



AIRCRAFT ACCIDENT REPORT

NPF/2018/10/03/F

Accident Investigation Bureau

**Final Report on serious incident involving
Cessna Citation 560 XLS+ aircraft with nationality
and registration marks 5N-HAR operated by the
Nigeria Police Airwing which occurred at Sir
Abubakar Tafawa Balewa Airport Bauchi, Nigeria
On 3rd October, 2018**

This report was produced by the Accident Investigation Bureau, Nigeria (AIB-N), Nnamdi Azikiwe International Airport, Abuja.

The report was based upon the investigation carried out by AIB-N, in accordance with Annex 13 to the Convention on International Civil Aviation, Civil Aviation Act 2006 and Civil Aviation (Investigation of Air Accidents and Incidents) Regulations 2019. In accordance with Annex 13 to the Convention on International Civil Aviation, it is not the purpose of aircraft accident/serious incident investigations to apportion blame or liability.

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Safety Recommendations in this report are addressed to the Regulatory Authority of the State, as well as other stakeholders, as appropriate. The Regulatory Authority is the authority that ensures implementation and enforcement.

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GLOSSARY OF ABBREVIATION USED IN THIS REPORT

AIB-N	Accident Investigation Bureau, Nigeria
AMO	Approved Maintenance Organisation
AOC	Air Operator Certificate
APU	Auxiliary Power Unit
ARFFS	Aircraft Rescue and Fire Fighting Services
ATC	Air Traffic Control
CAS	Crew Alerting System
CC	Cabin Crew
CRM	Crew Resource Management
CVR	Cockpit Voice Recorder
DATCO	Duty Air Traffic Control Officer
DNAA	Nnamdi Azikiwe International Airport, Abuja
DNAK	Akure Airport, Akure (DNAK)
DNBC	Sir Abubakar Tafawa Balewa Airport, Bauchi
FDR	Flight Data Recorder
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
LOFT	Line Oriented Flight Training
NCAA	Nigerian Civil Aviation Authority
Nig. CARs	Nigerian Civil Aviation Regulations

NP	Nigeria Police
NPAW	Nigeria Police Airwing
NPF	Nigeria Police Force
PF	Pilot Flying
PIC	Pilot In Command
PIC-US	Pilot-In-Command Under Supervision
PM	Pilot Monitoring
PMI	Principal Maintenance Inspector
PNCF	Permit for Non-Commercial Flight Operations
POI	Principal Operations Inspector
QRH	Quick Reference Handbook
RAeS	Royal Aeronautical Society
SOP	Standard Operating Procedures
TRE	Type Rated Examiner
TRI	Type Rated Instructor
VMC	Visual Meteorological Condition
V _r	Rotation speed

Aircraft accident report number:	NPF/2018/10/03/F
Registered owner:	The Nigeria Police
Operator:	Nigeria Police Airwing
Manufacturer:	Cessna Aircraft Company (Textron Aviation), USA
Aircraft type and model:	Cessna Citation 560 XLS+
Year of manufacture:	2011
Serial number:	560-6067
Nationality and registration marks:	5N-HAR
Location:	Sir Abubakar Tafawa Balewa airport, Bauchi, 10°29'00"N, 009°48'36"E
Date and Time:	3rd October, 2018; at about 08:30 h <i>(All times in this report are local time (UTC +1) unless otherwise stated)</i>

SYNOPSIS

Accident Investigation Bureau (AIB-N), Nigeria was notified of the incident by the Nigeria Police on the 22nd October, 2018 and commenced investigation. Investigators were dispatched to the site on 6th November, 2018.

On 3rd October, 2018 at about 07:29 h, a Cessna Citation 560 XLS+ aircraft with nationality and registration marks 5N-HAR operated by the Nigeria Police (NP) was on a flight routing Nnamdi Azikiwe International Airport, Abuja (DNAA) to Akure Airport, Akure (DNAK) via Sir Abubakar Tafawa Balewa Airport, Bauchi (DNBC) and back to Abuja (DNAA). On board were six persons including of three crew members (Pilot, Co-pilot and Cabin Crew (CC)), and three passengers with fuel endurance of 4 hours 20 minutes. The Pilot was the Pilot Flying (PF) and the Co-pilot was the Pilot Monitoring (PM).

At 08:11 h, the aircraft landed on runway (RWY) 35 in DNBC. After landing, the aircraft was taxied and parked normally. While taxiing to the apron, the pilot requested for a quick turn-around from Air Traffic Control (ATC) and opted to file a flight plan by radio which the Duty Air Traffic Control Officer (DATCO) granted.

According to the PF, he set the parking brake and shut down the left engine for the passengers to disembark. Thereafter, PF instructed the cabin crew to put the chocks ON. The PF maintained that he was not aware that a transit walk-around was carried out on ground Bauchi by the PM.

The crew reported that during the take-off roll on RWY 17, after Rotation speed (V_r) was attained, the aircraft did not get airborne.

According to the PM, on take-off run at V_r , the PF stated that the aircraft would not lift-up (rotate) and he commanded for an abort. All persons on board disembarked without injury.

The investigation identified the following causal and contributory factors:

Causal factor

Uncoordinated flight as a result of inadequate Crew Resource Management (CRM) that led to the partial release of parking brake, which resulted in rejected take-off.

Contributory factors

1. Inability of the aircraft to get airborne after attaining the rotation speed (V_r) during take-off roll even with aft elevator pressure.
2. Non-adherence to Standard Operating Procedures (SOPs) as contained in the Cessna Citation 560 XLS+ Airplane Flight Manual.

Five Safety Recommendations were made.

1.0 FACTUAL INFORMATION

1.1 History of the flight

On 3rd October, 2018 at about 07:29 h, a Cessna Citation 560 XLS+ aircraft with nationality and registration marks 5N-HAR operated by the Nigeria Police (NP) on a flight routing: Nnamdi Azikiwe International Airport, Abuja (DNAA) to Akure Airport, Akure (DNAK) via Sir Abubakar Tafawa Balewa Airport, Bauchi (DNBC) and back to Abuja (DNAA). On board were six persons including of three crew members (Pilot, Co-pilot and Cabin Crew (CC)), and three passengers with fuel endurance of 4 hours 20 minutes.

The flight was on an Instrument Flight Rules (IFR) flight plan. The aircraft was scheduled to drop-off all the passengers at DNBC. The incident flight was intended to be a ferry flight to DNAK for a pick up. Information provided to AIB by NP stated that the flight was scheduled to be operated with the Co-pilot as the Pilot In Command (PIC) and the Pilot as the first officer.

The Pilot was the pilot flying (PF) and the Co-pilot was the pilot monitoring (PM) and Commander.

The dispatch was done by the flight crew after receiving some of the flight release documents (flight plan and weather forecast for Bauchi (DNBC) to Akure (DNAK)). Furthermore, there was no pre-departure crew briefing.

During the post occurrence interview, the crew stated that the aircraft took off from Abuja (DNAA) en-route Bauchi and landed on runway (RWY) 35 in DNBC at 08:11 h. While taxiing to the apron, the pilot requested for a quick turn-around from Air Traffic Control (ATC) and opted to file a radio flight plan which was granted by the Duty Air Traffic Control Officer (DATCO).

The crew further stated that after landing, the aircraft was taxied and parked normally.

According to the PF, he set the parking brake and shut down the left engine for the passengers to disembark. Thereafter, PF instructed the cabin crew to put the chocks ON.

The PF maintained that he was not aware that a transit walk-around was carried out on ground Bauchi. However, the PM said he carried out a walk-around.

