



AAID

*Air Accident Investigation Department
of the Bahamas*

AIRCRAFT ACCIDENT REPORT AAID# AO-18-000027

**Loss of Control Inflight and
Uncontrolled Collision with Terrain (Ocean)**

**Piper Aztec PA-23-250
N8383C**

**Nirvana Beach, New Providence,
Bahamas**

8th November, 2018



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Aviation Investigation Report **AO18-000027**

This report is available on the website of the
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www.baaid.org/accidents

ABOUT THE AAID

The Aircraft Accident Investigation Department (AAID) is the independent aviation accident investigation department under the Bahamas Ministry of Tourism and Aviation (MOTA) charged with the responsibility of investigating all aviation accidents and incidents in the Bahamas.

The AAID's function is to promote and improve safety and public confidence in the aviation industry through excellence in:

- Independent investigation of aviation accidents and other safety occurrences
- Safety data recording, analysis and research
- Fostering safety awareness, knowledge and action.

The AAID does not investigate for the purpose of assigning fault, apportioning blame or to provide a means for determining civil or criminal liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times, the AAID endeavors to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

The AAID performs its functions in accordance with the provisions of the Bahamas Civil Aviation Act 2016, Civil Aviation (Investigations of Air Accidents and Incidents) Regulations and Amendment Regulations 2017, International Civil Aviation Organization (ICAO) Annex 13 (Eleventh edition, July 2016) and, where applicable, relevant international agreements.

The Ministry of Tourism and Aviation mandates that the Aircraft Accident Investigation Department investigate aviation accidents and incidents, determine probable causes, issue safety recommendations, study aviation safety issues and evaluate the safety effectiveness of agencies and stakeholders involved in air transportation. The objective of a safety investigation is to identify and reduce safety-related risk. AAID investigations determine and communicate the safety factors related to the aviation safety matter being investigated.

The AAID makes public its findings and recommendations through accident reports, safety studies, special investigation reports, safety recommendations and safety alerts. Unless otherwise indicated, recommendations in this report are usually addressed to the regulatory authorities of the State having responsibility for the matters with which the recommendation is concerned or the Bahamas Government, industry organizations and agencies, as appropriate. It is for those authorities to decide what action is taken.

When the AAID issues a safety recommendation, the person, organization or agency is required to provide a written response without delay. The response shall indicate whether the person, organization or agency accepts the recommendation, any reasons for not accepting part or all of the recommendation(s), and details of any proposed safety action(s) resulting from the recommendation(s) issued.



**Piper Aztec PA-23-250
N8383C**

**Loss of Control Inflight and
Uncontrolled Collision with Terrain (Ocean)
Nirvana Beach, New Providence, Bahamas
November 8th, 2018**

ABSTRACT:

This report explains the accident, involving a Piper Aztec PA-23-250 aircraft, serial number 27-4412 which departed the West Palm Beach County Park Airport (KLNA) on November 8th, 2018 at approximately 7:26 PM Eastern Standard Time (EST). The aircraft departed under instrument flight rules with destination Lynden Pindling International Airport (LPIA/MYNN)¹, New Providence, Bahamas. There was one pilot and a load of cargo on board at the time of the accident. The pilot reported to the Nassau Air Traffic Controller that he was experiencing an engine malfunction, shortly after which the aircraft disappeared from radar coverage. The crash occurred approximately 2.3 nautical miles (NM) from the approach end of Runway 14 of the Lynden Pindling Int'l Airport. The pilot, major parts and components of the aircraft and an undetermined amount of cargo were unaccounted for, as the aircraft sank and was never recovered from the ocean due to the depths of the ocean where it sank. The 406-megahertz emergency locator transmitter activated on impact with the ocean after which the Nassau Air Traffic Control alerted search and rescue and other relevant authorities of the accident.

This investigation was done in accordance with Annex 13 to the Convention on International Civil Aviation. The investigation is intended neither to apportion blame, nor to assess individual or collective liability. Its sole objective is to draw lessons from the occurrence, which may help to prevent future accidents.

Consequently, the use of this report for any purpose other than for the prevention of future accidents, could lead to erroneous conclusions.

¹ MYNN and LPIA are abbreviations used interchangeably in this report denoting Lynden Pindling Int'l Airport. MYNN is the designator used by the International Civil Aviation Organization, while LPIA is the official name for the airport once named Nassau Int'l Airport (MYNN).

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EXECUTIVE SUMMARY

On the 8th November 2018 at approximately 9:03 PM EST, the AAID was notified that Nassau Air Traffic Control (ATC) had lost radar contact with Piper Aztec N8383C approximately 2.3 NM from the approach end of RWY 14 at the Lynden Pindling International Airport (LPIA) in the area of Nirvana Beach.

