AIRCRAFT ACCIDENT REPORT

SWAT/2015/06/11/F

Accident Investigation Bureau

Report on the Accident involving a Hawker Siddeley HS-125-800 XP aircraft owned and operated by SWAT Technology Limited with nationality and registration marks N497AG which occurred on Runway 21, Port-Harcourt Airport, Omagwa, Rivers State On 11th June, 2015

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

The report is based upon the investigation carried out by Accident Investigation Bureau, 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.

Readers are advised that Accident Investigation Bureau investigates for the sole purpose of enhancing aviation safety. Consequently, AIB reports are confined to matters of safety significance and should not be used for any other purpose.

Accident Investigation Bureau believes that safety information is of great value if it is passed on for the use of others. Hence, readers are encouraged to copy or reprint for further distribution, acknowledging the Accident Investigation Bureau as the source.

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

©Accident Investigation Bureau Nigeria, 2021

Printed in Nigeria for the Accident Investigation Bureau (AIB)

TABLE OF CONTENTS

TABLE OF FIGURES

GLOSSARY OF ABBREVIATIONS USED IN THIS REPORT

AIB	Accident Investigation Bureau
AGL	Above Ground Level
APP	Approach Control
ARFFS	Aerodrome Rescue and Fire Fighting Service
ATC	Air Traffic control
ATPL(A)	Airline Transport Pilot Licence (Aeroplane)
BKN	Broken Cloud
CB	Cumulonimbus
CAT1	Category 1
CRM	Crew Resource Management
CVR	Cockpit Voice Recorder
DME	Distance Measuring Equipment
DNAA	ICAO Location Indicator for Nnamdi Azikiwe International Airport
DNPO	ICAO Location Indicator for Port Harcourt International Airport
FAAN	Federal Airports Authority of Nigeria
FDR	Flight Data Recorder
FL	Flight Level
ft	Feet
GAT	General Aviation Terminal

h	Hour
hPa	Hectopascal
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System
kt	Knot
km	Kilometre
NAMA	Nigerian Airspace Management Agency
NE-NW	North East to North West
NCAA	Nigerian Civil Aviation Authority
NIMET	Nigerian Meteorological Agency
NOSIG	No Significant Change
PA	Public Address System
PAPI	Precision Approach Path Indicator
PF	Pilot Flying
PM	Pilot Monitoring
POT	Port Harcourt Airport VOR
TC	Tower Controller
QNH	Altimeter setting above mean sea level
UTC	Universal Co-ordinated Time

VOR	Very High Frequency Omnidirectional Radio Range

Aircraft accident report number:	SWAT/2015/06/11/F
Registered owner and operator:	SWAT Technology Limited
Aircraft type and model:	Hawker Siddeley HS-125-800 XP
Manufacturer:	Raytheon Aircraft Company, USA
Year of manufacture:	1999
Serial number:	258439
Nationality and registration marks:	N497AG
Location:	Port Harcourt Airport, Runway 21 Omagwa, Rivers State, Nigeria
Date and Time:	11th June, 2015 at about 19:16 h (*All times in this report are local time, equivalent to UTC + 1 unless otherwise stated)*

SYNOPSIS

On 11th June, 2015, a HS-125-800XP aircraft with nationality and registration marks N497AG, operated by SWAT Technology Limited departed Nnamdi Azikiwe International Airport, Abuja at 18:25 h for Port Harcourt as a charter flight. There were five persons on board inclusive of three flight crew and two passengers. The Captain was the Pilot Flying while the Co-pilot was the Pilot Monitoring.

At 18:48 h, during cruise at Flight Level 280, N497AG established contact with Lagos and Port Harcourt ATC units.

At 18:55 h, the aircraft was released by Lagos to continue with Port Harcourt.

Port Harcourt then cleared N497AG to descend FL210.

At 19:13 h, the crew reported field in sight at 6 nautical miles to touch down to the Tower Controller (TC). TC then cleared the aircraft to land, with caution "runway surface wet". The crew experienced light rain at about 1.3 nautical miles to touch down with runway lights ON for the ILS approach.

At 19:16 h, the aircraft touched down with left main wheel in the grass and the right main wheel on the runway but was steered back onto the runway.

The nose wheel landing gear collapsed, and the aircraft stopped on the runway.

