

***SOUTH AFRICAN***



***CIVIL AVIATION  
AUTHORITY***

**THE INCIDENT REPORT IS IN RESPECT OF THE INVESTIGATION INTO THE CAUSE(S) OF A SERIOUS INCIDENT INVOLVING A BAE 146 – RJ85 AIRCRAFT, ZS-SSH, AFTER TAKE-OFF FROM OR TAMBO INTERNATIONAL AERODROME (FAJS) ON 12 NOVEMBER 2011.**

The objective of a serious incident investigation is to establish the cause (s) of the incident and to take steps to prevent a further occurrence. As such the objective is not to apportion blame or liability.

The purpose of this investigation is therefore to ensure that the investigation is conducted in the most effective and comprehensive way to establish the cause (s). The investigation team is committed in adhering to the International Provisions defined in Annex 13 to the Convention on international Civil Aviation, of which South Africa is a signatory.

It is trusted that the investigation will lead to the introduction of corrective actions, should any deficiencies be identified, to ensure the continued safety of passenger transported in South African airspace and on South African aircraft.

Issued by Aircraft Accident and Incident Investigation Division (AIID)

South African Civil Aviation Authority (SACAA)

February 2013

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## AIRCRAFT INCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/0874	
<b>Aircraft Registration</b>	ZS-SSH	<b>Date of Incident</b>	10 Nov 2011		<b>Time of Incident</b>	1820Z
<b>Type of Aircraft</b>	AVRO 146-RJ85		<b>Type of Operation</b>		Commercial	
<b>Pilot-in-command Licence Type</b>		Commercial	<b>Age</b>	32	<b>Licence Valid</b>	Yes
<b>Pilot-in-command Flying Experience</b>		Total Flying Hours	6022.0		Hours on Type	2064.0
<b>Last point of departure</b>		O.R.Tambo International Airport (FAJS)				
<b>Next point of intended landing</b>		Oribi Airport (FAPM) Pietermaritzburg				
<b>Location of the incident site with reference to easily defined geographical points (GPS readings if possible)</b>						
Runway 03 Right at O.R.Tambo International Airport (FAJS).GPS Coordinates S26°08.684 E028°15.259						
<b>Meteorological Information</b>						
<b>Number of people on board</b>	2+2+74	<b>No. of people injured</b>	0	<b>No. of people killed</b>	0	
<b>Synopsis</b>						
<p>On Thursday morning, 10 November 2011 at 0720Z, the crew of ZS-SSH consisted of the Captain, First Officer and two Cabin Crew-members. Flight duties for the day consisted of a scheduled international flight from OR Tambo International Airport (FAJS) to Tete Airport (Chingodzi) FQTT and returning to FAJS and a scheduled domestic flight from FAJS to Pietermaritzburg Airport (FAPM).</p> <p>The international flight from FAJS to FQTT and back to FAJS was uneventful and the crew had a two hours rest period, before the scheduled domestic flight from FAJS to FAPM.</p> <p>The cockpit crew arrived at ZS-ASX at 1550Z for the intended domestic flight from FAJS to FAPM, but encountered a pressurisation defect and decided to utilize ZS-SSH instead in order to avoid a delay.</p> <p>At approximately 1630Z, the captain, first officer, two cabin crew-members and 74 passengers boarded the aircraft ZS-SSH that was still parked at parking bay C18. The cockpit crew completed a pre-flight inspection on the aircraft and noted that there were no defects reported in the technical logbook from the previous flight. After the four engines were started, the ramp controller notified the cockpit crew that the nose landing gear doors were still in the open position. The captain and first officer considered that it was not something to be concerned about as there were no previous defects reported. The aircraft was then taxied to the threshold of Runway 03L and took off for the flight from FAJS to FAPM.</p> <p>The undercarriage retracted normally but the cockpit crew experienced an excessive wind noise and vibration coming from the nose landing gear area that became worse as the airspeed increased. The cockpit crew then recycled the undercarriage, but as the wind noise and vibration was still evident, it was decided to return and land back at FAJS. The undercarriage was then selected to the down position, but only the two green down and locked lights for the left and right hand main landing gears illuminated which indicated that the nose landing gear failed to extend and lock down. The cockpit crew then attempted to extend the nose landing gear according to the relevant emergency extension handbook, but to no avail. A fly-pass was then performed and the airport fire department emergency services and tower confirmed that the nose landing gear did not extend. "G" manoeuvres were performed but did not resolve the problem.</p> <p>During the emergency landing at FAJS, the aircraft landed on both main landing gears first with the nose of the aircraft in a slight nose up attitude. The nose eventually lowered and the lower nose area scraped on the runway surface before the aircraft came to rest approximately 2500m down the runway. The occupants exited the aircraft at the forward left main cabin entry door. Seven (7) passengers were transported to hospital for observation and released shortly thereafter without any injuries.</p>						
<b>Probable Cause</b>						
<p>Nose landing gear failed to extend and lock down.  <u>Contributory factor:</u> Nose landing gear doors were opened during maintenance by disconnecting the nose landing gear door operating rod at the lower attachment point for NDT inspection to be carried out. The operating rod was not re-connected back to normal after maintenance causing the operating rod to obstruct the nose landing from extending normally.</p>						
<b>IARC Date</b>				<b>Release Date</b>		

## AIRCRAFT INCIDENT REPORT

**Name of Owner/Operator** : S.A. Airlink (PTY) LTD  
**Manufacturer** : British Aerospace  
**Model** : AVRO 146-RJ85  
**Nationality** : South African  
**Registration Marks** : ZS-SSH  
**Place** : Johannesburg (FAJS)  
**Date** : 10 November 2011  
**Time** : 1820Z

*All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.*

### **Purpose of the Investigation :**

*In terms of Regulation 12.03.1 of the Civil Aviation Regulations (1997) this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and **not to establish legal liability.***

### **Disclaimer:**

*This report is given without prejudice to the rights of the CAA, which are reserved.*

## **1. FACTUAL INFORMATION**

### **1.1 History of Flight**

- 1.1.1 On Thursday morning, 10 November 2011 the crew that consisted of the Captain, First Officer and two Cabin crew-members signed on for flight duties at OR Tambo International Airport (FAJS) at 0720Z. The first flight that consisted of a scheduled international flight from FAJS to Tete Airport (FQTT) that returned to FAJS at 1350Z was uneventful. The crew then had a two hours rest period, before the scheduled domestic flight from FAJS to FAPM.
- 1.1.2 The cockpit and cabin crew then boarded the aircraft, ZS-ASX at 1550Z for the intended domestic flight from FAJS to FAPM, but encountered a pressurisation defect and decided to utilize aircraft, ZS-SSH, in order to avoid a long delay.
- 1.1.3 At approximately 1630Z, the cockpit crew and the two cabin-crewmembers including 74 passengers, boarded the aircraft ZS-SSH parked at parking bay C18 at FAJS. The cockpit crew completed the pre-flight inspection on the aircraft and noted that there were no defects reported in the technical logbook from the previous flights. After the engines were started, the ramp controller notified the cockpit crew that the nose landing gear doors were still open, The Captain and First Officer considered that it was not something to be concerned about as the aircraft had just arrived back from previous flights with no technical defects noted in the aircraft technical logbook. The aircraft was then taxied to the threshold of Runway 03L and took off from FAJS to FAPM.

- 1.1.4 After the undercarriage retracted normally with no abnormal light indications, the cockpit crew experienced an excessive wind noise and vibration coming from the nose landing gear area that became worse as the aircraft airspeed increased. The cockpit crew then recycled the undercarriage, but the wind noise and vibration was still evident. It was decided to return and land back at FAJS. The undercarriage was then selected to the down position, but only the two green down and locked lights for the left and right hand main landing gears illuminated which indicated that the nose landing gear failed to extend and to lock down. The cockpit crew then attempted to extend the nose landing gear according to the relevant emergency extension handbook instructions, but to no avail. A fly past was then performed and the airport fire department emergency services and tower confirmed that the nose landing gear did not extend. “G” manoeuvres were performed but failed to resolve the nose landing gear extension problem.
- 1.1.5 During the emergency landing on Runway 03R at FAJS, the aircraft landed on both main landing gears first with the nose of the aircraft in a slight nose up attitude. The nose of the aircraft eventually lowered and the lower nose area scraped on the runway surface before the aircraft came to rest approximately 2500m down the runway.
- 1.1.6 The occupants exited the aircraft at the forward left main cabin entry door only as the tail section was too high above the ground for evacuation. The fire department assisted the passengers to evacuate the aircraft at the forward left main cabin door.
- 1.1.7 The Airport Clinic Section at FAJS concluded that 7 passengers were transported to hospital for observation and released shortly thereafter without any injuries sustained.

