



AIRCRAFT ACCIDENT REPORT

DANAL/2019/01/23/F

Accident Investigation Bureau

**Final Report on the Serious Incident involving a Dornier
328-100 aircraft with nationality and registration marks
5N-DOX, operated by Dornier Aviation Nigeria AIEP
(DANA) Limited, which occurred at Port Harcourt Military
Airport On 23rd January, 2019**

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

The report is based on the investigation carried out by AIB, in accordance with Annex 13 to the Convention on International Civil Aviation, Nigerian 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 ABBREVIATIONS USED IN THIS REPORT

AIB	Accident Investigation Bureau, Nigeria
ATC	Air Traffic Control
ATPL (A)	Airline Transport Pilot License (Aeroplane)
C of A	Certificate of Airworthiness
CVR	Cockpit Voice Recorder
DANA	Dornier Aviation Nigeria AIEP Limited
DNMM	ICAO locator for Murtala Muhammed Airport, Lagos
DNPM	ICAO locator for Port Harcourt Military airport
DNPO	ICAO locator for Port Harcourt International Airport
FDR	Flight Data Recorder
ft	Feet
F/O	First Officer
h	hour (time)
ICAO	International Civil Aviation Organization
KHz	Kilo Hertz
m	meter
NCAA	Nigerian Civil Aviation Authority
NM	Nautical Mile



PF	Pilot Flying
PIC	Pilot-in-Command
PM	Pilot Monitoring
QRH	Quick Reference Handbook
SOPs	Standard Operating Procedures
UTC	Coordinated Universal Time
VFR	Visual Flight Rules
VOR	Very High Frequency Omnidirectional Range



5N-DOX

Aircraft accident report number:	DANAL/2019/01/23/F
Registered owner:	Dornier Aerospace International (DASI) GmbH, 6020 Innsbruck, Austria
Registered operator:	Dornier Aviation Nigeria AIEP (DANA) Limited, Kaduna
Aircraft type and model:	Dornier 328 -100
Manufacturer:	Fairchild Dornier Luftfahrt GmbH, Germany
Year of manufacture:	1997
Serial number:	3073
Nationality and registration marks:	5N-DOX
Location:	Port Harcourt Military Airport, Port Harcourt
Date and time:	23rd January, 2019 at about 10:03 h

*(All times in this report are
local time (UTC+1) unless
otherwise stated)*

SYNOPSIS

Accident Investigation Bureau; Nigeria (AIB) was notified of the serious incident by the Operator in the evening of 24th January, 2019. Air Safety Investigators were dispatched to the site and arrived Port Harcourt Military Airport on 25th January, 2019. Post incident assessment commenced immediately under the provision of Civil

Aviation (Investigation of Air Accident and Incidents) Regulations 2019 and ICAO Annex 13. All stakeholders were notified appropriately.

On the 23rd of January 2019, a Dornier 328-100 aircraft with nationality and registration marks 5N-DOX departed Finima, Bonny on a Visual Flight Rules (VFR) flight plan as flight DAV462. On board were 2 Pilots, 1 Cabin Crew, 1 Aircraft Maintenance Engineer, and 12 Passengers.

5N-DOX was routing Finima Bonny to Port Harcourt Military (DNPM) and from DNPM to Nnamdi Azikiwe International Airport Abuja (DNAA) on that day.

At 09:47 h, the aircraft departed Finima, Bonny for Port Harcourt as DAV462, the Co-pilot was Pilot Flying while the Pilot was the Pilot Monitoring.

At 09:50 h, DAV462 established contact with Port Harcourt Military and gave estimates. DAV462 was cleared by NAF Base ATC to FL 060 on QNH 1012 and to report released by Port Harcourt International ATC.

At 09:54 h, DAV462 called NAV Tower (DNPM) and reported "NOW Released by Civil, Request further DESCENT..."

At 09:58 h, at about 6.2 miles, the crew reported "RUNWAY IN SIGHT" to DNPM ATC. ATC cleared DAV462 to land Runway 22 in sight, wind 250°/06 knots.

At 10:00 h, DAV462 landed to right of the Runway Centre line (Runway 22).

At 10:03 h, Pilot Called "MAYDAY MAYDAY, we just overrun the Runway now and we are at the Apron at the Aero Contractors' ramp, we had a serious emergency".

At 10:04 h, ATC at Port Harcourt Military (DNPM) called DAV462 to ascertain the nature of the occurrence and the pilot responded, "I SAY AGAIN, WE HAD ENGINE EMERGENCY DURING LANDING, WE OVER RUN THE RUNWAY, WE ARE AT AERO APRON NOW."



