PRELIMINARY REPORT ON ACCIDENT INVOLVING SIKORSKY S-76C++ HELICOPTER BELONGING TO BRISTOW HELICOPTERS NIGERIA LIMITED WITH REGISTRATION 5N-BQJ WHICH OCCURED AT ABOUT 75 NM TO LAGOS IN THE ATLANTIC OCEAN ON THE 3RD OF FEBRUARY, 2016.

REGISTERED OWNER AND OPERATOR:	Bristow Helicopters Nig. Ltd.
PLACE OF ACCIDENT:	75 NM off Lagos in the Atlantic Ocean.
DATE AND TIME:	3th of February, 2016 at about 1025hrs.
LOCATION:	75NM off Lagos in the Ocean. Lat: 05^0 21.396' N and Long: 004^0 20.530' E *(All times in this report is local time, equivalent to UTC+1, unless otherwise stated)*

1.0 Factual Information:

1.1 History of the Flight:

5N-BQJ, Sikorsky S-76C++ aircraft, a domestic chartered flight operated by Bristow Helicopters Nigeria Limited, departed Lagos on the 3rd of February 2016, for ERHA FPSO (Floating Production Storage Off-loading). Instrument meteorological conditions prevailed at the time and Instrument Flight Rule (IFR) flight plan was filed. Two flight crew members and nine passengers were on the outbound trip that was almost uneventful. The captain was in command as the pilot flying (PF), upon landing in ERHA (Off Shore Platform location) a passenger onboard seated in the middle row complained about perceiving a burning smell; although, the flight crew did not perceive any smell. The PF had a word with the passenger and went back to check the internal and external of the aircraft for smell, the check result was negative. However, the crew reported that Digital Auto Flight Control System (DAFCS) and TRIM FAIL lights illuminated twice and were reset on the outboard leg to ERHA FPSO.

5N-BQJ departed ERHA for the inbound trip to Lagos at 09:50:00hrs with nine passengers and was flying at 3000ft with the co-pilot as the pilot flying (PF) and the captain as the pilot monitoring (PM). The captain asserted that within 15 minutes after departure, that *"we got repeated illumination of the 'TRIM FAIL' and 'DAFCS'. The Emergency Operational Procedure (EOP) was consulted and the pilot flying was advised to fly hands and feet on the controls, which he did". Initial contact was established at 75NM with Lagos Approach. The PF called my attention to the collective being heavy and the power dropping anytime he pulled to maintain power. I noticed a slight turn to the right and I called the PF to check his heading and almost immediately he came back with a problem with the compass. I noticed a fast spinning of the Electronic Horizontal Situation Indicator (EHSI) and compass, the instrument readings inaccurate/inconsistent, the aircraft started a turn to the right with a high rate of descent."* The captain further said *"I remembered taking the controls from the PF. I noticed the controls not responding properly, I made a distressed call on the Approach frequency. We stabilized at 1500ft"*.

According to Air Traffic Controller's transcript, the flight first contact and the first clearance with Lagos Approach were at 10:04:37hrs which stated *"5N-BQJ is cleared to the field not above three thousand expect visual approach for runway 18L report for descent".*

While the Lagos Approach efforts in trying to raise 5N-BQJ were abortive, an aircraft 5N-MPN agreed to help relay between the Approach and 5N-BQJ. At 10:09:13hrs 5N-MPN relayed *"Lagos standby they are calling that they stabilized on a thousand five hundred. Just standby".* At 10:09:44hrs 5N-MPN relayed *"Okay they lost all their instruments. Aircraft stabilized at a thousand five hundred on the radial 143 65NM proceeding back to Lagos I believe".*

At 10:16:22hrs, Lagos Approach asked another aircraft AZM 2322 to help raise 5N-BQJ stating *"Please can you help me raise 5N-BQJ a helicopter from ERHA declared MAY DAY shortly to know his intention, estimates to LAG or he's going back to ERHA?"*
The Captain stated that *"I noticed the cyclic not responding to lateral movement. I updated the MAYDAY call on Lagos Approach frequency and declared a MAYDAY on ERHA frequency*". The complaint from the crew that the aircraft was not responding to control inputs was relayed by two aircraft. AZM 2322 followed the communication until the aircraft ditched.

