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Report on Ground Collision Incident to M/s Air India Boeing 787-8 Aircraft VT-ANE at Stockholm Airport on 28/11/2018

O/o Director Air Safety(NR),
Safdarjung Airport,
New Delhi-03

Foreword

This document has been prepared based upon the evidences collected during the investigation, opinion obtained from the experts etc. The investigation has been carried out in accordance with Annex. 13 to the Convention on International Civil Aviation and under the Rule 13(1) of Aircraft (Investigation of Accidents and Incidents) Rules 2017. 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 accidents or incidents.

Contents

Investigation Report on Ground Collision Incident to M/s Air India B 787-8 Aircraft VT-ANE at Stockholm Airport on 28/11/2018

1. Aircraft Type	:	Boeing 787-8
Nationality	:	Indian
Registration	:	VT-ANE
2. Owner &Operator	:	Air India Limited
3. Pilot – in –Command	:	ALTP Holder
Extent of injuries	:	Nil
4. First Office	:	ALTP Holder
Extent of injuries	:	Nil
5. Place of Incident	:	Arlanda Airport, Stockholm (ARN) ESSA
Coordinates of Site	:	N5939.2: E017 56.3
6. Date& Time of Incident	:	28/11/2018, 17:45 Hrs. LTC 1645 UTC
7. Last point of Departure	:	IGI Airport, Delhi (DEL) VIDP
8. Point of intended landing	:	Arlanda Airport, Stockholm (ARN) ESSA
9. Type of operation	:	Schedule Operation
10. Crew on Board	:	02+08
Extent of injuries	:	Nil
11.Passengers on Board	:	175
Extent of injuries	:	Nil
12. Phase of operation	:	During taxiing in to stand after landing
13. Type of incident	:	Ground Collision
15. Elevation	:	102 ft.

(All timings are in UTC unless otherwise specified)

Synopsis:

On 28.11.2018, M/s Air India B787-800 aircraft while operating a scheduled flight AI-167 (Delhi to Stockholm Arlanda (ARN)) was involved in a ground collision incident near stand number F28L at 16:45 UTC (post sunset) at Stockholm Arlanda (ARN) airport. There were 175 passengers, 08 cabin crew and two pilots on board the aircraft. There was no injury to any person on board. Aircraft was cleared for stand F28R, however, aircraft followed F28L taxi line. After moving forward in the taxi lane of stand F28L, aircraft was brought to a halt and clarification was taken from ATC, which reiterated the last clearance. Thereafter, after communication with the ATC which advised the crew to maneuver the aircraft with caution if possible, an attempt was made to realign the aircraft with F28R. In the process, the outboard portion of left wing of the aircraft impacted the building in the vicinity of the parking stand F28L. The aircraft was stopped immediately and the passengers deplaned normally after taking clearance from the local authorities.

The Swedish Accident Investigation Authority (SHK) carried out an assessment and decided not to investigate the incident. DGCA-India instituted inquiry under Rule 13(1) of the Aircraft (Investigation of Accidents and Incidents) Rules 2017 vide its notification Ref. DGCA-15020/10/2018-DAS dated 06.12.2018 and intimated Swedish Accident Investigation Authority (SHK) accordingly. SHK appointed Mr. Nicolas Seger, Senior Safety Investigator, Aviation as Accredited Representative for Sweden. However, Swedish Accident Investigation Authority (SHK) did not associate in further investigation.

The incident was caused as the crew maneuvered the aircraft for going to parking stand F28R from the lead line of Parking Stand F28L without checking the left wing tip clearance.

The contributory factors were as follows:

(a) Mental fatigue of the first officer and wrong inputs by him.
(b) Lack of assertiveness of the PIC.
(c) Reduced situational awareness of the ATCO.
(d) Noncompliance of the procedures/instructions.

1. Factual Information

1.1 History of the flight:

On 28/11/2018, M/s Air India B787-8 aircraft VT-ANE was operating a scheduled passenger flight AI-167(Delhi to Stockholm Arlanda (ARN)). It was involved in an incident of ground collision while maneuvering in stand F28R at Stockholm Arlanda (ARN). There were 02 operating crew, 08 cabin crew and total 175 passengers on board the aircraft. After pre-flight inspection, aircraft took off from Delhi at around 08:50 UTC under the command of an ATPL holder Pilot flying (LHS) and another ATPL holder as First officer (RHS). The first officer Pilot was also handling the radio telephony communications. The en-route flight and the landing on RWY19L at Stockholm airport were uneventful. The reported visibility was 10 km or more and there was no significant weather advisory.

Aircraft arrived in Stockholm at 16:50 UTC. After landing the aircraft vacated Runway 19L via "W4" and was given taxi clearance by the ATC (ground) at Stockholm to taxi via Taxiway "W" to stand F28R and hold short of "Z" and the same was acknowledged by the First Officer.