ATC responded, "Copied, you skidded off the runway, the Fire Emergency Unit is beside you" and the Pilot Confirmed.

The crew and passengers disembarked without injuries.

The investigation identified the following:

Causal factor

Asymmetrical propeller torque experienced on ground during landing roll due propeller Control Unit (PCU) failure in-flight.

Contributory factor

1. Non-recognition of the prevailing torque oscillation malfunction.
2. Non-execution of the proper checklist.
3. Excessive right rudder application after landing.

Two Safety Recommendations were made.

1.0 FACTUAL INFORMATION

1.1 History of the flight

On 23rd January 2019, a Dornier 328-100 aircraft with nationality and registration marks 5N-DOX operated by Dornier Aviation Nigeria AIEP (DANA) Limited as passenger flight DAV462 from Finima, Bonny to Port Harcourt Military Airport (DNPM) and then to Nnamdi Azikiwe International Airport, Abuja. Visual Flight Rules (VFR) flight plan was filed for the flight. It was the first flight of the day. On board were 16 persons, including 12 passengers, 2 Pilots, 1 Cabin Crew and 1 Aircraft Maintenance Engineer with fuel endurance of two hours.

DAV462 was scheduled to depart at 08:15 h from Finima but was delayed due weather, reporting thunderstorm in rain at destination airport, DNPM.

At 09:47 h, the aircraft departed Finima. The Co-pilot was the Pilot Flying (PF) while the Pilot was the Pilot Monitoring (PM).

At 09:50 h, DAV462 established contact with Port Harcourt Military Airport Air Traffic Control (DNPM ATC) and passed its traffic information as follows "DO 328 MAINTAIN FL60 TO NAF BASE, AIRBORNE AT 47, NAF BASE GOING TO BE AT TIME 0900¹, ON BOARD 16-4 ENDURANCE TWO HOURS, 5N-DOX." ATC acknowledged and cleared DAV462 to FL060 and requested DAV462 to report released by Port Harcourt International Airport (DNPO).

At 09:54 h, DAV462 reported "NOW RELEASED TO YOU BY CIVIL REQUEST FOR FURTHER DESCEND, WE ARE RIGHT BASE OF LEFT BASE OF RWY 22." ATC responded "DAV462 DESCEND TO CIRCUIT ALTITUDE QNH 1012 REPORT TEN MILES FINAL RUNWAY 22".

At 09:58 h, the crew reported "WE ARE SIX MILES IN CONTACT WITH THE FIELD".

¹ 0900 is equivalent to 10:00 h.



At 09:59 h, ATC requested DAV462 to report runway 22 in sight, DAV462 acknowledged and confirmed they had runway 22 in sight, thereafter ATC issued a landing clearance "CLEARED TO LAND RUNWAY 22, WIND 250°/06 KNOTS, CHECK GREENS CLEAR TO LAND RUNWAY 22".

According to the crew at 6.2 NM they noticed that number 1 engine was producing torque² higher than the recommended 20% for final approach and landing. At flight idle, it was indicating 24%, whereas the number 2 engine was indicating the normal 20% torque at flight idle.

From post occurrence interview, there was no evidence that the crew of 5N-DOX took any action to correct this abnormal flight condition.

At 10:00 h, DAV462 landed right of centreline runway 22. The crew also stated that, on idling the power lever during the landing roll, torque from number 1 engine increased to 27% instead of decrease below 10% causing a differential torque between the engines. It showed a maximum value of 34%. The torque from number 2 engine decreased below 10% (normal indication). The aircraft veered off the runway to the right. The aircraft veered further right of the runway centreline onto the runway shoulder and was uncontrollable despite rudder application. BETA light³ were sighted and speed was higher than normal taxi speed. Emergency park brake was engaged. The aircraft came to a stop at Aero Contractors' ramp. The occupants disembarked without injury.

The incident occurred at 10:00 h in daylight and visual meteorological conditions prevailed.

² Torque is defined as a force which produces a rotating force on an object measured in Nm (Newton meter).

³ A cockpit indication for a position of the Power levers



1.2 Injuries to persons

Injuries	Crew	Passengers	Total in the aircraft	Others
Fatal	Nil	Nil	Nil	Nil
Serious	Nil	Nil	Nil	Nil
Minor	Nil	Nil	Nil	Not Applicable
None	4	12	16	Not Applicable
Total	4	12	16	

1.3 Damage to aircraft

The aircraft was slightly damaged.

1.4 Other damage

One runway edge light was damaged.

