



AIRCRAFT ACCIDENT REPORT

REPORT ON THE ACCIDENT INVOLVING
AFRICA' CONNECTION D 228 AIRCRAFT
REGISTRATION S9-AUN, WHICH OCCURRED
AT SÃO TOMÉ INTERNATIONAL AIRPORT
ON 18th DECEMBER, 2018

NATIONAL ACCIDENT INVESTIGATION COMMISSION

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GLOSSARY OF ABBREVIATION USED IN THIS REPORT	

ACC	Area Control Cent
ACCID	Accident
ADR	Accident Data reporter
AIP	Airport Information Publication
AOC	Air Operator Certificate
APP	Approach
CB	Commulunibus
CNIPAIA	National Commission for Accident and Incident Investigation
CVR	Cockpit Voice Recoder
DME	Distance Measuring Equipment
DOC	Document
FDR	Flight Data Recorder
FR	Final Report
GCA	Ground Control Approach
ICAO	International Civil Aviation Organization
IDR	Incident Data Report
INAC	National Civil Aviation Authority
INCID	Incident
LBV	Libreville
SR	Safety Recommendation
STP	Sao Tome and Principe
TODA	Take Off Distance Available
TORA	Take Off Run Available
TSN	Time Since New
TSO	Time Since Overhaul
UTC	Universal Time Coordinated
VHF	Very High Frequency
VOR	VHF Omnidirectional Range

AIRCRAFT ACCIDENT REPORT Nº: AC/18/12/2018/RF

TITLE: Accident.

NAME OF OWNER: WILMAX INTERNATIONAL NV

NAME OF OPERATOR: AFRICA'S CONNECTION

MANUFACTURER: Dornier Luftfahrt GMBH.

MODEL: DO 228-201.

REGISTRATION: S9 – AUN.

PLACE OF OCCURRENCE: São Tomé International Airport

DATE OF ACCIDENT: December 18, 2018.

TIME OF OCCURENCE: 18 hours and 53 minutes UTC.

WEATHER CONDITIONS: Few CB clouds 2000 feet, SCT 11000 feet with Nil weather.

CREW: Captain, First Officer

EXPLANATORY NOTE

This report states the technical findings to the circumstances and causes of this occurrence, in accordance with Annex 13 to the Chicago Convention and the Law No. 3/ 2017, published in Diário da República (National Gazette) No. 29 of March 22 .

This report does not seek to apportion blame or establish accountability, but it is only the determination of causes and making recommendations aimed at preventing its recurrence. The sole purpose of this technical report is to draw lessons, which could prevent future accidents.

SYNOPSIS

National Commission for Accident and Incident Investigation (CNIPAIA) was notified of the occurrence on the 18th December 2018. Investigators were dispatched on the same day to carry out investigation on the occurrence and all stakeholders were notified accordingly.

At 14h16 UTC the aircraft DO 228,S9-AUN departed from Sao Tome (FPST) to Douala (FKKD) with estimating flight time of 01h42.

After take off from Sao Tomé the crew noticed that with gear retracted the transition light did not go off and was on throughout the flight.

At Douala as destination airport, during the approach for landing and having selected the landing gear down, the crew realized that the nose gear was not down and only main gear was extended and locked. The crew recycled the landing gear but to no avail. With this abnormal prevailing condition the crew decided to return to home base at Sao Tome Airport;

Upon arrival at Sao Tome airport and during final approach for landing the crew declared nose gear mal function and the all procedures were observed and at last the aircraft landed with nose gear up at 18h53 UTC without injuries and fatalities; the aircraft was partially damaged.

1.0 FACTUAL INFORMATION

1.1 History of the Flight

The aircraft was initially planned to fly on 18th December from Sao Tomé (FPST) to Yaoundé (FKKY) and thereafter to Tibati (FKKT) as final destination with night stop. The following day the routing should be Tibati to Sao Tomé with stop over at Douala (FKKD).

On the day of departure the crew filed a flight plan from Sao Tome to Douala contrary to previous Civil Aviation clearance.