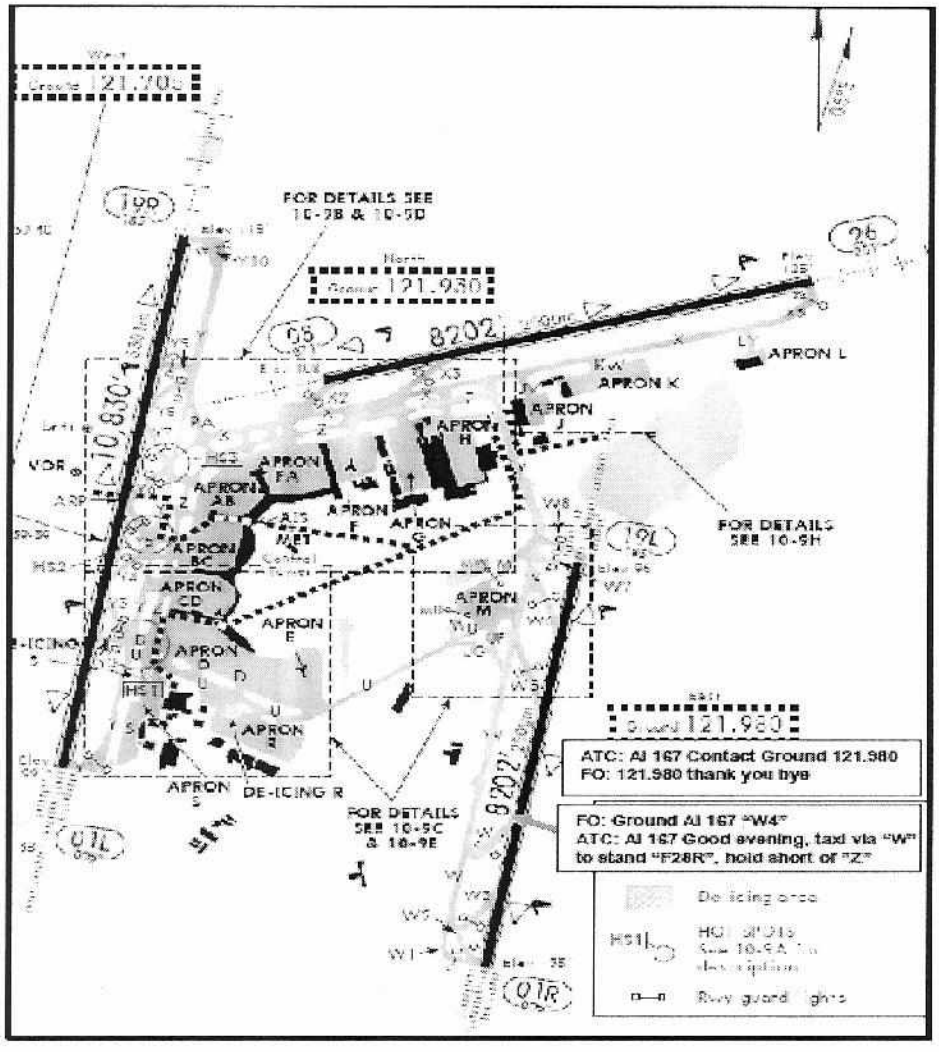


Fig No.1 Path followed by the Aircraft

The first officer also made note of it on the flight plan. Then aircraft was given further Taxi clearance via "Z" and "ZQ".

During taxi, when the aircraft was passing stand F30 (Ref fig.2), the PIC asked the first officer if the stand allocated was F28 Right. The first officer replied that it was F28 Left. While approaching the stand, the PIC asked the first officer where to turn as the lead in lines to stand F28 Left and F28 Right were not clearly visible on the ground due to wet surface and reflection of light. F28 is Multiple Apron Ramp System (MARS) and is equipped with the Visual Docking Guidance system (VDGS). When the aircraft reached near stand F28, the VDGS of stand F28Right was not activated by the ground handling agency. Neither the VDGS of stand F28 Left was activated. The aircraft turned into stand following the lead line for stand F28L. After moving forward, the first officer made a call to stop the aircraft as he believed to have seen Stop on the VDGS, while the commander was not able to see anything on the display of the VDGS as it was not activated. The aircraft was stopped. At this stage again, PIC asked whether they had to go to the left or right. The copilot again reiterated that they had to go to the left. Then the PIC recollected that First Officer earlier had said the right stand. They then sought confirmation from the ATC. ATC reconfirmed that the F28R stand was allocated to them. They informed ATC that they had come on stand F28L lead line. The ATCO stated that "OK Sir and I don't know I will see what I can do about that".

At this stage, the first officer advised PIC that they can turn to the right and the crew of the AI-167 communicated to ATC that they are able to turn to the right if the permission is granted. The permission was given by ATC but with CAUTION. There is a building on the left side of the apron and outboard of left wing was in close proximity. As per the available information, the building was neither lit nor it had any obstruction light. While maneuvering from F28L line to F28R line, left wing leading edge impacted the building. PIC stopped the aircraft immediately and passengers were deplaned normally. There was no injury to any person on board the aircraft.