1.5 Personnel information

1.5.1 Pilot

Nationality: Nigerian

Age: 59 years

License type: Air Transport Pilot License (Aeroplane)

License: Valid till 30th December 2020

Aircraft ratings: Cessna-172, Piper Aztec 23, Hawker Siddeley 125-800, Dornier 228, Embraer 110 Dornier 328, Boeing 737-200,

	Beechcraft 300/350, British Aerospace Corporation BAC 1-11
Medical certificate:	Valid till 16th December, 2019
Simulator:	Valid till 17th February, 2019
Proficiency check:	Valid till 17th February, 2019
Total flying time:	18,400 h
Total on type:	6,500 h
Total on type (PIC):	6, 500 h
Last 90 days:	150 h
Last 28 days:	59 h
Last 24 hours:	1:50 h

1.5.2 Co-pilot

Nationality:	Nigerian
Age:	35 years
License type:	Airline Transport Pilot License (Aeroplane)
License:	Valid till 24th October, 2021
Aircraft ratings:	Beechcraft 58, Tampico Club-20, Dornier 328-100
Medical certificate:	Valid till 9th July, 2019
Simulator:	Valid till 17th June, 2019
Proficiency check:	Valid till 17th June, 2019
Total flying time:	3,900 h
Total on type:	3,650 h

Total on type (PIC):	1,700 h
Last 90 days:	100 h
Last 28 days:	Not Available
Last 24 hours:	1:50 h

1.6 Aircraft Information

1.6.1 General Information

Manufacturer:	Fairchild Dornier Luftfahrt GmbH, Germany
Model:	Dornier 328-100
Serial number:	3073
Year of manufacture:	1997
Certificate of Airworthiness:	Valid till 4th June, 2019
Certificate of Insurance:	Valid till 23rd May, 2019
Certificate of Registration:	15th August, 2009
Noise certificate:	28th January, 2008
Total hours since new:	22,141.1 h
Total cycles since new:	22,218
Total hours since last inspection:	35 h

5N-DOX



Figure 1: The incident aircraft

1.6.2 Powerplant

	Engine No. 1	Engine No. 2
Manufacturer	Pratt & Whitney Canada	Pratt & Whitney Canada
Engine type	PW 119B	PW 119B
Year of manufacture	1994	1995
Serial number	PCE-116064	PCE-116157
Time since new	31,457.4 h	20,697 h

1.6.3 Propeller

	Propeller No. 1	Propeller No. 2
Manufacturer	Hartzell Propeller Inc.	Hartzell Propeller Inc.
Type	HD-36C-3B	HD-36C-3B
Year of manufacture	Not Available	Not Available
Serial number	HL-224	HL-128
Total time since new	27.339 h	22,202.8 h
Total time since overhaul	127.1 h	367 h

1.6.4 Propeller Control Unit (PCU)

Manufacturer	Hartzell Propeller Inc.
Part Number/Model	D-1199-2
Serial Number	PCU-A-EFS316

The aircraft technical logbook entry of 23rd January 2019 (post-occurrence) indicated:

- "L/H engine propeller will not come out of feather."
- "L/H PCU replaced IAW DO328 MM 61-21-04. OPS, Rig Check, Leak Check, OK".

1.7 Meteorological information

Time: 0820UTC

Wind: 250°/06 kt

Visibility: 7 km



5N-DOX

Weather:	Thunderstorm
Cloud:	BKN 210m
Temp/Dew point:	25/24°C
QNH:	1012 hPa
Time:	0900UTC
Wind:	VRB/02 kt
Visibility:	8 km
Weather:	Slight Rain
Cloud:	BKN240 m
Temp/Dew point:	25/24°C
QNH:	1012 hPa

1.8 Aids to navigation

The status of the navigational aids at DNPO/DNPM on the day of the occurrence are as follows:

DNPO

VOR/DME	–	Serviceable
ILS/DME	–	Serviceable
NDB	–	Unserviceable

DNPM

Nil

1.9 Communication

There was two-way communication between the crew and the ATC.

DNPO

Approach frequency 124.9 MHz

Tower frequency 119.2 MHz

DNPM

Tower frequency 122.35 MHz

1.10 Aerodrome information

The Port Harcourt Military Airport is controlled by the Nigerian Air force (NAF). The coordinates of the airport are 4°50'45"N and 7°01'15"E. It is on an elevation of 63 ft AMSL with an asphalt-coated, bi-directional runway orientation of 04/22. The runway dimensions are 6, 923 ft by 82 ft (2117 m by 25 m) respectively.

1.11 Flight recorders

The aircraft is fitted with Cockpit Voice Recorder (CVR) and Flight Data Recorder (FDR). The recorders, whose particulars are given below, were retrieved and taken to the Bureau's Flight Safety Laboratory in Abuja for download and analysis.

