



# **AIRCRAFT ACCIDENT FINAL REPORT**

## **Landing Gear Failure**

**BAHAMASAIR HOLDINGS LIMITED  
DE-HAVILLAND DHC-8-301**

**C6-BFN  
S/N 159**

**Governor's Harbour, Eleuthera, Bahamas  
April 20, 2007**

**FSI# A0723266  
TCBC# A07F0061**



# Flight Standards Inspectorate Bahamas Department of Civil Aviation

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September 3, 2007

Mr. Cyril Saunders  
Director  
Civil Aviation Department  
Seaban House  
Crawford Street, Oakes Field  
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Bahamas

Sir

The attached report summarizes the investigation into the circumstances of the accident involving De-Havilland DHC-8-301 aircraft C6-BFN, registered to Bahamasair Holdings Limited. This accident occurred at Governor's Harbour International Airport, Governor's Harbour, Eleuthera, Bahamas on 20 April, 2007.

This report is submitted pursuant to Part XII, Regulation 80, and Schedule 19 of the Bahamas Civil Aviation (Safety) Regulation (CASR 2001) and in accordance with Annex 13 to the Convention on International Civil Aviation Organization (ICAO).

In accordance with Annex 13 to the Convention on International Civil Aviation (ICAO), and Schedule 19 of the Bahamas Civil Aviation (Safety) Regulations (CASR April 17, 2001), the fundamental purpose of such investigations is to determine the circumstances and causes of these events, with a view to the preservation of life and the avoidance of similar occurrences in the future. It is not the purpose of such investigations to apportion blame or liability.

This information is published to inform the aviation industry and the public of the circumstances surrounding this accident. The contents of this Report may be subjected to alterations or corrections if additional information becomes available.

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Delvin R. Major  
Investigator in Charge  
Flight Standards Inspectorate  
Department of Civil Aviation (Bahamas)