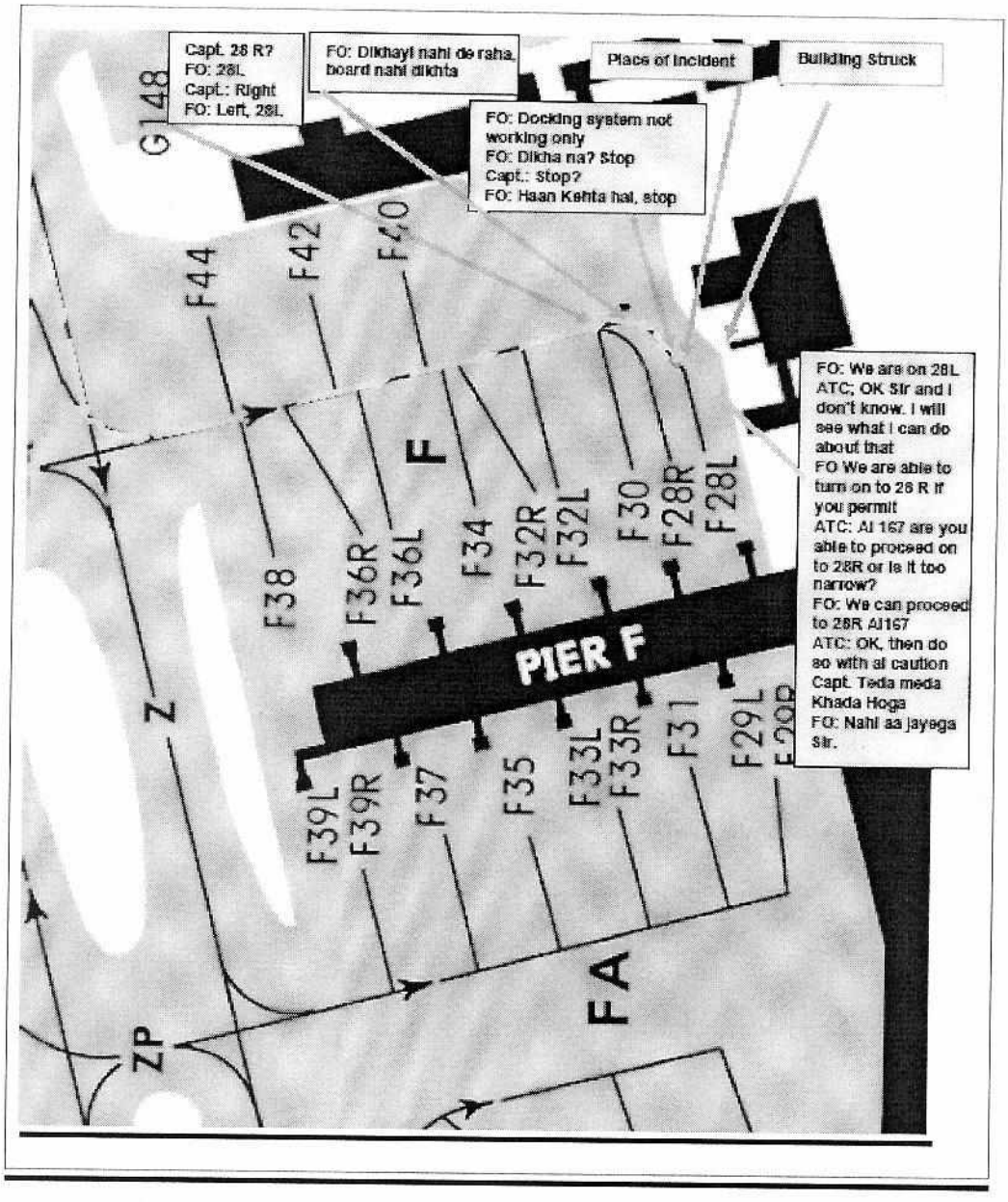


Figure No.2 Events near F28 Stand

1.2 Injuries to persons:

Injuries	Crew	Passengers	Others
Fatal	Nil	Nil	Nil
Serious	Nil	Nil	Nil
Minor	Nil	Nil	
None	2+8	175	

1.3 Damage to Aircraft :

Minor.

The damage is to the left raked wing tip, inboard of the removable wing tip. The damage extends into the left wingtip structure with the leading edge, spar, ribs and skin. The aircraft electrical wiring & NAV light assembly was also damaged. The width of the damage along the leading edge is approximately 70cms in length.

1.4 Other damage:

The plaster and few bricks at corner edge of building got damaged.

1.5 Personnel information

1.5.1 Pilot – in – Command

Age	:	52 years
License	:	ATPL
Date of Issue	:	17.10.2009
Valid up to	:	17.10.2020
Category	:	Aeroplane
Class	:	Multiengine
Date of Med. Exam	:	18.09.2018
Med. Exam valid upto	:	17.09.2019
Date of Issue of FRTO License	:	04.07.2012
Valid up to	:	13.07.2022
Total flying experience	:	19482 Hrs.
Experience on type	:	1631.33 hrs.
PIC Experience on type	:	1526:55hrs.

Flying details (in hrs.):

Total flying experience during last 180 days	:	368.00 Hrs
Total flying experience during last 30 days	:	62:45 Hrs
Total flying experience during last 07 Days	:	22.33 Hrs
Total flying experience during last 24 Hours	:	07.50 Hrs

The PIC had his weekly rest on 26.11.2018 and 27.11.2018. On 28.11.2018 he operated the incident flight.

1.5.2 Co-Pilot

Age	:	45 years
License	:	ATPL 2090
Date of Issue	:	15.10.2009
Valid up to	:	14.10.2020
Category	:	Aeroplane
Class	:	Multiengine
Date of Med. Exam.	:	05.10.2018
Med. Exam valid upto	:	04.09.2019
Date of issue of FRTO License	:	28.09.2016
FRTO Licenses Valid up to	:	27.09.2021
Total flying experience	:	15100 hrs.
Experience on type	:	914 hrs.
Experience as PIC on type	:	780 hrs. approx.

Flying details (in hrs.):

Total flying experience during last 180 days	:	366.55 Hrs
Total flying experience during last 30 days	:	56.34 Hrs
Total flying experience during last 07 Days	:	14.40 Hrs
Total flying experience during last 24 Hours	:	08.00 Hrs

The First Officer had his weekly rest on 25.11.2018 - 26.11.2018 and on 27.11.2018 he operated a flight AI-539(MAA-DEL). On 28.11.2018 he operated the incident flight.

As per the First Officer statement he had suffered a personal tragedy on the day of the incident flight. He planned to report sick and sent message at 05:01UTC to in charge rostering, but later at 05:58UTC on he decided to operate the flight and accordingly communicated to crew rostering.

Both the operating crew had adequate rest as per the Flight Duty Time Limitations (FDTL) requirement prior to operating the incident flight.

Both the operating crew were not involved in any serious incident/ accident in past

1.6 Aircraft Information:

Manufacturer	The Boeing Company, USA
Type	Boeing 787-8
Aircraft Serial No.	36280
Year of Manufacturer	2008
Certificate of Airworthiness	No. 65378 issued on 01/12/2013; Valid till 02/12/18
Airworthiness Review Certificate	ANE/6578/ARC2ND/2016/265 Issued on 29.11.2017 valid till 01/12/18
Category	Normal
Sub Division	Passenger / Mail / Goods
Certificate of Registration	Cert No. 4469/2 Valid till 15/04/2027 Category "A"
Owner	Celisa aircraft LLC, C/o Wilmington trust Company, 1100 North Market Street, Wilmington, Delaware19890-1605, USA
Operator	Air India Limited Airlines House, 113, Gurudwara Rakabganj Road, New Delhi-110001
Minimum Crew Required	Two
Maximum All Up Weight Authorised	2,27,930.00 Kgs
Last Major Inspection	C1 Check done on : 25.04.17, FH 41832/FC 5487
Airframe Hrs. Since New	41854 : 26 Hours as on 27.04.2017

1.6.3 Weight and Balance:

- There were total of "175" passengers, "8" cabin crew and "2 "pilots.
- Zero Fuel Weight 149285 Kgs
- Take off Weight (Max) 227930 Kgs
- Take-off Weight(Actual) 191789 Kgs
- TO CG 25.51 %
- Landing Weight (MAX) 172365 Kgs
- Landing Weight (ACTUAL) 157189Kgs

1.6.4 Aircraft Description:

The Boeing 787 Dreamliner is a long-range twin-engine aircraft with a conventional twin-aisle layout. Approximately 50% of the aircraft's primary structure is constructed using composite materials, including the fuselage and the wings.

The wing span of the aircraft is 60.1 meters (Ref. fig. No. 3). The aerodrome reference code is 4E.