The PF then instructed the cabin crew (CC) to remove the chocks and close the door. He further stated that he maintained his toes on the brakes up to the time they commenced taxi.

At 08:20 h, the crew requested for taxi clearance which was granted by the ATC for RWY 17 departure. The taxi involved back-tracking on RWY 17. At 08:23 h, the crew reported "ready for departure" and approval was also granted with full departure clearance.

The crew reported that during the take-off roll on RWY 17, after Rotation speed (V_r) was attained, the aircraft did not get airborne.

According to the PM, on take-off run at V_r , the PF stated that the aircraft would not lift-off (rotate) and he commanded for an abort. He added that, the PF said that he felt there was a swerve to the left. The take-off was aborted and the aircraft came to a stop at about 603 m (1,977 ft) before the end of the runway. The PF commanded for evacuation and the evacuation procedure was accomplished in accordance with the aircraft's Quick Reference Handbook (QRH).

The ATC reported, "Afterwards within a very short time, the tower observed sparks of light coming out from underneath the aircraft in motion specifically from the right wheel and immediately tried to alert the pilots and to advice them to abort the take off while simultaneously sounding the crash alarm bell so as to prompt the fire and rescue services. Yet no response from the aircraft although at that point the aircraft was seen coming to a halt."

All persons on board were evacuated unassisted. Aircraft Rescue and Fire Fighting Services (ARFFS) personnel put out the main landing gears fire that emanated during the take-off roll.

The incident occurred at 08:30 h in daylight in Visual Meteorological Conditions (VMC).

1.2 Injuries to persons

Injuries	Crew	Passengers	Total in the aircraft
Fatal	Nil	Nil	Nil
Serious	Nil	Nil	Nil
Minor	Nil	Nil	Nil
None	3	Nil	3
TOTAL	3	Nil	3

1.3 Damage to aircraft

The aircraft was slightly damaged.

1.4 Other damage

Nil.

1.5 Personnel information

1.5.1 Pilot

Nationality:	Nigerian
Age:	47 years
Licence type:	Airline Transport Pilot Licence (A)
Licence validity:	11th June, 2019
Ratings:	Part 1: Cessna Citation 560 XL Part 2: Fokker 28, Boeing 737-300/500, Embraer 170/190
Medical validity:	9th October, 2019
Simulator validity:	11th May, 2019
Total flying time:	2,803.7 h
Total on type:	565.5 h
Total on type PIC (US):	329.7 h
Last 90 days:	9 h
Last 28 days:	5.8 h
Last 7 days:	3.1 h
Last 24 hours:	45 minutes

According to the records available to the Bureau, the pilot has part 1 endorsement on type, valid till 9th October, 2019. He was scheduled to operate the flight as a co-pilot and also to assist the pilot.

1.5.2 Co-Pilot

Nationality:	Nigerian
Age:	63 years
Licence type:	Airline Transport Pilot Licence (A)

Licence validity:	25th November, 2019
Aircraft ratings:	Part 1: Cessna Citation 560XL/Sovereign-680, Hawker 125-800XP, Embraer 135/145, Gulfstream III, De-Havilland DASH-6, Piper Aztec-23, Beech Baron 500/425/404/402/200, Cessna 150/172
Medical Validity:	14th July, 2019
Simulator Validity:	4th May, 2019
Total Flying Time:	12,108.5 h
Total on Type:	1,034.6 h
Total on Type (PIC):	864.3 h
Last 90 days:	34.1 h
Last 28 days:	16.0 h
Last 7 days:	8.6 h
Last 24 hours:	1.8 h

According to the records available to the Bureau, the co-pilot has part 1 endorsement on type, valid till 14th July, 2019. He was scheduled to operate the flight as a pilot. He also has a TRI/TRE endorsement on type, valid till 21st April 2011. The endorsement was also valid for PAAN African Airlines Limited.

1.5.3 Cabin crew

Nationality:	Nigerian
Age:	32 years
Licence type:	Cabin crew
Licence validity:	15th July, 2019
Aircraft ratings:	Boeing 737-300, Cessna Citation 560XL

1.6 Aircraft Information

1.6.1 General information

Type:	Cessna Citation 560 XLS+
Manufacturer:	Cessna Aircraft Company (Textron Aviation); USA
Year of manufacture:	2011
Serial number:	560-6067
Registered owner:	The Nigeria Police
Operator:	Nigeria Police Airwing
Nationality and registration marks:	5N-HAR
Certificate of Airworthiness:	Valid till 17th July, 2019
Certificate of Insurance:	Valid till 14th September, 2019
Certificate of Registration:	Issued 3rd May, 2011
Noise Certificate:	Issued 28th July, 2015
Total Airframe Time:	638.31 h



Figure 1: 5N-HAR parked on the tarmac at DNBC

1.6.2 Powerplant

Engines	Number 1	Number 2
Manufacturer	Pratt & Whitney Canada	Pratt & Whitney Canada
Year of manufacture	2010	2010
Engine model	PW545C	PW545C
Serial number	PCE-DFO 141	PCE-DFO 142
Time since new	638.31 h	638.31 h
Cycles since new	714	714

Type of fuel used: Jet A1

1.6.3 Auxiliary Power Unit (APU)

Engine model	RE100 (XL)
Serial number	P-838
Time since new	594.20
Cycles since new	1,008

Type of Fuel: Jet A1

1.6.4 Power Brake and Anti-Skid system

Extract from Textron Aviation Illustrated Parts Catalogue Model 560 XL (-5001 THRU -5500) (-5501 and ON) Revision 39

The power brake and anti-skid installation is a closed center, phosphate-ester fluid based system with its own separate independent power-pack assembly, accumulator and reservoir. These components provide pressurized hydraulic fluid to the brake metering valve and anti-skid valve, regulated to a maximum of 1050 psi pressure to the brakes. This pressure is based upon pilot/co-pilot input through the brake pedals, and electronic inputs from the digital anti-skid control unit.

RPM transducers at each wheel sense the beginning of a skid and transmit this information to the digital anti-skid control unit. A hand operated pneumatic emergency brake valve is provided in the event of a power brake failure. Pneumatic pressure is transmitted to brakes through a shuttle valve integral to each brake assembly. Additionally, a parking brake is included in the basic hydraulic brake system.

Wheel Brakes

The power brake and anti-skid system are designed independent of the main hydraulic system. Toe-actuated multiple disc carbon brakes are installed on the main gear wheels. Braking can be accomplished by either of two independent systems: the power brake hydraulic system or the backup pneumatic system. Normal braking can be applied from either cockpit seat. The emergency brake control is installed under the left instrument panel only.

Parking Brake Valve

The parking brake is a part of the normal brake system and employs controllable check valves that can prevent the return of fluid after the brakes have been set. Parking brakes are set by depressing the toe brakes and pulling out the black parking brake handle located under the lower left side of the instrument panel. The parking brake should not be set if the brakes are very hot. This increases brake cool down time due to decreased airflow, and may result in sufficient heat transfer from the brakes to cause the parking brake thermal relief valves to open or to melt the thermal relief plugs in the wheel, causing deflation of the tire. See Appendix 1: Power brake/anti skid system.