The aircraft departed the West Palm Beach County Park (KLNA) Airport at 7:26 EST on an instrument flight plan² with destination Nassau, Bahamas (MYNN / (LPIA)). Based on reports from both Nassau and Miami air traffic control centers, there were difficulties with communication between both centers and the aircraft. Other aircraft in the airspace attempted to relay instructions from the centers to the aircraft.

As the flight progressed and the aircraft got closer to Nassau, communications improved between the aircraft and Nassau ATC. The pilot was able to receive and confirm instructions issued by ATC including his landing clearance. Shortly after receiving a second landing clearance, while approximately 5 miles from the field, the pilot advised ATC he was having engine difficulties. ATC requested information about fuel and person on board the aircraft, however, there was no response from the pilot.

A short time thereafter, radar contact with Nassau ATC was lost. The 406-megahertz emergency locator transmitter³ (ELT) installed in the aircraft was activated (observed by ATC) presumably when the aircraft made impact with the ocean. Nassau ATC alerted emergency personnel of the loss of radar contact with the aircraft and the ELT activation, possibly from the downed aircraft. The loss of contact occurred approximately 2.3 NM from the approach end of runway 14 (approximately ½ NM from the shoreline) in the vicinity of Nirvana Beach, in the Western District of New Providence.

Emergency personnel alerted were the LPIA crash and rescue fire services, the Royal Bahamas Police and Defense Force, (RBPF and RBDF) the United States of America (USA) Coast Guard and the Bahamas Air Sea Rescue Association (BASRA). Search and rescue assets were deployed by the responding agencies. Rescue crews of the RBDF reported that they observed the tail section of the aircraft above the water when they arrived on scene. With the assistance of the Coast Guard, providing aerial sweeps of the area, using high intensity lights, searches were conducted with hopes of recovering occupant(s) of the aircraft in the water. However, no occupant(s) were observed or rescued during that search.

Efforts continued for several days after the aircraft disappearance, however, they were hampered due to inclement weather. Miscellaneous items, believed to be from the aircraft, were recovered by the RBDF and other agencies searching for the downed aircraft. Eight days after the accident, components of the aircraft as well as additional cargo, believed to be from the aircraft, were located by concerned civilians, off the western coast of New Providence (near Nirvana Beach), where the aircraft crashed. According to responders, the recovered components were submerged in approximately 60 ft. of water.

The AAID has determined the probable cause of this accident to be loss of control inflight resulting in uncontrolled flight into terrain (ocean). Engine malfunction has been determined to be a contributing factor in the loss of control event.

² **Instrument Flight Rules (IFR):** The U.S. Federal Aviation Administration's (FAA) Instrument Flying Handbook defines IFR as: "Rules and regulations established by the FAA to govern flight under conditions in which flight by outside visual reference is not safe. IFR flight depends upon flying by reference to instruments in the flight deck, and navigation is accomplished by reference to electronic signals." It is also a term used by pilots and controllers to indicate the type of flight plan an aircraft is flying, such as an IFR or VFR flight plan

³ **ELT Emergency Locator Transmitter** ICAO defines an Emergency locator transmitter (ELT) as equipment which broadcasts distinctive signals on designated frequencies and, depending on application, may be automatically activated by impact or be manually activated. A suitably configured ELT is an integral component of the international satellite system for search and rescue (SAR) COSPAS-SARSAT. When activated manually - or automatically by immersion in water or as a result of high 'g' forces on impact - ELTs transmit a distress signal which can be detected by non-geostationary satellites and then located precisely by either or both of GPS trilateration and Doppler triangulation

TITLE

Registered Owner: Global Aero Aircraft LLC

Manufacturer: Piper Aircraft

Aircraft Type: PA-23-250

Nationality: United States of America

Registration: N8383C

Place of Accident: 2.3 nm from the approach end of RWY 14 of LPIA

Date and Time: 8th November 2018, 8:50 PM EST

Notification: BCAA, NTSB, FAA, ICAO

Investigating Authority: Air Accident Investigation Department,
Ministry of Tourism and Aviation

Investigator in Charge: Mr. Kendall Dorsett Jr.

