



AIRCRAFT ACCIDENT REPORT
AAIA# AO-21-009

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

Piper Navajo PA-31-350
N827RD
South Bimini,
Bahamas

16th April, 2021





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Aviation Investigation Report **AO-21-009**

This report is available on the website of the
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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 (MOT&H) 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-31-350
N827RD**

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Uncontrolled Collision with Terrain (Ocean)
South Bimini, Bahamas
April 16, 2021**

ABSTRACT:

This report explains the accident, involving a Piper Navajo, PA-31-350 aircraft, serial number 31-7652094 which departed the South Bimini Airport (MYBS) on April 16, 2021 at approximately 9:40pm EDT (0140 UTC)¹. The aircraft departed under instrument flight rules with destination Opa Locka, Florida in the United States of America (USA).

There were two persons on board the aircraft at the time of the accident, one pilot and one passenger, his son (also a pilot).

The crash occurred in shallow waters (approximately 4-6 feet at low tide) approximately 1.18 nautical miles (nm) from the approach end of Runway 10 of the South Bimini Int'l Airport (0.24 nm from the end of Runway 10). The pilot sustained serious injuries and after seen at the local clinic was transported to the Princess Margaret Hospital in Nassau, Bahamas for further medical attention. The passenger succumbed to his injuries as a result of the initial impact and subsequent crash sequence and was later flown to the Rand Pathology Laboratory at the Princess Margaret Hospital in Nassau, Bahamas where an autopsy was performed to determine cause of death.

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 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 April 16, 2021 at approximately 9:42pm EDT (0142 UTC), a PA-31-350 model, Piper Navajo aircraft, with United States registration N827RD, crashed moments after takeoff from the South Bimini Int'l Airport (MYBS²), Bimini, Bahamas.

The private flight departed MYBS with intended final destination of Opa Locka Airport (KOPF), Opa Locka, Florida, USA. The pilot sustained serious injuries and after being seen by medical personnel in South Bimini, was flown to Nassau, Bahamas for further medical attention. The passenger who occupied the right seat of the aircraft, succumbed to injuries he sustained as a result of the initial impact and subsequent crash sequence and subsequent submersion in the waters at the end of the runway environment.

The pilot was a US certified commercial pilot with ratings for airplane land, single and multi-engine as well as an instrument airplane rating. The pilot's medical certificate was valid at the time of the accident. The passenger (pilot's son) also held a valid US certified private pilot – single engine land – airplane certificate. It is unknown what role (if any) the passenger (son) played during the takeoff to crash sequence.

The weather conditions at the time of the accident was night (instrument meteorological conditions). A weak high pressure ridging was forecasted to continue to dominate the weather over the Bahamas throughout the night. However, no significant weather was anticipated.

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

Contributing factors in this accident included:

- Unknown

² Airport code is a 4 letter unique identifier that is assigned to the airports by the International Civil Aviation Organization (ICAO).

TITLE

Registered Owner: GOYO Air LLC

Manufacturer: Piper

Aircraft Type: PA-31-350

Nationality: United States of America

Registration: N827RD

Place of Accident: In shallow waters, 0.24 nm from the end of Runway 10 of MYBS

Date and Time: 16 April, 2021 at approximately 9:42pm EDT (0142 UTC)

SYNOPSIS

Notification: CAA-B, NTSB, FAA, ICAO

Investigating Authority: Aircraft Accident Investigation Authority
Ministry of Transport & Housing

Investigator in Charge: Captain. Delvin R. Major (AAIA)

**Accredited
Representatives:** Mr. Todd Gunther (NTSB) (USA)

Technical Advisors: Mr. Damian Galbraith (Piper Aircraft)
Mr. James Childers (Lycoming)
Mr. Charles McKinley (FAA)
Captain Donald Barrett (CAA-B)
Captain Chavaz Thomas (CAA-B)

Releasing Authority: Aircraft Accident Investigation Authority

**Date of Final
Report Publication:** July 19th, 2022

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
METAR	Weather Report furnished by Meteorological Department
MYBS	South Bimini International Airport
NM or nm	Nautical Miles
NTSB	National Transportation Safety Board (USA)
VFR	Visual Flight Rules
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.

