

FINAL INVESTIGATION REPORT ON SERIOUS INCIDENT TO M/S SPICEJET PVT. LTD. BOEING 737-800 AIRCRAFT VT-SXE AT VARANASI ON 27TH FEBRUARY 2020

AIRCRAFT ACCIDENT INVESTIGATION BUREAU MINISTRY OF CIVIL AVIATION GOVERNMENT OF INDIA

FOREWORD

In accordance with Annex 13 to the Convention on International Civil Aviation Organization (ICAO) and Rule 3 of Aircraft (Investigation of Accidents and Incidents), Rules 2017, the sole objective of the investigation of an accident/serious incident shall be the prevention of accidents and incidents and not to apportion blame or liability. The investigation conducted in accordance with provisions of the above said rules shall be separate from any judicial or administrative proceedings to apportion blame or liability.

This document has been prepared based upon the evidences collected during the investigation, opinion obtained from the experts and laboratory examination of various components. Consequently, the use of this report for any purpose other than for the prevention of future accidents or incidents could lead to erroneous interpretations.

INDEX

	Para	Content	Page No.
		Executive Summary	5
1		FACTUAL INFORMATION	6
	1.1	History of the Flight	6
	1.2	Injuries to Persons	6
	1.3	Damage to Aircraft	6
	1.4	Other Damage	6
	1.5	Personnel Information	7
	1.5.1	Pilot-in-Command	7
	1.5.2	Co-Pilot	8
	1.6	Aircraft Information	8
	1.6.1	B737-800 Aircraft – General Description	8
	1.6.2	Pneumatic System – B737-800	11
	1.7	Meteorological Information	13
	1.8	Aids To Navigation	14
	1.9	Communications	14
	1.10	Aerodrome Information	14
	1.11	Flight Recorders	14
	1.11.1	Relevant DFDR data	14
	1.11.2	CVR Analysis	17
	1.12	Wreckage and Impact Information	17
	1.13	Medical and Pathological Information	17
	1.14	Fire	18
	1.15	Survival Aspects	18
	1.16	Tests and Research	18
	1.17	Organisational and Management Information	18
	1.18	Additional Information	18
	1.10.1	Dilet Deport as per OPE	10
	1.10.2	Pilot Report as per OKF Pilot Report as per Tech Log	20
	1 18 4	Troubleshooting as per Work Order	20
	1.18.5	High failure rate of PCCV	21
	1.19	Useful or Effective Investigation Techniques	20
2		ANALYSIS	22
	2.1	Serviceability of Aircraft	22
	2.2	Weather	22
	2.3	Operational Factors	22
	2.3.1	Pilot Factor	22
	2.3.2	Crew Handling of the Aircraft & Decision Making	22
•	2.4	Circumstances Leading to the Incident	23
3	0 4	CONCLUSIONS	24
	3.1	Findings	24
	3.2	Probable Cause of the Incident	25
4		SAFETY RECOMMENDATIONS	25
		Annexure 'A'	26
		Annexure 'B'	30

GLOSSARY

AAIB	:	Aircraft Accident Investigation Bureau, India
AMSL	:	Above Mean Sea Level
ARC	:	Airworthiness Review Certificate
ASR	:	Airport Surveillance Radar
ATPL	:	Air Transport Pilot Licence
ATC	:	Air Traffic Control
AUW	:	All Up Weight
C of A	:	Certificate of Airworthiness
C of R	:	Certificate of Registration
CAR	:	Civil Aviation Requirements
CPL	:	Commercial Pilot License
CVR	:	Cockpit Voice Recorder
DFDR	:	Digital Flight data Recorder
DGCA	:	Directorate General of Civil Aviation
ECS	:	Environmental Control System
FO	:	First Officer
FCOM	:	Flight Crew Operating Manual
FCTM	:	Flight Crew Training Manual
FRTOL	:	Flight Radio Telephone Operators License
hrs	:	Hours
ΙΑΤΑ	:	International Air Transport Association
ICAO	:	International Civil Aviation Organization
IFR	:	Instrument Flight Rules
ILS	:	Instrument Landing System
LLZ	:	Localizer
MEL	:	Minimum Equipment List
MLG	:	Main Landing Gear
NDB	:	Non-Directional Beacon
NLG	:	Nose Landing Gear
NM	:	Nautical Miles
PA	:	Passenger Address
PF	:	Pilot Flying
PIC	:	Pilot in Command
РМ	:	Pilot Monitoring
QRH	:	Quick Reference Handbook
RA	:	Radio Altitude
RESA	:	Runway End Safety Area
SB	:	Service Bulletin
SEP	:	Safety and Emergency Procedures Manual
VFR	:	Visual Flight Rules
VMC	:	Visual Meteorological Conditions
VOR	:	VHF Omnidirectional Range
UTC	:	Coordinated Universal Time

FINAL INVESTIGATION REPORT ON SERIOUS INCIDENT TO M/S SPICEJET LIMITED B737-800 AIRCRAFT VT-SXE AT VARANASI ON 27th FEB 2020

1.	Aircraft			
		Туре	:	B737-800
		Nationality	:	Indian
		Registration	:	VT-SXE
2.	Operator		:	Spice Jet Limited
3.	Owner		:	M/s Alterna Aircraft V B Limited, Ireland
4.	Pilot		:	ATPL Holder
5.	Co-Pilot		:	CPL Holder
6.	No. of Pass	engers on board	:	191 (Excluding Six Crew Members)
7.	Date & Tim	e of Incident	;	27 th Feb 2020 at 0915 UTC
8.	Place of Inc	cident	:	Enroute
9.	Co-ordinate	es of Incident Site	:	N/A
10.	Last point c	of Departure	:	Mumbai Airport
11.	Intended la	nding place	:	Varanasi Airport
12.	Type of Op	eration	:	Scheduled Operation
13.	Phase of op	peration	:	Cruise
14.	Type of Sei	rious Incident	:	Emergency descent due to uncontrolled cabin pressurization

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

Executive Summary

On 27th Feb 2020, M/s SpiceJet Ltd. Boeing B737-800 aircraft VT-SXE while operating a scheduled flight from Mumbai to Varanasi was involved in a Serious Incident of "Emergency descent due to uncontrolled Cabin pressurization" near Varanasi Airport.

This was the third sector for the day for the aircraft. The aircraft chocks were off at 0720 hrs UTC. The taxi out and the take off was uneventful. During climb, ENG #1 Bleed annunciator was illuminated. Associated Non Normal Checklist (NNC) actions were carried out by the crew and #1 Bleed annunciator went off after switching of #1 pack. Further, the flight continued to destination with single pack. While descending from FL370 and passing FL332, the crew noticed that the cabin altitude is increasing and simultaneously CABIN Altitude Horn came on. Crew declared "MAYDAY" and an emergency descent was carried out by crew. The oxygen masks were deployed. Once the Aircraft reached at approx FL 100, cabin altitude was under control, the masks were removed, and the crew cancelled the distress situation. The aircraft landed safely at VNS and there was no casualties reported.

Director General, AAIB appointed Sh. Anil Tewari, Director, AAIB as Investigator – In – Charge & Sh. Amit Kumar, Safety Investigator Officer, AAIB as Investigator to investigate into the probable cause(s) of the serious incident, vide order No. INV.12011/7/2020-AAIB dated 9thMarch 2020 under Rule 11 (1) of Aircraft (Investigation of Accidents and Incidents), Rules 2017.