At 10:17:58hrs AZM 2322 relayed to Lagos that *"They are ditching the aircraft Lagos. They are declaring an emergency they are ditching the aircraft. They have thirteen souls on board. They are ditching. Position is 136 75 miles. It's an emergency".* The souls onboard was confirmed eleven later.

Other aircraft joined in the search and rescue, no visual contact was reported by Caverton Company aircraft at 10:36:44hrs. At 10:38:49hrs, Approach reported *"Copied still negative contact with the other aircraft on 78NM radial 138 confirm?"*

However, the aircraft ditched safely at about 10:25:00hrs into the Atlantic Ocean at about 75NM to Lagos, the two life rafts were deployed, although the left raft was slightly damaged during jettisoning of the left side door. The passengers and crew safely evacuated into the life raft and were rescued one and half hours later. More passengers transferred to the right life raft, thus creating a tilt of the aircraft to the right. The aircraft later capsized with the Emergency floating devices holding the aircraft afloat upside down, fully submerged in the salty waters of the Atlantic Ocean at about 75NM to Lagos (See fig. 2).

A speed boat was dispatched from the Sea Truck Group (STG) Jacson 25 ship to rescue crew and passengers (See fig 1). Several other boats from CHEVRON, AGIP and SHELL were involved in the rescue effort. Passengers and crew were all taken to the ship which subsequently berthed at the Eko Support Quay. They were later taken to the Lagoon Hospital where toxicology tests were performed only on the crew. The tests were negative to any substance of abuse. The first interviews were also conducted at the Lagoon Hospital.

Fig. 1. The Sea Truck Group (STG) rescue ship with a Heli-deck on board

Among the few aircraft that helped in relaying messages between the helicopter and Lagos Approach, were 5N-LAG, 5N-BDY and 5N-BLX. They reported that the passengers and crew onboard the helicopter had been rescued.

1.2 Injuries to Persons:

INJURIES	CREW	PASSENGERS	OTHERS
FATAL	Nil	Nil	Nil
SERIOUS	Nil	Nil	Nil
MINOR/NONE	2	9	Nil
Total	2	9	Nil

1.3 Damage to Aircraft:

The helicopter was destroyed by submerging into the salty waters of the ocean (See Figs. 2-5).