1.0 FACTUAL INFORMATION.

1.1 HISTORY OF THE FLIGHT

On April 16, 2021 at approximately 9:42pm EDT (0142 UTC), a PA-31-350 model, Piper Navajo Chieftain aircraft, with United States registration N827RD, crashed moments after takeoff from the South Bimini Int'l Airport (MYBS), South Bimini, Bahamas.

The private flight departed MYBS with intended final destination of Opa Locka Airport (KOPF), Opa Locka, Florida, USA . The pilot sustained serious injuries and after being seen by medical personnel in South Bimini, was flown to Nassau, Bahamas for further medical attention. The passenger (pilot's son) who occupied the right seat of the aircraft, succumbed to injuries he sustained as a result of the initial impact and crash sequence and subsequent submersion in waters at the end of the runway environment. The aircraft came to rest in waters approximately 4 – 6 feet at low tide and 0.24nm from the end of runway 10 at coordinates N25°42.4' and W079°15.9'.

The pilot was interviewed upon his transfer to Nassau at the Princess Margaret Hospital and stated that he and his son (passenger) took some friends over to the island and landed at approximately 8:45pm. An instrument flight plan was subsequently filed. According to the pilot, after completing all pre-takeoff checks satisfactorily, he departed and became airborne at approximately 9:40pm.

The pilot recounted that after he selected gear up, he “proceeded to climb to 1,200 feet,” and his next memory was “being in the water with the crew door blown open.” The pilot further stated that he observed two Bahamian men who shouted at him from approximately 300 yards away on land “sir, are you okay, do you need help?”

A local boat operator that was called after the crash assisted in rescuing the pilot and the passenger from the aircraft. The passenger was not responsive, despite lifesaving efforts to revive him, he succumbed to his injuries.

The deceased passenger was subsequently flown to Nassau and transported to the Rand Pathology Laboratory at the Princess Margaret Hospital where an autopsy was performed on the 19 April, 2021 to determine cause of death.

The Aircraft Accident Investigation Authority with assistance from the Civil Aviation Authority Bahamas conducted an onsite investigation on 17 April, 2021. Onsite investigation determined the following:

- The aircraft was airborne momentarily and may have reached an altitude between 50 to 100 feet. Due to the darkness at the time of departure, security camera coverage from the airport terminal building captured the lights of the aircraft which could be seen from its takeoff roll on the surface, of runway 10 to the point where it got airborne, started to climb and shortly thereafter, disappear from camera view in the waters beyond the enclosed runway environment.
- One eyewitness to the crash stated “I observed N827RD departing runway 10 as they climbed to some 30 to 40 feet and came down a few seconds later I heard a thud at a distance.” Other eyewitnesses to the crash confirmed the same information, around the same time and the events that followed.
- The aircraft was on an instrument flight plan to depart South Bimini at the time of the accident.
- Arrangements were made with personnel in South Bimini to provide services to facilitate the landing and departure of this aircraft.



- Due to the altitude of the aircraft when control was lost, no communication could be made with either the Nassau or Miami Air Traffic Control Centers.

1.2 INJURIES TO PERSONS

Injuries	Crew	Passengers	Total
Fatal	0	1	1
Serious	1	0	1
None	0	0	0
TOTAL	1	1	2

1.3 DAMAGE TO AIRCRAFT

The extent of damage to the aircraft was substantial. Both left and right engines were dislodged from their installed position on the aircraft as a result of the initial impact and subsequent crash sequence.

- The left engine was located in waters approximately 54 feet left from its installed location on the aircraft
- The right engine was located in waters approximately 53 feet from its installed location on the aircraft, both engines were found 18.5 feet apart.

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 N25°42.4' and W079°15.9'.

On 20th April, 2021 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 of the aircraft was a 58 year old male. He was certified by the Federal Aviation Administration (FAA) in the United States of America (USA) and was issued a Commercial Pilot certificate with single and multi-engine aircraft land privileges on 9th April, 2018. The pilot was also issued an instrument rating by the FAA and type rated in the G-IV aircraft with second-in-command privileges.