The engines were shut down and all persons on board disembarked without any injury.

The aircraft was substantially damaged.

The investigation identified the following:

Causal factor

Black hole effect disorientation causing low-level manoeuvre into grass verge.

Contributory factor

1. Most of the Runway 21 right edge lights were unserviceable at landing time.
2. Inadequate Crew Resource Management during approach.

One Safety Recommendation was made.

1.0 FACTUAL INFORMATION

1.1 History of the flight

On 11th June, 2015, at about 18:25 h, an HS-125-800XP aircraft with nationality and registration marks N497AG, operated by SWAT Technology Limited departed Nnamdi Azikiwe International Airport, Abuja (DNAA) for Port Harcourt International Airport (DNPO) as a charter flight on an Instrument Flight Rule (IFR) flight plan. There were five persons on board inclusive of three flight crew and two passengers. The Captain was the Pilot Flying while the Co-pilot was the Pilot Monitoring.

At 18:48 h, N497AG established contact with Lagos and Port Harcourt Air Traffic Control (ATC) units cruising at Flight Level (FL) 280.

At 18:55 h, the aircraft was released by Lagos to continue with Port Harcourt.

Port Harcourt cleared N497AG for descent to FL210.

At 19:13 h, the crew reported field in sight at 6 nautical miles to touch down to the Tower Controller (TC). TC then cleared the aircraft to land with caution "runway surface wet". The crew experienced light rain at about 1.3 nautical miles to touch down with runway lights ON for the ILS approach.

At about 1,000 ft after the extension of landing gears, the PM remarked 'Okay...I got a little rain on the windshield' and the PF responded, 'We don't have wipers sir... (Laugh) Na wa o[1]'.

[1]Na wa o – local parlance, - pidgin, for expression of surprise

From the CVR, at Decision Height, the PM called out 'minimums' while the PF called back 'landing' as his intention. The PM reported that the runway edge lights were visible on the left side. On the right side, it was missing to a large extent and only appeared for about a quarter of the way from the runway 03 end. The PM observed that the aircraft was slightly to the left of the "centreline" and pointed out "right, right, more right."

The PM further stated that at 50 ft, the PF retarded power and turned to the left.

At 40 ft, the PM cautioned the PF to 'keep light in sight don't go to the left'.

At 20 ft, the PM again said, 'keep on the right'. PF replied, 'Are you sure that's not the centre line?'.

At 19:16 h, the aircraft touched down with left main wheel in the grass and the right main wheel on the runway but was steered back onto the runway. The PF stated, "...but just on touchdown the right-hand lights were out, and in a bid to line up with the lights we veered off the runway to the left".

The nose wheel landing gear collapsed, and the aircraft stopped on the runway.

The engines were shut down and all persons on board disembarked without any injury.

From the CVR recordings, the PF told the PM that he mistook the brightly illuminated left runway edge lights for the runway centreline and apologised for the error of judgement for which the PM responded 'I told you'.

The aircraft was towed out of the runway and parked at GAT Apron at 21:50 h.

The accident occurred at night in light rain.

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	2	5
Total	3	2	5

1.3 Damage to aircraft

The aircraft was substantially damaged.

1.4 Other damage

Nil.

1.5 Personnel information

1.5.1 Pilot (Captain) (PF)

Nationality:	British
Age:	44 years
Licence type:	Airline Transport Pilot Licence (Aeroplane)
Licence:	Valid till 18th October, 2020
Aircraft ratings:	Piper Aztec-23, Beechcraft-300, Tampico Club TB-9, TB-20, Beech Baron (B58), Hawker-900 XP, Hawker Siddeley-125/800XP

Instrument rating:	Valid till 9th March, 2016
Medical certificate:	Valid till 9th July, 2015
Licence proficiency check:	March, 2015
Operator proficiency check:	March, 2015
Total flying time:	4,180 h
On type:	2,752 h
On type (PIC):	1,752 h
Last 90 days:	186 h
Last 28 days:	47 h
Last 24 hours:	4:25 h