At 14h16 UTC the aircraft DO 228,S9-AUN departed from Sao Tome to Douala with estimating flight time of 01h42.

After take off the crew noticed that with gear retracted the transition light did not go off and was on throughout the flight.

At destination and during the approach for landing, selecting landing gear down, the crew realized that the nose gear was not down and only main gear was extended and locked. The crew performed the troubleshooting to identify the cause and recycled the landing gear but to no avail. The situation prevailed with nose gear up and main gear extended and locked.

In this regard and due to inability to land safely in Douala, the crew decided to return to home base at Sao Tome Airport;

During the remaining flight back home the crew established normal communications with Libreville Control and later on with Sao Tomé ATC, but at no time the crew reported to Sao Tome Air Traffic Control (ATC) for any emergency situation despite they had requested the Air Traffic Controller to inform the Company 's Flight Operations Office that they were having a technical problem.

At 17h39 the crew requested for visual approach and ATC cleared the aircraft to visual approach and to report base leg of runway 11.

At 17h43 on final approach and when cleared to land the crew informed that they could not land due to nose gear malfunction and performed the go-around procedure. There after they did a low pass and Air Traffic Controller confirmed the nose gear was not down. At 17h44 the crew declared emergency.

The Air Traffic Controller immediately informed the Airport Fire Service and other related specialized services and authorities. All emergency procedures on ground were observed including applying foam on the runway to soft and mitigate the damage of the aircraft and preventing any fire situation.

At last the aircraft was able to perform an emergency landing only with main gear extended at 18h53 UTC, without injuries and fatalities. The aircraft was partially damaged.

1.2 Injuries to Persons

Injuries	Crew	Passengers	Others
Fatal	Nil	Nil	Nil
Serious	Nil	Nil	Nil
Minor	Nil	Nil	Nil
None	2	1(Mechanic)	Nil
Total	2	1	Nil

1.3 Damage to Aircraft

The aircraft partially damaged.

1.4 Other Damage

Nil.

1.5 Personnel Information

1.5.1 The Captain

Age: 61 years

Nationality: Santomean

Gender: Male.

Licence: ATPL

Licence Validity: 30/10/2020

Medical Certificate /Validity: Class 1, 31/01/2019

Aircraft Ratings: DO 228,EMB 110,LET 410 UVP,NORD 262,PA/23,DHC-6,BE-200,FK-27

Total Flying Experience (All types): 13 974 hrs.

Total on Type: 3651 hrs.

Last 90 days: 85 hrs.

Last 28 days: 33 hrs.

Last 24 hours: 7 hrs.

1.5.2 The First Officer

Age: 29 years

Nationality: Santomean

Gender: Male.

Licence: CPL-A

Licence Validity: 18/05/2019

Medical Certificate /Validity: Class 1, 30/10/2019

Aircraft Ratings: DO 228,CE-172S, DA-42-42, PA-28R-200

Total Flying Experience (All Types): 705 hrs.

Total on Type: 372 hrs.

Last 90 days: 110 hrs.

Last 28 days: 69 hrs.

Last 24 hours: 06:20 hrs.

1.5.3 Aircraft Maintenance Technician (AMT)

Age: 45 years

Nationality: Venezuelan

Gender: Male.

Licence: AMT

Licence Validity: 10/08/2018(Expired)

STP Licence Validation Certificate Validity: 10/08/2018(Expired)

Medical Certificate Validity: N/A

1.6 Aircraft Information

1.6.1 General Information

Type/Model: DO 228-201

Aircraft manufacturer: Dornier Luftfahrt GMBH

Serial Numbe: 8076

Year of manufacture: 1986

Airframe time: 13 026.01

Cycles: 14 222

Certificate of Airworthiness nº 01 /011 Issued on 5th February 2018. Valid to 1st February 2019.