The pilot possessed a valid First Class Medical certificate issued 5th October, 2020. The flight time noted on his last medical check as of 5th October, 2020 revealed, 2,085 total hours and 85 hours documented in the last six (6) months. No concerns were reported by the airman and no significant issues were identified by the Medical Examiner during the physical examination.

The pilot's son occupied the copilot's seat in the aircraft. He was also a certified pilot, certificated by the FAA. He held a valid Private Pilot certificate with airplane single engine land rating.. It is unknown what role, (if any), the pilot's son played during the takeoff to crash sequence.

The son's most recent FAA Medical evaluation was conducted 20th November, 2018 at which time, no civil flight experience was reported. No concerns were reported by the airman and no significant issues were identified by the Medical Examiner during the physical examination. The pilot's son was subsequently issued a First Class Medical Certificate without limitations.

1.6 AIRCRAFT INFORMATION

Manufacturer	Piper
Type, model and Registration	Navajo Chieftain, PA-31-350, N827RD
Year of Manufacture	1976
Serial Number	31-7652094
Certificate of Airworthiness issue date	29th March, 2021
Total airframe time as of 1st April , 2021	7,102.6 hours
Engine type, amount	Lycoming, TIO-540-Series (2)
Propeller, type, amount	Hartzell, 3-blade, constant speed, controllable pitch, full feathering (2)
Maximum allowable takeoff weight	7,000 pounds
Fuel type	Aviation Gasoline

1.6.1 GENERAL³

N827RD was a Piper Navajo Chieftain Aircraft, PA-31-350 model, with serial number 31-7652094. It was a fixed wing aircraft manufactured in 1976. The airplane was configured in a seven-place executive seating arrangement (including both pilot and copilot seats). N827RD 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 (182 gallons is useable). It has an oil capacity of 12 US Quarts (each engine).

The aircraft also has a maximum baggage capacity of 200 pounds each in the forward and aft baggage area and a maximum capacity of 300 pounds in each wing locker.

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

³ General information for this aircraft extracted from the Piper Aircraft Corporation, Piper Navajo Chieftain Pilots Operating Manual – Revised 22nd October, 2012.

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 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.

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 and also added baggage area accessible from the rear of the nacelle.

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 Chieftain is powered with turbocharged Avco Lycoming TIO-540-J and LTIO-540-J series engines. The left engine rotates clockwise and the right engine rotates counterclockwise as viewed from the pilot seat. The six-cylinder engines develop 350 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. It was registered to GOYO Air LLC in Miami, Florida, USA.

1.6.2 AIRCRAFT MAINTENANCE

An Annual/100 hour inspection was completed on the airframe of this aircraft on 28th April, 2020 at Hobbs time 7079.2 hours.

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.

N827RD	Manufacturer	Type	Serial number	Tach time	Time since overhaul
Aircraft	Piper	PA-31-350	31-7652094	N/A	N/A
Engine 1 (L)	Lycoming	TIO-540-J2BD	L-2707-61A	7524.3	0
Engine 2 (R)	Lycoming	LTIO-540-J2BD	L-2568-68A	5667.2	0
Propeller 1	Hartzell	HC-E3YR-2ATF/FC 8468-6R	DJ9609A	8591.2	39.6 hrs.
Propeller 2	Hartzell	HC-E3YR- 2ALTF/FJC8468-6R	DJ9535A	8823.1	39.6 hrs.

Most recent maintenance activity documented on this aircraft prior to the accident was completed on 1st April, 2021 at aircraft Hobbs time 7102.6 hours and 23.4 hours since major overhaul and included;

- removal and repair to the aircraft battery,
- gear swing
- minor adjustment to the nose landing gear door rod ends
- lubrication of both main and nose landing gears.
- removal and repair to the left fuel servo due to fuel contamination within the fuel servo.

All above inspections were conducted in accordance with approved Piper Service Manual for the PA-31-350 aircraft.

1.6.3 AIRCRAFT WEIGHT AND 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 was not established.

The following weight limitations are posted for the Navajo Chieftain;

- Maximum Ramp Weight of 7,045 pounds,
- Maximum Takeoff and Landing Weight of 7,000 pounds
- Empty Weight of 4,030 pounds; and
- Zero fuel weight of 7,000 pounds
- Useful load⁴ of 2,970 pounds

As the aircraft was loaded with only two (2) persons and no baggage or cargo, it has been determined that the aircraft may have been within the legal operating weight limitations.