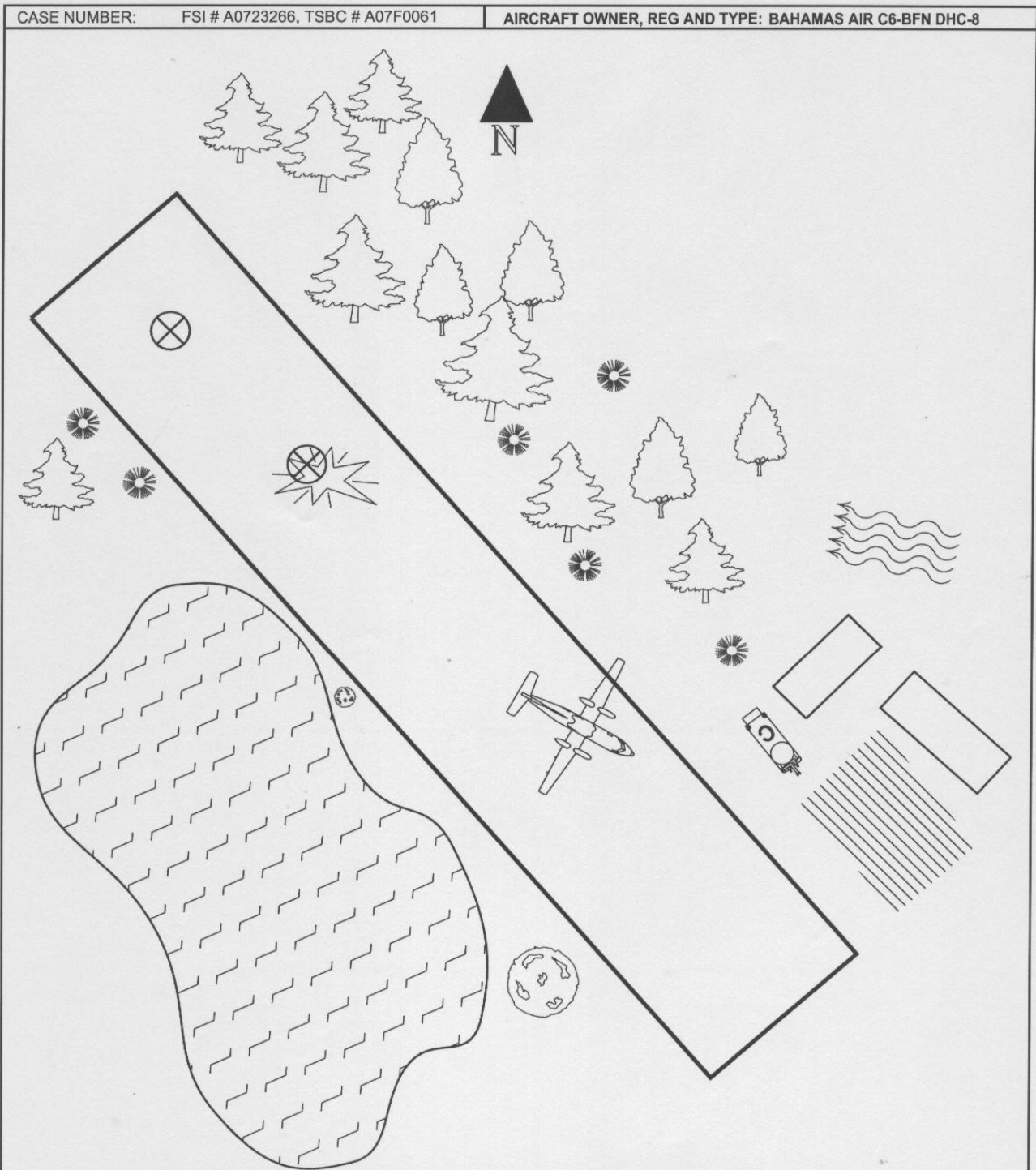
## Participants in the Investigation

|                        |  |  |
|------------------------|--|--|
| <b>Delvin R. Major</b> | <b>Flight Standards Inspectorate</b>         | <b>IIC</b>                                       |
| <b>Hubert Adderley</b> | <b>Flight Standards Inspectorate</b>         | <b>Airworthiness</b>                             |
| <b>Dion Demeritte</b>  | <b>Flight Standards Inspectorate</b>         | <b>Airworthiness</b>                             |
| <b>John Britten</b>    | <b>Transportation Safety Board of Canada</b> | <b>Accredited Representative</b>                 |
| <b>Robert Benzon</b>   | <b>National Transportation Safety Board</b>  | <b>Accredited Representative</b>                 |
| <b>Jeffrey Kennedy</b> | <b>National Transportation Safety Board</b>  |  |
| <b>Lothar Hopp</b>     | <b>TSBC –</b>                                | <b>Operations Officer</b>                        |
| <b>Peter Kramar</b>    | <b>TSBC –</b>                                | <b>Engineering Branch CVR and DFDR</b>           |
| <b>Ted Givins</b>      | <b>TSBC</b>                                  | <b>Manager Engineering Branch</b>                |
| <b>Dennis Pharoah</b>  | <b>TSBC -</b>                                | <b>Recorder Analyst</b>                          |
| <b>Jim Donnelly</b>    | <b>Bombardier Aerospace</b>                  | <b>Manager Air Safety</b>                        |
| <b>David Fisher</b>    | <b>Bombardier Aerospace</b>                  | <b>Senior Air Safety Investigator</b>            |
| <b>David De Vogel</b>  | <b>Bombardier Aerospace</b>                  | <b>In-service Engineering &amp; Tech Support</b> |
| <b>Eli Levy</b>        | <b>Bombardier Aerospace</b>                  | <b>Metallurgy &amp; Failure Analyst</b>          |
| <b>Tom Fischer</b>     | <b>Messier –Dowty</b>                        | <b>Product Support Manager</b>                   |
| <b>Rick Raininger</b>  | <b>Messier –Dowty</b>                        | <b>Metallurgist</b>                              |
| <b>John Close</b>      | <b>Messier –Dowty</b>                        | <b>Manager In-service Stress Engineering</b>     |
| <b>Brian Farrar</b>    | <b>Messier –Dowty</b>                        | <b>Senior Designer</b>                           |
| <b>Ronnie Archer</b>   | <b>Bahamasair</b>                            | <b>Manager Quality Assurance</b>                 |
| <b>Prince Storr</b>    | <b>Bahamasair</b>                            | <b>Manager of Maintenance</b>                    |
| <b>Winslow Moss</b>    | <b>Bahamasair</b>                            | <b>Superintendent Maintenance</b>                |
| <b>Alexio Rolle</b>    | <b>Bahamasair</b>                            | <b>Technical Representative</b>                  |





## CRASH SCENE DIAGRAM



### FLIGHT STANDARDS INSPECTORATE

|                                 |   |                                  |                                   |
|---------------------------------|---|----------------------------------|-----------------------------------|
| INVESTIGATOR: Delvin R. Major   | LOCATION: Governors Harbour Int'l Airport |                                  | COUNTRY: BAHAMAS                  |
| WEATHER: VFR                    | RUNWAY COND.: ASPHALT                     | DATE OF INCIDENT: APRIL 20, 2007 | TIME OF INCIDENT: 1708 EST 2208 Z |
| DRAWN BY: Delvin R. Major - IIC | REF. FILE: A0723266                       | DATE: May 2nd, 2007              | SCALE: Not Drawn to Scale         |





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FLIGHT STANDARDS INSPECTORATE  
BAHAMAS CIVIL AVIATION DEPARTMENT

AIRCRAFT ACCIDENT  
FINAL REPORT No. A0723266

De-Havilland DHC-8-301  
C6-BFN  
April 20, 2007

**SYNOPSIS**

**Operator:** Bahamasair Holdings Limited

**Manufacturer:** Boeing Canada, De Havilland Division

**Place of Accident:** Runway 15 at Governor's Harbour International Airport, Governor's Harbour, Eleuthera, Bahamas. Co-ordinates N 25° 16.922' W 76° 19.727'

**Investigating Authority:** Flight Standards Inspectorate

**Investigator in Charge:** Delvin R. Major

**Notification:** Transport Canada (State of Manufacturer / Design)  
Boeing Canada, De Havilland Division - (Aircraft Manufacturer)  
Hamilton Standard – (Propeller Manufacturer)  
Messier Dowty - (Gear Manufacturer)

**Party to Investigation:** Transport Canada (State of Manufacturer / Design)  
Boeing Canada, De Havilland Division (Aircraft Manufacturer)  
Messier Dowty (Gear Manufacturer)

**Releasing Authority:** Director - Bahamas Civil Aviation Department

**Date of Report:** September 3, 2007



## ABBREVIATIONS, TERMINOLOGY

|          |   |
|----------|---|
| AIS      | Automatic Information Services                                      |
| AMM      | Aircraft Maintenance Manual   |
| AMT      | Aviation Maintenance Technician                                     |
| ATS      | Air Traffic Services  |
| CASR     | Bahamas Civil Aviation (Safety) Regulations (April 17, 2001)        |
| C of A   | Certificate of Airworthiness  |
| C of R   | Certificate of Registration   |
| CG       | Center of Gravity   |
| CVR      | Cockpit Voice Recorder  |
| DCA      | Director of Civil Aviation  |
| DFDR     | Digital Flight Data Recorder  |
| DOO      | Director of Operations  |
| DRTL     | Disaster Response Team Leader                                       |
| DS       | Director of Safety  |
| CAD      | Civil Aviation Department   |
| EDT      | Eastern Daylight Time (-5 hours (-4DT) to convert from UTC)         |
| ERM      | Emergency Response Manual   |
| FAA      | Federal Aviation Administration                                     |
| FSI      | Flight Standards Inspectorate                                       |
| ICAO     | International Civil Aviation Organization                           |
| ILS      | Instrument Landing System   |
| IFR      | Instrument Flight Rules   |
| IMC      | Instrument Meteorological Condition                                 |
| LH       | Left Hand   |
| MLG      | Main Landing Gear   |
| MALSF    | Medium-intensity Approach Lighting System (with sequenced flashers) |
| MD       | Manager of Dispatch   |
| MCM      | Maintenance Control Manual  |
| MM       | Maintenance Manual  |
| MET      | Meteorological Office / Department                                  |
| MIRL     | Medium Intensity Runway Lights                                      |
| MM       | Maintenance Manual  |
| MYEM     | ICAO Airport Designation – Governors Harbour                        |
| NM or nm | Nautical Miles  |
| NTSB     | National Transportation Safety Board                                |
| RCA      | Root Cause Analysis   |
| RH       | Right Hand  |
| RII      | Required Inspection Item  |
| SEP      | Survival and Emergency Procedures Training                          |
| T/L      | Technical Log   |
| TSBC     | Transportation Safety Board of Canada                               |
| USA      | United States of America  |
| VFR      | Visual Flight Rules   |
| VOR      | (Very High Frequency) Omni-directional Range Station                |
| VMC      | Visual Meteorological Conditions                                    |
| UTC / Z  | Universal Coordinated Time / Zulu                                   |



**DEFINITIONS** When the following terms are used in this report, they have the following meanings as per CASR 2001 and ICAO Annex 13;

**“Aircraft Accident”**– means an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage or the aircraft is missing or completely inaccessible.

**"Fatal injury"** - means any injury which results in death within 30 days of the accident.

**“Flight recorder”** - Any type of recorder installed in the aircraft for the purpose of complementing accident/incident investigation.

**"Incident"** - means an occurrence other than an accident, associated with the operation of an aircraft, which affects or could affect the safety of operations.

**“Investigation”**- A process conducted for the purpose of accident prevention which includes the gathering and analysis of information, the drawing of conclusions, including the determination of causes and, when appropriate, the making of safety recommendations.

**“Response Time”** - Response time is considered to be the time between the initial call to the rescue and fire fighting service and the time when the first responding vehicle(s) is (are) in position to apply foam at a rate of at least 50 percent of the discharge rate specified in ICAO Annex 14 Chapter 9, Table 9-2. (Table 9-2 not included in this report however it can be found in Annex 14, Chapter 9).

