

# **AIRCRAFT ACCIDENT REPORT**

## **FINAL REPORT**

**Western Air Limited  
Fairchild Aircraft (SA-227)  
C6-REX  
Nassau New Providence Bahamas  
May 6, 2005**

**Report A0516317**





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**WESTERN AIR LIMITED**

**FAIRCHILD AIRCRAFT (SA-227)  
C6-REX**

**Nassau New Providence, Bahamas  
May 6, 2005**



# Flight Standards Inspectorate Bahamas Department of Civil Aviation

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Mrs. Glennys Hanna-Martin  
Minister of Transportation

Mr. Cyril Saunders  
Director of Civil Aviation

Captain Patrick Rolle  
Manager of Flight Standards Inspectorate

The attached report summarizes an investigation made into the circumstances of an accident involving Fairchild Aircraft (SA-227), registration C6-REX that had an accident in Andros and subsequently at Nassau Int'l Airport on May 6, 2005. In that accident, aircraft had a gear collapse and propeller strike in Andros, became airborne again and had a gear collapse in Nassau.

This report is submitted pursuant to Schedule 19.001(a) of the Bahamas Aviation Safety Regulation (BASR 2001) and in accordance with Annex 13 to the Convention on International Civil Aviation (ICAO).

Philip Romer  
Aviation Safety Inspector  
Investigator in Charge  
Flight Standards Inspectorate  
Department of Civil Aviation (Bahamas)

June 28, 2005

**APPROVED FOR RELEASE AS A PUBLIC DOCUMENT**

*In accordance with Annex 13 to the Convention on International Civil Aviation (ICAO), and Schedule 19 of the Bahamas Aviation Safety Regulations (BASR April 17, 2001) it is not the purpose of aircraft accident investigation to apportion blame or liability. The sole objective of the investigation and the Final Report is the prevention of accidents and incidents.*







**Section 1****Abbreviations and Terminology used in this report.**

ADDS	Aviation Digital Data Service - Report furnished by Meteorological Department
BASR	Bahamas Aviation Safety Regulations (April 17, 2001)
BDCA	Bahamas Department of Civil Aviation
C of A	Certificate of Airworthiness
C of R	Certificate of Registration
CAD	Civil Aviation Department
CFR	Code of Federal Regulations
CG	Center of Gravity
DCA	Director of Civil Aviation
EDT	Eastern Daylight Time (+5 hours to convert to UTC or Zulu time)
FAA	Federal Aviation Administration
FSI	Flight Standards Inspectorate
ICAO	International Civil Aviation Organization
IFO	International Field Office (FAA)
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Condition
MEL	Minimum Equipment List
METAR	Meteorological Aerodrome Report
NM or nm	Nautical Miles
NTSB	National Transportation Safety Board
USA	United States of America
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
Zulu or UTC	Universal Coordinated Time also termed Zulu time or Z



FLIGHT STANDARDS INSPECTORATE  
CIVIL AVIATION DEPARTMENT  
(Bahamas)

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**REPORT No. A0516317  
WESTERN AIR LIMITED  
FAIRCHILD AIRCRAFT (SA-227)  
C6-REX**

**Nassau New Providence, Bahamas  
May 6, 2005**

**A. BASIC INFORMATION**

**Operator:** Western Air Limited

**Manufacturer:** Fairchild Aircraft

**Model:** SA-227

**Registration:** C6-REX (Bahamian)

**Place of Accident:** San Andros and Nassau Bahamas

**Date of Accident:** May 6, 2005

**Investigating Authority:** Flight Standards Inspectorate

**Investigator in Charge:** **Philip Romer**

**Notification:** Director of Civil Aviation

**Releasing Authority:** Flight Standards Inspectorate

**Date or Final Report:** **June 28, 2005**

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



## **B. SYNOPSIS:**

The occurrence of this accident was notified to the Flight Standards Inspectorate by the Nassau Control Tower. On May 6, 2005, at approximately 1900 hours a Metroliner SA-227, twin engine, turboprop airplane, C6-REX, owned and operated by Western Air Limited on a commercial flight from Nassau to San Andros developed technical problems upon landing in San Andros. The aircraft touched down, left main gear collapsed, propeller struck the runway surface and the pilots were able to takeoff again and flew the aircraft back to Nassau Int'l Airport where the accident occurred.

