FINAL INVESTIGATION REPORT ON HARD LANDING INCIDENT TO M/S TATA SIA AIRLINE (VISTARA) AIRBUS A320 AIRCRAFT VT-TTM WHILE OPERATING FLIGHT UK-913 (SECTOR: DELHI-INDORE) ON 09.08.2021

DIRECTORATE GENERAL OF CIVIL AVIATION

GOVERNMENT OF INDIA

New Delhi

FOREWORD

This document has been prepared based upon the evidences collected during the investigation and laboratory examinations of various components.

The investigation has been carried out in accordance with Annex 13 to the convention on International Civil Aviation and under Rule 13 (1) of Aircraft (Investigation Accidents and Incidents) Rules, 2017.

The sole objective of the investigation of an incident is prevention of accidents and incidents and not to apportion blame or liability.

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1	**Aircraft**	Type	A320-232
		Nationality	Indian
		Registration	VT-TTM
2	**Owner**	M/s Wilmington Trust SP Services (Dublin) Limited, Irish	
3	**Operator**	M/s TATA SIA Airlines Ltd. (M/s Vistara)	
4	**Pilot-in-Command** **Extent of injuries**	ATPL Nil	
5	**Place of Incident**	Indore Airport	
6	**Co-ordinates of Incident site**	Latitude 22°43'18"N & Longitude 75°48'03"E	
7	**Date & Time of Incident**	09.08.2021 at 0747 Hrs	
8	**Last Point of Departure**	Indira Gandhi International Airport, New Delhi (VIDP)	
9	**Intended place of landing**	Devi Ahilya Bai Holkar Airport, Indore (VAID)	
10	**Type of Operation**	Scheduled Operation	
11	**Crew on Board** **Extent of injuries**	02+04 Nil	
12	**Passengers on Board** **Extent of injuries**	140 Nil	
13	**Phase of Operation**	Landing	
14	**Type of Incident**	Hard Landing (Abnormal Runway Contact)	

(All timings in the report are in IST)

SYNOPSIS

On 09th August 2021, an A320 aircraft VT-TTM of M/s TATA SIA Airlines LTD. (M/s Vistara) was involved in hard landing incident at Devi Ahilya Bai Holkar Airport, Indore, while operating a scheduled flight UK-913 from Delhi to Indore.

The aircraft took off from Delhi airport at 0645 Hrs for Indore. The copilot was the pilot flying and PIC was Pilot monitoring. The flight was uneventful during takeoff, cruise and descent. The aircraft was stabilized at 1000ft as per the requirement of stabilized approach criteria. The aircraft was cleared for instrument landing on runway 25 at Indore.

During finals, the rate of descend increased due to pitch down movement by pilot flying and aircraft made a hard landing with vertical acceleration of 3.4G. After landing, aircraft taxied and parked to the assigned bay at Indore airport. There was no injury to any person and visual damage to aircraft.

DGCA-India instituted investigation of the incident under Rule 13 (1) of Aircraft (Investigation of Accidents and Incidents), Rules 2017 by appointing Investigator-In-Charge along with member.

The investigation concluded that high rate of descent coupled with inadequate flare resulted in aircraft touchdown with high vertical acceleration. Poor Crew Resource Management between the cockpit crew during the critical phase of flight was the contributory factor to the incident.

1. FACTUAL INFORMATION

1.1 HISTORY OF THE FLIGHT:

On 09th August 2021, M/s Vistara A320 aircraft VT-TTM was scheduled to operate passenger flight UK- 913 from Delhi to Indore. There were a total of 146 person on board the aircraft including 06 crew members. This was the first flight of the day for operating crew. This was a supervised takeoff and landing (STOL) flight. The copilot was the pilot flying and PIC was Pilot monitoring. The copilot was suitably trained and assessed for STOL by M/s Vistara. PIC was not suitably trained and assessed for STOL by M/s Vistara, however PIC was cleared by his previous employer to carry out STOL.

The aircraft took off from Delhi airport at 0645 Hrs for Indore. The flight was uneventful for takeoff, cruise and descent. The aircraft was stabilized at 1000ft as per the requirement of stabilized approach criteria of M/s Vistara. The aircraft was cleared for instrument landing on runway 25 at Indore. The weather at Indore was conducive for landing with visibility of 3000m and winds 260Deg/05Kts.

The autopilot was disengaged at 618ft RA. During final approach at about 200 ft RA, pilot flying started increasing the pitch to control the rate of descent, which reduced to 448 fpm at 150ft RA. PF again decreased the pitch to 0.4 degree at 83ft RA resulting in increase of rate of descent to 1072fpm. At 40ft RA, aural warning of sink rate and retard came. At 34 ft AGL, PIC took over the controls and aural warning of dual input came. Due to high rate of descent, crew could not control the aircraft and landed with inadequate flare which resulted in aircraft touchdown with 3.4 G.