1.5.2 Co-Pilot (PM)

Nationality:	Nigerian
Age:	59 years
Licence type:	Airline Transport Pilot Licence (Aeroplane)
Licence:	Valid till 4th April, 2020
Aircraft ratings:	Cessna-150, Dash-60 (Twin Otter), DC-9, BAC 1-11, Boeing 737-300/500, Embraer-170/190, MD-80, Boeing737-NG, BAE-125-1000, Challenger 600/601
Instrument rating:	Valid till October, 2015
Medical certificate:	Valid till 30th June, 2015
Licence proficiency:	October, 2014
Operator proficiency:	October, 2014
Total flying time:	16,744 h

On type:	147 h
Last 90 days:	11 h
Last 28 days:	11 h
Last 24 hours:	6 h

1.6 Aircraft information

1.6.1 General information

Manufacturer:	Raytheon Aircraft Company, USA
Aircraft type:	HS-125-800XP
Year of manufacture:	1999
Serial number:	258439
Nationality and registration marks:	N497AG
Total airframe time:	8,447:22 h
Cycles/Landings:	6,831
Certificate of insurance:	Valid till 8th June, 2016
Standard airworthiness certificate:	Issued on 27th January, 2010
Category:	Transport
Certificate of registration:	Valid till 31st March, 2017

Figure 1: Photo of the aircraft after the occurrence

1.6.2 Powerplant

	Engine No. 1	**Engine No. 2**
Manufacturer:	Honeywell, USA	Honeywell, USA
Type/Model:	TFE 731-5BR-1H	TFE 731-5BR-1H
Serial number:	P107492	P107487
Time since new:	8,197 h	8,230 h
Cycles since new:	6,520	6,449

Type of fuel used is Jet A1.

1.7 Meteorological information

The following weather information was obtained from NiMet office at Port Harcourt International Airport and was available to the crew.

Time:	**1800 UTC**
Wind:	Calm
Visibility:	5000 m
Weather:	TSRA
Cloud:	BKN 180m Few 600m CB (NE-NW)
Temperature/ Dew point:	26°C/24°C
QNH:	1011 hPa
Trend:	NOSIG

Time:	**1900 UTC**
Wind:	Calm
Visibility:	5000 m
Weather:	TS to SE
Cloud:	BKN 210m Few 600m CB (NE-NW)
Temperature/Dew point:	26°C/24°C
QNH:	1012 hPa
Trend:	NOSIG

1.8 Aids to Navigation

The status of the navigation and landing aids available at the time of the occurrence is as follows:

'POT' VOR/DME 113.5 MHz: - 'Serviceable'-

'POT' ILS/DME 110.3 MHz: - 'Serviceable'-

1.9 Communications

There was effective communication between the aircraft and the ATC.

1.10 Aerodrome information

Port Harcourt Airport (DNPO) has Aerodrome Reference Point 05°00'56"N, 006°56'58"E and an elevation of 87 ft (27 m). The aerodrome has a runway with an orientation of 03/21. The length and width of the runway are 3,000 m (9,843 ft) and 60 m (197 ft) respectively, with an asphalt/concrete ungrooved surface and a blast pad of 120 m (393.7 ft) at both ends. Both runways have Precision Approach Lighting System (PALS) and Runway 21 has Precision Approach Path Indicator (PAPI).

DNPO is equipped with ICAO Cat. 1 approach lights and non-standard edge lights (no runway threshold identification lights, no runway centreline lights and no runway touchdown zone lights).

At the time of the occurrence, Precision Approach Path Indicator (PAPI) was serviceable. Runway 21 left edge lights were ON and bright, while runway 21 right edge lights were ON but at low intensity.

According to FAAN, an earth fault occurred due heavy rain on the day of the occurrence which short-circuited part of the right runway edge lights shortly before the time of the occurrence. The fault was rectified and the edge light circuit became serviceable at about 22:25 h, same day.

1.11 Flight recorders

The aircraft is fitted with Solid State Memory Flight Data Recorder and Cockpit Voice Recorder.

	Flight Data Recorder (FDR)	**Cockpit Voice Recorder (CVR)**
Manufacturer	Allied Signal, USA	Universal Avionics Systems Corporation, USA
Model	SSFDR	SSCVR
Part Number	980-4700-027	1603-02-12
Serial Number	5337	636

Both recorders were retrieved in good condition from the aircraft. The CVR and FDR were successfully downloaded at the AIB Flight Safety Laboratory in Abuja. However, due unavailability of a compatible FDR data frame documentation, the FDR data could not be analysed.