## 1.2 Injuries to Persons

Injuries	Pilot	Crew	Pass.	Other
Fatal	-	-	-	-
Serious	-	-	-	-
Minor	-	-	-	-
None	2	2	74	-

## 1.3 Damage to Aircraft

- 1.3.1 The aircraft sustained damage to the nose lower area and nose landing gear doors.



Figure 1, shows the BAE 146-RJ85 aircraft on the runway with the nose landing gear in the retracted position.

## 1.4 Other Damage

1.4.1 There was no other damage sustained.

## 1.5 Personnel Information

1.5.1 Captain:

Nationality	South African	Gender	Male	Age	32
Licence Number	0270435233	Licence Type	Airline Transport		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Flight Test, Multi and Single Engine Piston, Instrument, Night and RVSM Ratings				
Medical Expiry Date	31 October 2012				
Restrictions	None.				

Flying Experience:

Total Hours	6022.0
Total Past 90 Days	224.0
Total on Type Past 90 Days	224.0
Total on Type	2064.0

- Aircraft Type Rating: According to the pilot's file, the Captain completed the BAE 146-RJ85 aircraft type training and type rating test on 29 April 2008. He submitted a type rating application to the SACAA to have the

type rating endorsed on his license. The application was approved and type rating issued on 30 April 2008. After issuance of the type rating, the Captain flew the aircraft type without being involved in any serious incident.

- Duty Times: The Captain's duty times for the last 48 hours were as follows. The Crew Roster Report shows that the Captain signed on for duty on Wednesday, 9 November 2011 at 0345Z and he was on duty until 1350Z. The next day on Thursday, 10 November 2011 he signed on at 0720Z and was on duty until 1950Z. There were no anomalies identified with the Captain's duty times.

#### 1.5.2 First Officer:

Nationality	South African	Gender	Male	Age	30
Licence Number	0270508807	Licence Type	Airline Transport		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Held Required Rating				
Medical Expiry Date	31 October 2012				
Restrictions	None.				
Previous Accidents	None.				

#### Flying Experience:

Total Hours	4106.6
Total Past 90 Days	245.1
Total on Type Past 90 Days	230.0
Total on Type	1602.0

- Aircraft Type Rating: The First Officer also completed the BAe 146-RJ85 aircraft training and type rating test on 21 September 2008. He submitted a type rating application to the SACAA. His application was approved and type rating issued on 23 September 2008. After issuance of the type rating, he flew the aircraft type without experiencing any incident.
- Duty Time: The First Officer's duty time for the last 48 hours was the following. The Crew Roster Report shows that the First Officer signed on for duty on Wednesday, 9 November 2011 at 0630Z and was on duty until 1539Z. On Thursday, 10 November 2011 he signed on at 0720Z and was on duty until 1950Z. There was no anomaly identified with the First Officer duty time.

#### 1.5.3 Cabin Crew Members:

##### 1.5.3.1 In Command Flight Attendant: (ICFA)

Nationality	South African	Gender	Female	Age	24
Licence Number	0272219726	Licence Type	Cabin Crew		
Licence valid	Yes	Type Endorsed	Yes		

### 1.5.3.2 Flight Attendant.

Nationality	South African	Gender	Female	Age	24
Licence Number	0272340639	Licence Type	Cabin Crew		
Licence valid	Yes	Type Endorsed	Yes		

**Note:** Both flight attendants were found to be appropriately qualified, experienced and rated on the aircraft type. The performances of the flight attendants were considered professional and there were no anomalies identified with their cabin duties at the time of the incident.

**Duty Time:** The duty times of the Flight Attendants for the last 48 hours were as following.

- (i) According to the Cabin Crew Roster Report, the In Command Flight Attendant signed on for duty on Wednesday, 9 November 2011 at 0700Z and she was on duty until 1300Z. On Thursday, 10 November 2011 she signed on for duty at 0720Z until 1935Z.
- (ii) The Flight Attendant signed on for duty on Wednesday, 9 November 2011 at 0320Z and she was on duty until 0917Z. On Thursday, 10 November 2011 she signed on for duty at 0720Z and was on duty until 1935Z.

There were no anomalies identified with the duty times of the cabin crew-members.

### 1.5.4 Aircraft Maintenance Mechanic:

Nationality	South African	Gender	Male	Age	29
Aircraft Maintenance Engineer License	None.				
Company Authorisation	9 February 2011 to 2 August 2013				
Aircraft & Engine Types	Jetstream J4100, Embraer 135 LR, Honeywell TPE 331, Honeywell ALF 502R-5, Rolls Royce AE 3007, BAe 146-RJ85-200				
Categories (Company Certification)	Airframes (A): Base & Line Maintenance – Perform Authority Engines (C): Base & Line Maintenance – Perform Authority Electrical (W): W 1.1 and W1.2 Line Maintenance – Perform Authority				



### 1.5.5 Ramp Controller:

SA Airlink make use of Ramp Controllers to do departure duties of the aircraft. The duties of the ramp controller are to ensure that the aircraft turn around and departures are coordinated. This includes cleaning, ensuring the fuelling truck is at the aircraft, the baggage is loaded as requested by the crew etc. They are also required to walk around the aircraft before start up to ensure that all servicing panels and doors are closed and secured. They communicate with the crew via a ground head set and give clearance to start the engines. In the case of ZS-SSH the Ramp Controller performed his duty and reported to the Captain that the nose landing gear doors were still open.

## 1.6. Aircraft Information

### 1.6.1 Airframe:

Type	AVRO 146-200 RJ85	
Serial No.	E2285	
Manufacturer	British Aerospace	
Date of Manufacture	1996	
Total Airframe Hours & Cycles (At time of Incident)	33111.59 hours	28762 cycles
Last Phase Inspection (Date, Hours & Cycles)	23 November 2010	31818.28 hours 28686 cycles
Hours & Cycles since Last Phase Inspection	1293.31hours 76 cycles	
C of A (Issue Date)	9 December 2010	
C of R (Issue Date) (Present owner)	26 December 2010 South African Airlink (Pty) Ltd.	
Operating Categories	Standard – Part 121	

### 1.6.2 Engine: No. 1

Type	Honeywell ALF 502 R-5	
Serial No.	LF07579	
Hours & Cycles since New (HSN & CSN)	Hours 20819.0	Cycles 18450

### 1.6.3 Engine: No. 2

Type	Honeywell ALF 502 R-5	
Serial No.	P07659	
Hours & Cycles since New (HSN & CSN)	Hours 20178.0	Cycles 17557

### 1.6.4 Engine: No. 3

Type	Honeywell ALF 502 R-5	
Serial No.	P07721	
Hours & Cycles since New (HSN & CSN)	Hours 19345.0	Cycles 16438

#### 1.6.5 Engine: No. 4

Type	Honeywell ALF 502 R-5	
Serial No.	P07695	
Hours & Cycles since New (HSN & CSN)	Hours 20876	Cycles 20876

#### 1.6.6 Aircraft Technical Information:

On Thursday, 10 November 2011, the aircraft, ZS-SSH completed its last domestic scheduled maintenance flight at approximately 1500Z. The aircraft flew from Kruger Mpumalanga International Airport (FAKN) to FAJS. After landing at FAJS the aircraft was taxied to Charlie apron where it was parked in parking bay C18. There were no defects recorded in the flight technical log and the aircraft was in a serviceable condition at the time.

1.6.7 The aircraft maintenance planning division of the maintenance organisation (AMO) expected ZS-SSH to return to the main base as there were some maintenance tasks due to be carried out on the aircraft. The aircraft had completed all its scheduled flights for the day and was available at that point for the maintenance tasks to be carried out.

1.6.8 The crew-chief/supervisor on night shift duty was responsible for carrying out the applicable maintenance tasks and it was his decision when to start carrying out the maintenance tasks. The work relevant to the maintenance tasks was required to be completed before the next day (11 November 2011) when the aircraft would have been scheduled for flight. In the meantime, whilst waiting for the night shift crew chief to sign on for duty, the aircraft was parked at C18. Hence, the day time crew chief/supervisor was still in charge of the maintenance activities until 1600Z on the day.