1. FACTUAL INFORMATION

1.1 History of the Flight

On February 27, 2020, SpiceJet Boeing 737-800 aircraft VT-SXE was operating flight SG-246, sector BOM - VNS. This was the third sector of the day for the aircraft and first sector for both Captain and first officer. There were 02 cockpit crew, 04 cabin crew and 191 passengers on board. At BOM, the PIC had undergone the preflight check for alcohol at 0625 UTC and FO at 0612 UTC; both crew were tested negative. The aircraft chocks were off at 0720 UTC. Taxi out and the takeoff was uneventful. During climb, passing FL190, #1 Bleed Trip Off annunciator came on. Associated actions as per Non Normal Checklist (NNC) were carried out and #1 PACK SWITCH was put to OFF and the #1 Bleed annunciator went off. As per PIC discretion, the flight continued to destination with single "PACK". During descend from FL370, the crew observed steady rise in cabin altitude. While descending and passing FL332, the CABIN Altitude Horn came on. Immediately, cockpit crew wore the oxygen mask & requested ATC for descent to FL100 due to decompression and the same was approved by ATC. Crew declared "MAYDAY" and an emergency descent was carried out. NNC actions for "CABIN ALTITUDE WARNING or Rapid Depressurization" were carried out by the crew. The oxygen masks were deployed inside the passenger cabin. Once the Aircraft reached approx FL 100, cabin altitude was under control, the masks were removed, and the crew cancelled the distress situation. The aircraft landed safely at VNS. There was no damage to the aircraft. There was no fire and injury to any of the occupants on board the aircraft.

1.2 Injuries to Persons

There was no injury to any of the aircraft occupant or personnel on ground.

1.3 Damage to Aircraft

There was no damage to the aircraft during the incident.

1.4 Other Damage

Nil

1.5 Personnel Information

1.5.1 Pilot - In – Command (PIC)

Date of Birth	:	19.03.82
License	:	ATPL
Date of Issue	:	06-Jan-15
Valid up to	:	05-Jan-22
Date of Class I Med. Exam.	:	18-Jun-19
Class I Medical Valid up to	:	24-Jun-20
Date of issue FRTOL License	:	22-Dec-08
FRTO License Valid up to	:	21-Dec-23
Endorsements as PIC	:	C172A, PA-34, B737-
		700/800/900/ MAX
Total flying experience	:	7599:45 Hrs
Total flying experience on type	:	7282:22 Hrs
Total flying experience as PIC on type	:	3920:41 Hrs
Last Flown on type	:	27-Feb-20
Total flying experience during last 1 year	:	682:36 Hrs
Total flying experience during last 6 Months	:	377:39 Hrs
Total flying experience during last 30 days	:	89:35 Hrs
Total flying experience during last 07 Days	:	18:24 Hrs
Total flying experience during last 24 Hours	:	02:30 Hrs
Rest period before flight	:	12:00 Hrs
Whether involved in Accident/Incident earlier	:	Νο
Last PPC	:	31 Jan 2020

1.5.2 Co-Pilot

Date of Birth	:	15-Jan-89
License	:	CPL
Date of Issue	:	01-Oct-10
Valid up to	:	15-Jun-21
Date of Class I Med. Exam.	:	24-Apr-19
Class I Medical Valid up to	:	27-Apr-20
Date of issue FRTO License	:	01-Oct-10
FRTO License Valid up to	:	27-Mar-21
Endorsements as PIC	:	NIL
Total flying experience	:	935:46 Hrs
Total flying experience on type	:	632:19 Hrs
Last Flown on type	:	27-Feb-20
Total flying experience during last 1 year	:	632:19 Hrs
Total flying experience during last 6 Months	:	344:07 Hrs
Total flying experience during last 30 days	:	83:28 Hrs
Total flying experience during last 07 Days	:	21:13 Hrs
Total flying experience during last 24 Hours	:	02:30 Hrs
Rest period before flight	:	12:45 Hrs
Whether involved in Accident/Incident earlier	:	No
Last PPC	:	13 Nov 19

1.6 Aircraft Information

1.6.1 Boeing 737-800 Aircraft - General Description

Boeing B737-800 is a subsonic, medium-range, civil transport aircraft. The aircraft is installed with two high bypass turbofan engines manufactured by International Aero Engines. The aircraft is designed for operation with two pilots and has passenger seating capacity of 189. The aircraft is certified in Normal (Passenger) category, for day and night operations under VFR & IFR. The maximum take-off weight (MTOW) is 79015 Kgs. The Maximum Landing weight is 65317 Kgs.

The Aircraft length is 39.472 meters, wingspan is 34.3 meters and height is 12.459 meters. The distance between main wheel centers is 5.715 meters. The Ground Clearance is 0.53 meters.



Figure-1: Three View Diagram of Boeing 737-800 aircraft

Aircraft VT-SXE (MSN- 34802) was manufactured in year 2007. The aircraft was registered with DGCA under the ownership of M/s Alterna Aircraft VB Limited, Ireland. The aircraft is registered under Category 'A' and the Certificate of Registration No. 5128.

The Certificate of Airworthiness Number 7231 under "Normal category" subdivision Passenger / Mail / Goods was issued by DGCA on 05/07/2020. The specified minimum operating crew is two. At the time of incident the Certificate of Airworthiness was current and valid.

The Aircraft was holding a valid Aero Mobile License No- A-010/149/RLO(NR) at the time of incident. This Aircraft was operated under Scheduled Operator's Permit No- S-16 which was valid. The scrutiny of the Airframe Log book revealed that as on February 27, 2020; before operating the subject flight the aircraft had completed 52496:51 Hrs (TSN) and 24009 landing (CSN).

The aircraft and its Engines are being maintained as per the maintenance program consisting of calendar period/ flying Hours or Cycles based maintenance approved by Regional Airworthiness office, Delhi. Accordingly, all major inspections and lower inspections (Pre-flight checks, Service Checks, Weekly Checks) were carried out as and when due.

The aircraft was last weighed on 22 Nov 2019 at IGI Airport, New Delhi and the weight schedule was prepared and duly approved by the office of Director of Airworthiness, DGCA, Delhi. As per the approved weight schedule, the Empty weight of the aircraft is 43099.05 Kgs. Maximum Usable fuel Quantity is 29324:41 ltrs. Empty weight CG is 16.78 meters aft of datum. As there has not been any major modification affecting weight & balance since last weighing, hence the next weighing is due on 21 Nov 2024. Prior to the incidented flight, the weight and balance of the aircraft was well within the operating limits.

All concerned Airworthiness Directives, mandatory Service Bulletins, DGCA Mandatory Modifications on this aircraft and its engines have been complied with as on date of event.

Transit Inspections are carried out as per approved Transit Inspection schedules. All higher inspection schedules including (checks 1 inspection) as per the manufacturer's guidelines as specified in Maintenance Program and are approved by the Continuing Airworthiness Manager (Post Holder for Continuous Airworthiness).

The aircraft is powered with two CFMI Engines. The details of the Engines is given below:

	Engine # 1 (LH)	Engine #2 (RH)
Engine Model	CFM56-7B	CFM56-7B
Serial Number	894431	894436
TSN(Hrs)	47726	47875

10

1.6.2 Pneumatic System - B737-800

The pneumatic system supplies compressed air to the airplane user systems. Following are the sources of pneumatic power:-

- Engine 1 bleed air system
- Engine 2 bleed air system
- Auxiliary power unit (APU) bleed air system
- Pneumatic ground air connection.