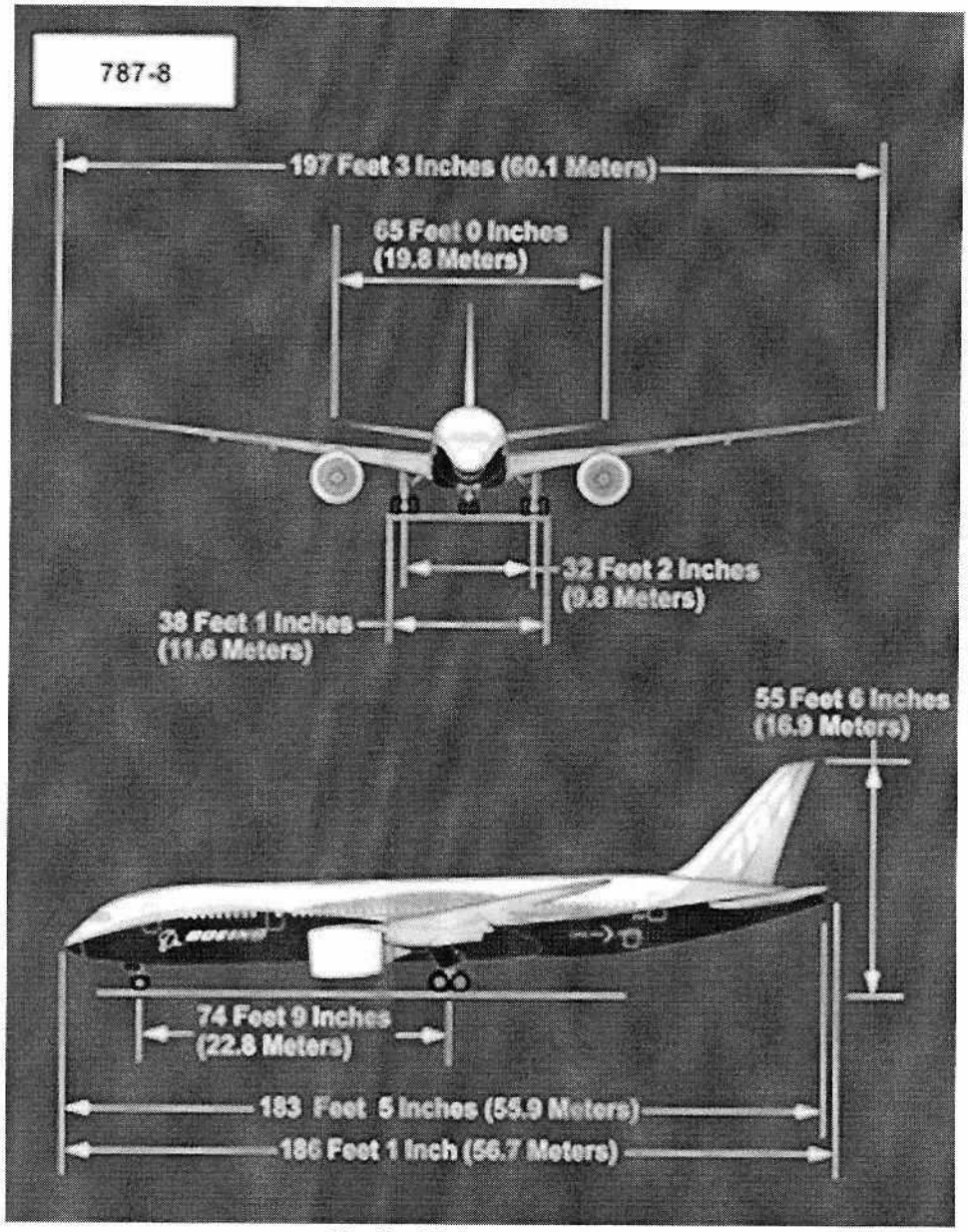


Fig. No.3 Principal Dimensions

1.7 Meteorological information:

The incident occurred at 1650 UTC and the METAR of 1550 UTC was valid at the time of incident. As per the METAR, following meteorological conditions existed.

Time (UTC)	1550
Wind	160/04 KTS
Visibility	CAVOK
Temp	-5° C
Dew Point	-6° C
QNH	1030 hPa

1.8 Aids to Navigation:

Not Applicable.

1.9 Communication:

There was always two ways communication between ATC and the Aircraft. At the time of incident, the aircraft was in contact with ATC on frequency 121.980MHz.

1.10 Aerodrome information:

Stockholm/Arlanda airport is under the administrative control of Swedavia AB. Airport is open for 24 hours operation. It is located at 20 nm from the Stockholm. Airport Reference Point coordinates: 593907N 0175507E 010.5° GEO 1650 M Both IFR/VFR type of traffic is permitted.

1.10.1 Runway data

Runway Designator	TORA (m)	TODA (m)	ASDA (m)	LDA (m)	Dimensions of RWY(m)
01 L	3301	3301	3301	3301	3301×45
19 R	3301	3301	3301	3301	3301×45
01 R	2500	2500	2500	2500	2500×45
19 L	2500	2500	2500	2500	2500×45
08	2500	2800	2500	2500	2500×45
26	2500	2500	2500	2500	2500×45

1.10.2 Rescue and Fire Fighting Services

Airport has CAT 10 fire fighting service and two fire stations. Rescue equipment include Tracked vehicle, decontamination vehicle, airport medical assistance, lift bags, water scooters and rescue rafts.

1.10.3 Meteorological Information:

It is provided on 24 Hours basis.

1.10.4 Mode S transponder

Stockholm/Arlanda aerodrome is equipped with an advanced surface movement radar communicating with aircraft and vehicles using Mode S transponders to obtain their position and identification code. Aircraft operators are required to ensure that Mode S transponder are able to operate when the aircraft is on the ground.

Flight crew are required, from the request to push back or taxi whichever is earlier, and after landing, continuously until the aircraft is fully parked on stand, to:

- Select AUTO mode and the assigned Mode A code.
- If AUTO MODE is not available, the pilots shall select XPNDR or the equivalent depending on installed equipment, and the assigned Mode A code.
- Set the aircraft identification if the aircraft is equipped with Mode S transponder.

1.10.5 Operations with large aircraft

Large aircraft is considered as aircraft with wing span with more than 65 m.

-A 380 operations: Parking will take place at F36R Pier F or at stands R9, R9C, R10 on apron R.
-B747-8 Operations: Parking will take place at F36 R Pier F or at stands R 9, R9C, R10 on apron R.