1.6.5 Pilot Checklist Model 560XL Citation XLS+ Normal Procedures 560-6001 and on

TAXI

1. PASS SAFETY Switch.....**ON**
2. Exterior Lights.....**As Required**
3. Brakes.....**Check**
4. Steering.....**Check**
5. Thrust Reversers.....**Check**
6. Flight Instruments.....**Check**

(See Appendix 2)

Takeoff

STATIC TAKEOFF

1. Throttles.....**To Detent**
(Check TO N1 bugs are green by 60 knots.)
2. Engine Instruments.....**Check**
3. Brakes.....**Release**

ROLLING TAKEOFF

1. Computed Takeoff Distance.....**Add 500 Feet**
2. Brakes.....**Release**
3. Throttles.....**To Detent Within 500 Feet After Brake Release**
(Check TO N1 bugs are green by 60 knots.)
4. Engine Instruments.....**Check**

1.7 Meteorological information

Time (DNBC): **0600Z**

Wind: 330°/05 kt

Visibility: 10 km

Weather: Nil

Clouds: BKN 210 m

Temperature/Dew Point: 22°C/21°C

QNH: 1019 hPa

Time (DNBC): **0700Z**

Wind: Calm

Visibility: 8 km

Weather: Nil

Clouds: BKN 210 m

Temperature/Dew Point: 22°C/21°C

QNH: 1019 hPa

Time (DNBC): **0800Z**

Wind: 270°/05 kt

Visibility: 10 km

Weather: Nil

Clouds: SCT 240 m

Temperature/Dew point: 24°C/21°C

QNH: 1019 hPa

1.8 Aids to navigation

The conditions of the navigational aids at Bauchi airport on the day of the occurrence were as follows:

1. 'BCH' VOR/DME BCEP 115.6 MHZ	Unserviceable
2. 'BU' NDB BCEP 323KHZ	Serviceable
3. 'IBT' ILS BCEP 111.3MHZ	Serviceable
4. VHF frequency 124.5 MHZ (main)	Serviceable
5. VHF frequency 11 9.6MHZ (secondary)	Serviceable
6. VHF frequency 121.7 MHZ (domestic)	Serviceable
7. HF frequency 9495/8903 KHZ (variable)	Serviceable
8. ICOM mobile radio	Serviceable
9. ATC Digital clock and intercom	Serviceable
10. Crash alarm bell and signal lamp	Serviceable
11. Wind direction and speed indicator	Unserviceable
12. Desktop phone and handset	Serviceable

1.9 Communications

There was two-way communication between DNBC ATC and the aircraft.

1.10 Aerodrome information

Sir Abubakar Tafawa Balewa Airport, Bauchi (DNBC) is located 23 km North-West of Bauchi. The airport reference point is 10°29'00" N, 009°48'36" E and elevation of 599.067 m with a runway orientation of 17/35. The length and width of the runway are 3,400 m and 45 m respectively. It also has an asphalt surface.

1.11 Flight recorders

The aircraft was equipped with a Flight Data Recorder (FDR) and a Cockpit Voice Recorder (CVR). The recorders were retrieved and taken to the AIB Safety Laboratory, Abuja for download and analysis.

1.11.1 Flight Data Recorder

Manufacturer	Fairchild, USA
Model	L3 COM AR
Part number	2100-1043-00
Serial number	000637034

The FDR was downloaded successfully. Relevant data relating to the occurrence, especially data relating to some parameters like magnetic heading, airspeed, hydraulic pressure and pressure altitude etc were retrieved and analysed.

Information relating to brakes (main brakes and parking brake) was not available in the data frame layout of the FDR installed on the aircraft.

1.11.2 Cockpit Voice Recorder

Manufacturer	Fairchild, USA
Model	L3 COM AR
Part number	2100-1020-02
Serial number	000649380

The CVR data related to the incident was found over-written. Therefore, relevant data expected were unavailable.

1.12 Wreckage and Impact Information

The aircraft came to a stop at about 45° to the right of centre line, 603 m (1,977 ft) before the end of RWY 17. The brake assembly of the two main landing gears were damaged including the hub cap, nut and screw from the main landing gear wheel. The main landing gear tyres were burnt and the left main landing gear up-lock bolt was also broken.



Figure 2: Parking brake position in the cockpit

Murtala Muhammed International
Airport, P.M.B. 616 Ikeja, Lagos,
Nigeria.

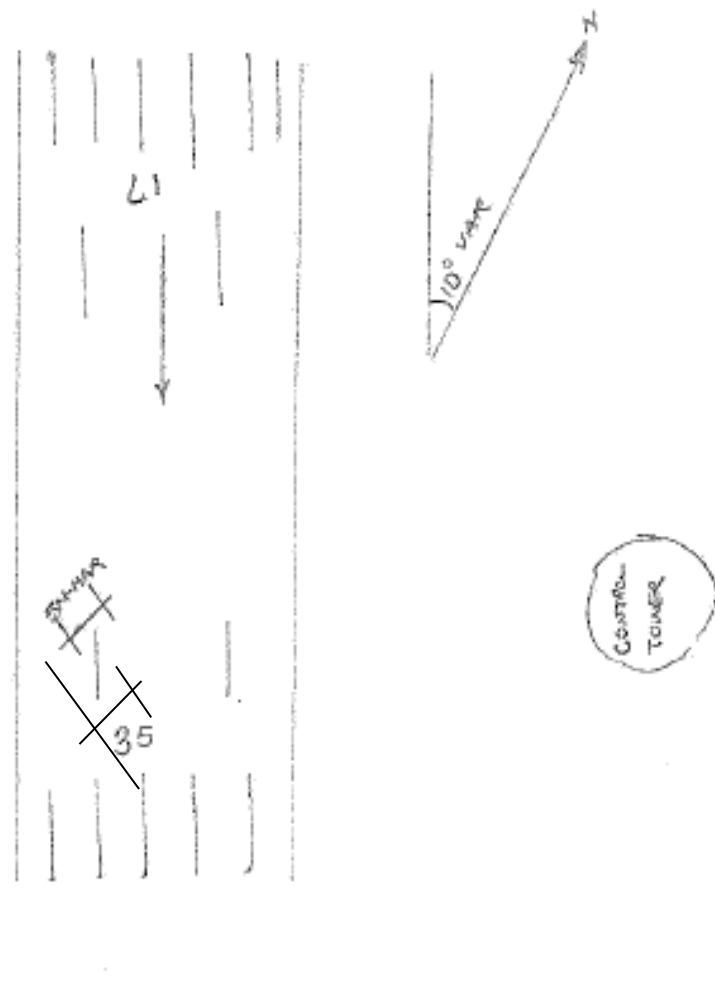
24hrs Emergency Lines:
+234(0)8077090909, 8077090908
Fax:

Aircraft Accident / Serious Incident Report Form



Accident Investigation
Bureau

Part 2

Show North and site elevation (amsl). If accident occurred on an airfield for which there is no published information, please provide as much detail as possible. Any photographs of the site and / or aircraft would greatly assist the investigation.	5.4 SKETCH ACCIDENT SITE 
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FILE REFERENCE

AIB Form 001

REG Date of event

Figure 3: Sketch of the Accident site indicating the final position of the aircraft
(Source: Nigeria Police)



Figure 4: Burnt main landing gear tyre



Figure 5: Damaged main landing gear brake assembly



Figure 6: Damaged left main landing gear up-lock bolt



Figure 7: Damaged main landing gear wheel assembly

1.13 Medical and pathological information

Drug and alcohol tests were not conducted on the flight crew.

1.14 Fire

The two main landing gear wheel assemblies were completely burnt.

1.15 Survival aspect

The incident was survivable. The seats and restraints were all intact and the crew members evacuated the aircraft unassisted before the arrival of ARFFS personnel.

The incident occurred on the runway accessible to ARFFS. According to ARFFS, the fire crew proceeded to the scene of the incident immediately after notification by DATCO. The crew stated that the ARFFS arrived the scene within 5 to 10 minutes.