1.12 Wreckage and impact information

The aircraft touched down at about 1,500 m from the threshold of runway 21 with the left main wheel on the left grass verge and the right main wheel on the runway, travelled a distance of about 300 m in the grass verge before returning to the runway and came to a stop about 2,600 m, with the nose wheel landing gear collapsed.

There was collection of grass on the left wing and the left engine generator cooling inlet.

Figure 2: Photo of grass collection on the left wing and generator cooling inlet

Figure 3: Photo of the aircraft where it stopped on the runway

Figure 4: Photo of collapsed nose wheel landing gear

1.13 Medical and pathological information

There was no medical or toxicological examination conducted on the crew.

1.14 Fire

There was no fire.

1.15 Survival aspect

The occurrence was survivable because there was liveable volume for the persons on board, the restraint system was intact and there was no post occurrence fire.

1.16 Test and research

Nil.

1.17 Organizational and management information

1.17.1 SWAT Technology Limited

SWAT Technology Limited is a subsidiary of the JAFAC Group. Other companies in the group are: JAFAC Construction, JAFAC Investment Nigeria Limited, Swat Links, JAFAC Hospitality Industry (Galpin Suites & Hotel), JAFAC Foundation, Global Private Jets and JAFAC Wine. The Operator was duly issued with Flight Operations Clearance Certificate (FOCC) and Maintenance Clearance Certificate (MCC) to operate the incident aircraft in private category, non-commercial in accordance with section 8.2.1.9 of Nig.CARs 2009.

1.17.2 The Nigerian Civil Aviation Authority (NCAA)

Nigerian Civil Aviation Authority 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 not only empowers the Authority to regulate Aviation Safety without political interference, but also to carry out oversight functions of Airports, Airspace, Meteorological Services, etc, as well as economic regulations of the industry.

1.17.3 Federal Airports Authority of Nigeria (FAAN)

FAAN is the operator of the Nigerian airports. One of its cardinal duties is the maintenance of airport facilities including runway lightings. Ensuring the serviceability of lightings such

as the runway edge lights, runway end lights, approach lights, Precision Approach Path Indicator (PAPI), etc, at all times, is the direct responsibility of FAAN electrical department.

1.18 Additional information

1.18.1 Human factor

According to the Human Factors Training Manual (ICAO Doc. 9683-AN/950), the human element is the most flexible, adaptable and valuable part of the aviation system, but it is also the most vulnerable to influences which can adversely affect its performance. Throughout the years, some three out of four accidents have resulted from less than optimum human performance. This has commonly been classified as human error.

1.18.2 Crew Resource Management (CRM)

CRM is a widely implemented strategy in the aviation community that acts as a training counter measure to human error. Traditionally, CRM has been defined as the utilization of all resources available to the crew to manage human error. From the onset, it is important to place CRM within the scope of Human factors training. CRM is but one practical application of Human factors training, covered with supporting crew responses to threats and errors that manifest in the operating environment. The objective of CRM training is to contribute to incident and accident prevention.

1.18.3 Black hole effect

A visual illusion known as "black hole effect" is another inherent risk of night visual approach. Black hole conditions exist on dark nights (usually with no moon or starlight),

when there are no ground lights between your aircraft and the runway threshold. The black hole illusion, sometimes called the featureless terrain illusion, fools pilots into thinking they are higher than they actually are, causing them to fly dangerously low approaches. Perception scientists disagree as to the exact cause of this illusion and it is likely that no single theory fully explains the phenomenon as there are many factors involved. The most extensive study was conducted by Boeing researchers after a series of airline black hole accidents in the 1960's. Using a flight simulator, experienced Boeing instructor pilots (with more than 10,000 hours each) conducted entirely visual approaches to runways in black hole conditions. The result was that without the aid of altimeter or glide slope information, most pilots flew excessively low approaches and crashed into terrain short of the runway. (*www.skybrary.aero/index.php/Night_Visual_Approaches*)

1.19 Useful or effective investigations techniques

Nil.

2.0 ANALYSIS

2.1 General

Records available to the Bureau indicate that the aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures. The mass and centre of gravity of the aircraft were within the prescribed limits.

