owner	CALC-20 AIRCRAFT LIMITED, 3 rd Floor, Europa House, Harcourt Centre, Harcourt Street,Dublin 2, Ireland.
Operator	M/s Air India Ltd.
Manufacturer Serial no.	6803
Year of Manufacture	2015
Certificate of Airworthiness	No. 6729; Date of Issue: 04.11.2015.
Airworthiness Review Certificate	Date of Issue: 31.10.2016 Date of Validity: 04.11.2017
Category	Normal
Certificate of Registration and validity	4619/2 ; Valid till 27.10.2027
Minimum Crew Required	2
Maximum All Up weight	77,000 KG
Last Major inspection	'1A' CHECK 10.07.2017
Last inspection	LAYOVER INSPECTION: 20.07.2017
Airframe Hrs since new	6625.55 HOURS / 3239 CYCLES
Airframe hours since last C of A	2552.27 HOURS/1383 CYCLES
Status of Airworthiness Directive, Service Bulletins, DGCA Mandatory Modifications	All Complied.

1.6.2: Engine Information:

<u>Engine:-</u>	<u>LH</u>	<u>RH</u>
Manufacturer	CFM	CFM
Type	CFM-56	CFM-56
Engine Serial no.	S/N 573106	S/N 573108
Time Since New	6633.35/3249	6331.27/3106
TSO	Nil	Nil
Last Major Inspection Carried out	'1A' CHECK 10.07.2017	
Last inspection Carried out	LAYOVER INSPECTION: 20.07.2017	
Average Fuel consumption(last 6 months)	902.38 KG/HR	902.38 KG/HR
Average Oil consumption (last 6 months)	0.104 QT/HR	0.104 QT/HR

1.6.3 SOP/ After Take-off Checklist:-

WHEN POSITIVE CLIMB is achieved:

POSITIVE CLIMB ANNOUNCE
 L/G UP ORDER (by PF)
 L/G SELECT UP (by PM)
 AP AS RQRD

1.6.4. QRH Checklist:-

The QRH checklist as re-produced below indicates the task sharing and responsibilities of the Pilot Flying (PF) and Pilot Monitoring (PM).

TAKEOFF	
PF	PM
TAKEOFF.....ANNOUNCE	
BRAKES.....RELEASE	
THRUST LEVERS..... FLX or TOGA	CHRONO..... START
The Captain places hand on thrust levers until V1	
DIRECTIONAL CONTROL.....USE RUDDER	
FMA.....ANNOUNCE	PFD/ND..... MONITOR
•BELOW 80 kt:	N1 (EPR)..... CHECK
	THRUST SET..... ANNOUNCE
	PFD and ENG indications..... MONITOR
•AT 100 kt:	ONE HUNDRED KNOTS.....ANNOUNCE
100 kt..... CHECK	
•AT V1:	V1..... ANNOUNCE
•AT VR:	ROTATION..... ORDER
ROTATION..... PERFORM	
•WHEN POSITIVE CLIMB:	POSITIVE CLIMB..... ANNOUNCE
L/G UP..... ORDER	L/G.....SELECT UP
AP..... AS RQRD	
•AT THR RED ALT:	
THRUST LEVERS..... CL	PACK 1+2 (if applicable)..... ON
•AT F SPEED:	
FLAPS 1..... ORDER	FLAPS 1..... SELECT

PF	PM
•AT S SPEED:	
FLAPS 0.....ORDER	FLAPS 0..... SELECT
	GND SPLRS.....DISARM
	EXTERIOR LIGHTS..... SET

AFTER TAKEOFF

PF	PM
	APU BLEED pb-sw.....AS RQRD
	APU MASTER SW..... AS RQRD
	ENG MODE selector..... AS RQRD
	TCAS Mode selector TA/RA
	ANTI ICE pb-sw..... AS RQRD
AFTER TAKEOFF / CLIMB C/L down to the line.....COMPLETE	AFTER TAKEOFF / CLIMB C/L down to the line..... COMPLETE