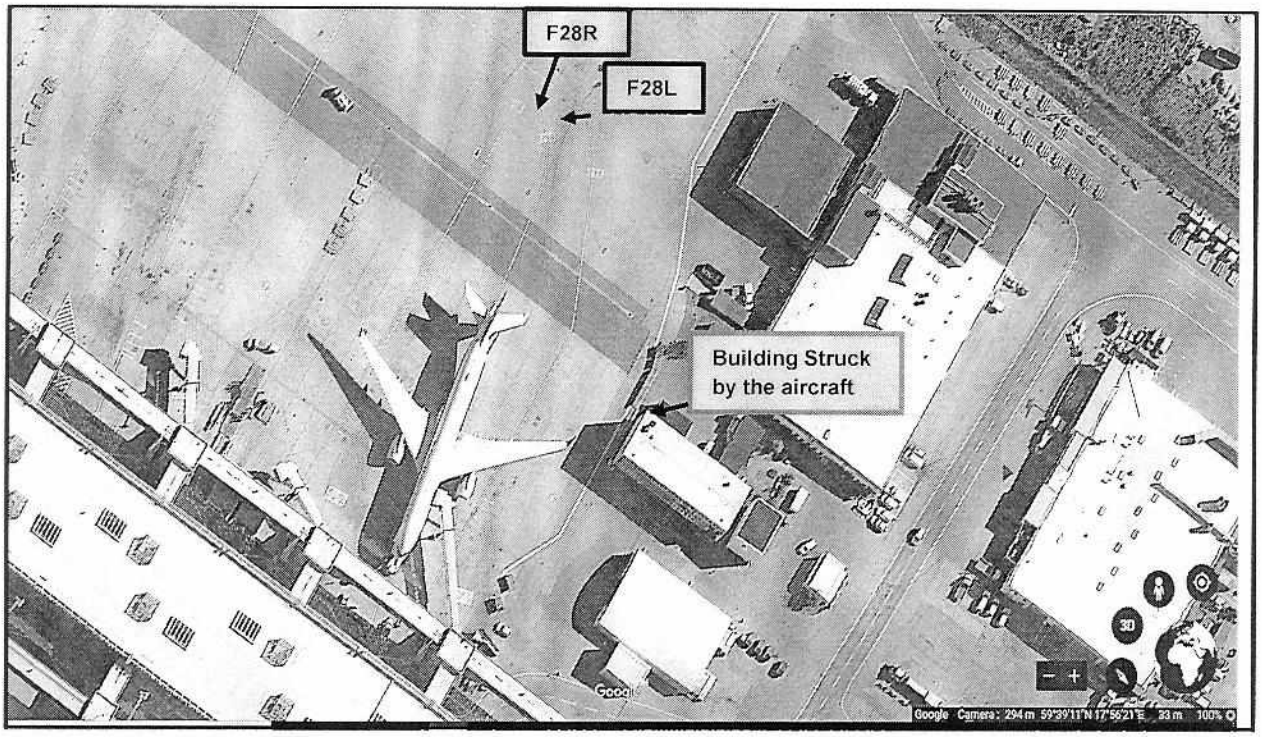
AIP Sweden for Stockholm/Arlanda airport does not prescribe any restrictions for the parking of Boeing 787-8 aircraft. Neither there is any wing span restrictions prescribed for the parking stands F28R and F28L.

1.10.6 Parking Stand F28.

Parking stand F28 is located in Pier F of terminal 5. It is a Multiple Apron Ramp System (MARS) and is equipped with the "APIS++" Visual Docking Guidance system (VDGS). It has two stands F28R and F28L.

The lead in line for the stand F28L is at an angle for some distance and then goes straight. It is on the edge of the apron and on its left side there are buildings due to which wing clearance reduces as the aircraft taxi in to the stand. As per the crew statement, the building was not well lit and also there was no obstruction light on the building. Using the google tool, it is estimated that the

distance between the lead line of the stand F28L and the edge of the building struck by the wing of the aircraft is 26.9 meters. The distance between the lead line of the stand and apron edge making is 22.26 m. This makes the stand suitable only for category "C" aircraft.



Stand F28

1.11 Flight recorders

The aircraft is fitted with two Solid State Enhance Airborne Flight Recorder (EAFR) as per table given below. The recorders showed no signs of damage. Data from both CVR & DFDR were downloaded and analyzed after the incident.

No	Unit	Manufacturer	Part Number	Serial Number	Model No
1	Enhance Airborne Flight recorder (EAFR) FWD	GE Aviation Systems, USA	182690-003	16H10P	325402
2	Enhance Airborne Flight Recorder (EAFR) AFT	GE Aviation Systems, USA	182690-003	16H10C	325402

1.11.1 Cockpit Voice Recorder

Four audio channels with duration of 02 hrs. 04 min 14 sec were found recorded in the CVR. The channels are

- HQ 1.wav,containing P1 Microphone recordings
- HQ 2.wav,containing P2 Microphone recordings
- HQ 3.wav,containing Passenger Address Microphone recordings
- HQ CAM.wav containing the Cockpit Microphone recordings

Following are the salient observations:

- The aircraft VT-ANE carried out a normal landing at ARN.
- After landing aircraft was cleared to taxi via W to stand F28Right and the same was acknowledged by the First Officer (FO).
- While taxiing the Captain asked the FO if the stand was 28Right to which FO replied that it was Left, 28 Left.
- While approaching the stand, the Captain asked the FO where to turn, apparently not having the lead in lines to the stand 28 LEFT and 28 RIGHT clearly visible on the ground.
- Having then turned on the Stand F28 lead in line, FO asked the Captain to stop.
- Captain then asked FO as to which line to follow and FO confirmed that it was LEFT.
- Captain while on the lead in line to the Stand F28Left had a doubt about the stand and asked FO to confirm with ATC.
- ATC confirmed that it was Stand F28Right. AI-167 then informed that they were on the stand F28LEFT.
- They informed ATC that they had come on parking stand F28L lead line. The ATCO stated that "OK Sir and I don't know I will see what I can do about that".
- At this stage the first officer advised PIC that they can turn to the right and the crew of the AI-167 communicated to ATC that they are able to turn to the right if the permission is granted.
- ATC asked AI-167 if it was able to do so, 'is the space too narrow'. To which AI-167 replied that, they can proceed.
- ATC then said that in that case they may proceed to stand F28RIGHT with caution.
- AI-167 acknowledged and while executing this manoeuvre to stand F28RIGHT, the left wing tip of the aircraft struck the building structure.
- The ATC then instructed AI- 167 to shut down the engines immediately.

1.11.2 Digital Flight Data Recorder

Data analyzed for heading, ground speed and Engine N1% at the time of taxying in to stand F28R. No discrepancy was observed.

1.12 Wreckage and impact information

The leading edge of the outboard portion of left wing of the aircraft impact the building. Due the impact the left wing outboard side leading edge area (just inboard of the removable wingtip) was damaged.