	Cockpit Voice Recorder	Flight Data Recorder
Manufacturer	Honeywell	L3-Communications
Model	SSCVR	FA2100
Part number	980-6020-001	2100-4043-00
Serial number	0442	000126168

The Cockpit Voice Recorder (CVR) recordings were found to be overwritten while the FDR was downloaded and analysed. See the plot below, in Figure 2.

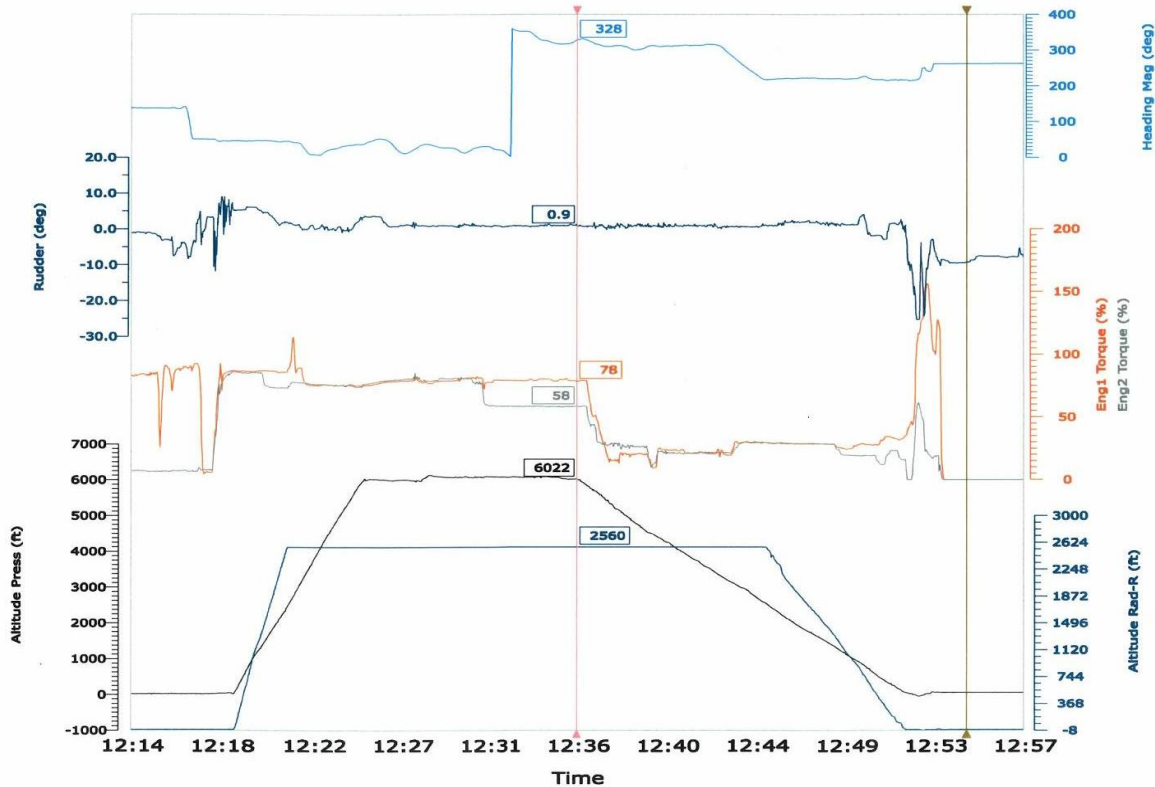


Figure 2: FDR Plot

Note:

1. The FDR showing a torque disparity of 20% (78/58) at 6,000 ft pressure altitude 23 minutes to DNPM.
2. The FDR showing initial rudder deployment of 26° right of the runway centreline immediately after touchdown.

1.12 Wreckage and impact information

Maintenance action on the replacement of the tyres and PCU for the incident aircraft had been carried out before the arrival of Air Safety Investigators.

Tyre marks on the runway showed that the aircraft exited the runway at a distance of 1,190 m from the threshold of runway 22. It further travelled on the runway shoulder for a distance of about 105 m. At a distance of approximately 98 m of its movement on the runway shoulder, the No. 4 right main tyre broke a runway edge light. The aircraft further veered off the runway shoulder and continued on the grass verge. It covered a distance of about 262 m on the grass verge. The aircraft travelled an additional distance of 259 m on the apron and came to a complete stop at about 3 m to the perimeter fence by the Aero Contractors ramp.



