ACCIDENT INVESTIGATION COMMISSION

FINAL REPORT

AIC 23 - 2001

Air Niugini Limited

P2-ANT

Fokker 70

Cabin Pressurisation Event In Flight

Port Moresby

PAPUA NEW GUINEA

20 February 2023

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ABOUT THE AIC

The Accident Investigation Commission (AIC) is an independent statutory agency within Papua New Guinea (PNG). The AIC is governed by a Commission and is entirely separate from the judiciary, transport regulators, policy makers and service providers. The AIC's function is to improve safety and public confidence in the aviation mode of transport through excellence in: independent investigation of aviation accidents and other safety occurrences within the aviation system; safety data recording and analysis; and fostering safety awareness, knowledge and action.

The AIC is responsible for investigating accidents and other transport safety matters involving civil aviation in PNG, as well as participating in overseas investigations involving PNG registered aircraft. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The AIC performs its functions in accordance with the provisions of the *PNG Civil Aviation Act,* and the *Commissions of Inquiry Act 1951,* and in accordance with *Annex 13* to the *Convention on International Civil Aviation.*

The objective of a safety investigation is to identify and reduce safety-related risk. AIC investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not a function of the AIC to apportion blame or determine liability. At the same time, an investigation report must include relevant factual material of sufficient weight to support the analysis and findings. At all times the AIC endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why it happened, in a fair and unbiased manner.

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ABOUT THIS REPORT

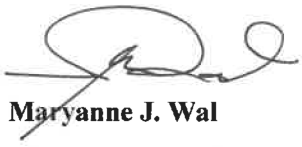
On 22 February 2023 at 14:52 local time (04:52 UTC), the AIC was notified by CASA PNG during an Aviation Safety Briefing of an occurrence which had occurred on 20 February 2023 at 16:00 local time involving a Fokker 70 aircraft, owned and operated by Air Niugini Limited. The AIC immediately gathered information regarding the occurrence and commenced the investigation.

This Final Report has been produced by the PNG AIC P.O Box 1709, Boroko 121, NCD, Papua New Guinea. It has been approved for public release by the Commission in accordance with *Para 6.5 of ICAO Annex 13*. The report is published on the AIC website www.aic.gov.pg .

The report is based on the investigation carried out by the AIC under the *Papua New Guinea Civil Aviation Act 2000 (As Amended),* and *Annex 13 to the Convention on International Civil Aviation*. It contains factual information, analysis of that information, findings and contributing (causal) factors, other factors, safety actions, and safety recommendations.

Although AIC investigations explore the areas surrounding an occurrence, only those facts that are relevant to understanding how and why the accident occurred are included in the report. The report may also contain other non-contributing factors which have been identified as safety deficiencies for the purpose of improving safety.

Readers are advised that in accordance with *Annex 13 to the Convention on International Civil Aviation*, it is not the purpose of an AIC aircraft accident investigation to apportion blame or liability. The sole objective of the investigation and the final report is the prevention of accidents and incidents (Reference: *ICAO Annex 13, Chapter 3, paragraph 3.1*). Consequently, AIC reports are confined to matters of safety significance and may be misleading if used for any other purpose.



Maryanne J. Wal
Chief Commissioner
11 September 2024

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GLOSSARY OF ABBREVIATIONS

AFM	: Aircraft Flight Manual
AGL	: Above Ground Level
AIC	: Accident Investigation Commission
AMSL	: Above Mean Sea Level
ATC	: Air Traffic Control
ATPL	: Air Transport Pilot License
ATS	: Air Traffic Service
CPC	: Cabin Pressure Control
CPL	: Commercial Pilot License
CPS	: Cabin Pressure System
CRM	: Crew Resource Management
CVR	: Cockpit Voice Recorder
EIS	: Engine Indicating System
FDR	: Flight Data Recorder
FFCOM	: Fokker Flight Crew Operating Manual
FIS	: Flight Information Service
FL	: Flight Level
hPa	: Hectopascals
ICAO	: International Civil Aviation Organization
IFR	: Instrument Flight Rules
ILS	: Instrument Landing System
kg	: Kilogram(s)
km	: Kilometre(s)
Kts	: Knots (nm/hour)
LAS	: Landing Altitude Setting
MTOW	: Maximum Take-off Weight
NM	: Nautical mile(s)
PF	: Pilot flying
PIC	: Pilot in Command
PIH	: Pacific International Hospital
PM	: Pilot monitoring
QNH	: Query Nautical Height (atmospheric pressure at sea level)
QRH	: Quick Reference Handbook
SSCVR	: Solid State Cockpit Voice Recorder
SSFDR	: Solid State Flight Data Recorder
TAF	: Terminal Aerodrome Forecast
UTC	: Universal Time Coordinate

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INTRODUCTION

SYNOPSIS

On 20 February 2023, at about 16:00 local time, (0600 UTC), a Fokker 70 aircraft, registered P2-ANT, operated by Air Niugini Limited, sustained an abnormal cabin pressurisation event during approach into Jacksons International Airport, Port Moresby, Papua New Guinea.

There were 71 persons onboard: two pilots, two cabin crew and 67 passengers (including 2 infants). There were 18 minor injuries, and 4 serious injuries sustained by the passengers. The crew did not sustain any injuries.

The aircraft was returning to Jacksons Airport following a diversion from Mt. Hagen Airport. The flight crew had decided to return to Jacksons Airport, Port Moresby after observing that the conditions were not suitable for approach and landing at Mt Hagen Airport (Unavailable PAPI Lights on Runway 12 and tailwinds on Runway 30). They held to the West of the Mt Hagen Airport at 8,000 ft AMSL, over the Mt. Hagen township, in anticipation for a reduction in the tailwind on Runway 30. Due to prevailing tailwinds the flight crew advised Air Traffic Services that a landing was not possible and that they had to return to Port Moresby. From the holding at Mt. Hagen, the aircraft began tracking East on climb from 8,000 ft AMSL. The aircraft levelled off at 31,000 ft AMSL and tracked back to Port Moresby.

About 106 NM from Jacksons, the crew commenced their descent from 31,000ft AMSL. The flight crew stated that approaching 10,000 ft on descent into Jacksons Airport, they actioned *the Fokker 70 Normal Procedures Before Approach Check*. The flight crew stated that they noticed that the Landing Altitude Setting (LAS) had not been set for an arrival into Jacksons, but was instead, still maintained at about 5,500 ft, which they initially set for Mt. Hagen Airport. The flight crew subsequently set the LAS to sea level for arrival into Jacksons Airport. Due to the rate at which the aircraft was descending, there was insufficient time to pressurise the cabin in time for landing. According to the flight crew, they had the option to delay the approach and hold or deviate from track while maintaining 10,000 ft AMSL to allow sufficient time for the cabin altitude to pressurise to sea level automatically. However, they had another flight to operate, which was behind schedule, the flight crew therefore, elected to continue the approach and increase the rate of cabin pressurisation manually, to descend the cabin altitude quicker.

The investigation found that the crew decided to execute the *Fokker 70 Abnormal Procedures* for *Manual Cabin Pressurization* to manually increase the rate of descent of the cabin altitude. Once the aircraft was established on final approach for Runway 14L, the flight crew observed an increasing cabin differential of 3.5 PSI which climbed up to 4 PSI, exceeding the allowable cabin differential for landing, therefore the flight crew opted to conduct a go-around and fly to Daugo (D901) to rectify the problem. As per the procedure, when in manual mode, the manual control lever should be placed to the UP position prior to landing to prevent any further pressurisation of the cabin in preparation for landing. The investigation determined that this final step had been missed by the flight crew resulting in the cabin differential continuing to increase, resulting in the execution of a go-around. It was at this time when the passengers experienced discomfort and some passengers sustained injuries.

Upon arrival at D901, and in a visual hold, the cabin differential was observed to continue to increase to 6 PSI. This exceeded the maximum allowable cabin differential for landing, which is 0.13 PSI. The flight crew reportedly actioned the *QRH Abnormal Procedure for "Reduced Cabin Pressure Differential Procedure"*. On completion the procedure, the flight crew observed that the cabin differential began to reduce again. The Cabin crew stated during the interview that it was around that time; certain passengers were observed to be bleeding from the ears and nose. The cabin crew proceeded to attend to the passengers accordingly.

The aircraft then left the hold at D901 and with ATC clearance, tracked for a right base turn. The flight crew reportedly conducted a normal approach and landed on Runway 14L and taxied to the parking bay where the engines were shut down and passengers disembarked. On disembarking, the cabin crew advised the affected passengers to seek assistance from the operator's Customer Services personnel on the ground when in the terminal area. The cabin crew then advised the flight crew that some of the passengers had sustained injuries. The flight crew then disembarked the aircraft and made their way to the next assigned aircraft for their next rostered flight. The injured passengers were attended to by Ground Operations personnel and taken to the hospital for treatment and further assessment.

The AIC determined that the *Abnormal procedures* for *Manual Cabin Pressurisation Control Procedure* to pressurise the cabin was not fully executed and as a result the PSI for landing was above the maximum allowable differential for landing. The crew then initiated a go around and actioned the *QRH Abnormal Procedure* for *"Reduced Cabin Pressure Differential Procedure"* which is not a procedure to reduce cabin differential. This procedure is executed when there is damage on the aircraft such as, a cracked window that does not allow maximum cabin-to-ambient pressure differential.

The report includes recommendations made by the AIC, with the intention of improving operational safety (Refer Part 4 of this report). It is important to note that the operational deficiencies brought to the attention of Air Niugini Limited are not directly causal to the serious incident but contributed to the serious incident. However, in accordance with *Annex 13 Standards*, identified safety deficiencies and concerns must be raised with the persons or organizations best placed to take safety action. Unless safety action is taken to address the identified safety deficiencies, death or injury might result in a future accident.

1 FACTUAL INFORMATION

1.1 History of flight

On 20 February 2023, at about 16:00 local time (06:00 UTC[1]), a Fokker 70 aircraft, registered P2-ANTowned and operated by Air Niugini Limited experienced an abnormal cabin pressurisation event during final approach into Jacksons International Airport[2], Port Moresby, Papua New Guinea, resulting in injuries to some passengers.

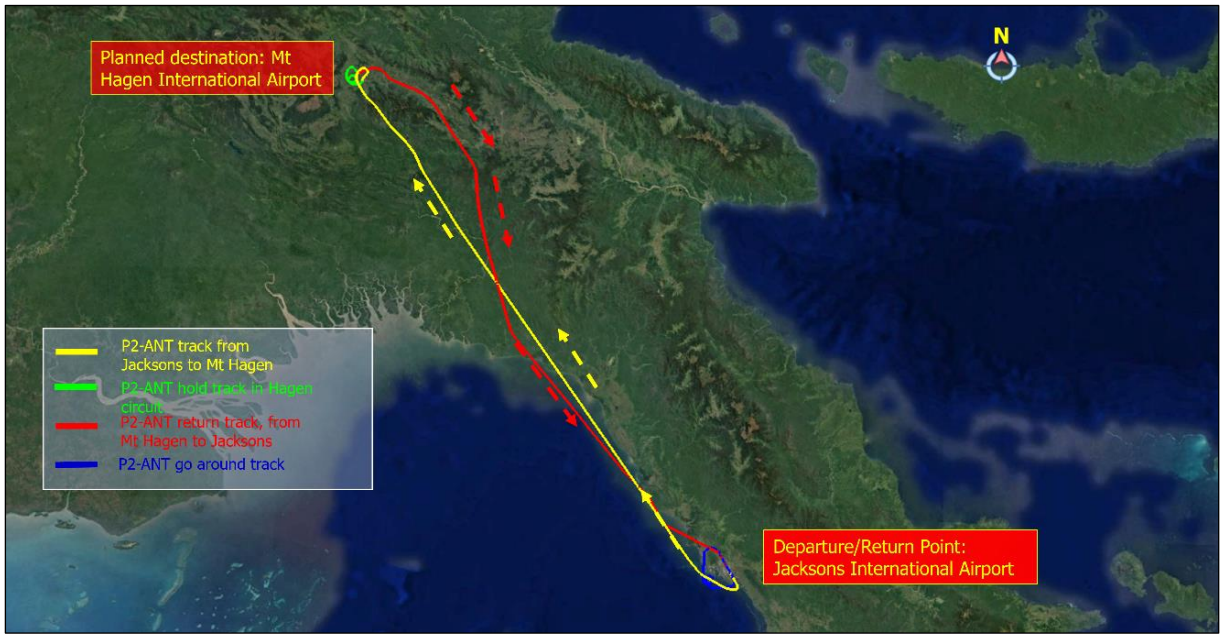

Figure 1. Depiction of occurrence flight path.

There were 71 persons onboard: two pilots, two cabin crew and 67 passengers (inclusive of 2 infants).

The co-pilot, occupying the right seat, was pilot flying (PF), and the Pilot in Command (PIC) who was on the left seat was the pilot monitoring (PM).

The flight crew[3] stated that the flight was originally scheduled to depart from Jacksons Airport at 12:15 on a flight to Mt. Hagen Airport, Western Highlands Province. However, P2-ANT departed at 14:09, almost two hours later and arrived overhead Mt. Hagen at 14:55. The flight from Port Moresby to Mt. Hagen was uneventful.

Air Traffic Services (ATS) records showed that in the Mt. Hagen area, traffic and weather information were provided to the flight crew, reporting that there were clouds in the circuit area and 5 to10 knot winds blowing from 180°.

The flight crew stated that while overhead Mt. Hagen and on assessment of the conditions for approach and landing, they considered that the conditions for landing on Runway 30 were not suitable due to a reported tailwind. Furthermore, with the work in progress at the time on part of the runway threshold, Runway 12 was not available for operations due to the unavailability of the Precision Approach Path Indicator (PAPI) lights with the displaced threshold.

1 The 24-hour clock, in Coordinated Universal Time (UTC), is used in this report to describe the local time as specific events occurred. Local time in the area of the serious incident, Papua New Guinea Time (Pacific/Port Moresby Time) is UTC + 10 hours.

2 Referred to as Jacksons Airport throughout the report.

3 The use of the term Flight Crew here and thereafter is referring to the PIC and co-pilot.

The crew decided to maintain 8,000 feet (ft) AMSL[4] and hold West of the Airfield over the Mt. Hagen township, in anticipation for a reduction in the tailwind on Runway 30. At 15:05, following unfavourable wind updates from ATS, the flight crew advised ATS that due to the prevailing tailwind on Runway 30, a landing was not possible and that they had to divert back to Port Moresby. From the holding at Mt. Hagen, the aircraft began tracking East on climb from 8,000 ft AMSL. Recorded data showed that the aircraft levelled off at 31,000 ft AMSL and tracked East towards Port Moresby.

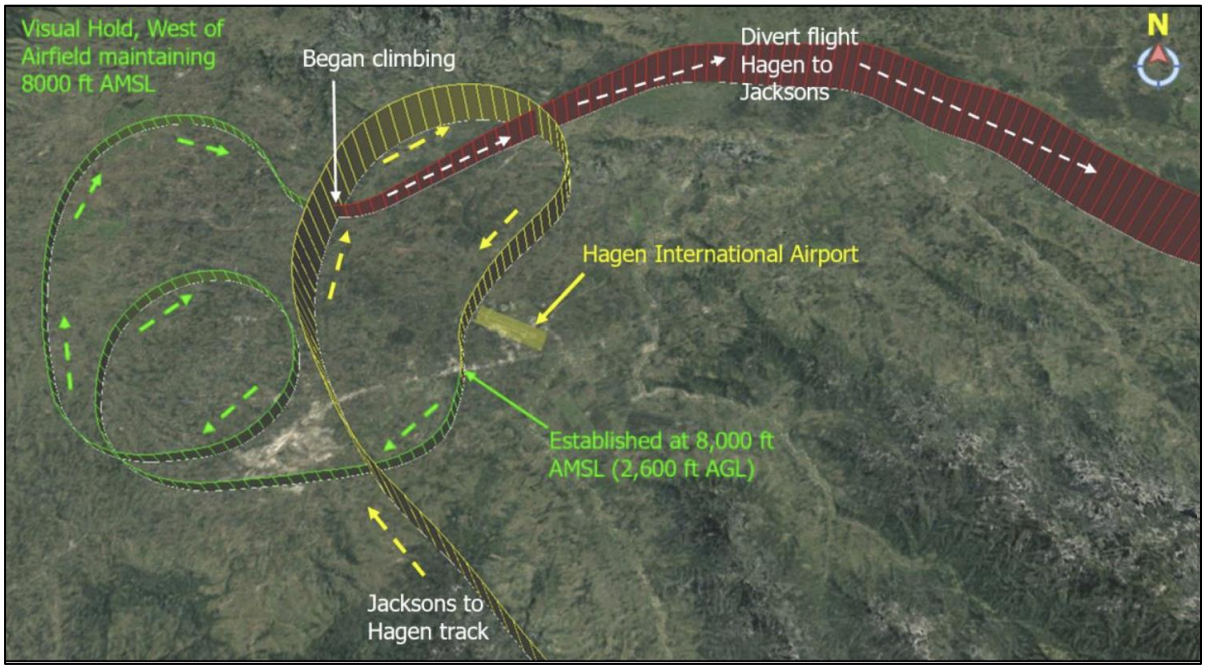

Figure 2. Depiction of the flight path in Mt. Hagen Circuit.