After landing, aircraft taxied and parked to the assigned bay at Indore airport. There was no injury to any person and visual damage to aircraft.

1.2 INJURIES TO PERSON

INJURIES	**CREW**	**PASSENGERS**	**OTHERS**
FATAL	Nil	Nil	Nil
SERIOUS	Nil	Nil	Nil
MINOR/None	Nil/06	Nil/140	

1.3 DAMAGE TO AIRCRAFT

Hard landing inspections in accordance to AMM was carried out for the aircraft on wheels and on jacks. It was found that, left hand and right hand main landing gear shock absorber experienced excessive loads. Accordingly, Airbus recommended that the aircraft can operate 400 FC or 90 Days. Both shock absorber were replaced on 02 Nov 2021.

1.4 OTHER DAMAGE

Nil

1.5 PERSONNEL INFORMATION:

1.5.1. Pilot-in-Command

Age	44 yrs
Gender	Male
License	ATPL
Date of Issue	26.10.2010
Valid up to	25.10.2021
Category	Airplane
Class I Medical Valid up to	27.11.2021
FRTO License Valid up to	20.03.2026
Total flying experience	10655 hrs 55mins
Total flying experience as PIC on type	4873 hrs 40mins
Total flying experience during last 1 year	524 hrs 56mins
Total flying experience during last 6 months	270 hrs 17 mins
Total flying experience during last 30 days	47 hrs 54mins
Total flying experience during last 7 days	12 hrs 48 mins
Total flying experience during last 24 hours	02 hrs 48mins

1.5.2 Co-Pilot:

Age	26 yrs
Gender	Female
License	CPL
Date of Issue	18.12.2017
Valid up to	17.12.2022
Category	Airplane
Class I Medical Valid up to	25.03.2022
FRTO license valid up to	17.12.2022
IR rating valid up to	06.02.2022
Total flying experience	894 hrs 53 mins
Total flying experience on type	694 hrs 53 mins
Total flying experience during last 1 year	397 hrs 38 mins
Total flying experience during last 6 months	202 hrs 55 mins
Total flying experience during last 30 days	07 hrs 08 mins
Total flying experience during last 7 days	00 hrs 00 mins
Total flying experience during last 24 hours	00 hrs 00 mins

Supervised take-off and landings:

CAR Section 8 Series F Part III, Issue 1 Rev 1 Dated 24th November 2016 lays down the requirements for "Supervised takeoff and landing requirements for scheduled and non-scheduled operators having aeroplane with AUW exceeding 5700kgs".

Para 3.1 (f) of the CAR requires PIC who permits a copilot to effect take-off and landing shall have been suitably trained and assessed for supervised takeoff and landing in a level C/CG/D/DG simulator by the operator.

However the PIC operating the flight was cleared by his previous employer on 11.05.2014 for supervised takeoff and landing on Airbus A320 type of aircraft, not by the present employer i.e M/s Vistara after joining on 02.01.2017.

Co-pilot was meeting the criteria of para 3.2 CAR Section 8 Series F Part III for undertaking the take-off and landing on Airbus A320 type of aircraft. She was cleared to undertake supervised take-off and landing on 19.04.2019.

1.6 AIRCRAFT INFORMATION:

Manufacturer	Airbus Industry, France
Type	A320-232
Constructor's S.No	7267
Year of Manufacturer	2016
Certificate of Airworthiness	C of A No. : 6803
Airworthiness Review Certificate	23.09.2021
Category	Normal
Sub Division	Passenger / Mail / Goods
Certificate of Registration no. and validity	Certificate # 4693, Validity 19.09.2022
Owner	Wilmington Trust SP Services (Dublin) Limited
Minimum Crew Required	Two
Maximum All Up Weight Authorised	73500 Kg
Last Major Inspection	48 MO Check done on 06th Aug. 2020
Last Inspection	Daily Check on 08th Aug 2021; Weekly on 02nd Aug 2021
Air frame Hrs. Since New	13854:32 (As on 09th Aug. 2021)

ENGINE		
MANUFACTURER	International Aero Engines	
	LH	RH
TYPE	IAE V2527-A5	IAE V2527-A5
SERIAL NO.	V18237	V18251

LAST INSPECTION CARRIED OUT	48 MO Check done on 6 Aug 2020 at 12361:43 Hrs. & 7302 Cyc	48 MO Check done on 6 Aug 2020 at 12361:43 Hrs. & 7302 Cyc

Before the incident flight i.e on 09.08.2021, no defect/snag was pending. All the concerned Airworthiness Directive, Service Bulletins, DGCA Mandatory Modifications on this aircraft and its engine were found complied with.

