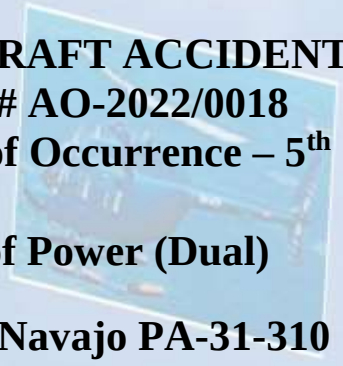
Aircraft Accident Investigation Authority of the Bahamas



AIRCRAFT ACCIDENT REPORT
AAIA# AO-2022/0018
Date of Occurrence – 5th June 2022

Loss of Power (Dual)

Piper Navajo PA-31-310
N711JW
Deadman's Cay, Long Island
Bahamas
Final Report – 22nd May 2023

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Aviation Investigation Report **AO2022-0018**

This report is available on the website of the
Aircraft Accident Investigation Authority at
www.baaid.org/accidents

ABOUT THE AAIA

THE AIRCRAFT ACCIDENT INVESTIGATION AUTHORITY (AAIA)

The Aircraft Accident Investigation Authority (AAIA) is the independent accident investigation agency under the Bahamas Ministry of Transport & Housing (MOTH) charged with the responsibility of investigating all aviation accidents and incidents in the Bahamas.

The AAIA'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 AAIA does not investigate for the purpose of apportioning blame or to provide a means for determining 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 AAIA 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 AAIA performs its functions in accordance with the provisions of the Aircraft Accident Investigation Authority Act, 2019 and Regulations, 2021 and the International Civil Aviation Organization (ICAO) Annex 13 and, where applicable, relevant international agreements.

The AAIA is mandated to investigate air transportation accidents and incidents, determine probable cause(s) of such accidents and incidents, issue safety recommendations, study transportation 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. AAIA investigations determine and communicate the safety factors related to the transport safety matter being investigated.

The AAIA 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 addressed to the regulatory authorities of the State having responsibility for the matters with which the recommendation is concerned. It is for those authorities to decide what action is taken.

When the AAIA 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 Navajo
PA-31-310
N711JW

Loss of Power (Dual)
Deadman's Cay, Long Island, Bahamas
5th June, 2022

ABSTRACT:

This report explains the accident, involving a Piper Navajo, PA-31-310 aircraft with United States registration N711JW, serial number 31-7712084 which departed the Deadman's Cay Airport (MYLD)[1], Long Island, Bahamas on June 5th, 2022 at approximately 9:05 EDT (1305 UTC)[2]. The aircraft departed under visual flight rules with destination Lynden Pindling International Airport (MYNN), New Providence, Bahamas.

There were seven persons on board the aircraft at the time of the accident. Varying degrees of injuries were noted to both passengers and pilot.

This investigation was conducted 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] A four-letter code used for the purposes of designating and identifying aerodromes around the world as defined by the International Civil Aviation Organization (ICAO).
[2] UTC - UTC is the time standard commonly used across the world. The world's timing centers have agreed to keep their time scales closely synchronized - or coordinated - therefore the name Coordinated Universal Time.

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EXECUTIVE SUMMARY

On 5th June, 2022, at approximately 9:05am EDT (1305 UTC), a PA-31-310 model, Piper Navajo aircraft, with United States registration N711JW, crashed moments after takeoff from the Deadman's Cay Airport (MYLD), Long Island, Bahamas.

The aircraft departed for the Lynden Pindling International Airport (MYNN), New Providence, Bahamas. The pilot sustained injuries and after being seen by medical personnel in Deadman's Cay, was flown to Nassau, Bahamas for further medical attention. There were six passengers on board the flight at the time of departure. Five of the six passengers sustained varying levels of injuries and one female passenger who occupied the rear seat succumbed to her injuries as a result of the crash sequence.

According to records obtained from the Federal Aviation Administration (FAA) of the United States of America, the pilot was issued an Airline Transport Pilot License (ATPL) with airplane-single and multi-engine land and instrument airplane ratings.

The weather conditions at the time of the accident was daytime (visual meteorological conditions).

The AAIA has determined the probable cause of this accident to be Loss of Power (Dual) resulting in a loss of control inflight (LOC-I), and subsequent uncontrolled flight into terrain.

TITLE

Manufacturer:	Piper
Aircraft Type:	PA-31-310
Nationality:	United States of America
Registration:	N711JW
Place of Accident:	2 NM from Deadman's Cay Airport (MYLD), Long Island, Bahamas N023º 11' 44" and W075º 06'10"
Date and Time:	5th June, 2022 at approximately 9:05am EDT (1305 UTC)

SYNOPSIS

Notification:	CAA-B, NTSB, FAA, ICAO
Investigating Authority:	Aircraft Accident Investigation Authority Ministry of Transport & Housing
Investigator in Charge:	Jaime Nixon (AAIA)
Accredited Representatives:	Mr. Adam Gerhardt (NTSB)(USA)
Technical Advisors:	Mr. Damian Galbraith (Piper Aircraft) Mr. James Childers (Lycoming) Mr. Kurt Gibson (Lycoming)
Releasing Authority:	Aircraft Accident Investigation Authority of the Bahamas
Date of Final Report Publication:	22nd May 2023

ABBREVIATIONS & TERMINOLOGY

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

AAIA	Aircraft Accident Investigation Authority
ATS	Air Traffic Services
BANSA	Bahamas Air Navigation Services Authority
CAA-B	Civil Aviation Authority of the Bahamas
EDT	Eastern Daylight Time (-4 hours to convert from UTC)
FAA	Federal Aviation Administration (USA)
ICAO	International Civil Aviation Organization
IMC	Instrument Meteorological Condition
IFR	Instrument Flight Rules
MET	Meteorological Office / Department
NM or nm	Nautical Miles
NTSB	National Transportation Safety Board (USA)
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
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.

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.

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 Air Transport (Doc 9587).

1.0 FACTUAL INFORMATION.

1.1 HISTORY OF THE FLIGHT

On 5th June, 2022 at approximately 9:05am EDT (1305 UTC), a PA-31-310 model, Piper Navajo aircraft, with United States registration N711JW, crashed moments after takeoff from the Deadman's Cay Airport (MYLD), Long Island, Bahamas.