At 15:39, about 106 nautical miles (NM) from Jacksons Airport, the flight crew commenced a descent from 31,000 ft AMSL. ATS records showed that at 15:47, on descent through 16,000 ft, P2-ANT established communication with ATS, with pre-descent to 12,000 ft and requested to track via the Laloki[5] from 30 NM Northwest. The flight crew was then given clearance by ATS to track via the Laloki intercept ILS[6] approach for Runway 14 Left (L). At 15:49, approaching 12,000 ft, P2-ANT was given further descent clearance to 11,000 ft.

The flight crew stated that approaching 10,000 ft on descent into Jacksons Airport, they conducted the *Approach Check.* As per the *Operator's FFCOM[7] Vol 1, Section 3.8.4*, this check is required to be conducted at or approaching 10,000 ft on descent, or 30 NM to the destination. During the execution of the *Approach Checks*, the flight crew discovered that the Landing Altitude Setting (LAS)[8] had not been set for arrival at Jacksons Airport, and maintained a setting of 5,500 ft. The flight crew stated that the LAS of 5,500 ft had initially been set for Mt. Hagen Airport prior to departure out of Port Moresby on the previous sector. The PIC subsequently corrected the setting and set the LAS to sea level (0 ft) for the arrival into Jacksons Airport.

The PIC recalled that at the time the correction was made, the aircraft was descending at a rate of more than 2,000 ft per minute. At that descent rate, the crew considered that there would not have been enough time for the pressurisation system to automatically pressurise the cabin to sea level in time for the landing at Jacksons Airport.

4 Above Mean Sea Level

5 The tracking point for transition to the ILS approach.

6 Instrument Landing System

7 Fokker Flight Crew Operating manual

8 The destination-landing altitude is required to be set before take-off, at the departure point. Refer to Section 1.6.2.1 for more information on LAS.

According to the flight crew, their options were either to stop descent and hold on track or deviate from track and maintain 10,000 ft to allow for the pressurisation system to automatically pressurise the cabin to sea level before continuing with the approach to land. The crew stated that the decision was made to continue with the descent after considering that the option to hold would have further delayed their arrival, and subsequently delay the departure of their next flight, which was scheduled for a 17:00 departure to Cairns, Australia.

The aircraft continued to descend and track via the Laloki Intercept as the crew attempted to increase the rate of cabin pressurisation by switching to Manual mode on the cabin pressure controller. The crew stated that they initiated the *Manual Cabin Pressurisation Control Procedure* as per the Fokker 70/ 100 Quick Reference Handbook and as stated in the operator's *FFCOM – Volume 1, Section 6.2.5* (Refer *Appendix A Section, 5.1.3*).

The flight crew stated that in order to maintain passenger comfort, they reduced the rate of descent of the aircraft to less than 2,000 ft per minute and selected the *cabin altitude control lever* on the *Cabin Pressure Control Panel* to the down position. They then manually increased the rate of cabin descent to a range of 800 -1,000 ft per minute. The PIC recalled that throughout that time, they observed no abnormalities with the cabin pressurisation system.

At 15:53, while descending through 8,700 ft, ATS instructed P2-ANT to descend to 3,500 ft, which the flight crew acknowledged. This followed shortly with further descent clearance to 2,500 ft for the 14L ILS Approach. Recorded data showed that the aircraft established on final approach for the 14L ILS at 15:54, passing through 5,800 ft, at about 10 NM from the runway.

Recorded data also showed that at 15:58, passing 2,500 ft, the aircraft landing gear was extended. This was found to be the time the aircraft was being configured for landing. The crew recalled at that point, they observed that the cabin altitude was at sea level, the cabin rate of change was at zero and the cabin pressure differential was reducing as the aircraft descended. As per the procedure, and upon their observations, the crew then set *the cabin altitude control lever* on the *Cabin Pressure Control Panel* to the mid position.

However, as the aircraft approached 1,000 ft on final approach, the flight crew observed a cabin differential pressure reading of 3.5 PSI[9], which then continued to increase to 4 PSI. As the differential was more than the maximum allowable cabin differential for landing, 0.13 PSI, the flight crew decided to execute a go-around and hold at Daugo (D901)[10] to rectify the problem.

Recorded data showed that at 16:00, at about 1,000 ft, the landing gear was retracted, and power was increased for the go-around. According to the cabin crew, around the time they heard the landing gear doors close as the landing gears were retracted, they started experiencing intense pain in their ears. They recalled looking around the cabin and observing passengers also showing signs of discomfort and pain (Refer to *Section 1.15.2).*

At 16:01, at about 2,500 ft, the flight crew advised ATS that due to a technical issue, they had conducted a go-around and requested to track and hold at D901, reporting that operations were normal. ATS subsequently provided clearance for the aircraft to track to and hold over D901. According to the flight crew, approaching D901, they were alerted by cabin crew about passengers experiencing severe pain and discomfort during the go around. The flight crew acknowledged the report from the cabin crew and briefed the cabin crew on the situation and their intention to issue a brief to the passengers over the Public Address (PA) system and that they would land as soon as the issue was rectified.

According to the flight crew, while holding at D901, an attempt was made to contact the operator's Maintenance Watch[11] for technical support to address the increasing cabin differential.

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9 Pound per square inch – measurement of pressure used in the imperial unit system of measurement.

10 Daugo island. Delta 901 -Vertical limit 4,000 ft to Ground-Flying training area.

11 Maintenance Watch: Provides overall technical coordination and technical support between Line Maintenance and Flight Operations. See Section 1.18, for more information on Maintenance Watch.

However, Maintenance Watch was not available at the time. The flight crew observed the cabin differential pressure continue to increase to 6 PSI.

In an attempt to reduce the cabin differential, the flight crew then decided to action the *Fokker 70 Quick Reference Handbook (QRH) Abnormal Procedure* for *'Reduced Cabin Pressure Differential Procedure*' (Refer *Appendix A Section, 5.1.4*). After completing the procedure, the flight crew observed the cabin differential begin to reduce again.

The cabin crew stated during the interview that it was around that time, certain passengers were observed to be bleeding from the ears and nose. The cabin crew proceeded to attend to the passengers accordingly. ATS recorded data showed that at 16:10, the flight crew reported that operations were normal and requested vectors for the ILS approach to return to land. P2-ANT was then cleared to maintain 2,500 ft and turn right to track for the 14 L ILS approach. As the aircraft left D901, the flight crew made a PA to the passengers, advising them to anticipate the possibility of experiencing some discomfort on landing, due to a pressurisation issue.

At 16:17, about 7 NM from Runway 14 L threshold, the aircraft re-established on the ILS approach and conducted a normal approach and landed at 16:20. The crew taxied to the parking bay and a normal disembarkation was carried out.

On disembarking, the cabin crew advised the affected passengers to seek assistance from the operator's Customer Services personnel in the terminal area. Once all the passengers had disembarked from the aircraft, the cabin crew advised the flight crew that some of the passengers had sustained injuries. Refer to Section 1.15.3 for more information.

The flight crew reportedly disembarked the aircraft and made their way to the assigned aircraft for their next flight. The injured passengers were attended to by Ground Operations personnel and taken to the hospital for treatment and further assessment. One out of the two cabin crew declared feeling unwell and was relieved of further duties, while the other cabin crew continued to operate an additional flight on the same aircraft.

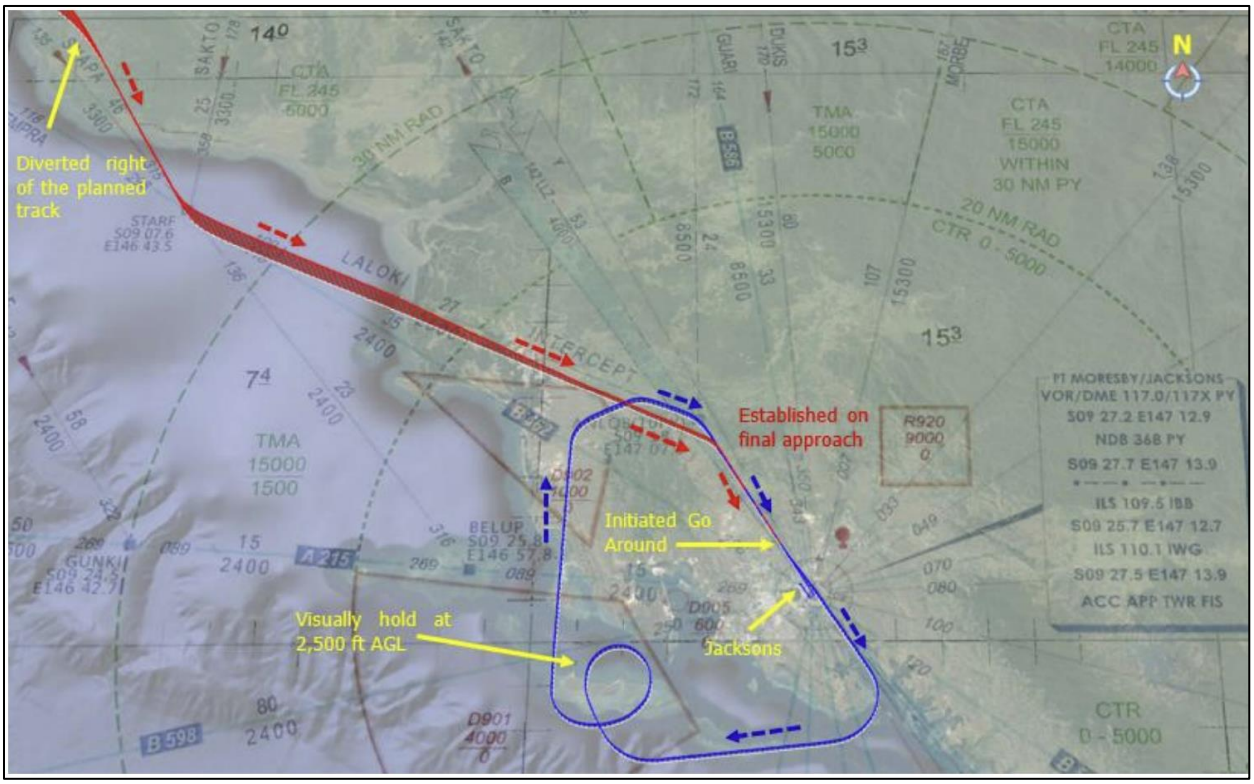

Figure 3. Depiction of the flight path from go-around to landing.

1.2 Injuries to persons

Injuries	Crew	Passengers	Total in Aircraft	Others
Fatal	-	-	-	-
Serious	-	4	4	-
Minor	1	16	17	Not applicable
Nil Injuries	3	47	50	Not applicable
TOTAL	4	67	71	-

Table 1: Injuries to persons

The Pacific International Hospital (PIH) provided medical reports for the 20 passengers on which they conducted medical examinations following the serious incident. Fifteen (15) passengers were given medical attention on the day of the occurrence, while five passengers were given medical attention a few days later.

According to the medical records 4 passengers sustained serious injuries while the other 16 passengers sustained minor injuries.

1.2.1 Serious Injuries[12]

Two adult passengers were diagnosed with Decompression Injury, Hypertensive Urgency and Hypokalemia. Examination results showed that the two passengers had elevated blood pressure, dizziness and severe pain in their ears. Both were admitted to the ward for treatment and discharged the next day after showing improvement in their blood pressure.

Another adult passenger was diagnosed with Otitic Barotrauma[13] in both ears. Examination results showed that the passenger's right ear's tympanic membrane was congested and had bulged, while the left ear sustained trauma on the anterior quadrant of the tympanic membrane with bleeding over it. The nose had a mixture of blood and left nasal discharge. The passenger was treated, and subsequent reviews were done on 23 February 2023 and 27 February 2023. The review report stated that the passenger had reduced pain and blockage. However, clot over the left tympanic membrane persisted. Otherwise, the membrane in both ears were found to be normal.

Among the four seriously injured passengers was a child whose Medical Report showed that he was diagnosed with Epistaxis/ Otitic Barotrauma. Examination results showed that the passenger's right ear's tympanic membrane bilateral was congested and had bulged. The nose was bleeding from both nasal cavities. The passenger was treated, and a follow up consultation was required, however, the passenger did not return to the hospital for the review.

12 ICAO Annex 13 defines Serious injury as an injury which is sustained by a person in an accident and which:

a) requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was received; or

b) results in a fracture of any bone (except simple fractures of fingers, toes or nose); or

c) involves lacerations which cause severe haemorrhage, nerve, muscle or tendon damage; or

d) involves injury to any internal organ; or

e) involves second- or third-degree burns, or any burns affecting more than 5 per cent of the body surface; or

f) involves verified exposure to infectious substances or injurious radiate.

13 A tissue injury to the ear secondary to inadequate pressure equalization between gas-filled body spaces and the external environment.

1.2.2 Minor injuries

The 16 passengers who were assessed to have sustained minor injuries were diagnosed with Otitic Barotrauma in the ear and were treated accordingly. Six passengers were required to do a follow up to have the condition of their ears assessed, however, only one passenger did a follow up and was reported to have had reduced pain and headache.

1.3 Damage to aircraft

There was no damage sustained by the aircraft.

1.4 Other damage

There was no other damage to property and/or the environment.

1.5 Personnel information

1.5.1 Pilot in Command

Age	: 33 years
Gender	: Male
Nationality	: Papua New Guinean
Type of licence	: ATPL[14] (Aeroplane)
Rating	: Fokker 70/100, DHC-8-200/300[15]
Total flying time	: 8,261.6 hours
Total hours in command	: 3,469.3 hours
Total on type	: 3,098.3 hours
Total last 90 days	: 196.4 hours
Total on type last 90 days	: 196.4 hours
Total last 7 days	: 13.9 hours
Total on type last 7 days	: 13.9 hours
Total on duty last 48 hours	: 8.0 hours
Total rest period(s) last 48 hours	: 18.0 hours
Total last 24 hours	: 6.0 hours
Total on type last 24 hours	: 6.0 hours
Last SEP[16] recurrent training	: 09 January 2023
Last proficiency check	: 10 January 2023
Last line check	: 17 July 2022
Route recency	: 17 July 2022
Aerodrome recency	: 17 July 2022
Medical class	: One
Valid to	: 28 December 2023
Medical limitation	: Nil

The PIC's flight time was within limitations in accordance with the requirements prescribed in *CAR Part 122, subsection 122.103* '*Flight time limitations* ' and *122.105 'Duty time limitations and Rest Periods*'.

14 Commercial Pilot License/Air Transport Pilot License

15 Single Engine/Multiengine Aeroplane (Land):SE<5700kg maximum take-off weight (MTOW), ME DHC6, DHC8, F70/100.

16 Safety and Emergency Procedure

1.5.2 Copilot

Age	: 38 years
Gender	: Male
Nationality	: Papua New Guinean
Type of licence	: CPL A[17]
Rating	: Fokker 70/100, DHC-8-200/300[18]
Total flying time	: 6,434.1 hours
Total on type	: 4,668.7 hours
Total last 90 days	: 219.7 hours
Total on type last 90 days	: 219.7 hours
Total last 7 days	: 12.7 hours
Total on type last 7 days	: 12.7 hours
Total on duty last 48 hours	: 10.7 hours
Total rest period(s) last 48 hours	: 18.0 hours
Total last 24 hours	: 2.4 hours
Total on type last 24 hours	: 2.4 hours
Last SEP recurrent training	: 30 December 2022
Last proficiency check	: 31 December 2022
Last line check	: 08 September 2022
Route and aerodrome recency	: 08 September 2022
Medical class	: One
Valid to	: 17 August 2023
Medical limitation	: Nil

The co-pilot's flight time was within limitations in accordance with the requirements prescribed in *CAR Part 122*, subsection *122.103 'Flight time limitations'* and *122.105 'Duty time limitations and Rest Periods'*.