1.7 METEROLOGICAL INFORMATIONS:

Weather was obtained from the Meteorological Department, weather report for Indore airport is given below:

VAID 090300Z 28008KT 3000 HZ FEW012 SCT018 BKN090 24/22 Q1010 NOSIG
VAID 090100Z 26005KT 3000 HZ FEW012 SCT018 BKN090 23/22 Q1009 NOSIG
VAID 090000Z 27005KT 3000 HZ FEW010 SCT018 BKN090 23/22 Q1009 NOSIG

As per the METAR, the weather was conducive for flying.

1.8 AIDS TO NAVIGATION:

At Devi Ahilyabai Holkar Airport, Indore the VOR/DME, ILS landing facility and PAPI are available on either side of runway 07/25.

1.9 COMMUNICATIONS:

Two way communications was available at Indore Airport. No unserviceability of any communication aid was reported by the ATC as well as by the flight crew.

1.10 AERODROME INFORMATION:

Indore Airport is known as Devi Ahilyabai Holkar Airport, Indore. It has a single runway 07/25 having dimensions 2750m x 45m. The airport elevation is 1851 ft. Its geographic location is at Latitude 22°43’18”N and Longitude 75°48’03”E.

1.11 FLIGHT RECORDERS:

1.11.1 Digital Flight Data Recorder (DFDR):

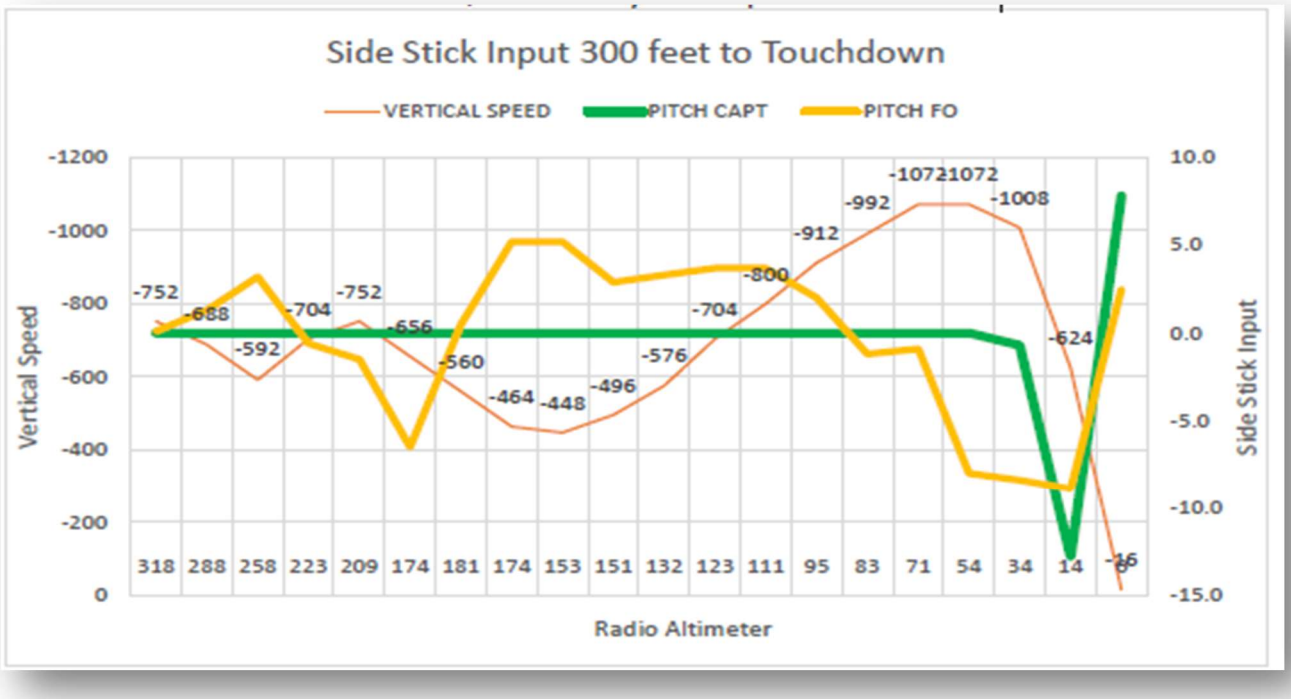
The significant events from the DFDR and graphical representation of the DFDR data are as follows:

Time (UTC)	Altitude (feet)	Aircraft controls with	Details
02:16:57	618	P2	• Autopilot was disengaged, however aircraft was on auto-thrust till landing • Rate of descent 704 fpm • Winds 265/15
02:17:05	514	P2	• Aircraft pitch 2.1 degree • Rate of descent 656fpm • Winds 274/14
02:17:29	200	P2	• Aircraft pitch 2.5 degree • Rate of descent 752 fpm • Winds 266/09 • Glideslope deviation -0.022
02:17:33	153	P2	• Aircraft pitch increased to 3.9 degree • Rate of descent decreased to 448 fpm • Winds 268/09 • Glideslope deviation 0.016
02:17:38	95	P2	• Aircraft pitch decreased to 0.7 degree • Rate of descent increased to 912 fpm • Winds 258/08
02:17:41	54	P2	• Aircraft pitch decreased to 0.4 degree

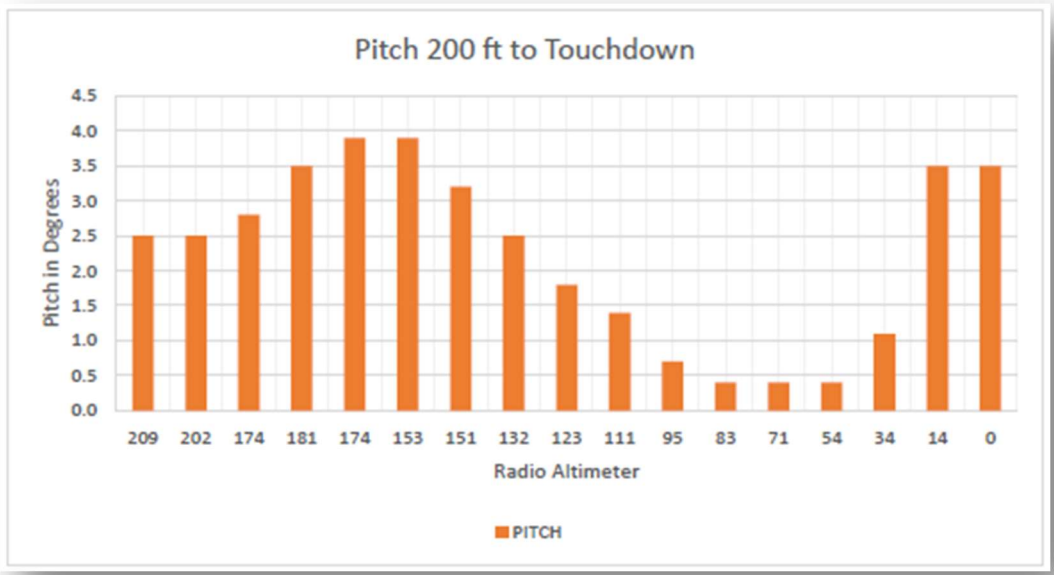
			• Rate of descent increased to 1072 fpm • Winds 262/09
02:17:42	34	PI & P2 (Dual input)	• Aircraft pitch increased to 1.1degree • Rate of descent decreased to 1008 fpm
02:17:44	Touchdown	PI & P2 (Dual input)	• Aircraft pitch increased to 3.5 degree • Vertical acceleration of 3.40 G

1.11.1.1 Graphical representation of DFDR data analysis

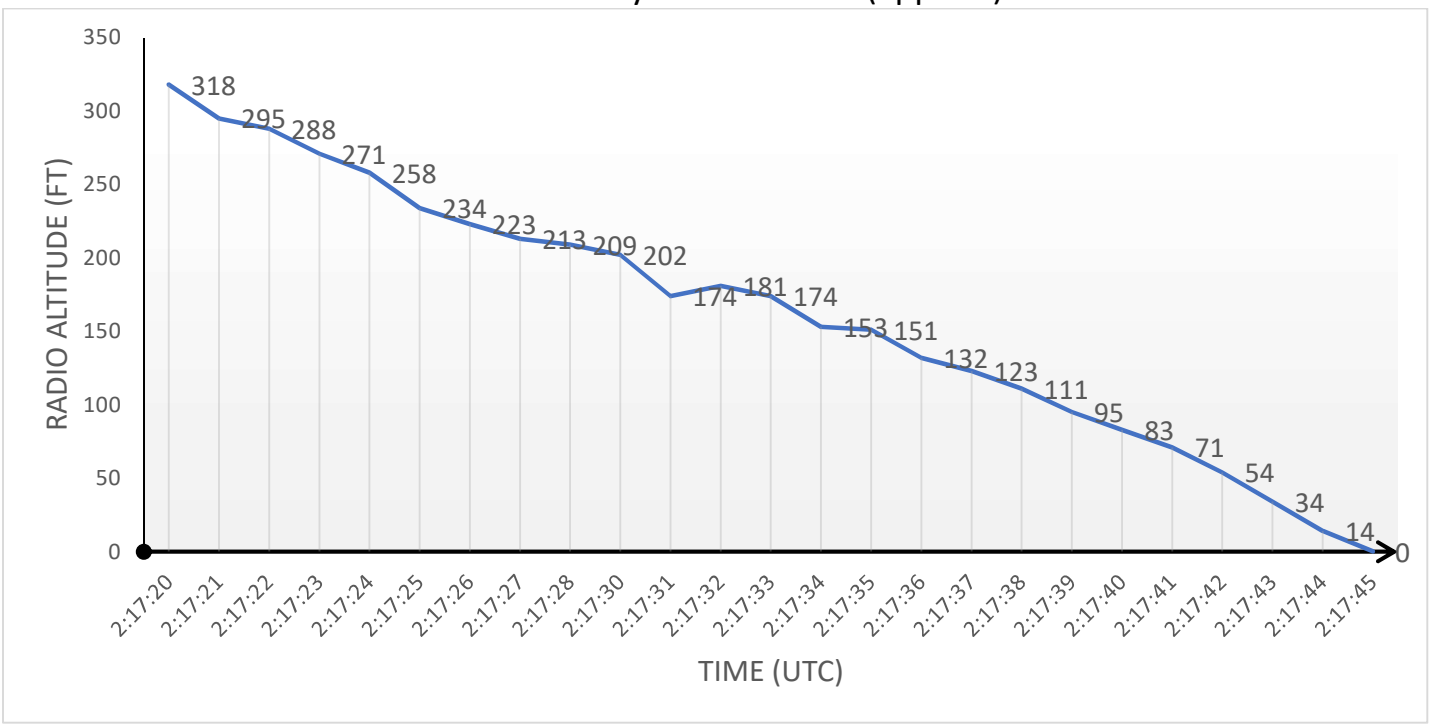
(a) Graphical representation for vertical speed along with the both cockpit crew side stick inputs are given below. It shows continuous pitch input was given by co-pilot which resulted in high rate of descent of 1072 fpm at 54ft RA. PIC gave a pitch input only after 34ft RA and resulted in dual input.