The aircraft departed for the Lynden Pindling International Airport (MYNN), New Providence, Bahamas. The pilot and several passengers sustained injuries and after being seen by medical personnel in Deadman's Cay, was flown to Nassau, Bahamas for further medical attention. The female passenger who occupied the rear seat of the aircraft, succumbed to injuries she sustained as a result of the impact and crash sequence. The aircraft came to rest in dense brush approximately 75 feet from the point of initial contact with trees, just 2NM from the Deadman's Cay Airport at N023º 11' 44" and W075º 06'10".

The pilot was interviewed upon his return to Nassau. During the interview the pilot stated that he arrived at the airport at approximately 8:10 am that morning and conducted his routine pre-flight checks of the aircraft. Shortly thereafter, he and the six passengers boarded the aircraft and prepared for their departure. According to the pilot, after conducting his pre-takeoff checks, he taxied to the runway and departed.

The pilot further stated that during the climb phase and shortly after the aircraft's gears were retracted, he observed a warning light that indicated low oil pressure. Shortly thereafter and at approximately 200 feet, the left engine power started to decline significantly. An attempt was made to return to the airfield. Shortly thereafter, the right engine power also started to decline. The pilot stated that at that moment he advised the passengers to brace for impact. The terrain warning aural alarm could be heard in the aircraft. Both pilot and several passengers interviewed confirmed that an alarm was heard throughout the accident sequence up until the aircraft made contact with the surface.

The aircraft made contact with several trees before impacting the ground, coming to rest approximately 75 feet after initial contact with trees. The scene of the crash was located approximately 2 nautical miles from the Deadman's Cay Airport in dense brush. The pilot and five of the passengers were able to exit the aircraft after it came to a stop. The female passenger who sat at the rear of the aircraft was ejected and found lying approximately 5 feet from the rear door of the fuselage by the other passengers as they exited the aircraft. She appeared to be unconscious and the pilot along with another passenger rendered assistance. Initially it seemed that she drifted in and out of consciousness and later appeared to be in distress. Life saving measures inclusive of CPR were utilized. All attempts were unsuccessful and she subsequently succumbed to injuries sustained as a result of the crash sequence.

The deceased female passenger was later flown to Nassau, Bahamas where an autopsy to determine cause of death was performed on June 9, 2022.

1.2 INJURIES TO PERSONS

Injuries	Crew	Passengers	Total
Fatal	0	1	1
Serious	1	5	6
None	0	0	0
TOTAL	1	6	7

1.3 DAMAGE TO AIRCRAFT

The extent of damage to the aircraft was substantial. Both left and right engines received extensive damages as a result of the initial impact and subsequent crash sequence.

The fuselage of the aircraft was compromised and twisted due to the initial impact and subsequent crash sequence.

The field of debris was confined to an approximate 100 feet radius from the center of the fuselage. The aircraft came to rest at coordinates N023º 11' 44" and W075º 06'10".

On 9th June, 2022 the aircraft was recovered and transported to a facility in the USA for further documentation and analysis.

All critical parts and components of the aircraft were recovered and accounted for during the analysis.

1.4 OTHER DAMAGE

Apart from damages sustained by the aircraft, no other structure was impacted or damaged.

1.5 PERSONNEL INFORMATION - PIC

The pilot in command of the aircraft was 45 years old at the time of the accident. He was certified by the Federal Aviation Administration (FAA) in the United States of America (USA) and was issued an Airline Transport Pilot License (ATPL), airplane multi-engine land on 30th October, 2014 and Private Pilot privileges with airplane-single engine land. The pilot was also issued a type rating on the Beechcraft BE-1900 aircraft.

The pilot in command First Class Medical certificate was issued by the FAA in May 2016.

1.6 AIRCRAFT INFORMATION

Manufacturer	**Piper**
Type, model and Registration	**Navajo C, PA-31-310, N711JW**
Year of Manufacture	**1977**
Serial Number	**31-7712084**
Certificate of Airworthiness issue date	**08/30/1977**
Total airframe time as of 1st April , 2021	**7,102.6 hours**
Engine type, amount	**Lycoming, TIO-540-A2C Series (2)**
Propeller, type, amount	**Hartzell, 3-blade, controllable pitch, full feathering (2)**
Maximum allowable takeoff weight	**6,500 pounds**

Fuel type	Aviation Gasoline

1.6.1 GENERAL[3]

N711JW was a Piper Navajo Chieftain Aircraft, PA-31-310 model, with serial number 31-7712084. It was a fixed wing aircraft manufactured in 1977. The airplane was configured in a seven-place executive seating arrangement (including both pilot and copilot seats). N711JW was a multi-purpose, low wing, twin-engine airplane equipped with retractable tricycle landing gear. It has a large cabin area which can be quickly converted from a commuter cabin to a cargo or executive interior. The many options and cabin arrangements available allow the aircraft to be easily suited to the individual needs of the owner. This airplane is certified in the normal category. (In the normal category all aerobatic maneuvers including spins are prohibited).

The aircraft uses Aviation Grade 100/130 Green fuel (Avgas) and has a capacity of 192 gallons (186 gallons is useable). It has an oil capacity of 12 US Quarts (each engine).

The aircraft also has a maximum baggage capacity of 150 pounds in the forward and 200 in the aft baggage area.

All major parts and components (described below) were accounted for at the crash site and were subsequently collected for further documentation and analysis.

AIRFRAME

The fuselage is a conventional semi-monocoque structure. It has an entrance door, emergency exit, baggage doors and miscellaneous access panels.

The main cabin door is located just aft of the left wing, it is a two piece door that separates in the middle. The upper half swings up and is held in the open position by a spring loaded support. The lower half swings down and houses the entrance steps. To open the door from outside, push on the forward part of the door handle and pull. Then lower the bottom half, pull out the steps and raise the upper half until it locks into position. To open from the inside, push the (lock) button beside the handle, pull, and lower the bottom half of the door. Then raise the upper half to the locked position. To close, raise the knurled cylinder on the upper door holder and lower the door. Raise the lower door, making sure the door support cords don't catch in the door frame. Pull the halves together and push the door handle in. Check that the door is properly locked by trying to pull the handle to the open position without pushing the lock button.