1.5.3 Cabin Crew (CC1)

Age	: 33 years
Gender	: Male
Nationality	: Papua New Guinean
Rating	: Fokker 70/100, DHC-8
SEP certificate expiry date	: 22 April 2023
Fokker Competency check due	: 13 April 2023

The CC1's personnel records showed that the CC1 had been employed by Air Niugini Limited since 2 June 2011.

17 Commercial Pilot License Aeroplane

18 Single Engine/Multiengine Aeroplane (Land):SE<5700kg MTOW, SE C172, ME PA34, DHC8, F70/100.

1.5.4 Cabin Crew (CC2)

Age	: 24 years
Gender	: Female
Nationality	: Papua New Guinean
Rating	: Fokker 70/ Fokker 100/ DHC-8
SEP certificate expiry date	: 8 July 2023
Fokker Competency check due	: 16 September 2023

The CC2's personnel records showed that the CC2 had been employed by Air Niugini Limited since 6 June 2022.

1.6 Aircraft information

1.6.1 Aircraft Data

Aircraft manufacturer	: Fokker
Model	: F28 Mk0070
Serial number	: 11577
Date of manufacture	: 1996
Aircraft registration	: P2-ANT
Total hours since new	: 46, 483.65
Total cycles since new	: 40,401.00
Certificate of Registration number	: 377
Certificate of Registration reissued	: 1 March 2019
Name of the owner	: Air Niugini Limited
Name of the operator	: Air Niugini Limited
Certificate of Airworthiness number	: 277
Certificate of Airworthiness issued	: 1 March 2019
Certificate of Airworthiness valid to	: Non terminating

1.6.1.1 Engine Data

Engine Type	: Turbofan
Manufacturer	: Rolls Royce
Model	: TAY 620-15
Type	: TAY
Right Engine	
Serial Number1	: 17179
Total engine hours since new	: 13,363.02
Left Engine	
Serial Number 2	: 17061
Total engine hours since new	: 38,324.95

1.6.1.2 Aircraft airworthiness and maintenance

At the time of the serious incident, the aircraft had a current Certificate of Airworthiness (CoA), Certificate of Annual Airworthiness Review (AAR), Certificate of Registration (CoR), and was certified as being airworthy.

The maintenance records were reviewed during the investigation, and it was identified that there were no outstanding scheduled maintenance, defects, and Minimum Equipment List (MEL).

For post-occurrence maintenance, refer to *Section 1.18.7.1*

1.6.2 Aircraft Pressurisation System

As per the manufacturer, the Fokker 70 aircraft is originally equipped with a pressure control panel on the overhead panel with the part number 2118386-9 without the Rate Limiter control knob. This panel can be interchanged with part number 2118386-5, which has a Rate Limiter control knob.

According to the *Fokker 70/100, Aircraft Maintenance Manual (AMM)*, the air pressure in the aircraft cabin comes from the Bleed Air System. The amount of air flow coming into the aircraft cabin for pressurisation comes from bleed valves which are connected to the compressor section of the engines. Pressurising of the aircraft cabin depends on the rate at which air is allowed overboard via the Primary and Secondary Outflow Valves.

The Pressurisation System normally operates automatically and schedules cabin pressurisation depending on the LAS set by the crew, as well as the parameters sensed throughout the different phases of flight.

In the event that there is a fault detected with the Automatic function, the fault light will illuminate on the Auto Pressurisation panel, and the Manual switch on the Cabin Pressure Selector panel on the overhead panel and an alert message on the multifunction display units will be shown, prompting the crew to switch to manual mode, and have direct manipulation of the Cabin Pressurisation Controller (CPC) manually.

1.6.2.1 Bleed Air System

The Bleed Air System supplies pressure and temperature regulated air to the aircraft systems. The main users are the air conditioning system and anti-icing system. Bleed-air is part of the bleed air system and refers to the compressed air that is taken from the engine compressor.

The bleed air is taken through ducting from the Low Pressure (LP) stage and High-Pressure (HP) stage of the engine compressor through the bleed valves. The bleed air that is extracted from the high- and low-pressure compressor of the engines and goes to the air-conditioning system where it is conditioned and supplied through ducts at the correct temperature and pressure to the cabin for passenger and crew safety and comfort. This is where a desired cabin pressure is maintained by controlling the cabin pressure using the "*pressure control system*", and automatically, the primary and secondary outflow valves are regulated to maintain a desired cabin pressure setting.

1.6.2.2 Cabin Pressure Control Systems

The Pressure Control System makes up the Cabin Pressurisation System (CPS). It controls the pressure (altitude) of the cabin and the flight compartment. The pressure in the cabin is regulated by the outflow valves which controls the air from the cabin to go out.

When in Automatic mode, the system maintains a scheduled cabin pressure rate with respect to the following:

- Pre-selected Landing Altitude Setting.
- Aircraft climb and Descent rates throughout the different phases of flight.
- Variation in Thrust and engine bleed air from the compressors.
- For descent, dependent on the mode of descent, i.e., Vertical Speed or Altitude Change mode.

This is all achieved through the automatic regulating of the Primary and Secondary Outflow Valves.

When operating in Manual Mode, the flight crew is required to constantly monitor and adjust the rates of cabin pressurisation and depressurisation as required to safely achieve either a desired cabin altitude to maintain at a certain cruise altitude, or a desired landing altitude to descend to for a landing.

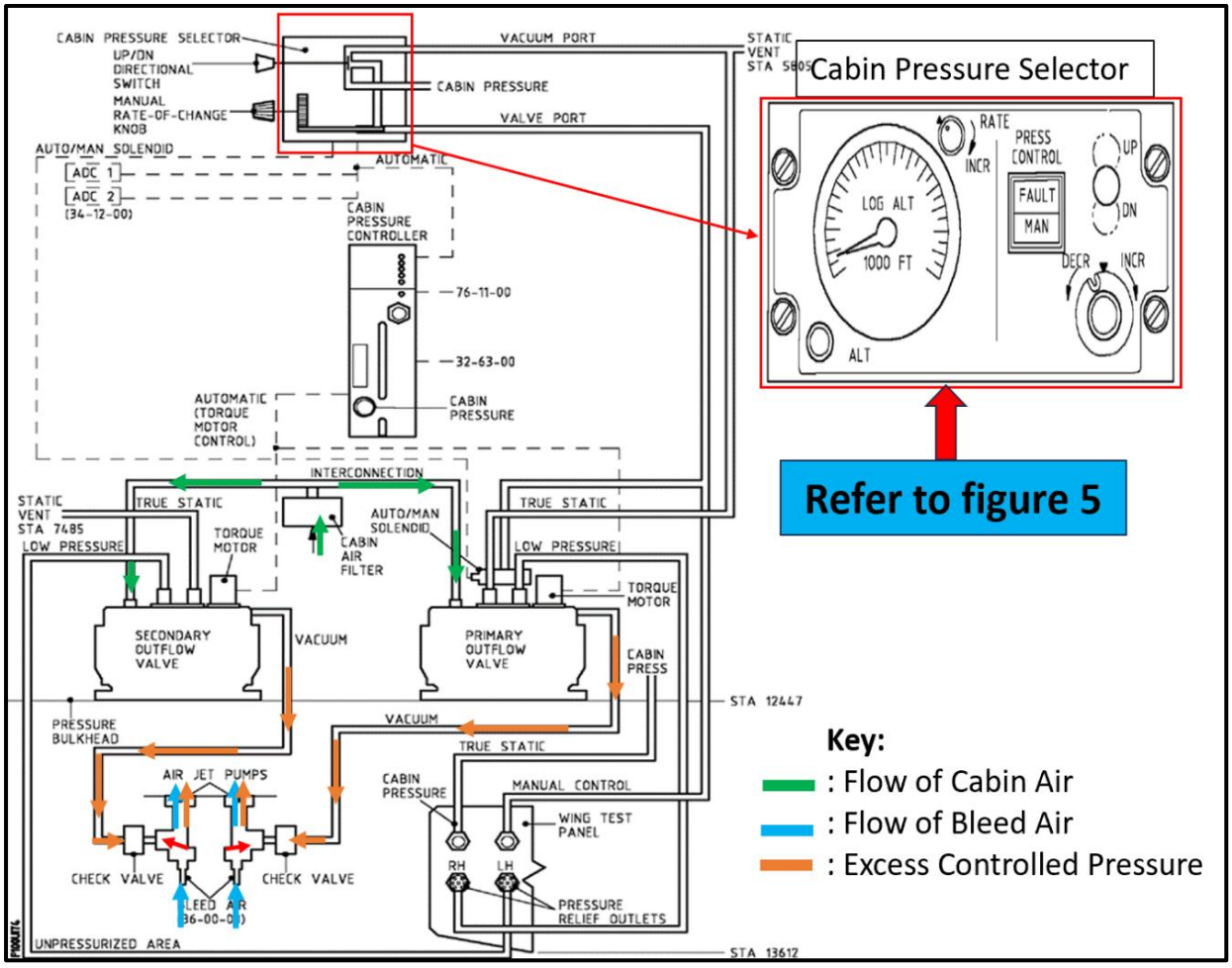

Figure 4. The Pressure Control System. (*SOURCE: Fokker 70/100 AMM)*

The outflow valves work in automatic and in manual mode to control the cabin pressure. In the automatic mode, pressurisation begins automatically when the take-off thrust is selected. After take-off, the Cabin Pressurisation Controller (CPC) automatically plans a cabin altitude for the respective aircraft altitude and a rate of cabin altitude change for the aircraft's rate of climb and descent. The CPC then commands the outflow valve to regulate the cabin air accordingly. If the CPC can no longer be able to control the system completely, the manual mode indication is automatically activated and shows on the Cabin Pressure Selector and prompts for manual mode of operation.

Depressing the push switch PRESS CONTROL activates the MAN (Manual) indication on the push switch to come on and allows the UP/Down (DN) directional control lever and the manual rate-of-change rotary a pneumatic needle valve on the CPS to directly control the cabin altitude. Placing the manual control lever to the UP and DN positions depressurises and pressurises the cabin respectively.

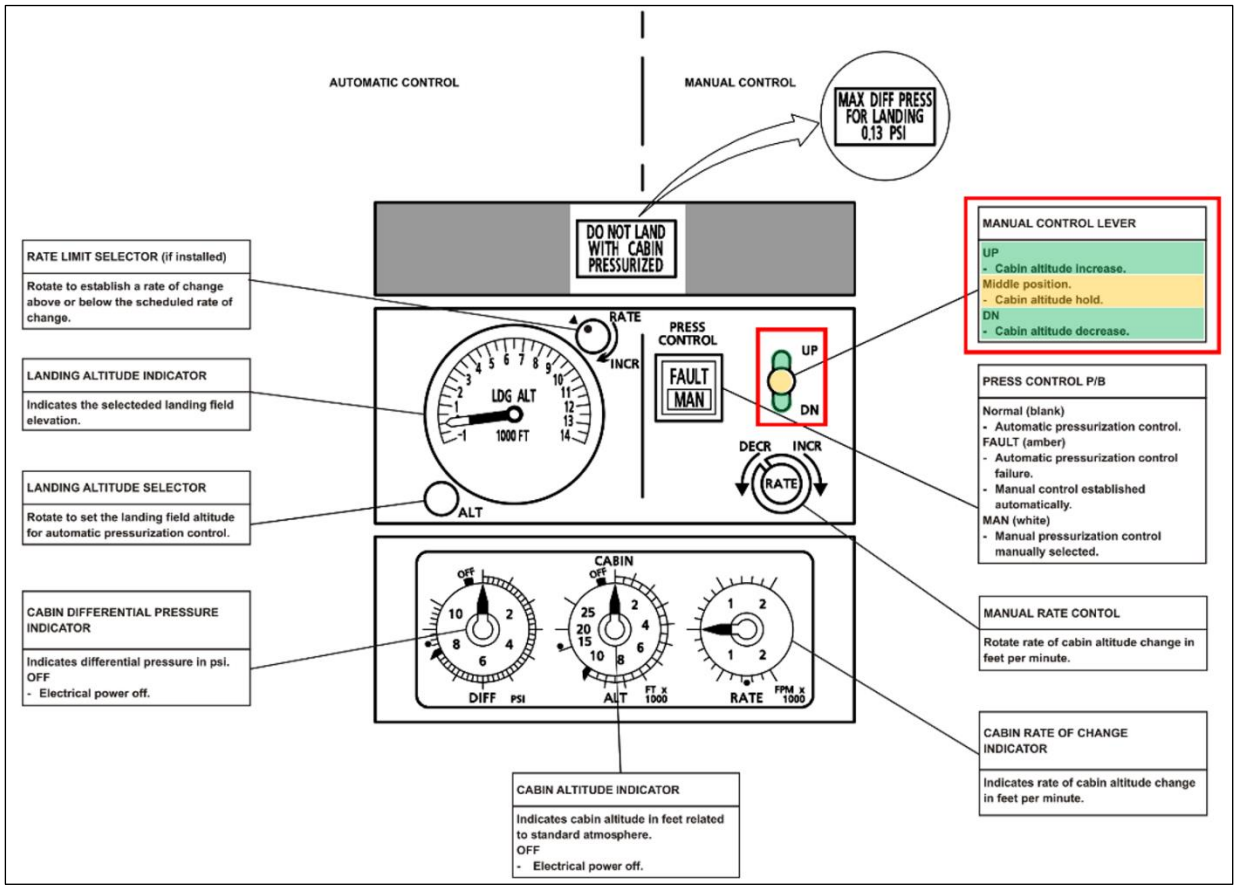

Figure 5. Pressurisation Controls and Indicators (Location: Overhead) Source: AOM Fokker 70/100

1.6.2.3 Automatic pressurisation control

In automatic mode, the pressurisation system is controlled by the CPC. Pressurisation begins automatically when the take-off thrust is selected on take-off. After take-off, the CPC automatically plans the climb schedule, which is:

- a cabin altitude for each aircraft altitude, and
- a rate of cabin altitude change for each aircraft rate of climb and descent.

When the destination airport altitude is below the departure airport altitude, the cabin altitude first descends at half the selected rate (this is the dwell rate) until the selected altitude is reached. Then the cabin altitude climbs in reference to the climb schedule. See *Figure 6.*

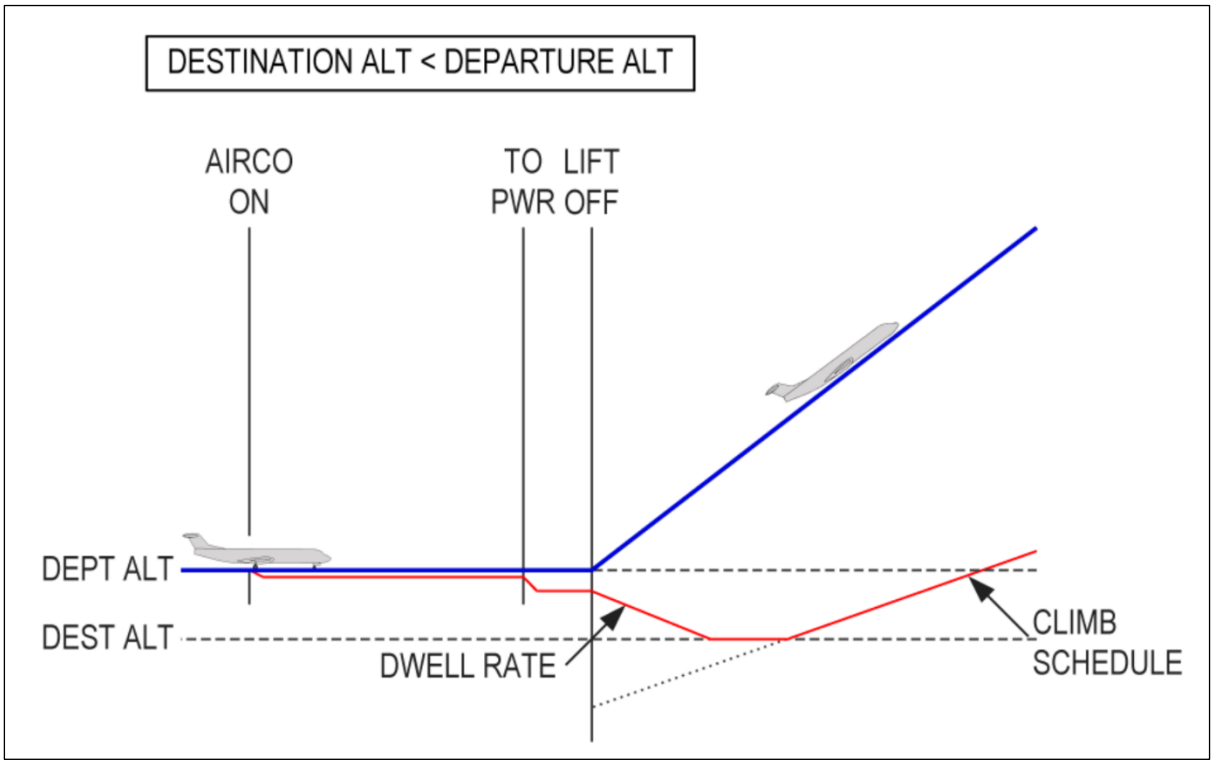

Figure 6: Climb schedule for destination-airport altitude lower than the departure-airport altitude

1.6.2.4 Manual pressurisation control

If the pressurisation controller fails completely, the manual mode is automatically activated. In the case of the serious incident flight, the pressurisation controller did not fail, however the flight crew opted to use the manual mode.