1.6.9 Amongst the list of maintenance tasks, the AMO had to comply with Service Bulletin: 146-32-174 on the nose landing gear. The service bulletin called for a non-destructive testing (NDT) ultrasonic inspection of the upper part of the main fitting of the Nose Landing Gear. The AMO contracted an external contractor to carry out all their NDT inspection activities. The external NDT contractor was issued a job order to carry out Service Bulletin: 146-32-174. In honouring his contractual obligation, the external contractor notified the AMO of his intention to finalise the NDT work immediately when the aircraft was available or arrived at FAJS.

1.6.10 Aircraft Documentation: The cockpit crew performed a pre-flight inspection on the aircraft before the flight. During the pre-flight inspection, the aircraft documentation was checked and the aircraft documentation was found valid in accordance with applicable regulation.

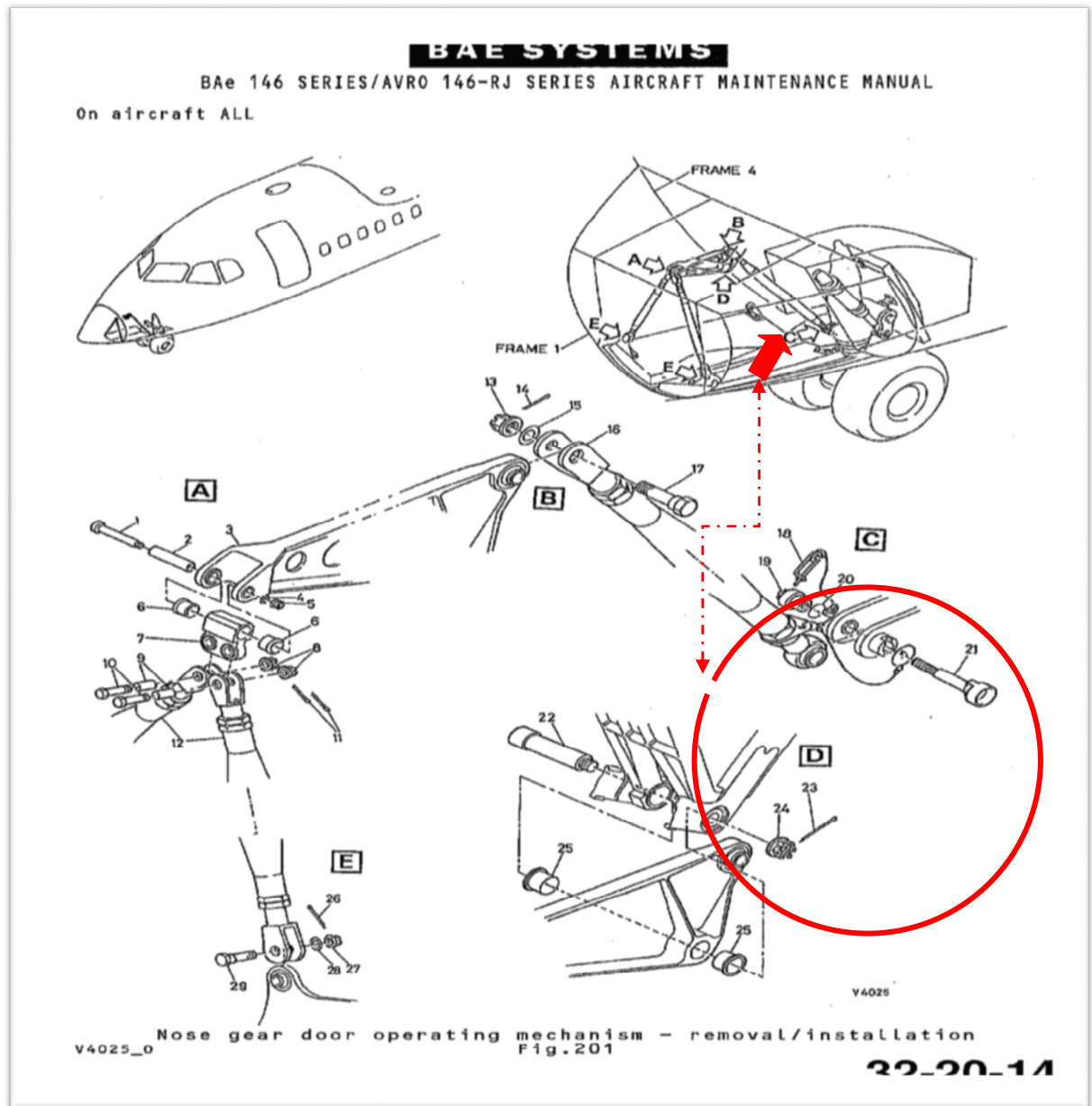
1.6.11 The AMO maintenance planner notified the external contractor that the aircraft was available for the NDT inspection on 10 November 2011. The external contractor called the day-shift crew chief/supervisor to inform him that he was at the entrance security gate and requested to be transported to the aircraft. The crew chief/supervisor sent an aircraft maintenance mechanic to transport the external contractor to the aircraft. The aircraft maintenance mechanic then

opened the nose landing gear doors by disconnecting the nose landing gear operating rod for the NDT contractor to gain access to the upper part of the forward face of the main fitting. The aircraft maintenance mechanic then left the aircraft and went back to the hangar in order to attend a shift hand-over meeting with the night shift crew supervisor. After completing the non-destructive testing inspection, the NDT contractor contacted the night shift crew chief/supervisor and informed him that the NDT task was carried out. The aircraft was left unattended due to the fact that there were other maintenance tasks still outstanding on the aircraft. The aircraft was to be towed to the hangar for further maintenance to be carried out.

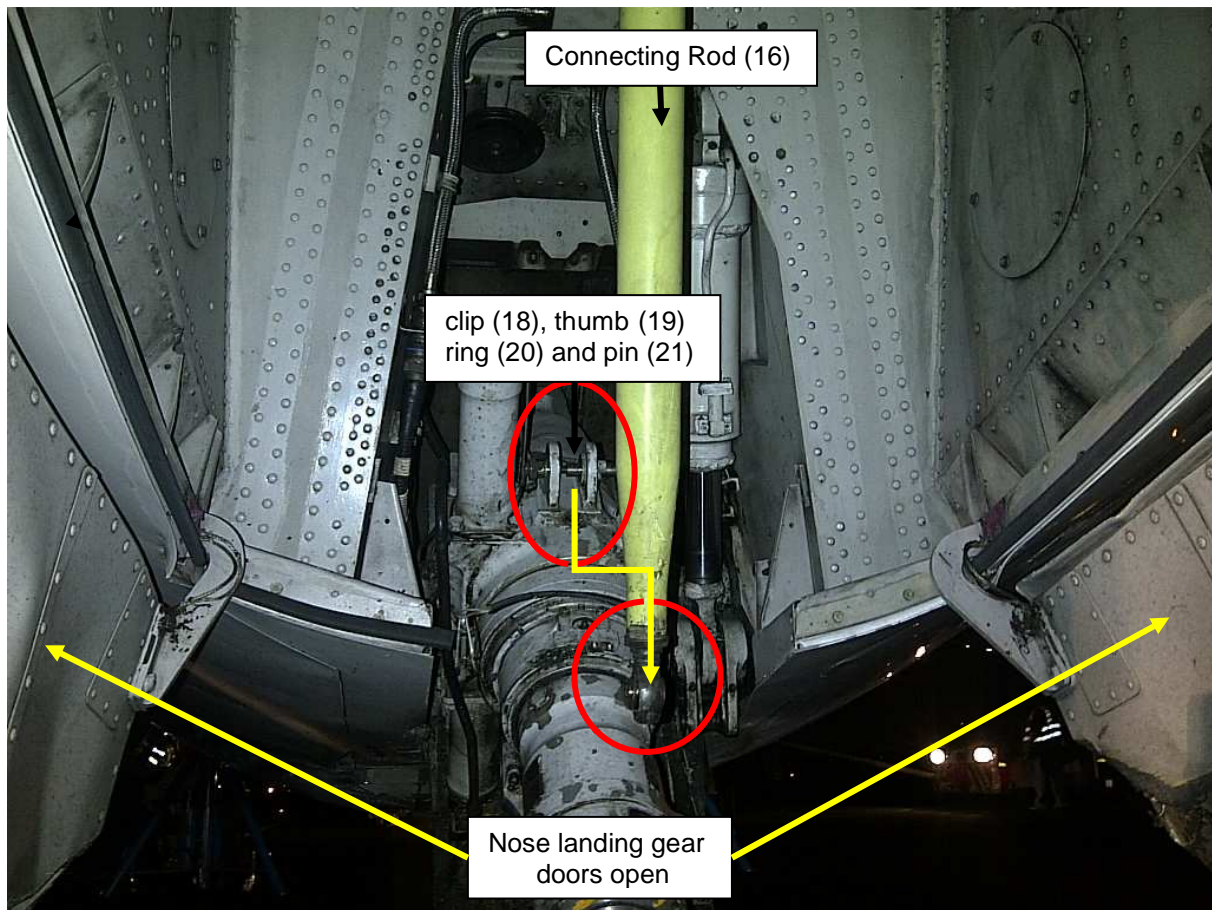
**Note:** Nose Landing Gear doors removal/opening procedure.