Fig. 2. The Helicopter submerged in the salty ocean water

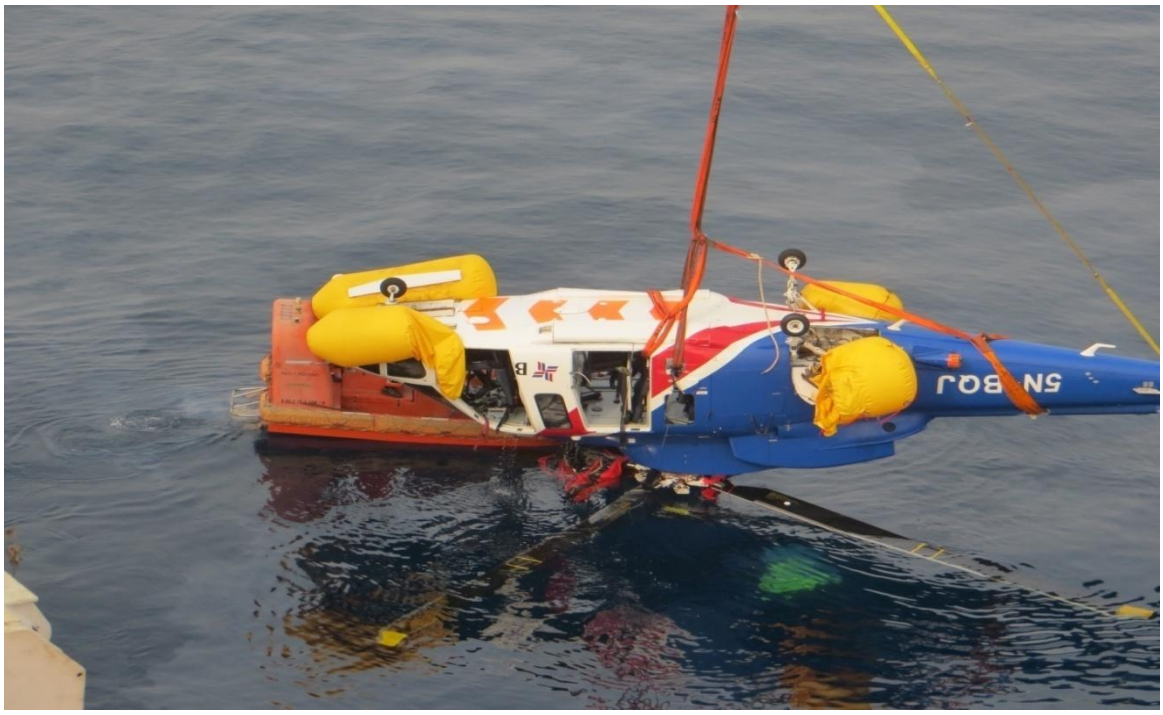

Fig. 3. Helicopter recovery from the ocean

Fig. 4. Helicopter turned in readiness to be loaded on the rescue ship

Fig. 5 Helicopter safely on board the rescue ship

1.4 Other Damage:

Nil.

1.5 Personnel Information:

1.5.1 Captain (Pilot Monitoring):

Date of Birth	-	17th November, 1980
Nationality	-	Nigerian
Licence No.	-	5249 ATPL (H)
Medical Expiry	-	4th July, 2016
Total Flight Hours	-	3,174hrs
Total Flight (PIC)	-	306hrs
Total Flight (Type)	-	2497:45:00hrs

1.5.2 First Officer (Pilot Flying):

Date of Birth	-	28th June, 1984
Nationality	-	Nigerian
Licence No.	-	6016 CPL (H)
Medical Expiry	-	5th November, 2016
Total Flight Hours	-	1,088hrs
Total Flight (SIC)	-	Not Available
Total Flight (Type)	-	852hrs

1.6 Aircraft Information:

1.6.1 General Information:

Type	:	S-76C++
Manufacturer	:	Sikorsky
Airframe time	:	6,837:85hrs
Cycles	:	12560
Serial No:	:	760656
Year of Manufacture	:	2007

1.6.2 Power Plant:

Engine Model: Turbomeca Arriel 2S2

No. 1

Serial No.	:	42066
Hours	:	5950:43
Cycles	:	4869/360.6 (N1)/275.7 (N2)

No. 2

Serial No.	:	42024
Hours	:	6305:19
Cycles	:	72.19/84.0 (N1)/58.2 (N2)

Type of Fuel **Jet A1**

1.7 Meteorological Information:

Time	:	0756hrs
Wind	:	223/11 Kts
Visibility	:	5445 Km
Weather	:	NSKC
Cloud	:	Broken 500m
Temp.	:	27^0 C
QNH	:	1012 hPa
Trend	:	No Significant Weather

Flight Recorders:

The Helicopter was fitted with a Multi Purpose Flight Recorder (MPFR) which represents the Cockpit Voice Recorder/Flight Data Recorder (CVR/FDR) (See fig.7), with a common part and serial number. However, a separate **Faerito Avionics Recorder** (Cockpit Image Recorder (CIR)) (See fig. 8) was also installed in the helicopter to augment the CVR and FDR. The recorders were retrieved when the aircraft was recovered from the ocean in good condition. The recorders were sent to Air Accident Investigation Branch (AAIB), UK and were successfully downloaded and are now being analyzed.

Investigation so far discovered some defects with both the Cockpit Image Recording and the Flight Data Recording Systems. The Flight Data Acquisition Unit (FDAU) also indicated internal FAULT. A significant number of the parameters on the FDR data such as heading, cyclic, collective and yaw control inputs were not retrieved. Other Non-volatile Memory Devices are being downloaded to obtain the necessary parameters.