**“Serious injury”** - means any injury which:

- Requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received;
- Results in a fracture of any bone (except simple fractures of fingers, toes, or nose);
- Causes severe hemorrhages, nerve, muscle, or tendon damage;
- Involves any internal organ; or
- Involves second or third degree burns, or any burns affecting more than 5 percent of the body surface.
- Involves verified exposure to infectious substances or injurious radiation.

**“Serious incident”** - An incident involving circumstances indicating that an accident nearly occurred.

**“State of Design”** - The State having jurisdiction over the organization responsible for the type design

**“State of Manufacture”** - The State having jurisdiction over the organization responsible for the final assembly of the aircraft.

**"Substantial damage"** - means damage or failure which adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component. Engine failure or damage limited to an engine if only one engine fails or is damaged, bent failings or cowling, dented skin, small punctured holes in the skin or fabric, ground damage to rotor or propeller blades, and damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wingtips are not considered "substantial damage" for the purpose of this Report.



## OVERVIEW

Bahamasair was notified of this accident by Captain Kendall Ingraham, pilot of C6-KEN who called Dispatch and advised that one of their aircrafts was disabled on the runway and smoke was observed coming from it. This was later confirmed by Captain Joel Stubbs captain of Bahamasair.

The Flight Standards Inspectorate was later notified by Bahamasair Holdings Limited that C6-BFN a Dash 8 was involved in an incident at Governor's Harbour International Airport. On April 20, 2007 about 1708 eastern daylight time (2208Z) a De-Havilland DHC-8, C6-BFN registered, owned and operated by Bahamasair Holdings Limited, Windsor Field, Nassau, Bahamas, was disabled on runway 15. Shortly after landing the left main gear failed. The shock strut (wheel assembly, piston and axle) departed the outer piston housing. This resulted in the aircraft dragging on its main strut and rear fuselage. The aircraft came to rest approximately 2000 feet beyond the touchdown point on runway 15.

The State of Manufacture, State of Design, and the Manufacturers of the Propeller, Engine and Landing Gear were notified of the accident on April 23, 2007. They were invited to participate in the investigation in accordance with Annex 13 and CASR 2001 Schedule 18.

Visual Meteorological Conditions prevailed at the time of the accident. The flight originated from Lynden Pindling International Airport, Nassau, Bahamas and terminated at Governor's Harbour International Airport, Governor's Harbour, Eleuthera, Bahamas.

The airplane sustained substantial damage. There were forty-eight (48) passengers, two (2) flight crew members and one (1) Cabin Attendant aboard the aircraft. The Pilot in Command holds a current Bahamas Civil Aviation Department (BCAD) Airline Transport Pilot rating and the First Officer holds a Current Bahamas Civil Aviation Department Commercial Pilot rating. No serious injuries or fatalities were reported.

## FACTUAL INFORMATION:

### 1.1 HISTORY OF THE FLIGHT

Flight number UP353 was a scheduled, commercial air transport flight operated by Bahamasair Holdings Limited. The flight originated from Lynden Pindling International Airport direct to Governor's Harbour International Airport, Governor's Harbour, Eleuthera, Bahamas.

The flight crew received a briefing from the dispatch center and a VFR flight plan was filed. The aircraft was in contact with Nassau Departure Control up to the point where they cancelled the flight plan and continued VFR into Governor's Harbour where communications were made on Unicom frequency 122.80 MHz.

The accident was located on Runway 15 at Governor's Harbour International Airport, Governor's Harbour, Eleuthera, Bahamas at co-ordinates - N 25° 16.922' W 76° 19.727'. The accident occurred during daylight time at approximately 17:08 local or 22:08Z. The cockpit voice recorder and the digital flight data recorder were recovered from the tail of the aircraft, prior to being transported to Transport Canada Safety Board for analysis and transcription. Transcription contained in appendices 26 and 27 respectively.





## **1.2 INJURIES TO PERSONS**

No fatal or serious injuries to occupants were reported up to the time of this report. However, minor injuries were reported by some passengers

## **1.3 DAMAGE TO AIRCRAFT**

The aircraft was substantially damaged. (See Aircraft Wreckage and Impact Information 1.12)

## **1.4 OTHER DAMAGE**

Other damages noted were to the runway. Gouges were made into the runway surface when the piston assembly [wheel assembly & axle assembly] separated from the piston housing. Gouges approximately 6 x 10 inches wide and 4 to 5 inches deep were noted in two locations on the runway surface along the ground track of the aircraft.

## **1.5 PERSONNEL INFORMATION**

### **1.5.1 Captain Brent Edwards**

At the time of the accident, the aircraft was under the command of Captain Brent Edwards. Captain Edwards was also the flying pilot. Captain Edwards, age 37 holds Bahamas Civil Aviation Airline Transport Pilot License number 323 with a Bahamian Dash 8 (DHC-8) Type Rating. Captain Edwards holds a First Class Medical, with no limitations, which was issued on April 17, 2007.

Captain Edwards's flight and duty time for the preceding 90 days, 7 days and 24 hours prior to the accident were 160 flight hours and 385 duty hours, 16.55 flight hours and 33:24 duty hours and 4:25 flight time and 9:1 duty hours respectively.

#### **Captain Edwards most recent training is as follows;**

1. Proficiency Check completed satisfactorily on March 16, 2007.
2. Last Line Check completed satisfactorily June 28, 2006.
3. Last Survival and Emergency Procedures Training (SEP) completed satisfactorily on May 5, 2006.

The accident occurred at the Governor's Harbour International Airport. Captain Edward met the experience requirements on this route as per BASR 2001 Schedule 14.160.

#### **Captain Edward's duty time and rest period prior to accident are as follows;**

He was on duty for 5:00 hours at the time of the accident and had completed two (2) sectors prior to Flight 353.

### **1.5.2 First Officer Jason Sweeting**

At the time of the accident First Officer Jason Sweeting was a required crewmember and the non flying pilot. First Officer Sweeting, age 29 holds Bahamas Civil Aviation Commercial Pilot License number CP548. First Officer Sweeting holds a First Class Medical, with no limitations which was issued on December 29, 2006.

First Officer Sweeting flight and duty time for the preceding 90 days, 7 days and 24 hours prior to the accident were 103 flight hours and 290 duty hours, 21:19 flight hours and 35:12 duty hours and 4:125 flight hours and 8:125 duty hours respectively.

#### **First Officer Sweeting most recent training is as follows;**

1. Proficiency Check completed satisfactorily on November 19, 2006.





2. Last Line Check completed satisfactorily June 14, 2006.
3. Last SEP Training completed satisfactorily on April 5, 2006.

The accident occurred at the Governor's Harbour International Airport. First Officer Sweeting met the experience requirements on this route as per BASR 2001 Schedule 14.160.

**First Officer Sweeting's duty time and rest period prior to accident are as follows;**

He was on duty for 5:00 hours at the time of the accident and had completed two (2) sectors prior to Flight 353.

### **1.5.3 Cabin Attendant Nedra Rodgers**

Ms. Nedra Rodgers was a required crewmember. She served in the position of Cabin Attendant.

Cabin Attendant Rodgers flight and duty time for the preceding 90 days, 7 days and 24 hours prior to the accident were 74 flight hours and duty 256 hours, 7:01 flight hours and 13:25 duty hours and 5:01 flight hours and 9:35 duty hours respectively.