According to the Aircraft Maintenance Manual (AMM), Chapter 32-20-14 the following is required when opening the doors. *“Remove clip (18), thumb (19) and ring (20) from pin (21). Remove pin (21). Allow doors to open”.*

(See below figure 201, nose gear door operation – removal/installation diagram)



(See below picture, showing nose landing gear doors removal/opening)

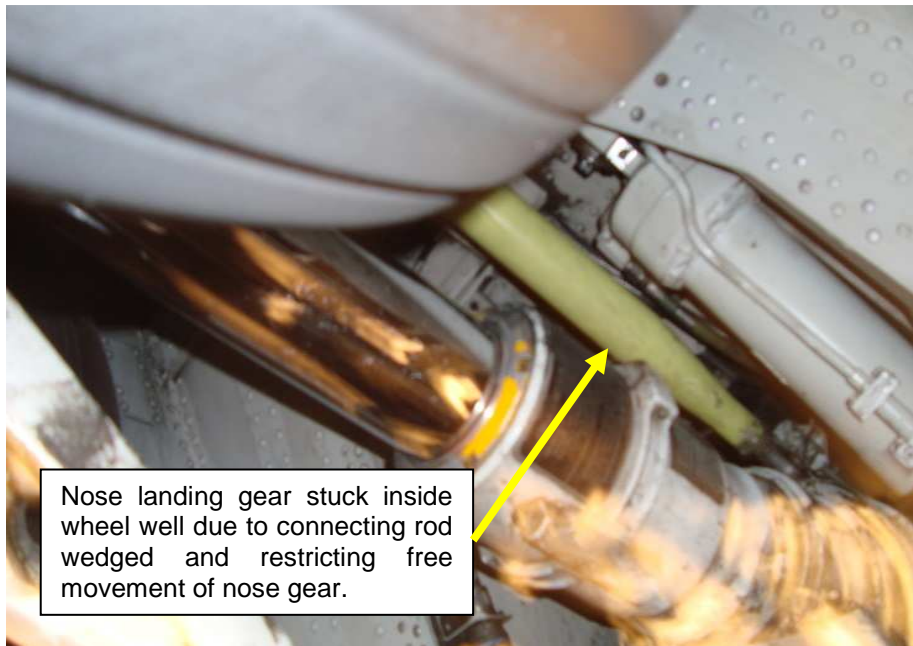


**Note:** According to the Aircraft Maintenance Manual (AMM), Chapter 32-20-14 the nose landing gear operation is as follows.

- (i) *“When landing gear retracts, the nose gear doors will open when gears is in motion and fully close when landing gear is fully retracted”.*
- (ii) *“When landing gear extends. Nose landing gear doors open when gear is in motion and fully close when landing gear is fully extended”.*

1.6.12 After the NDT inspection was carried out, the aircraft ZS-SSH was still parked on the apron at parking bay C18 with the nose landing gear doors open and the applicable connecting rod disconnected. Apart from the NDT external contractor and aircraft maintenance mechanic who opened the nose landing gear doors, no one at the AMO knew that the doors were opened manually with the No.21 pin removed in order for the NDT task to be accomplished.

1.6.13 Aircraft Change: As the aircraft ZS-ASX was originally scheduled for a domestic flight from FAJS to FAPM, a pressurisation defect was established that could not be rectified without causing a delay. It was then decided to utilize Aircraft ZS-SSH for the flight. The day-shift crew chief/supervisor first checked the aircraft technical log and noted that there were no defects recorded in the technical logbook which suggested that the aircraft was serviceable for the intended flight.



**Photo showing nose landing gear connecting rod (16) wedged inside the nose landing gear wheel well)**

1.6.14 According to available evidence the aircraft maintenance mechanic who opened the nose landing gear doors and left the connecting rod disconnected, did not make an entry in the aircraft technical logbook or on maintenance documentation to indicate that the nose landing gear doors were opened by disconnecting the rod inside the nose landing gear doors. There was also no maintenance in progress identification warning on the nose landing gear doors.

1.6.15 There was no evidence that the AMO inspected the aircraft after the external contractor completed the NDT. The external contractor left the aerodrome with the NDT maintenance documentation still in his possession; hence the AMO could not certify the documentation after the NDT inspection was done. The implication of the scenario was that the aircraft was dispatched without the AMO certifying the NDT work that was carried out.

1.6.16 There was no evidence that a pre-flight inspection was carried out on the aircraft by the AMO maintenance personnel prior to the flight. The AMO relied on the technical log which had no defects recorded in it before authorising the flight. There was no evidence that the pilot or co-pilot completed an external pre-flight of the aircraft.

## **1.7 Aids to Navigation**

1.7.1 The aircraft was flown under Instrument Flight Rules (IFR). The crew executed an emergency landing on Runway 03L at FAJS. The following radio navigation and landing aids were available at FAJS:

- (i) Non-directional radio beacon (NDB) - CB: frequency kHz.
- (ii) Very high frequency omnidirectional radio range (VOR) - CTV: frequency 115.2 MHz

- (iii) Distance measuring equipment (DME) – CTV/CTI/KSI: frequencies 115.2 MHz
- (iv) Instrument landing system (ILS) LOC: frequency 109.1MHz.
- (v) Instrument landing system (ILS) GP CATII: frequency 331.4 MHz
- (vi) Runway centrelines and identification markings.

All the above identified navigation and landing aids were serviceable at the time of the incident.

The navigational equipment found installed in the aircraft was as per approved Minimum Equipment List (MEL). There was no report of the crew experiencing any anomalies with the aircraft navigation equipment.

## 1.8 Meteorological Information

1.8.1 The weather conditions below was obtained from the pilot's questionnaire:

Wind direction	340/06	Wind speed	06kt	Visibility	CAVOK
Temperature	18°C	Cloud cover	CAVOK	Cloud base	CAVOK
Dew point	+03°C				

## 1.9 Aids to Navigation

1.9.1 The aircraft was equipped with the standard navigation equipment which was approved for the aircraft type. The cockpit crew did not experience any defect or malfunction with the aircraft navigational equipment. The navigation equipment was in a serviceable condition at the time of the incident.

## 1.10 Communications.

1.10.1 The aircraft was equipped with the standard navigation equipment approved for the aircraft type. No defect or malfunction was experienced with the navigational equipment at the time of the incident.

1.10.2 The cockpit crew communicated with FAJS air traffic control (ATC) on the Radar frequency 124.5 MHz with regards to the nose landing gear extension problem who notified the airport fire department rescue emergency services to be on standby for an emergency landing.

## 1.11 Aerodrome Information

Aerodrome Location	O.R Tambo Airport. FAJS	
Aerodrome Co-ordinates	S26° 08.01' E028° 14 32'	
Aerodrome Elevation	5558ft	
Runway Designations	03L/21R	03R/21L
Runway Dimensions	4418 x 60m	3400 x 60m
Runway Used	Runway 03R – Emergency landing	
Runway Surface	Asphalt	
Aerodrome Status	Licensed	
Approach Facilities	ILS LLZ NDB VOR UHF DME; ILS GP	



The aircraft (ZS-SSH) took off from Runway 03L at O.R. Tambo International Airport (FAJS).

The aircraft turned back to O.R. Tambo Airport and an emergency landing was executed onto Runway 03R with the nose landing gear stuck in the retracted position.