The pneumatic manifold collects the compressed air from the sources and supplies it to the user systems. Valves in the manifold, control the flow of bleed air into the manifold, isolate the manifold into left and right sides, and control the flow of manifold air into the user systems.

Following are the airplane systems that use pneumatic power:

- Engine start systems
- Air conditioning and pressurization systems
- Nitrogen generation system
- Engine inlet cowl anti-ice systems
- Wing thermal anti-ice systems
- Water tank pressurization system
- Total air temperature probe aspiration
- Auxiliary fuel tank pressurization system
- Hydraulic reservoir pressurization system.

Pneumatic system controls and indications are on the P5-10 air conditioning panel. The indications and controls use 28C DC and 115 V AC.

Figure-2 below is a schematic of the different user units and sources of the pneumatic system.



Figure-2: Schematic of Pneumatic System on Boeing 737NG Aircraft

Engine 1 and 2 bleed air is tapped from the 5th and 9th stage compressors. APU bleed air is active during certain conditions, including when the aircraft is on the ground or when it is in the air up to FL170. The system is protected by an APU check valve. The ground connection is located in the right underbelly of the aircraft. It's main purpose is to serve as a connector port for a ground pneumatic supply.

High temperature, high pressure air is pooled in the pneumatic manifold. This acts as a reservoir to hold all the fluids, as well as a supply line for the user systems from the pneumatic sources. The pneumatic manifold is equipped with an isolation valve that is able to isolate the left pneumatic system from the right pneumatic system, and vice versa. This is especially useful in the event of a component failure. The isolation valve is normally closed.



Figure-3: The location of the pneumatic system within the aircraft

The isolation valve consists of strong, lightweight, corrosion resistant ducts, protected by gold coating and held in tension by support. As mentioned, the ducts are separated into the left and right system. Figure-3 above describes the location of the pneumatic system onboard the aircraft.

1.7 Meteorological Information

During Departure from BOM :- From ATIS, following weather details were obtained for RWY 14: at time 0633 hrs UTC, wind 130 degree 07 knots, visibility 2500 m, temp 35 degree C, QNH 1013 HPa.

During Arrival at VNS:- From ATIS, following weather details were obtained for RWY 27: at time 0836 hrs UTC, winds 030 degree 02 knots, visibility 4000 m, temp 20 degree C, QNH 1014 HPa.

1.8 Aids to Navigation

All Navigational Aids fitted on the aircraft and installed at Varanasi Airport were working satisfactorily.

1.9 Communications

At the time of incident, the aircraft was in contact with Varanasi Area Control. There was always two-way communication between the aircraft & ATC.

1.10 Aerodrome Information

Lal Bahadur Shastri International Airport (IATA: VNS, ICAO: VEBN) is a public airport located at Babatpur, 26 km northwest of Varanasi, Uttar Pradesh, India. The air traffic services at Varanasi airport are provided by AAI including Aerodrome Control service (ADC/SMC), Approach Control service (APP), Area Control Service (ACC) and Route Surveillance Radar Service (RSR).

1.11 Flight Recorders

The aircraft was fitted with Solid state Cockpit Voice Recorder having part No. 2100-1020-00 and Serial No. 000455432 and Digital Flight Data Recorder having part No. 2100-4043-00 and Serial No. 000849101.

1.11.1 Relevant DFDR data

Time in UTC	Sequence of Events
	Engine 2 start
07.24.00	ENG#1 bleed switch ON
07.24.00	ENG#2 bleed switch ON
	ECS Isolation valve : open
	Engine 1 start
07.24.51	ENG#1 bleed switch ON
07.24.51	ENG#2 bleed switch ON
	ECS Isolation valve : open
07:25:08	Flaps 5 selected
	Taxi start
	ENG#1 bleed switch ON
07.26.05	ENG#2 bleed switch ON
07.20.05	ENG#1 bleed Valve : Open
	ENG#2 bleed Valve : Open
	ECS Isolation valve : Closed

07:54:13	Line UP RWY 14
	Aircraft took off
	TRA#1: 77.2
	TRA#2: 77
	CAS: 165 kts
	Selected Altitude: 6992 ft
	ENG#1 bleed switch ON
07:55:15	ENG#2 bleed switch ON
	ENG#1 bleed Valve : Open
	ENG#2 bleed Valve : Open
	ECS Isolation valve : Closed
	Left ECS PACK ON
	Right ECS PACK ON
	ECS Isolation valve : CLOSED
	Selected Altitude: 8992 ft
	ENG#1 bleed switch ON
	ENG#2 bleed switch ON
07:55:53	ENG#1 bleed Valve : Open
	ENG#2 bleed Valve : Open
	ECS Isolation valve : Closed
	Right ECS PACK ON
	Master Caution for TU sec,
	FNC#1 blood awitch ON
	ENG#1 bleed switch ON
08.05.10	ENG#2 bleed Switch ON ENG#1 blood Valve : Open
00.05.10	ENG#2 bleed Valve : Open
	ECS Isolation value : Closed
	Left FCS PACK ON
	Right ECS PACK ON
	Master caution for 4 sec.
	Attitude: 23041 ft(baro)
	ENG#1 bleed switch ON
	ENG#2 bleed switch ON
08:07:19	ENG#1 bleed Valve : Open
	ENG#2 bleed Valve : Open
	ECS Isolation valve : Closed
	Left ECS PACK ON
	Right ECS PACK ON
	ENG#1 bleed Valve : Closed
	Altitude: 23523 ft (baro)
	ENG#1 bleed switch ON
08.02.32	ENG#2 bleed switch ON
00.01.00	ENG#2 bleed Valve : Open
	ECS Isolation valve : OPEN
	Lett ECS PACK OFF
	Right ECS PACK ON
08:17:02	Master caution for 2 sec
	ENG#1 bleed switch ON

	ENG#2 bleed switch ON
	ENG#1 bleed Valve : Closed
	ENG#2 bleed Valve : Open
	ECS Isolation valve : OPEN
	Left FCS PACK OFF
	Right FCS PACK ON
	Aircraft level off at FL 370
	ENG#1 bleed switch ON
	ENG#2 bleed switch ON
	ENG#1 bleed Valve : Closed
08:17:56	ENG#2 bleed Valve · Open
	ECS Isolation valve · OPEN
	Left ECS PACK OFF
	Right ECS PACK ON
	Aircraft TOD
	FNG#1 bleed switch ON
	ENG#2 bleed switch ON
	ENG#1 bleed Valve · Closed
09:12:32	ENG#2 bleed Valve : Open
	ECS Isolation valve · OPEN
	Left ECS PACK OFF
	Right ECS PACK ON
	Master caution for 4 sec.
	Attitude: 35112 ft(baro)
	ENG#1 bleed switch ON
	ENG#2 bleed switch ON
09:13:58	ENG#1 bleed Valve : Closed
	ENG#2 bleed Valve : Open
	ECS Isolation valve : OPEN
	Left ECS PACK OFF
	Right ECS PACK ON
	Cabin altitude Warning for 08 Min 15 sec
	Attitude: 33222 ft(baro)
	ENG#1 bleed switch ON
	ENG#2 bleed switch ON
09:15:09	ENG#1 bleed Valve : Closed
	ENG#2 bleed Valve : Open
	ECS Isolation valve : OPEN
	Left ECS PACK OFF
	Right ECS PACK ON
	Master caution for 08 Min 13 sec
	Attitude: 26996 ft(baro)
	ENG#1 bleed switch ON
	ENG#2 bleed switch ON
09:16:35	ENG#1 bleed Valve : Closed
	ENG#2 bleed Valve : Open
	ECS Isolation valve : OPEN
	Left ECS PACK OFF
	Right ECS PACK ON
09:29:05	Aircraft level off at FL 50