**Cabin Attendant Rodgers most recent training is as follows;**

Ms. Rodgers last proficiency check was completed satisfactory on September 21, 2006. The accident occurred at the Governor's Harbour International Airport. Ms. Rodgers met the experience requirements on this route as per BASR 2001 Schedule 14.150.

**Cabin Attendant Rodgers' duty time and rest period prior to accident are as follows;**

She was on duty for 5:00 hours at the time of the accident and had completed two (2) sectors prior to Flight 353.

## **1.6 AIRCRAFT INFORMATION – GENERAL**

### **1.6.1 AIRWORTHINESS AND MAINTENANCE**

Dash-8 (DHC-8-301), serial number 159 was manufactured in July 1989 by DeHavilland Aviation Limited - Bombardier Aerospace. It was registered in the Bahamas and bore the registration number C6-BFN.

Bahamasair Holdings Limited is the registered owner of C6-BFN. It was registered on February 20, 1990. C6-BFN was issued its latest valid Certificate of Airworthiness on June 30, 2006.

#### ***Aircraft History***

C6-BFN has flown a total of 29,570.82 hours and 52,653 cycles since manufacture. Since last C-Check the aircraft has flown 3,296.77 hours and 5439 cycles. Since last L-Check C6-BFN has flown 23.25 hours and 47 Cycles. C6-BFN was maintained under Bahamasair's Approved Dash 8 Scheduled Maintenance Program. This program is based upon the Manufacturer's (De-Havilland) Maintenance Program.

#### ***Engines***

Both engines fitted to C6-BFN were Pratt and Whitney model number PW123. The recommended overhaul period for this model (PW123) is 12,000 hours.



- **Left engine** serial number PC-E123174 time since overhaul is 7,527 hours, cycles since overhaul is 12,663 and time since last inspected is 3,297.05 hrs.
- **Right engine** serial number PC-E123178 time since overhaul is 8,793 hours, cycles since overhaul is 15,185 and time since last inspected is 1,678.45 hrs.

### **Propellers**

Both propellers on C6-BFN were manufactured by Hamilton Sundstrand. The propellers were model number 14SF-23. The recommended overhaul period for this model (14SF-23) is 10,500 hours.

- The No. 1 Propeller serial number MFG910640 time since overhaul is 4,885 hours and time since last inspected [L-Check] 23.25 hours.
- The No. 2 Propeller serial number MFG910641 time since overhaul is 4,827 hours and time since last inspected [L-Check] 23.25 hours.

#### **1.6.2 PERFORMANCE**

The performance of the aircraft was not a factor in the accident. *Performance and Weight & Balance information attached as Appendix A-22.*

#### **1.6.3 FUEL**

The fuel was not a factor in the accident. C6-BFN Aircraft uses Jet A type Aviation Fuel.

### **1.7 METEOROLOGICAL INFORMATION**

The weather forecast for the Northwest Bahamas and area including Governor's Harbour was partly cloudy conditions with a slight chance of showers. An Automated Weather System (AWOS) was operating on frequency 118.20 to advise the crew of local weather.

The flight occurred during daylight. Landing was at 2115 UTC (1715 local – obtained from Aircraft Occurrence Report). The official sunset on April 20, 2007 was 19:35 local time.

### **1.8 AIDS TO NAVIGATION**

Aids for navigation were not a factor in this accident.

### **1.9 COMMUNICATIONS**

Post accident – Flight Recorders and pilots' statements indicated no communication was established between the aircraft and the airport or the Bahamasair Operations Office at the Governor's Harbour Int'l Airport.

### **1.10 AERODROME INFORMATION**

Governor's Harbour Int'l Airport ICAO identifier (MYEM) is located at 25°1704.94N and 076°1951.64W coordinates. Elevation measured at 26 feet. Magnetic Variation of 7°W. The airport is under the administration of the Bahamas Civil Aviation Department. The airport can be used for IFR as well as VFR traffic.

Aerodrome administration available Monday to Friday 1400 to 2200 local. ....AIS, Flight Service, Met Briefing and ATS are not available at the airport but can be received via Nassau AIS, FSS, MET and ATS respectively. There is Avgas and Jet A fuel available.

The runway physical characteristics include;



- Runway 15, magnetic bearing 151.77° and 8,024' x 150' asphalt, strength unknown. Threshold coordinates 25°1737.39N and 076°2016.85W and elevation of 13 feet.
- Runway 33, magnetic bearing 331.77° and 8,024' x 150' asphalt, strength unknown. Threshold coordinates 25°1632.47N and 076°1926.41W and elevation of 14 feet.
- Stopways Dimension 500' x 150' unpaved on Runways 15 and 33.

ATS communication facilities listed as Nassau Radio on frequency 118.45MHz and 128.0 MHz 24 hours when airborne.

MALSF and PAPI (3° 15' Nominal), white MIRL (200/61m spacing) and other apron edge and flood lights available.

*(Above aerodrome information obtained from Department of Civil Aviation – AIP, the Bahamas, and Amendment 01 / 2007).*

## 1.11 FLIGHT RECORDERS

### 1.11.1 Cockpit Voice Recorder

The aircraft was equipped with a Cockpit Voice Recorder Serial Number 53537, Model Number A100A and Part number 93-A100-80 manufactured by Fairchild dated 8 / 87. The recorder was housed in the tail section of the aircraft and was recovered in good condition. It appeared to have received no visible external damage from the impact. The CVR was transported to the Transport Canada Safety Board, Ottawa, Canada for analysis and transcription. *Transcription attached as appendix A-26.*

### 1.11.2 Digital Flight Data Recorder

The aircraft was equipped with a Digital Flight Data Recorder manufactured by Lockheed Aircraft Services Company. It is Model Number 209F, Part Number 10077A500. The Digital Flight Data Recorder was also housed in the tail section of the aircraft and appeared to have received no visible external impact damage. It was also transported to Transport Canada Safety Board, Ottawa, Canada for analysis, and transcription. *Data Plots attached as appendix A-27.*

## 1.12 WRECKAGE AND IMPACT INFORMATION

The accident aircraft and wreckage area were examined on April 21, 2007. All major components of the aircraft were accounted for at the scene.

The initial impact was located approximately 100 yards from the displaced threshold of runway 15. The aircraft came to rest on a heading of approximately 140 degrees.

The underside of the left wing tip, the left propeller, the bottom of the rear left engine nacelle and the bottom of the fuselage, bore the main impact. The fuselage remained intact. The cockpit and empennage were intact. The horizontal stabilizer and elevators had no visible impact or post impact damage. The vertical fin and rudder had no visible impact or post impact damage.

Both wings remained attached to the fuselage. Ailerons were attached with no visible impact or damage, flaps were extended to the take off position and there appeared to be no visible damage.



Both engines remained attached to the wing nacelles. The Left Engine sustained substantial damage due to sudden propeller stoppage. The left propeller was extensively damaged due to repeated contact with runway surface [each contact is considered a separate propeller sudden stoppage event] whilst the left engine was producing power. The right propeller was found in the feathered position and appeared to have sustained no damage.