The fire that emanated from the main landing gears during the take-off roll was contained by the ARFFS.

1.16 Test and research

Not applicable.

1.17 Organisational and management information

1.17.1 The Nigeria Police Airwing (NPAW)

NPAW is a unit under The Nigeria Police Operations Department, which provides flight services on both fixed and rotary wing aircraft including search and rescue operations, Police air ambulance services, aerial patrol operations, VIP transport operations, lifting of electoral personnel/material and other equipment.

The NPAW has a fleet of 14 aircraft including 13 Bell helicopters and 1 Cessna Citation (560 XLS+) aircraft.

NPAW has one Pilot on contract and two in-house Co-pilots, rated on the XLS+. Permit for Non-Commercial Flight (PNCF) was granted to Nigerian Police (NP) on 19th November, 2010 by NCAA and was valid for three years from date of issuance. See Appendix 3: Permit for Non-Commercial Flight (PNCF). NPAW does not have approved Standard Operating Procedures (SOPs) and relevant Operations Manuals (Ops Manuals).

NPAW is an Approved Maintenance Organisation (AMO) with AMO Number AMO/5N/NPF issued by NCAA valid till 13th October, 2018.

1.17.1.1 NPAW crew pairing arrangement for XLS+

According to information provided to AIB-N, NPAW has one Pilot on contract and two Co-pilots rated on XLS+. In the case of the incident flight, the Pilot was scheduled to operate the flight as a Co-pilot while the Co-pilot was scheduled to operate as a pilot.

1.17.2 Nigerian Civil Aviation Authority (NCAA)

NCAA is the regulatory body for aviation in Nigeria. It became autonomous with the passing into law of the Civil Aviation Act 2006 by the National Assembly and assent of the President of the Federal Republic of Nigeria. The Act empowers the Authority

to regulate Aviation Safety and also carry out oversight functions of airports, airspace, meteorological services etc as well as economic regulations of the industry.

1.17.2.1 NCAA Correspondence

Records from NCAA indicated that the NPAW Permit for Non-Commercial Flights (PNCF) to conduct Corporate Aviation Operation was initially issued on the 19th November, 2010. The PNCF was later renewed on 8th September, 2014. A letter dated 20th February, 2017 was sent to NPAW informing them of the date of expiry and Nig.CARs part 18.2.4.2 requirement to initiate the renewal process 6 months prior to expiry. Further correspondence on subject matter was not received by NCAA from NPAW and the permit expired on the 7th September, 2017 and is yet to be renewed.

Extracts from Nig. CARs 2015

2.2.1.7. (b)(1) *The holder of a licence, certificate, authorization or designation shall not exercise privileges other than those granted by the licence, certificate, authorization or designation.*

The privileges granted by a licence, or by related ratings, may not be exercised unless the holder maintains competency and meets the requirements for recent experience of this Part.

8.10.1.26. Supervised Line Flying-pilots.

(a) Each pilot initially qualifying as PIC shall complete a minimum of 10 flights performing the duties of a PIC under the supervision of a check pilot.

8.10.1.37. Instructor Training

(a) No person may serve nor may any AOC holder use a person as an instructor for flight crew, cabin crew or flight dispatcher, unless he or she has completed the curricula approved by the Authority for those functions for which they are to serve.

(b) Specific training programme requirements for flight crew instructors are contained in IS: 8.10.1.37.

IS:8.10.1.37. – *(a) Flight crew instructor training.*

(1) No operator may use a person, nor may any person serve as flight instructor in a training programme unless:

(ii) within the preceding 24 calendar months, that person satisfactorily conducts instructions under the observation of an inspector from the Authority.

IS:8.10.1.40. – *(a) Training for check personnel-general.*

(1) No operator may use a person, nor may any person served as a check person in a training programme unless, with respect to the aircraft type involved, that person has satisfactorily completed the appropriate training phases for the aircraft, including recurrent training and differences training, that are required to serve as PIC, as applicable.

8.10.1.38. Personnel Approved to Conduct Checks

(a) The Authority may approve the following AOC holder personnel to conduct checks when such personnel meet the requirements for the authorised responsibilities, and may be approved for either aircraft or simulator, or both, as applicable, for checking of flight crew—

(1) Check pilot;

....

(b) The authorized duties of check personnel are to—

(1) Conduct initial and recurrent proficiency checks for flight crew and competency checks for cabin crew and flight operations officers,

(2) Certify as satisfactory, the knowledge and proficiency of the flight crew, and the knowledge and competency of the cabin crew and flight operations officers; and

(3) For all check personnel, supervise operating experience (OE).

8.14. Corporate Aviation Operations

8.14.2. Flight Operations.

8.14.2.1. Operating Facilities.

An operator shall ensure that a flight will not be commenced unless it has been ascertained by every reasonable means available that the ground and/or water facilities including communication facilities and navigation aids available and directly required on such flight, for the safe operation of the aircraft, are adequate for the type of operation under which the flight is to be conducted.

8.14.2.3. Operations Manual.

(a) An operator shall provide, for the use and guidance of personnel concerned, an operations manual containing all the instructions and information necessary for operations personnel to perform their duties. The operations manual shall be amended or revised as is necessary to ensure that the information contained therein is kept up to date. All such amendments or revisions shall be issued to all personnel that are required to use this manual. The operations manual shall be approved by the Authority in accordance with IS: 8.14.2.3.

8.14.2.6. Checklists

(a) Checklists shall be used by flight crews prior to, during and after all phases of operations, and in emergencies, to ensure compliance with the operating procedures contained in the aircraft operating manual and the aircraft flight manual or other documents associated with the certificate of airworthiness and otherwise in the operations manual, are followed. The design and utilization of checklists shall observe Human Factors principles.

8.14.2.11. Flight Preparation.

(a) The operator shall develop procedures to ensure that a flight is not commenced unless:

(1) The aircraft is airworthy, duly registered and that appropriate certificates with respect thereto are on board the aircraft; ...

(b) The instruments and equipment installed in the aircraft are appropriate, taking into account the expected flight conditions;

(c) Any necessary maintenance has been performed in accordance with Sub-part 8.14.10

(d) The mass of the aircraft and centre of gravity location are such that the flight can be conducted safely, taking into account the flight conditions expected;

(e) any load carried is properly distributed and safely secured; and

(f) the aircraft operating limitations, contained in the flight manual, or its equivalent, will not be exceeded.

8.14.2.12. Operational Flight Planning.

(a) An operator shall specify flight planning procedures to provide for the safe conduct of the flight based on considerations of aircraft performance, other operating limitations and relevant expected conditions on the route to be followed and at the aerodromes concerned. These procedures shall be included in the operations manual.

8.14.3.5. Duties of Pilot-in-Command.

(a) The pilot-in-command shall ensure that the checklists specified in 8.14.6 are complied with in detail.

(b) The pilot-in-command shall be responsible for notifying the nearest appropriate authority by the quickest available means of any accident involving the aircraft, resulting in serious injury or death of any person or substantial damage to the aircraft or property. In the event that the pilot-in command is incapacitated the operator shall take the forgoing action.

(c) The pilot-in-command shall be responsible for reporting all known or suspected defects in the aircraft, to the operator, at the termination of the flight.

(d) The pilot-in-command shall be responsible for the journey log book or the general declaration containing the following information:

(1) Aircraft nationality and registration;

(2) Date;

(3) Crew member names and duty assignments;

(4) Departure and arrival points and times;

(5) Purpose of flight;

(6) Observations regarding the flight; and

(7) Signature of the pilot-in-command.