**Accredited
Representatives:** Mr. Aaron McCarter (NTSB)
Mr. Charles McKinley (FAA)
Mrs. Shemeka Forbes (BCAA)

Technical Advisors: Mr. Damian Galbraith (Piper Aircraft)

Releasing Authority: Air Accident Investigation Department

**Date of Final
Report Publication:** 16th December 2019

ABBREVIATIONS & TERMINOLOGY

When the following terms are used in this report, they have the following meanings:

AAID	Air Accident Investigation Department
AIP	Aeronautical Information Publication
ATS	Air Traffic Services
CAGR	Bahamas Civil Aviation General Regulations
BANSD	Bahamas Air Navigation Services Division
BCAA	Bahamas Civil Aviation Authority
EST	Eastern Standard Time (-5 hours to convert from UTC)
FAA	Federal Aviation Administration (USA)
ICAO	International Civil Aviation Organization
IMC	Instrument Meteorological Condition
IFR	Instrument Flight Rules
KIAS	Knots Indicated Airspeed
LPIA	Lynden Pindling Int'l Airport
MET	Meteorological Office / Department
METAR	Weather Report furnished by Meteorological Department
NM or nm	Nautical Miles
NTSB	National Transportation Safety Board (USA)
RBDF	Royal Bahamas Defense Force
RBPF	Royal Bahamas Police Force
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VOR	Very high Frequency Omnidirectional Range
UTC / Z	Universal Coordinated Time / Zulu time

DEFINITIONS

When the following terms are used in the Standards and Recommended Practices for Aircraft Accident and Incident Investigation, they have the following meaning:

Accident. An occurrence associated with the operation of an aircraft which, in the case of a manned aircraft, takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, or in the case of an unmanned aircraft, takes place between the time the aircraft is ready to move with the purpose of flight until such time as it comes to rest at the end of the flight and the primary propulsion system is shut down, in which:

- a) a person is fatally or seriously injured as a result of:
 - being in the aircraft, or
 - direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or
 - direct exposure to jet blast, except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew; or
- b) the aircraft sustains damage or structural failure which:

— adversely affects the structural strength, performance or flight characteristics of the aircraft, and
— would normally require major repair or replacement of the affected component, except for engine failure or damage, when the damage is limited to the engine, its cowlings or accessories; or for damage limited to propellers, wing tips, antennas, tires, brakes, fairings, small dents or puncture holes in the aircraft skin; or

c) the aircraft is missing or is completely inaccessible.

Note 1.— For statistical uniformity only, an injury resulting in death within thirty days of the date of the accident is classified as a fatal injury by ICAO.

Note 2.— An aircraft is considered to be missing when the official search has been terminated and the wreckage has not been located.

Accredited representative. A person designated by a State, on the basis of his or her qualifications, for the purpose of participating in an investigation conducted by another State. Where the State has established an accident investigation authority, the designated accredited representative would normally be from that authority.

Aircraft. Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

Causes - Actions, omissions, events, conditions, or a combination thereof, which led to the accident or incident. The identification of causes does not imply the assignment of fault or the determination of administrative, civil or criminal liability.

Flight recorder - Any type of recorder installed in the aircraft for the purpose of complementing accident/incident investigation.

Investigation - A process conducted for the purpose of accident prevention which includes the gathering and analysis of information, the drawing of conclusions, including the determination of causes and, when appropriate, the making of safety recommendations.

Investigator-in-charge - A person charged, on the basis of his or her qualifications, with the responsibility for the organization, conduct and control of an investigation.

Note - Nothing in the above definition is intended to preclude the functions of an investigator-in-charge being assigned to a commission or other body.

Operator - A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

Preliminary Report - The communication used for the prompt dissemination of data obtained during the early stages of the investigation.

Safety Deficiency - An unsafe condition or underlying factor with risks for which the defences are less-than-adequate.

Safety recommendation - A proposal of the accident investigation authority of the State conducting the investigation, based on information derived from the investigation, made with the intention of preventing accidents or incidents.

State of Design - The State having jurisdiction over the organization responsible for the type design.

State of Manufacture - The State having jurisdiction over the organization responsible for the final assembly of the aircraft.

State of Occurrence - The State in the territory of which an accident or incident occurs.

State of the Operator - The State in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

State of Registry - The State on whose register the aircraft is entered.

Note. — In the case of the registration of aircraft of an international operating agency on other than a national basis, the States constituting the agency are jointly and severally bound to assume the obligations which, under the Chicago Convention, attach to a State of Registry. See, in this regard, the Council Resolution of 14 December 1967 on Nationality and Registration of Aircraft Operated by International Operating Agencies which can be found in Policy and Guidance Material on the Economic Regulation of International.