(b) Graphical representation for pitch attitude with radio altitude is given below. It shows the aircraft pitch was decreased to 0.4 degree at 54ft RA. The aircraft touched down with a pitch of 3.5 degrees.



(c) Graphical representation for radio altitude with time is given below. The flare was short and lasted only for 4 seconds (approx.) before touchdown.



1.11.2 Cockpit Voice Record (CVR):

The relevant events from the CVR tape transcript are as follows:

Time (Relative Time)	Source	Transmission
01:49:29	System Generated	1000FT
01:49:30	P1	Stabilized
01:49:53	P2	Rwy insight
01:49:55	P2	Manual flight
01:50:27	System Generated	200
01:50:34	P1	Keep going down, keep going down
01:50:35	P2	Yes captain going, correcting
01:50:36	System Generated	100
01:50:37	P1	Check
01:50:38	P1	Control, Control
01:50:39	P2	You have control
01:50:41	System Generated	50
01:50:41	System Generated	40
01:50:42	System Generated	Sink rate, sink rate
01:50:42	System Generated	Retard, retard
01:50:44	System Generated	Dual input, retard
01:52:05	P2	Didn't you take control? You have
01:52:10	P1	I have to take it, but it was too late. You didn't flare, I tried to flare but it was too late. We had a sink rate

1.11.3 Correlation between DFDR and CVR

1. CVR transcript and crew statements (para 1.17) were correlated and it is inferred that below 100 ft, PIC gave a call “control, control” and co-pilot gave a call “You have Control”. PIC did not take over the control until “sink rate, sink rate” & “retard, retard” auto call came.

2. CVR tape transcript was further correlated with DFDR data and it was found that at no point, co-pilot left the side stick and there was a continuous pitch (up and down) inputs. At 34ft RA when the “sink rate, sink rate” & “retard, retard” auto call came, PIC gave a pitch input to control the rate of descent (i.e 1008 fpm) of the aircraft. Subsequently” dual input” auto call generated and the pitch at the touchdown was increased to 3.5 degrees.

1.12 WRECKAGE & IMPACT INFORMATION:

Not applicable

1.13 MEDICAL AND PATHOLOGICAL INFORMATION:

The crew had submitted a self-declaration regarding consumption of alcohol as per prevailing DGCA Order No. DGCA-15031/4/2020-DAS dated 24 Mar 2020 before operating the flight from Delhi.

1.14 FIRE:

There was no pre/post incident fire.

1.15 SURVIVAL ASPECTS:

All the persons on-board the aircraft including 06 crew were safe.

1.16 TESTS AND RESEARCH:

Nil

1.17 ORGANIZATIONAL AND MANAGEMENT INFORMATION:

M/s TATA SIA Airlines Limited (Vistara) is a scheduled airline having an AOP no. S-27, which is a joint venture between Tata Sons Private Limited and Singapore Airlines Limited (SIA). The Airlines head Quarter is located at Gurugaon, Haryana. The Company is headed by the Chief Executive Officer who is assisted by a team of professionals from various departments. The airline has a fleet of 50 aircraft, including 39 Airbus A320, 04 Airbus A321neo, 05 Boeing 737-800NG and 02 Boeing 787-9.