8.14.5. Cabin Baggage (Take-off and Landing)

(a) An operator shall specify procedures to ensure that all baggage carried onto an aircraft and taken into the passenger cabin is adequately and securely stowed.

8.14.6. Aircraft Performance Operating Limitations.

(a) An aircraft shall be operated in compliance with the terms of its certificate of airworthiness and within the approved operating limitations contained in its flight manual.

(b) The State of Registry shall take such precautions as are reasonably possible to ensure that the general level of safety contemplated by these provisions is maintained under all expected operating conditions, including those not covered specifically by the provisions of this part.

(c) A flight shall not be commenced unless the performance information provided in the flight manual indicates that the Standards of 8.14.4 to 8.14.8 can be complied with for the flight to be undertaken.

(d) In applying the regulations in this Part, account shall be taken of all factors that significantly affect the performance of the aircraft (such as : mass, operating procedures, the pressure altitude appropriate to the elevation of the aerodrome, temperature, wind, runway gradient and condition of runway, i.e. presence of slush, water and/or ice, for landplanes, water surface condition for seaplanes). Such factors shall be taken into account directly as operational parameters or indirectly by means of allowances or margins, which may be provided in the scheduling of performance data or in the comprehensive and detailed code of performance in accordance with which the aircraft is being operated.

8.14.9.4. Qualifications.

(a) Flight crew member licensing

(1) An operator shall:

(i) Ensure that each flight crew member assigned to duty holds a valid licence issued by the State of Registry, or if issued by another Contracting State, rendered valid by the State of Registry;

(ii) Ensure that flight crew members are properly rated; and

(iii) Be satisfied that flight crew members are competent to carry out assigned duties.

8.14.10. Flight Operations Officer/Flight Dispatcher.

(a) An operator shall ensure that any person assigned as a flight operations officer/flight dispatcher is trained and maintains familiarization with all features of the operation which are pertinent to their duties, including knowledge and skills related to Human Factors.

Extract from NCAA Technical Guidance Materials Volume 1 (General Inspector Handbook) Chapter 11 Section 2

Flight Operations Inspector - Principal Operations Inspector (POI)

I. Position summary

The Principal Operations Inspector functions as the primary operations interface between assigned air carriers and other aviation entities, and the NCAA. Has program responsibility to assure that assigned organizations meet Nigerian CARs with respect to operations programs. Determines the need for and establishes work

programs for surveillance and inspection of assigned organizations within manpower and budget limitations to assure adherence to the applicable regulations.

II. Duties and responsibilities

A. Technical administration

Assures on a continuing basis that assigned organizations are properly and adequately organized, staffed, and equipped; have and conduct an adequate training program, including an acceptable record keeping system; and have facilities and procedures that meet all regulatory requirements; Chairs joint NCAA-industry meetings; maintains regular contact with organizations assigned; and coordinates with top management officials. Requires or directs correction of any deficiencies/discrepancies and refuses or withdraws approval if they cannot be resolved.

Is responsible for the conduct of enforcement investigations and preparation of final reports and recommendations; Performs or supervises the emergency suspension of certificates or cancellation of operations specifications. Conducts or directs the re-examination of certificated airmen or re-certification of an operator or agency.

Conducts investigations of public complaints, government inquiries, and aircraft incidents and accidents;

Provides verbal and/or written technical assistance to legal counsel, testifies at court trials and formal hearings, and gives depositions.

Coordinates Minimum Equipment List (MEL) approvals with Principal Airworthiness Inspectors; Takes enforcement action in instances of non-compliance with the MEL;

Coordinates with other inspectors as required to accomplish additional air carrier surveillance.

B. Certification

Approves/accepts or disapproves/rejects manuals and revisions. May require amendments to previously approved manuals to correct any conflict with regulatory requirements, eliminate unsafe practices, and/or improve the specificity of instruction.

Evaluates training programs to ensure that they meet the requirements of the Nigerian CARs and associated NCAA guidance materials; Approves or disapproves these training programs including flight simulators, training devices, or other equipment used in these programs;

Approves/disapproves designations of check airmen and makes recommendations on the appointment of designees.

Evaluates operations and facilities by on-site inspections and review of reports by other inspectors or other personnel; Negotiates changes that are essential or desirable in their policies and procedures. Determines the appropriate methods and/or plans for implementing corrective action and determines through on-site inspection or inspector reports the effectiveness of corrective action taken.

Evaluates and approves/disapproves requests to operate under conditions not previously authorized and may prescribe additional conditions and limitations as appropriate.

Approves the original issuance of operations specifications and issues original operation certificates; Approves amendments to operations specifications.

Evaluates the safety of proposed changes in route or airport authorizations; Prescribes any changes required before approval.

Directs or participates in proving flight evaluations to determine compliance with Nigerian CARs; Recommends changes that will be required prior to approval.

C. Surveillance

Responsible for monitoring all phases of company operations, including: training programs and records, base and station facilities, and route systems. Coordinates with and reviews reports from other inspectors and other personnel to identify trends that indicate deterioration in the safety of operations. Directs or suggests changes required to correct such trends.

Responsible for monitoring the activities of designated examiners, check airmen, and instructors.

D. Other

May be assigned other duties and responsibilities as required;

The inspector may be required to participate in the NCAA flight program as a flight crew member. If so, the inspector will be required to meet the medical and flight currency requirements set forth in NCAA orders governing the operation of aircraft.

The inspector, when so directed, is required to keep an appropriate control point informed as to his/her whereabouts and the telephone number at which he/she can be reached in the event of an aviation incident/accident requiring NCAA investigation.

III. Supervision received

The inspector independently performs technical execution of assigned regulatory, certification and/or surveillance activities. An assigned supervisor provides general technical and administrative supervision. Actions taken are guided by adherence to Nigeria Civil Aviation Regulations, national and regional directives and sound management practices.

CHAPTER 11 SECTION 5

Airworthiness Inspector - Principal Airworthiness Inspector (Maintenance/Avionics)

I. Position summary

The Principal Airworthiness Inspector (Maintenance/Avionics), functions as the primary airworthiness interface between assigned air operators and other aviation entities, and the Nigeria Civil Aviation Authority (NCAA). Has program responsibility to assure that assigned organizations meet the Nigerian Civil Aviation Regulations with respect to maintenance, preventive maintenance, and alteration programs. Determines the need for and establishes work programs for surveillance and inspection of assigned organizations within manpower and budget limitations to assure adherence to the applicable regulations.

II. Duties and responsibilities

A. Technical administration

Assures on a continuing basis that assigned organizations are properly and adequately organized, staffed, and equipped, have and conduct an adequate training program including an acceptable record keeping system, and have facilities and procedures that meet all regulatory requirements. Chairs joint NCAA-industry meetings; maintains regular contact with organizations assigned; and coordinates with top management officials. Requires or directs correction of any deficiencies/discrepancies and refuses or withdraws approval if they cannot be resolved.

Develops maintenance program requirements through participation on Maintenance Review Boards, coordinates Minimum Equipment List (MEL) approvals with the principal operation inspector and takes enforcement action in instances of non-compliance with the MEL.

Responsible for the conduct of enforcement investigations and preparation of final reports and recommendations, performs or supervises the emergency suspension of certificates or cancellation of operations specifications. Conducts or directs the re-examination of certificated airmen or re-certification of an operator or agency.

He/she conducts investigations of public complaints, government inquiries, and aircraft incidents and accidents.

Provides verbal and/or written technical assistance to legal counsel, testifies at court trials and formal hearings, and gives depositions.

Coordinates with other inspectors as required to accomplish additional air carrier surveillance.