1.0 FACTUAL INFORMATION.

1.1 HISTORY OF THE FLIGHT

On 8th November, 2018 at approximately 8:50 PM EST, (0150 UTC)⁴ a Piper Aztec PA-23-250 aircraft disappeared from radar contact of the Nassau air traffic approach control at the Lynden Pindling International Airport (MYNN).⁵ The flight departed West Palm Beach, County Park Airport (KLNA) with the pilot as the sole occupant and a load of cargo.

At 7:35 PM, the pilot made contact with Miami Center Sector 21 (Freeport Low) on frequency 133.40 MHz requesting permission to change his route of flight from his position at the time direct to the Nassau VOR⁶.

Miami Center acknowledged, but was unable to provide a direct route clearance to the Nassau VOR, but instead issued clearance to the HANKX intersection instead. The pilot acknowledged the amended clearance.

Due to moderate and heavy precipitations off the coast of West Palm Beach, Florida, Miami Center provided weather avoidance instructions and directions to the pilot.

At 8:21 PM, Miami Center contacted Nassau approach control to handover radar tracking of N8383C. Nassau ATC advised negative radar contact with the aircraft at that time.

Nassau ATC made several unsuccessful attempts to contact the aircraft by radio. The pilot eventually responded and radar contact was eventually established with the aircraft. A series of unintelligible transmissions followed when ATC again tried to communicate with the pilot. These unintelligible transmissions were assumed to be from the aircraft as ATC instructions to the pilot were going unanswered. The pilot eventually responded stating that he read ATC "very weak."

The pilot requested landing permission for Runway 14. After confirming field in sight, clearance was given for the visual approach to Runway 14 at MYNN.

At 8:39 PM, the pilot was assigned and acknowledged clearance to land Runway 14. The pilot was advised of field conditions at this time. ATC also requested additional information from the pilot.

Between 8:40 PM and 8:48 PM, radio call outs were made to the aircraft with no response.

At 8:50 PM, the pilot stated, "Tower, eight three Charlie, I'm having engine problems." At the time of this transmission, based on radar data provided by ATC, the aircraft was at an altitude of 600 ft. and indicated airspeed of 82 knots. ATC acknowledged transmission and requested souls and fuel on board. The pilot never responded.

Approximately two minutes after the pilot's last transmission, radar contact with the aircraft was lost, followed by an ELT signal, which was heard over ATC's frequency.

Air Traffic Control immediately initiated emergency response protocols informing Miami Center, the Royal Bahamas Defense and Police Force, the US Coast Guard and BASRA of the possibility of the downed aircraft in the vicinity of Nirvana Beach, approximately two nautical miles from the approach end of Runway 14, where the last radar contact was observed.

The RBDF dispatched two vessels from the Harbor Patrol Unit based in Nassau Harbor and one vessel from the Coral Harbor Base, in addition to a roving patrol ground team to conduct shoreline searches.

At 9:50 PM, the first RBDF vessel arrived on scene, to be followed shortly after by vessels from BASRA, RBPF marine unit vessel, and the US Coast Guard Helicopter.

⁴ UTC - Coordinated Universal Time abbreviated to UTC, is the primary time standard by which the world regulates clocks and time. It is within about 1 second of mean solar time at 0° longitude; it does not observe daylight saving time. To convert from UTC to Eastern Standard Time subtract 5 hours from UTC time displayed. All times in this report will refer to local time.

⁵ MYNN airport code is a 4 letter unique identifier that is assigned to the airports by the International Civil Aviation Organization (ICAO).

⁶ VHF Omnidirectional Radio Range (VOR), is an aircraft navigation system operating in the VHF band. VORs broadcast a VHF radio composite signal including the station's Morse Code identifier (and sometimes a voice identifier), and data that allows the airborne receiving equipment to derive the magnetic bearing from the station to the aircraft. This line of position is called the "radial". Alternatively, the VOR radial may be combined with magnetic heading from the aircraft compass to provide a bearing relative to the aircraft axis, which can be used to home to the beacon. VOR beacons are frequently used as way-points on conventional Airway systems, or as the basis for a Non-Precision Approach.



Figure 1. Google Map location of aircraft disappearance

At 10:24 PM, the tail section of N8383C was located and observed partially submerged at coordinates 25° 04' 11.2" N Latitude and 077° 30' 26.3" W Longitude, approximately ½ mile from the shorelines of Nirvana Beach in the Western District of New Providence. The US Coast Guard Helicopter provided aerial lighting in the area while search efforts continued on the surface. Shortly after visual contact of the aircraft was made, it disappeared below the surface.

Search efforts were conducted until approximately 2:00am on 9th November 2018. After which, all vessels returned to their respective bases.

By 6:00 AM, operations resumed. Between November 9th and 13th parts of the airframe of the aircraft and other debris were recovered by the RBDF and other search assets. The recovered items were reported to be from a depth of approximately 112ft.