Figure 3: The main wheel tyre marks on the runway right shoulder (white arrow) and a damaged runway edge light (red arrow)



Figure 4: The aircraft main wheel tyre marks on the runway and the runway right shoulder



Figure 5: The aircraft's tyre marks on the Apron



1.13 Medical and pathological information

No medical or toxicological test conducted on the crew.

1.14 Fire

There was no fire.

1.15 Survival aspects

The occurrence was survivable because the aircraft was intact and there was liveable volume of space. The seat belts, shoulder harnesses and seats were intact and in normal position after the occurrence.

1.16 Test and research

The defective PCU was sent to the facility of The Hartzell Service Centre, Ohio, USA for tear down. The result is shown below:

The Hartzell Service Centre, FAA certified repair station SJ3R843L, issued work order 15265 to overhaul one Hartzell Propeller Control Unit model D-1192-2, serial number PCU-A-EFS316.

The PCU failed the incoming ATP because of low pressure at the 400 pound relief valve. Pressure at the relief valve should be 470+/-30 psi.

After disassembly, the filter was found to be full of a black silt-like substance.

Visual inspection of the remaining part including the Coupling/Tube Assembly and Volume Exchange Unit exhibited signs of normal wear. No dimensional inspections have been performed at this time.



Figure 6: The defective left engine PCU

1.17 Organizational and management information

1.17.1 Dornier Aviation Nigeria AIEP

Dornier Aviation Nigeria AIEP is an airline based in Kaduna, Nigeria , they provide flight operations services on both regular basis (to our corporate clients), spot aircraft charter services and also provides crew and aircraft on lease agreement.

They also provide Maintenance and Training services for aircraft owners as well as Ground and Maintenance support to airlines, charter companies and private aircraft owners in Nigeria and the West African Sub region.

The Company's head office is located at the Kaduna Old Airport, Nigeria

1.18 Additional information

1.18.1 Propeller Control Unit (PCU) System (extracts from Dornier 328-100 Aircraft Maintenance Manual)

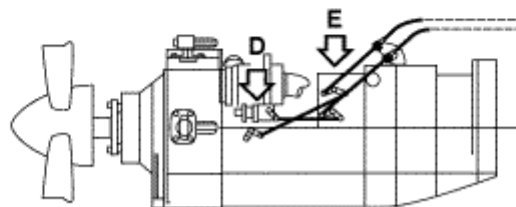
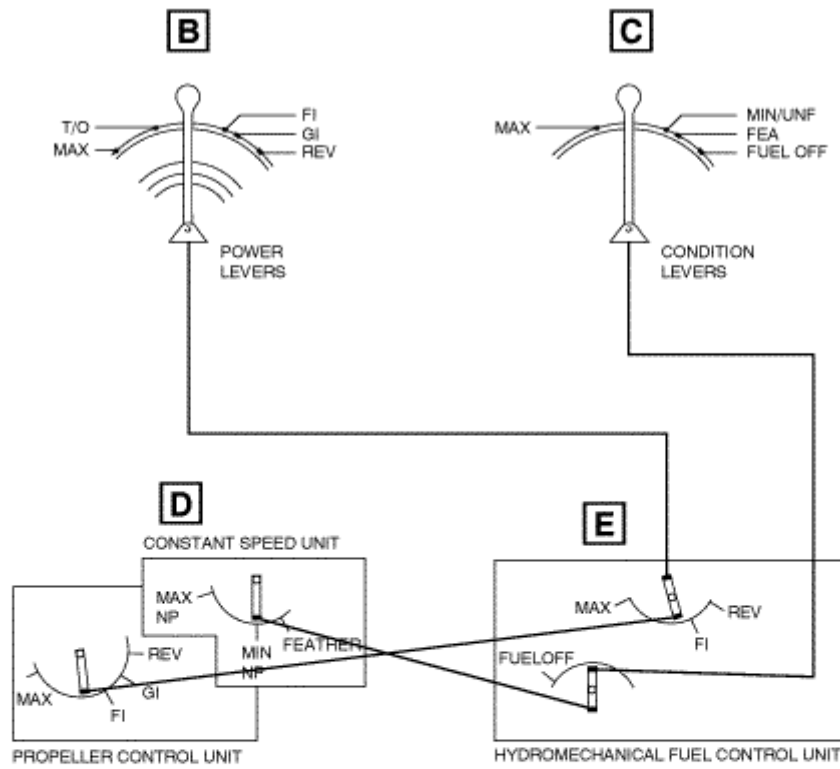
The propeller is controlled by the propeller control unit (PCU) mounted on the aft side of the engine reduction gearbox. The PCU responds to commands from the flight compartment power and condition levers and controls and actuates the propeller hydraulically using oil from the engine lubrication system. The pressure of the engine lubricating oil is increased by the high pressure pump to a value required by the system.