Certificate of Registration nº 01/011 issued on 3rd August 2017

1.6.2 Power Plant

No. 1

Manufacturer: Honeywell

Model: TPE 331-5-252 D

Serial Number: P-39149

No.2

Manufacturer: Honeywell

Model: TPE 331-5-252 D

Serial Number: P-39062

1.6.3 Propeller

No.1

Manufacturer: Hartzell

Model: HC-B4TN-5ML-3A

Serial Number: CDA 25057

No.2

Manufacturer: Hartzell

Model: HC-B4TN-5ML-3A

Serial Number: CDA 5063

1.6.4 General Maintenance Records:

Schedule Maintenance completed on 26 January 2018:

- 1200 FHI Inspection
- 6 Months Inspection
- 12 Months Inspection

The Maintenance was carried out on the aircraft at :

- Total Time 12 599:15
- Total Cycles 13470

Certificate of Release to Service was issued on 26th January 2018

Regarding 2018 Schedule Maintenance, some of maintenance records were not available for perusal.

1.6.5 Recommended Service Bulletin:

Service Bulletin (SB) is a document issued by the aircraft manufacturers to operators to enhance safety.

One Service Bulletin related to the nose landing gear was issued by the manufacturer as follow:

SB nº SI-228-036 was issued on 28th April 1989

Title: Improved safety pin on NLG (for towing)

Effectivity:

Dornier 228-100/101 and 228-200/201/202

LBA-Gerate-Kennblatt-Nr.: 2031a and 2031b

Serial – Nos.: All airplanes

Reason:

When towing the airplane, an incorrectly inserted safety pin on the nose landing gear could move out, and cause the lock to engage.

The nose landing gear could be damaged.

Information:

Dornier highly recommends the modification of the safety pin P/N UO1A90000 accordingly.

DORNIER
228

DORNIER GMBH
PRODUCT SUPPORT



D-8000 MÜNCHEN 66
POB 2160
Federal Republic of Germany

**Service
Information**

Phone: Weßling/Obb. 08153 300
Telex: 527 767 dops d
Telegram: DOPS München

Title: Improved safety pin on NLG (for towing)

Effectivity:

Dornier 228-100/101 and 228-200/201/202
LBA-Geräte-Kennblatt-Nr.: 2031a and 2031b
Serial-Nos.: All airplanes

Reason:

When towing the airplane, an incorrectly inserted safety pin on the nose landing gear could move out, and cause the lock to engage.
The nose landing gear could be damaged.

Information:

Dornier highly recommend the modification of the safety pin P/N UO1A090000 according to fig. 1.

LBA Approval: Dornier GmbH, LBA approved development company No. 1-EA9
It is the operator's responsibility to comply with the relevant Aviation Regulations of the country in which the aircraft is registered.

Date of issue April 28, 1989

Revision-No

Date

No SI-228-036

Model Dornier 228

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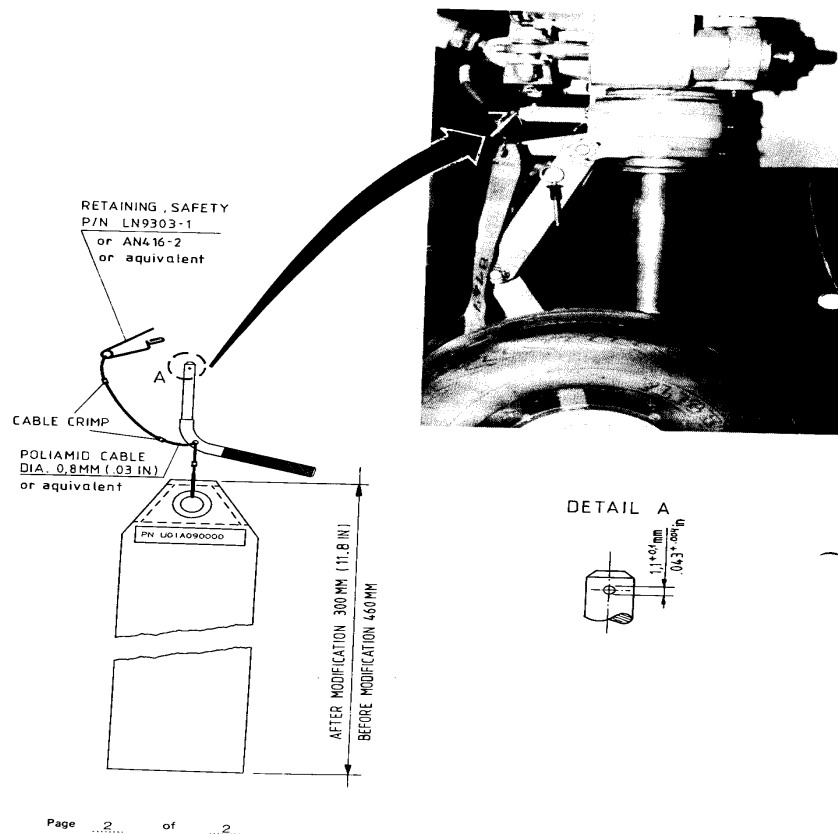