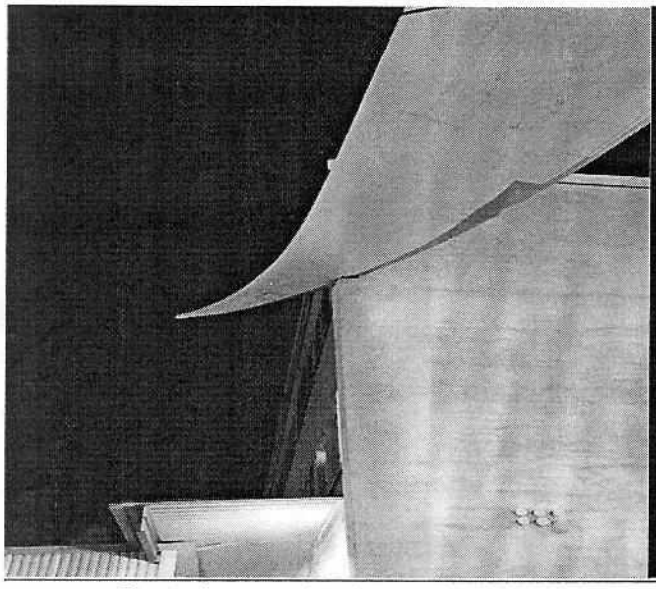


Fig. 4 : Impact with the building

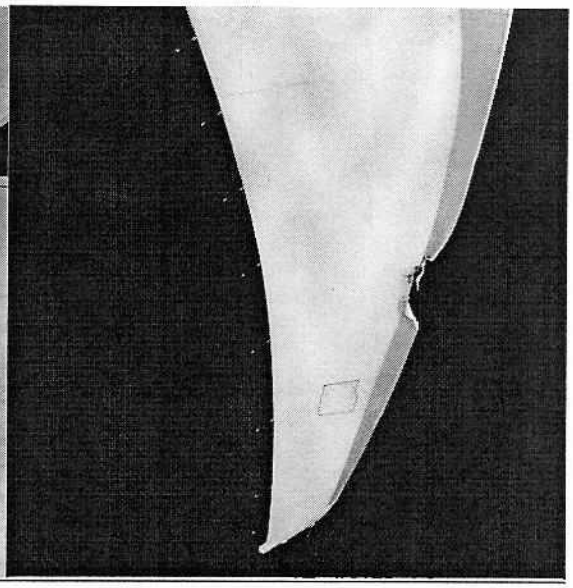


Fig.5 Damage to wing

The damage extends into the left wing structure, the leading edge, spar, ribs and skin. The aircraft electrical wiring & NAV light assembly is also damaged. The width of the damage along the leading edge is approximately 70cms in length.

1.13 Medical and pathological Information:

Prior to operating the flight both the cockpit crew & cabin crew had undergone pre-flight medical / Breath Analyzer test at Delhi and were found negative.

1.14 Fire:

Nil

1.15 Survival aspects:

The incident was survivable.

1.16 Tests and research:

To assess whether the wingtip is visible while seated on the LH pilot seat, an exercise was performed on B787-800.

It was observed that, by turning back the wing tip can be seen from the LH side window, while seated on LH pilot seat (Fig.6).

Fig. 6 View of the LH wing tip as seen from the LH side window

1.17 Organization and Management information:

1.17.1 General

Air India Limited is a Scheduled Airline having DGCA Air Operator's Permit (AOP) No. S-9 in Category "Passenger and Cargo". Its fleet consists of Airbus A319-100, Airbus A320-200, A320 neo, Airbus A321-200, Boeing 747-400, Boeing 777 and Boeing 787 types of aircraft. The Company is headed by Chairman & Managing Director assisted by a team of professionals in various departments. Its international operation covers 52 foreign destinations. At foreign destinations, the dispatch function is centrally performed; however, engineering and ground handling function is subcontracted to local agencies. Air India has a procedure in place for the evaluation of the subcontractors before awarding the work and the same is incorporated in Air India Ground Handling Operational Manual, Engineering Procedure Manual and Corporate SMS Manual.

The operation to Stockholm was commenced on 16th August 2017, after undertaking Risk Assessment.

1.17.2 Air India instructions for the crew while approaching a Parking stand:

Part II of Operations manual Part B "B787 Standard Operating Procedure" containing following instructions for the crew while they are approaching a parking stand after landing:

Pilot Flying	Pilot Monitoring
	Start APU (If delayed due to fuel conservation)
Verify the parking area is clear of equipment **Identify the Docking system** **Verify correct Airplane type** and wing walkers (if any)	
Call out " Taxi light Off"	Select Taxi light to Off

1.17.3 Ground Handling

At Stockholm Air India has subcontracted ground handling services to SAS Ground Handling Sweden AB. As per the agreement reached between M/s Air India and SAS Ground Handling Sweden AB punctuality target is 100%. Further no penalty is envisaged for Ground Handling delay up to 09 minutes.

1.17.4 Swedavia instructions regarding Parking/Docking

Swedavia airport regulations for Stockholm Arlanda Airport regarding parking/docking are as follows:

Activation of fixed parking aids is not only a form of guidance to the pilot but also an acknowledgement that the parking stand is free from objects, equipment or personnel that may damage/suffer damage or injury from the aircraft. When a stand is equipped with a fixed parking aid, the ground handling company for each aircraft is responsible for ensuring that:

- The parking aid is operated only by qualified personnel.
- The parking aid is operated according to Swedavia's training material.
- Before the arrival of the aircraft, the parking aid is activated to accommodate the right aircraft type and as appropriate, the right version.
- Before activation of the fixed parking aid, the parking stand has been inspected and found free of equipment, objects or personnel that may damage/suffer damage or injury from the aircraft
- While the aircraft is taxiing in, the parking aid is checked to verify that its function will follow expected behaviour throughout the docking procedure.
- In case of irregularities in the docking procedure, or system error, the emergency stop button is activated
- Any error or irregularity noted in the system is reported to the Arlanda Service Center tel 010- 109 6600
- No vehicles or personnel remain or pass between the aircraft and the docking system during the docking procedure.

1.17.5 Air India Requirements Crew leave and Sickness:

Relevant Extract from the Air India Operations Manual Part A on crew leave and Sickness is appended below:

1.29.1 Reporting of illness / disability

Requirements of DGCA

The Director General of Civil Aviation, India requires monthly and half-yearly return of illness/ disability among crew to be submitted to his office on a regular basis.

The following information is required to be shown in the returns in respect of every illness/ disability both of minor and serious nature:

i) Date and time illness/disability occurred.
ii) Nature of illness / disability.
iii) Number of days illness / disability lasted.
iv) Number of days absented from duty on account of illness / disability.
v) Name (s) and address (es) of Doctor (s) who attended.
vi) Sickness and fitness certificates.