An emergency exit is located in the right forward side of the fuselage. The 23 x 30 inch exit is an integral part of the third window from the front, on the right side. To open, remove the Plexiglas window located to the rear of the emergency exit window, pull the handle and push the window out.

A large two-piece windshield and six windows along each side of the fuselage give excellent visibility to the pilot and passengers. The five forward side windows are of double pane construction to reduce window fogging.

The wing is an all-metal, cantilever, semi-monocoque structure. Each wing panel incorporates an I-beam main spar which extends into the fuselage. The two spars are bolted together with high strength butt plates giving in effect a continuous main spar. There is also a full length rear spar and a short front spar. All of the spars are structurally attached to the side of the fuselage.

[3] General information for this aircraft extracted from the Piper Aircraft Corporation, Piper Navajo Chieftain Pilots Operating Manual – Revised 22nd April, 2002.

The wing tips are made of fiberglass and are removable for easy repair or replacement. Two bladder fuel cells are provided in each wing panel to store fuel. Wheel wells in each wing panel store the main gear when retracted. Wheel well doors are provided to completely enclose the gear when retracted. Access openings are provided to aid in inspecting and servicing components in the wing. A portion of the leading edge, inboard of the nacelle, is removable to provide access to and inspection of the wires and lines in the leading edge.

Ailerons are all metal and are fully balanced for smooth control of the aircraft.

Flaps are all metal and are actuated by an electric motor located under the cabin floor. The flap is connected to a screw transmission which is actuated by a flexible shaft connected to the electric motor.

The engine nacelles are an integral part of the wing. They provide structure for mounting the engines.

The empennage consists of a vertical fin, a rudder, a horizontal stabilizer and elevators. They utilize an aluminum cantilever structure with fiberglass tips. The rudder and elevators both have trim tabs. The elevator tab also serves as an anti-servo tab.

POWERPLANT AND PROPELLERS

The Navajo is powered with two turbocharged Avco Lycoming TIO-540-A2C engines. The left engine and the right engine rotates clockwise as viewed from the pilot seat. The six-cylinder engines develop 310 HP each at 2575 RPM. They are equipped with geared starters, single drive dual magnetos, 24-volt 70-amp alternators, shielded ignition, turbochargers, hydraulic pumps, oil filters, oil coolers, pneumatic pressure pumps and three-bladed propellers. Recommended overhaul is at 1200 hours.

The propellers are Hartzell, three-blade, constant speed, controllable pitch and full feathering. They are controlled by a propeller governor mounted on each engine. The governor is controlled by the corresponding propeller control in the pedestal. A combination of nitrogen air for pressure, a spring*, and oil pressure actuates the blades. A predetermined nitrogen charge is put in the propeller nitrogen chamber. As the propeller control is moved it moves a valve in the governor which allows oil pressure to enter the propeller hub or return to the crankcase. Oil pressure from the governor moves the blades to low pitch (high RPM). The nitrogen charge and spring* move the blades to high pitch (low RPM) or to feathering.

When the engines are shut down leave the prop control in the high RPM position. The nitrogen pressure and spring* will move the blades to the low RPM setting, removing most of the oil in the prop hub. This prevents damage to the propeller during cold weather starts. Feathering is accomplished by maintaining an engine speed of at least 1000 RPM and pulling the propeller control aft through the detent. The detent is to prevent inadvertent feathering. To unfeather, move the control to increased RPM and engage the starter until the propeller begins windmilling (in flight).

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.

1.6.2 AIRCRAFT MAINTENANCE

An Annual/100 hour inspection was completed on the airframe of this aircraft on 9th March, 2022 at Hobbs time 714.8 hours, Total Tachometer time 3656.

Removal and major overhaul in accordance with manufacturer's specifications was done to both left and right engine. Both engines were subsequently installed on the aircraft and test run after the overhaul and installation.

Applicable and current Airworthiness Directives (AD) were complied with during this inspection. The aircraft was later determined to be in airworthy condition and subsequently returned to service. The information below was documented during the Annual/100 hr. inspection.

N711JW	Manufacturer	Type	Serial number	Tach time	Time since overhaul
Aircraft	Piper	PA31-310	31-7712084	3656	N/A
Engine 1 (L)	Lycoming	TIO-540-A2C	RL-4842-61A	3656	299.9
Engine 2 (R)	Lycoming	TIO-540-A2C	RL-4765-61A	3656	299.9
Propeller 1	Hartzell	HC-E3YR-2A	DJ10154A	3656	299.9
Propeller 2	Hartzell	HC-E3YR-2A	DJ10797A	3656	299.9

1.6.3 AIRCRAFT WEIGHT AND BALANCE

No weight and 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 was not established.

The following weight limitations are posted for the Navajo 310;

- Maximum Ramp Weight of 6,536 pounds
- Maximum Takeoff and Landing Weight of 6,500/ 6,200 pounds
- Empty Weight of 4,304.07 pounds; and
- Zero fuel weight of 5,360 pounds
- Useful load[4] of 2,145.43 pounds

1.7 METEOROLOGICAL INFORMATION

No adverse weather was seen in satellite and radar images over Deadman's Cay Airport (MYLD) during the time of the accident. However, marginal visual flight rules occurred around Long Island due to passing showers and more widely scattered showers and isolated thunderstorms.

1.8 AIDS TO NAVIGATION

Navigational aids were not a factor in this accident.

1.9 COMMUNICATIONS

Communication with MYLD can be made on the Unicom frequency of 122.800 MHz or Nassau Radio on 128.000MHz (primary) or 124.200MHz (secondary).

Communications were not a factor in this accident.

1.10 AERODROME INFORMATION[5]

Deadman's Cay Airport (ICAO: MYLD) is situated on the island of Long Island with the center of the airport located at coordinates 23º10'44.39"N and 075º05'37.12"W at an elevation of 10 ft. above mean sea level.

The aerodrome is a government owned facility operated by the Family Island Airport Division (FIAD) of the Airport Authority. It is serviced by an asphalt runway 09/27 (4,042 feet long x 90 feet wide).

[4] The useful load is the difference between the maximum gross weight and the empty weight. To the empty weight, you have to add the fuel, oil, any other fluids, pilot and passengers, and baggage.

[5] Information for this aerodrome extracted from the Bahamas Aeronautical Information Publication Fifth Edition Amendment 01/ 2022.