09:29:22	Master caution for 04 sec Attitude: 4989 ft(baro) ENG#1 bleed switch ON ENG#2 bleed switch ON ENG#1 bleed Valve : Closed ENG#2 bleed Valve : Open ECS Isolation valve : OPEN Left ECS PACK OFF Pight ECS PACK ON
09:32:15	Aircraft started descent
09:36:32	Aircraft level off at FL 23
09:42:31	All Gear down Altitude: 2165 ft AGL
09:42:39	Flaps 30 selected Altitude: 2160 ft AGL
09:42:43	Aircraft started descent
09:45:20	Aircraft landed ENG#1 bleed switch ON ENG#2 bleed switch ON ENG#1 bleed Valve : Closed ENG#2 bleed Valve : Open ECS Isolation valve : OPEN Left ECS PACK OFF Right ECS PACK ON
09:46:12	Runway Exit
09:49:01	Both engine shutdown

1.11.2 Cockpit Voice Recorder Analysis

Relevant analysis is placed at Annexure 'A' to this report.

1.12 Wreckage and Impact Information

There was no damage to the aircraft.

1.13 Medical and Pathological Information

The crew had undergone pre-flight medical (Breath Analyser Test) at Mumbai before departure as per requirement of CAR Section 5, Series F, Part III. The test result was negative i.e. both cockpit crew were not under the influence of alcohol.

The crew had undergone post – flight medical test at Varanasi after the incident which was found to be negative.

1.14 Fire

There was no fire.

1.15 Survival Aspects

The incident was survivable.

1.16 Tests and Research

Nil

1.17 Organisational and Management Information

The aircraft was operated by a scheduled operator holding AOP No. S-16 in Passenger and Cargo Category which is valid till 16.05.2023. M/s SpiceJet currently has seven Boeing 737-700, fifty-two Boeing737-800, five Boeing 737-900, thirteen Boeing 737-8(MAX), Four B737-700 (Freighter), Five B737-800 (Wet Lease), and thirty-two Bombardier Q400s, with a total of 118 aircraft.

The operator carries out maintenance of aircraft as per CAR 145 approved organization. They have in-house training facility for the pilots, cabin crew, airport services and Engineering.

The organisation has formulated an Operations Manual based on the existing regulations, duly approved by DGCA.

1.18 Additional Information

1.18.1 Brief overview - Air Conditioning & Pressurisation system

B737-800 Aircraft Bleed air supplies the following systems: -

- Air conditioning
- Engine Starting
- Pressurisation
- Hydraulic tank pressurisation
- Engine / Wing Anti-ice
- Water tank pressurisation

Bleed air is supplied normally by the engine 5th stage low pressure area, additionally 9th when demand is high. Any over pressure or over temperature will

cause the valve to close and illuminate the BLEED TRIP OFF light. Duct Pressure is measured after the bleed air valve and before the pack valve.

Isolation valve has 3 positions, namely:

- Close, isolates both sides of the bleed air system

- Auto, opens the valve if any bleed or pack switches are moved to OFF, otherwise valve is closed

- Open, isolation valve is open

Outflow Valve: - Cabin pressurisation is controlled by the outflow valve. Maximum differential pressure is 9.1 psi. The outflow valve can be controlled by 3 DC motors, 2 Automatic controlled and 1 manually controlled. There are 2 positive pressure relief valves, and one negative pressure relief valve.

Packs:- Air from the left pack is supplied to the flight deck, any excess air is returned to the mix manifold. Air from the right pack supplies the mix manifold The mix manifold air is then passed through the trim air system and distributed to the forward and aft cabin. Trim air is used to adjust zone temperatures. The 3 zones are the flight deck, the forward cabin and the aft cabin. If a pack is not operating, the other pack will regulate in high flow (except on ground or in-flight with flaps extended) If a pack fails or is turned off, the other pack will produce air to satisfy the coolest zone temperature demand. If the trim air system is failed, each pack will operate in isolation of the other.

A recirculation fan reduces the load on the air conditioning system. Air from the cabin and E&E bay is drawn and circulated around the cargo bay before being filtered and returned to the mix manifold.

Ground air conditioning:- feeds in the mix manifold, temperature control from the ground unit.

External air cart: - feed in the pneumatic bay, permits engine air start, temperature can be controlled in flight deck.

1.18.2 Pilot Report as per Occurrence Report Form (ORF)

As recorded in ORF: "During climb no. 1 bleed trip off light illuminated. Associated NNC was carried out. Flight was conducted on single pack. During descent cabin started climbing and cabin altitude started increasing. Carried out fast descent. Cabin altitude was uncontrollable. Hence initiated emergency descent and carried out memory items followed by cabin altitude warning rapid depressurization NNC at approx. 10000ft. Cabin was under control masks were removed and cancelled distress situation was under control. Normal landing was carried out. No casualties were reported."

1.18.3 Pilot Report as Per Techlog

As per techlog, pilot had reported snag "During climb no. 1 bleed trip off light illuminated. Associated NNC was carried out. Flight was conducted on single pack. During descent, cabin started climbing and cabin altitude started increasing. Carried out fast descent cabin altitude was uncontrollable hence initiated emergency descent and carried out memory item followed by cabin altitude warning. Rapid depressurization NNC. At approx 10000ft cabin was under control, masks were removed and cancelled distress. Situation was under control. Normal landing was carried out."

1.18.4 Troubleshooting as Per Work Order

Rectification action carried out by maintenance staff and recorded in the work order is as follows:

"Cabin Pressure Controllers (CPC) BITE Carried As Per Fault Isolation Manual (FIM) 21-31 Task 801 found following faults: -

(1) Manual Switch (Informative).

(2) Cabin Alt 10000 Ft (Informative).

(3) Low Inflow / High Leakage.

Troubleshooting started with Engine #01 Bleed Trip Off at climb. As Per Fault Isolation Manual (FIM) 36-10 Task 809 during visual inspection found PCC valve shaft free to rotate and during leak check of Engine #01 pneumatic line with APU Bleed as source found downstream Pr. Sense Line to Precooler leaking. PCCV replaced as per AMM 36-12-02 and downstream Pr. Sense Line (P/N 16135-81) replaced with serviceable one as per AMM 36-12-01. Post Installation Leak check carried out with APU Bleed as source found no leaks and post installation test of PCCV carried out as per AMM 36-12-01, Found Satisfactory. Low Bleed for Engine #02 at descent troubleshooting carried out as per FIM 36-10 Task 809 found control pressure sense Tube (P/N 332a2350-11) of High Stage Valve broken. Same Replaced With serviceable pipeline as per AMM 36-11-06. Post installation leak check carried out found no leaks. Confidence check carried out as per AMM 21-00-05-780-801, Found Satisfactory. Again, CPC BITE carried out found satisfactory.

Crew oxygen pressure 1100 Psi sufficient for three cockpit crew operation. All used oxygen masks in cabin and galley and unused oxygen masks in all Lavatory stowed back and panels refitted as per AMM 35-22-31. For Passenger and Attendant oxygen systems MEL 35 05A and MEL 25-03-01 has been invoked. A/C and Engine normalised. Cabin depressurization condition inspection carried out as per AMM 05-51-81, Found Satisfactory".