There were 19 passengers and 2 crew members on board. There were no reported injuries to passengers or crew. The aircraft sustained damages to the left main landing gear, propeller and wingtip. In addition, both wheel assemblies on the right main landing gear were also damaged.

The Pilot in Command held an Airline Transport Pilot License with an SA-227 type rating and the First Officer held an Airline Transport License with an SA-227 second in command rating. Both crews were certificated by the Republic of Argentina and their licenses were validated by the Bahamas Civil Aviation Department. No serious injuries or fatalities were reported.

The weather conditions in the vicinity of The Nassau International Airport between 1700 UTC and 2300 UTC 6<sup>th</sup> May, 2005 had winds at 280 degrees at 9 knots, temperature at 32 degrees Celsius with a dew point at 18 degree Celsius and a barometric pressure at 29.98 inches of mercury. The official sunset was at 7:43pm.

## **FACTUAL INFORMATION:**

### **1. History of the Flight**

<b>Flight Number</b>	503
<b>Type of Operator</b>	<b>Basic Air Taxi</b>
<b>Type of Operation</b>	<b>Commercial Air Transport</b>
<b>Crew Briefing</b>	<b>Unknown</b>
<b>Flight Planning</b>	<b>Unknown</b>
<b>Destination</b>	<b>San Andros, Bahamas</b>
<b>Flight Path</b>	Nassau to San Andros to Nassau
<b>Radio Communications</b>	ATC
<b>ATC Report</b>	On file
<b>CVR Report</b>	Not Applicable
<b>Witness Statement</b>	Crew statement on file
<b>Location of Accident</b>	Nassau International Airport
<b>Time of occurrence</b>	<b>Evening</b>
<b>Time of Day</b>	<b>7:47 pm (2347Z)</b>

**2. Injuries to persons**                      **None**

### **3. Damage to aircraft**

Left gear, propeller, wingtip, and right wheel assembly and tires.



**1.4 Other Damage -** No other damage other than listed above were reported.

## **1.5 PERSONNEL INFORMATION**

### **1.5.1 The Captain**

The captain aged 33 years old held an Airline Transport Pilot License with an SA-227 type rating. The captain was certificated by the Republic of Argentina and his license was validated by the Bahamas Civil Aviation Department.

The captain's most recent first class medical was issued February 16, 2005 with no limitations. His most recent proficiency check was satisfactorily completed on February 14, 2005. Pilot had accumulated a total of 7,479 hours up to the time his resume was last updated.

The total hours flown in the period 90 days, 7 days and 24 hours preceding the accident was not able to be determined as records submitted did not contain flight and duty sheet for the month of May.

### **1.5.2 First Officer**

The first officer aged 42 year old held an Airline Transport Pilot License with an SA-227 second in command designation on his ATP license. The captain was certificated by the Republic of Argentina and his license was validated by the Bahamas Civil Aviation Department.

The first officer's most recent first class medical was issued May 3, 2005 with no limitations. His most recent proficiency check was satisfactorily completed on December 14, 2004. Pilot had accumulated a total of 2,201 hours up to the time his resume was last updated.

The total hours flown in the period 90 days, 7 days and 24 hours preceding the accident was not able to be determined as records submitted did not contain flight and duty sheet for the month of May.

## **1.6 AIRCRAFT INFORMATION – GENERAL**

The Fairchild Aircraft SA227 is a low wing, twin engine, propeller-driven, pressurized airplane. The accident airplane, serial number 649 was manufactured in 1986. It was registered in the Bahamas as C6-REX. It was registered to Western Air Limited, Mastic Point Andros, Bahamas.

The aircraft had a recent Certificate of Registration June 25, 2003. It's most recent Certificate of Airworthiness was issued on June 24, 2004.

Up to the time of the accident the aircraft had flown a total of 31,217.5 hours since manufacture. It had flown a total of 22.2 hours since last periodic inspection (Phase 4). The aircraft was maintained under the provisions of BASR 2001.