Placing the manual control lever to the UP or DN positions depressurises and pressurises the cabin respectively. The increase and decrease of cabin altitude rate-of-change is achieved by manually turning the rotary-switch towards the Increase (INCR) and towards the Decrease (DECR) position respectively. The cabin altitude increases or decreases until the UP/DN Directional control lever is set back to the centre/middle position, refer to *Figure 5*.

1.6.2.5 Abnormal procedures

According to the operator and manufacturer, the *Abnormal Procedures for Manual Cabin Pressurisation Control* is applied when there is a fault with the Automatic Cabin Pressurisation Control mode. On application of the abnormal procedure for Manual Cabin Pressurisation Control, the flight crew are to monitor cabin altitude and cabin vertical speed during climb and descent. The investigation noted that, on the day of the serious incident, the automatic mode was functioning normally without any fault.

1.7 Meteorological information

1.7.1 PNG National Weather Service

1.7.1.1 Mt. Hagen Terminal Aerodrome Forecast

Mt. Hagen Terminal Aerodrome Forecast (TAF) 2 was issued on 20 February 2023 at 07:50 and was valid from 12:00 to 21:00.

Wind:	Variable at 3 kts
Visibility:	Greater than 10 km in light showers and rain
Cloud:	Scattered at 1,500ft broken at 3,000 ft
INTER:	From 12:00 to 21:00
Visibility:	4,000 m in thunderstorms and rain
Cloud:	Broken at 800 ft few cumulonimbi at 1,600 ft
QNH[19]:	1017 1015 1016

Table 2: Mount Hagen TAF.

1.7.1.2 Port Moresby Terminal Aerodrome Forecast

Port Moresby Terminal Aerodrome Forecast (TAF) 3 was issued at 16:00 on 20 February 2023 and was valid from 10:00 on 20 February 23 to 12:00 on 21 February 23.

From 16:00	
Wind:	120 degrees 6kts
Visibility:	Greater than 10km in light showers of rain
Cloud:	Scattered at 1700ft Broken at 3000ft
From 16:00 to 20:00	
Visibility:	4000m in heavy thunderstorms and rain
Cloud:	Broken at 1000ft Few Cumulonimbi at 1800ft
Temperature:	30 29 28 27
QNH:	1006 1007 1009 1008

Table 3: Port Moresby TAF.

1.8 Aids to Navigation

Ground-based navigation aids, onboard navigation aids, or aerodrome visual ground aids and their serviceability were not a factor in this serious incident.

1.9 Communications

The aircraft was equipped with two Very High Frequency (VHF) radios and one High Frequency (HF) radio communication system.

Communications between ATS and the crew, including the serviceability of radio equipment were not factors in this serious incident.

19 Query Nautical Height (atmosphere pressure at sea level).

1.10 Aerodrome information

Airport name	Jacksons International Airport-Papua New Guinea
Location indicator	AYPY-PORT MORESBY
Airport authority	PNG National Airports Corporation
erodrome Services	Tower & Ground control/ Radar/ Automatic Dependent Surveillance Broadcast (ADSB)
	Flight Information Service (FIS)
Type of Traffic permitted	Visual Flight Rules (VFR) / Instrument Flight Rules (IFR)
Coordinates	09° 26.509′ S, 147° 17′ 13.144′ E
Elevation	129 feet (39 metres)

Table 4: Aerodrome information - Jacksons Airport.

1.11 Flight recorders

The aircraft was fitted with a Solid-State Cockpit Voice Recorder (SSCVR) and a separate Solid-State Flight Data Recorder (SSFDR). The table below provides more information of the recorders.

CVR		**FDR**	
Manufacturer	Honeywell	Manufacturer	Honeywell
Model	SSCVR	Model	SSFDR
Part Number	980-6022-001	Part Number	980-4700-003
Recording duration	Approximately 2 hours recording	Recording duration	More than 25 hours
		Recording capability	128 words per second

Table 5: Flight recorders technical information.

On 23 February 2023, three days after the day of the serious incident, both the FDR and CVR data were downloaded and readout by AIC at its Flight Recorder Facility.

During analysis of the CVR data, the AIC discovered that the data pertaining to the serious incident had already been overwritten by data from the post occurrence flights conducted after 20 February 2023.

The FDR data readout showed parameters for: Master Caution, Master Warning and Cabin Altitude Warning. The recorded data did not show any activation of the Warnings or Cautions.

The investigation also used recorded data to generate a graphical plot of the serious incident flight from top of descent to touchdown, at Jacksons Airport, to show the aircraft's rate of descent.

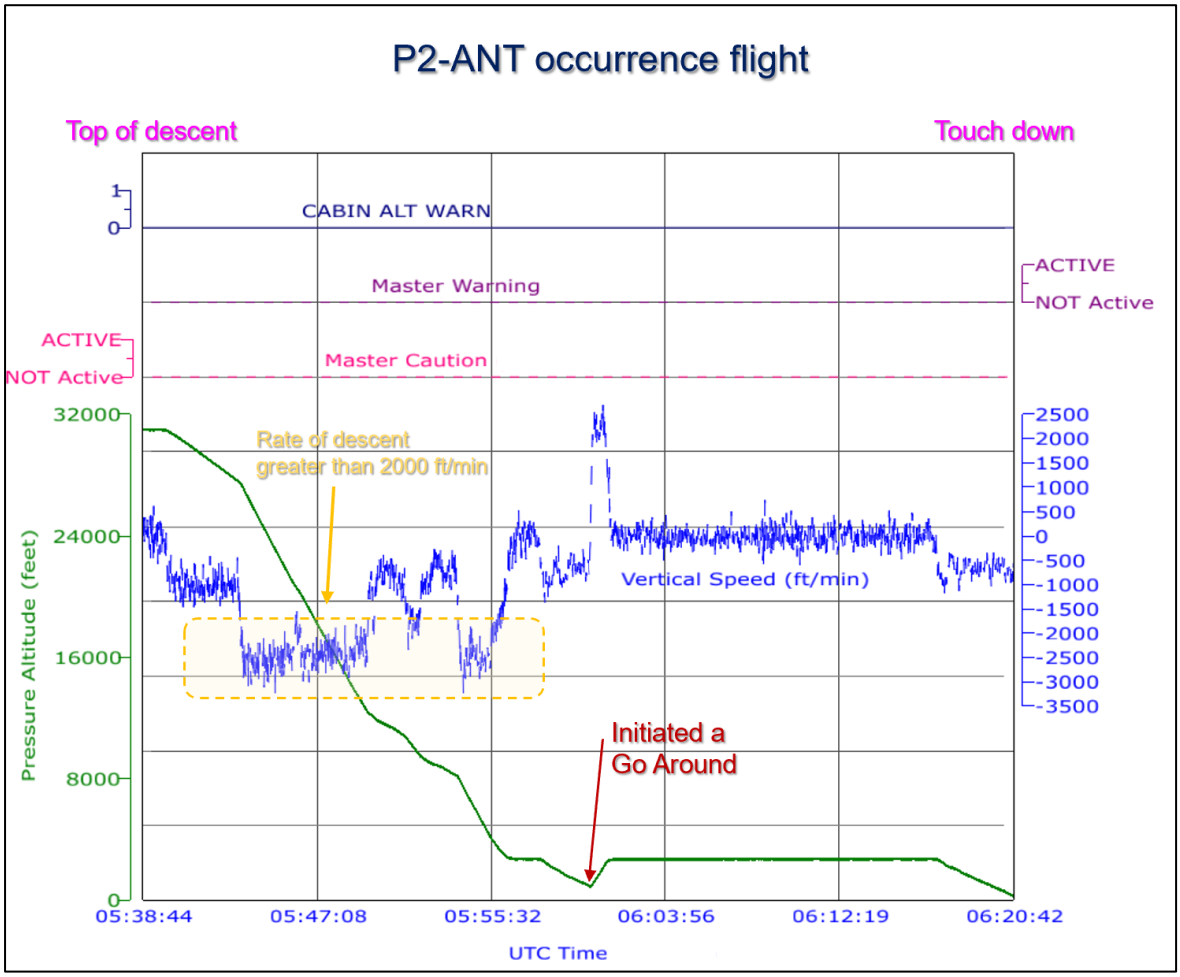

Figure 7. SSFDR recorded data plot of the serious incident flight.

1.12 Wreckage and Impact Information

As stated in section 1.3, the aircraft was undamaged.

1.13 Medical and Pathological Information

There was no evidence that physiological factors or incapacitation affected the performance of flight crew.

1.14 Fire

There was no evidence of pre-or post-impact fire.

1.15 Survival Aspects

1.15.1 Flight crew

The flight crew stated that they did not sustain any injuries during the pressurisation event.

1.15.2 Cabin crew and passengers

The cabin crew stated that during the approach for landing at Jacksons Airport, they noticed the aircraft initiating climb for a go-around. According to CC1, who was seated adjacent to the forward exit door, as soon as the undercarriage doors closed, he started experiencing discomfort and his ears were blocked. At this time, a few passengers were calling for assistance, so the CC1 left his seat to attend to the passengers. When approaching the passengers, he felt the pressure in the cabin was "really intense". He further described the cabin to be over-pressurized and likened his body's experience to being deep under the sea, with the feeling of wanting to "burst". The passengers indicated to the CC1 that they were experiencing the same discomfort. Some of the passengers seated in the back of the cabin, between rows 11 to 15, were bleeding through their nose and ears, and a passenger at row 14, seat Golf (14G) vomited blood.

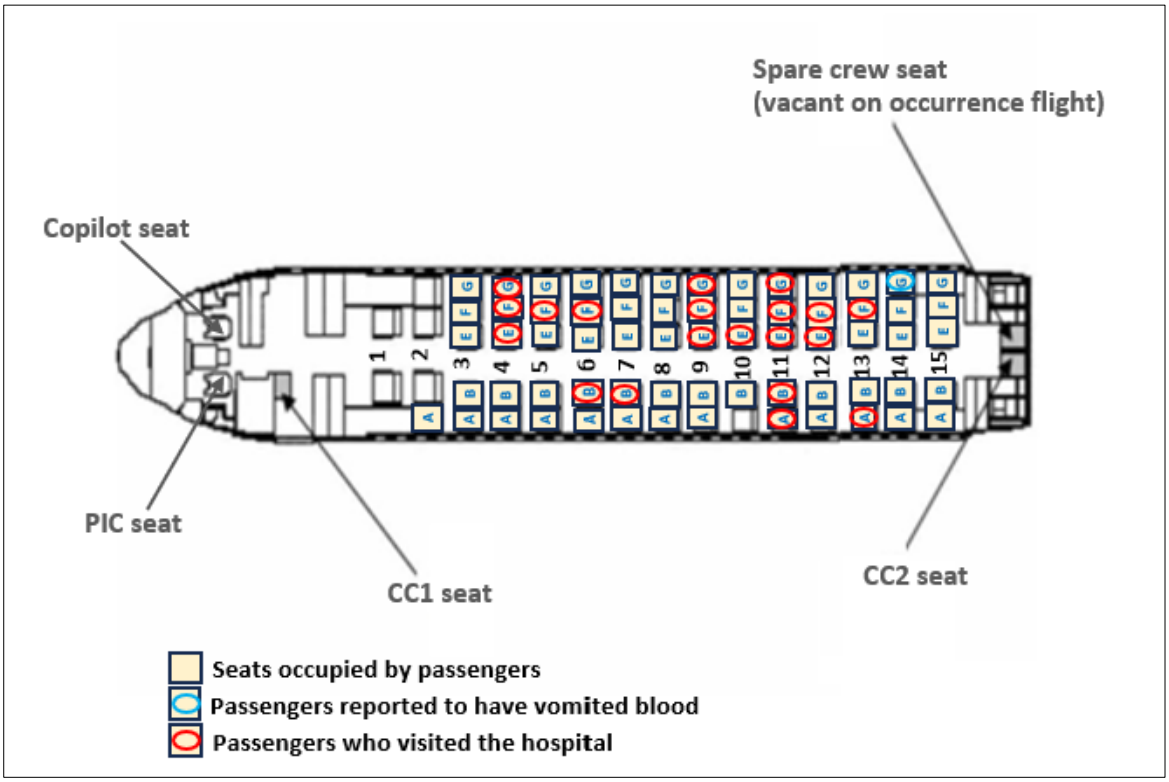

Figure 8. Crew and passenger seating information.

Upon observing the state of the passengers, cabin crew immediately informed the flight crew of the situation in the cabin through the interphone, in accordance with the operator's *Safety and Emergency Procedures Manual – Volume 1*. According to the cabin crew, the PIC advised over the interphone that the flight crew were dealing with an issue related to pressure. The PIC subsequently advised the passengers of the situation through a PA.

The PIC did not communicate the in-flight emergency to the Airport Manager in accordance with the operator's *Airport Services Manual, Section 6.18.7.2 Injury or Accident*, as he indicated in his interview that he was not made aware of passengers bleeding and in need of medical attention in-flight.

The cabin crew stated that passengers were in agony from the pain they were experiencing. Some passengers left their seats but were advised to return to their seats and fasten their seatbelts. The cabin crew later walked through the cabin reassuring distressed passengers and administering First Aid to injured passengers.

During the second approach to land at Jacksons Airport, the cabin crew stated that the PIC advised them to be seated for landing. According to the cabin crew, as soon as the undercarriage doors opened, a thick odorless fog was observed emanating from the air vents on the bottom sides of the cabin. The fog reduced visibility in the cabin. The cabin crew, seated at the back of the cabin near the lavatory, saw what she described as thick fog originating from row 2 of the cabin. She observed the thick fog travel as far as row 3. The cabin crew said they later saw an air rush dispersing the thick fog in the cabin.

The aircraft continued with the approach and landed safely on Runway 14L. According to cabin crew statements, after the aircraft landed, the passengers were still bleeding and in agony in the cabin.

As the aircraft taxied to the parking bay, the cabin crew went through the cabin and attended to the passengers that were bleeding.

1.15.3 Flight crew actions post-flight

As soon as all the passengers had disembarked from the aircraft, the CC1 advised the flight crew that some of the passengers had sustained injuries, however, no further action was taken by the flight crew in relation to the matter.

As per the operator's *Standard Operating Procedures Manual, Section 2.12.2 Post flight Briefing,* which states:

> *"…Any significant events on any flight should be debriefed as soon as possible and certainly before the crew disperses at the completion of a flight or duty."*

The flight crew disembarked the aircraft without conducting a debrief with the cabin crew.

Furthermore, the *Cabin Crew Administration Manual, Section 5.24.4 Pilots and Cabin Crew (Debriefing after an Unusual Event)*, states:

> *"When an 'unusual event' which occurs on board the aircraft results in increased communication between the Pilots and Cabin Crew, the PIC must debrief the air crew as soon as practicable after the flight. An unusual event would typically be a disruptive passenger(s), a passenger(s) requiring medical treatment, non-normal or emergency operations.*
>
> *The debriefing can occur on board the aircraft or in a briefing/debriefing room at the airport or hotel, away from passengers, the public or distractions.*
>
> *All Pilots and Cabin Crew members who are part of the operating air crew must attend, even if these delays attending a following duty on another aircraft. The PIC should coordinate the debriefing with the CC1.*
>
> *The reason for the event (particularly a non-normal or emergency operation) should be discussed honestly and comprehensively, in a manner that alleviates any apprehensions the air crew may have regarding the safety of continued operation. Judgemental statements should be avoided and questions from the air crew are to be encouraged. The PIC should provide any follow-up information as it becomes available.*
>
> *The PIC must ask if there has been any injuries and arrange medical assistance as appropriate."*

According to interview statements, the flight crew were rostered to operate an international flight on another aircraft to Cairns, Australia, following the occurrence flight. The flight crew disembarked P2-ANT and left for the International Terminal at Jacksons Airport, and subsequently conducted the flight to Cairns. The cabin crew remained onboard P2-ANT as they were rostered to operate another flight to Lae with a new set of flight crew. However, the CC2 was affected by pain in the ears and was unfit to continue with rostered duties for the rest of the day.