Search and rescue divers estimated the depth of the water in the area where the aircraft was initially observed to be approximately 60 ft. During the search, contents presumably from the aircraft, were discovered and collected (47 one quart bottles of aviation oil).

On the 15th November, a volunteer team of deep-sea divers located additional debris and larger parts of the aircraft including wingtips, engine cowling, and other smaller parts of the airframe. Based on debris path, it appears the underwater currents carried the larger portion of the aircraft over the continental shelf into much deeper water than humans can access unaided by specialized equipment.

1.2 INJURIES TO PERSONS

Injuries	Crew	Passengers	Total
Fatal	1	0	1
None	0	0	0
TOTAL	1	0	1

1.3 DAMAGE TO AIRCRAFT

The extent of damage to the aircraft is unknown, as the aircraft was never recovered from the ocean for further analysis. However, parts of the left and right wingtips, engine cowlings and smaller miscellaneous pieces of the aircraft were recovered which confirmed the identity of the missing aircraft.

Damages to the recovered right wingtip appeared more substantial than that sustained by the left wingtip which would account for the right side of the aircraft sustaining the brunt / greater force of the initial impact during the crash sequence.



1.4 OTHER DAMAGE

No other damage was reported.

1.5 PERSONNEL INFORMATION - PIC

The pilot of the aircraft was a 34 year old male. He was certified by the Federal Aviation Administration in the United States of America. He was issued an Airline Transport Pilot certificate with single and multi-engine aircraft land ratings on December 31st, 2012. He was also type rated in the Beechcraft 1900 aircraft.

The pilot possessed a valid First Class Medical certificate issued January 1st 2018. The flight time noted on his last medical check revealed, 5,500 total flight hours had been logged.

1.6 AIRCRAFT INFORMATION

Manufacturer	Piper
Type, model and Registration	PA-23-250, Aztec, N8383C
Year of Manufacture	1970
Serial Number	27-4412
Certificate of Airworthiness issue date	6 November, 1969
Total airframe time	3,206.4 hours
Engine type, amount	Lycoming TIO-540-CIA (2)
Propeller, type, amount	Hartzell HC-E2YR-2RBSF (2)
Maximum allowable weight	5,200 pounds
Fuel type	Aviation Gasoline

1.6.1 GENERAL

N8383C was a Piper Aztec PA-23-250 model with serial number 27-4412. It was a fixed wing aircraft manufactured in 1970. The airplane is a six-place, low wing, twin-engine airplane equipped with retractable tricycle landing gear. This airplane is certified in the normal category. In the normal category all aerobatic maneuvers including spins are prohibited.

The airplane is approved for day and night VFR/IFR operations when equipped in accordance with United States Code of Federal Regulations Part 91 and 135. It was registered to Global Aero Aircraft LLC in Lakeland Florida, USA.

1.6.2 AIRCRAFT MAINTENANCE

The Airworthiness Directive (AD) Log and all maintenance records (airframe, engine, and propeller) for N8383C were reviewed. The information below has been documented as of the 5th October 2018.

N8383C	Manufacturer	Type	Serial number	Tach time	Time since overhaul
Aircraft	Piper	PA-23-250	27-4412	Unknown	3,206.4 TTSN ⁷
Engine 1	Lycoming	TIO-540-CIA	L-1416-61	354.8 hrs	26.2 hrs
Engine 2	Lycoming	TIO-540-CIA	L-1406-61	394.2 hrs	1,575.0 hrs
Propeller 1	Hartzell	HC-E2YR-2RBSF	BP9777A	328.6 hrs	254.2 hrs
Propeller 2	Hartzell	HC-E2YR-2RBSF	BP7547	328.6 hrs	1393.3 hrs

1.6.3 EMERGENCY LOCATOR TRANSMITTER

N8383C was equipped with a 406-MHz automatic fixed emergency locator transmitter (ELT) in the tail section of the aircraft. If the ELT is activated on impact or manually by the crew, it transmits signals on both 406 MHz and 121.5 MHz

The 406-MHz frequency transmitted the downed aircraft's position to the Nassau Air Traffic Control Center after radar contact was lost and once the aircraft made contact with the ocean surface.

1.6.4 AIRCRAFT WEIGHT & BALANCE

No weight & balance documentation was uncovered during the process of the investigation. As a result, an exact accounting of the aircraft's weight and loading prior to departure could not be accurately determined. The investigation however, did uncover documentation confirming amount of fuel purchased for the aircraft (470.4 pounds), receipts for 50 cases of aircraft engine oil (1,125 pounds), two under water scooters (140 pounds) and an aircraft battery (96 pounds), which witnesses identified as having been purchased to carry on the aircraft to the Bahamas.