According to the Bahamas Aeronautical Information Publication (AIP), Deadman's Cay Airport is equipped with:

- 1 x 300 pounds Purple K fire extinguisher

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, from the point of the take-off roll, travelled approximately 2 nautical miles and came to rest in dense brush approximately 75 ft. from point of first contact with trees. The center of the aircraft was documented at coordinates N023º 11' 44" and W075º 06'10". The debris field appeared to be contained in an area with a radius of approximately 100 feet from the center of the fuselage.

The right wing of the aircraft appeared to have made first impact with the trees. Shortly thereafter, the fuselage of the aircraft and the left wing made contact with the ground and surrounding trees. The density and thickness of the trees in the area where the aircraft crashed, limited the distance the aircraft traveled after impact with the surface.

The extent of damages sustained by the aircraft were substantial. The left side of the aircraft appeared more heavily damaged than the right side, which indicated that the left side of the aircraft was the first portion of the aircraft to make contact with the surface at high speed. The aircraft travelled a distance of approximately 75 ft. from the initial impact point before coming to rest.

Both left and right engines and their cowling (covering), as well as other components and pieces of the aircraft that were detached during the crash sequence, were recovered, documented and analyzed during the post-crash analysis.

Damages documented to the recovered airframe, major control surfaces, parts and components appeared to be attributable to impact forces. The flight control surfaces and major structural components were all recovered and damages documented and where applicable, further analyzed.

An analysis of the aircraft and both engines were conducted at a secure facility by investigators of the AAIA and representatives of the Manufacturer of the aircraft and engines. The following were noted:

Fuselage

The fuselage exhibited impact damage and separated by recovery personnel about 4' from the empennage. The emergency exit window was separated from its retainer. The nose baggage door exhibited impact damage and partially separated from the fuselage; the door was noted in the "closed latched and locked" position. Impact damage was noted to the cargo door and was partially separated from the fuselage. The upper cabin door was impact damaged and remained attached to its mounts; its window was fragmented. The lower cabin door was impact separated from the fuselage; the upper and lower cabin doors were noted in the "closed and latched" positions. The left pitot tube was impact separated from the fuselage and its pitot port was obstructed with an organic material consistent to that of wood; The right pitot tube was separated from the fuselage and not observed within the recovered wreckage.

The #7 seat/belted potty seat back and bottom was displaced; its lap belt assembly remained attached to its mounts and was observed unlatched. Field test of the lap belt determined it to be functional; there was no shoulder harness installed.

The #6 seat was impact damaged and partially separated from its mounts; its lap belt remained attached and observed unlatched, and determined to be functional during field test.

The #5 seat was impact damaged and partially separated from its mounts; its lap belt remained attached to its mounts and was functional during field test. Impact damage was noted to the #4 seat but remained attached to its mounts; its lap belt remained attached and was functional during field test. Impact damage was noted to the #3 seat but remained attached to its mounts; its lap belt remained attached and was functional during field test.

The #2 seat/copilot, exhibited impact damage and remained attached to its mounts; its lap belt and shoulder harness remained attached to their respective attach points with the lap belt unlatched. The lap belt and shoulder harness were determined to be functional during field test.

The #1 seat/pilot, exhibited impact damage and remained attached to its mounts; its lap belt and shoulder harness remained attached to their respective attach points with the lap belt unlatched. The lap belt and shoulder harness were determined to be functional during field test. NOTE: there were no shoulder \harnesses installed for seats #3 through #7.

The instrument panel, fuel control panel, and engine control pedestal exhibited impact damages. The pilot and copilot control wheels remained attached to their respective attach points, and the rudder pedal assembly was impact damaged. The following electric and control positions were observed as following:

- Flap control: off
- Air-conditioning: fan on
- Cockpit air: off
- Defrost: on
- Cabin air: on
- Left and Right Engine Fuel Pump Switches: Both off
- Left Engine left and right mags: On
- Right Engine left and right mags: On
- Hobbs Meter: 740.7
- Landing gear selector: Up

- Avionics Master: On
- PFD: Off
- Position Lights: On
- Engine Alternate Airs: Off
- Ground Vent Fan: On
- Landing Light: Off
- Trim Master: On
- Alternator Field Control: UK/ Impact damaged
- Battery Master: Off
- Engine controls, throttles, mixtures, and propellers: Varying mid-travel positions.
- Left fuel control: Inboard fuel cell
- Right fuel control: Inboard fuel cell
- Cross-feed control: Off/Closed
- Left fuel shut-off: Mid-travel
- Right fuel shut-off: Off/Open flow

NOTE: The fuel control panel exhibited impact damage with deformation of its supporting structure.

Left Wing

The left wing was separated from the fuselage by impact and recovery with Impact damage noted to the wing. The firewall and attached engine with mount was separated from the wing and the lower engine cowling was fragmented. The main gear was retracted in the "up" position. Both inboard and outboard fuel cells were breeched from impact damage. The outboard fuel cap remained attached to its receptacle and the inboard cap was separated; The seals of the fuel caps were in place. Both fuel tank vents and pick-up screens were clear of obstruction; The inboard fuel cell flapper valve was in place and functional; its low fuel level float was determined to be inoperative during field test with a multi-meter. About two gallons of liquid was observed within the inboard fuel cell and was determined to contain water when tested with water finding paste. No fuel was observed within the outboard fuel cell and fuel line continuity was established from the fuel selector valve to the outboard fuel cell during field test with low-pressure air.

The fuel shut-off valve and control cable remained attached to their respective attach points and the cable was separated at the wing-root by recovery. The valve was observed in the "on" position and was confirmed during field test with low-pressure air; The valve leaked in the "on" position from its rotating shaft when field tested in water with low-pressure air. The cross-feed valve exhibited impact damage and its control cable to valve hardware was not present; the valve was determined to be in the "on" position during field test with low-pressure air. The fuel selector valve remained attached to its mounts and its control cable remained attached and was separated at the wing-root by recovery personnel. The fuel selector valve was noted in the "outboard fuel cell" position and was determined to be functional during field test with low-pressure air; a liquid consistent in odor to that of aviation type gasoline was observed within the valve. Fuel was observed within the gascolator bowl and its filters were clear of debris; no water was present when fuel was checked with water finding paste. The emergency pump was determined to be functional when field tested with a DC power source. No anomalies were noted during pressure check of the wing-root flexible fuel lines.