Injured passengers were attended to by the operator's Customer Service. (Refer to Section 1.17.4).

1.16 Tests and Research

1.16.1 Cabin Pressurization Test in Manual Mode

As part of the investigation, Fokker Services requested AIC to verify the controlling part of the Cabin Pressurization System in Manual Mode. A Cabin Pressurization Test in Manual Mode was conducted on aircraft P2-ANT by the operator's maintenance team, in the presence of AIC investigators to evaluate the cabin pressurization system's functionality. The test aimed to verify the system's control accuracy and measure values.

The test results indicated that the *Step 21* set forth by Fokker Service of the procedure for pressurizing the fuselage, where the expected psi value was 2, matched the measured value of 2 psi. This confirmed proper functionality and alignment with expected values, negating anomalies with the Cabin Pressure Selector panel or the Primary Outflow Valve. (Refer to *5.2 Appendix B,5.2.1*).

1.17 Organisational and Management Information

1.17.1 Aircraft Operator: Air Niugini Limited

Air Niugini Limited is a State-Owned Enterprise, with its headquarters in Air Niugini Haus, 7 Mile, Port Moresby, PNG. Its main operational base and maintenance base are located at Jacksons International Airport at 7 Mile, Port Moresby. Air Niugini operates both cargo and passenger flights domestically and internationally.

1.17.2 Accident and Serious Incident Notification

The operator's *Flight Administration Manual (FAM) Section 7.1* states;

> *Should there be any accidents or incidents involving company aircraft, the company or Pilot in Command shall notify the Civil Aviation Authority of the Accident or incident as soon as practicable. ACT 289, CAR Part 12.51 and 55.*

The operator's *FAM Section 7.1.3* states;

> *In the event of an accident or serious incident resulting in injury, death, or substantial aircraft damage it is the PIC's responsibility to notify the nearest authority, by the quickest available means. In the event the PIC is incapacitated it is the First Officer's*[20] *and/or a company appointed officer's responsibility to do so.*
>
> *The occurrence details shall be forwarded to the Civil Aviation Safety Authority of PNG within three (3) working days on an Air Niugini Operations Occurrence Report (OOR) form.*
>
> *The details required shall include a statement by each flight crew member who was on the aircraft at the time of the accident, detailing the facts, conditions, and circumstances relating to the accident.*
>
> *Where a flight crew member is incapacitated, the statement required shall be submitted as soon as the flight crew member is able.*
>
> *Pilot in Command shall use the earliest means of communication at his disposal to notify General Manager Flight Operations or his Deputy of the circumstances and details of the accident.*

20 Co-pilot

The investigation found that the Fokker Fleet Management, after being advised of the emergency that was experienced inflight by the cabin crew of the serious incident flight, contacted the PIC to gather more information. It was at this time that the PIC had verbally notified of the pressurisation event inflight on P2-ANT. An occurrence report was later issued by the PIC to Flight Operations on the same day.

The AIC established that neither the PIC, nor the operator notified CASA PNG of the serious incident as soon as practicable.

The *FAM Section 7.1*.8 also states;

> *When an incident occurs to a company aircraft the Pilot in Command and the company shall provide CASA with the occurrence details within three (3) working days of the incident on an Air Niugini Operations Occurrence Report (OOR) form.*

The investigation found that the OOR form was provided to both CASA PNG and the AIC on 22 February 2023, two days after the occurrence.

1.17.3 Access and Control

The *Civil Aviation Act* (CA Act), *Section 62 (1)* states:

> *(1) As soon as practicable after an accident or incident is notified under Section 60, CASA shall notify the Commission that CASA has been notified of the accident or incident where it is of any of the following kinds:-*
> *(a) an accident involving aircraft;*
> *(b) a serious incident in accordance with the provisions of the Convention.*

Furthermore, the *Civil Aviation Act, Section 246 (3)(c)* states;

> *3) Without limiting the generality of the powers conferred by Section 222 or Section 245, for the purpose of exercising any of its functions, duties, or under this Commission and any person authorized in writing for the purpose by the Commission shall have power to do the following:*
>
> *c) where necessary to preserve or record evidence, or to prevent the tampering with or alteration, mutilation, or destruction of any aircraft, place, aeronautical product, or any other thing involved in any manner in an accident or incident, to prohibit or restrict access of persons or classes of persons to site of any accident or incident.*

CASA PNG had only become aware of the serious incident a day after the occurrence, and subsequently, CASA PNG notified the AIC on the 22 February 2023. However, following the serious incident, P2-ANT continued to operate flights until the time the AIC was notified. This caused important volatile aircraft data to be overwritten by subsequent flights following the serious incident flight.

1.17.4 Passengers Requiring Medical Attention

There was no activation of the Airside Management Plan. The investigation found that this was a result of flight crew not notifying the relevant persons of the injuries sustained by the passengers.

The cabin crew stated that once the aircraft had come to a stop and the doors opened, they noticed that the Customer Service Officer (CSO) seemed unaware of the injured passengers. The cabin crew advised the disembarking passengers to notify the CSO on the ground if they required medical attention.

According to Customer Service, they were not made aware of any special requirements for the disembarking passengers. The Customer Service personnel only became aware of the inflight emergency event when one of the passengers demanded medical attention for the affected passengers at the Customer Service counter at the Jacksons Domestic Terminal. Customer Service subsequently advised the Ground Operation team of the event and proceeded to arrange for medical assistance for the passengers. The

operator’s medical practitioner met with the affected passengers at the Terminal prior to the passengers being transported to hospital for further medical attention.

According to the operator's *Airport Services Manual, Section 6.18.7.2 'Injury or Accident''*.

> *If an accident or injury happens to a passenger either inflight or on the ground, when in the company's care, immediate action must be taken to lessen his or her suffering to the best extent possible.*
>
> *In the event of an accident inflight either through turbulence or some other cause, the Pilot In Command of the aircraft will be responsible for radioing the arrival station. The pilot is to advise the Airport Manager of the passenger's name, type of injury and the extent to which medical attention might be required on the ramp or in the private area inside the terminal.*

On receipt of this message the Airport Manager or the deputy airport manager will:

> *1. Be responsible for alerting such company personnel as may possess medical or first aid qualification and getting the services of a suitable medical practitioner to attend the arrival of the aircraft.*
> *2. Also contact the nearest ambulance service **IF IT IS NECESSARY.***
>
> *On arrival of the aircraft, the injured passengers will disembark after all other passengers and be taken to a suitable place away from public view, so that suitable medical or first aid attention can be taken.*

The AIC found that the cabin crew had advised the flight crew of the passenger's discomfort and injuries inflight, however, the flight crew did not radio the arrival station of the injuries sustained by some passengers inflight. Therefore, all persons responsible for attending to the injured passengers were unaware and did not meet the aircraft to attend to the passengers.

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1.18 Additional Information

1.18.1 James Reason's model of Accident Causation

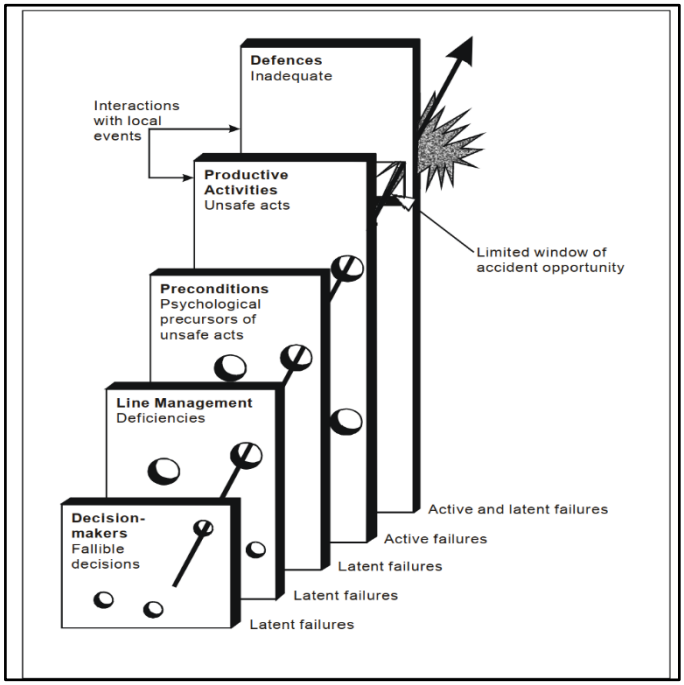

Figure 9. Modified version of James Reason's model of accident causation, showing the various human contributions to the breakdown of a complex system. (Source: James Reason, Human Error, 1990. United Kingdom: Cambridge University Press).

Failures in the system create holes in all the defences. When the holes in all of the slices momentarily align, 'permitting a trajectory of accident opportunity, so that a hazard passes through holes in all of the defences, resulting in accidents as shown in *Figure 9*.

The investigation identified absent or failed defences and human error (intended and unintended actions) directly led to the serious incident. Tasks and environmental conditions that existed prior to and at the time of the serious incident directly influenced flight crew and aircraft performance. Absent or failed defences, human error and task or environmental conditions is discussed throughout the report and in the Analysis.

1.18.2 Pre-flight Preparation

The operator's procedures on *'Pre-flight Duties before Flight' in Section 7.1 (1) (c)* in the *Standard Operating Procedures (SOP) Manual* states that prior to the commencement of each flight, the PIC shall ensure that each flight crew member complete a review of the following documents:

- The Sign On Certification;
- General declaration form to ensure accuracy;
- Aircraft Technical Log and the MEL/CDL to determine Airworthiness status of the aircraft;
- the Operational flight plan (OFP);
- Weather information to include enroute and departure;
- destination and alternate airports;
- Notams applicable to the enroute phase of flight and to departure;
- destination and alternate airports;

- Aircraft performance data which are also in the EFB OPT for easy access inflight; and
- the Aircraft weight/mass and balance which are also in the EFB OPT for easy access inflight.

The AIC found from interviews with flight crew that they had arrived late for sign on and both crews stated that they reviewed pre-flight documents individually before making their way to the aircraft. The investigation could not determine if all required flight documents were reviewed prior to departure or if pre-flight briefing was conducted onboard the aircraft.

1.18.3 Runway 12 and Runway 30 – Mt Hagen Airport

According to the broadcast, Automatic Terminal Information Service (ATIS)[27] message for Mt. Hagen Airport, aircraft arriving and departing were advised to use Runway 12. Conditions reported were, winds blowing from 120° at 10 knots, maximum 15 knots. Visibility at 10 kilometers or greater, clouds scattered at 4,000 ft, temperature of 21°C, dewpoint of 19°C and QNH of 1016 hPa.

The flight crew stated that when they arrived at Mt. Hagen Airport, Runway 12 was the duty runway for departure and arrival aircraft due to tailwind components on Runway 30. They added that due to the displaced threshold on Runway 12, the PAPI lights were unavailable. The requirements were that *Air Niugini operations may continue for a maximum period of 14 consecutive days in respect of any runway that is served by an unusable approach slope indicator system*. The dispensation was issued by CASA PNG to Air Niugini Limited, dated 12 October 2004. It was an exemption from requirements in *CAR Part 121.69 (b) which applied to F-28 and F-100 Typ*e aircraft operated by Air Niugini Limited.

Air Niugini Limited had a 14-day dispensation period to operate without PAPI lights however, at the time of the serious incident, the dispensation period of 14 days had lapsed. Therefore, Runway 12 was not suitable for P2-ANT on the day.

The flight crew therefore elected to hold over the Mt. Hagen township at 8,000 ft AGL and advised Mt. Hagen tower of their intentions accordingly. Wind checks were done by the Flight Crew while holding over the township.

Information gathered from the flight crew interview and from ATC recordings, indicated that P2-ANT could not land in Mt. Hagen due to tailwinds on Runway 30, the flight crew stated that, the tailwind confirmed in the operator's *SOP Manual, sub-section 16.4.3 'Fokker 100/70'*, which states that the tailwind component for Take off and Landing is 10 kts. The flight crew added that due to the calculated landing weight of 35 tonnes and the prevailing wind conditions, Runway 30 was also not suitable for landing. Therefore, with persisting tailwinds, the flight crew decided that a landing was not possible and decided to return to Port Moresby.

Given the conditions at the time, as well as the aircraft's limitations, the investigation noted that Runways 12 and 30 were not suitable for Fokker 70/100 aircrafts for operations on the day of the serious incident.

1.18.4 Flight Crew Schedule and Roster

According to interviews conducted with the flight crew, they had initially been rostered to conduct different flights during the day, and later conduct flight PX098 to Cairns together, with an estimated departure time of 17:00. However, on the day of the serious incident flight, the flight crew were advised of multiple schedule and roster changes. The flight crew were eventually notified on very short notice by telephone at about 11:55 that they were scheduled to sign on at 12:15 to operate flight PX182 from Port Moresby to Mt. Hagen (the serious incident flight). The flight crew were required to operate flight PX098 from Port Moresby to Cairns after conducting flight PX182.

Both pilots signed-on for their flight past the departure time, collected the flight documents and proceeded to the aircraft. The flight then departed almost an hour late to Mt. Hagen.

The flight crew stated that last minute changes often occur due to flight disruptions, unserviceability of aircraft, flight cancellations, roster being amended for crew to cover other flights, crew shortage and not enough reserve crew to cover for the changes.

The procedure on roster changes is captured in the operator's *Flight Administration Manual*, *Section 4.18.2, 'Operational Changes'* which states;

> *Roster changes shall normally be advised as soon as practicable by the Technical Crewing Officers. Such changes may be several days ahead of the actual change or on a short - term basis as operational demands dictate.*
> *All roster changes shall be notified to the Flight Crew Member by either:*
> *Telephone*
> *Personal contact*
> *Facsimile*
> *Roster change notification slip*
> *A flight crew member is required to acknowledge any such roster.*

1.18.5 Normal procedures checks and scans

During interview, flight crew and the flight operations management stated that their SOPs, as outlined in *their FFCOM – Volume 1*, specifically required the crew to set the LAS, for the destination airport, before take-off at the departure airport, and during approach for landing at the destination airport.

The operator's 'Normal Procedures' were reviewed focusing on the period from the take-off to the approach phase. A review of the operator's normal procedures in *FFCOM – Volume 1*, showed that the necessary destination field elevation /LAS is required to be set before take-off from the departure port. The procedure also requires the LAS to be set/checked at various phases of the flight as checklist or scan checklist items. Refer to *Table 6.*

The destination elevation is set before take-off. After take-off and climb, to the approach phase of the flight, the flight crew scan and/or check the pressurisation system and ensure the LAS for the destination airport setting. However, the aircraft did not land at Mt. Hagen Airport. The investigation found that the destination airport's elevation had not been set following the flight crew's decision to divert to Port Moresby. During diversion recorded data showed that during the diversion the flight had climbed from 8,000 ft to 10,000 ft in less than a minute. The flight crew did not set the destination airport elevation during this phase of flight. All required scans and checks from climb to transition phase of the flight were missed by the crew *(Refer to Table 6).* During descent to Jacksons Airport, when carrying out the 10,000 ft scan before approach, the crew found that the LAS was still set for Mt Hagen and not set for Jacksons Airport, Port Moresby.

No.	Phase of flight	Checklist / Scan	Action item	Remarks
1	Before take-off	*Before take-off / Initial Acceptance Check*	*Set destination field elevation*	Not applicable for the serious incident flight
2	Before take-off	*Before take-off / Intransit Check*	*Set destination field elevation*	Not applicable for the serious incident flight
3	Climb	*10,000 ft scan*	*The PM will turn off the landing lights and check the Pressurisation system*	Appropriate time to set the LAS, however, missed by the flight crew.
4	Cruise	*Cruise scan*	*There is no specific cruise check however both crew members are expected to make a periodic scan of all aircraft systems and IRS/FMS positions against the most appropriate raw data available. The PM will check the pressurization to ensure the cabin altitude is below 8,000 ft, the cabin differential is in the green and the cabin rate is stable at zero.*	An opportunity to check and set LAS.
5	Descent planning	*Silent Scan*	*A silent scan is to be made by both crew of all aircraft systems paying special attention:* • *Pressurization: ensuring destination altitude + 200ft is set.*	An opportunity to check and set LAS.
6	Transition Altitude	*At transition level*	*Both crew will then check the pressurization system for normal indications or rate, differential and altitude.*	Although not directly requiring crew to check LAS, it is another opportunity to check the LAS.
7	During descent	*10,000 ft scan*	*Both crews will conduct the approach scan.*	It was during this scan when passing 10,000 ft, that the flight crew realised that the LAS was not set for their destination, Jacksons Airport.
8	Approach	*Approach Check*	*Set/check destination field height. Check cabin diff. DO NOT LAND WITH CABIN PRESSURIZED.*	

Table 6. Normal procedures - checks and scans.