The instrument panels were intact. The left fuel shut-off valve handle was pulled. The right fuel shut-off valve handle was in the normal position. Both windshields were undamaged. No life vests were found open within the aircraft. The passenger entrance door which is also an emergency exit, the right forward emergency exit door and the right under-wing emergency exit window were all found open. The Left under-wing emergency exit window was found closed. All seats remained secured in the seat tracks, were intact and in their original positions. An overhead panel approximately 8 feet in length was dislodged from its position and found resting on the top of seats number 7CD thru 11CD.

Both engine Power Levers were found in the Flight Idle Position and both Condition Levers were found in the "Fuel Off" position.

#### **1.13 MEDICAL AND PATHOLOGICAL INFORMATION**

Not a factor in this accident.

#### **1.14 FIRE**

There was no post impact fire.

#### **1.15 SURVIVAL ASPECTS**

The aerodrome is equipped with an Oshkosh 1500 gallon water (1000 gallon foam) fire rescue truck and a portable fire extinguisher.

#### **1.16 TESTS AND RESEARCH**

##### **1.16.1 Gear Inspection – Bombardier (*Appendix A-30*), Messier-Dowty (*A-30-1*)**

The LH MLG gear components were analyzed by Bombardier Aerospace Lab in Toronto Canada in the presence of the Flight Standards, Transport Canada, Messier Dowty and Bahamasair. Report is attached as *Appendix A-30*.

##### **1.16.2 Engine Inspection – Pratt and Whitney**

The engine was inspected at Governor's Harbour International Airport by Pratt & Whitney in the presence of the Flight Standards and Bahamasair. *Report is attached as Appendix A-25.*

##### **1.16.3 Cockpit Voice Recorder – CVR** was transcribed by Transport Canada Safety Board Laboratory in Ottawa, Canada in the presence of the Flight Standards Inspectorate. *Transcription attached as Appendix A-26.*

##### **1.16.4 Digital Flight Data Recorder – DFDR** data was plotted and analyzed by Transport Canada Safety Board Laboratory in Ottawa Canada in the presence of the Flight Standards Inspectorate. *Data plots available as Appendix A-27.*



**1.16.5 Aircraft Inspection and Structural Assessment** The airframe was inspected at Governor's Harbour International Airport by Bombardier in the presence of the Flight Standards Inspectorate and Bahamasair.

*A Structural Assessment report is attached as Appendix A-24.*

**1.17 ORGANIZATIONAL AND MANAGEMENT INFO**

- |   |                                 |
|---|---------------------------------|
| • Operator  | Bahamasair Holding Limited      |
| • Maintenance Organization [AMO Equivalent System]  | Bahamasair Holding Limited      |
| • Certification, Licensing and Regulatory Authority | CAD                             |
| • Organizational Structure and Functions            | (will be discussed in Analysis) |
| • Management Policies and Practices                 | (will be discussed in Analysis) |

**1.18 ADDITIONAL INFORMATION**

No additional information available at this time



## ANALYSIS:

### 2.1 GENERAL

- **Crew qualifications** – All required crew were qualified in accordance with Bahamas Civil Aviation (Safety) Regulations 2001. Both flight crewmembers had accomplished Proficiency Checks, Line Checks and SEP training as required by regulations. Flight and Cabin Crew rest period, flight and duty times were within limitations specified in Bahamasair's General Operations Manuals and Operations Specifications.
- **Weather** – Visual Meteorological Condition existed at the time and was not a factor in this accident.
- **ATC** – Air Traffic Control was not available at the Governor's Harbour Int'l Airport.
- **Aids to Navigation** – Aids to navigation was not a factor in the accident.

### 2.2 AIRCRAFT

- **Aircraft maintenance** – This Aircraft was maintained in accordance with Bahamasair's Approved Dash 8 Scheduled Maintenance Program. This program is based upon the Manufacturer's (De-Havilland) Maintenance Program.
  - "L" Check April 15, 2007 at 29,547.57 hrs and 52606 cycles.
  - A, 2A and 4A March 9, 2007 at 29,339.57 hrs and 52253 cycles.
  - A, 3A and 6A September 15, 2006 at 28520.28 hrs and 50901 cycles.
  - A and 5A January 3, 2006 at 27374.08 hrs and 49026 cycles.
  - C Check April 30, 2005 at 26274.05 hrs and 47214 cycles.
- **Aircraft Components** - Left engine propeller blades were twisted and severely damaged, which had been consistent with the engine producing power at impact. The right engine propeller sustained no damage.
  - The LH MLG was substantially damaged. The shock strut departed from the outer cylinder, resulting in the outer cylinder being severely damaged due to ground impact.
- **Aircraft performance** – Aircraft performance was not a factor in this accident. Completed load data and performance calculations attached as appendix A-22.
- **Mass and balance** – was not a factor in this accident. The aircraft was last weighed on November 25, 2004.
- **Aircraft Navigational Instrumentation** – Instrumentation was not a factor in the accident.
- **Aircraft Systems**
  - **Engines** – No visible damages were noted to the right engine. The Left Engine sustained substantial damage due to sudden propeller stoppage. Metal fragments which were later identified as internal components were recovered from the engine nacelle and runway. For further details see attached Pratt and Whitney Technical Report. (*Appendix A-25*)





- **Human factors** – There was no evidence that incapacitation or physiological factors affected the flight crew performance.
- **Psychological and physiological factors affecting personnel involved.** - There was no evidence that the crew suffered any sudden illness or incapacitation which might have affected their ability to control the aircraft.

## 2.3 SURVIVABILITY

### Crash and Rescue Services (Governor's Harbour Int'l Airport)

- Rescue Equipment– The fire truck located at the airport **was not operational;** however the portable fire extinguisher was present at the aircraft at the time of the accident.
- The Flight & Cabin Crew did not follow Bahamasair's Evacuation Procedures.
- The flight crew never gave the command to brace or evacuate the aircraft.
- The evacuation of aircraft C6-BFN was hindered due to passenger stopping to gather their belonging.
- Flight & Cabin crew instructions could not be heard and was ineffective during passenger egress from the aircraft. This resulted in delays of the evacuation process.
- **Analysis of injuries and fatalities** – There were no serious or fatal injuries reported by passengers or crew up to the time of this report. However, some passengers reported they suffered minor injuries while attempting to evacuate the aircraft.

## 2.4 AERODROME

- **Communication** – Not a factor in this accident.
- **Fencing** – currently at the International Airport at Governor's Harbour there is **barrier / fencing surrounding the terminal but it does not effectively prevent unauthorized encroachment around the airfield perimeter.**

## 2.5 MANAGEMENT CORPORATE CULTURE, PROCEDURES AND POLICIES

### 2.5.1 DISPATCH

- Dispatch Center failed to initiate emergency response procedures as required by Bahamasair Emergency Response Manual.
- Since mid March 2007 the Director of Operations and the Chief Pilot shared the duties of the Manager of Dispatch.
- Communications –
  - Communications could not be established, between the Bahamasair Dispatch Center in Nassau and the station at Governor's Harbour as reported by the PIC, following the accident as required by BASR Schedule 12.450(b)(c).*(See Appendix A-16)*
- **Emergency Response Manual**
  - Bahamasair Dispatch failed to initiate the Planned Emergency Response as per the Emergency Response Manual.
  - Bahamasair Revision policy for its ERM does not allow the author of the revision (Director of Safety) to have positive verification of receipt once a revision has been accomplished.