Details of Replaced Component:

PRE COOLER CONTROL VALVE (PCCV): ON/OFF P/N: 3289562-5, ON S/N: 1659C, OFF S/N: 5609 PR.SENSE LINE: ON/OFF P/N: 16135-81 CONTROL PRESSURE SENSE TUBE: ON/OFF P/N: 332A2350-11

1.18.5 High Failure Rate of PreCooler Control Valve (PCCV)

During investigation, data in respect of removal / Installation of PCCV for last one year fitted on B737-800 aircraft held by operator was analysed. It was noticed that a total of 75 PCCV units have been replaced due to various reasons. The details are placed at Annexure 'B' to this report.

1.19 Useful or Effective Investigation Techniques

Nil

2. ANALYSIS

2.1 Serviceability of the Aircraft

Aircraft VT-SXE (MSN- 34802) was manufactured in year 2007. The aircraft is registered with DGCA under the ownership of M/s Alterna Aircraft V B Limited. At the time of incident, the Certificate of Airworthiness was current and valid. On the day of incident, the aircraft VT-SXE had logged 52496:51 AF Hours (TSN) and 24009 Landings (CSN). VT-SXE was operated under Scheduled Operator's Permit No S-16 which was valid. The aircraft and Engines were being maintained under continuous maintenance as per maintenance program consisting of calendar period based maintenance and flying Hours/ Cycles based maintenance as per maintenance program approved DGCA. Accordingly, the major and all lower inspections (Pre-flight checks, Service Checks, Weekly Checks) were carried out as and when due.

The left Engine S/N 894431 had logged 47726 Hrs and the right Engine S/N 894436 had logged 47875 Hrs. There was no defect report on the engines on the previous flight. All concerned Airworthiness Directives, mandatory Service Bulletins, DGCA Mandatory Modifications on this aircraft and its engines have been complied with as on date of event.

The defect record of the aircraft were scrutinized for a period of one month prior to the date of occurrence of the serious incident and no defect was found pending on the aircraft. Prior to the incident flight, the weight and balance of the aircraft was well within the operating limits. From the above, *it is inferred that the serviceability of the aircraft is not a contributory factor to the incident.*

2.2 Weather

The visibility at the time of landing at Varanasi was 4000 meter, Winds 030/02 knots and temperature 20 degree C with no significant change in the prevailing weather conditions. *It is not a contributory factor to the incident.*

2.3 Operational Factor

2.3.1 Pilot Factor

Both cockpit crew were qualified to operate the flight. The PIC was holding valid ATPL license and the FO was holding a valid CPL license and were qualified on type.

Both crew were current in all trainings and ratings as per the requirements. All actions taken by cockpit crew were in accordance to Flight Crew Training Manual (FCTM).

The Captain had total flying experience of about 7599:45 hours with approximately 7282:22 hours on type and about 3920:41 hours as PIC on type. The co-pilot had a total flying experience of about 935:46 hours with approximately 632:19 hours on type.

2.3.2 Crew Handling of the Aircraft and Decision Making

As per Pilot-in-Command discretion, he decided to continue the flight on to Varanasi Airport after having reviewed all relevant aspects as mentioned below.

- (i) The pilot-in-command was informed by the CP that the cabin crewmembers and the passengers were all right.
- (ii) The cabin altitude had eventually stabilized at 10,000 feet.
- (iii) The aircraft had sufficient fuel remaining.

(iv) The weather at expected time of arrival at Varanasi Airport (destination) was favourable.

As per DFDR and SSCVR, all associated checks were carried out as per SOP by the crew.

2.4 Circumstances Leading to the Incident

As per DFDR data, during climb and passing FL190, #1 ENG Bleed Trip Off annunciator came on. Associated Non Normal Checklist (NNC) actions were carried out by the crew and #1 PACK SWITCH was switched OFF and #1 Bleed Trip Off annunciator went off. As per PIC discretion, flight was continued to destination with single pack functional. However, while descending from FL370, due to low air bleed from #2 ENG (due to broken control pressure sense line of high stage valve), the cabin altitude started to rise & the same was noticed by the crew. Further, descending and passing FL332, the CABIN Altitude Horn was triggered. Immediately, cockpit crew wore the oxygen mask & requested ATC for descent to FL100 due to decompression and he same was approved by Varanasi ATC. Crew declared "MAYDAY" and an emergency descent was carried out. NNC for "CABIN ALTITUDE WARNING or Rapid Depressurization" actions were carried out. As per NNC, the oxygen masks were deployed inside the cabin and once the Aircraft reached at approx FL 100, cabin was under control, the masks were removed, and the crew cancelled the distress situation.

During post landing system check of #1 ENG (as per work order), following were noticed:

(i) Pre-Cooler Control Valve (PCCV) shaft free to rotate.

(ii) Pneumatic lines with APU bleed leaking.

(iii) Downstream pressure line to pre cooler leaking.

Further, during troubleshooting for low Air bleed from #2 ENG during descent, it was observed by AME that the control pressure sense tube of high stage valve was broken which resulted in low air bleed and had triggered cabin altitude warning.

3. CONCLUSION

3.1 Findings

(a) The Certificate of Airworthiness, Certificate of Registration and Certificate of Flight Release of the Aircraft was valid on the day of Incident.

(b) All concerned airworthiness directives, mandatory service bulletins, mandatory modifications on the aircraft and its engines on date of incident had been complied with.

(c) Both operating crew were duly qualified on type B737 aircraft to operate the flight.

(d) As per Flight Duty Time Limitations (FDTL), both crew had adequate rest prior to undertaking the flight on 27 Feb 2020.

(e) There was no snag reported prior to the incidented flight.

(f) The taxi out and the takeoff was uneventful.

(g) As per DFDR data, during climb and passing FL190, ENG #1 Air Bleed Trip Off annunciator came on.

(h) Non Normal Checklist (NNC) actions were carried out by crew and #1 PACK was switched off.

(j) PIC used his discretion and the flight was continued to destination with single pack.

(k) While descending from FL370, due to low bleed air from #2 ENG, the cabin altitude started rising & same was noticed by the cockpit crew.

(I) During descent and passing FL332, the CABIN Altitude Horn triggered. Immediately, cockpit crew wore the oxygen mask & requested ATC for "descent to FL100 due decompression" and same was approved.

(m) Crew declared MAYDAY and an emergency descent was executed. NNC for "CABIN ALTITUDE WARNING or Rapid Depressurization" actions were carried out by the crew.

(n) As per NNC, the oxygen masks were deployed inside the cabin. Once the Aircraft reached FL 100, cabin altitude was under control, the masks were removed and distress situation was cancelled.

(o) The aircraft landed safely at VNS and no injury or damage to personnel or property was reported.

(p) Low air bleed from #2 ENG was due to control pressure sense tube of high stage valve found broken during rectification.

3.2 Probable Cause of the Incident

The most probable cause for illumination of ENGINE #1 Air Bleed Trip off annunciator coming on could be attributed to free rotation of Pre-Cooler Control Valve (PCCV) shaft and pneumatic leak from pre cooler pressure pipeline. Further, triggering of Cabin Altitude Warning horn could be attributed to low air bleed from #2 ENG due to broken control pressure sense tube.