1.6.5. SOP/ Maximum operating speed:-

MAXIMUM OPERATING SPEED VMO/MMO

Ident.: LIM-AG-SPD-00019991.0002001 / 17 MAR 17

Applicable to: MSN 2593-8056

VMO..... 350 kt
MMO..... M 0.82

MAXIMUM SPEEDS WITH THE LANDING GEAR EXTENDED

Ident.: LIM-AG-SPD-00001901.0001001 / 17 MAR 17

Applicable to: ALL

Maximum speed with the landing gear extended (VLE).....280 kt /M 0.67
Maximum speed at which the landing gear may be extended (VLO extension) 250 kt /M 0.60
Maximum speed at which the landing gear may be retracted (VLO retraction) 220 kt /M 0.54

1.6.6. Post-Flight maintenance report (PFR):-

No faults/warning related to the landing gear system was registered/recorded in the PFR.

1.6.7. Pilot Defect Report (PDR):-

The flight crew did not inform AME at Nagpur that the aircraft was flown with landing gears extended from Kolkata to Nagpur.

1.6.8. Centre of Gravity: There were only 99 passengers against the capacity of 180 seats on board the aircraft. The crew members consisted of 02 flight crew and 05 cabin crew. The aircraft was not over loaded. The centre of gravity was within limits.

1.6.9. Fuel: The aircraft used aviation turbine fuel with specification Jet A-1. There was approx 3.2 tons of fuel on board while landing at Nagpur.

1.7 Meteorological information:

WIND 280/05, Visibility 1500m RA, Temp/DP 26/26, QNH 1001

ADD INFO: SCT008 012 FEWCB025, OVC 080 CB.

It was raining at the time of departure from Kolkata. Clouds were present scattered at 800 feet and 1200 feet. Few CB clouds were present at 2500 feet. The sky was overcast with CB clouds at 8000 feet. Wind was calm and visibility was 1500 meters.

1.8. Aids to navigation:

Kolkata aerodrome is equipped with navigational aids like DVOR, DME and ILS. All aids to navigation were serviceable. Onboard navigational equipment were also serviceable. No un-serviceability was reported. Navigational aids at Nagpur airport were also serviceable.

1.9. Communication:

The aircraft is equipped with VHF communication equipment. Kolkata ATC is also equipped with VHF communication facility. Two way VHF radio communications was available between aircraft and Kolkata ATC and that between the aircraft and Nagpur ATC. Neither the flight crew nor the ATC unit reported any un-serviceability or difficulty in VHF communication.

1.10 Aerodrome information:

Aerodrome information is not relevant.

1.11. Flight recorders:

1.11.1. CVR:

The aircraft was installed with a Solid State Cockpit Voice Recorder. However the recordings of the unit could not be retrieved; as the aircraft continued to operate to Mumbai after landing at Nagpur without removal of the unit.

1.11.2 DFDR:-

The aircraft was installed with a Solid State Flight Data Recorder. The recording of the unit was retrieved and salient points are as interpreted below:-

- 1.11.2.1. The take-off was performed by the PIC, who was the pilot flying (PF) for the sector. This is evident from the inputs being recorded from the PIC Side stick.
- 1.11.2.2. The aircraft took-off from Kolkata at 04:33:02 UTC. Speed (CAS) at take-off was 158.4 kt.
- 1.11.2.3. The Landing Gear lever was not selected to “UP” position after achieving a positive climb upon lift-off from Kolkata.
- 1.11.2.4. The take-off was carried out with Flaps in “config 2”.
- 1.11.2.5. The aircraft climbed transition altitude of 5500 feet at 04:36:27 UTC.
- 1.11.2.6. The aircraft reached a maximum altitude of 24352ft at 05:32:13 UTC in the occurrence sector (Kolkata- Nagpur).
- 1.11.2.7. The maximum speed reached/achieved during flight in sector Kolkata- Nagpur was 232.9 kt (CAS) at 06:19:19 UTC and at 7520 ft (Baro alt), i.e during descent to Nagpur.
- 1.11.2.8. The Engine Anti-ice remained switched OFF for the entire duration of the flight in the occurrence sector.