1.18.1.1 Propeller Control Unit

The propeller control unit (PCU) consists of a number of different components mounted to and interconnected by the PCU manifold. All porting of the propeller control oil is handled through internal ports in the PCU manifold. The PCU manifold is mounted to a quick access disconnect (QAD) by means of a "V" clamp. The QAD is mounted directly to the reduction gearbox (RGB) and interconnects the oil passages of the RGB and the manifold.

The PCU houses the Beta valve, the Beta switch and the PCU servo piston which in turn operates the piston indicating rod and oil transfer tube. The PCU manifold provides a mounting for the feather solenoid valve.

5N-DOX



Propeller Control Component Location – Flight/Engine Compartment

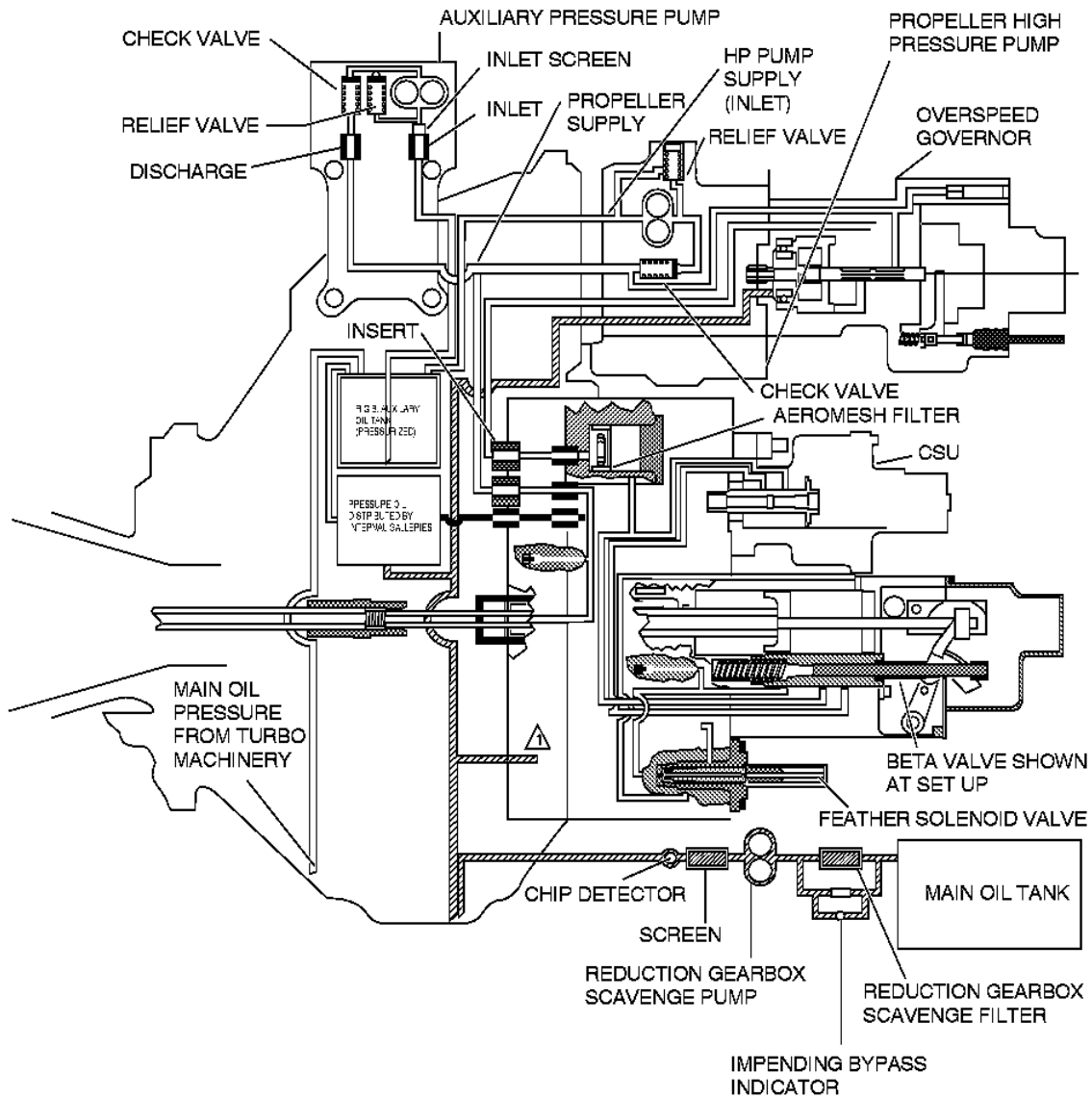
ICN : D1-A-6121-D0005-A-02

1.18.1.2 Propeller Control

The flight compartment POWER lever is connected by a control linkage to the propeller control unit (PCU). The pilot selects the required power and engine torque using the POWER lever. During ground operations in the BETA mode the power lever allows direct pilot control of each propeller pitch angle.