The flap exhibited impact damage and was observed in the "up/0°" position. The aileron was impact damaged and partially separated from the wing; its balance weight was separated and not observed within the recovered wreckage. The aileron control rod remained attached to the aileron and bellcrank. The aileron control cables remained attached to their respective attach points and were separated at the wing-root by recovery personnel. Aileron control continuity was established from the cockpit through recovery separations to the aileron.

Right Wing

The right wing was separated by recovery personnel and impact separated about 11' from the wing-root. The gear was observed "retracted/up position". The firewall with attached engine, engine mount, and engine cowlings were separated from the wing. Impact damage was noted to the lift detector. The inboard and outboard fuel cells were fragmented, and their fuel caps remained attached to their respective receptacles. Fuel line continuity was established during field test with low-pressure air from the wing-root fuel lines to the inboard and outboard fuel cells. The inboard fuel cell's pick-up screen was impact damaged and separated from its attach point; its line was pulled from the fuel cell. The inboard fuel cell flapper valve was not installed and not observed within the cell. Impact damage precluded field test of the inboard fuel cell's low fuel level float assembly; broken wire in the assembly.

The fuel shut-off valve exhibited impact damage and was noted in the "on" position which was confirmed during field test with low-pressure air. The shut-off valve's control cable remained attached to the valve. During field test with low-pressure and water, the shut-off valve leaked from its rotating shaft in both "on & off" positions. The fuel selector valve exhibited impact damage and its control cable remained attached; the valve was observed mid-travel between the "outboard fuel cell & off" selections. Field test with low-pressure air determined flow from the output port to the outboard fuel cell port; the valve was determined to be functional during field test. The gascolator and emergency fuel pump exhibited impact damage. The gascolator bowl and filters were clear of debris and no fuel was observed. Impact damage precluded field test of the emergency fuel pump.

The wing-root flexible lines were field tested with low-pressure air and water; the fuel line from the gascolator to the fuel selector leaked during field test. Its tag numbers were: Stratoflex 156001-8D-0073 Type A A/T 08-05-1998 Lot 228 1Q98.

The flap exhibited impact damage and was observed in the "up/0°" position. The aileron remained attached to its mounts and its balance weight was separated from the assembly. The aileron control rod remained attached to the aileron and bellcrank. The aileron control cables remained attached to the bellcrank and were separated by recovery personnel at the wing-root and 11' from the wing-root. Aileron control continuity was established from the cockpit through recovery separations to the aileron. The aileron trim tab exhibited impact damage and it and its control rod remained attached to their respective attach points. The aileron trim barrel assembly exposed about 4 jackscrew threads/ 5/8" from its leading edge indicative of a "neutral" aileron trim setting.

Empennage

The vertical stabilizer was separated by recovery personnel with impact damage observed. The rudder assembly remained attached to its mounts with impact damage noted to its upper area. The rudder's torque tube was cut by recovery personnel. The rudder control cables remained attached to their respective attach point and were separated by recovery about 4' from the rudder; control continuity was established from the cockpit through recovery separations to the rudder. The rudder trim tab exhibited impact damage and remained attached to its mounts; its control rod remained attached to the trim tab and trim barrel assembly. The rudder trim barrel assembly exposed about 3 jackscrew threads/ ½" from its leading edge which was indicative of a slight "nose left" trim setting; its trim cables were cut by recovery.

The horizontal stabilizer remained attached to its mounts with impact damage observed; the left side was impact separated about 4' from its supporting structure. The elevator remained attached to its mounts with impact damage noted. The left elevator was impact separated in three sections. The elevator control rod and return spring remained attached to their respective attach points. Elevator control cables remained attached to their respective attach points and were separated by recovery about 4' from the elevator; elevator control continuity was established from the cockpit through recovery separations to the elevator. The elevator trim tab and control rod remained attached to their respective attach points. The trim barrel assembly exposed about 4 jackscrew threads/ 1/2" from its leading-edge indicative of a slight "nose down" elevator trim setting.

1.13 MEDICAL AND PATHOLOGICAL INFORMATION

As a result of serious injuries sustained during the initial impact and subsequent crash sequence, the pilot and surviving passengers received medical attention at the local clinic in Deadman's Cay and were later transported to Nassau, Bahamas to the local hospitals for further evaluation.

As a result of the crash sequence a female passenger received fatal injuries. She was later transported to Nassau, Bahamas to the Rand Pathology Laboratory where an autopsy was performed.

Autopsy report concluded that the fatal injuries sustained by the passenger was a result of "multiple injuries, blunt force trauma to the head, torso and extremities."

1.14 FIRE

No fire occurred as a result of the crash.

1.15 SURVIVAL ASPECTS

Based on witness statements provided and evidence obtained during post-accident analysis, the deceased was ejected and found lying approximately 5 feet from the rear door of the fuselage. It is possible that the deceased passenger may have not been properly secured by the passenger seat restraint. The Pathologist Autopsy Report determined that the deceased succumbed to injuries primarily due to impact and blunt force trauma.

1.16 TESTS AND RESEARCH

Three Electronics International Engine monitors with two DAU's, and two Garmin Aera portable devices were retained by the AAIA and shipped to the NTSB Recorder Laboratory for data download, analysis and report.

A NTSB Specialist Factual Report on the Electronic Devices was completed on 11th January 2023.

1.16.1 ENGINE ANALYSIS

Examinations were conducted of both engines and its components post-crash by representatives of the manufacturer of the engines (Lycoming) at a secured facility in Florida, United States of America (USA). The results follows:

- **Left Engine**

As first viewed, the engine was suspended from a lift. The propeller hub flange was fractured and the propeller was impact separated from the engine crankshaft flange. The starter rig gear support was fractured. The alternator and alternator mount were impact damaged. The engine oil sump was impact fractured. The engine mount was impact damaged. The fuel injector servo was fractured across the throttle bore and separated from the engine.

The engine was partially disassembled to facilitate the examination. The engine crankshaft was rotated by means of a tool inserted in the vacuum pump drive pad and continuity of the crankshaft to the rear gears and to the valve train was confirmed. Compression and suction were observed from all six cylinders.