1.11.2.9. The wing anti-ice was selected ON thrice in the sector of occurrence.

1.11.2.10. The aircraft landed at Nagpur at 0631 UTC. Total fuel consumed by Engine No.1 was 3842 kg and the total fuel consumed by Engine No. 2 was 3802 kg. i.e Total fuel consumed at the time of landing was 7644 kg.

1.12. Wreckage and impact information:

There was no impact and no wreckage.

1.13. Medical and pathological information:

This information is not applicable.

1.14. Fire:

There was no fire or smoke during or following the incident.

1.15. Survival aspects:

The incident was survivable.

1.16. Tests and research:

The occurrence was referred to the aircraft manufacturer (i.e M/s Airbus) for their comments on warnings/indications to the cockpit crew w.r.t landing gear not being retracted in-flight. In their reply, Airbus highlighted the already established FCOM and QRH procedures, which are the basic recommendations to be complied for normal and safe operations. Airbus also added that: ECAM warnings related to Landing Gear do not include the case where the landing gear is still down without abnormal failures. Nevertheless the aural warning “OVER SPEED” will trigger whenever V_{LE} is reached.

1.17. Organizational & Management Information : (M/s AIR INDIA)

M/s Air India is public sector Aviation Company of the Government of India. It has a mix fleet of 136 aircraft that include Boeing 747s, Boeing-777s, Boeing-737s, and Airbus variants A-319/320/321. It has two subsidiaries; M/s Air India Express and M/s Alliance Air. M/s Air India, including its subsidiaries, operates fixed wing aircraft only. M/s Air India operates in domestic as well as in international sectors. Its corporate office is in Delhi. It has operational

bases at Delhi, Mumbai, and Kolkata & Chennai. A-320 aircraft are based at Delhi for operational and maintenance control.

1.18. Additional information:

1.18.1 Information from Statement of Pilot in Command (Pilot Flying):

1.18.1.1 Soon after take-off, 'positive climb' call was given by the first officer (Pilot Monitoring).

Then pilot-in-command (pilot flying) ordered 'landing gear up'. The first officer took her hands to landing gear lever but it was not 'selected up' for retraction.

1.18.1.2. The pilot-in-command did not verify when the first officer (PM) carried out the 'After Take-Off Check list'.

1.18.1.3. The pilot- in-command said that at an earlier occasion she was involved in an incident of multiple stall warnings in severe weather conditions. So she was careful this time and exercised more caution while in weather. She kept looking at temperature to make sure that as soon as it was below 10° C and in moisture, she would put wing and engine anti ice ON; and sometimes even before seeing actual icing.

1.18.1.4. The aircraft was out of bad weather when it was 100 NM approx. away from Kolkata.

1.18.1.5. The pilot-in-command did not write in the PDR at Nagpur that the aircraft was flown with landing gear down.

1.18.1.6. The pilot-in-command did not hear any undue sound or noise in flight with landing gear down.

1.18.1.7. Due bad weather after take-off, the mind of pilot- in- command was occupied and she was suggesting different headings to the first officer for conveying to ATC for clearance.

1.18.1.8. The pilot-in-command mentioned that the incident probably would have been averted had she cross-checked the 'After Take-off' check list by actually looking at parameters.

The MCDU was showing 'descent' phase of the aircraft. She went through all system pages but did not find any red flag. During flight the 'three greens' light indication in cockpit for landing gear 'down' appeared normal to her and did not alert her.

1.18.2 Statement of First Officer (Pilot Monitoring):-

1.18.2.1. Positive climb call was given by the first officer. The Pilot-in Command (Pilot Flying) called out 'Gear UP'. The first officer had her hands on landing gear lever to select it up, but eventually that was not done.

1.18.2.2. In 'After Take-Off' check list which is also a 'challenge and response procedure', the same thing went unnoticed.