4. SAFETY RECOMMENDATIONS

DGCA may advice FAA to take up with OEM (M/s Boeing) of high failure rate of PCCV in B737-800.

Dmit Kumen

(Amit Kumar) SIO, AAIB Investigator

Date: 27 Apr 2020 Place: New Delhi

/ (Anil Tewari) Director, AAIB Investigator – In - Charge

25

CVR transcript VT-SXE (SG-246) dated February 27, 2020.

Time: UTC			
7:51:39	Normal Checklist– before takeoff		
7:52:26	P2: clear for line up behind landing short final		
7:53:32	runway entry scan procedure – speed brakes down and detent, flaps 5, 5, 5 & green light		
7:54:28	ATC: SG246, RWY 14 clear for takeoff, wind 200/03kts		
	P2: clear for takeoff SG246clear for takeoffcheck		
	P1: engines are stabilized P2: stabilized P1: ready P2: check		
	P2: N1 TOGA P1: check P2: takeoff thrust 98.2**setP1: check		
	P2: 80kts P1: check P2: throttle hold P1: check		
	P2: V1 rotate+ve rate P1: gear up P2: 400ft P1: LNAV		
7:56:31	Normal checklist – After Takeoff		
7:57:05	P2: **passing transition P1: passing 43		
7:57:29	P2: cabin climbing, differential building up,		
8:05:12	P2: caution, air conditioning problem, bleed trip off light has come up, ***		
	P1:ek second he P2: hah hah P1:*** bleed trip off non normal checklist		
8:05:59	Non normal checklist actions – Bleed Trip OFF (since BLEED TRIP OFF		
	light stayed illuminated the affected side PACK SWITCH was put to OFF)		
8:11:19	P1: ok cabin climbing ****		
8:14:25	P2: how's the cabin temperature CC: it's very hot in the cabin		
8:16:59	P1: ***cabin is stabilized **Ok P2: ok		
9:12:03	P2: radar SG246, request descent		
	ATC: SG246, VNS descent to FL270		
	P1: Confirm overhead approach for RWY 27.		
	P2: sir (to ATC) confirm overhead approach for RWY 27, SG246		
09:12:22	ATC: SG-246, expect ILS approach for runway 27		
	P2: roger, copied		
9:13:36	P2: *** P1: is the cabin climbing?is the cabin climbing?		
9:13:57	P2: ***shall do a master caution checkanduh		
	P1: jo ho payaegabut why is it climbing?we could say put the bleed air		
	switch to OFF when I switched ON.		
	P2: no. P1: what if we put this to OFF what will happen?		
	P2: isolation close P1: ***changed		
9:14:33	P1: what is this?aircraft is on descent		
	P2:haa P1: why does the bleeds gone OFF		
9:14:51	P1: VNS, SG246, request immediate descent level 100.		
	ATC: SG246 decent to level 250		
	P1: descent 250, SG246, request immediatedescent		

	(to P2) tell cabin crew that we might have		
	ATC: sir roger, emergency descent todescent to FL210		
9:15:09	P1: descent FL210, SG246#CABIN PRESS WARNING HORN#		
9:15:19	Oxygen mask downed by cockpit crew		
9:15:40	P2: sir can u hear me now?		
9:15:49	P2: can't hear u sir P1:*** P2: yes sir can hear you now		
9:15:57	ATC: SG246 VNS when able report reason. P1: roger		
9:16:05	P1: ***audio not clear*** P2: check		
	P1: establish crew communication *** pressurization mode selector auto		
	P2: check P1: out flow valve***no clear audio**		
	P2: check(memory actions)		
9:16:30	P1: if cabin altitude uncontrollable, passenger signs ON, PASS OXYGEN		
	switch ON		
	P2: check		
9:16:47	P1: emergency descent this is your captain, return to your seats, and use		
	the oxygen mask		
	ATC: SG246 request reason for emergency descent P2: sir		
	P1: sir we have a decompressionATC: sir decompression!!!!		
9:17:01	P1: affirmMAY DAY, MAY DAY, MAY DAYSG246 descent level 100		
	ATC:***confirming want to descent to level 100		
	OTHER A/C: -ve sir SG calling you ATC : SG246 descending flight level		
	100 P2: affirm sir SG246, descending level 100 due technical		
9:17:33	P2: ***QNH setting sirwith upressurization***request latest QNH		
	ATC: QNH standby QNHQNH 1014 HPa. P2: copied		
9:17:58	P2: master cautionuhON		
9:18:09	P1: ok emergency descent non normal checklistemergency descent non		
	normal checklist		
	P2: coming up sir		
9:18:37	P2: cabin depressurization non normal checklist (non normal checklist		
	actions in respect of rapid depressurization was carried out)		
9:19:02	P2: emergency descent non normal checklist (non normal checklist		
	actions in respect of emergency descent was carried out)		
9:21:32	ATC: SG246 descent to transition level flight level 50		
	P1: roger descent level 50, SG 246		
	ATC: SG246 and ahhconfirm nature of emergency		
	P1: we have a decompression and we had to do an emergency descent, first		
	no decompression		
	ATC: roger,		
9:21:54	ATC:SG246 wind 360/05kts, visibility 5km, runway in use 27, report preference		
	of runway		
	P1: we can accept 27		
	ATC: SG246 radar roger		
9:22:08	P2 : approaching 100 and cabin altitude is showing, not at 100***		

	P1:***P2: ah***check								
9:22:33	P1: ok 100, remove your mask and see if you are feeling ok								
	P2: check sir***								
9:23:02	Oxygen mask removed by crew								
9:23:12	P2: reporting to boom again P1: *** P2: check done								
9:23:18	P1: ***we are now ok P2: ***switches***ha P1: ***still we need to								
	cancel the *** P2: ok								
9:23:35	P1(PAX announcement): ladies and gentlemen this is your Captain, we have								
	descended to a safe altitude, the situation is now under control and cabin crew								
	please carry out your post depressurization duties								
9:23:53	ATC: SG246 radar confirm any assistance required, report persons on board								
	and endurance P1:stdby								
9:24:56	P1: hello SCC: yes Captain P1: ok how's the situation behind								
	SCC: everything is fine as of nowP1: its fine na, nothing major na								
	SCC: it's getting smoky in the cabin P1: sorry								
	SCC: it's getting smoky in the cabin P1: smoky, yah that's fine								
	SCC: yah P1: but otherwise passengers and all are fine right SCC: yeah all								
	are fine P1: meaning we don't need any assistance as of now right?								
	SCC: Ok work								
0.24.34	B2: ***for passonger enhand and *** B1: ***audie not clear***								
9.24.34	P2. To passenger of board and P1. addition to clear NNC in respect of Emergency descent (from point 8 onwards)								
9.24.41	P2: end of non normal checklist and rapid depressurization								
9:25:13	P1: all actions are complete P2: yes cantain all actions are complete								
0.20.10	P1: so I will be briefing for radar vectors P2: check								
	P1: radar vectors II S runway 27 P2: check sir								
9.26.00	P2: radar SG246, we are cancelling our MAY DAY								
0120100	P1: we are cancelling distress								
	ATC: SG246 confirm no assistance required P1 : uhas of now as per the								
	information from our crew everything is OK								
	ATC: SG246 tower roger and confirm preferring runway 27 only								
	P1: affirm RWY 27 is acceptable								
	ATC:SG 246 roger, turn right heading 085, vectoring for ILS Z approach for								
	runway 27								
9:27:01	P1: alright landing RWY 27, we will be vacating via A B, auto break 3 and flaps								
	30 landing P2: check sir P1: ok and *** P2: weather within minima, MDF is								
	2.9 P1: ok P2: we are landing with 3.4 P1:acha cabin is descending now								
	P2: check sir								
9:27:41	reviewing go around procedures								
9:29:07	SCC: Captain everyone is fine ***P1: thank you so much								
	SCC: are we on safe altitude now P1: yeah yeahwe are 5000 now we are								
	landing now, we are landing in VNS								
	SCC: we are landing in VNS P1: yeah SCC: Ok captain thank you								