A weight and balance document to determine if the aircraft was within its allowable weight and balance envelope for safe flight, was not created by the investigation team because the amount of cargo placed on the aircraft could not be accurately determined.

An aircraft battery and a quantity of engine oil (47 bottles – 88 pounds) were recovered along with other airframe parts and components of the aircraft. Despite a receipt showing 50 cases of aviation oil was purchased, no evidence were uncovered to determine whether all 50 cases were placed on the aircraft, or the amount (if any) that was left behind.

⁷ TTSN - Total Time Since New

1.7 METEOROLOGICAL INFORMATION

1.7.1 ENROUTE

The pilot requested and was given vectors to circumnavigate weather by approximately 20 miles due to severe weather in the vicinity of his direct route.

1.7.2 DESTINATION

METAR⁸ issued by the Bahamas Department of Meteorology (MET) at 8:00 PM (0100 UTC) reported winds from 100 degrees at 5 knots. Few clouds were forecasted to be at 2,000 feet and another layer of scattered clouds expected at 3,500 feet. Temperature was 79 degrees and dew point 76 degrees. Altimeter setting was 30.01 Mb.

The Bahamas Marine Forecast provided by (MET) issued at 6:00pm (2200 UTC) on the 8th November indicated for all areas, easterly winds at 10 to 15 knots, with seas 2 to 4 feet over the ocean. There was a chance of few passing showers. High tide was forecasted for 8:12pm and 8:36am Friday; and low tide was forecasted for 2:18am Friday and 3:05pm Friday. A warning was in place due to a slight chance of rip currents along east coast beaches.

In the vicinity of the accident, the weather was reported as visual meteorological conditions. The United States National Transportation Safety Board (NTSB) conducted further weather analysis. Based on this weather analysis, it was determined that weather was not a factor in this accident.

1.8 AIDS TO NAVIGATION

The pilot filed and operated on an instrument flight rules flight plan, the aircraft was in radar coverage and contact was established with both Miami and Nassau Air Traffic Centers throughout the route of flight. Operability of navigational aids were not a factor in this accident.

1.9. COMMUNICATIONS

Miami Control Centers reported to Nassau Control the difficulty they encountered with communication between the center and the aircraft shortly after its departure from the West Palm Beach Country Airport. There were instances of no response or considerable periods of time between calls being initiated with the aircraft and calls being acknowledged.

After Miami Center transferred control of the aircraft to the Nassau Approach Control Center, the communication problems persisted. Several attempts by Nassau Control Center to make contact with the aircraft were unsuccessful. The pilot attempted two-way radio communication with Nassau Control Center, however, it was unsuccessful. The pilot of another aircraft on the frequency attempted to relay air traffic information between N8383C and Nassau Approach Center.

Eventually, as the aircraft got closer into the Nassau airspace, the pilot was able to make contact, although most of his transmissions at first were unintelligible.

Steady transmissions were eventually established between Nassau ATC and the aircraft exchanging and acknowledging instructions. ATC cleared the aircraft to land and a short time later; the pilot advised that he was having engine problem(s). The pilot was not able to advise which engine was giving the problem, however, when asked to provide further information about persons and fuel on board, the pilot never responded. Approximately two minutes after reporting the problem to ATC, the aircraft disappeared from the ATC radar screen, followed by activation of the ELT, which was heard over the ATC radio frequency.

⁸ METAR is a format for reporting weather information. A METAR weather report is predominantly used by pilots in fulfillment of a part of a pre-flight weather briefing, and by meteorologists, who use aggregated METAR information to assist in weather forecasting.

1.10 AERODROME INFORMATION

Lynden Pindling International Airport (MYNN) is situated on the island of New Providence with the center of the airport located at coordinates 25° 02' 20"N and 077° 27' 58"W at an elevation of 16 ft. above mean sea level. It serves as a port of entry aerodrome and is the main gateway into The Bahamas.

The aerodrome is a government owned facility operated by the Nassau Airport Development Company (NAD) that is serviced by two intersecting runways 14/32 (11,126 feet long x 150 feet wide) and 09/27, (8,273 feet long x 150 feet wide), both surfaced with asphalt.

Air traffic control services, in addition to customs and immigration processing and handling are provided on a 24hr basis.