## 1.12 Flight Recorders

1.12.1 The Flight Recorders installed on the aircraft were the following:

- (i) The Flight Data Recorder (FDR) that was installed in the aircraft was a Lockheed type, Part No.10077A500-803, Serial No. 3493 and the Cockpit Voice Recorder (CVR) was a L3 communications type, Part No 2100-1020-02 Serial No. 000194546.
- (ii) The flight recorders were removed and found in a serviceable condition from the aircraft on 10 November 2011.

1.12.2 The CVR had a solid state memory as a reading medium and could only retain the last 2 hours of the crew voice communications and noise within the cockpit environment. The CVR was de-activated after the emergency landing. The CVR was shipped overseas for downloading purposes.

1.12.3 The FDR was submitted to a local service provider for down loading. The FDR was found in a serviceable condition. The recording media within the unit is a magnetic tape, with a recording duration of 25 hours. This particular FDR records in ARINC 573 mode. The FDR download information is attached as ANNEXURE "B".

1.12.4 FDR Download information:

- At 17:16:25, the aircraft rotated at a computed air speed (CAS) of 129kt.
- At 17:16:31, the aircraft became airborne at 140kt CAS with the left and right hand main landing gears including the nose landing gear fully retracted in the up-lock, (air-mode) position.
- At 17:16:35, the left and right main landing gear was extended and locked down, (ground-mode), but the nose landing gear remained in the retracted air-mode position.
- At approximately 17:18:35, the undercarriage was retracted and extended (recycled). The left and right main landing gears extended and locked down, but the nose landing gear still remained in the retracted, (air-mode) position.
- At approximately 17:27:00, the undercarriage was again recycled with the same result as before.
- At approximately 19:18:00, the aircraft landed with 33° of flaps with the left and right hand main landing gears extended and locked down with the nose landing gear still retracted after the aircraft was airborne for almost two hours.



## 1.13 Wreckage and Impact Information

1.13.1 The aircraft was committed to an emergency landing onto Runway 03R at FAJS with the nose landing gear in an unsafe condition and not extended. The left and right hand main landing gears were fully extended and locked down and touched down first on the runway with the nose of the aircraft in a slight nose up attitude. The nose of the aircraft eventually lowered and scraped onto the runway surface for approximately 200 metres before the aircraft came to rest approximately 2500m from the threshold of Runway 03R.



Figure showing aircraft took off from Runway 03L at FAJS and emergency landing onto Runway 03R

## 1.14 Medical and Pathological Information

1.14.1 There was no injuries sustained by the crew and passengers in the incident.

1.14.2 The Airport Clinic Department at FAJS concluded that only 7 passengers were transported to hospital for observation and released shortly thereafter without any injuries sustained in the incident.

## 1.15 Fire

1.15.1 Some smoke was evident in the cockpit and cabin area of the aircraft after the aircraft came to rest as a result of the nose lower area scraping on the runway for 200 metres which dissipated within a few seconds.

1.15.2 There was no evidence of a pre or post impact fire.

## **1.16 Survival Aspects**

1.16.1 The incident was considered to be survivable due to the fact that there was virtually no impact forces involved during the emergency landing. The aircraft was intact and damage was limited to the bottom of the nose section of the aircraft only.

1.16.2 The crew and passengers sustained no injuries during the incident.

1.16.3 Evacuation: The aircraft forward left main entry door escape chute was deployed only as the rear main cabin doors were too high above the ground with the aircraft in a nose down attitude. The rescue and fire fighting services assisted the passengers to evacuate the aircraft at the forward left main entry door safely.

Note: FAJS ATC activated the crash alarm and the rescue and fire fighting services were put on standby for the emergency landing. The rescue and fire fighting services were dispatched to RWY 03R to provide relevant emergency assistance to the occupants as required.

## **1.17 Tests and Research.**

1.17.1 Not considered necessary.

## **1.18 Organizational and Management Information**

1.18.1 The aircraft maintenance was carried by an approved Aircraft Maintenance Organisation (AMO) No 052.

1.18.2 The Owner/Operator SA Airlink (Pty) Ltd was in possession of a valid AOC Domestic Schedule, Class I, License No S051D, A/C Category AI/A2, Air Service SI/S2 and AOC International Schedule, Class I, License No I/S031, A/C Category AI/A2, Air Service SI/S2.

1.18.3 The aircraft in question was on a scheduled domestic flight when the incident occurred.

## **1.19 Additional Information**

1.19.1 According the aircraft "Emergency Lowering" procedures stipulated in the Abnormal Approach and landing with the nose landing gear green light not

Board Members: Ms P Riba (Chairperson of the Board), Mr S Motau, Mr P Ndlovu, Dr N Sangweni, Adv R R Dehal  
Mr Z Nomvete, Mr Z Thwala (Acting DCA) and Mr L Mabaso, **Company Secretary**: Mr A Motake

illuminated, gentle “G” applications can be performed.

1.19.2 According to the aircraft “Emergency Lowering” procedures stipulated in the Abnormal Approach and landing with the nose landing gear green light not illuminated, gentle “G” applications can be performed. A brief description of the “Emergency Lowering” is attached to the report as per Annexure “A”.

1.19.3 According to SA Airlink Operations Manual Aircraft SOP, Section 2, Normal Operating Procedures:

➤ Exterior Inspection (Captain)

The pre-flight interior and exterior is normally done by the Captain whilst the First Officer is doing the Cockpit Safety Checks. The Exterior Security Inspection is completed the same time. During all walk-arounds, the crew shall wear a visible jacket.

## **1.20 Useful or Effective Investigation Techniques**

1.20.1 Not required.

## **2. ANALYSIS**

2.1 The Captain, First Officer and two Cabin Crew-members, flight duties for 10 November 2011 consisted of a scheduled international flight from OR Tambo International Airport (FAJS) to Tete Airport (Chingodzi) FQTT and back to FAJS that were uneventful. The crew then had a two hour rest period before the next scheduled domestic flight from FAJS to Pietermaritzburg (FAPM).

2.2 The external NDT contractor that was contacted by the AMO Maintenance Planner arrived at the aircraft parked at C18, accompanied by an aircraft maintenance mechanic as requested by the day-shift supervisor, in order to carry out the NDT Service Bulletin: 146-32-174 on the nose landing gear. The aircraft maintenance mechanic then opened the nose landing gear doors by disconnecting the nose landing gear door operating connecting rod and immediately went back to the hangar.

2.3 According to available evidence the aircraft maintenance mechanic who opened the nose landing gear doors, did not made an entry in the aircraft technical logbook or on maintenance documentation to indicate that the nose landing gear rod was opened by disconnected the door operating rod inside the nose landing gear doors. There was also no maintenance in progress identification warning on the nose landing gear doors.

2.4 The aircraft nose landing gear doors remained open and the applicable connecting rod manually disconnected. Apart from the NDT external contractor and the aircraft maintenance mechanic who opened the nose landing gear doors, no one was notified or knew that the nose landing gear doors were opened manually with the connecting rod disconnected for the NDT task to be accomplished.

- 2.5 At approximately 1550Z, the cockpit and cabin crew-members boarded the aircraft (ZS-ASX) that was scheduled for a domestic flight from FAJS to FAPM but encountered a pressurisation defect. In order to avoid a further delay, it was decided to utilize ZS-SSH instead for the intended scheduled domestic flight.
- 2.6 At about 1630Z, the Captain, First Officer including the two Cabin crew-members and 74 passengers boarded the aircraft ZS-SSH. The cockpit crew completed a pre-flight inspection on the aircraft and noted that there were no defects reported in the technical logbook from the previous flight on the day. The Ramp Controller advised the cockpit crew that the nose landing gear doors were still in the open position after the engines were started, but the cockpit considered that it was not something to be concerned about as no outstanding defects were outstanding.
- 2.7 After takeoff, the cockpit crew experienced some vibration as the undercarriage was retracted which became worse as the airspeed was increased. The cockpit crew then lowered the undercarriage, but the nose landing gear failed to extend and to lock down with the normal and with the emergency systems. An emergency landing was then executed after ATC confirmed during a fly pass that the nose landing gear did not extend.
- 2.8 The nose landing gear connecting rod that was disconnected at the lower attachment point for NDT maintenance inspection, restricted the free movement of the nose landing gear when attempts were made to extend the nose landing gear.