**Note.**

1. Once a revision has been issued the reminder notice only instructs the recipient to sign and return the notice to the Director of Training. However, this does not serve as confirmation that the manual has been revised.
  2. There is no procedure that instructs the Director of Training to advise the Director of Safety of receipts of the revisions.
- Bahamasair Dispatch Center failed to make available the most current revision of the ERM to the Dispatchers on Duty at the time of the accident.

**Note.**

The Manager of Dispatch [Director of Operations] produced his assigned copy of the ERM on April 23, 2007, which; was at revision 1, when the current revision was Revision 3.

- **DISPATCH PROCEDURES**

- Dispatch personnel failed to retrieve ERM. (*See Dispatch Statement A-36*)
- Dispatch personnel on duty failed to complete documentation required as per ERM.
- The Accident Notification Checklist and Emergency Incident Activity Log (UPF 701 and 702) were not completed as required by the ERM.
  - *ERM Revision 3, December 30 2005, Chapter 8, Emergency and Accident Reporting Requirements, page 8.1.1 states – “whenever a dispatcher exercises emergency authority, he / she shall submit a dispatcher irregularity report with a complete account of the emergency to the Director of Operations within 24 hours after the date of the emergency.”*
- UPF 701 and 702 were not submitted to the Director of Operations as required in the ERM. *Copies of the required forms (UPF 701 and 702) were submitted on April 30, 2007, 10 days after the accident. The forms were back dated to show April 20, 2007). (See Appendix 17 and 18.*
- Duties as outlined in ERM Revision 3 dated December 30, 2005, Chapter 5, Page 5.1.5 were not followed by Dispatch in that;
  - (a) the call list was not initiated
  - (d) communication could not be established with the aircraft
  - (i) flight crew records and all computer records related to the flight were not frozen
  - (k) the dispatch center failed to collect documents and maintain communication records as appropriate.

## **2.5.2 SAFETY DEPARTMENT**

- On the date and time of the accident, the Director of Operations assumed the responsibilities of the Operations, Safety and Dispatch Departments.
- As the ERM falls under the responsibility of the Safety Department, the role of the safety department was reviewed and the following noted: -
  - The Safety Department could not produce any copies of the reminder notices and had no idea where they could be located to verify that all manual holders were at the latest revision. However, the reminder notice instructs the recipient to return to the Training Department.
  - The Safety Department could not verify that all manual holders were issued revision 3.
  - The Emergency Response Team Leader, (ERM Rev 3, December 30, 2005, Chapter 5, Page 5.1.7) failed to ensure dispatch initiate the appropriate call list.



## **2.6 INTERVIEWS**

- 1. MANAGER OF THE AERODROME**  
(See Managers Statement Appendix A-35)
- 2. FIREMAN – On Duty**  
(See Fireman’s Statement Appendix A-11)
- 3. FIREMAN – Off Duty**  
(See Fireman’s Statement Appendix A-12.
- 4. AIR TRAFFIC CONTROLLER**  
(See Controller’s statement Appendix A-13)

**PASSENGER STATEMENTS** – \*All passenger statements that were gathered by the Investigation Team can be found in the Appendices.



## CONCLUSIONS:

### 3.0 Probable Cause

**Probable Cause has been determined as an over-center Torque Link condition that culminated in a single cycle failure of the cylinder.** The over center torque links condition occur as a result of the over extension of the shock strut.

**Possible Contributory factors to the over extension of the shock strut includes:**

#### Possible Cause for Loss of Damping

- The failure to install the dampening ring when the landing gear was assembled.
- Improper servicing of the landing gear shock strut with Mil-H-5606 hydraulic fluid plus nitrogen during initial assembly.
- Improper servicing of landing gear shock strut during line maintenance and inadequate post servicing follow up per AMM Chapter 12. See attached report *Appendix A-30 From Bombardier*
- Under-serviced shock strut (low oil volume)
- A broken damper ring
- No damper ring
- Disengaged damper ring See attached report *Appendix A-30-1 Messier Dowty (Manufacturer of Gear)*

### 3.1 AERODROME

- Aerodrome is approved for IFR/VFR flights as per Bahamas AIP; however, at the time of the accident there was no IFR approaches available.
- Runway does not have fencing / barrier as required by Annex 14. However the area surrounding the terminal is fenced.
- Aerodrome is equipped with Oshkosh 1500 gallon water (1000 gallon foam) fire rescue truck which was not operational; however, a portable fire extinguisher was available and present at the aircraft at the time of the accident.
- Bahamasair Governor's Harbour Operations could not communicate with their aircraft at the time of the accident.

### 3.2 AIRCRAFT

- The aircraft was maintained under Bahamasair's Approved Dash 8 Scheduled Maintenance Program. This program is based upon the Manufacturer's (De-Havilland) Maintenance Program.
- The aircraft had a current valid Certificate of Airworthiness.
- Bahamasair release the aircraft serviceable for the flight.
- There were no reports of airframe failure or flight control system malfunction prior to the accident.
- All control surfaces were accounted for, and damage to the aircraft was attributable to the failure of the accident [LH MLG assembly failure].

### 3.3 FLIGHT CREW

- The flight crew was properly licensed and qualified for the flight in accordance with Bahamas Civil Aviation (Safety) Regulations and Bahamas General Operations Manual.
- The flight crew held current medical certificate and their flight and duty time records were in compliance with CASR 2001.



- The Cabin Attendant was properly trained and qualified for the flight in accordance with Bahamas Civil Aviation (Safety) Regulations and Bahamasair General Operations Manual.

### 3.4 FLIGHT OPERATIONS

The crew's actions following the accident did not conform to Bahamasair Emergency Procedures outlined in the Dash 8 Operations Manual, Non Normal Checklist, Revision 10 dated June 27, 2006 **Engine Fire on Ground or Passenger Evacuation Checklist** (Appendix A-10) which specifically required:-

- **The Captain to give the evacuation order.**  
The command for the evacuation was to be broadcast using the PA system.
- **The First Officer to complete his required checks as required by the On Ground Emergency and Passenger Evacuation Checklist.**  
Turning "On" the Emergency Lights is called for as apart of the required checks.
- **The First Officer requested to be relieved of his duty to assist with the evacuation. The Captain agreed with the First Officer and relieved him of his cockpit duties to assist.**  
It is not clearly whether the checklist [both pilots] was completed; however, the emergency light system was not "turned on" as required by the checklist.
- **The flight crew duties during the evacuation were not conducted in accordance with the procedures in the company Operations Manual.**

### 3.5 Operations Department

- The Director of Operations assumed the role of the Director of Safety.
- Bahamasair does not have a written procedure for the handover of responsibilities/authority of required management positions [BASR].
- Failed to initiate Emergency Response Plan as outlined in the ERM.
- Failed to ensure proper documentation was completed as per the ERM.
- Failed to ensure dispatch secure records and documents as per the ERM.
- Was not able to locate the assigned copy of the ERM.
- Not familiar with the revision policies of manuals under his control.