The flight compartment CONDITION lever is connected by a control linkage to the constant speed unit (CSU) of the PCU. During flight the propeller control system operates in the governed mode, in which the propeller blade pitch is controlled automatically and the PCU maintains a constant propeller RPM determined by the position of the CONTROL lever.

5N-DOX



△ ALL PCU DRAINS DRAIN INTO QAD CAVITY AND THEN INTO RGB SUMP

Propeller Control – System Schematic

ICN : D1-A-6121-D0008-A-02

1.18.1.3 Synchrophasing System

The propeller synchrophasing system reduces the noise level in the aircraft and prevents vibration in the airframe structure. The system provides matched speed and phase relationship between the left and right hand propellers.

1.18.1.4 Feathering System

The feathering system provides a means of feathering and unfeathering the propeller blades during aircraft operation or for ground maintenance purposes. The system can be mechanically, electrically or automatically actuated depending on the particular requirements.

The LH and RH propeller control system are identical.

The propeller is controlled by the propeller control unit (PCU) mounted on the aft side of the engine reduction gearbox. The PCU responds to commands from the flight compartment power and condition levers and controls and actuates the propeller hydraulically using oil from the engine lubrication system. The pressure of the engine lubricating oil is increased by the high pressure pump to a value required by the system.

1.18.1.5 Power Levers

The Power levers are located on the flight compartment center pedestal and have these positions:

- *MAX (maximum power)*
- *T/O (take-off power)*
- *FI (flight idle)*
- *GI (ground idle)*

- *REV (reverse thrust)*

Each lever is connected to the hydromechanical fuel control unit (HMU) on the LH side of the appropriate engine and controls the amount of power output from the engine. The HMU and PCU are interconnected by a rod linkage. Together these units establish the correct combination of RPM, fuel flow and propeller blade pitch. Propeller control is divided into two operations; "Governing" and "Beta".

GOVERNING mode (in flight). In this mode, the propeller blade pitch is automatically controlled by the PCU to maintain a constant propeller RPM determined by the position of the *CONDITION* lever

BETA mode. In this mode, the PCU allows direct pilot control of the propeller blade angle via the power lever. When the *POWER* lever is detented⁴ below flight idle (FI) in the *BETA* range the coordinated RPM and blade pitch is controlled by the *POWER* lever to maintain constant pitch in accordance with demand. The position of the *POWER* lever enables the setting of the required power and engine torque. When the *POWER* lever is positioned below ground idle (GI) into reverse (*REV*), the propeller blade pitch is reversed to provide the aircraft with reverse thrust for ground handling purposes, or rapid deceleration after landing.

1.18.1.6 Condition Levers

The Condition levers are located on the flight compartment center pedestal and have these positions:

MAX (maximum RPM)

MIN (minimum RPM)

⁴ Detent - a mechanism that temporarily keeps one part in a certain position relative to that of another and can be released by applying force to one of the parts.

UNF (unfeather position)

FEA (feather position)

FUEL (fuel shut-off)

Each lever is connected to the HMU and controls the propeller RPM for aircraft take-off and the various flight configurations. The HMU and the constant speed unit of the propeller control unit are interconnected by a rod linkage.



Figure 7: Flight deck of 5N-DOX

1.19 Useful or effective investigation techniques

Not applicable.



2.0 ANALYSIS

2.1 General

The crew were certified and medically fit to operate the flight. The incident flight was the first flight of the day.

The aircraft documents and records available to the Bureau show that the aircraft was certified and maintained in accordance with approved procedures and existing NCAA regulations. There was no evidence of deferred defects or malfunctions in the aircraft technical logbooks that could have contributed to the occurrence at the time of departure from Finima, Bonny for Port Harcourt Military Airport.

This analysis focuses on the crew action during approach and landing phases of the flight, use of checklist, SOPs, evaluation of the tyre marks, tyre tracks and the Propeller Control Unit (PCU).