Multi Purpose Flight Recorder (MPFR)

Manufacturer	:	Penny & Giles
Part Number	:	D51615-102
S/N	:	001664-003

Faerito Avionics Recorder (Cockpit Image Recorder)

Manufacturer : Physical Optics Corporation

Model : FAC 88 N20NNUV

Part Number : 4308-05000-20

S/N : 4308-000032

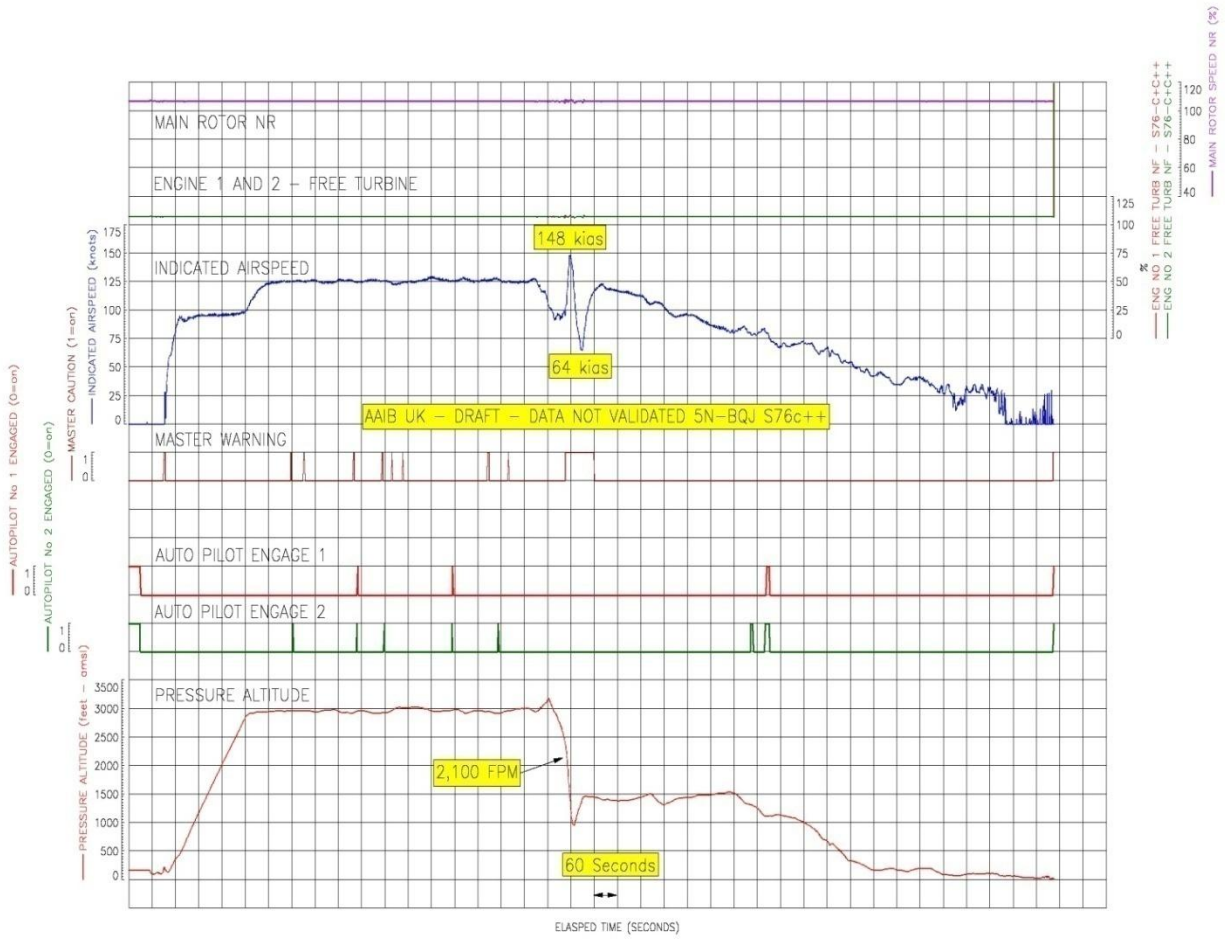

Fig.6a FDR Recorder Download Plot

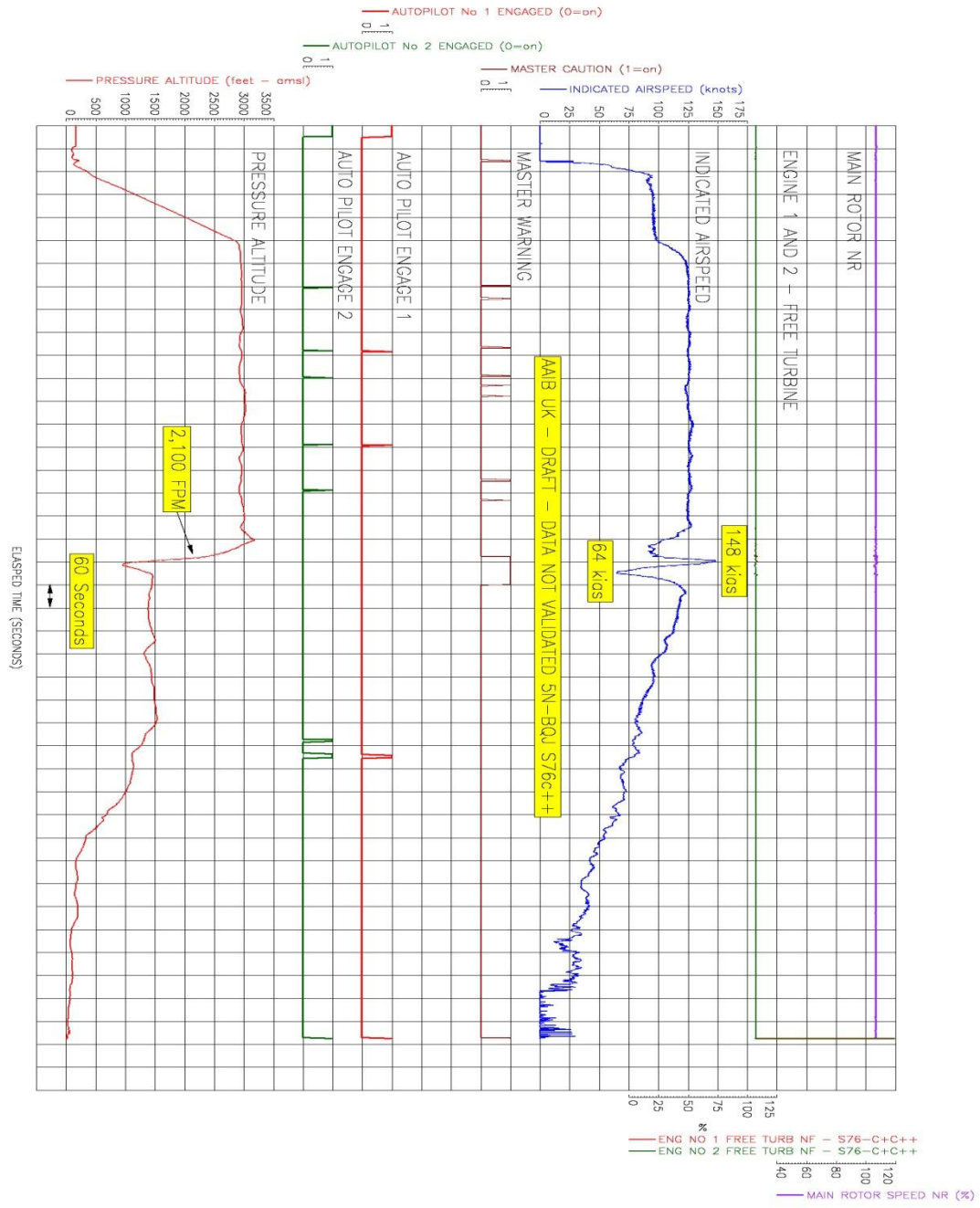

Fig. 6b FDR Recorder Download Plot

Fig.7 Multi-Purpose Flight Recorder

FAERITO IMAGE RECORDER:

The FAERITO image recorder records images at up to five frames per second from three cameras, left, centre and right. The left and right cameras are directed to record the Captain Station (P1) and Co-pilot Station (P2) Primary Flight Display (PFD) and Navigation Monitor Display (NMD) displays and the centre camera, the engine instrument and standby artificial horizon. On the S76 C++ the image recording system was installed due to UK CAA requirement to record additional parameters besides the FDR, when a reduced capacity Health and Usage Monitoring System (HUMS) system was fitted. There is no requirement to have the system installed outside the UK.