The crewmembers were licensed, medically fit and adequately rested to operate the flight.

This analysis focuses essentially on the Crew adherence to procedures and Crew Resource Management (CRM).

2.2 Aircraft manoeuvre at finals to land

At 6 DME on the ILS/DME to runway 21 of Port Harcourt International Airport, the Co-Pilot (PM) confirmed 'field in sight' to the Pilot Flying and he acknowledged. According to the PM, the crew stayed on the ILS and the PF disconnected the autopilot between 700 ft and 600 ft AGL. At Decision Height, the crew were not established on the centreline and were visually impaired by rain. This should have called for a missed approach, rather than attempting to correct the deviation from the ILS.

After the aircraft touched down, the PF told the PM that he mistook the brightly illuminated left runway edge lights for the runway centreline and ended up putting the left side of the aircraft landing gear in the grass verge. This may have been because of "Black Hole effect" - a visual illusion with the inherent risk in night visual approaches.

According to CVR recording, it is worthy to note that the aircraft windshield wipers were inoperative at the time the PF called for wipers. This may have impaired the PF's vision and his ability to identify the runway edge lights to keep the centreline.

At the time of the occurrence, investigation revealed that DNPO runway 21 did not have runway centreline lightings.

2.3 Crew Resource Management (CRM)

The investigation revealed that the CRM between the Pilot (PF) and the Co-Pilot (PM) was inadequate. From the Cockpit Voice Recordings, the crew were engaged in non-flight related conversations at the critical landing phase of the flight, thereby violating the norms of a sterile cockpit. The effect of the non-adherence to Cockpit discipline is a distraction which was obvious during the crew approach to runway 21.

The PM stated that he noticed the PF flew left of the localiser and said "centreline, centreline" for which the PF corrected, but the correction was inadequate.

Other conversations captured on the CVR reveal that from Decision Height to touchdown, the PM gave several cues about the incorrect position of the aircraft with respect to the runway which the PF acknowledged but seemed unable to comply with.

Had the PM taken control of the aircraft when he noticed the PF's control was not properly aligned, this occurrence could have been averted.

2.4 DNPO Airfield lighting serviceability status

The investigation revealed that the Approach lights, threshold lights and Precision Approach Path Indicator (PAPI) lights were serviceable at the time of the occurrence.

Also all runway 21 left edge lights were serviceable and operating at full intensity whereas some of the right edge lights were not serviceable and operating at low intensity.

According to FAAN, an earth fault occurred due heavy rain which short-circuited part of the right runway edge lights. The fault was rectified and the edge light circuit became serviceable at about 22:25 h.

There is need for more proactive action from FAAN as the fault finding and rectification were triggered by the incident.

3.0 CONCLUSIONS

3.1 Findings

1. The aircraft had a valid Standard Airworthiness Certificate.
2. The crew were licensed and qualified to conduct the flight.
3. The Captain was the Pilot Flying at the time of the occurrence.
4. At 19:13 h, 6 NM to touchdown, the crew reported 'field in sight' and was cleared to land by ATC.
5. At 19:16 h, the aircraft touched down at about 1,500 m from the threshold runway 21, with the left main wheel on the grass verge.
6. At about 1,800 m from the threshold of runway 21, the aircraft returned to the runway and stopped at about 2600 m.
7. The nose wheel gear collapsed.
8. The Airport Rescue and Fire Fighting Services (ARFFS) arrived the crash scene within 2 minutes of the occurrence.
9. All the five occupants in the aircraft disembarked with no injury.
10. At the time of the occurrence, the Precision Approach Path Indicator (PAPI) were serviceable; runway 21 edge lights left was ON and bright while runway 21 edge lights right was ON but at low intensity.
11. The aircraft was towed out of the runway and parked at GAT Apron at 21:50 h.

3.2 Causal factor

Black hole effect disorientation causing low-level manoeuvre into grass verge.

3.3 Contributory factor

1. Most of the runway 21 right edge lights were unserviceable at landing time.
2. Inadequate Crew Resource Management during approach.

4.0 SAFETY RECOMMENDATIONS

4.1 Safety Recommendation 2021-028

Federal Airports Authority of Nigeria (FAAN) should ensure the serviceability of DNPO runway lighting systems during all operations.