1.18 ADDITIONAL INFORMATION:

1.18.1 Excerpt of PIC statement:

"On Approaching RWY 25, Indore and after disconnecting auto pilot the aircraft was stabilized. At around 500 feet AGL, the vertical speed dropped to 500 fpm so PIC commanded co-pilot to continue approach. PIC kept monitoring for any further deviation and kept his hand on the side stick for taking over for any unfavorable situation. Considering the sudden change of events from normal profile "control, control" was called by PIC. As the commands were with co-pilot, PIC never responded as "I have control" and there were no intension of takeover controls. At or around 30 feet, PIC felt the sink and made a correction to arrest the pitch and got the sink rate aural warning. On touchdown crew felt the landing to be firm and hard. There were no other deviation. After completion of the flight and parking the aircraft, the tech log entry was made for" suspected hard landing" on main wheels with 60.5 ton.

1.18.2 Excerpt of FO statement:

"Approaching Indore the ATIS reported weather parameters within STOL margins. Decent was appropriately managed and fully stabilized by 1000 feet.

Runway 25 was visual at about 800', and manual control was taken, the aircraft weight approximately 60.5T. Approach flown correctly on the ILS uptil 500', when the winds displayed on the ND about 27kts headwind. During visual scan of ND on the approach, co-pilot **erroneously saw the glideslope deviation at a low radio altitude and gave a pitch down input which then increased the rate of descent (ROD)**. Copilot applied pitch up command to arrest the ROD. At about 60'-50' the PIC took over controls by calling out 'I have controls', co-pilot stopped giving the sidestick input, in another second or two when the sink rate seemed high, co-pilot pulled the sidestick slightly back and dual Input call was triggered. The touchdown was hard, aircraft backtracked and taxied back to the bay. The engineering team and all the stakeholders were duly notified of the same and post flight duties carried out.

1.18.3 PF/PM Duties Transfer as per FCOM

PF/PM DUTIES TRANSFER

Ident.: PRO-NOR-SCO-00011914.0001001 / 23 DEC 14
Applicable to: ALL

To transfer control, flight crewmembers must use the following callouts:

- To give control: The pilot calls out "YOU HAVE CONTROL". The other pilot accepts this transfer by calling out "I HAVE CONTROL", before assuming PF duties.
- To take control: The pilot calls out "I HAVE CONTROL". The other pilot accepts this transfer by calling out "YOU HAVE CONTROL", before assuming PM duties.

1.18.4 Procedure on Supervised take-off and landing as per Operations Manual of M/s Vistara:

As per Para 1.1.2.2.2

a) The aircraft is established on the correct approach profile by 1000 feet above the aerodrome elevation. **He shall also ensure that the aircraft is stabilized during approach at the correct approach speed and aligned with the runway centreline and maintain a rate of descent within the specified limits for the type of aircraft and approach being made**.
b) Due consideration shall be given to the aircraft serviceability status and factors such as snags carried forward under minimum equipment list that affect take-off and landing handling or performance
c) The co-pilot is adequately briefed for take-off and landing

d) Co-pilot. The co-pilot shall ensure that

1. Adequate briefing for take-off and landing has been done.
2. The PIC is advised without delay of any circumstance that may adversely affect take- off or landing conducted by the co-pilot.

1.18.5 Requirements of Supervised take-off and landing:

DGCA Civil Aviation Requirement (CAR) Section 8 Series F part III, issue 1 rev 1 dated 24.11.2016 on "Supervised Takeoff and Landing Requirements for Scheduled and Non-Scheduled Operators Having Aeroplanes with AUW Exceeding 5700 Kgs" states following:

(i) Para 3-Eligibility requirements:

3.1 **PIC**. The PIC who permits a co-pilot to effect take-off and landing shall have;

a. Minimum flying experience – 3000 hours.
b. Minimum command experience – 1000 hours.
c. Minimum PIC experience on type – 300 hours.
d. Blameworthy free accident/incident record for preceding 3/1 years respectively.
e. Recent flying experience of 10 hours in preceding 90 days.
f. Been suitably trained and assessed for supervised take-off and landing in a level C/CG/D/DG simulator by the operator.

3.2 **Co-pilot**. The co-pilot who effects takeoff and landing shall have;

a. Been suitably trained and assessed for supervised take-off and landing in a level C/CG/D/DG simulator by the operator.
b. Completed type rating syllabus including base training/ZFTT simulator session as applicable.