The accident airplane was configured with a captain's seat, a first officer's seat, 16 single passenger seats and a triple passenger seat in the rear of the airplane (for a total of 19 passenger seats in 9 rows). The airplane had a main entry door on the left forward side of the fuselage and three emergency exits, two of which were on the right side of the cabin (at rows 5 and 6) and one of which was on the left side of the cabin (at row 5). The airplane also had a cargo door on the left side of the fuselage. The cargo storage area began at the partition immediately aft of the triple passenger seat and extended almost to the aft pressure bulkhead.

The aircraft engines were Garrett TPE 331-11V-612G. The left engine Serial Number P-44610 had an overhaul period of 7,000. Time since overhaul or last inspection unknown

The right engine Serial Number P-44323C had an overhaul period of 7,000. Time since overhaul or last inspection unknown.

The propellers were Dowty Rotal Propellers. Serial Number (C) R321/4-82-F/8 was fitted to the left engine. Total flight hours since overhaul and since last inspection unknown. The Propellers had an overhaul period of 5,000 hours

Serial Number 4846/87 was fitted to the right engine. Total flight hours since overhaul and since last inspection unknown. The Propellers had an overhaul period of 5,000 hours.

The accident aircraft was not equipped with an auto pilot.

### **1.7 Meteorological information**

The weather conditions in the vicinity of The Nassau International Airport between 1700 UTC and 2300 UTC 6<sup>th</sup> May, 2005 had winds at 280 degrees at 9 knots, temperature at 32 degrees Celsius with a dew point at 18 degree Celsius and a barometric pressure at 29.98 inches of mercury. The official sunset was at 7:43pm.

### **1.8 Aids to Navigation**

No problems with any navigational aids were reported.

### **1.9 Communications**

Communications were established with the Nassau Air Traffic Radar Control and subsequently the Nassau Control Tower.

A copy of ATC transcript on file at Flight Standards Inspectorate.



## **1.10 AIRCRAFT LOAD**

- 1. Operational empty weight of the aircraft listed as 9,500 pounds. Actual recalculated weight which included crew, totaled 9,655 pounds.**
- 2. Manifested weight of bags was 467 pounds. Actual recalculation of weight arrived at a figure of 522 pounds.**
- 3. Number of bags manifested was 22 pieces. Actual recalculation of listed bags totaled 25 pieces.**
- 4. Total manifested passenger weight shown as 2840 pounds. Recalculated listed passenger weight totaled 3000 pounds.**
- 5. Passenger weight on manifest was for 18 persons. However, there was a 19<sup>th</sup> passenger whose weight was not listed.**
- 6. Total weight manifest at 14,207 pounds. Recalculated weight arrived at a figure of 14,522 pounds which did not include the 19<sup>th</sup> passenger plus the three (3) extra bags.**
- 7. The aircraft maximum takeoff weight was exceeded by 22 pounds plus the weight of three (3) bags and a 19<sup>th</sup> passenger, the total weight of which was not listed. The total overweight was thus brought to a higher figure.**

Above information based on passenger manifest provided to FSI.

## **1.11 Cockpit Voice Recorder**

Aircraft is fitted with CVR however; recording was not obtained as part of the investigation.

## **1.12 Wreckage and Impact information**

The aircraft came to rest upright. The underside of the left wingtip, the left propeller, the bottom of the left aft engine nacelle, and the left main gear, bore the main impact of the collapse. The right main gear tires also sustain damage. 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. There was no post impact fire.

Both wings were still attached to the fuselage. Damage was confined to the left side of the aircraft described above. Both ailerons were attached and received no impact or post impact damage. Position of the flaps could not be determined, however, the left flap did sustain minor damages.

Both engines were intact in the nacelles. Damage to the left engine could not be determined without more detailed inspection and analysis. The left propeller was extensively damaged from the impact. The right propeller did not appear to have sustained any impact damage.

Left and Right engine throttle levers were found in the "Idle / Cut Off" range. Left and Right propeller control lever were found forward of the feathered range. Both stop and feather control were pulled. Trim selector was selected to the pilot side. There was no way of substantiating the position of the controls at the time of impact due to the actions of the first responders.