1.18.2.3. After Take-off/Climb' checklist has four items:

- LDG GEAR.....UP
- FLAPS.....RETRACTED
- PACKS.....ON
- BARO REF.....SET (BOTH)

The first officer checked only 'BARO' and did not check other three items.

1.18.2.4. During approach at Nagpur, at 1000 feet 'NOT STABILISED' call was given by first officer (PM). But at 500 feet 'NOT STABILISED, GO AROUND' call was not given by the first officer. She said that it might be due to her preoccupation of her mistake of not retracting the landing gear.

1.18.3. Transition altitude at Kolkata:

At Kolkata, for QNH values less than 993 hPa, the transition altitude is 6000 feet.

For QNH values ranging from 993 hPa to 1013 hPa, the transition altitude is 5500 feet.

For QNH values 1014 hPa, the transition altitude is 5000 feet.

Therefore, for the subject flight with NH value 1001 hPa, the transition altitude was 5500 feet.

1.18.4. Input from M/s Airbus Customer Service:

ECAM warnings related to landing gear do not include the case where the landing gear is still in the down position, without abnormal failures. Nevertheless the aural warning 'OVER SPEED'

will trigger whenever V_{LE} is exceeded. As the speed remained below V_{LE} , there was no aural warning also.

1.19. Useful or effective investigation techniques:-

Nil.

2. Analysis:-

2.1. Maintenance aspects: The Certificate of Airworthiness and Airworthiness Review Certificates were valid on the day of occurrence. The aircraft was airworthy. Last major inspection, '1A check' on the aircraft was carried out on 10.07.2017. Layover check was carried out on 20.07.2017. All airworthiness directives, service bulletins and DGCA mandatory modification were complied. There was no snag prior to the flight. There were no ECAM warnings during the flight. The aircraft climbed above FL 240 but remained below FL 250 with its landing gear in extended position. The aircraft speed did not exceed 280 kts with landing gear extended. This shows that the system logic was working fine. The aircraft was serviceable. Maintenance aspect was not a contributory factor to the incident.

2.2 Operational aspects:-

The licences of flight crew were valid. The flight crew were appropriately qualified. They had undergone pre-flight medical check at Mumbai. It was negative and they were allowed to operate the flight. The FDTL was within limit. For this sector, pilot-in-command was the pilot flying (PF) and the first officer was the pilot monitoring (PM). The task sharing is such that PF will fly and navigate and the PM will monitor and communicate. Apart from this, the QRH checklist clearly distributes the cockpit checklist procedures between PF and PM. Soon after take-off from Kolkata, on achieving 'positive climb' the pilot-in-command ordered for selecting landing gear up. It was the task of the first officer to select the landing gear up. But she did not do so. It was an omission on the part of the first officer. Further, the first officer checked only one item 'BARO' in the 'After Take-off' checklist and did not check the rest three items which included retracting of 'landing gear'. This was again another omission on the part of the first officer. The pilot-in-command mentioned that the incident probably could have been averted had she cross-checked the 'After Take-off' check list by actually looking at parameters. It was her duty to cross-check or verify following a 'challenge and response' procedure. But the pilot-in-command did not verify

when the first officer was carrying out the 'After Take-Off Check list'. This was an omission on the part of the pilot-in-command. During approach at Nagpur when the aircraft was at 500 feet and not stabilized, the first officer did not give a call 'NOT STABILIZED, GO AROUND. This was also an omission on the part of the first officer. But this did not contribute to the incident. Thus, it is clear that the landing gear was not retracted because both the flight crew did not carry out the 'After Take-off' checklist following a 'challenge and response' procedure. There were series of omissions by both the flight crew. After landing at Nagpur, the fact that the aircraft had flown with landing gear down was not mentioned in 'Pilot Defect Report'. It was a significant occurrence. A mention of the same in PDR was necessary for structural inspection. It appears that there was an attempt on the part of the pilot-in-command to hide the occurrence. Hiding such significant occurrence could be hazardous to operational safety of aircraft. Maximum speed limit with the landing gear extended (V_{LE}) is 280 kt. The maximum speed reached during the flight was 232.9 kt. The speed limit was not exceeded. There is no mention of altitude restriction with regard to landing gear in extended position. The landing gear remained extended in flight from Kolkata to Nagpur and there was continuous 'three greens' indication in cockpit. But it did not occur to the flight crew that 'three greens' indication should not be there in a flight during cruise. Both the flight crew did not adhere to 'standard operating procedure' after take-off from Kolkata. They did not carry out the 'After Take-off check list' following 'challenge and response' procedure properly. It was a causal factor to the incident.