2.2 Conduct of the flight

At 09:58 h about 6 nautical miles to touchdown, the crew reported "RUNWAY IN SIGHT" to DNPM ATC. The ATC reported the prevailing wind at 250°/06 knots and runway 22 in use for landing. According to the crew statement, it was observed at short finals and with the power levers at flight idle position, the torque on engine number 1 and engine number 2 indicated 24% and 20% respectively. However, the crew account did not disclose any checklist action taken at the time of noticing this disparity in indication which should have called for "**L or R PROP LOW PITCH**", **(ABNOM-9-10) CONDITION: PCU DETECTED LOW PITCH CONDITION (BLADE ANGLE BELOW FI and SEVERE TORQUE OSCILLATIONS)**" checklist.

2.2.1 Situational awareness/Use of checklist

The disparity in engine torque according to the FDR had occurred at 6,000 ft, which became more pronounced at touchdown to a value of 300% disparity as shown on the FDR plot. However, from the crew statement, these values were missed. Because they missed the true nature of the problem, they were not able to execute the correct checklist to arrest the situation.

The crew action to continue the approach under a normal landing checklist instead of the **ABNOM-9-10** checklist was inappropriate. The crew should have discontinued the approach and pick a hold over the station to execute the applicable checklist before coming in to land.

Pilot's radio communication with the ATC was not standard. He reported that he was "right base of left base of runway 22" while he was not at the airport's circuit altitude, which did not convey his exact position.

The investigation revealed certain lapses in crew adherence to checklist application and SOP compliance in this flight.

2.2.2 Evaluation of tyre marks and tyre tracks

The tyre tracks showed that the aircraft landed right of the runway centerline and veered further right into the grass verge. This indicates the effect of a propeller torque asymmetry coupled with excessive rudder input of -30° as revealed by the FDR plots especially after touchdown which the crew were unable to arrest.

The investigation believed that there was a delayed application of Emergency brakes considering the distance travelled by the aircraft before it finally stopped.

2.3 Propeller Control Unit (P.C.U.)

5N-DOX landed to the right of runway 22 centerline. During the landing roll, with the power levers at ground idle position; torque on engine number 1 was 27% and increased to 34%. The torque on the engine number 2 decreased below 10%.

The disparity in the left and right propeller torque values is an indication of failure of the propeller control unit (PCU) of the number 1 engine. This is evident from the crew account that the engine number 1 torque value at about 6.2 NM to touchdown and at landing, did not agree with the corresponding power lever settings.

3.0 CONCLUSION

3.1 Findings

1. The aircraft had a valid Certificate of Airworthiness.
2. The mass and centre of gravity of the aircraft were within the prescribed limits.
3. The flight crew were certified, qualified and medically fit to operate the flight.
4. The flight was scheduled to depart Finima Airstrip, Bonny to Abuja via Port Harcourt Military Airport.
5. The Co-pilot was the Pilot Flying while the Pilot was the Pilot Monitoring.
6. At about 6.2 NM to touchdown, the crew reported 'Runway in sight' to the Air Traffic Controller (ATC) and was cleared to land but to exercise caution as the runway surface was wet.
7. The appropriate checklist (in the QRH) "L or R PROP LOW PITCH", (ABNOM-9-10) "CONDITION: PCU DETECTED LOW PITCH CONDITION (BLADE ANGLE BELOW FI and SEVERE TORQUE OSCILLATIONS)", "SINGLE ENGINE OPERATION" APPROACH AND LANDING CHECKLIST (ABNOM-9-2), ABNOM-9-3 and ABNOM-9-4 were not executed.
8. At 10:00 h, 5N-DOX landed to the right of runway 22 centerline.
9. The aircraft finally stopped at about 3 meters to the airport perimeter fence near the Aero Contractors Ramp.
10. The occupants disembarked without injury.
11. Maintenance action on the replacement of the tyres and PCU for the incident aircraft had been carried out before the arrival of Air-Safety Investigators.

3.2 Causal factor

Asymmetrical propeller torque experienced on ground during landing roll due propeller Control Unit (PCU) failure in-flight.

3.3 Contributory factor

1. Non-recognition of the prevailing torque oscillation malfunction.
2. Non-execution of the proper checklist.
3. Excessive rudder application of -30° after landing.

4.0 SAFETY RECCOMMENDATIONS

4.1 Safety Recommendation 2022....014

Dornier Aviation Nigeria AIEP LTD should ensure that its flight crew adhere strictly to checklist procedures in accordance with the company's Standard Operating Procedures (SOPs).

4.2 Safety Recommendation 2022....015

NCAA should ensure that airline operators do not carry out maintenance action on accident/incident aircraft or contaminate any potential evidence as stipulated in Civil Aviation (Investigation of Air accidents and incidents) Regulation 2019.