Fig. 1 NACCELE NLG



1.7 Meteorological Information

Meteorological conditions as obtained from National Meteorology Institute on the day of occurrence were as follows:

Time: 18:00 UTC

Wind: 190/06kts

Visibility: +10kms

Present Weather: Nil

Clouds: few CBs 2000 feet, SCT 3300 feet

Temperature: 28º C

Dew Point: 25ºC

QNH: 1012

Time: 19:00 UTC

Wind: 200/06 kts

Visibility: +10kms

Present Weather: Nil

Clouds: Few CBs 2000 feet, SCT 11000 feet

Temperature: 28º C

Dew Point: 26º C

QNH: 1013

1.8 Aids to Navigation

The conditions of the navigation aids at São Tomé International Airport on the day of the occurrence were as follows:

- ACC/APP, VHF 127.500 MHz;
- TWR VHF 118.900 MHz
- TWR VHF 121.500 MHz (Emergency Frequency);
- VOR/DME 117.3

1.9 Communications

There was two-way communication between the crew and the Control Tower

1.10 Aerodrome Information

Sao Tome International Airport with ICAO location indicator FPST has a runway designation of 11/29. Runway 11 was used for landing.

The surface is coated with asphalt and has a dimension, 2160m/45m. The Aerodrome Reference Point is: 00º2'40" and 006º 42'47" E with an elevation of 10m (33 ft.). Runway 11 has threshold co-ordinate of 002249.36N, 0064210.37E and elevation of 12m.

Other declared distances of RWY 11 are as follows:

RWY length- 2160m

RWY width – 45 m

TORA – 2160m

TODA – 2160m

ASDA-2160

LDA-2160m

Strip – 2240m*150m

CWY- 60m

Runway inspection is usually carried out by the airport fire service personnel before any take off and landing. On the day of occurrence the runway was inspected before the landing observing the all emergency procedures appropriate for emergency landing in that prevailing situation.

1.11 Flight Recorders

The aircraft equipped only with Cockpit Voice Recorder whose details are:

Type: AV557D

Part Number: 980-6019-001

Serial Number: 240

Date Code: 9046

Manufacturer: SUNDSTRAND

The recorders were successfully downloaded at the BFU-Laboratory of German Federal Bureau of Aircraft Accident Investigation at Braunschweig, Germany;

1.12 Wreckage and Impact Information

The aircraft landed at slow speed keeping as long as possible the nose up to mitigate the possible harsh contact with the runway; it touch down on main gear at approximately 238m from the threshold and the nose touch down after 19m. The aircraft came to the rest approximately 441 m from the threshold of the runway.

The impact caused structural damages as:

- Deformation of the radome and compartment bag
- Damage of the nose landing gear bay
- Lower skin aft wheel bay shaved
- Skin top fuselage wing damaged
- Longerons damaged inside Top and Lower windows



Fig.2 REFERENCE POINT NOSE GEAR STEERING RING



Fig.3 DEFLECTION THE TORQUE LINK ASSY



Fig.4 Safety Pin (for towing) and NLG Steering Coupling Mechanism



Fig.5 Part of the nose landing gear damaged

1.13 Medical and Pathological Information

Not Applicable.