B. Certification

Has responsibility for initial and ongoing certification of air carriers, aircraft, airmen and air agencies.

Evaluates requests for an air carrier to operate under conditions not previously specified in the maintenance portion of the operations specifications, approves or disapproves requests and provides additional conditions and limitations as needed.

Provides guidance to assigned air carriers in the development of required maintenance manuals and record keeping systems. Reviews and determines adequacy of manuals associated with the air carrier's maintenance programs and revisions. Assures that manuals and revisions comply with regulatory requirements, prescribe safe practices, and furnish clear and specific instructions governing maintenance programs and approves operations specifications and amendments.

Determines if air carrier maintenance/avionics facilities and contract arrangements for the purpose of overhaul work, major repairs, alterations, and other maintenance are satisfactory. Reviews changes and negotiates with air carrier management to resolve problems.

Determines if overhaul and inspection time limitations warrant revision.

Evaluates an operator's proposed reliability programs for compliance with the Authority's policies, advises operator of deficiencies and required changes and approves/disapproves reliability programs.

Determines if the air carrier's training program meets the requirements of the Nigeria Civil Aviation Regulations, is compatible with the maintenance program, is properly organized and effectively conducted, and results in trained and competent personnel.

Directs or participates in proving flight evaluations to determine compliance with the Nigerian CARs, recommends changes that will be required prior to approval.

C. Surveillance

Directs the inspection and surveillance of the air carrier's continuous airworthiness maintenance program, monitors all phases of the air carrier's maintenance operation, including the following: maintenance, engineering, quality control, production control, training, and reliability programs.

Analyzes trends to detect deterioration in the maintenance program.

Analyzes reports submitted by the air carrier to ensure compliance with the maintenance program and assures the air carrier has an effective continuing analysis and surveillance program to meet the requirements of the Nigeria Civil Aviation Regulations.

Responsible for monitoring the activities of air operators and other industry personnel.

Other

May be assigned other duties and responsibilities as required.

The inspector, when so directed, is required to keep an appropriate control point informed as to his/her whereabouts and the telephone number at which he/she can be reached in the event of an aviation incident/accident requiring NCAA investigation.

III. Supervision received

The inspector independently performs technical execution of assigned regulatory, certification and/or surveillance activities. An assigned supervisor provides general technical and administrative supervision. Actions taken are guided by adherence to Nigeria Civil Aviation Regulations, national and regional directives and sound management practices.

1.18 Additional information

1.18.1 Standard Operating Procedures (SOPs)

Standard Operating Procedures (SOPs) are universally recognized as a basic to safe aviation operations. Effective crew coordination and crew performance, two central concepts of Crew Resource Management (CRM), depend upon the crew's having a shared mental model of each task. That mental model, in turn, is founded on SOPs. SOPs should be clear, comprehensive, and readily available in the manuals used by flight deck crewmembers.

Source: <https://cfapp.icao.int/fsix/Library/AC%20120%2071.pdf>

1.18.2 Crew Resource Management/Cockpit Resource Management (CRM)

Crew Resource Management (CRM) is the effective use of all available resources for flight crew personnel to assure a safe and efficient operation, reducing error, avoiding stress and increasing efficiency.

CRM was developed as a response to new insights into the causes of aircraft accidents which followed from the introduction of flight data recorders (FDRs) and cockpit voice recorders (CVRs) into modern jet aircraft. Information gathered from these devices has suggested that many accidents do not result from a technical malfunction of the aircraft or its systems, nor from a failure of aircraft handling skills or a lack of technical knowledge on the part of the crew; it appears instead that they are caused by the inability of crews to respond appropriately to the situation in which they find themselves. For example, inadequate communications between crew members and other parties could lead to a loss of situational awareness, a breakdown in teamwork in the aircraft, and, ultimately, to a wrong decision or series of decisions which result in a serious incident or a fatal accident.

The widespread introduction of the dynamic flight simulator as a training aid allowed various new theories about the causes of aircraft accidents to be studied under experimental conditions. On the basis of these results, and in an attempt to remedy the apparent deficiency in crew skills, additional training in flight deck management techniques has been introduced by most airlines. Following a period of experimentation and development, the techniques embraced by the new training became known collectively as CRM. The importance of the CRM concept and the utility of the training in promoting safer and more efficient aircraft operations have now been recognised worldwide.

CRM encompasses a wide range of knowledge, skills and attitudes including communications, loss of situational awareness, problem solving, decision making, and teamwork; together with all the attendant sub-disciplines which each of these areas entails. The elements which comprise CRM are not new but have been recognised in one form or another since aviation began, usually under more general headings such as 'Airmanship', 'Captaincy', 'Crew Co-operation', etc. In the past, however, these terms have not been defined, structured or articulated in a formal way, and CRM can be seen as an attempt to remedy this deficiency. CRM can therefore be defined as a management system which makes optimum use of all

available resources - equipment, procedures and people - to promote safety and enhance the efficiency of flight operations.

CRM is concerned not so much with the technical knowledge and skills required to fly and operate an aircraft but rather with the cognitive and interpersonal skills needed to manage the flight within an organised aviation system. In this context, cognitive skills are defined as the mental processes used for gaining and maintaining situational awareness, for solving problems and for taking decisions. Interpersonal skills are regarded as communications and a range of behavioural activities associated with teamwork. In aviation, as in other walks of life, these skill areas often overlap with each other, and they also overlap with the required technical skills. Furthermore, they are not confined to multi-crew aircraft, but also relate to single pilot operations, which invariably need to interface with other aircraft and with various ground support agencies in order to complete their missions successfully.

(The above paragraphs were taken from a paper by the CRM Standing Group of the Royal Aeronautical Society (RAS))

Classroom training in CRM must be provided in conjunction with simulator revalidation training. Of particular importance is its integration with Line Oriented Flight Training (LOFT), which involves response to realistic scenarios where the application of CRM principles will usually be the road to successfully coping. LOFT details have become a standard component of most commercial operator aircraft type training.

CRM originally was referenced as "cockpit resource management," but the term was later broadened to encompass the entire crew.

1.18.2.1 ICAO Standards

An operator shall establish and maintain a ground and flight training programme, approved by the State of the Operator. The training programme shall include

training in knowledge and skills related to human performance (ICAO Annex 6 Part 1 Chapter 9 Para 9.3.1).

1.18.3 Cessna Citation Model 560 XLS+ Parking Brake Systems (Operation)

The parking brake is designed to hold an aircraft in place when the engines are not producing thrust. If the engines are started and the throttle levers are advanced, the thrust from the engines can cause the aircraft to move and the tyres to rotate. When this occurs the brake disks rub against the brake pads and cause heat to build-up. The heat can build up enough to start a fire. However, to activate the parking brake the control knob has to be pulled aft by the pilot so that it will be sticking out from underneath the instrument panel when activated.

The two most likely scenarios for partial parking brake operation are:

1. The pilot fails to fully depress the brake pedal when setting the parking brake
2. The brakes lose pressure over time (this is why it is recommended to use wheel chocks to keep the aircraft from moving when parked).

A partially set parking brake could also cause an aircraft not to accelerate normally. It can also lead to a wheel fire because of the brake pads rubbing against brake disks thus generating heat.

There is no protection in the parking brake system to prevent the aircraft from taking off with parking brake ON. Also, there is no Crew Alerting System (CAS) message for activation of the parking brake in Cessna Citation 560 XLS+.

2.0 ANALYSIS

2.1 General

The crew was qualified and certified for the flight in accordance with existing regulations.

The maintenance records indicated that the aircraft was maintained in accordance with existing regulations and approved maintenance programme. It also had a valid Certificate of Airworthiness with no deferred defect entries in the Technical log.