1.7 METEOROLOGICAL INFORMATION

METAR⁵ issued by the Bahamas Department of Meteorology (MET) at 10:00pm EDT (0200 UTC) reported winds from the southwest at 10 knots.

The meteorological conditions at the time of the accident was night (instrument meteorological conditions).

A weak high pressure ridging was forecasted to continue to dominate the weather over the Bahamas throughout the night. However, no significant weather was anticipated. Weather was not a contributing factor in this accident.

1.8 AIDS TO NAVIGATION

An automatic weather observation system (AWOS) is available at MYBS with reception on frequency 118.450 MHz and a possible range of up to 25nm from the airport. Information such as wind direction, wind speed, wind gusts, air temperature/humidity, dew point, altimeter settings, visibility, cloud height/sky conditions and density altitude can all be received from this system.

MYBS is equipped with a threshold and runway approach and end lighting system, as well as taxiway edge and apron lights which permits use at night. A precision approach path indicator (PAPI) is also installed on runway 10.

Radio navigation and landing aids for the aerodrome includes the Bimini VORTAC⁶, identifier ZBV available on frequency 116.70 MHz, operation is 24 hrs. Operability of navigational aids were not a factor in this accident.

1.9. COMMUNICATIONS

The pilot filed and was operating on an instrument flight rules flight plan into and out of South Bimini Airport. The flight plan was filed with and coordinated through Miami Air Route Traffic Control Center (ARTCC) and Nassau TRACON⁷ (ATC).

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 **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.

⁶ A **VORTAC** is a radio-based navigational aid for aircraft pilots consisting of a co-located VHF omnidirectional range (VOR) beacon and a tactical air navigation system (TACAN) beacon.

⁷ **TRACON** acronym for terminal radar approach control which is an ATC facility responsible for managing the airspace in and around selected airports.

Communication with MYBS can be made on a 24-hr. basis on the Unicom frequency of 122.800 MHz or Nassau Radio on 128.000MHz (primary) or 124.200MHz (secondary)

As the crash occurred moments after takeoff, the height of the aircraft did not permit a contact with either Nassau or Miami Air Traffic Control Centers.

1.10 AERODROME INFORMATION⁸

South Bimini International Airport (IATA : BIM, ICAO: MYBS) is situated on the island of South Bimini with the center of the airport located at coordinates 25°41'59.92"N and 079°15'54.49"W at an elevation of 8 ft. above mean sea level. It serves as a port of entry aerodrome into The Bahamas.

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 10/28 (6,400 feet long x 100 feet wide)

According to the AIP, South Bimini Airport is rated as a category 5 for firefighting. There is no capacity for removal of disabled aircraft. The airport is equipped with the following rescue and firefighting services;

- 2 Units Topkick
- Capacity: 1000 gallons water
 - 130 gallons foam (6% AFFF)
 - 500 pounds dry chemical
 - Oshkosh T1500
- Capacity: 1500 gallons water
 - 210 gallons foam (6% AFFF)
 - 500 pounds dry chemical
- 2 x 300 pounds Purple K

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 1.18 nautical miles and came to rest in waters approximately 4-6 feet (at low tide), at coordinates N25° 42.4' and W079° 15.9' and 0.24 nautical miles from the end of runway 10 (beginning of runway 28). The underwater debris field appeared to be contained in an area with a radius of approximately 50-100 feet from the center of the fuselage.

- Both engines separated from the aircraft on impact and were found to the left of the aircraft final resting place.
- The left engine was located in waters approximately 54 feet left from its installed location on the aircraft.
- The right engine was located in waters approximately 53 feet from its installed location on the aircraft, both engines were found 18.5 feet apart.
- The left wing and engine of the aircraft appeared to have made impact with the seas first, as they received the brunt of the impact forces (and damages consistent were noted), resulting in the aircraft continuing its motion to the right and away from the engines.

⁸ Information for this aerodrome extracted from the Bahamas Air Navigation Services Division Aeronautical Information Publication Amendment 1, 2020.