The interiors of the cylinders were observed using a lighted borescope and no anomalies noted. A review of partial copies of the aircraft maintenance records revealed that the most recent annual inspection was completed on 03/09/2022.

The most recent engine field overhaul was completed on 08/07/2007. The engine had accumulated 299.9 hours of time-in-service in the almost 15 years since that overhaul. Lycoming Service Instruction No. 1009BE states: "All engine models are to be overhauled within twelve (12) calendar years of the date they

first entered service or of last overhaul. This calendar year time period TBO is to mitigate engine deterioration that occurs with age, including corrosion of metallic components and degradation of non-metallic components such as gaskets, seals, flexible hoses and fuel pump diaphragms.

- **Left Propeller**

The propeller hub flange was fractured and the propeller was impact separated from the engine crankshaft flange. The propeller spinner was impact damaged. The propeller blade marked "A" was curved aft about 80 degrees at about mid-span. That blade exhibited leading edge impact damage near the tip and chord-wise scoring. The propeller blade marked "B" exhibited "S" bending, leading edge damage near the tip and chord-wise scoring. The blade marked "C" was curved toward the blade back about 90 degrees at about mid-span and rotated about 180 degrees in the propeller hub. That blade also exhibited leading edge gouges. The propeller governor remained attached to the engine and no damage was noted. The propeller governor cable remained attached to the governor control arm. The arm was positioned near the full increase RPM stop. The governor was removed and rotated freely by hand. The governor oil screen was absent of debris.

Fuel System Remarks:
The fuel injector servo was impact fractured across the throttle bore and separated from the engine. The throttle fuel control mixture link was broken. The throttle control attachment stud on the servo throttle control arm was broken and the control cable separated from the arm. The mixture control cable remained attached to the servo mixture control arm. The control cable was impact damaged and the position of the arm unreliable. A small amount of liquid with an odor consistent with aviation gasoline drained from the servo when it was tilted. The servo regulator section was partially disassembled and no damage to the rubber diaphragms or other internal parts noted. The regulator section brass plug was secure. The servo fuel inlet screen was unobstructed. The two fuel flow divider manifolds were unobstructed. The fuel injector nozzle lines were secure and the one-piece nozzles unobstructed. The engine driven fuel pump remained attached to the engine and no damage was noted. The pump was removed and produced air and the outlet fitting when rotated by hand. A small amount of liquid with an odor consistent with aviation gasoline drained from the pump when it was tilted.

Magneto Remarks:
Both magnetos remained attached to the engine and no damage was noted. Both magnetos produced spark from all ignition towers when rotated by hand.

Spark Plug Remarks:
The sparkplug electrodes exhibited dark gray coloration and worn normal condition. The electrodes of the #2, #4 and #6 top and the #4 and #6 bottom spark plugs were oil soaked.

The ignition harness was impact damaged.

The starter remained attached to the engine. No damage was noted and it was not removed.

The alternator remained attached to the engine and was impact damaged. The alternator belt was not observed.

The vacuum pump remained attached to the engine and no external damage was noted. The composite drive assembly was separated and the fracture surfaces not burnished. The pump was partially disassembled and the carbon rotor and carbon vanes observed unbroken.

Oil System Remarks:
Oil was observed in the engine. The oil suction screen contained about ¼ teaspoon of black particulate matter easily crushed with a fingernail consistent with carbon. The oil filter media also contained some black particulate matter easily crushed with a fingernail consistent with carbon.

Turbo System Remarks:
The turbocharger remained attached to the engine and no external damage was noted. Oil but no coking was observed in the turbine and compressor wheel housing. A scrub mark about one inch long was observed on the compressor housing. The turbine and compressor wheels remained attached and rotated freely by hand. The exhaust tubing was impact damaged. The density controller, differential controller and exhaust bypass valve remained attached to their respective tubing sections and no damage was noted.

- **Right Engine**

As first viewed, the engine was laying on the floor at the facilities of Florida Air Recovery in Ft Pierce, FL. The engine cowling was removed and the engine was suspended from a lift and partially disassembled to facilitate the examination. The alternator and alternator mount were impact damaged. The engine mount was impact damaged. The engine crankshaft was rotated turning the propeller and continuity of the crankshaft to the rear gears and to the valve train was confirmed. Compression and suction were observed from all six cylinders.

The interiors of the cylinders were observed using a lighted borescope and no anomalies noted. A review of partial copies of the aircraft maintenance records revealed that the most recent annual inspection was completed on 03/09/2022. The most recent engine field overhaul was completed on 08/07/2007. The engine had accumulated 299.9 hours of time-in-service in the almost 15 years since that overhaul. Lycoming Service Instruction No. 1009BE states: “All engine models are to be overhauled within twelve (12) calendar years of the date they first entered service or of last overhaul.

This calendar year time period TBO is to mitigate engine deterioration that occurs with age, including corrosion of metallic components and degradation of non-metallic components such as gaskets, seals, flexible hoses and fuel pump diaphragms.

- **Right Propeller**

The propeller remained attached to the engine crankshaft flange. The propeller spinner was impact damaged. The propeller blade marked “A” was curled aft about 100 degrees from about 8 inches outboard of the hub. That blade exhibited leading edge gouges and trailing edge “S” bending. The blade marked “B” was missing a portion of the blade tip and exhibited leading edge bends. The blade marked “C” was turned about 90 degrees in the hub and curved aft about 80 degrees at about mid-span. It also exhibited blade tip curling and leading edge gouges. The propeller governor remained attached to the engine and no damage was noted. The propeller governor cable remained attached to the governor control arm. The arm was positioned near the full increase RPM stop. The governor was removed and rotated freely by hand. The governor oil screen was absent of debris.

Fuel System Remarks:
The fuel injector servo remained attached to the engine and no external damage was noted. The throttle and mixture control cables remained attached to the throttle and mixture control arms. The throttle control arm was observed in a mid-range position. The mixture control arm was observed in a full rich position. The servo regulator section was partially disassembled and no damage to the rubber diaphragms or other internal parts noted. The regulator section brass plug was secure. The servo fuel inlet screen was unobstructed.

The two fuel flow divider manifolds were unobstructed.

The fuel injector nozzle lines were secure and the two-piece nozzles unobstructed.