1.14 Fire

There was no post-crash fire

1.15 Survival Aspect

The crew operated the aircraft to a safe emergency landing. Though the damage to the aircraft was substantial, the occupants survived the accident with no injuries.

1.16 Test and Research

The Voice Recorder (CVR) was sent to German Federal Bureau of Aircraft Accident Investigation (Bundesstelle für Flugunfalluntersuchung) for download and readout of retrieved information from Voice Recorder.

1.17 Organizational and Management Information

1.17.1 The Operator

Africa's Connection STP Ltd is a company registered and incorporated according to the Laws of the Democratic Republic of Sao Tomé and Príncipe and based in Sao Tome.

The company is holder of Air Operator Certificate nº 01/AOC/2017 issued on 26th April 2018 valid to 31st December 2018.

The main operations of the airline are:

- Schedule Flight
- Non-Schedule Flight

1.17.2 Civil Aviation Authority

National Civil Aviation Authority (INAC) is the civil aviation regulatory body of Sao Tomé and Príncipe. It is a Department under the Ministry of Infrastructures, Natural Resources and Environment. INAC is concerned with the following main competencies:

- Cooperation with International Civil Aviation Organization
- Agreements on air transport and other Civil Aviation matters
- Permission for overfly, entry, exit and transit of aircraft
- Certification and supervision of Airport and Air Operators
- Authorization and Supervision of flight operations
- Certification of the Aircraft
- Certification of Aircraft Maintenance Base
- ATS Supervision
- Licensing of air navigation facilities
- Airspace regulation and supervision of navigation and air traffic services

- Licensing of Aeronautical Personnel

1.17.3 Airport Operator

National Airports and Safety Corporation (ENASA) is the Operator of the Sao Tomé International Airport. It is also in charge of air navigation services.

1.18 Additional Information

Nil

1.19 Useful or Effective Investigation Techniques used

Not applicable.

2.0 Analysis

2.1 General

After daily inspection and before departure the aircraft is towed between fuel pit hangars to main ramp. These have been the routine by the maintenance technician and other ground personnel whenever there is flight to be operated. The taxiway is not in the good shape because of roughness and degradation of the surface what should be the reason for maintenance ground personnel to have more appropriate and careful handling during aircraft towing. There are evidence that the pin have come out a couple of times without company's maintenance to take any corrective action to address the issue.

On the day of occurrence when the pin came out and during turning it affected the nose landing gear torque link that suffered serious damages. No action whatsoever was taken to correct the situation.

It is pertinent to emphasize that the manufacturer issued a service bulletin on 28 April 1989 to improve safety pin on Nose Landing Gear (for towing). If the modification according to that service bulletin was effectively complied it could avoid the pin to come out even with strong vibration due to taxiway roughness.

On the day of the flight the crew filed a flight plan from Sao Tome to Douala contrary to previous Civil Aviation clearance indicating Yaoundé as first destination. There was no evidence available to CNIPAIA to ascertain the reasons for change of the destination.

2.2 Conduct of the flight

The aircraft took off at 14h16 with estimating time flight of 01h42 to destination.

Given the situation that after departure the landing gear transition light did not go out with gear up, the investigation could not establish the reason that made the crew to continue the flight in that condition.

During approach for landing at Douala, the crew realized that the nose gear was not down and only main gear was extended and locked. In keeping with procedures laid down in emergency checklist the crew performed the troubleshooting to identify the cause followed by recycling the landing gear. During the recycling the main landing gear did not go up while the nose gear maintained always up. In face of that the crew returned back to São Tomé flying with main gear down on emergency condition.

It is pertinent to note that the crew neither reported to Libreville ATC nor reported to São Tomé ATC any emergency or landing gear malfunction.

On final approach and when cleared to land the crew informed that they could not land due to nose gear malfunction and performed the go-around procedure. There after they did a low pass and Air Traffic Controller confirmed the nose gear was not down. Only at that time the crew declared emergency.

The crew performed a professional emergency landing with only main gear extended. There were no injuries and fatalities.

The weather situation was good all day in the area making flying less stressful for the crew specially taking in account the emergency landing to be performed.