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 may have been the first portion of the aircraft to make contact with the surface (water) at high speed. The aircraft travelled some distance 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.

The following were noted during the post-crash analysis;

Fuselage

The fuselage was partially fragmented from its nose section to about the main cabin area. One pitot tube was separated and the other was not located within the recovered wreckage. The nose baggage door was impact damaged and separated from the fuselage. The nose baggage door was noted in the “latched and locked” position. The emergency exit window, and crew door were impact damaged and separated from their respective attach points. The main cabin door, and cargo door remained attached to their respective attach points. Impact damage was noted to the nose gear and was observed in the “up” position.

The pilot’s seat remained attached to its mounts and its shoulder harness was determined to be functional during field test. Its lap belt remained attached to its mounts; however, corrosion of its latch assembly from saltwater immersion precluded field test. The copilot’s seat was partially separated from its mounts and exhibited impact damage. The fuselage was fragmented in this area. The shoulder harness was determined to be functional during field test. Its lap belt assembly was observed latched and its outboard webbing was separated/cut. Seats #3 through #8 remained attached to their respective mounts.

The instrument panel exhibited impact damage. The control wheels and shafts remained attached to their respective attach points, and rudder pedal assembly exhibited impact damage. The following cockpit control were observed.

- Mixture levers: Rich
- Propeller levers: fine/high RPM
- Throttle levers: open
- Gear lever: up
- Alternate air controls: Primary/filtered air
- Flap control: up
- Cross-feed: off
- Left fuel selector: Inboard
- Right fuel selector: Inboard
- Left fuel firewall shut-off: Stowed
- Right fuel firewall shut-off: pulled/off, impact damage noted.
- Seatbelt light: on
- No smoking light: on
- Wing light: on
- Anti-collision lights: on
- Position lights: on
- Air-conditioning: on
- Recirculating fan: low
- Left windshield heat: on
- Left/Right pitot heat: on

- Propeller deice: on
- Left engine left and right magnetos: on
- Right engine left and right magnetos: on
- Left fuel pump: off
- Right fuel pump: off
- Left nacelle tank transfer switch: on
- Right nacelle tank transfer switch: off
- Avionics master: on
- EFIS: on
- Autopilot: off

The right manifold pressure needle static at 34 in Hg. & left at 36.5 in Hg. Left cylinder head temp static at 300° F. Left and right exhaust temps static at 1275° F. Left fuel quantity static at ½ & right static at ¾. Pilot's airspeed static at 98 knots.

Left Wing

The left wing was separated from the fuselage and separated about 11' from the wing root area. The outboard section was fragmented. The main gear exhibited impact damage and was noted in the "up" position. The aileron was partially separated from its mounts and its balance weight was not located within the recovered wreckage. The aileron bellcrank exhibited deformation and its control cables were separated about 12" from the bellcrank by recovery personnel. The aileron control cables were also separated at the wing root area with their ends exhibiting a splayed, broomstrawed appearance consistent with tension overload. Aileron control continuity was established through impact and recovery separations. The flap exhibited impact damage and its jackscrew exposed no threads indicative of the flap in the "up/0°" position.

The inboard, outboard, and nacelle fuel tank caps remained attached to their respective receptacles. The outboard fuel cell was void of fuel and its pick-up screen was clear of obstruction. No fuel was observed within the inboard fuel cell, and its pick-up screen was clear of obstruction. The inboard fuel cell's flapper valve was free to move when facilitated by hand. A residual amount of blue liquid consistent in color and odor to that of aviation type gasoline was observed within the nacelle fuel tank.

The cross-feed valve exhibited impact damage and its control lever was separated from the assembly and remained attached to its control cable. Field test with low-pressure air confirmed the cross-feed valve was in the "cross-feed/open" position. The firewall fuel shut-off valve was determined to be in the "off/closed" position during field test with low-pressure air. However, the shut-off valve's control cable was separated at the wing root area. The fuel selector exhibited impact damage and its control lever was separated from the assembly but remained attached to the control cable. The fuel selector valve was determined to be in the "outboard" fuel tank position during field test with low-pressure air.

The gascolator bowl and its internal filters exhibited corrosion consistent with saltwater immersion.