The engine driven fuel pump remained attached to the engine and no damage was noted. The pump was removed and produced air and the outlet fitting when rotated by hand. A small amount of liquid with an odor consistent with aviation gasoline drained from the pump when it was tilted.

Magneto Remarks:
Both magnetos remained attached to the engine and no damage was noted. Both magnetos produced spark from all ignition towers when rotated by hand.

Spark Plug Remarks:
The sparkplug electrodes exhibited dark gray coloration and worn normal condition. The electrodes of the #2 and #6 bottom spark plugs were oil soaked.

The ignition harness exhibited minor impact damage.

The starter remained attached to the engine. No damage was noted and it was not removed.

The alternator remained attached to the engine and was impact damaged. The alternator belt was present and unbroken.

The vacuum pump remained attached to the engine and no external damage was noted. The pump was partially disassembled and the composite drive assembly, carbon rotor and carbon vanes observed unbroken.

Oil System Remarks:
Oil was observed in the engine. The oil suction screen and the oil filter media were absent of metallic debris.

Turbo System Remarks:
The turbocharger remained attached to the engine and no external damage was noted. Oil but no coking was observed in the turbine and compressor wheel housing. The turbine and compressor wheels remained attached and rotated freely by hand. The exhaust tubing was impact damaged. The density controller, differential controller and exhaust bypass valve remained attached to their respective tubing sections and no damage was noted.

1.17 REGULATORY OVERSIGHT

As this aircraft was operated under Part 91 of the United States Code of Federal Aviation Regulations, there was no requirement for oversight by the Bahamas regulatory authorities, as this was a private aircraft operating in the Bahamas.

1.18 OTHER INFORMATION

Emergency Response
The Deadman's Cay Airport is an uncontrolled airfield and as such there are no Air Traffic Control services available at the aerodrome. After the crash of the aircraft, survivors used their personal cellular phones to make contact with family and friends to alert them of the crash. Air Traffic Control in Nassau was also alerted during this time.

Rescue personnel were able to pinpoint the location of the crash site based on GPS coordinates via a mobile application. Eventually rescuers, inclusive of individuals from the town, as well as members of the Royal Bahamas Police and Defense Force were able to locate the crash site.

Assistance inclusive of life saving measures were rendered to all passengers. However, one passenger succumbed to injuries sustained. The remaining survivors were transported to the local clinic for medical attention. The surviving passengers were later transported to hospitals in New Providence for further medical attention.

2.0 ANALYSIS

The AAIA does not investigate for the purpose of apportioning blame or to provide a means for determining 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 AAIA 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 analysis presented here is in no way intended to apportion liability or blame, but rather note anomalies or areas of concerns to the investigation team that could shed light on what may have happened with an attempt to prevent future occurrences.

Of interest during the documentation of the control switches on the flight deck the following were noted:

- Left fuel pump: off
- Right fuel pump: off

About two gallons of liquid was observed within the inboard fuel cell and was determined to contain water when tested with water finding paste. It could not be determined whether the water present in the fuel cell contributed to the accident, or if the abundance of water found was as a result of heavy rains post-accident.

The most recent engine field overhaul was completed on 08/07/2007. The engine had accumulated 299.9 hours of time-in-service in the almost 15 years since that overhaul. Lycoming Service Instruction No. 1009BE states: "All engine models are to be overhauled within twelve (12) calendar years of the date they first entered service or of last overhaul. This calendar year time period TBO is to mitigate engine deterioration that occurs with age, including corrosion of metallic components and degradation of non-metallic components such as gaskets, seals, flexible hoses and fuel pump diaphragms.

CAUTION Calendar year TBO is based on accelerated testing and overall fleet service data. Local climate conditions, storage conditions, frequent extended periods of inactivity, preservation techniques used during inactive periods and frequency of oil changes can affect corrosion of metals and degradation of non-metals.

For FAA Part 91 or EASA Part NCO (non-commercial) or equivalent operations, only an appropriately rated and qualified maintenance person (or international equivalent) can allow the twelve (12) calendar year TBO to be exceeded with concurrence from the controlling civil aviation authority to verify agreement with this provision and after thoroughly examining the engine for corrosion and degradation in accordance with 14 CFR 43 Appendix D (or international equivalent) and determining that the engine remains in an airworthy condition. This inspection is to be repeated annually or as necessary to ensure continued airworthiness. The twelve (12) calendar year TBO must not be exceeded if the engine is affected by AD 2012-19-01 and not in compliance with AD 2012-19-01.

Maintenance documentation reviewed produced evidence that indicated that the aircraft was maintained in an airworthy condition in accordance with the manufacturer's specifications and procedures.

According to the Piper Navajo Pilot Operating Handbook;

> "The **fuel boost pumps*[6]** are operated continuously and are provided to maintain fuel under pressure to the other fuel pumps, improving the altitude performance of the fuel system. There are no fuel boost pump control switches or pressure gauges provided. Each fuel boost pump is controlled by a separate circuit breaker located in the circuit breaker control panel. The fuel boost pumps are activated when the master switch is turned on and continue to operate until the master switch is turned off or the fuel boost pump circuit breakers are pulled (off). Fuel boost pump warning lights, mounted at the bottom of the windshield divider post, illuminate when the fuel boost pressure is less than 3 PSI.
>
> In a full power continuous climb from takeoff to high altitude under conditions of high ambient temperature, high climb rate, and extremely volatile fuel, the engine-driven fuel pump and the boost pump may not maintain a sufficient pressure head to the engine-driven fuel pump."
>
> This aircraft serial number was 31-7652094 which would indicate that the ***fuel boost pumps should operate continuously.***

While the use or non-use of the emergency fuel pumps could not be definitively determined to be a cause or a contributing factor in the accident, it is note-worthy, as they are required to be **"ON"** during take-offs and landings as per manufacturers documentation noted below.

> The following excerpts item 8, 10 and 11 are from Section II – Procedures from the Navajo Chieftain Pilots Operating Manual. Normal Takeoff and Climb Procedure taken from Operating Instructions and Operating Tips.

8. BEFORE TAKE-OFF
   a. Seat belt/no smoking sign - on (if installed)
   b. Crossfeed - off
   c. Fuel valves - on "inboard" tanks
   d. Emergency fuel pumps - on, pressure up

[6] Installed on serial nos. 31-7405479 and up and serial nos. 31-5001 thru 31-7405478 when Piper Kit No. 760 873 is installed. Extract taken from Piper Chieftain Pilot Operating Manual.