#### 3.5.1 Safety Department

- Safety Department is manned by one (1) person. [A pilot]
- Has no follow-up for revision policies of manuals under his control.
- Not adhering to procedures as it relates to revision notification for the ERM.
- Fail to ensure that all manual holders were in possession of the current revision of the ERM.
- As Disaster Response Team Leader, he failed to ensure dispatchers carry out assigned duties.
- Disaster Response Team was never activated. Bahamasair management was not aware as to who was the Lead person or the prescribed members of the Disaster Response Team.

#### 3.5.2 Dispatch

- Dispatch failed to initiate emergency response procedures as required by Bahamasair Emergency Response Manual.



- The call list contained in the ERM was not initiated.
- Communication could not be established with the aircraft.
- Dispatch failed to ensure flight crew records, communication and all related computer records / documents related to the flight were frozen (lock down) as required by ERM and BASR 2001.
- Dispatch used forms (from the ERM) from a revision that is no longer current.

### 3.6 MAINTENANCE PERSONNEL –

Numerous queries and inconsistencies arise with the training records of the individual conducting the replacement of the landing gear in question (*see appendix A-34*).

### 3.7 MAINTENANCE PROCEDURES

A review of the aircraft records (T/L page 68211) revealed that the LH shock strut outer cylinder part number 10115-503, s/n DCLA1196 was replaced by Bahamasair personnel on May 19, 2006 as per MM 32.10.06.

The unit that was installed was new. The shock strut piston assembly, p/n 10105-501, s/n 0513WH, was removed from the outer cylinder that was being replaced and installed in the new outer cylinder.

**The maintenance entry on T/L page 68211 makes no reference to the piston being removed and installed in the new outer cylinder.** There were no Non Routine Work cards or Work Continuation sheets made up detailing the work that was being carried out at that time.

**The MM reference 32-10-06 used for the replacement of the shock strut is not correct.**

**The removal and replacement of the shock strut from the aircraft (MM 32-10-11) and the removal and replacement of the piston assembly from the shock strut (CMM 32-10-06).**

**Task card 3210/15 called for the MLG Shock strut to be serviced.** This was accomplished on May 19, 2006 at the time of the shock strut change as per Task Card 3210/15. **However, the maintenance entry on T/L page 68211 makes no reference to the shock strut being serviced or retractions checks being carried out.** The DHC8 MM 32-10-11 calls for the shock strut to be serviced and for retraction checks to be carried out.

- There is no evidence to show Bahamasair, in the replacement of the MLG shock strut and changing the piston assembly from the old strut to the new one, followed the proper procedures and used the correct maintenance manual reference for the work that was carried out.
- There was no evidence to show Quality Control (QC) involvement in this work process.
- There was no evidence to indicate the Required Inspection was complied with for the MLG change and the piston replacement. Note: The MCM was revised shortly after the MLG replacement to require a RII after a landing gear change.
- There was no evidence to suggest the MLG was tested and functioned checked as required by the Messier-Dowty Component Maintenance Manual 32-10-06 page 713 and De-Havilland Dash 8 Maintenance Manual 32-10-11 page 205. The Technical log entry makes no reference to such function checks.
- There was no evidence to suggest Bahamasair ensured a proper maintenance release to service was accomplished. The technical log entry does not reflect a properly reference for the actual work carried out on the aircraft as required by Bahamasair MCM 05-01-03 Para D (a).





### **Airworthiness Directive CF-2006-14**

Transport Canada had issued an Airworthiness Directive CF-2006-14 - Main Landing Gear Shock Strut Over-Extension. The AD issue date was June 14, 2006. Part B and C are applicable to the DHC Dash8 301.

Part B calls for the changed of MLG shock strut servicing task 3210/15. This reduces the servicing task form 7000 cycles to 5000 cycles or every C check.

Part 'C' of the AD calls for the Upper Bearings P/N 10130-3 and P/N10130-551; and the Damper ring P/N 10129-3 and P/N 10129-551 to be replaced with an Upper bearings P/N 10-130-5 and Damper Ring P/N 10129-5 and 10129-553 whenever the gear is repaired or overhauled.

At the time of the LH MLG change on C6-BFN, Transport Canada AD CF-2006-14 dated June 14, 2006 was not yet issued. However, Service Bulletin 8-32-144 Revision A, dated April 29, 2002 had been issued by Bombardier.

*See All Operator Message Number 794 and 814 issued by Bombardier Subject Main Landing Gear Shock Strut Over Extension.*

*See also AD CF-2006-14 in Appendices.*

### **3.8 COMMUNICATION SERVICES**

- Bahamasair Dispatch could not established communications with the Station and the aircraft at Governors Harbour International Airport.

### **3.9 RESCUE SERVICES (AMBULANCE / FIRE RESCUE)**

- Fire truck was available at the airport at the time of the accident, it however was not operational. There was a portable fire extinguisher available at the accident site.
- The ambulance never made it to the airfield.
- Rescuers in vehicles breached the airport perimeter and drove onto the runway service road.
- The crew was unable to determine passenger count as required, because rescuers were intermingled with passengers and taxis were transporting persons from the aircraft to the terminal.

### **3.10 COCKPIT VOICE RECORDER / FLIGHT DATA RECORDER**

- Both Cockpit Voice Recorder and Digital Flight Data Recorder were located in the tail section of the aircraft.
- The recorders did not sustain any visible external damage from the impact.
- Both recorders were sent to the Transport Canada Safety Board Laboratory in Ottawa Canada for analysis and transcription. *Reports and transcriptions contained in appendix A-26 and A-27.*

### **3.11 EVACUATION PROCEDURES**

- Evacuation was conducted by crew of aircraft after the accident.
- Evacuation commenced without the authority of the Pilot in Command.
- The Pilot in Command was never consulted prior to the initiation of the evacuation by the Cabin Attendant.



### **3.12 MEDICAL**

- There was no evidence that the pilots suffered any sudden illness or incapacity, which might have affected his ability to control the aircraft.
- There was no evidence that incapacitation or physiological factors affected the flight crew performance.



## SAFETY RECOMMENDATIONS:

### 4.0 SAFETY ALERTS

Safety Alert 001 was issued on May 14, 2007 to Bahamasair Holdings Limited reference Servicing of Landing Gear. *See Appendix A-30.*

Safety Alert 002 was issued on June 4, 2007 to all operators of Dash 8 – 300 Series Aircrafts references to Additional Cabin Attendants, *See Appendix A-31.*

Safety Alert 003 was issued on June 13, 2007 to Bahamasair reference the Training Record and signing authority of the Mechanic who completed and released C6-BFN after the Gear Changed.