The emergency fuel pump functioned during field test with a DC power source. The boost pump did not function during field test with a DC power source; however, a material consistent to that of corrosion was observed upon partial disassembly of the pump.

Right Wing

The right wing was separated from the fuselage by recovery personnel. The wing exhibited impact damage with leading edge deformation. The lift detector remained attached and was determined to be functional during field test. The main gear exhibited impact damage and was observed in the "up" position. Impact damage was noted to the flap and it remained attached to the wing. The flap's jackscrew exposed no threads which is indicative of the flap in the "up/0°" position. The aileron was impact damaged and remained attached to its mounts. Impact damage was noted to the aileron bellcrank and its

control cables were separated at the wing root area. Aileron control continuity was established through impact and recovery separations. The aileron trim tab remained attached to its mounts and its jackscrew exposed about 4 threads from the front of the trim assembly indicative of a “neutral to slight right roll” aileron trim setting.

The air-conditioning condenser door was in the “closed” position.

The inboard, outboard, and nacelle fuel tank caps remained attached to their respective receptacles. No fuel was observed to the outboard fuel tank, and fuel line continuity was confirmed during field test with low-pressure air from the wing root to the outboard fuel tank. The inboard fuel tank was fragmented at its inboard area from impact damages. The inboard tank’s pic-up screen was clear of debris and the tank’s flapper valve was not located within the recovered wreckage. A residual amount of blue liquid consistent in color and odor to that of aviation type gasoline, and water was observed within the nacelle fuel tank. The fuel tanks vents were clear of obstruction.

The gascolator bowl and filters were clear of debris. The firewall fuel shut-off valve was in the “Closed” position; however, its control cable was separated about 2’ from the valve. The fuel selector and its attached lever exhibited impact damage. The fuel selector valve was noted in the “off” position. The positions of the fuel selector and firewall shut-off valve were confirmed during field test with low-pressure air.

The fuel boost pump functioned during field test with a DC power source. The emergency pump functioned during field test with a DC power source.

Empennage

No visible impact damage was noted to the vertical stabilizer. The rudder remained attached to its mounts with impact damage note to its upper area. The rudder trim barrel exposed about 9 jackscrew threads from the front of the assembly indicative of a “neutral” rudder trim setting. Rudder control continuity was established from the rudder to the cockpit area. The horizontal stabilizers were separated about mid-span by recovery personnel. The elevator and trim tab remained attached to their respective attach points and were separated about mid-span by recovery personnel. Impact damage was noted to the separated elevator and horizontal stabilator sections. The elevator trim barrel exposed about 2 jackscrew threads forward of the assembly indicative of a “neutral to slight nose up” elevator trim setting. Elevator control continuity was established from the elevator to the cockpit area.

1.13 MEDICAL AND PATHOLOGICAL INFORMATION

As a result of serious injuries sustained during the initial impact and subsequent crash sequence, the pilot received medical attention at the local clinic in South Bimini and was later transported to Nassau to the Princess Margaret Hospital for further evaluation.

As a result of the fatal injuries received by the passenger, he was also transported to Nassau 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 “Fracture of the Skull with intracranial hemorrhage complicating drowning and Blunt Force trauma to head.”

1.14 FIRE

No fire occurred as a result of the crash.

1.15 SURVIVAL ASPECTS

Due to the impact and blunt force trauma experienced by the passenger during the crash sequence and subsequent submersion in water, the length of time of submersion and the severity of the blunt force trauma (skull fracture) received by the passenger, made his survivability non-viable.

1.16 TESTS AND RESEARCH

After the recovery of the aircraft from waters, it was transported to the United States where investigators continued their analysis of the debris and documented damages sustained.

Several components were removed from the aircraft and its power plant and sent to the manufacturer and other organizations for further analysis.

The pilot and copilot attitude indicators were extracted and their internal gyros were examined. The pilot's electric driven gyro's internal rotor exhibited rotational scoring. The copilot's vacuum driven gyro exhibited rotational scoring to its internal rotor and housing.

The NTSB retained a Shadin fuel computer, JPI engine monitor, Garmin SD card, and a Garmin GTN 750 for further examination.