Radio navigation and landing aids for the aerodrome include a VOR/DME, identifier ZQA on frequency 112.700 MHz and an Instrument Landing System (ILS) RWY 14 on frequency 110.100 MHz

1.11 FLIGHT RECORDERS.

The aircraft was not equipped with a flight data recorder or a cockpit voice recorder. Neither recorder is required by Aviation Regulations for this aircraft type.

1.12 WRECKAGE AND IMPACT INFORMATION

The aircraft's last position according to ATC radar stamped at 8:50:53 pm LCL (0150 UTC) was approximately 2.3 miles Northwest of RWY 14 at the Lynden Pindling International Airport. The aircraft's last known position was coordinates Latitudes 25° 04' 11.6" N and Longitude 077° 30' 27.6" W.

The extent of damages sustained by the aircraft could not be determined as, with the exception of both wingtips, portions of the engine cowling and some other small airframe parts, the fuselage, engines and other heavier components and control surfaces sank to the ocean floor a short while after impact.

Both wingtips of the aircraft, and the left upper engine covering (cowling), and miscellaneous pieces that were detached during the crash sequence, were recovered. The right wingtip appeared heavily damaged, whilst the left wing tip appeared to have sustained minimal damage.

All of the damage noted to the recovered parts and components appeared to be attributable to impact forces. None of the flight control surfaces and major structural components was recovered.

Miscellaneous cargo and other debris, including smaller parts and components from the aircraft were recovered. The underwater debris field appeared to be at a depth of approximately 60 feet, descending progressively deeper in a north westerly direction leading toward the underwater continental shelf where debris was documented trailing over the shelf. It is reported that in some areas, this continental shelf extends downward several thousand feet.

Based on the underwater currents at the time and the direction of the debris field, the aircraft is also believed to have gone over the continental shelf.

1.13 MEDICAL AND PATHOLOGICAL INFORMATION

As the pilot was not recovered during the search and rescue/recovery missions, there is no way to determine what factors may have been present, (if any), to determine whether physiological or other factors may have contributed to the accident.

1.14 FIRE

There was no reported fire.

1.15 SURVIVAL ASPECTS

As the aircraft and pilot was never recovered, there is no way to determine survivability chances as a result of the impact forces. The seat occupied by the pilot, or safety restraints used (which in some cases can aid in survivability) could not be determined. Therefore, crash survivability is undetermined.

However, as this accident occurred in water, the US Coast Guard was consulted to provide guidance on estimates of survivability in a water environment.

The methodology used by the US Coast Guard is the Probability of Survival Decision Aid (PSDA)⁹, which utilizes environmental parameters including air temperature and water temperature. Physical attributes such as subject's height, weight etc. is also considered to produce an estimate of survival time. The US Coast Guard concluded that survival times in the case of this pilot; his Functional Time¹⁰ and Cold Survival Time¹¹ to be approximately 120 hrs.

Based on the calculations above, it would be reasonable to expect a timeframe of survival of at least five days after the event. However, it should be noted that the medical or physical condition of the pilot, whether or not he sustained any injuries or was conscious after the accident, was not known in the aftermath of what would have been a forceful impact with the ocean. Therefore, those calculations would be commensurate with what should be considered as a best-case scenario.

1.16 TESTS AND RESEARCH

No test or research was conducted as the aircraft and its major structures and components were never recovered.

1.17 REGULATORY OVERSIGHT

As this aircraft was operated under Part 91 of the USA Code of Federal Regulations, there was no requirement for oversight by the Bahamas regulatory authorities, as this was a private aircraft visiting and not domiciled in the Bahamas.

1.18 OTHER INFORMATION – NON-ESTABLISHMENT OF ICAO SEARCH AND RESCUE STANDARD

The Bahamas, as a signatory State to the Convention on International Civil Aviation (27th May 1975), is **obligated** to comply with the standards and recommended practices (SARPs) as prescribed in the Convention and outlined in its nineteen (19) Annexes.

Annex 12 to the Convention on International Civil Aviation, entitled 'Search and Rescue', specifically outlines the SARPs that are to guide contracting States in the establishment and conduct of search and rescue activities.

Over the years, steps were initiated by the Government of The Bahamas to adopt the SARPs contained in Annex 12. However, to date, there has been no effective establishment and implementation of the necessary requirements as specified in Annex 12 relative to Search and Rescue.

⁹ **Probability of Survival Decision Aid (PSDA)** predicts the impact of hypothermia and dehydration on survival time during exposure for a wide range of conditions in marine environments. The United States Coast Guard (USCG) has mandated PSDA use in their search and rescue (SAR) operations since June 2010

¹⁰ **Functional Time** (core temperature above 34°C or 93.2°F) is the length of time (hours) during which an individual may participate in self-rescue or take actions that will enhance survival/protection from exposure.