However, the Permit for Non-Commercial Flight Operations (PNCF) was not renewed since its expiration (7th September, 2013). Therefore, the investigation found that the NP's PNCF was not valid.

2.2 Conduct of the flight

This section focuses mainly on analysis of conduct of the flight based on Nig. CARs 2015. It is important to mention that The Nigeria Police Airwing (NPAW) did not have approved operational procedural guidance manuals, such as Standard Operating Procedures (SOPs), Quick Reference Handbook (QRH) as required by sub-part 8.14 (Corporate Aviation Operations) of Nig. CARs 2015.

The flight was scheduled to be a normal flight in accordance with NPAW standard crew pairing (Pilot on the left and Co-pilot on the right) but was conducted contrary to this arrangement, i.e. the Pilot sat on the right while the Co-pilot sat on the left seat. This shows that the flight was conducted as supervised flight with Pilot-in-Command Under Supervision (PIC/US).

In view of the above, the flight was inappropriately operated because both flight crew members were not qualified to sit and operate at sitting positions during the flights as at the time of the occurrence. This is not in compliance with sections

2.2.1.7.(b)(1), 8.10.1.26 (a) and 8.10.1.38 (a) (1), IS: 8.10.1.37 (a)(1)(i) and (ii) and IS: 8.10.1.40 (a)(1) of Nig. CARs 2015 respectively.

2.3 Crew Resource Management (CRM) relating to the flight

The flight crew carried out the responsibilities of an assigned dispatcher in addition to their normal duties. This resulted in improper dispatch of the flight, leading to lack of standard crew briefing, acquisition of essential documents relating to the flight information such as flight plan (DNAA - DNBC), fuel loading, weight and balance, weather forecasts, NOTAMs and proper record keeping. Therefore, the flight was not dispatched appropriately in compliance with the provisions of section 8.14.10 of Nig. CARs 2015.

Initial walk-around was conducted prior to the beginning of the first flight by the PM, but the outcome of this walk-around was not reported to the PF and the PF did not at any time request for the outcome of the walk-around.

On ground DNBC after parking, the PM stated that he conducted a walk-around but he did not report the outcome of the walk-around to PF. Also, the PF did not instruct the PM to conduct the walk-around at any time. This clearly identifies a disconnect between the flight crew, which poses safety concerns to the conduct and safe operation of flights and is not in compliance with the provisions of paragraph 8.14.3.5 of Nig. CARs 2015. The PF instructed the Cabin Crew (CC) to put ON the chocks after parking later instructed the CC to remove the chocks and come back into the aircraft and close the door.

These actions according to the Normal Checklist call for the Parking Brake to be SET and RELEASE respectively. It also confirms that the Parking Brake was used during the transit.

Both the PF and PM could not confirm that the required checklists (Shut-down, Before Starting Engines, Taxi and Rolling Take-Off) were accomplished for the

intended DNBC - DNAK sector (the incident flight). It is important to highlight that most of these checklists contained "Brake" action items (SET or RELEASE). This could have eliminated doubts about the position of the Parking Brake (SET or RELEASE). This is not in compliance with the provisions of paragraph 8.14.2.6 of Nig. CARs 2015.

2.4 Rejected take-off

The Duty Air Traffic Control Officer (DATCO) at DNBC observed that the aircraft appeared to take longer than the normal time required for the take-off roll, however FDR information showed that the aircraft had normal longitudinal acceleration compared to previous take-off from DNAA and as such did not reveal any evidence of sluggish acceleration. Furthermore, the FDR revealed that the aircraft attained 130 KIAS, which was above the speed (107 knots) required for the aircraft to take-off, even with the aft elevator pressure the aircraft could not lift up and the pilot decided to reject the takeoff. Therefore, the investigation could not determine the reason the aircraft failed to lift up upon attaining the rotation speed (V_r). It is important to note that there is no protection for the parking brake system to prevent the aircraft from taking off with parking brake ON. Also, there is no Crew Alerting System (CAS) message for activation of the parking brake in aircraft.

2.5 Damage to the main wheels

The parking brake is designed to hold an aircraft in place when the engines are not producing thrust. With engines running and throttle levers advanced, the thrust from the engines can cause the tyres to rotate and move the aircraft.

It is possible for the parking brake to operate partially even when the parking brake knob is pushed forward if the pilot fails to fully depress the brake pedal when setting the parking brake. The PF stated that he maintained his toes on the brakes up to the

time they commenced taxi, meanwhile it is also possible that he did not fully depress the brake pedals while setting the parking brakes. This might have led to partial operation of the parking brake during the taxi out and take-off roll.

When this occurs, the brake disks rub against the brake pads and causes heat to build-up which can be enough to start a wheel fire. This condition of partial operation of the parking brake during the taxi and take-off roll led to brake binding which resulted in wheel fire.

3.0 CONCLUSIONS

3.1 Findings

1. The flight crew were medically fit and adequately rested to operate the flight.
2. The aircraft was certified, and maintained in accordance with existing regulations and approved maintenance programme.
3. The aircraft had a valid Certificate of Airworthiness.
4. There were no deferred defect entries in the Technical log.
5. The Permit for Non-Commercial Flight Operations (PNCF) had not been renewed since its expiration on 18th November, 2013.
6. The operator does not have an approved Operations Manuals.
7. The dispatch was done by the flight crew after receiving some of the flight release documents (flight plan and weather forecast for DNBC to DNAK).
8. The flight was scheduled to be operated with the Co-pilot as the Pilot and the Pilot as the Co-pilot.
9. The Pilot was the pilot flying (PF) and the Co-pilot was the pilot monitoring (PM).
10. The relationship between the flight crew was not cordial.
11. The CRM of the crew was inadequate.
12. The PF was pilot in command under supervision (US).
13. The TRI/TRE endorsement on type, valid till 21st April 2011.
14. The TRI/TRE endorsement was also valid for PAAN African Airlines Limited.
15. The PM conducted a transit walk-around and did not report the outcome to the PF.
16. The flight from Abuja to Bauchi was normal.
17. The PF did not request for the outcome of the transit walk-around.
18. ATC tried to alert the flight crew of sparks of fire from the right wheels during the take-off roll.

19. ATC did not notify AIB-N about the occurrence.
20. The aircraft did not lift-up on reaching calculated (V_r) speed even with aft elevator pressure and the take-off was aborted.
21. The aircraft came to a stop at about 45° to the right of centre line, 603 m (1,977 ft) before the end of RWY 17.
22. The crew members evacuated the aircraft unassisted before the arrival of ARFFS personnel.
23. The seats and restraints of the aircraft were all intact.
24. Fire was observed from the main landing gear after the aircraft stopped.
25. Aircraft Rescue and Fire Fighting Services (ARFFS) personnel arrived at the scene at about 5 minutes after the crash alarm bell sounded and put out the main wheel fire.
26. The position of the parking brake is not easily visible to the pilot on the right seat.
27. The aircraft has no Crew Alerting System (CAS) message associated with the parking brake operation.
28. The NPAW had already changed both main wheel assemblies and removed the aircraft before notifying AIB-N.
29. The Nigeria Police notified AIB-N 19 days after the occurrence.

3.2 Causal factor

Uncoordinated flight as a result of inadequate Crew Resource Management (CRM) that led to the partial release of parking brake, which resulted in rejected take-off.

3.3 Contributory factors

1. Inability of the aircraft to lift-up after attaining the rotation speed (V_r) during take-off roll even with aft elevator pressure.
2. Non-adherence to Standard Operating Procedures (SOPs) as contained in the XLS+ Airplane Flight Manual.