RESPONSIBILITY OF CREW

In view of the above mandatory requirements, all crew are required to submit all the above particulars to Movement Control whenever they report sick.

1.17.6 SAS- Ground Handling

SAS ground handling provided following information to the Air India team which visited the Stockholm after the incident.

- They are following SOP given by Air India as per contract.
- The Qualified Ramp Manager with the team were allocated for the arrival.
- The allocated Ramp officer was busy on another aircraft, as Air India aircraft arrived before schedule, at the time of the incident, whereas he was expected to be there as per the agreement.
- He is the authorized personnel to put ON guidance system.
- The Guidance system was OFF for both the stands in question when aircraft initiated the turn into F28L. The lights on the nose in guidance system were ON which indicates just the stand number.
- They do not provide with wing tip marshallers to Air India or any other operator except the American carriers.

1.18 Additional Information

1.18.1 Activation of VDGS:

a) The Guidance system is activated by the authorized person before arrival by entering an electronic signature.
b) The authorized personnel would enter type of arriving aircraft.

1.18.2 Fatigue:

(An Extract from FAA Handbook on Human Factor)

Fatigue is a major human factor that has contributed to many errors. Fatigue can be mental or physical in nature. Emotional fatigue also exists and effects mental and physical performance. A person is said to be fatigued when a reduction or impairment in any of the following occurs:
Cognitive ability, decision-making, reaction time, coordination, speed, strength, and balance. Fatigue reduces alertness and often reduces a person's ability to focus and hold attention on the task being performed.

Symptoms of fatigue may also include short-term memory problems, channeled concentration on unimportant issues while neglecting other factors that may be more important, and failure to maintain a situational overview. A fatigued person may be easily distracted or may be nearly impossible to distract. He or she may experience abnormal mood swings. Fatigue results in an increase in mistakes, poor judgment, and poor decisions or perhaps no decisions at all.

A fatigued person may also lower his or her standards. Tiredness is a symptom of fatigue. However, sometimes a fatigued person may feel wide awake and engaged in a task. The primary cause of fatigue is a lack of sleep. Good restful sleep, free from drugs or alcohol is a human necessity to prevent fatigue. Fatigue can also be caused by stress and overworking. A person's mental and physical state also naturally cycles through various levels of performance each day. Variables such as body temperature, blood pressure, heart rate, blood chemistry, alertness, and attention rise and fall in a pattern daily. This is known as one's circadian rhythm. A person's ability to work (and rest) rises and falls during this cycle. Performance counter to circadian rhythm can be difficult. Until it becomes extreme, a person may be unaware that he or she is fatigued. It is easier recognized by another person or in the results of tasks being performed.

1.18.3 Information requested from Swedish Accident Investigation Authority:

Following information was requested from the Swedish Accident Investigation Authority:

- Aerodrome Operator's SOP for the stand allocation.

- Any SOP for the selection of the Aircraft for the Visual Guidance Docking System/ Gate Management System
- Collision Avoidance Risk Assessment carried out by the Aerodrome Operator for this MARS Stand.
- Any safety feature put in place to prevent aircraft from entering the wrong stand.
- The adjacent building with which the wing of the aircraft struck does not appear to have obstruction light, is there any published document indicating the proximity (distance of stand centreline from the building) of the building to the stand. Also, details of any local regulations which regulates the installation of the obstruction lights on the buildings especially in proximity to the parking stands.
- The Dimensions of the stand F 28 L from the taxi lane to the Last Stop Point (split distance; two angular portions+ straight line portion). Also the distance of its centreline from the building.
- The "Code letter" of the aircraft which can be parked at stand F28L.
- The type of Visual Guidance Docking System being used for this stand and details of the obstructions mapped in it for this stand.
- VDGS data and the video.
- Transcript of the ATC recording from the time the aircraft landed till impact.
- Statement of the duty ATCO regarding the incident.

However the above information was not provided by them.

1.19 Useful and Effective Investigation Techniques

Nil.

2. Analysis

2.1 Departure from Procedure:

2.1.1 M/s Air India instructions for the crew while approaching a parking stand require both pilots to:

Part II of Operations manual Part B "B787 standard Operating Procedure" contains following instructions for the crew while they are approaching a parking stand after landing:

- Verify the parking area is clear of equipment
- Identify the Docking system
- Verify correct Airplane type and wing walkers (if any)

The crew while turning for the parking stand did not see the type of aircraft displayed on the VDGS board. They did not wait for their type of the aircraft to be displayed on the VDGS board. This reduced a safety link in the process which would have prevented aircraft from entering the wrong parking stand.

Thus, the crew by turning in for the parking stand without their type of the aircraft being displayed on the VDGS board violated M/s Air India procedures/instructions.

2.1.2 Maneuvering in the Lead line to Parking Stand:

After the crew informed the ATC that they were in F28L parking stand, they informed ATC that a turn to parking stand F28R was possible and sought permission. The ATC raised apprehension of narrow area. But the PIC without checking the left wing clearance agreed to the maneuver. The maneuver was prompted by the First officer. First Officer may not have had knowledge of left wing clearance.

Thus, the PIC maneuvered the aircraft without checking the left wing clearance.

2.1.3 Non Activation of VDGS System by SAS Ground Handling Sweden AB.

Swedavia Airport has following regulations in place for the ground handling agencies

- The parking aid is operated only by qualified personnel.
- The parking aid is operated according to Swedavia's training material
- Before the arrival of the aircraft, the parking aid is activated to accommodate the right aircraft type and as appropriate, the right version

The ground handling services at Stockholm is provided by SAS Ground Handling Sweden AB. Accordingly they are required to activate the VDGS before the arrival of the aircraft. This will allow the aircraft the correctly identify the parking stand as per the type of the aircraft and safety park. Before arrival of the aircraft the concerned personnel from SAS group were not available to activate the VDGS.

Thus, there was failure on part of SAS Ground Handling to perform the contracted activity, which reduced the safety margin.

2.2 Human Factor

2.2.1 Actions of First Officer

Fatigue is a major human factor that has contributed to many errors. Fatigue can be mental or physical in nature. Emotional fatigue also exists and effects mental and physical performance

Symptoms of fatigue may also include short-term memory problems, channeled concentration on unimportant issues while neglecting other factors that may be more important, and failure to maintain a situational overview. A fatigued person may be easily distracted or may be nearly impossible to distract. Fatigue results in an increase in mistakes, poor judgment, and poor decisions or perhaps no decisions at all. Tiredness is a symptom of fatigue. However, sometimes a fatigued person may feel wide awake and engaged in a task. They lower their own standards.