### **3. CONCLUSION**

#### **3.1 Findings**

- 3.1.1 The captain, first officer and the two cabin crew-members, flight duties on the day that the incident occurred, consisted of a scheduled international flight from OR Tambo International Airport (FAJS) to Tete Airport (Chingodzi) FQTT and back to FAJS that were uneventful. After a two hour rest period, the crew was also scheduled for a domestic flight from FAJS to FAPM.
- 3.1.2 The captain and the first officer were both in possession of valid Airline Transport Pilot's licences and valid medical certificates approved by a SACAA medical examiner.
- 3.1.3 Both flight attendants on board the aircraft were found to be appropriately qualified, experienced and rated on the aircraft type. The performances of the flight attendants were considered professional and there was no anomalies identified with their cabin duties at the time of the incident.
- 3.1.4 The incident aircraft (ZS-SSH) in question arrived back at FAJS and parked on the apron at parking bay C18 after an uneventful flight earlier that day with no defects recorded in the aircraft technical logbook. The aircraft was scheduled

to be towed back to the hangar for maintenance work that was to be carried out including NDT inspection of the nose landing gear upper part of the forward face of the main fitting.

- 3.1.5 Aircraft Change: As the aircraft (ZS-ASX) that was originally scheduled for a domestic flight from FAJS to FAPM, became unserviceable due to a pressurisation defect, it was decided to utilize the incident aircraft ZS-SSH for the flight. The day-shift-crew supervisor checked the aircraft technical logbook and confirmed that there were no defects recorded which suggested that the aircraft was serviceable for the flight.
- 3.1.6 There was no evidence that a pre-flight inspection was carried out on the aircraft by the AMO maintenance personnel prior to the flight. The AMO relied on the technical log which had no defects recorded in it before authorising the flight.  
It is a matter of concern that it is evident that a pre-flight inspection was not carried out on the aircraft by the AMO maintenance personnel prior to the flight. If a proper pre-flight was indeed carried out, the defect in the nose landing gear with the nose landing gear in the open position could have been noted and corrective action taken.
- 3.1.7 It is evident that a lack of supervision and responsibility existed in that the incident aircraft was not checked for serviceability after the nose landing gear doors was manually opened by a non-certified aircraft mechanic and a non-destructive (NDT) ultrasonic inspection was carried out.

### **3.2 Probable Cause/s**

- 3.2.1 The nose landing gear failed to extend after the undercarriage was selected to the down position.
- 3.2.1. The nose landing gear doors were opened by an aircraft maintenance mechanic by disconnecting the nose landing gear door operating rod at the lower attachment point for NDT inspection to be carried out. The operating rod in question was not reconnected back to normal, causing the operating rod to become stuck (wedged) into a position which restricted the nose landing gear not to extend and lock down.

## **4. SAFETY RECOMMENDATIONS**

- 4.1 The AMO should conduct a comprehensive review of their maintenance procedures, polices, processes etc. relevant to the incident that occurred.
- 4.2 The SACAA should conduct a comprehensive audit to review the AMO capacity to effectively service and maintain the various aircraft types which they are approved to maintain.

4.3 The SACAA to assess the Operator and AMO degradation of their safety record in terms of accidents and serious incidents which they were involved in recently.

## 5. APPENDICES

5.1 Annexure "A"

5.2 Annexure "B"

Compiled by :

.....  
for Director of Civil Aviation

Date: .....

Investigator-in-charge : .....

Date : .....

Co-Investigator : .....

Date: .....

## ANNEXURE “A”

### 1.19.1 Emergency Lowering

A leg is locked down if its green annunciator is lit on either the normal indicator or the standby indicator. With the Emergency Gear Down Lever in the latched position:

- The gear cannot be retracted.
- The nose-wheel steering is not available .

At 190kt IAS with flaps retracted;

- Emergency Gear Down lever – Pull and latch.
- Normal and Standby Gear Indications – Check for 3 greens after 30 seconds.
- Normal Gear Selection – Down.

If either or Both Main Gear still not Locked Down:

- DC-Pump – ON for 1 minute or until a green light is obtained for each main leg if sooner.

If Either or Both Main Gear not Locked Down:

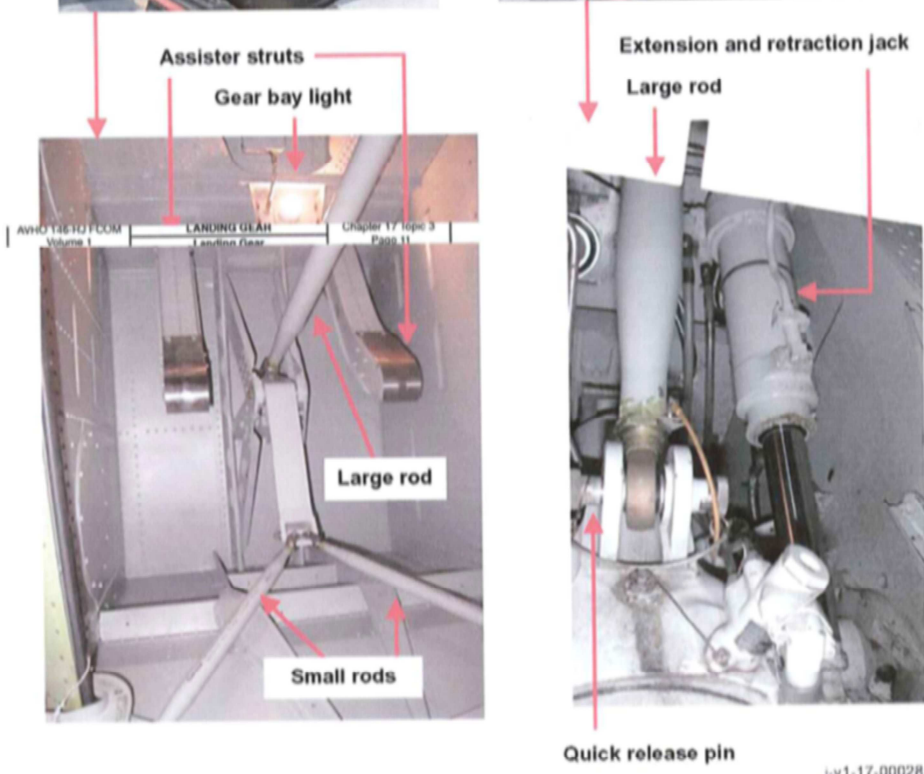
- Gently Yaw or slideslip aircraft by applying rudder in the direction of the unlocked leg. Rudder inputs must be moderate and progressive. Sudden or rapid rudder movements must be avoided.

If no Nose Green Light:

- Accelerate to Placard Speed for the Gear/flap configuration and make gentle application of “G”.