The recorder removed from 5N-BQJ is understood to be the first accident damaged recorder of this type. The download of data and display of images were made using replay software provided by the manufacturer, Physical Optics Corporation (POC).

Fig. 8. Faerito Avionics Recorder (Cockpit Image Recorder)

Additional Information:

The cause of the accident has not been determined, as the investigation is still ongoing. Meanwhile, the initial FDR download confirmed some of the crew assertions like an un-command rapid rate of descent and speed reduction. The aircraft descended within 60 seconds from 3000ft to 1000ft approximately at the rate of 2,100 Feet Per Minute (FPM) also loosing speed from 148 KIAS to 64 KIAS over the same period (60 seconds) before stabilizing at 1,500ft (See figs 6a and 6b).

Annual flight recording readout for the aircraft was not available since it was introduced into service in Nigeria in 2013. This is a requirement in accordance with NCAA (Order 001) 2014 paragraph 4 which stipulates requirement for continued serviceability and inspection of flight recorder systems. ICAO Annex 6 Part III refers to the same requirement.

Preliminary Findings:

1. The flight crew were certified and qualified to conduct the flight in accordance with applicable Nigerian Civil Aviation Regulations (Nig. CARs).
2. The Captain and Co-pilot had 2497:45 and 852:00 hrs on aircraft type, respectively.
3. The helicopter was maintained in accordance with approved Maintenance schedule.
4. The Helicopter was manufactured in 2007 with total Airframe Hours of 6,837:85
5. The flight departed from the ERHA FPSO Oil Platform.
6. The flight preceding the accident aircraft was without incident except for a passenger who reported perceiving a burning smell in the cabin.
7. The crew reported instrument and flight control problems with TRIM FAIL and DAFCS repeated illuminations.
8. The crew declared emergency, according to the pilot and Lagos Approach transcripts.
9. Lagos Approach found it difficult raising 5N-BQJ, and had to rely on other aircraft to relay communication.
10. There were eleven souls on onboard including two crew members at the time of ditching.

11. The crew and passengers life vests were activated.
12. The aircraft ditched into the Atlantic Ocean about 75 NM to Lagos.
13. The life rafts on the helicopter were deployed with the left raft slightly damaged.
14. The wreckage of the helicopter was confined to a small area around the ditching site in the Atlantic Ocean since the ditching was controlled and successful.
15. The Search and Rescue including evacuation of crew and passengers were promptly carried out.
16. The main wreckage capsized and was later submerged in the salty waters of the ocean while the emergency floatation devices prevented the helicopter from sinking.
17. Only one of the two rafts inflation bottles under the crew seats was discharged.
18. There was no evidence of fire outbreak before and after ditching.
19. Defects were discovered in both Image and Flight Data Recording Systems.
20. No annual flight recording readout was available for the aircraft.

Further Information and Investigative Action:

Future investigative activities will include, but not limited to the following:

- Evaluation of the aircraft approved maintenance program.
- Determination of the helicopter maintenance history.
- Detailed reconstruction of flight based on recorded data.
- Analysis of the helicopter performance in relation to cyclic, collective and yaw stabilization control.
- Investigative testing of all Stabilization Augmentation System (SAS), Trim actuators.
- Interview of relevant personnel of the operator.
- Consideration for possible modification of FDAU Fault output system line to display a fault in the cockpit when there is malfunction of the unit.

- Further physical observation and electrical continuity and insulation resistance checks on the cable looms of both auto-pilot, cyclic, collective and yaw control channels.

Interim Safety Recommendation:

Bristow Helicopters Nig. Ltd must ensure the following:

a.) That annual flight recording readout is carried out for every aircraft in accordance with NCAA (Order 001) 2014 paragraph 4 and ICAO Annex 6 Part III.

b.) The records obtained shall be preserved with the appropriate current data frame layout and presented on demand to the investigative authority in case of serious incidents/accidents.