Both the pilots operated this flight after availing weekly rest. The first officer had undergone a personal tragedy on the day of the incident flight. He first thought of reporting sick and then changed his mind and operated the flight.

After landing the ATC allocated them parking stand F28R. He wrote down this stand number on the flight plan. Then he repeatedly informed the pilot that they have been allocated F28L. Also he suggested the PIC to maneuver to move towards stand F28R after they had moved forward on the lead line of parking stand F28L. PIC maneuvered towards F28R without realizing about the lack of left wing clearance even though the ATCO had informed them of the narrow region.

First officer was convincing and prevailed upon the PIC to work on erroneous decisions.

Thus, the First Officer was under mental fatigue arising out of the emotional distress. He compromised his decision to report sick.

2.2.2 Lack of Assertiveness of the PIC:

The PIC was also monitoring the communication with the ATC. He was partially aware that the stand allocated to them was F28R. However, he agreed to the erroneous information provided by the First officer that the allocated stand was F28L. Further, he before maneuvering for entering in to parking stand F28R was not sure about safety and the alignment of the aircraft but he followed the advice of First officer without making a crosscheck of the wing tip clearance on left side. **Thus, the PIC lacked assertiveness and followed the advice of his first officer without cross check/verification.**

2.2.3 Action of ATCO (Ground Control):

The level of the ASMGCS available at the Stockholm airport is not known. The ATCO did not notice the aircraft entering the wrong parking stand. When the aircraft reported that it had entered the wrong parking stand F28L, the ATCO was not aware of further course of action. ATCO advised the aircraft that the place was narrow, but ATCO was probably not aware that the stand F28L was meant for Aerodrome Code "C" aircraft and not Code "E" aircraft.

Thus the ATCO exhibited reduced situational awareness and permitted the aircraft to take turn for the parking stand F28R when no wing tip clearance existed.

2.3. Documentation of hazard and Risk Assessment:

2.3.1 Swedavia Airport:

Close to the parking stand F28L, there is a building. Due to the proximity of the building this parking stand is suitable for a Code "C" aircraft.

Wing span restrictions for stand F28L are not mentioned in the AIP for this airport.

The building does not have an obstruction light. As per relevant ICAO Annex the

aerodrome operator is required to carry out the collision avoidance risk assessment and take the mitigation measures accordingly.

Considering the existing hazard, Swedavia airport does not appear to have carried out safety risk assessment for the collision avoidance.

2.3.2 Air India:

Before the commencement of the operation to Stockholm, M/s Air India carried out hazard identification and risk assessment based on the published data. Further after the commencement of the operation no feedback regarding hazards existing at the airport has been obtained. A meaningful Hazard identification process would have revealed the existence of the hazard.

3. Conclusions:

3.1 Findings

3.1.1 In the AIP no restrictions has been published regarding the wing span restriction for the stands F28L.

3.1.2 The FO read back the transmission correctly but recalled the wrong stand number when queried by the Captain while approaching the stand F28.

3.1.3 The concerned personnel to activate the guidance system from Ground Support (SAS) was not available as he was late to receive the aircraft.

3.1.4 The crew by turning in for the parking stand without their type of the aircraft being displayed on the VDGS board violated M/s Air India procedures/instructions.

3.1.5 The PIC maneuvered the aircraft without checking the left wing clearance.

3.1.6 The First Officer was under mental fatigue arising out of the emotional distress. He compromised his decision to report sick. He availed of weekly rest before the operation of incident flight.

3.1.7 The PIC lacked assertiveness and followed the advice of his First Officer without cross check/verification.

3.1.8 The ATCO exhibited reduced situational awareness and permitted the aircraft to take turn for the parking stand F28R when no wing tip clearance existed.

3.1.9 No meaningful hazard identification and risk mitigation process has been followed by Swedavia Airport and Air India.

3.1.10 Considering the existing hazard, Swedavia airport does not appear to have carried out safety risk assessment for the collision avoidance.

3.2 Cause of Incident:

The incident was caused as the crew maneuvered the aircraft for going to parking stand F28R from the lead line of Parking Stand F28L without checking the left wing tip clearance. The contributory factors were

(a) Mental Fatigue of the first officer and wrong inputs by him.
(b) Lack of assertiveness of the PIC
(c) Reduced situational awareness of the ATCO

(d) Noncompliance of the procedures/instructions by the flight crew as well as the ground handling agency.

4. Safety Recommendations:

4.1 Necessary Corrective action may be taken in respect of the concerned crew.

4.2 Air India should put in place a robust and meaningful system for hazard identification and risk assessment. This should include structured feedback process from the operating crew, station managers and other stake holders responsible for the safe operation.

4.3 Appropriate action may be taken in respect of the ground handling agency for not activation of the VDGS before the arrival of the aircraft.

(Maneesh Kumar)
Director Air Safety and Investigation-In-Charge

20.05.2019

APPENDIX-A

GLOSSARY

ALTP	Airline Transport Pilot License
AMSL	Above Mean Sea Level
ARC	Airworthiness Review Certificate
ASDA	Accelerated Stop Distance Available
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer
AUW	All Up Weight
C of A	Certificate of Airworthiness
CAR	Civil Aviation Requirements
CAT	Category
CPL	Commercial Pilot License
CVR	Cockpit Voice Recorder
EAFR	Enhance Airborne Flight Recorder
DFDR	Digital Flight data Recorder
DGCA	Directorate General of Civil Aviation
FAA	Federal Aviation Administration-USA
FC	Flight Cycles
FCOM	Flight Crew Operating Manual
FCTM	Flight Crew Training Manual
FDTL	Flight Duty Time Limitation
FH	Flight Hours
FO	First Officer
FRTOL	Flight Radio Telephone Operators License
Ft	Feet
GS	Ground Speed
Hrs	Hours
ICAO	International Civil Aviation Organization
Kg	Kilogram
LDA	Landing Distance Available
MARS	Multiple Apron Ramp System
MEL	Minimum Equipment List
METAR	Meteorological Terminal Aviation Routine
NAV	Navigation
PIC	Pilot in Command
RWY	Runway
SOP	Standard Operating Procedure
TORA	Take-off Run Available
TODA	Take-off Distance Available
UTC	Coordinated Universal Time
VDGS	Visual Docking Guidance system
XPNDR	Transponder
ZFWT	Zero Fuel Weight