9:29:20	Normal checklist - Descent (pressurization LAND ALT 300set, Recall: master
	caution overhead air-conditioning all associated, auto break 3, VREF set for
	flap 30, 146 and minimums 530)
9:29:39	P1: now again it started pressurizingmatlab the pack
	P2:haa P1: pack ka duct nahiaarahatha P2:haa
	P1: ***but yeh tho abhi manual pe he na
	P2: may be that's why P1: I don't know bleed aarehe what ever
9:31:56	ATC: SG246 descent to 2300ft QNH 1014
9:32:31	P2: and transition ***
9:32:35	Normal checklist – Approach (QNH 1014 passing 4600ft)
	P2: checklist complete no deviation
9:36:35	P2: that fluctuate P1: **** P2: yes sir, yes it was not there, it was climbing
	2000ft,something 1500, 2000ALT hold P1: check
9:37:03	ATC: SG 246 confirm all OPS normal P2 : affirm sir all OPS normal and we
	are 197 POB sir
	ATC: roger and endurance P2: enduranceSTBY sir
	P1: STBYsir we are ok in terms of endurance no problem
	ATC: roger sir
9:38:18	Cabin galley secured
9:39:36	P2: now its 45 sir both, P1: sorry P2: the duct pressure 45, 46
9:42:07	ATC: SG246 tower clear to land wind 310° 04kts
9:42:54	Normal Checklist – Landing (flaps 30, green lights)
9:45:08	sync call 100
9:45:11	sync call 50
9:45:15	sync call 20
9:45:16	sync call 10
9:45:19	touch down sound
9:45:25	P2: reversers normalauto brake disarm50kts
9:45:47	ATC: SG246 vacate via TXWY B, stand 01
9:49:43	Normal checklist – Shutdown
9:50:46	SCC: ma'am Im not able to open the door
9:51:22	P1: ground GND: go ahead sir P1: ok, the crew is not able to open the door
	now we have closed the out flow valve because of the decompression but the
	cabin is ah GND: *** P1: the cabin was showing a *** level at that time,
	now its showing a different GND: okthe pressure difference is how much
	right now P1: aahsee its showing ahcabin altitude is showing free level
	but cabin differential pressure is showing 0.2
	GND: .2***

<u>Annex 'B'</u> (Refers to Para 1.18.5)

PCCV Removal / Installation Details

S. No	Date	Aircraf t Registr ation	Type of Rem oval	Reason for removal	TSM	Time betwee n installa tion
1.	02 Jan 19	VT-SZM	US/TS	RH bleed low 20 PSI PDR-respectively in all crz phases, observed on both sectors, split observed, R-20 PSI,L-35 PSI.	N/K	2220:00
2.	10 Jan 19	VT-SPP	US	PCCV operation not satisfactory- sluggish	N/K	39:00
3.	30 Jan 19	VT-SLE	US	PCCV position indicator free/not secured	N/K	1426:00
4.	05 Feb 19	VT-SLJ	US	PCCV faulty, butterfly valve free movement	N/K	2061:00
5.	17 Feb 19	VT-SZA	US	During transit servicing as per FIM 36-10 TASK 804 found PCCV operation check unsatisfactory. PCCV replaced with serviceable one as per AMM 36-12-02-000/400-801.	4846.00	4846:00
6.	28 Feb 19	VT-SLI	US/TS	Left bleed trip off	6960.00	698:00
7.	04 Mar 19	VT-SLL	US	PCCV sticky, and due bleed trip off Transit Servicing.	N/K	716:00
8.	09 Mar 19	VT-SGH	US	Engine #2 PCCV found unserviceable. Flapper valve loose.	N/K	3812:00
9.	15 Mar 19	VT-SLH	US/TS	Due reports of low bleed in cruise.	N/K	1997:00
10.	16 Mar 19	VT-SGX	US	Bleed pressure drifting	7132.00	4912:00
11.	17 Mar 19	VT-SZK	US	PCCV shaft found play & damage in shaft and grove. Hence PCCV replaced with `S` one as per AMM 36-12- 02	21271.00	17171:0 0
12.	17 Mar 19	VT-SZK	US	Corrective label booking, so that component can be received and gran processed. System transaction only.	34528.00	00:00
13.	23Mar19	VT-SLG	US	Operation sluggish	N/K	221:00
14.	29 Mar 19	VT-SGH	US	PCCV found free to rotate with manual drive. Not going back to open position on its own.	28549.00	221:00
15.	03 Apr 19	VT-SGG	US	Replaced due MEL 36-9.	8198.00	245:00
16.	02 Apr 19	VT-SGG	US/TS	Trouble shooting	3815.00	3815:00
17.	19 May 19	VT-SLH	US	PCCV butterfly valve hole elongated.	14305.00	2846:00
18.	11 May 19	VT-SYA	US	ENGINE #2 low bleed transit servicing carried out as per FIM 36-10 TASK 804, on inspection found PCCV movement sluggish. Suspected PCCV faulty. PCCV replaced. Found sat.	11.00	11:00
19.	22 Apr 19	VT-SGZ	US/TS	For transit servicing of low bleed ENG#2, suspected PCCV faulty. Hold on tag issued.	N/K	2020:00
20.	10 Apr 19	VT-SLG	US	PCCV spring action INOP / rotating freely.	N/K	449:00
21.	16 Jun 19	VT-SYI	US	PDR: RH bleed trip off light illuminated during climb, NNC carried out transit servicing carried out as per FIM 36-10 TASK 801. PCCV butterfly movement found free. Hence, PCCV replaced with "S" as per AMM 36- 12-02.	476.00	476:00
22.	15 Jun 19	VT-SGZ	US	MEL 36-9 revoking.	N/K	145:00