## **1.13 Medical and Pathological Information**

No serious or fatal injuries occurred.

## **1.14 Fire**

No in-flight or post accident fire occurred



## **1.15 Survival Aspects**

Not Applicable.

## **1.17 Organizational and Management Information**

Western Air Limited is a scheduled / on demand commuter basic air taxi operator based in Mastic Point, Andros Bahamas at the San Andros International Airport. Western Air Limited operates under the provision of the Bahamas Aviation Safety Regulations (BASR 2001).

At the time of the accident Western Air Limited operated 5 Fairchild Metro Liner SA-227 aircrafts including the accident aircraft.

Its maintenance was conducted under BASR 2001 and in accordance with guidance in its General Maintenance Manual and Maintenance Control and Procedures Manual. All mechanics employed or contracted for maintenance were required to be familiar with the policies and procedures in these manuals.

Western Air Limited maintenance was performed exclusively by its mechanic, the airline remained responsible for the airworthiness of its airplanes and all of the maintenance performed.

### **1.18.1 Pilot statement**

Both pilots gave two individual reports to the Flight Standards Inspectorate. The first statements were given shortly after the occurrence. The second statements were required due to questions arising from the investigation. Both sets of statements are on file at the Flight Standards Inspectorate.

## **2.0 ANALYSIS:**

### **2.1 General**

1. Operational empty weight of the aircraft listed as 9,500 pounds. Actual recalculated weight which included crew, totaled 9,655 pounds.
2. Manifested weight of bags was 467 pounds. Actual recalculation of weight arrived at a figure of 522 pounds.
3. Number of bags manifested was 22 pieces. Actual recalculation of listed bags totaled 25 pieces.
4. Total manifested passenger weight shown as 2840 pounds. Recalculated listed passenger weight totaled 3000 pounds.
5. Passenger weight on manifest was for 18 persons. However, there was a 19<sup>th</sup> passenger whose weight was not listed.
6. Total weight manifest at 14,207 pounds. Recalculated weight arrived at a figure of 14,522 pounds which did not include the 19<sup>th</sup> passenger plus the three (3) extra bags.
7. The aircraft maximum takeoff weight was exceeded by 22 pounds plus the weight of three (3) bags and a 19<sup>th</sup> passenger, the total weight of which was not listed. The total overweight was thus brought to a higher figure.
8. The captain and the first officer were properly certificated and qualified.
9. No evidence indicated any preexisting medical or behavioral conditions that might have adversely affected their performance during the accident flight.



10. The flight crew duty records do not reflect fatigue as a contributing factor.
11. The accident aircraft was properly certified and equipped in accordance with BASR 2001.
12. No evidence indicated that the airplane was improperly maintained.
13. Weather was not a factor in this accident.
14. There were no factors involving air traffic services.
15. Aircraft Navigational Instrumentation not a factor in the accident.

### **3.0 CONCLUSIONS**

#### **3.1 Findings**

1. The captain and the first officer were properly certificated and qualified. Both crew were certificated by the republic of Argentina and licenses were validated by the Bahamas Civil Aviation Department.
2. No evidence indicated any preexisting medical or behavioral conditions that might have adversely affected their performance during this accident flight.
3. The evaluations of flight crew records do not reflect fatigue as a contributing / determining factor of this accident.
4. The accident aircraft was properly certified and equipped in accordance with BASR 2001. No evidence indicated that the airplane was improperly maintained.
5. Weather was not a factor in this accident.
6. Air traffic services not a factor in this accident.
7. Aircraft Navigational Instrumentation not a factor in this accident.
8. Left gear drag brace failure occurred at San Andros International Airport. This fact evident by the recovery of portions of the left landing gear drags brace at San Andros.
9. Left Propeller strike runway at San Andros. This fact evident by the witness marks identified on the runway at San Andros.
10. All control surfaces were accounted for, and all damage to the aircraft was attributable to the impact forces.
11. The aircraft was equipped with a Cockpit voice recorder. However a transcript was not taken of the period preceding the accident.
12. The Crewmembers did not follow procedures as required by BASR 2001 Schedule 10.430(c) [Mass and Balance computation] and Aircraft Flight Manual or Rotorcraft Flight Manual.
13. Analysis of the Mass and Balance computations confirmed that the aircraft: -
  - a. Maximum structural takeoff weight of 14,500 pounds was exceeded.