2.3. Circumstances leading to the incident: After take-from Kolkata, the aircraft achieved positive climb. The pilot-in-command ordered for retracting 'landing gear up'. The first officer did not retract the landing gear. Again during carrying out 'After Take-Off' checklist, the first officer checked only 'BARO' and did not check rest of the three items in the checklist viz.

- i) LANDING GEAR.....UP;
- ii) FLAPS.....RETRACTED;
- iii) PACKS.....ON.

The pilot-in-command did not verify the 'After Take-off' checklist carried out by the first officer. Thus, the landing gear remained extended throughout the flight from Kolkata to Nagpur. Although, in the later part of the flight the flight crew tried to find out the reason as to why the aircraft was not climbing. But they could not find out because there was no warning in the cockpit

related to flight with landing gear in extended position. ECAM warnings related to landing gear do not include the case where the landing gear is in the extended position, without abnormal failures. Nevertheless the aural warning ‘OVER SPEED’ would trigger whenever V_{LE} is exceeded. As the speed remained below V_{LE} , there was no aural warning also. The ‘challenge and response procedure’ for carrying out ‘After Tak-off’ check list was not followed properly. Thus the incident occurred due non adherence to ‘standard operating procedure’ on the part of both the flight crew after take-off from Kolkata.

3. Conclusion

3.1 Findings:

3.1.1. The aircraft was airworthy and serviceable. There was no snag in the aircraft prior to the departure. Also there was no snag or warnings during the flight from Kolkata to Nagpur.

3.1.2. The aircraft was not over loaded.

3.1.3. The licences of the flight crew were valid and the flight crew was appropriately qualified.

3.1.4. The FDTL was within limit.

3.1.5. The flight crew had undergone pre-flight medical check at Mumbai.

3.1.6. After achieving positive climb, the first officer did not retract the landing gear after being ordered by pilot-in-command. It was an omission. The first officer did not adhere to standard operating procedure. It was a causal factor to the incident.

- 3.1.7. During carrying out ‘After Take-Off’ checklist, the first officer checked only ‘BARO’ and did not check other three items in the checklist. It was another omission. The first officer was again found not adhering to standard operating procedure. It was a causal factor to the incident.

3.1.8. The pilot-in-command did not verify when the first officer carried out the ‘After Take-Off Check list’. Challenge and response procedure for carrying out check list was not followed. The pilot-in-command did not adhere to standard operating procedure. It was a causal factor to the incident.

3.1.9. During approach at Nagpur, when the aircraft was at 500 feet and not stabilized, the first officer did not give a call 'NOT STABILIZED, GO AROUND. This was also an omission but this did not contribute to the incident of flight with landing gear extended.

3.1.10. The fact that the aircraft was flown with landing gear extended, was not mentioned in 'Pilot Defect Report' by the pilot-in-command. There was an attempt on the part of the pilot –in-command to hide a significant occurrence. Hiding significant occurrence from Aircraft Maintenance Engineer could be hazardous to safety of aircraft operations.

3.2. Probable cause of the incident:

The incident of 'flight with extended landing gear' occurred due non-adherence to 'standard operating procedure' on the part of both the flight crew after take-off.

4. Safety Recommendations:-

Action as deem fit may be taken by the competent authority in view of findings no. 3.1.6, 3.1.7, 3.1.8, & 3.1.10.

Place: Kolkata
Date: 15.07.2020.



(H.N Mishra)
Dy. Director Air Safety
(Inquiry Officer)