(ii) **Para 5- Responsibility**

5.1 **Operator**. The operator shall ensure that;

a) The Operations Manual contains instructions, requirements and the procedure laid down for supervised take-off and landing consistent with this circular.
b) **Pilots are suitably trained and assessed for supervised take-off and landing in a level C/CG/D/DG simulator**.
c) List of pilots authorized for supervised take-off and landing is maintained and disseminated to all concerned.
d) List of aerodromes excluded for supervised take-off and landing is maintained and disseminated to all concerned.
e) Responsibility and duties of PIC and co-pilot for conduct of reject take-off and go-around maneuvers are specified for both cases when the copilot is occupies the RHS during co-pilot line flying/training/checks and LHS during PIC upgrade training/checks.
f) Method of handing and taking over controls between the PIC and co-pilot is specified.

5.2 **Pilot-in-command**. The PIC shall ensure that;

a. The aircraft is established on the correct approach profile by 1000 feet above the aerodrome elevation. **He shall also ensure that the aircraft is stabilized during approach at the correct approach speed and aligned with the runway centerline and maintain a rate of descent within the specified limits for the type of aircraft and approach being made**.
b. Due consideration shall be given to the aircraft serviceability status and factors such as snags carried forward under minimum equipment list that affect take-off and landing handling or performance.
c. The co-pilot is adequately briefed for take-off and landing.

5.3 **Co-pilot**. The co-pilot shall ensure that;

a. Adequate briefing for take-off and landing has been done.
b. **The PIC is advised without delay of any circumstance that may adversely affect take-off or landing conducted by the co-pilot**.

(ii) Para 6.2- General requirements

The meteorological minima for supervised take-off and landing shall be;

a. Visibility - 500 m higher than applicable minima.
b. Cloud base - 200 ft above MDA/DA.
c. Cross/tail wind component - maximum 10 kts.

1.19 USEFUL OR EFFECTIVE INVESTIGATION TECHNIQUES.

Nil.

2. ANALYSIS:

2.1. Aircraft:

The Aircraft had valid certificate of Airworthiness, Certificate of Registration and ARC before operating the incident flight. Last ARC was issued on 23th September 2020. All the inspections were carried out as per the approved schedules. Last major inspection was carried out on 06th August, 2020.

After the incident, hard landing inspections in accordance with AMM was carried out. It was found that, left hand and right hand of main landing gear shock absorber experienced excessive loads. OEM recommended to change the effected part within 400 FC or 90 Days. Same were replaced on 02 Nov 2021.

From the above, it is inferred that the maintenance aspect was not the contributory factor to the incident

2.2. Weather:

Weather was normal throughout the flight and no significant change was observed. During landing at Indore airport, the visibility was 3000m, winds 260/05 KT, Hence the weather was favorable for supervised take-off and landing.

2.3. Operational:

2.3.1: Flight Progress Details:

On 09th August 2021, M/s Vistara A320 aircraft VT-TTM was scheduled to operate passenger flight UK- 913 from Delhi to Indore. This was the first flight of the day for operating crew. This was a supervised takeoff and landing (STOL) flight. The Copilot was the pilot flying (PF) and PIC was the pilot monitoring. The aircraft took off from Delhi airport at 0645 Hrs for Indore. The flight was uneventful during takeoff, cruise and descent. The aircraft was stabilized at 1000ft as the requirement of stabilized approach criteria. The aircraft was cleared for instrument landing on runway 25 at Indore.

Due to pitch down movement, aircraft rate of descent was increased during finals and aircraft made a hard landing of 3.4G. After landing, aircraft taxied and parked to the assigned bay at Indore airport. There was no injury to any person and visual damage to aircraft.

2.3.2 Aircraft handling during approach and landing:

The CVR/DFDR recording/data were analyzed and it is inferred that the aircraft was stabilized by 1000ft and autopilot was disengaged at 618ft RA. During final approach at about 200 ft RA, pilot flying started increasing the pitch as she felt that there is a glideslope deviation. From analysis of DFDR data it can be verified that there was no significant deviation from glideslope. However, Pilot flying tried to capture the glide slope deviation by continuous changing of pitch movement of the aircraft. This led the increase of rate of descent from 656 fpm to 1072 fpm. Below 100ft RA, Pilot monitoring gave a call “control, control” with an intension to keep the aircraft in stabilized profile. However, co-pilot assumed that PIC wants to take over the control and gave a call “You have Control”. PIC did not take over the control. DFDR analysis shows that at no point, co-pilot left the side stick and there was a continuous pitch (up and down) inputs. As per the operations manual of M/s Vistara, Co-pilot is required to advise PIC without delay of any circumstance that may adversely affect take- off or landing conducted by the co-pilot. Also the same manual requires PIC to ensure that the aircraft is stabilized during approach at the correct approach speed and

aligned with the runway centreline and maintain a rate of descent within the specified limits for the type of aircraft.