2.3 Meteorological Factors

Nil

2.4 License issues

Aircraft Maintenance Technician (AMT) Licence was expired on 10 August 2018.

Assistant Mechanic Aircraft Maintenance Certificate was expired on 16 March 2015.

It is not understandable how the technicians were discharging its duties with expired licence and certificate and having also an undocumented ground staff as part of the team

3.0 Conclusions

3.1 Findings

The investigation revealed the following:

(1) The aircraft had a valid Certificate of Airworthiness.

- (2) The Company had a valid Air Operator Certificate.
- (3) The State of Registration and Operator is São Tomé and Príncipe.
- (4) There were three persons on board the aircraft (2 flight crew and 1 Maintenance Technician).
- (5) The pilots were certified and qualified to conduct the flight.
- (6) The three ground staff involved in handling and towing the aircraft, two were holder of an expired licence and certificate and the other one was undocumented.
- (7) The company is not holder of Maintenance Certificate.
- (8) The flight was the first to be conducted for that day by the crew.
- (9) There was effective communication between Air Traffic Controller (ATC) and the crew during all phases of the flight.
- (10) The crew decided to continue flight to Douala despite the landing gear transition light was still on after gear up.
- (11) On approach to Douala, upon the extension of the landing gear, the nose gear did not come down and only the main gear extended. After performing the emergency procedure and recycling the landing gear the nose gear still did not come down and at this time the main gear did not come up.
- (12) Returning to base the aircraft was flown throughout with main landing down.
- (13) The crew at no time reported Libreville and Sao Tome ATC for any emergency situation.
- (14) The crew only reported nose gear technical problem during final approach and emergency landing was declared after go around procedure.
- (15) Modification as recommended in the Service Bulletin nº SI-228-036 was not complied.

3.2 Causal Factors

The investigation determines that the cause of this accident as:

During towing of the aircraft, the pin for towing came out and at time of turning it damaged the nose landing gear torque link affecting the alignment and centering of the nose wheel.

After take off and selecting landing gear up, the nose gear was stuck in the nose compartment due to 15° off deflection from centre point.

Nose wheel could not be extended because it was stuck in the nose compartment.

3.3 Contributory Factors

The contributory factors to this accident include but are not limited to the following:

3.3.1 Inadequate tow bar

3.3.2 Inadequate aircraft tow tractor

3.3.3 Aircraft tow tractor was technically faulty

3.3.4 Lack of appropriate training for ground personnel on aircraft towing

3.3.5 Undocumented ground personnel discharging maintenance duties

3.3.6 Roughness and degradation of taxiway surface

3.3.7 No action was taken for specific inspection on the nose landing gear for any damages caused during towing of the aircraft

3.3.8 No compliance with Service Bulletin nº SI-228-036 issued by the manufacturer on 28th April 1989.

4.0 Safety Recommendations

Taking in account the discrepancies and non-compliance, CNIPAIA issues the following recommendations:

4.1 Safety Recommendation nº 01/2018

Civil Aviation Authority of Sao Tome and Principe should intensify its surveillance and monitoring on all validation of maintenance technician and ground personnel certificates.

4.2 Safety Recommendation nº 02/2018

Civil Aviation Authority should not permit undocumented personnel to carry out maintenance duties.

4.3 Safety Recommendation nº 02/2018

Civil Aviation Authority should establish contact with homologous Authorities of countries which are manufacturers of aircraft registered in São Tomé and Príncipe regarding Service Bulletins and other related Airworthiness Directives (AD) with aim of creating safety in the aviation industry.

4.4 Safety Recommendation nº 04/2018

Africa Connection as the operator should monitor the validity of maintenance technician licences and ground personnel certificates.

4.5 Safety Recommendation nº 05/2018

Africa Connection should lay down procedures to improve maintenance work and upgrade training for the ground staff.

4.6 Safety Recommendation nº 06/2018

Africa Connection should make acquisition of a new and appropriate tow bar.

4.7 Safety Recommendation nº 07/2018

National Airports and Safety Corporation (ENASA) should make necessary effort to repair the taxiway surface.