1.18.6 Human Factors

1.18.6.1 Crew Resource Management (CRM)

According to *Air Niugini Limited Flight Administration Manual, Section 5.1 and 5.2*, CRM is the active process employed by flight crew to identify existent and potential threats to safe flight and develop, communicate, and implement plans and actions to avoid or control each threat. CRM also supports the avoidance, management, and correction of human errors, whatever their origin - flight crew or external. Broadly defined, CRM consists of the effective utilisation of all available human, equipment, and informational resources towards the goal of safe and efficient flight.

It is Air Niugini's aim to achieve high standards and strengthen them where needed. Integration of sound technical, procedural (SOP) and CRM standards will increase the probability of safe flight. CRM is an inseparable part of Air Niugini's culture. Crew members are required to exhibit the behaviors and skills espoused in CRM training.

The components of Air Niugini CRM training include:

- Initial Introduction / Awareness. A 3 day combined Modules 1,2 and 3 CRM Course Subjects.
- Recurrent training. Annual recurrent training will consist of ½ day classroom session. All the elements of the initial Introduction Modules will be refreshed over a 3- year cycle. New material will be incorporated as required.
- License renewal – CRM training is required as part of the pilot's License Renewal in accordance with Annex 6 Standards and CASA PNG approvals.

The co-pilot had attended the CRM recurrent training on 21 December 2022 and the PIC on 22 December 2022. Both pilots were current at the time of the serious incident.

The *Air Niugini Flight Administration Manual* states:

> *CRM combines individual skills and human factors knowledge with effective crew coordination. It is a model of management used to manage the following principles: Threat and Error Management; Crew performance; Situational awareness; Decision making.*

The investigation found that during the events leading up to the time of the serious incident, the crew lost situational awareness. Crew performance was also affected by stress factors and decision making was ineffective as there was breakdown in effective communication between both pilots. The investigation also found that the crew performance lacked Threat and Error Awareness and Management.

The *Air Niugini SOP Manual, Section 2.5.1.4, Challenge and Response* states:

> *When a crew member notices a significant deviation from standard procedures during a normal flight regime, he shall communicate this immediately to the crew member flying. If he does not receive a response to his challenge either verbally or be corrective action, he should immediately repeat the challenge.*
>
> *If there is still no response to the second challenge, then he shall take over control of the aircraft and restore safe flight condition while he obtains assistance to determine the cause of the problem.*
>
> *All crew members are to be aware of this challenge and response philosophy. If they are challenged, they must be prepared to respond immediately, either verbally or by taking corrective action.*

The investigation determined that the flight crew were unaware of the quickly developing unsafe situation; the rapid increase in the cabin pressure resulting in passenger injuries.

The co-pilot had suggested to the PIC that they hold while waiting for the cabin to depressurise. However, the PIC responded by stating that the cabin be manually depressurised. The co-pilot did not question or challenge the PIC; lack of assertiveness.

1.18.6.2 Threat and Error Management

ICAO Doc. 9683, Human Factors Training Manual, provides a perspective to Threat and Error Management (TEM), as follows:

> *Threats and errors are pervasive in the operational environment within which flight crews operate. Threats are factors that originate outside the influence of the flight crew but must be managed by them. Threats are external to the flight deck. They increase the complexity of the operational environment and thus have the potential to foster flight crew errors. Bad weather, time pressures to meet departure/arrival slots, delays and, more recently, security events, are but a few of the real-life factors that impinge upon commercial flight operations. Flight crews must manage an ever-present "rain" of threats and errors, intrinsic to flight operations, to achieve the safety and efficiency goals of commercial air transportation. Sometimes these goals pose an apparent conflict.*
>
> *In attempting to understand human performance within an operational context, the focus of TEM is to identify, as closely as possible, the threats as they manifest themselves to the crew; to recreate crew response to the threats; and to analyse how the crew managed the consequent error in concordance with the native view. This is the perspective from the inside and in context. Such a view offers operational relevance to CRM.*
>
> *Threats impact on the crew's ability to manage a safe flight. An event or factor is qualified as a threat only if it is external to the flight deck, i.e. if it originates outside the influence of the crew. Crews must deal with threats while pursuing commercial objectives that underlie airline operations. Threats are not necessarily deficiencies in the aviation system, but external events that increase the complexity of flight operations and therefore hold the potential to foster error. Threat management in flight operations is needed to sustain performance in demanding contexts. The total elimination of threats would only be possible by not flying at all. What is important is that crews recognize threats and can apply countermeasures to avoid, minimize or mitigate their effect on flight safety.*
>
> *Threats can be either overt or latent. Overt threats are those that are tangible and observable to the crew. Examples of these include poor weather, aircraft malfunctions, automation events, ground events, aircraft traffic, terrain, and airport/aerodrome facilities. Overt threats are a given in aviation, and very little can be done from the standpoint of the flight crew to control these threats. Nevertheless, under specific combinations of operational circumstances, flight crews have to manage overt threats because they pose risks to the operation.*
>
> *Within the TEM concept, flight crew operational error is defined as an action or inaction by the crew that leads to deviations from organizational or flight crew intentions or expectations.*
>
> *Operational errors may or may not lead to adverse outcomes. TEM defines five categories of errors:*

a. *Intentional non-compliance error. Willful deviation from regulations and/or operator procedures.*
b. *Procedural error. Deviation in the execution of regulations and/or operator procedures. The intention is correct, but the execution is flawed. This also includes errors where the crew forgot to do something.*
c. *Communication error. Miscommunication, misinterpretation, or failure to communicate pertinent information within the flight crew or between the flight crew and an external agent (e.g. ATC or ground operations).*
d. *Proficiency error. Lack of knowledge or psycho-motor ("stick and rudder") skills.*
e. *Operational decision error. A decision-making error that is not standardized by regulations or operator procedures and, as such, unnecessarily compromises safety. In order to be categorized as a decision error, at least one of three conditions must have existed. First, the crew had more conservative options within operational reason and decided not to take them. The second condition is the decision was not verbalized and therefore not shared between crew members. The last condition is the crew had time but did not use it effectively to evaluate the decision. If any of these conditions were observed, then it is considered a decision error in the TEM framework. An example would include a crew's decision to fly through known wind shear on an approach instead of going around.*

The investigation identified procedural, communication and operational decision errors that contributed to the serious incident. This is discussed throughout the report and in the analysis.

The flight crew were unable to avoid, or mitigate the error (i.e. unmanaged errors), therefore the consequential outcome led to an undesired aircraft state (cabin pressurisation event in flight) which led to injuries.

1.18.7 Maintenance

1.18.7.1 Post occurrence maintenance

The operator provided P2-ANT's Aircraft Journey Technical Log (AJTL) records to the AIC. According to the AJTL records for the occurrence flight, a defect entry was made by the PIC which read; *'AUTO PRESS CTRL FAULT'*. The action taken by the engineers, following the occurrence flight was recorded as; *'CPC CHECK NIL FAULT FOUND. BITECHK C/OUT SATIS. REFER AMM 21-31-00-811'.* The aircraft was released back to service on the same day.

The PIC indicated in a statement that he had incorrectly described the nature of the pressurisation event on the AJTL due to being in a state of confusion.

After the occurrence flight, the flight crew who operated P2-ANT did not report the actual nature of the pressurisation event to the maintenance team nor did they notify the flight crew that would operate P2-ANT to Lae.

1.18.7.2 Maintenance Watch Centre

According to the operator's *Maintenance Control Manual (MCM), Volume 1*, the Maintenance Watch Centre is part of the Maintenance Control Department, and its responsibilities include:

- *Overall technical co-ordination and technical support between Line Maintenance and Flight Operations.*

At the time the PIC of the occurrence flight contacted Maintenance Watch, the person on duty was unavailable. The PIC ended the call without leaving a message regarding the situation, nor did he request that the maintenance watch duty personnel contact him when available.

1.19 Useful or Effective Investigation Techniques

The investigation was conducted in accordance with the Papua New Guinea *Civil Aviation Act*, and the Accident Investigation Commission's approved policies and procedures, and in accordance with the Standards and Recommended Practices of *Annex 13* to the *Chicago Convention on International Civil Aviation.*

2 ANALYSIS

2.1 General

The analysis section of this report discusses relevant facts that contributed to the serious incident. The serious incident did not have a single causal factor. There were several conditions, both active and latent that contributed to the outcome of the serious incident. The analysis will therefore focus on the following issues, but not necessarily under separate headings:

- Flight Operations
- Aircraft Systems
- Human Factors
- Organisational Aspects

2.2 Flight Operations

The flight crew had only identified the incorrect LAS during the descent into Port Moresby. The LAS was still set to the Mt. Hagen elevation at 5,500 ft instead of being set to sea level for Port Moresby. As a corrective action, the crew made the decision to initiate the *Manual Cabin Pressurisation Procedure*.

The *Manual Cabin Pressurisation Procedure* is only to be actioned in the event of a pressurisation issue when there is a fault with the automatic CPC. The AIC found that the execution of the *Manual Cabin Pressurisation Procedure* was non-standard. Since there was no failure of the cabin pressure controller system in Auto mode, there was no reason to go to Manual mode. With reference to the aircraft Manuals and checklists of the Fokker F70, the Manual mode should only be used in case the AUTO mode fails (for instance the pressure controller), or in case of a cracked windshield to decrease the differential pressure. The action of the flight crew to increase the descent rate of the cabin altitude demonstrated an improper use of the Manual mode. It was also noted that despite there being other options available to the flight crew to allow the CPC to automatically pressurise the cabin to sea level, their decision to initiate the *Manual Cabin Pressurisation Procedure* was influenced by a combination of factors.

At the time of the serious incident flight, the AIC found that the crew were subjected to time pressure. When the incorrect LAS was discovered, the aircraft was approaching 10,000 ft and the LAS was at 5,500 ft. The aircraft was also descending at a rate of more than 2,000 ft per minute (fpm).

From 10,000 ft it would have taken the aircraft less than 5 minutes to touchdown if the descent was continued at that rate. It was also noted that following the correction of the LAS from 5,500 ft to sea level, at an average rate of 300-400 fpm, the automatic pressure controller would have required at least 11 minutes to pressurise the cabin from 5,500 ft to sea level. If the crew opted to continue the approach at a descent rate of 2,000 fpm while allowing the automatic pressure controller to pressurise the cabin at a rate of 300-400 fpm, the aircraft would have caught the cabin at about 3,000 ft and as a result the cabin would have suddenly depressurised via the Outflow valves, causing discomfort and potentially injuring the passengers.

Due to the time pressure that the crew were subjected to at the time, it was found that the crew decided to continue the approach to landing and at the same time presssurise the cabin from 5,500 ft to sea level with the intention of preventing further delay. The decision was then made to manually pressurise the cabin to sea level at a higher rate.

On the initiation of *the Manual Cabin Pressurisation Procedure*, the flight crew selected the Manual function, moved the Manual control lever to the down position and increased the rate of cabin pressurisation by adjusting the control knob to a rate of 800-1000 fpm. The cabin continued to pressurise manually at the increased rate as the aircraft continued to descend.

Around this time, the passengers started to experience discomfort. This was a result of the increased rate of pressurisation by the crew from 300-400 fpm to 800-1000 fpm. The aircraft continued to descend and at about 2,500 ft the crew observed the cabin pressure indicating sea level. They subsequently moved the manual control lever from the DOWN position to the MID position. This caused the outflow valve to maintain a static position to hold the cabin pressure at sea level. The crew then actioned the Before Landing Procedure to configure the aircraft for landing.

According to the Quick Reference Handbook, before landing, the manual control lever must be moved to the UP position to prevent any further pressurisation and to remove all residual pressure from the cabin to avoid a sudden depressurisation on touchdown. The AIC found that the manual control lever was not moved to the UP position after the aircraft was configured for landing.

Approaching 1,000 ft on finals, the crew observed the cabin differential indicator value increasing to 3 psi. Since the reading was above the maximum value permitted for landing, the crew initiated a go around. Applying full power significantly increased the rate of compressed bleed airflow to the cabin. However, with the outflow valve maintaining a static position to a pressurisation rate setting of 800-1000 ft, the bleed air inflow rate caused by the application of Go around power, could not be complemented by the outflow valve to maintain the selected cabin descent rate.

The AIC concluded that if the manual control lever had been in the UP position at the time full power was applied, the outflow valve would have been able to move to fully open position providing pressure relief and the cabin pressure would not have risen to an unsafe level. The AIC determined that this pressurisation event resulted in the severe ear and sinus pain and bleeding experienced by the passengers.

Furthermore, in an attempt to reduce the cabin differential, the crew decided to execute the Abnormal Procedure for Reduced Cabin Differential Procedure. The AIC notes that the Reduced Cabin Differential Procedure is used to reduce further damage when a crack in the front window or sliding window is observed. However, on the crew's execution of this procedure, the AIC noted that the final step of the Reduced Cabin Differential Procedure involved placing the manual control lever on the Cabin Pressure Selector on the overhead panel to the UP position. In both procedures, the execution of this step is to remove any residual pressure from the cabin. Given that the cabin had been pressurised as observed on the increased cabin differential, when the crew executed the final step of the Reduced Cabin Differential Procedure, the aircraft experienced a sudden depressurisation via the outflow valves.

As a result of the sudden depressurisation, a thick cloud of mist was observed in the cabin, similar to that observed on sudden depressurisations at altitude. The aircraft continued with a normal approach and landing.

The AIC established that the CPC was serviceable at the time of the serious incident. Additionally, the *Manual Cabin Pressurisation Procedure* is not recommended when there are no faults with the automatic function of the CPC. However, the crew decided to use the procedure as an alternative instead of delaying the approach to allow the CPC to automatically pressurise the cabin. Furthermore, the procedure was incorrectly applied by the flight crew resulting in the cabin pressurisation event.

2.2.1 Time Pressure

The operator's *Flight Administration Manual* outlines the provision for short notice of roster changes to flight crew as required by operational demands. However, the manual does not specify the limitation on time in which flight crew can be notified on short notice of roster changes.

On the day of the occurrence, the flight crew were notified of the change in roster 20 minutes prior to the required sign-on time. Due to the short notice, the flight crew signed on late for duty, and the flight from Port Moresby to Mt Hagen was subsequently delayed by just under an hour.

Given that the flight crew had already been rostered beforehand to conduct an international flight from Port Moresby to Cairns with an estimated departure time of 17:00, and with the predicament of the delayed flight out of Port Moresby for Mt Hagen, the AIC assessed the flight crew's decision-making, actions and inactions inflight and post-flight, and determined that the flight crew was adamant to not cause consequential delay to the departure of the international flight. The AIC determined the flight crew's conduct was done out of time pressure to meet commercial expectations.

It is the view of the AIC that the operator's existing procedures on Crew Rostering imposes, among other risks, time pressure on flight crew, especially in instances where flight crew endeavor to not cause consequential delays to their subsequent rostered flights throughout the day. Although it is understood that the delivery of service determines the profitability of the operator, it is the opinion of the AIC that when flight crew are exposed to operational time pressures, it is highly likely that their decision-making will be heavily influenced by the need to meet commercial requirements to the extent that safety may be compromised, unintentionally, due to human error.

2.3 Human Factors

An accident or incident is not solely the result of an action taken by one individual. The potential for an accident is created when failed or absent defenses, human error (intended and unintended actions) and existing conditions present within an organisation or air transportation system interact in a manner which breaches all the defenses that result in an accident or incident. The front-line personnel (Flight crew, Air traffic controller, Cabin crew etc.) are the last line of defense. The investigation identified absent or failed defenses, human error and tasks and environmental conditions that directly or indirectly contributed to the abnormal cabin pressurisation event.

Due to numerous crew roster changes and reallocation of flights on the day of the occurrence, the flight had departed Port Moresby behind schedule. At the time of the occurrence, the existing crew rosters showed no evidence to support a flight and duty related fatigue situation. However, the numerous roster changes on the day of the flight, to flight crew's daily schedules, posed a likelihood of acute mental stress and fatigue, compounding with the initial tasks of daily flight planning. For crew to be subjected to multiple roster changes on short notice and prior to sign on, it is highly likely that the crew may have carried the mental stress past sign on, into flight planning stages, through to the flight to Mt Hagen and back to Port Moresby. Other stress factors were observed to be due to task overload with limited time available and degrading operating conditions at Mt Hagen Airport, such as tailwinds, displaced threshold and unavailable PAPI lights on Runway 12 which contributed to the reduced situational awareness of the flight crew. The workload pressure of holding over Mt Hagen township due tailwinds and unable to land on Runway 30 with only 15 minutes of holding fuel and running behind schedule was a likely contributory cause to crew not conducting the necessary scan at 10,000 ft on climb from 8,000 ft to 10,000 ft, when diverting from Mt Hagen to Port Moresby.