At 40ft RA, aural warning of sink rate and retard came. At 34 ft AGL, PIC took over the controls and aural warning of dual input came along with "sink rate-sink rate and retard" aural warning. At no point, co-pilot left the side stick and there was a continuous pitch (up and down) inputs. High rate of descent coupled with inadequate flare resulted in aircraft touchdown with 3.4 G.

In the present incident, the co-pilot did abrupt maneuverers below 1000 ft to control the aircraft. PIC used confusing callout to control the aircraft which resulted into dual inputs in the cockpit. Also, he took over the aircraft very late which resulted into inadequate flare and hard landing of the aircraft.

2.3.3 Supervised take-off and landings (STOL):

(a) Para 3.1 (f) & para 5.1(b) of CAR Section 8 Series F Part III requires PIC to be "suitably trained and assessed for supervised take-off and landing in a level C/CG/D/DG simulator by the operator". However neither operator nor PIC ensured the fulfillment of above requirement for STOL.

(b) Para 5.2 (a) of CAR Section 8 Series F Part III requires PIC shall ensure that "the aircraft is stabilized during approach at the correct approach speed and aligned with the runway centerline and maintain a rate of descent within the specified limits for the type of aircraft and approach being made". However PIC did not initiate corrective actions on time despite the rate of descent of the aircraft was high during finals.

It is inferred from above para 2.3,

a) High rate of descent coupled with inadequate flare resulted in aircraft touchdown with high vertical acceleration of 3.4 G.
b) There was a breakdown of Crew Resource Management (CRM) between the cockpit crew. Further the PM did not use the correct phraseology and PF perceived the callout of PM incorrectly.
c) There was contravention of CAR Section 8 Series F Part III by operator in terms of using the privileges of STOL.

3. CONCLUSIONS:

3.1. FINDINGS:

3.1.1 The Certificate of Airworthiness and the Certificate of Registration of the aircraft was valid on the date of incident.

3.1.2 All the concerned Airworthiness Directive, Service Bulletins, DGCA Mandatory Modifications on this aircraft and its engine were found complied with.

3.1.3 The crew had submitted a self-declaration regarding consumption of alcohal as per prevailing DGCA Order before operating the flight from Delhi.

3.1.4 The aircraft was under command of an appropriately licensed ATPL holder with a CPL holder as the co-pilot.

3.1.5 Aircraft was scheduled for supervised takeoff and landing (STOL) flight. During the flight, Co-pilot was the pilot flying and PIC was the pilot monitoring.

3.1.6 Weather was conducive for supervised take-off and landing.

3.1.7 The take-off, climb, cruise and approach were uneventful. The aircraft was stabilized by 1000ft RA. The autopilot was disengaged by the PF at 618 ft RA while the auto thrust remained engaged.

3.1.8 During final approach at about 200 ft RA, pilot flying started increasing the pitch as co-pilot(i.e pilot flying) assumed that there is a glideslope deviation. Analysis of DFDR data indicates that there was no significant deviation from glideslope. However, Pilot flying tried to capture the glide slope deviation by continuous changing of pitch movement of the aircraft.

3.1.9 Continuous changing of pitch increased the rate of descent from 656 fpm to 1072 fpm.

3.1.10 Below 100ft RA, Pilot monitoring gave a call “control, control” with an intension to keep the aircraft in stabilized profile. However, co-pilot assumed that PIC wants to take over the control and gave a call “You have Control”.

3.1.11 PIC did not take over the control. DFDR analysis shows that at no point, co-pilot left the side stick and there was a continuous pitch (up and down) inputs.

3.1.12 At 40ft RA, aural warning of sink rate and retard came. At 34 ft AGL, PIC took over the controls and aural warning of dual input came along with "sink rate-sink rate and retard" aural warning.

3.1.13 High rate of descent coupled with inadequate flare resulted in aircraft touchdown with 3.4 G.

3.1.14 M/s Vistara did not ensure the compliance of requirement of Para 5.1(b) of CAR Section 8 Series F Part III.

3.2 PROBABLE CAUSES:

High rate of descent coupled with inadequate flare resulted in aircraft touchdown with high vertical acceleration.

Contributory factor:

Poor Crew Resource Management between the cockpit crew during the critical phase of flight was the contributory factor to the incident.

4. SAFETY RECOMMENDATIONS:

4.1 Nil recommendation in view of the following:

(a) Cockpit crew have already undergone corrective training.

(b) M/s Vistara has amended their operations manual in view of the finding no.3.1.14 to meet the requirement of Para 5.1(b) of CAR Section 8 Series F Part III.

(Capt A.K Yadav)
SFOI(A)/ Member

(Rahul Agarwal)
ADAS/ Investigator-In-Charge

Place: New Delhi