1.16.1 ENGINE ANALYSIS

Examinations were conducted of both engines and its components post-crash. The results follows;

- **Left Engine**

The propeller hub mounting flange was fractured and the propeller separated from the engine. The exterior surfaces of the crankcase exhibited corrosion consistent with immersion in salt water. The engine cowling was not on the engine. The tubular engine mount was impact damaged and separated from the aircraft firewall. The sparkplug ignition leads were not connected to the sparkplugs and the sparkplugs had been removed and reinstalled before the engine exam. The engine was suspended from a lift and partially disassembled to facilitate the examination. The engine crankshaft was rotated through about 300 degrees of rotation before encountering resistance. When the cylinder rocker covers were removed, the exhaust valve rotator caps were found loose under the rocker covers of the #1, #3 and #5 cylinders. All six cylinders and pistons were removed. After the cylinder removal the crankshaft was rotated by hand freely through 360 degrees of rotation. No bent valve pushrods were observed. The camshaft lobes and cam followers were observed through the crankcase cylinder pads and not damage noted. No damage to the crankshaft, connecting rods or other engine internal component was observed. All 16 cam lifter bodies were removed and were firm (pumped up) when depressed by hand. The lifter body check valves were depressed to release the internal oil and the bodies all operated freely. No damage was noted to the cylinders, pistons valves or valve springs.

- **Left Propeller**

The propeller hub mounting flange was fractured and the propeller separated from the engine. One propeller blade was turned about 180 degrees in the hub socket and curved aft about 90 degrees at about 2/3 span. That blade exhibited longitudinal twisting toward the blade face. Another blade was bent aft about 90 degrees at about mid-span. The remaining blade was turned about 180 degrees in the hub socket and curved forward about 30 degrees at about mid-span. That blade exhibited longitudinal twisting toward the blade face and "S" bending. The propeller governor remained attached to the engine and no damage was noted. The propeller governor cable was broken. The cabled rod end remained attached to the governor actuator arm. The governor drive was rotated freely by hand and produced oil from the outlet port. The governor oil screen was absent of debris.

- Other engine components including Fuel Systems (Screens, Flow Dividers, Injector Nozzles and Fuel Pumps), Magnetos, Spark Plugs, Ignition Harness, Starter, Alternator, Generator, Vacuum Pump, Lubrication System, and Turbo System were all analyzed and in most cases, no damages were noted or where damages were noted, it most resulted from corrosion, as a result of submersion in salt water or possible impact damages. (*Full damage report noted in Engine Manufacturers field notes - not included in this report*).

- **Right Engine**

As first viewed, the engine was laying on a pallet. The propeller remained attached to the engine crankshaft flange. The propeller spinner was fragmented and crushed against the propeller hub. The exterior surfaces of the crankcase exhibited corrosion consistent with immersion in salt water. The engine cowling was not on the engine. The tubular engine mount was impact damaged and separated from the aircraft firewall. The sparkplug ignition leads were not connected to the sparkplugs and the sparkplugs had been removed and reinstalled before the engine exam.

The engine was suspended from a lift and partially disassembled to facilitate the examination. The engine crankshaft was rotated by turning the propeller and continuity of the crankshaft to the rear gears and to the valve train 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 the most current engine maintenance logbook revealed the most recent engine overhaul was completed on 04/14/2020. The engine had accumulated 33.8 hours of time-in-service since the overhaul.

- **Right Propeller**

The propeller remained attached to the engine crankshaft flange. The propeller spinner was crushed against the propeller hub and twisted opposite the direction of rotation. Two propeller blades were free to rotate in the hub by hand. The other blade remained fixed in the hub. The blade marked "A" remained fixed in the hub and was curved aft about 15 degrees. That blade exhibited longitudinal twisting toward the blade face and trailing edge "S" bending. The blade marked "B" was curved forward about 45 degrees and turned about 90 degrees in the hub. The blade was also twisted longitudinally toward the blade face. The blade marked "C" was curved aft about 80 degrees and turned about 90 degrees in the hub. The propeller governor remained attached to the engine and no damage was noted. The propeller governor control cable rod end remained attached to the governor control arm and the arm was positioned about 1/8 inch from the full RPM increase stop. The cockpit propeller control lever was positioned fully forward. The governor was removed and rotated freely by hand. The governor gasket was not equipped with an oil screen.