23.	10 Jun 19	VT-SLH	US/TS	Due to PDR of bleed trip off light PCCV replaced.	294.00	294:00
24.	04 Jun 19	VT-SLM	US/TS	Removed for troubleshooting.	14206	9466:00
25.	27 May 19	VT-SGY	US/TS	ENG#1 bleed duct pressure low, suspected PCCV	N/K	2097:00
				faulty.		
26.	27 Aug 19	VT-SYM	US	Bleed trip off light came on during climb after takeoff	1147.00	1147:00
				for BLEED#1. Troubleshooting carried out as per FIM		
				TASK 36-10 TASK 809. PCCV operation found sluggish.		
				LH ENG PCCV replaced with a serviceable one as per		
				AMM 36-12-02. Installation test carried out and found		
07	00.0.10) (T. 67) (satisfactory. MEL 36-09 revoked.	4770.00	4772.00
27.	08 Aug 19	VI-SZK		Due low bleed # 1 ENG. Defect cell requirement.	4772.00	4772:00
20.	06 Aug 19			Due low bleed 1/5, issued hold on tag.	1181.00	929:00
29.	29 Jul 19	VI-5Y5	05/15	while carrying out troubleshooting found PCCV	37306.0	832:00
30	24 Jul 10			Decry faulty	7220.00	04:00
31	24 Jul 19	VT SGZ		PCCV faulty.	7550.00 N/K	255.00
32	22 Jul 19			Bleed low as per TIP report	25701.0	120.00
32.	27 Jun 19			LHS bleed trip light ON descent	358.00	358.00
34	27 Jun 19	VT-STQ		Defect cell recommendation due report of E#2 low	2113.00	2113.00
04.	22 3011 13			bleed in-flight carried out F#2 low bleed	2115.00	2115.00
				troubleshooting as per FIM 36-10 TASK 804 suspected		
				PCCV faulty. Same replaced with serviceable one		
35.	18 Jun 19	VT-SPP	US/TS	sourcing	3387.00	804:00:
						00
36.	17 Jun 19	VT-SXB	US	PCCV replaced with serviceable one as per AMM. Post	51.00	51:00:0
				installation check C/O. Hence MEL continues.		0
37.	06 Oct19	VT-SYG	US	PDR T/S C/O as per FIM TASK 36-10 TASK 801 found	33376.0	1939:39
				PCCV faulty same replaced with a svcbl one as per		
				AMM 36-12-02.		
38.	28-Sep 19	VT-SZM	US/TS	Suspected faulty PCCV changed due to low bleed at crz	14701.85	168:27
				// PDR //		
39.	21 Sep 19	VT-SZN	US	As instruction from MCC as part of trouble shooting	14122.30	14122:1
				PCCV OF Eng#2 replaced with serviceable one, found		8
40				snag still persist. MEL 36-9 continues.		
40.	18 Sep 19	VT-SLN	US	Due RH ENGINE low bleed report.	3868.12	1611:53
41.	17 Sep 19	VI-SZM	US	PCCV sluggish in operation.	13155.62	13155:3
42	12 600 10			DCCV abanged due law blood muchan value exercition	NI /1/	/
42.	13 Sep 19	VI-SZIVI	05/15	PCCV changed due low bleed problem valve operation	N/K	133:59
13	07 Sop 10		115	Sight blood trip off light Again came on in this sector		02.41
+5.	07 360 19	VI-31A	03	during climb. Associated NNC carried out		02.41
44	02 Sep 19	VT-S7M	US	As per W/O 4252392 duct press 15 PSI	771 63	771.38
45.	02 Nov19	VT-SYF	US	PCCV faulty.	17764.08	2180:10
46.	31 Oct 19	VT-SXA	US/TS	PCCV found faulty.	8593.90	399:17
47.	29 Oct 19	VT-SXA	US/TS	Suspected faulty PCCV.	N/K	374:16
48.	27 Oct 19	VT-S YM	US	For trouble shooting purpose. Operation of PCCV	1497.72	945:24
				found sluggish.		
49.	24 Oct 19	VT-SXE	US	PCCV suspected faulty due bleed trip off.	11880.15	122:09
50.	14 Oct 19	VT-SXE	US	NO#2 bleed trip off light came on after takeoff.	N/K	1191:44
51.	11 Oct 19	VT-SZM	US	PIREP: Large diff observed between LH AND RH ENG	153.37	153:22

				bleed duct pressure (LH 40 PSI and RH 15 PSI)		
				throughout cruise. PCCV replaced.		
52.	05 Nov 19	VT-SZN	US	LH low bleed t/s bleed health chk carried out as per-	14575.18	14575:1
		_		AMM 36-11-00. Found PCCV faulty. Same replaced as		1
				per AMM 36-12-02. Security of installation checked		
				found satisfactory. Further T/S to be carried out as per		
				pilot feedback.		
53.	08 Dec 19	VT-SYG	US/TS	Trouble shooting for bleed drifting.	N/K	729:13
54.	06 Dec 19	VT-SXA	US/TS	Removed as per instructions. PCCV (ENG #2) installed	N/K	453:12
				with higher/reliable P/N. Removed unit is in "S"		
				condition.		
55.	05 Dec 19	VT-SYN	US	Suspected defective remains closed with during	4413.85	2586:51
				troubleshooting.		
56.	04 Dec 19	VT-SYX	US	Bleed trip light, operation sluggish.	N/K	1106:08
57.	03 Dec 19	VT-SYA	US/TS	Due low bleed reported on E#02.	N/K	1304:28
58.	02 Dec19	VT-SYM	US	Same suspected faulty during T/S	14803.57	1217:25
59.	21 Nov19	VT-SYX	US	PCCV found faulty. To revoke MEL 36-05	44503.37	2187:47
60.	19 Nov 19	VT-SYS	US	Low bleed.	1570.07	1275:55
61.	10 Nov 19	VT-SYA	US	Due report of low bleed on LH engine	N/K	1381:38
62.	11 Dec 19	VT-SZ I	US/TS	As per WO 4548172 PCCV removed and modified	1317.98	663:46
				PCCV installed.		
63.	11 Dec 19	VT-SYY	US	PCCV faulty	N/K	109:36
64.	11 Dec 19	VT-SLN	US/TS	Due upgradation to higher P/N.	N/K	1030:05
65.	10 Dec 19	VT-SLH	US/TS	As per WO. Removed given serviceable tag.	5284.28	403:07
66.	09 Dec 19	VT-SYS	US/TS	New P/N upgradation in fleet.	1783.37	219:22
67.	08 Dec 19	VT-SLF	US/TS	Inspection / replacement. Carried out inspection of	7791.02	830:23
				bleed system. PCCV installed on RHS engine . Carried		
				out installation of PCCV. Found satisfactory.		
	15 Dec 19	VT-SGX	US	PCCV movement sluggish intermittently.	6662.75	1140:56
	18 Dec 19	VT-SXE	US	MEL 36-05-02 trouble shooting.	N/K	641:53
	25 Dec 19	VT-SXD	US	TLP # 703/04 # 1 `BLEED TRIP OFF` light during clb.	1904.63	1904:38
	07 Jan 20	VT-SLL	US	Defect cell WO due report of E#2 bleed low during	38387.57	198:33
				flight.		
	18 Jan 20	VT-SXB	US	Suspected faulty	1781.95	1510:41
68.	01 Feb 20	VT-SXA	US/TS	Suspected PCCV faulty on low bleed T/S	N/K	1103:14
60	07 Feb 20	VI-SGG		As part of 1/S	N/K	3422:43
69.	09 Feb 20	VI-SXA	US/IS	Found PCCV sluggish in operation.	//0.23	//0:14
[71.	28 Feb 20	VI-SXE	US	PDR during climb NO#01 ENGINE bleed trip off light	2747.05	2/4/:03
				illuminated associated NNC was carried out; flight was		
				conducted on single pack. During descent, cabin		
				Started climbing and cabin altitude started increasing.		
				uncontrollable hance initiated emergency descent and		
				carried out memory item followed by cabin altitude		
				warning Rapid depressurization NNC At approx		
				10000FT cabin was under control masks were		
				removed and cancelled distress. Situation was under		
				control. Normal landing was carried out.		
72.	04 Mar 20	VT-SLE	US/TS	Defect cell WO due report of E#2 BLEED pressure	N/K	4836:09
				drifting.		

73.	11 Mar 20	VT-SXE	US/TS	Suspected PCCV faulty.	3996.78	128:40
75.	21 Mar 20	VT-SGH	US/TS	Sourcing done due work order requirement to service	182.48	182:29
				VI-SFG.		