**Figure 3.9 - Looking into the Nose Gear Bay**



i-v1-17-00028



## ANNEXURE “B” (FDR Parameters)

TIME	PALT	CAS	HEAD	PITCH	ROLL	RALT	FLAP	SQAUTL	SQAUTN	SQAUTR	GRPSOL	AOA	ACVERT	ACLONG
17:15:00	6728	0	211.4	-0.6	0.3	2		GND	GND	GND	DWN LOCK	46	1.029	0.2
	6728	32	210.9	-0.4	0.1		18	GND	GND	GND	DWN LOCK	46	1.022	0.208
17:15:00	6728	36	211.1	-0.6	-0.1	2		GND	GND	GND	DWN LOCK	46	1.017	0.2
	6728	47	210.5	-0.6	-0.3		18	GND	GND	GND	DWN LOCK	46	1.001	0.198
17:15:00	6728	49	211.2	-0.6	-0.3	2		GND	GND	GND	DWN LOCK	46	1.01	0.189
	6726	60	211.6	-1	0.3		18	GND	GND	GND	DWN LOCK	46	0.976	0.179
17:16:00	6726	64	211.2	-0.6	0.1	1		GND	GND	GND	DWN LOCK	46	1.026	0.191
	6724	84	211.4	-0.8	0.1		18	GND	GND	GND	DWN LOCK	-3	0.983	0.165
17:16:00	6722	99	211.4	-0.8	0.3	2		GND	GND	GND	DWN LOCK	-3	0.965	0.155
	6720	105	210.9	-0.6	0.4		18	GND	GND	GND	DWN LOCK	-4	1.056	0.136
17:16:00	6718	117	210.9	0.1	0.4	2		GND	GND	GND	DWN LOCK	-3	1.047	0.138
	6718	124	210.9	0.3	0.3		18	GND	GND	GND	DWN LOCK	-3	1.04	0.128
17:16:00	<b>6716</b>	<b>135</b>	<b>211.1</b>	<b>6.6</b>	<b>-0.1</b>	<b>3</b>		<b>GND</b>	<b>AIR</b>	<b>GND</b>	<b>DWN LOCK</b>	<b>1</b>	<b>1.026</b>	<b>0.167</b>
	<b>6722</b>	<b>140</b>	<b>211.8</b>	<b>14.5</b>	<b>0.3</b>		<b>18</b>	<b>AIR</b>	<b>AIR</b>	<b>AIR</b>	<b>DWN LOCK</b>	<b>8</b>	<b>1.072</b>	<b>0.207</b>
17:16:00	6744	143	212.1	22.2	-0.6	73		GND	AIR	GND	UP LOCK	8	1.04	0.181
	6760	144	210.9	21.5	-1		18	GND	AIR	GND	UP LOCK	6	1.001	0.181
17:16:00	6788	146	209.1	25.2	-1.5	261		GND	AIR	GND	UP LOCK	7	1.051	0.208
	6808	145	209	24.9	-1		18	GND	AIR	GND	UP LOCK	6	0.99	0.195
17:16:00	6838	144	209	21.9	-0.1	508		GND	AIR	GND	UP LOCK	5	0.956	0.189
	6854	145	209.3	22.8	0.1		18	GND	AIR	GND	UP LOCK	6	1.004	0.198
17:16:00	6858	145	209.3	23.3	-0.1	599		GND	AIR	GND	UP LOCK	7	1.02	0.202
17:17:00	6882	144	209.7	24	-0.1	699		GND	AIR	GND	UP LOCK	7	0.997	0.195
17:17:00	6926	145	210.4	23.1	0.8	930		GND	AIR	GND	UP LOCK	6	1.008	0.195
17:17:00	6948	145	211.1	22.8	0.1	1058		GND	AIR	GND	UP LOCK	6	0.985	0.191
17:17:00	6970	145	211.1	24.2	-0.8	1167		GND	AIR	GND	UP LOCK	7	1.026	0.198
17:17:00	6992	144	211.1	20.8	-0.6	1287		GND	AIR	GND	UP LOCK	5	0.938	0.183
17:17:00	7008	146	210.9	17.7	-0.8	1389		GND	AIR	GND	UP LOCK	5	0.942	0.183
17:17:00	7022	149	210.5	17.1	0.4	1472		GND	AIR	GND	UP LOCK	5	0.992	0.183
17:17:00	7034	151	211.4	16.8	0.8	1526		GND	AIR	GND	UP LOCK	4	1.004	0.175
17:17:00	7044	154	211.8	15.6	0.1	1579		GND	AIR	GND	UP LOCK	3	1.01	0.169
17:17:00	7070	158	211.8	13.8	-0.6	1687		GND	AIR	GND	UP LOCK	2	1.006	0.157
17:17:00	7086	160	212.6	17.3	6.2	1742		GND	AIR	GND	UP LOCK	3	1.106	0.169
17:17:00	7102	160	217.8	14.7	18.2	1873		GND	AIR	GND	UP LOCK	1	0.988	0.14
17:17:00	7116	162	227.3	12.2	25.2	1918		GND	AIR	GND	UP LOCK	1	1.058	0.146
17:18:00	7126	165	238.5	12.6	25.8	2029		GND	AIR	GND	UP LOCK	2	1.124	0.155
17:18:00	7136	166	249.6	12.4	25.8	2138		GND	AIR	GND	UP LOCK	2	1.119	0.146
17:18:00	7146	167	260.3	11.9	25.6	2188		GND	AIR	GND	UP LOCK	1	1.099	0.14
17:18:00	7158	169	269.8	11.9	18.7	2258		GND	AIR	GND	UP LOCK	1	1.095	0.134
17:18:00	6146	170	274.8	10.8	7.1	2268		GND	AIR	GND	UP LOCK	-1	1.02	0.122
17:18:00	8208	172	276.3	9.9	2	2318		GND	AIR	GND	UP LOCK	-2	1.001	0.097
17:18:00	8216	173	276.9	6.9	0.3	2368		GND	AIR	GND	UP LOCK	-3	0.958	0.062
17:18:00	<b>8222</b>	<b>174</b>	<b>277.2</b>	<b>6.4</b>	<b>0.1</b>	<b>2408</b>		<b>AIR</b>	<b>AIR</b>	<b>AIR</b>	<b>DWN LOCK</b>	<b>-3</b>	<b>0.992</b>	<b>0.066</b>
17:18:00	8228	174	277.2	5.9	-0.3	2438		AIR	AIR	AIR	DWN LOCK	-2	1.022	0.068
17:18:00	<b>8232</b>	<b>176</b>	<b>279</b>	<b>5.4</b>	<b>9.4</b>	<b>2498</b>		<b>GND</b>	<b>AIR</b>	<b>GND</b>	<b>UP LOCK</b>	<b>-2</b>	<b>1.02</b>	<b>0.069</b>
17:18:00	8234	179	284.8	5.5	21.4	2598		GND	AIR	GND	UP LOCK	-2	1.085	0.095
17:18:00	8238	181	294.8	8.9	25.6	2588		GND	AIR	GND	UP LOCK	0	1.201	0.122
17:18:00	8248	184	304.7	9.6	25.2	2578		GND	AIR	GND	UP LOCK	-1	1.104	0.122
17:18:00	8260	187	314.2	11.5	19.4	2578		GND	AIR	GND	UP LOCK	1	1.126	0.138
17:18:00	8274	188	319.1	12.6	11.3	2638		GND	AIR	GND	UP LOCK	0	1.045	0.128
17:19:00	8288	190	322.4	11.3	6.9	2678		GND	AIR	GND	UP LOCK	0	0.933	0.13
17:19:00	8302	195	324.2	15.6	3.8	2748		GND	AIR	GND	UP LOCK	5	1.065	0.191
17:19:00	8318	197	325.3	21.7	1.3	2808		GND	AIR	GND	UP LOCK	8	1.099	0.214
17:19:00	8346	198	325.3	24	0.3	2858		GND	AIR	GND	UP LOCK	7	1.056	0.208
17:19:00	8370	195	325.8	22.4	-0.6	3007		GND	AIR	GND	UP LOCK	5	0.99	0.169
17:19:00	8388	192	325.4	10.8	0.4	3047		GND	AIR	GND	UP LOCK	-1	0.811	0.091
17:19:00	8392	192	325.8	5	-0.4	3137		GND	AIR	GND	UP LOCK	-2	0.915	0.046
17:19:00	8388	193	325.6	5	-1	3087		GND	AIR	GND	UP LOCK	-2	1.029	0.03
17:19:00	8386	192	325.3	4.5	-0.1	3057		GND	AIR	GND	UP LOCK	-3	1.013	0.021

TIME	PALT	CAS	HEAD	PITCH	ROLL	RALT	FLAP	SQAUTL	SQAUTN	SQAUTR	GRPOSL	AOA	ACVERT	ACLONG
17:27:00	8368	159	169	8.9	0.1	3097		GND	AIR	GND	UP LOCK	1	1.024	0.056
<b>17:27:00</b>	<b>8370</b>	<b>159</b>	<b>169.2</b>	<b>8.3</b>	<b>0.3</b>	<b>3137</b>		<b>AIR</b>	<b>AIR</b>	<b>AIR</b>	<b>DWN LOCK</b>	<b>1</b>	<b>1.008</b>	<b>0.068</b>
17:27:00	8370	159	169.2	8	-0.1	3137		AIR	AIR	AIR	DWN LOCK	1	1.001	0.07
17:27:00	8370	159	169.4	7.5	0.3	3157		AIR	AIR	AIR	DWN LOCK	1	1.001	0.068
17:27:00	8370	159	169.5	7.5	0.1	3157		AIR	AIR	AIR	DWN LOCK	1	1.013	0.062
17:27:00	8368	159	169.4	7.5	-0.1	3167		AIR	AIR	AIR	DWN LOCK	1	1.004	0.062
17:27:00	8368	159	169.9	7.6	3.8	3177		AIR	AIR	AIR	DWN LOCK	1	1.01	0.066
17:27:00	8368	159	174.8	8.2	19.2	3207		AIR	AIR	AIR	DWN LOCK	1	1.06	0.074
17:27:00	8368	160	186.4	8.2	27.2	3217		AIR	AIR	AIR	DWN LOCK	3	1.122	0.082
17:27:00	8364	159	196.8	8.2	21.5	3187		AIR	AIR	AIR	DWN LOCK	3	1.092	0.08
17:27:00	8364	159	203.8	8.7	14.1	3147		AIR	AIR	AIR	DWN LOCK	2	1.049	0.078
17:27:00	8364	159	208.2	8.5	7.1	3137		AIR	AIR	AIR	DWN LOCK	1	1.017	0.068
17:27:00	8366	160	209.7	8.2	2.9	3157		AIR	AIR	AIR	DWN LOCK	0	1.001	0.062
17:27:00	8366	160	210.4	7.6	0.8	3177		AIR	AIR	AIR	DWN LOCK	1	1.01	0.058
17:27:00	8368	159	210.4	7.5	-0.6	3227		AIR	AIR	AIR	DWN LOCK	0	0.995	0.058