The crew also missed other scans from cruise to transition level, which would have been an opportunity to check and set the appropriate destination LAS.

With the late sign on by both flight crew, it is likely that the pre-flight preparations prior to the departure of the initial sector from Port Moresby to Mt Hagen would not have been carried out effectively to identify the hazards associated with the flight and plan mitigating or preventative actions to reduce the risk of an accident. Despite obtaining the latest weather information, weather had changed rapidly leading to unanticipated weather conditions, which was the case in Mt Hagen where they experienced a tailwind component and windspeeds not suitable for landing. It is likely that if a proper preflight preparation would have been carried out, the conditions (weather/wind conditions, displaced threshold on Runway 12 and PAPI lights unavailable on Runway 12) at Mt Hagen Airport as well as the aircraft's total landing weight, would have been taken into consideration and planned accordingly.

On the day of the occurrence, the crew faced poor crew resource management. This was evident during the diversion phase at Mt. Hagen, where a higher than usual workload environment was observed in the cockpit. The flight crew may have been too busy to recognize that they were overloaded with tasks and missed setting the correct landing elevation for Port Moresby in Mt Hagen during the diversion. The scans and checks from climb to transition level, which could have identified the incorrect LAS, were also missed.

Task saturation, operational and commercial pressures (next flight from Port Moresby to Cairns likely to be delayed due to the late departure out of Port Moresby for Mt Hagen) and degrading operating conditions had added stress on the crew. Evidence showed that the flight crew were distracted due to multiple tasks which resulted in the flight crew not monitoring the overall conditions to make appropriate decisions. This was evident in the flight crew's decision to control the cabin pressurisation when the automatic mode was functional, and the decision to not advice the relevant persons of the serious incident and the injured passengers prior to landing at Port Moresby. The pilot in command was fixated on landing the aircraft to operate their next flight and erred in his rushed decision to control the pressurisation system manually when automatic mode was functional. However, the co-pilot did not challenge this decision.

There was much to do without enough time which led to the crew's inability to focus on what really mattered. As task saturation increased, the flight crew might have started shutting down, unable to continue performing effectively.

3 CONCLUSIONS

3.1 FINDINGS

3.1.1 AIRCRAFT

a) The aircraft was certified, equipped and maintained in accordance with existing regulations and approved procedures.

b) The aircraft had a valid Certificate of Airworthiness and had been maintained in compliance with the regulations.

c) The maintenance records indicated that the aircraft was equipped and maintained in accordance with existing regulations and approved procedures.

d) The aircraft was certified as being airworthy when dispatched for the flight.

e) The mass and the centre of gravity of the aircraft were within the prescribed limits.

f) There was no evidence of any defect or malfunction in the aircraft that could have contributed to the serious incident.

g) There was no evidence of airframe failure or system malfunction prior to the serious incident.

3.1.2 CREW / PILOTS

a) Both pilots were licensed and qualified for the flight in accordance with existing regulations.

b) Both pilots were properly licensed, medically fit and adequately rested to operate the flight.

c) Both pilots were in compliance with the flight and duty time regulations.

d) The pilot's degraded performance was consistent with the effects of fatigue, and there was sufficient evidence to determine if the pilot's degraded performance contributed to the serious incident.

e) The pilot's actions and statements indicated that his knowledge and understanding of the aircraft systems was inadequate.

f) The pilot's actions and statements indicated that they had lost situational awareness and their attention had been fixated on departing Mt Hagen due environmental and operational conditions unsuitable for landing.

g) The flight crew did not advise customer service of the injured passengers prior to landing at Port Moresby.

3.1.3 FLIGHT OPERATIONS

a) The flight crew carried out normal radio communications with the relevant ATC units.

b) The flight crew had missed setting Port Moresby elevation on diversion out of Mt Hagen due to operating and environmental conditions not suitable for landing.

c) The flight crew set Port Moresby altitude at 10,000 ft during the execution of the Approach Check.

d) The altitude setting had been corrected from 5,500 ft AGL to sea level during the approach into Jacksons Airport.

e) The flight crew then executed the Fokker 70 Abnormal Procedure for Manual Cabin Pressurisation Control, to increase the rate of descent of the cabin altitude.

f) The Abnormal Procedure for Manual Cabin Pressurisation Control is applied when there is a fault with the Automatic Pressurisation Control mode however, the automatic mode was functioning normally without any fault, on the serious incident flight.

g) The Manual Cabin Pressurisation procedure was not fully executed therefore the cabin differential began to increase again, resulting in the flight conducting a go-around.

h) The flight crew executed the Fokker 70 Abnormal Procedure for Reduced Cabin Differential to reduce cabin differential and conducted a normal approach and landing on runway 14L. This procedure, however, is to be executed in the event of a reduced cabin pressure differential in flight and not to reduce cabin pressure differential.

i) The pilot made the decision to divert to Port Moresby when the tail wind component prescribed in the Operators Standard Operating Procedures Manual was not suitable for landing.

3.1.4 OPERATOR

a) The investigation found that there were multiple last-minute changes to both pilots' flight crew roster and schedule.

3.1.5 AIR TRAFFIC SERVICES AND AIRPORT FACILITIES

a) ATC provided prompt and effective assistance to the flight crew.

b) The investigation found that Runway 12 had a displaced threshold due to maintenance works, therefore PAPI lights were unavailable. Air Niugini had a 14-day dispensation period to operate without PAPI lights, however, at the time of the serious incident they had passed the dispensation period. The requirements were that Air Niugini operations may continue for a maximum period of 14 consecutive days in respect of any runway that is served by an unusable approach slope indicator system.

3.1.6 FLIGHT RECORDERS

a) The aircraft was fitted with a Solid-State Cockpit Voice Recorder (SSCVR) and a separate Solid-State Flight Data Recorder (SSFDR). The table below provides more information on the recorders.

b) The CVR download was not performed because the occurrence data was already overwritten.

c) The FDR data readout showed that the following parameters: Master Caution, Master Warning and Cabin Altitude Warning were recorded, however, the recorded data did not show any activation of the alerts.

3.1.7 MEDICAL

a) There was no evidence that incapacitation or physiological factors affected the flight crew.

b) There was evidence that some passengers and cabin crew were affected by the cabin pressurisation during the flight.

3.1.8 SURVIVABILITY

a) The serious incident was survivable.

b) The PIC did not communicate the in-flight emergency to the Airport Manager in accordance with the operator's *Airport Services Manual*.

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3.2 CAUSES [CONTRIBUTING FACTORS]

There were several factors that contributed to the serious incident. Flight crew actions were influenced by the organisational, operational and environmental conditions.

- Organisational factors like multiple changes to flight crew roster and last-minute notification to crew resulted in task saturation and stress, that prevented crew situational awareness and good crew resource management and decision making on the day of the serious incident. This resulted in the oversight by the crew to set Port Moresby landing altitude in Mt. Hagen.
- Operational and environmental conditions impacted the way crew conducted their operation in Mt. Hagen and in Port Moresby.
- The flight crew did not complete the final step of the *Fokker 70 Abnormal Procedures Manual Cabin Pressurisation Control*, which was to set the Manual control lever to the 'UP' position before landing to depressurise the cabin and prevent any further pressurisation. Due to not completing the procedure, the cabin differential began to increase again on finals which led to a go-around. Some passengers and cabin crew sustained injuries during the go-around due to a rapid change in cabin pressure. The flight crew then actioned the *Fokker 70 Abnormal Procedures for Reduced Cabin Differential*.

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4 SAFETY ACTIONS AND RECOMMENDATIONS

4.1 Safety Actions

Air Niugini Limited, through its Internal Investigation Report reference *OOR:2DA93-55A70*, informed the Accident Investigation Commission (AIC) of the following Safety Actions completed and proposed following the serious incident:

4.1.1 Training

4.1.1.1 Safety Action taken:

The flight crew completed training on the Fokker Pressurisation Systems and Flight Warning Systems in the Fokker Systems Computer Based Technical (CBT). A detailed assessment to evaluate systems knowledge and comprehension was completed to a satisfactory/acceptable level before the flight crew resumed normal flying duties.

4.1.1.2 Safety Action taken:

The operator's current Command Capability Assessment Program (CCAP) was reviewed and aligned to Evidence Based Training (EBT) to ensure that the review must access appropriate level of assessment of non-technical skills (NTS). The revised CCAP was documented in the Training and Checking Manual (TCM) Vol 1.

4.1.1.3 Safety Action taken:

The PIC's command position on the Fokker Fleet was temporarily withdrawn pending successful completion of the re-evaluation based on the revised CCAP. While awaiting completion of the revaluation process, the PIC was re-trained, and he resumed flying operations as a co-pilot on the Fokker Fleet.

4.1.1.4 Safety Action taken:

The co-pilot's proposed progression to command on the Dash 8 Fleet was placed on-hold temporarily, pending successful completion of the re-evaluation based on the revised CCAP. While awaiting completion of this process, the co-pilot retained his position as a co-pilot on the Fokker Fleet.

4.1.1.5 Safety Action taken:

The Flight Operations Department, through the Fleet Managers reviewed the simulator recurrent cyclics and included a diversion from overhead a destination airport to Top of Climb.

4.1.2 Organisation

4.1.2.1 Safety Action taken:

Flight operations reviewed its current manpower planning methodology for the determination of accurate number of pilots per fleet.

4.1.2.2 Safety Action taken:

Flight Operations ensured the manpower planning methodology supports the current Flight Operations management structure, allowing ample time for management pilots to be in the office for administration. Proposed 80% administration time, 20 % flying/sim duties time per roster period for the management pilots.

4.1.2.3 Safety Action taken:

Flight Operations ensured the manpower planning methodology accurately determines the number of Standard Pilots required per fleet to commensurate with the flight crew training demands.

4.1.2.4 Safety Action taken:

Flight Operations reviewed and enhanced its communication process with Commercial on schedule planning to facilitate pilot per fleet to commensurate with flight crew training demands.

4.1.3 Communication

4.1.3.1 Safety Action taken:

Flight Operations coordinated with the Corporate Training (Part 141) to organise a combined Crew Resource Management (CCRM) debriefing session for the flight crew and cabin crew involved in this serious incident. The CCRM debriefing session was facilitated by a CRM Instructor and co-facilitated by representatives from the Fokker Fleet Office, Flight Safety Office and Cabin Crew Management. The flight crew will have to complete this requirement before resuming to normal flying duties.

4.1.3.2 Safety Action taken:

The Flight Operations coordinated with the Corporate Training (Part 141) to convert the lessons learnt from this serious incident (based on the investigation findings and recommendations) into a case study to be used for flight crew and cabin crew discussions in the future CCRM sessions.

4.1.3.3 Safety Action taken:

The Flight Operations issued a General Flight Standing Order (FSO) to all flight crew describing the definition and classification of an accident and a serious incident.

4.1.3.4 Safety Action taken:

The Flight Operations issued a General Flight Standing Order (FSO) to all flight crew detailing reporting requirements for an accident and a serious incident and the declaration of an emergency. (Either inflight on and/or upon arrival/parking at the gate).

4.1.3.5 Safety Action taken:

Flight Operations amended the Occurrence Report Form in Comply 365 in the Electronic Flight Bag (EFB) to include relevant fields for reporting on classification of the accidents/incident and the severity of injury/injuries to any person/persons associated with the flight.

4.1.3.6 Safety Action taken:

The Cabin Crew Management reviewed current procedures for the communication of an emergency situation (language of urgency) in the cabin to the flight deck. (Including authorisation for Cabin Crew to call the Fight Deck in cases of emergency thus overriding the sterile cockpit requirements/procedures under 10,000 ft).

4.1.4 Incompatible Goals

4.1.4.1 Safety Action taken:

The IOC Duty Managers and Crewing Officers be reminded in writing of the importance to plan, coordinate and communicate well flight crew on day of operations to comply with flight and duty time limitations (FDTL), human factors and schedule disruptions.

4.1.5 Procedures

4.1.5.1 Safety Action taken:

The Fokker Fleet Office issued a Fokker Flight Standing Order (FSO) to remind Fokker flight crew on pressurisation Systems Checks in reference to Fokker FCOM Vol. 1 Section 2.20.4, the check for the pressurisation system conducted at 10,000 ft fleet shall include the checking that the landing altitude of arrival destination is set. This particularly important when subject to inflight diversion.

4.1.5.2 Safety Action taken:

The Fokker Fleet Office reviewed and documented new procedures for inflight diversions on the Fokker Fleet.

4.1.6 Regulatory influence

4.1.6.1 Safety Action taken:

Flight Operations to review timelines for the FRMS Project with the aim to introduce FRMS in the next 6 to 12 months.

4.2 Safety Recommendations

4.2.1 Recommendation number AIC 24-R07/23-2001 to Air Niugini Limited.

The PNG Accident Investigation Commission recommends that Air Niugini Operations Limited ensure that in accordance with the operator's *Airport Services Manual, Version* 17, *subsection 6.18.7.2*, the Pilot in Command of an accident flight, either through turbulence or some other cause where an injury occurs to the passengers, should advise the relevant persons of the passengers' names, type of injury and the extent to which medical attention might be required.

Action requested.

The AIC requests that Air Niugini Operations Limited note recommendation *AIC 24-R07/23-2001* and provide a response to the AIC within 90 days of the issue date and explain (including with evidence) how Air Niugini Operations Limited has addressed the safety deficiency identified in the safety recommendation.

4.2.2 Recommendation number AIC 24-R08/23-2001 to Air Niugini Limited.

The PNG Accident Investigation Commission recommends that Air Niugini Operations Limited, to mitigate the risk of flight crew incorrectly or not fully executing procedures in flight by:

- Reviewing all flight crew training and competency records to ensure crew are adequately trained and competent in the use of Abnormal and Normal procedures inflight and understand the Aircraft systems, performance, and operation on aircraft type endorsed on.

Action requested.

The AIC requests that Air Niugini Operations Limited note recommendation *AIC 24-R08/23-2001* and provide a response to the AIC within 90 days of the issue date and explain (including with evidence) how Air Niugini Operations Limited has addressed the safety deficiency identified in the safety recommendation.

4.2.3 Recommendation number AIC 24-R09/23-2001 to Fokker Services.

The PNG Accident Investigation Commission recommends that Fokker Services or the Manufacturer review the Abnormal Procedure in the Aircraft Flight Manual (AFM) and relevant Manuals and ensure that the 'Manual Cabin Pressurisation Procedure' is reviewed to clarify the final step of the procedure,

- "BEFORE LANDING:

MANUAL CONTROL LEVER _____UP"

So that the Procedure is completed prior to the crew entering the critical phase of Final Approach to landing, where further manipulation of the CPC may potentially be a distraction.

Action requested.

The AIC requests that Fokker Services note recommendation AIC 24-R09/23-2001 and provide a response to the AIC within 90 days of the issue date and explain (including with evidence) how Fokker Services has addressed the safety deficiency identified in the safety recommendation.

Fokker Services Group proposed Safety Action.

Fokker Services reviewed the following Abnormal Procedures 4.2.1 in the Aircraft Flight Manual AFM and relevant Manuals (i.e., AOM/ QRH):

- Manual Cabin Pressurisation procedure
- Reduced Cabin Pressure Differential procedure
- Manual Depressurisation procedure

Following the review of the above mentioned procedures with regard to the performance of the manual cabin pressurization/ depressurization procedural steps, it is Fokker Services opinion that the procedures are well defined and technically adequate. However, flight crews may think that, when actuated the step "MAN CONTROL LEVER….MID POSITION", that cabin pressure will remain constant. However, with changing thrust during climb, descent and leveling off, also the cabin pressure will change. In order to provide flight crew with additional guidance, Fokker Services proposes to revise the remarks text below the MANUAL CABIN PRESSURISATION CONTROL PROCEDURE and the REDUCED CABIN PRESSURE DIFFERENTIAL PROCEDURE in the Aircraft Operating Manual AOM) and Quick Reference Handbook (QRH).