- Other engine components including Fuel Systems (Screens, Flow Dividers, Injector Nozzles and Fuel Pumps), Magnetos, Spark Plugs, Ignition Harness, Starter, Alternator, Generator, Vacuum Pump, Lubrication System, and Turbo System were all analyzed and in most cases, no damages were noted or where damages were noted, it most resulted from corrosion, as a result of submersion in salt water or possible impact damages. (*Full damage report noted in Engine Manufacturers field notes - not included in this report*).

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

Emergency Response

As crash and firefighting personnel and others were at the airport at the time of takeoff and observed the aircraft disappear in the darkness, when they heard a "loud thud" they rushed to the scene in their personal vehicle to render assistance.

Despite having listed in the Bahamas Aeronautical Information Publication (AIP) the availability of two (2) crash and rescue fire truck, none were working and available at the time this accident occurred, which precipitated the firemen at the airport at the time of the crash, to respond in their private vehicles to render assistance.

With the help of boaters and other first responders that responded after the crash, both pilot and passenger were rescued within minutes of the crash.

Despite lifesaving efforts to revive the passenger, he succumbed to injuries sustained.

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
- Left nacelle tank transfer switch: on

According to the Piper Navajo Chieftain Pilot Operating Handbook;

“The **emergency fuel pumps** are installed for emergency use in case of an engine driven fuel pump failure, or whenever the fuel pressure falls below 34 PSI. They are also used during takeoff and landing, and for priming the engines. Control switches for the emergency fuel pumps are located in the overhead switch panel to the right of the fuel gauges.

While the use or non-use of the 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.

*It could not be determined why the left nacelle transfer switch was selected to the **ON** position or whether the switch could have moved by itself due to the collision sequence.*

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**

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.

3.0 CONCLUSIONS

The AAIA has classified the accident as a loss of control inflight (LOC-I) resulting in an uncontrolled flight into terrain. The probable cause of this accident has been undetermined.

Contributing Factors which aided in the Loss of Control Inflight includes;

1. Unknown

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 held a valid Commercial Pilot Certificate with single and multi-engine land and instrument ratings. He also held a G-IV second in command type rating.
6. The pilot held a valid First Class Medical Certificate with limitations “Must have available, glasses for near vision.”
7. The aircraft was not equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR); neither was required by regulations.
8. The maintenance records indicated that the aircraft was equipped and maintained in accordance with existing US CFR regulations and manufacturer’s approved maintenance procedures.
9. The most recent maintenance activity conducted on the aircraft included an annual inspection completed on April 28th, 2020.
10. The most recent work conducted on both engines were an overhaul completed on April 14th, 2020. The engines had accumulated 33.8 hours of time-in-service since the overhaul.
11. The aircraft crashed in waters approximately 0.24nm from the departure end of Runway 10 of the South Bimini Int’l Airport, Bimini, Bahamas.
12. The partially submerged aircraft was located at coordinates N25° 42.4’ and W079° 15.9’
13. Concerns noted during inspection post-crash was the non-use of fuel boost pumps as required by manufacturers checklist.
14. Manufacturers Engine Analysis Report did not note any engine or component damages or anomalies that would prevent normal operation of the engines. All damages noted were post impact or erosion damages as a result of salt water immersion.
15. Weather was not a contributing factor in this occurrence.
16. Navigational Aids were not a contributing factor in this accident

17. No crash and rescue vehicle were working at the time of the crash to render assistance.
18. Crash and rescue personnel responded in their private vehicles to render assistance.

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. The recommendations issued are not in any way assigning blame, but rather identifying areas that may need to be improved or addressed in the interest of safety.

The safety recommendation that follows while not contributing to the accident, can be improved in the event future accidents happen in an area that is under the control of the aerodrome operator.

As a result of this investigation, the Aircraft Accident Investigation Authority makes the following recommendation(s);

1. Airport Authority Family Island Airport Division (AA FIAD) ensure adequate firefighting equipment, **in working order**, is available, comparable to the designation of the aerodrome and the type of aircraft that use this aerodrome.