NORMAL TAKEOFF AND CLIMB

Before takeoff the following should be checked:

1. Seat belts/no smoking sign - on (if installed)
2. Crossfeed - off
3. Fuel valves - on "inboard" tanks
4. Emergency fuel pumps - on, pressure up
5. Air conditioner - off (if installed)
6. Mixture - rich (forward)
7. Prop controls - low pitch (forward)
8. Engine instruments - normal

10. CLIMB
    a. Climb (see Climb Performance - Section III) to circling min. at full throttle
    b. Climb power - set
    c. Cowl flaps - as required
    d. Emergency fuel pumps (See item 11, Cruise - Note 2)
       (1) Off one at a time - check pressure
       (2) On if fuel boost pump warning light illuminates and/or engine fuel pressure goes below 34 psi or is unsteady during climb
    e. Air conditioner - as desired (if installed)
    f. Seat belt/no smoking sign - off (if installed)
    g. Oxygen - on when required

11. CRUISE
    a. Emergency fuel pumps - off (see Note 2)
    b. Fuel selectors - on (inboard or outboard) (See Note 1)
    c. Cowl flaps - close (position to maintain temperatures at or below maximum allowable)
    d. Throttle - set (desired manifold pressure)
    e. Propeller - set (desired rpm)
    f. Mixture - lean in accordance with engine manual

NOTE

1. It is recommended that, with the aircraft loaded to a rearward c.g., fuel be burned from the outboard tanks first. This action will tend to move the c.g. forward with fuel burn-off.
2. If fuel pressure falls below 34 PSI or if excessive fuel pressure fluctuation occurs, turn on emergency pump.

9. All fuel pumps should be on for takeoffs and landings. On airplanes not equipped with fuel boost pumps*, the emergency fuel pumps should be on and operating on the ground for starts and when temperatures are above 75°F. With fuel boost pumps installed, use of the emergency fuel pumps will not normally be required for climbs or cruise at any altitude. However, high power climbs to high altitude under conditions of elevated ambient temperature, high climb rate, and extremely volatile fuel may cause a fuel boost pressure warning light to illuminate and/or the engine fuel pressure gauge to indicate unsteady fuel pressure. The emergency fuel pump should be turned on to provide stable engine operation during the high power operations, but may be turned off after level-out if reduction to cruise power extinguishes the boost pump warning light, and if engine fuel pressure remains steady with the emergency fuel pump off.

During post-crash analysis of the aircraft, the left engine emergency fuel pump was determined to be functional when field tested with a DC power source and there were no anomalies noted during pressure check of the wing-root flexible fuel lines. This suggests, and it would appear that the emergency fuel pump for the left engine was functional prior to the accident.

The right engine emergency fuel pump was unable to be tested during post-crash analysis due to impact damage sustained.

3.0 CONCLUSIONS

The AAIA has determined the probable cause of this accident to be Loss of Power (Dual) resulting in a loss of control inflight (LOC-I), and subsequent uncontrolled flight into terrain.

Contributing factor(s):
- Undetermined

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. No evidence of a weight and balance for the aircraft was found during the investigation.

5. The pilot possessed an Airline Transport Pilot License (ATPL) with airplane multi-engine land, and private pilot privileges with airplane-single engine land, issued by the Federal Aviation Administration (FAA) in the United States of America (USA) on 30th October 2014. He also held a type rating on the BE-1900 aircraft.

6. The pilot in command First Class Medical Certificate was issued by the FAA in May 2016. Title 14 US Code of Federal Regulations Part 61.2 (b) (1) states: "***No person may: Exercise privileges of an airman certificate, rating, endorsement, or authorization issued under this part unless that person meets the appropriate airman and medical recency requirements of this part, specific to the operation or activity."***

   In accordance with Title 14 US Code of Federal Regulations Part 61.23 (d), the expiration of a First Class Medical Certificate issued under this Part for an individual age 40 or over, exercising the privileges of a private pilot certificate is as follows, ***"24th month after the month of the date of examination shown on the medical certificate."***

7. The aircraft was not equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR); neither was required by regulations.

8. As the aircraft was US registered, it was required to be in compliance with existing US CFR regulations.

9. The maintenance records indicated that the aircraft was maintained in accordance with the manufacturer's approved maintenance procedures.

10. The most recent maintenance activity conducted on the aircraft included an annual inspection completed on 9th March, 2022.

11. The aircraft crashed in dense brush approximately 2nm from the departure end of Runway 09 of the Deadman's Cay Airport, Long Island, Bahamas.

12. The crashed aircraft was located at coordinates N023º 11' 44" and W075º 06'10".

13. Concerns noted during inspection post-crash was the observation of both emergency fuel pumps in the “OFF” position.

14. Manufacturers Engine Analysis Report did not note engine or component damages or anomalies prior to the accident that would prevent normal operation of the engines.

15. The NTSB Specialist Factual Report on the Electronic Devices did not indicate abnormal aircraft performance parameters prior to the accident.

16. Both left and right propellers examined exhibited damages consistent with the propellers rotating at the time of impact. It is uncertain whether power was being generated.

17. Weather was not a contributing factor in this occurrence.

18. Navigational Aids were not a contributing factor in this occurrence.

19. Rescue services were rendered upon notification by survivors of the crash.

4.0 SAFETY RECOMMENDATION(S)

The objective of a safety investigation is to identify and reduce safety-related risk. The AAIA does not investigate for the purpose of apportioning blame or to provide a means for determining liability.

Although there were no safety recommendations issued directly as a result of the investigation into this occurrence, this and other recent accidents/incidents involving United States registered aircraft operating in the Bahamas, prompted the AAIA to raise a safety concern with the Federal Aviation Administration (FAA) in a correspondence dated 21st February 2023.

The safety concern identified the need for enhanced surveillance activity which can potentially serve as a mitigating measure against future occurrence of accidents/incidents. The FAA responded on 22nd February 2023 and advised that there will be enhanced efforts in collaboration with the Civil Aviation Authority Bahamas (CAA-B) to address safety related issues with an aim of reducing the occurrence of accidents/incidents involving United States registered aircraft operating in the Bahamas.