The Remarks may be changed as follows:

MANUAL CABIN PRESSURISATION PROCEDURE

Remarks:

- *The Target cabin altitude is the lowest possible cabin altitude that can be obtained.*
- *Monitor cabin altitude and vertical speed during climb and descent, correct if necessary.*
- *Before landing, verify cabin differential pressure is less than 1 psi and manual control lever up.*
- *Rapid changes in cabin pressure cause discomfort and possibly injury to passengers and crew.*

REDUCED CABIN PRESSURE DIFFERENTIAL PROCEDURE

Remarks:

- *Monitor cabin pressure differential and vertical speed during climb and descent, correct if necessary.*
- *Before landing, verify cabin differential pressure is less than 1 psi and manual control lever up.*
- *Rapid changes in cabin pressure cause discomfort and possibly injury to passengers and crew.*
- *If MEA above 25,000 ft cabin altitude may exceed 10,000 ft.*
- *When cabin altitude is above 10,000 ft the CABIN ALT warning will be presented.*

- *In case of cabin altitude above 10,000 ft consider the use of oxygen masks for crew and passengers. When using oxygen for supplemental purposes select mask regulators to NORM.*

PNG Accident Investigation Commission (AIC) assessment of Fokker Services response

The AIC reviewed the Fokker Services Group documents provided to the AIC of the proposed safety action to be taken. The AIC is satisfied that the evidence satisfactorily addresses the safety deficiencies identified in the AIC *Safety Recommendation AIC 24-R01/23-1005.*

The AIC has assigned the Fokker Services response as *Satisfactory Intent* rating and record the status of the AIC Recommendation: **Monitor.**

5 APPENDICES

5.1 Appendix A: Flight Operations

5.1.1 Air Niugini FFCOM-Volume 1 Section 2.20.4

2.20.4 10000ft scan

At 10000ft the PM will call "***10000",*** the PF will respond "***checked".***

Both crew will then reset MDA on EFIS control panel to zero.

The Captain will, at his discretion turn off the seat belt sign.

The first officer will check the crew oxygen pressure.

The PM will turn off the landing lights and check the pressurisation system.

PM will check:

- The cabin rate of climb is normal at 300fpm
- The Cabin Altitude is not climbing through 10000ft.
- The differential pressure is positive, progressively increasing and in the green band.

If required, the PF will go to the **secondary plan** and **copy active plan.** This will update the secondary plan to ensure the primary and secondary have the same route.

When changing planning to cruise at a lower level than the original Level entered into the FMS

As required, the PF can select **BRG/DIST** TO and remote tune VOR/DME on the **Progress page**.

5.1.2 Air Niugini FFCOM-Volume 1 Section 3.4.8

3.4.8 Approach Check

AT TRANSITION LEVEL

ALTIMETERS	SET	(CR)
• Preset altimeter setting on ASP.		
• When passing transition level, select QNH on EFIS panel and STBY ALT.		
• PF Calls “QNH Set, (QNH),(read actual altitude),(read actual IAS)”		
• PM Cross-checks and calls “Set”		
• Cross-check altitude indications, Capt and F/O.		
• Airspeed X-Checked and in accordance with airspace or ATC requirements		
LANDING ALTITUDE	CHECKED	(PM)
• Set/check destination field height. Check cabin diff. DO NOT LAND WITH CABIN PRESSURIZED		
IGNITION	NORMAL/CONT	(PM)
• Check IGNITION at NORM		
Note: For a/c not equipped with the auto ignition system, select AUTO when the landing runway is wet.		
MFDS	CHECKED	(PM)
• Check MFDS for status information and recall in case of MESSAGE CANCELLED displayed at MFDS.		
SEAT BELT SIGN	ON	(PM)

LANDING DATA/APPROACH BRIEFING..... COMPLETED (CR)

- Perform approach briefing and set minimums if required.
- Select ILS frequency/localiser course, VOR frequency/radials and ADFs as required.
- Select FMS TO/APPR page and check estimated landing weight and VAPP for the intended flap setting. In case of an FMS approach insert MDA and confirm the FINAL APPR prompt.
- Ensure ARC or ROSE, APP/LOC Course and GLS selected for a Scat-1 Approach

Note: To prevent high workload in case MAP display is lost, the following procedure is recommended for approach:

- Select ND to ARC or ROSE.
- Preset VOR/DME frequency and radial as required for STAR.
- Select ND to MAP.
  - If MAP display is lost:
- Select ND to ARC or ROSE

APPROACH CHECK COMPLETE

5.1.3 Air Niugini FFCOM - Volume 1, Section 6.2.5

6.2.5 Manual Cabin Pressurisation Control Procedure

MANUAL CABIN PRESSURIZATION CONTROL PROCEDURE

■ CLIMB:
MANUAL CONTROL LEVER . . . . . UP
MANUAL RATE CONTROL . . . . . AS REQD
● When reaching target CAB ALT:
MANUAL CONTROL LEVER . . . . . MID POS

■ DESCENT:
MANUAL CONTROL LEVER . . . . . DN
MANUAL RATE CONTROL . . . . . AS REQD
● When cabin altitude reaches landing altitude:
MAN CONTROL LEVER . . . . . MID POS

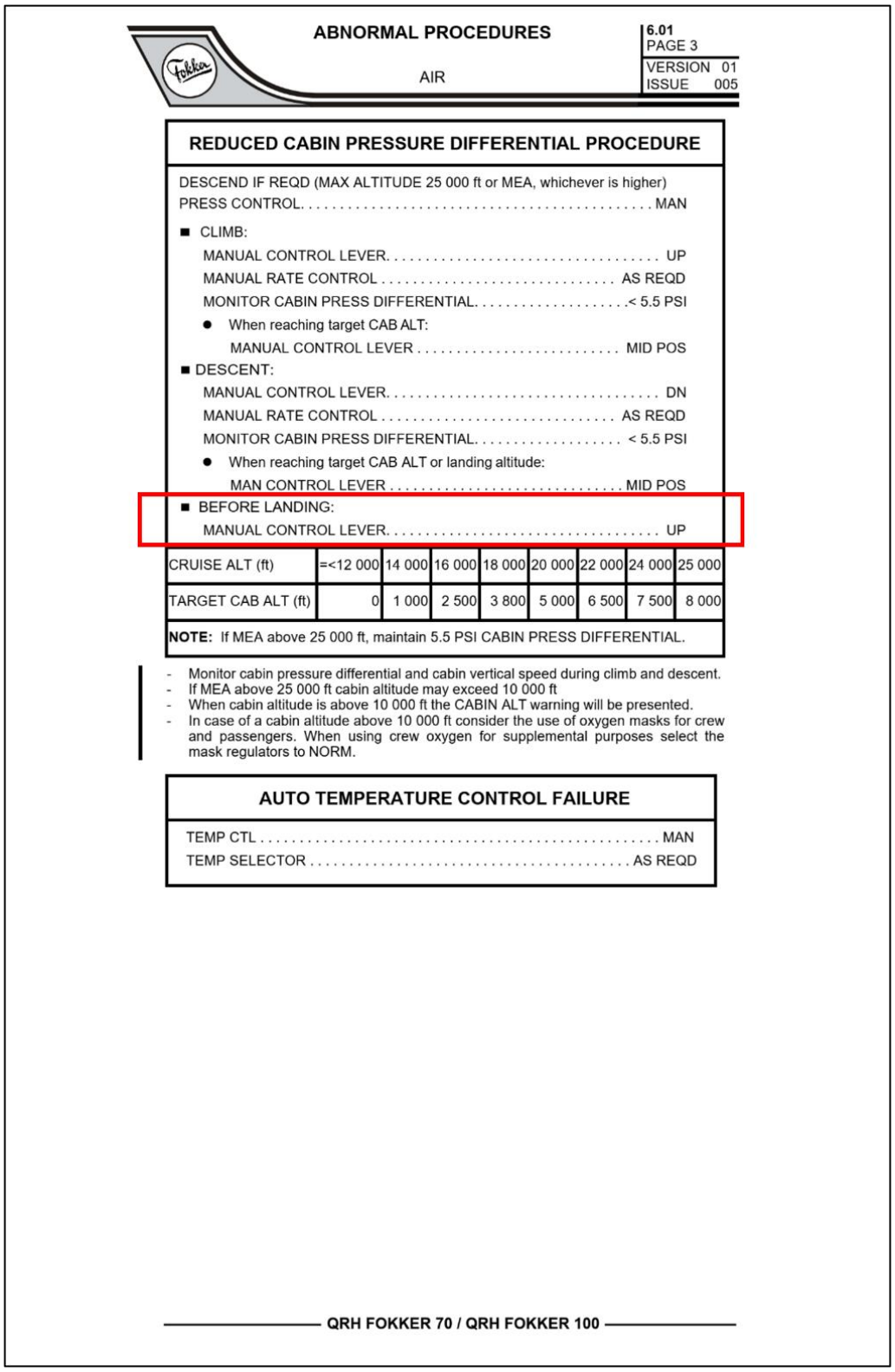
■ BEFORE LANDING:
MANUAL CONTROL LEVER . . . . . UP

CRUISE ALT (ft)	18 000	20 000	22 000	24 000	26 000
TARGET CAB ALT (ft)	0	1000	2100	3100	4000
CRUISE ALT (ft)	28 000	29 000	31 000	33 000	35 000
TARGET CAB ALT (ft)	5000	5500	6400	7200	8000

Remarks:

- The target cabin altitude is the lowest possible cabin altitude that can be obtained.
- Monitor cabin altitude and cabin vertical speed during climb and descent.

5.1.4 Fokker 70 QRH Abnormal Procedures for Reduced Cabin Pressure Differential Procedure



ABNORMAL PROCEDURES

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REDUCED CABIN PRESSURE DIFFERENTIAL PROCEDURE

DESCEND IF REQD (MAX ALTITUDE 25 000 ft or MEA, whichever is higher)
PRESS CONTROL. . . . . MAN

■ CLIMB:
MANUAL CONTROL LEVER. . . . . UP
MANUAL RATE CONTROL . . . . . AS REQD
MONITOR CABIN PRESS DIFFERENTIAL. . . . . < 5.5 PSI
● When reaching target CAB ALT:
MANUAL CONTROL LEVER . . . . . MID POS

■ DESCENT:
MANUAL CONTROL LEVER. . . . . DN
MANUAL RATE CONTROL . . . . . AS REQD
MONITOR CABIN PRESS DIFFERENTIAL. . . . . < 5.5 PSI
● When reaching target CAB ALT or landing altitude:
MAN CONTROL LEVER . . . . . MID POS

■ BEFORE LANDING:
MANUAL CONTROL LEVER. . . . . UP

CRUISE ALT (ft)	=<12 000	14 000	16 000	18 000	20 000	22 000	24 000	25 000
TARGET CAB ALT (ft)	0	1 000	2 500	3 800	5 000	6 500	7 500	8 000

NOTE: If MEA above 25 000 ft, maintain 5.5 PSI CABIN PRESS DIFFERENTIAL.

- Monitor cabin pressure differential and cabin vertical speed during climb and descent.
- If MEA above 25 000 ft cabin altitude may exceed 10 000 ft
- When cabin altitude is above 10 000 ft the CABIN ALT warning will be presented.
- In case of a cabin altitude above 10 000 ft consider the use of oxygen masks for crew and passengers. When using crew oxygen for supplemental purposes select the mask regulators to NORM.

AUTO TEMPERATURE CONTROL FAILURE

TEMP CTL . . . . . MAN
TEMP SELECTOR . . . . . AS REQD

QRH FOKKER 70 / QRH FOKKER 100

5.1.5 Fokker Flight Crew Operating Manual Abnormal Procedure for Abnormal Procedures – Procedures.

6. Abnormal Procedures

6.1 Procedure

The abnormal procedures represent the actions to ensure adequate safety, and to ease the further conduct of the flight after a failure. Abnormal procedures are to be initiated on command of the captain. The following assignment of tasks is recommended:

- The Pilot Flying (PF) is responsible for flight path and airspeed control, and aircraft configuration.
- The Pilot Monitoring (PM) is responsible for checklist reading and execution of the required action.

The PF shall monitor the PM's actions during accomplishment of the procedure and cross confirmation between PF and PM is essential.

Most alerts are presented by a message at the Multifunction Display Unit (MFDU). In the air, the important items of the associated abnormal procedure are also displayed at the MFDU. For initial actions the MFDU procedure lines may be followed, but the crew should, time permitting, verify each alert with the ABNORMAL PROCEDURES in the QUICK REFERENCE HANDBOOK (QRH). Check for presence of status messages after completion of procedures. Status messages contain operationally relevant information only.

5.2 Appendix B, 5.2 Aircraft

5.2.1 Fokker Services Cabin Pressurisation Test Result

8. Procedure

A. Pressurize the fuselage

Action	Result
1. In the flight compartment, on the centralized-fault display unit (CFDU), push the ON switch.	a. The CFDU shows the MAIN MENU page.
2. On the CFDU, move the cursor with the UP/DN switches SYSTEM TEST.	
3. On the CFDU, push the ENTER switch.	a. The CFDU shows the SYSTEM TESTS page.
4. On the CFDU, move the cursor with the UP/DN switches to the ATA 31 FWC ALERT INHIBIT cancel line.	
5. On the CFDU, push the LH ENTER switch.	
6. On the CFDU, push the MAIN MENU switch.	a. The CFDU shows the MAIN MENU page.
7. On the CFDU, move the cursor with the UP/DN switches to SYSTEM STATUS.	
8. On the CFDU, push the ENTER switch.	a. The CFDU shows the SYSTEM STATUS page.
9. On the CFDU, move the cursor with the UP/DN switches to the ATA 21-26 AVNCS COOLING OUTLET VALVE line.	a. The CFDU shows [NOT OPEN]
10. In the flight compartment, on the AIRCONDITIONING panel, push the APU BLEED pushswitch.	a. The white OFF legend of the APU BLEED Pushswitch goes off. b. The BLEED PRESS indicator shows not less than 40 psi.
11. Note down APU bleed pressure.	a. APU Bleed pressure: 44 psi
12. On the AIRCONDITIONING panel, push the PACK 1 and PACK 2 pushswitches.	a. The white OFF legend in the PACK 1 and PACK 2 pushswitches go off.
13. Check that the LH and RH ECS operate.	
14. On the AIRCONDITIONING panel, push the ECON pushswitch.	a. The ON legend in the ECON switch comes on.
15. On the CPS, push the PRESS CONTROL pushswitch.	a. The white MAN legend in the PRESS CONTROL pushswitch comes on.
16. On the CPS, set the UP/DN control lever to the DN position.	
17. Open, tag, safety the circuit breaker GROUND FLIGHT CONT 3 RH EPB C83322A.	
18. On the CPI, observe and note down the value the RATE indicator is indicating.	a. 0 ft/ min
19. After 2 minutes, on the CPS, observe and note down the value the RATE indicator is indicating.	a. 0 ft/ min
20. On the CPS, slowly turn the rate-of-change rotary switch DECR/INCR clockwise to a comfortable rate of between 500 till 1000 ft/min.	a. The cabin will now pressurize.
21. On the CPS, set the UP/DN control lever to the mid position when the DIFF indicator on the CPI is indicating 2 psi.	a. The RATE indicator will go back to the 0 ft/min position. (YES) / NO (circle what is correct)
22. Wait 2 minutes.	
23. On the CPI, check that the DIFF indicator is indicating 2 psi.	a. The DIFF indicator indicates 2 psi. (YES) / NO (circle what is correct)
24. In case the result in step 21 is not 2 psi, note down the value indicated by the DIFF indicator and the rate of change shown on the rate indicator.	a. The DIFF indicator indication is: 2 psi psi b. The rate indicator indication is: 0 ft/ min

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B. Depressurize the fuselage

Action	Result
1. On the CPS, turn the rate-of-change rotary switch DECR/INCR fully counter-clockwise.	
2. On the CPS, set the UP/DN control lever to UP.	
3. On the CPS, slowly turn the manual rate-of-change rotary switch DECR/INCR clockwise to a comfortable rate.	a. On the CPI, the RATE indicator will indicate a Negative value. Cabin is now depressurizing.
4. On the CPI, when the DIFF indicator shows o psi, open the sliding window.	
5. Open the passenger door.	
6. Shut down the APU (Refer to AMM 49-10-00-866-822)	

In case the result in step 21 of the pressurize the fuselage procedure (A) is not indicating 2 psi but a higher value, it might indicate a problem with the Cabin Pressure Selector panel or a problem with the Primary Outflow Valve.
We would advise Air Niugini to replace the Cabin Pressure Selector panel and the Primary Outflow Valve.
After replacement of the Cabin Pressure Selector panel and the Primary Outflow Valve, the above described tests has to be repeated. In case the result of step 21 of procedure A, "Pressurize the fuselage" is not indicating 2 psi after replacement of both parts, please contact Fokker Services for further troubleshooting.

If agreed with PNG Accident Investigation Commission, please send the removed parts to Fokker Services for further investigation.