- b. Maximum structural landing weight during landing in San Andros was exceeded.
- c. Calculated center of gravity was incorrect.

See Exhibit ..... FSII

- 14. Crewmembers calculation of mass and balance were based on figures provided by passenger handling agent.

### 3.2 Probable Cause

The Authorities determined the probable cause of this accident as;

#### **Failure of the left main drag brace.**

Federal Aviation Administration Airworthiness Directive AD 2000-17-11 and Fairchild Service Bulletin 227-32-043 states the following: -

*“This amendment adopts a new airworthiness directive (AD) that applies to certain Fairchild Aircraft, Inc. (Fairchild) SA226 and SA227 series airplanes equipped with certain Ozone Industries, Inc., main landing gear (MLG) assemblies. This AD requires you to repetitively inspect the MLG drag brace assembly (consists of both brace and links) for cracks, and requires you to replace or rework any cracked MLG drag brace assembly. This AD is the result of several reports of cracks in the MLG drag brace assemblies on the affected airplanes. The actions specified by this AD are intended to detect and correct cracks in MLG drag brace assembly. Continued airplane operation with such cracks could lead to MLG failure and result in loss of control of the airplane during takeoff or landing operations.”*

#### **Additional Findings supplied by Western Air Maintenance Section: -**

“1.10.1 After the landing gear failure Western Air Ltd inspected the landing gear on its fleet of two remaining Metro aircrafts (14500 lb MTOW — 16,000 lb MTOW has reinforced and modified drag braces ) and checked the lower drag braces using dye penetrant for cracks. The crack checking was performed around the recesses machined to accommodate grease fittings. All the 2 other Metro III aircraft were found to have cracks in the lower drag brace machined recess area as per following detail:

#### **C6-SAR**

LH Lwr drag link outboard: Cracks around grease fitting area - strut side - beyond limit  
LH Lwr drag link inboard: Cracks around grease fitting area - strut side - beyond limit  
RH Lwr drag link outboard: Cracks around grease fitting area - strut side - within limit - reworked -  
RH Lwr drag link inboard: No cracks found

#### **C6-KER**

LH Lwr drag link outboard: Cracks around grease fitting area - strut side - beyond limit  
LH Lwr drag link inboard: Cracks around grease fitting area - strut side - within limit - condemned part because they are matched sets -  
RH Lwr. drag link outboard: No cracks found.  
RH Lwr. drag link inboard: No cracks found.



### **Examination results**

To be conducted by US metallurgical laboratory — Q&C metallurgical — FL -

### **Microstructure and hardness**

To be conducted by US metallurgical laboratory — Q&C metallurgical — FL -

**See Exhibit – FSI2 - for Western Air Limited Analysis.**

### **Additional Factor**

C6-REX was overweight at the time of this flight evidence by Exhibit – **FSI1**.

## **4.0 SAFETY RECOMMENDATIONS:**

The extent of the investigation into Western Air Limited warrants the following recommendations.

1. Random inspection of Western Air Limited Flight Preparation Records.
2. Fleet wide maintenance inspection of the gear link drag brace instituted immediately at Western Air Limited.  
*(Western Air Limited has been proactive and has already inspected the fleet to determine if there was any other cracked MLG link drag brace. Further, Western Air Limited has replaced any cracked components discovered as a result of their investigations.) See Exhibit – FSI2.  
The Flight Standards Inspectorate has on record the aircraft that were affected and the repairs that were carried out.*
3. Western Air establishes an operational control center (OCC) and provides a training program and documentation for qualified operational control personnel.
4. Due to the high number of cycles verses the number of flight hours flown, the times interval between inspections of main landing gear drag brace shall be reduced from 1,000hours to 500hours.

## **5.0 DEFINITIONS**

Load Manifest – an aircraft specific document required to summarize the mass and balance and loading calculations of aircraft in commercial air transport.