4.0 SAFETY RECOMMENDATIONS

4.1 Safety Recommendation 2021-015

Cessna Aircraft Company (Textron Aviation), USA should consider redesigning the parking brake system of Cessna Citation XLS+ to incorporate take-off protection, visual and aural warnings and also make the position visible to both occupants of the cockpit.

4.2 Safety Recommendation 2021-016

The Nigeria Police Airwing should develop Operations Manuals and Standard Operating Procedures in accordance with the provisions of sub-part 8.14 of the Nigeria Civil Aviation Regulations for guidance.

4.3 Safety Recommendation 2021-017

The Nigeria Police Airwing should ensure that flight crew adhere to all provisions of CRM during flight operations.

4.4 Safety Recommendation 2021-018

Nigeria Civil Aviation Authority should ensure that NPAW flight operations are carried out in accordance with relevant provisions of Nig. CARs 2015.

4.5 Safety Recommendation 2021-019

The Nigeria Civil Aviation Authority (Principal Maintenance Inspector (PMI)/Principal Operations Inspector (POI)) attached to Nigeria Police Airwing should intensify oversight function on Nigeria Police Airwing's operations.

APPENDICES

Appendix 1: Power brake/anti skid system



CITATION XLS+ OPERATING MANUAL

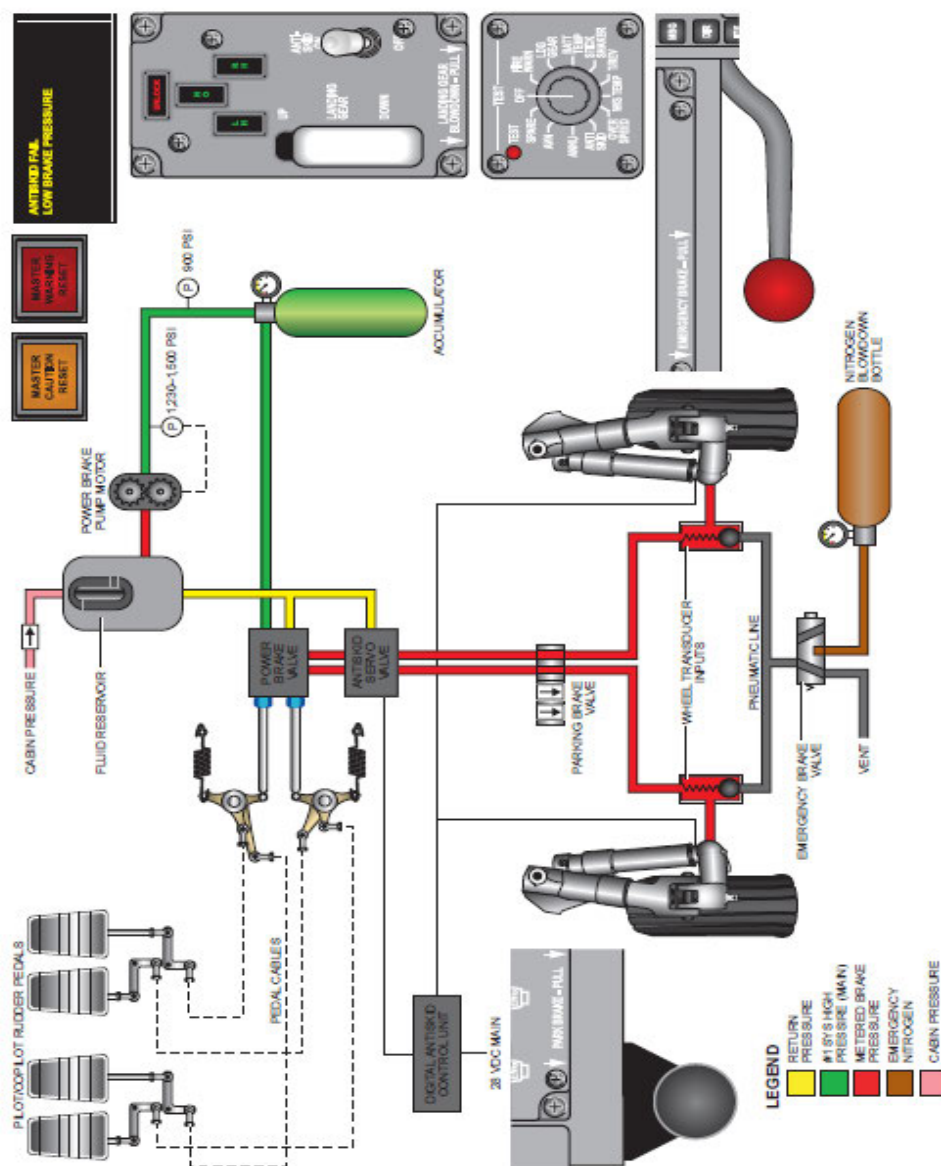


Figure 14-11. Power Brake/Antiskid System

Appendix 2: Simplified criteria- Flaps 15° takeoff

Simplified Criteria - Flaps 15° Takeoff

If the following conditions are met, the simplified performance may be used.

1. No obstacle in flight path.
2. Throttles - TO detent.
3. Anti-ice - OFF.
4. Flaps - 15.
5. Takeoff field length available - 5000 feet or longer.
6. No tailwind.
7. No runway gradient.
8. Dry paved runway.

The values to be used are as follows:

WEIGHT	20,200 POUNDS OR LESS	20,200 POUNDS OR LESS	20,200 POUNDS OR LESS
ALTITUDE OF AIRPORT	2000 FEET OR BELOW	4000 FEET TO 2001 FEET	6000 FEET TO 4001 FEET
AMBIENT TEMPERATURE	25°C OR LESS	20°C OR LESS	10°C OR LESS
V ₁	102 KIAS	103 KIAS	102 KIAS
V _R	107 KIAS	107 KIAS	107 KIAS
V ₂	118 KIAS	118 KIAS	118 KIAS
SINGLE-ENGINE CLIMB SPEED	160 KIAS	160 KIAS	160 KIAS

56XFM8-00-00

Taxi

1. PASS SAFETY Switch ON
2. Exterior Lights As Required
3. Brakes Check
4. Steering Check
5. Thrust Reversers Check*
6. Flight Instruments Check

3-710-12

Configuration AA

56XCLBNP-02

Appendix 3: Permit for Non Commercial Flight (PNCF)

 **FEDERAL REPUBLIC OF NIGERIA**
NIGERIAN CIVIL AVIATION AUTHORITY

 **NCAA**

PERMIT NUMBER
NCAA/ATR66/NCF33
ISSUE 2

PERMIT FOR NON-COMMERCIAL FLIGHT (PNCF)

A permit to operate non-commercial flight within and outside Nigeria is hereby granted, pursuant to Section 32 of the Civil Aviation Act 2006, to:

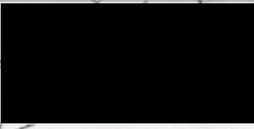
THE NIGERIA POLICE AIRWING
OLD DOMESTIC AIRPORT,
MURTALA MUHAMMED AIRPORT
IKEJA, LAGOS.

for a period of three (3) years with effect from 19th day of November, 2010 to operate the following aircraft types:

- (i) Bell 206B III
- (ii) Bell 222B
- (iii) Bell 427
- (iv) Bell 412
- (v) Bell 429
- (vi) Bell 430 and

levant

Dr. H. O. Demuren
DIRECTOR GENERAL



The privileges and conditions which form part of this Permit are in the attached annex