TIME	PALT	CAS	HEAD	PITCH	ROLL	RALT	FLAP	SQAUTL	SQAUTN	SQAUTR	GRPOSL	AOA	ACVERT	ACLONG
	6716	106	211.2	8	0.3		33	AIR	AIR	AIR	DWN LOCK	4	1.038	-0.008
<b>19:16:00</b>	<b>6716</b>	<b>105</b>	<b>211.4</b>	<b>9.8</b>	<b>-0.4</b>	<b>4</b>		<b>AIR</b>	<b>AIR</b>	<b>AIR</b>	<b>DWN LOCK</b>	<b>6</b>	<b>1.063</b>	<b>0.005</b>
	<b>6716</b>	<b>103</b>	<b>211.6</b>	<b>10.1</b>	<b>0.8</b>		<b>33</b>	<b>GND</b>	<b>AIR</b>	<b>GND</b>	<b>DWN LOCK</b>	<b>6</b>	<b>1.188</b>	<b>0.003</b>
	6716	101	211.1	10.3	0.8	3		GND	AIR	GND	DWN LOCK	5	0.985	-0.001
	6716	100	210.5	9.4	0.1		33	AIR	AIR	AIR	DWN LOCK	5	0.983	0.001
19:16:00	6716	99	210.4	10.1	1	3		GND	AIR	GND	DWN LOCK	5	1.095	0.013
	6716	98	210.4	10.3	0.6		33	GND	AIR	GND	DWN LOCK	6	0.922	0.003
	6716	96	210.5	7.3	-0.3	3		GND	AIR	GND	DWN LOCK	5	1.122	0.005
	6718	95	210.4	8.9	1		33	GND	AIR	GND	DWN LOCK	3	1.013	-0.003
19:17:00	6716	94	210	8.9	0.8	3		GND	AIR	GND	DWN LOCK	5	0.99	-0.001
	6718	92	210	8	1.3		33	GND	AIR	GND	DWN LOCK	4	1.038	-0.007
	6718	91	210.2	8.9	1.1	3		GND	AIR	GND	DWN LOCK	4	1.101	0.009
	6718	91	210.7	8.7	1		33	GND	AIR	GND	DWN LOCK	5	1.029	0.011
19:17:00	6718	89	211.4	7.3	-0.1	3		GND	AIR	GND	DWN LOCK	5	0.933	-0.005
	6718	88	211.6	6.9	0.3		33	GND	AIR	GND	DWN LOCK	3	0.922	-0.007
	6718	87	211.2	8.5	0.1	3		GND	AIR	GND	DWN LOCK	3	1.004	0.003
	6718	86	210.9	8.2	0.1		33	GND	AIR	GND	DWN LOCK	5	0.97	0.017
19:17:00	6718	85	211.1	6.1	0.4	3		GND	AIR	GND	DWN LOCK	4	1.11	0.001
	6718	84	211.1	4.3	0.1		33	GND	AIR	GND	DWN LOCK	2	1.11	-0.015
	6718	84	211.4	4.3	-0.3	3		GND	AIR	GND	DWN LOCK	1	1.004	-0.011
	6718	83	211.6	4.8	-0.1		33	GND	AIR	GND	DWN LOCK	1	0.883	-0.009
19:17:00	6718	82	211.8	5.5	-0.1	3		GND	AIR	GND	DWN LOCK	1	0.983	-0.003
	6718	82	211.6	5.9	-0.3		33	GND	AIR	GND	DWN LOCK	2	1.104	0.009
	6718	81	211.2	5.5	0.1	3		GND	AIR	GND	DWN LOCK	2	0.995	-0.011
	6718	80	211.1	4.1	0.1		33	GND	AIR	GND	DWN LOCK	2	0.922	-0.011
19:17:00	6718	80	211.2	1.5	-0.3	3		GND	AIR	GND	DWN LOCK	0	0.985	-0.034
	6718	79	211.2	-2.9	0.1		33	GND	AIR	GND	DWN LOCK	-2	1.067	-0.066
	6720	79	211.1	-9.4	0.1	2		GND	AIR	GND	DWN LOCK	-5	1.049	-0.121
	6720	78	210.9	-9.8	0.1		33	GND	AIR	GND	DWN LOCK	-9	1.045	-0.14
19:17:00	6720	76	211.2	-10.3	0.1	2		GND	AIR	GND	DWN LOCK	-9	1.017	-0.249
	6722	73	211.6	-9.8	-0.6		33	GND	AIR	GND	DWN LOCK	-9	0.985	-0.347
	6722	68	210.9	-9.9	-0.1	2		GND	AIR	GND	DWN LOCK	-10	0.972	-0.414
	6722	62	210.7	-9.9	-0.4		33	GND	AIR	GND	DWN LOCK	-10	0.97	-0.465
19:17:00	6722	56	211.8	-10.1	-0.4	2		GND	AIR	GND	DWN LOCK	-10	0.958	-0.496
	6720	49	212.1	-10.3	-1.1		33	GND	AIR	GND	DWN LOCK	-10	0.981	-0.451
	6720	43	210.9	-10.3	-0.3	2		GND	AIR	GND	DWN LOCK	-10	0.974	-0.425
	6720	38	210.4	-10.3	-0.6		33	GND	AIR	GND	DWN LOCK	-11	1.001	-0.404
<b>19:17:00</b>	<b>6720</b>	<b>32</b>	<b>211.2</b>	<b>-10.5</b>	<b>-1</b>	<b>2</b>		<b>GND</b>	<b>AIR</b>	<b>GND</b>	<b>DWN LOCK</b>	<b>-10</b>	<b>0.988</b>	<b>-0.425</b>
	<b>6720</b>	<b>0</b>	<b>211.4</b>	<b>-10.5</b>	<b>-1.1</b>		<b>33</b>	<b>GND</b>	<b>AIR</b>	<b>GND</b>	<b>DWN LOCK</b>	<b>-10</b>	<b>0.995</b>	<b>-0.408</b>
	6720	0	211.1	-10.3	-0.8	2		GND	AIR	GND	DWN LOCK	-11	0.979	-0.404
	6720	0	210.9	-10.1	-1		33	GND	AIR	GND	DWN LOCK	-11	0.995	-0.423
19:17:00	6720	0	210.5	-10.3	-1	2		GND	AIR	GND	DWN LOCK	-11	0.997	-0.416
	6720	0	210.4	-10.3	-1		33	GND	AIR	GND	DWN LOCK	-10	0.99	-0.38
	6718	0	210	-10.3	-1	2		GND	AIR	GND	DWN LOCK	-11	0.997	-0.152
	6718	0	210	-10.3	-1		33	GND	AIR	GND	DWN LOCK	-11	1.029	-0.097
19:17:00	6718	0	210	-10.3	-1	2		GND	AIR	GND	DWN LOCK	46	1.013	-0.101
	6718	0	210	-10.3	-1		33	GND	AIR	GND	DWN LOCK	46	1.017	-0.099
	6718	0	210	-10.3	-1	2		GND	AIR	GND	DWN LOCK	46	1.015	-0.099
	6718	0	210	-10.3	-1		33	GND	AIR	GND	DWN LOCK	46	1.013	-0.099
19:17:00	6718	0	210	-10.3	-1	2		GND	AIR	GND	DWN LOCK	46	1.017	-0.099
	6718	0	210	-10.3	-1		33	GND	AIR	GND	DWN LOCK	46	1.013	-0.099
	6718	0	210	-10.3	-1	2		GND	AIR	GND	DWN LOCK	46	1.015	-0.099
	6718	0	210	-10.3	-1		33	GND	AIR	GND	DWN LOCK	46	1.013	-0.099

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