### 4.1 AERODROME

- a) **Recommend that additional measures be taken to prevent unauthorized encroachment onto Governor's Harbour International Airport, Governor's Harbour, Eleuthera.**

### 4.2 CREW

- a) Recommend that Bahamasair establishes a schedule that allows both Flight Deck and Cabin crews to participate in simultaneous evacuation drills and flight crew incapacitation scenarios.
- b) Recommend that CAA review Bahamasair's Dash 8 cabin accompaniment
  - i. Recommend Bahamasair reassess emergency evacuation procedures and training on Dash 8 [crew compliment & crew resource management – cockpit and cabin crew]
- c) Bahamasair shall revise its training program to include joint exercises for unplanned emergencies and crew resource management – cockpit & cabin crews coordination.
- d) Bahamasair shall ensure cabin bull horns are accessible to the cabin attendant at their assisted position during an emergency.
- e) Bahamasair must enhance its Crew Resource Management training

### 4.3 FLIGHT OPERATIONS

- a) Bahamasair **must** ensure that a dedicated dispatch manager is made available immediately; the Carriers present arrangement is not acceptable to the Flight Standards Inspectorate and our findings show that there is no policy and procedure to ensure at all times there is an assigned member of the management team who has authority and is accountable for dispatch and the safety department.
- b) Bahamasair **MUST** ensure that all levels of management and line personnel follows procedures and policies outline in its respective manuals during all levels of operations especially during an emergency or other periods of critical operations.
  - o **ICAO Annex 6, Part 1, Eight Edition, July 2001, Chapter 4 Paragraph 4.6.1 (d) states** – “in the event of an emergency, the flight dispatcher / flight operations officer, shall initiate such procedures as may be outlined in the operations manual.”
- c) Bahamasair **must** ensure sharing of information between operations and maintenance (Lean strategies).



- The Airline must establish **Quality Initiatives** (setting up critical variables to monitor and adjust quality circles and teams) Reliability improvements (reliability-centered maintenance, predictive maintenance, and improved use of maintenance resources)

#### 4.4 CORPORATE CULTURE

- a) Recommend that Bahamasair Holdings Limited initiates a **Safety Management System (SMS)** Program.
- b) Recommend that Bahamasair initiate a **Root Cause Analysis (RCA)\*** process to identify the underlying management systems that caused this event to occur or made the consequences of this event more severe.
- c) Recommend that Bahamasair Emergency Response Manual be amended to clearly **identify the leaders** and members of the Disaster Response Team and the role that each must play. (organizational chart and role responsibilities)
- d) Recommend the safety department be revamped to include input from all areas of the company affecting safety.
- e) Recommend that Bahamasair revise its Cabin Attendant proficiency checks form to indicate clearly successful and unsuccessful results.

#### 4.5 MAINTENANCE PERSONNEL

- a) Recommend that Bahamasair audit and review its company authorization process for consistency with its actual day to day practices and make the necessary changes accordingly.
- b) Recommend that Bahamasair carry out an in depth audit and review of all AMT training records to ensure that the records reflect the current status of the applicable AMT. Copies of all licenses, training certificates, approvals, authorizations and the basis for such authorizations should be on the AMT file.
- c) Recommend that Bahamasair ensures that forecasted training needs are satisfied for all AMT and other maintenance related personnel.

#### 4.6 MAINTENANCE PROCEDURES

- a) Recommend that Bahamasair carryout a detailed training by a qualified person to its AMT's on its Maintenance Control Manual and in the proper use of the manufacturer maintenance manual to ensure that proper MM references are utilized in maintenance release of aircraft to service.
- b) Recommend that Bahamasair amend its Quality Control procedures to ensure that QC Inspectors are involved in the release to service of any aircraft from detailed non-routine maintenance activities.
- c) Recommend that the Quality Assurance Department increase its surveillance of company aircraft while in service and during maintenance (schedule and non-routine) and to focus not only on the aircraft condition but also on the paperwork, maintenance procedures and personnel.



- d) Recommend that Bahamasair amend its maintenance procedures to require Non routine work cards (NRWC) and continuation work sheet to be generated when detailed work processes that require multiple steps are being carried out with references made to the applicable Manufacturer maintenance manual.

#### **4.7 EVACUATION PROCEDURES**

- a) Recommend that the Mega Phone be relocated from its present position and place in an area accessible to the Cabin Attendant even while seated.
- b) Recommend that Cabin Attendant Training emphasizes the need for the Cabin Attendant to seek authorization from the flight deck prior to initiating evacuation, unless flight deck crew is confirmed to be incapacitated.

#### **4.8 COMMUNICATION PROCEDURES**

- a) Recommend that Bahamasair re-evaluate all of its out stations to confirm there are communication capabilities.
- b) Recommend that Flight Standards establish an enhanced oversight program that includes station evaluation of all stations that are in use by Bahamasair not just a few that were previously sampled.

#### **4.9 OTHER**

- a) Recommend that the Bahamas Civil Aviation Department conduct an audit of the Governors Harbour Airport in light of perimeter breach.
- b) Recommend that the Flight Standards Inspectorate move to realign the certificate management duties of Bahamasair to include a Principal Operations Inspector (POI) and a Certificate Manager (CM) each with differing duties that encompasses the total certificate management of Bahamasair.



## APPENDICES

- A-01 Captain Written Statement
- A-02 First Officer Written Statement
- A-03 Flight Attendant Written Statement
- A-04 Aircraft Occurrence Report
- A-05 Witness Statement Edward Isaacs
- A-06 Witness Statement Ian Samuel Williams
- A-07 Witness Statement Margaret Isaacs
- A-08 Witness Statement Mary Julia Isaacs Pierre
- A-09 Witness Statement Sidney Isaacs
- A-10 Non-Normal Checklist – On Ground Emergencies
- A-11 Fireman Statement Jeffrey Pinder
- A-12 Fireman Statement Edmund Bethel
- A-13 A.T.C Statement Granville Bethel
- A-14 Main Landing Gear Shock Strut #1
- A-15 Main Landing Gear Shock Strut #2
- A-16 BASR Schedule 12.450
- A-17 Form UPF – 707 Confirmed Aircraft Accident/Incident Notification Checklist
- A-18 Form UPF – 701 Emergency Incident Activity Log
- A-19 Witness Statement Shayne M. Sweeting
- A-20 Witness Statement Bridgette Barrett
- A-21 Aerodrome Information – Governors Harbour, Eleuthera, Bahamas
- A-22 Load and Balance and Performance Data
- A-23 Coordinates and Distance of Aircraft Accident and Parts Recovered
- A-24 Bombardier Structural Damage Analysis
- A-25 Engine Inspection Analysis
- A-26 Cockpit Voice Recorder Transcription
- A-27 Flight Data Recorder Plots
- A-28 Seating Arrangement DHC-8
- A-29 Safety Alert 001
- A-30 Gear Inspection Analysis
- A-31 Passenger Seating Location
- A-32 Safety Alert 002
- A-33 Safety Alert 003
- A-34 Maintenance Personnel Record Inspection (Mr. Winslow Moss)
- A-35 Airport Manager's Statement – Cynthia Johnson
- A-36 Dispatcher on Duty's Statement – Darcy Darville

**NOTE:** The complete list of appendices above have not been included with this report. They are however, available should the appropriate authority for the administration of justice, determines that their disclosure outweighs the adverse domestic and international impact such action may have on that or any future investigation.