¹¹ **Cold Survival Time** (hours) is the time it takes for the core temperature to drop to 28°C or 82.4°F. Below that threshold, the probability of death due to hypothermia significantly increases.

1.18.1 EMERGENCY RESPONSE

In the aftermath of this occurrence, a multi-agency effort was utilized to provide search and rescue. This included the Royal Bahamas Defense Force (RBDF), the US Coast Guard, Royal Bahamas Police Force (RBPF) and the Bahamas Air Sea Rescue Association (BASRA).

Search and rescue activities were conducted between Thursday 8th November 2019 and Wednesday 14th November 2019. Afterwards, operations transitioned into search and recovery.

Listed below is an overview of the joint search and rescue effort provided in response to this occurrence:

- 5 platforms were used: Boats, divers, drone, aircraft, and shoreline patrols
- On scene on the night of the occurrence were:
 - 1 x US Coast Guard helicopter;
 - 2 x RBDF patrol craft;
 - 1 x BASRA Boat;
 - 1 x RBPF Boat
- Approximately six hours of air search and rescue time were conducted within the first two days of the incident in addition to drone patrols
- Up to 20 RBDF divers conducted searches on 8 of the 11 days. Due to adverse weather conditions, no search efforts were conducted on three of those days
- RBDF Patrol craft conducted over 100 hours of maritime surface patrols

2.0 ANALYSIS

No analysis conducted (due to non-recovery of aircraft)

3.0 CONCLUSIONS

The AAID has determined the probable cause of this accident to be loss of control inflight and uncontrolled collision with terrain (ocean). Engine malfunction has been determined to be a contributing factor to the loss of control inflight.

3.1 FINDINGS

1. The aircraft was certified and equipped in accordance with existing US CFR regulations Part 91 and approved procedures.
2. The aircraft had a valid certificate of airworthiness.
3. The aircraft was properly registered in the United States of America.
4. The aircraft was having difficulty communicating with both Nassau and Miami Control Centers throughout the flight.
5. No evidence of a weight and balance for the aircraft and its cargo was found during the investigation.
6. The pilot held a valid Airline Transport Pilot license with single and multi-engine land and instrument ratings.
7. The pilot held a valid First Class Medical with no limitations or waivers attached.
8. The aircraft was not equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR); neither was required by regulations.
9. The maintenance records indicated that the aircraft was equipped and maintained in accordance with existing US CFR regulations and approved procedures.
10. The aircraft crashed in waters approximately 2.3 NM from the approach end of Runway 14 of the Lynden Pindling International Airport, Nassau N. P., Bahamas.
11. Weather was not a contributing factor in this occurrence.
12. The pilot reported to Nassau ATC that he experienced an engine malfunction. Approximately 2 minutes after this report to ATC, the aircraft disappeared from the radar screen in ATC. Shortly thereafter Nassau ATC received an ELT signal.
13. Nassau ATC immediately notified Crash and Fire Rescue Services at the LPIA, as well as other emergency response personnel including the United States Coast Guard (USCG), The Royal Bahamas Defense Force (RBDF), Royal Bahamas Police Force (RBPf) and the Bahamas Air and Sea Rescue Association (BASRA).
14. The partially submerged empennage of the aircraft was located at 10:24 PM (0324 UTC) at coordinates latitude 25° 04' 112" N and longitude 077° 30' 263" W.
15. The Bahamas has not established and implemented the standards and recommended practices (SARPs) as outlined in Annex 12 as it relates to Search and Rescue Services (*see 1.18 for more information*).

4.0 SAFETY RECOMMENDATION(S)

During the course of this investigation, the Bahamas' non-establishment and implementation of the standards and recommended practices of Annex 12 (Search & Rescue) to the Convention on International Civil Aviation were highlighted due to the nature of this occurrence.

The investigative process identified that within recent years, steps were taken by the Government of The Bahamas to rectify this deficiency. However, this process has seemingly stalled and would require a conscientious commitment on the part of the Government in order to rectify this issue.

As a result, the Air Accident Investigation Department makes the following recommendation (1);

Recommends that the Government of The Bahamas fulfill the requirements as specified within Annex 12 (Search & Rescue), as a signatory to the Convention on International Civil Aviation, by establishing and implementing the prescribed standards that:

- a) designates an appropriate entity to perform search and rescue services,
- b) grants the Bahamas Civil Aviation Authority (BCAA) the authority to provide oversight of the designated search and rescue entity,
- c) establishes a Rescue Coordination Center (RCC) in support of the provision of search and rescue services.