



Aviation Short Investigation Final Report

Controlled Flight into Terrain (C-FIT)
Piper PA-32-260 – N3790W

Waters near North Andros, Bahamas
1st June 2023

AAIA Aviation Occurrence Investigation
Report # OCC-2023/0019

Final Report
5th February 2024



Fig.1: Photo of accident aircraft N3790W

Released in accordance with Section 25 of the Aircraft Accident Investigation Authority Act (AAIA) 2019 and Section 1.445 of the AAIA Regulations 2021.

Publishing information

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About the AAIA

The Aircraft Accident Investigation Authority (AAIA) is the independent accident investigation agency under the Bahamas Ministry of Energy & Transport (MOE&T) charged with the responsibility of investigating all aviation accidents and serious 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, International Civil Aviation Organization (ICAO) Annex 13 and, where applicable, relevant international agreements.

The Aircraft Accident Investigation Authority is mandated by the Ministry of Energy & Transport to investigate aviation accidents and serious incidents, determine probable causes of accidents and serious incidents, issue safety recommendations, study transportation safety issues and evaluate the safety effectiveness of agencies and stakeholders involved in air transportation. The object 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. 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.

About this report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.

AIRCRAFT ACCIDENT

INVESTIGATION AUTHORITY

Manufacturer: Piper

Aircraft Type: PA-32-260

Nationality: United States of America

Registration: N3790W

Serial Number: 32-715

Place of Accident: Waters near North Andros, Bahamas

Date and Time: 1st June 2023, 2:40 pm EDT (1840 UTC)

Notification: Civil Aviation Authority Bahamas (CAA-B)
National Transportation Safety Board (NTSB) United States

Investigating Authority: Aircraft Accident Investigation Authority,
Ministry of Energy & Transport

Investigator in Charge: Mr. Saint-Tino Morley

Accredited Representative: Ms. Heidi Kemner (NTSB)

Releasing Authority: Aircraft Accident Investigation Authority

Date of Final Report Publication: 5th February 2024

Occurrence Summary

On the 1st June 2023 at 3:10 pm EDT (1910 UTC), the Aircraft Accident Investigation Authority (AAIA) received notification of an occurrence involving a Piper PA-32-260 aircraft with United States registration N3790W that was ditched into waters off of North Andros, Bahamas while enroute to the Palm Beach International Airport (KPBI), West Palm Beach, FL, USA with five (5) persons on board.

The private flight which departed the San Andros Airport (MYAN), Andros, Bahamas at approximately 2:20 pm EDT, was operating as an Air Care Alliance Flight with call sign CMF2587, and was the fifth (5th) leg of a trip that originated from the Kissimmee Gateway Airport (KISM), Kissimmee, FL, USA, at approximately 6:45 am that morning.

The first stop was at Hidden Lake Airport (FA40), New Port Richey, FL, where the aircraft was topped off with 30 gallons of Avgas fuel, then on to Plant City Airport (KPCM), Plant City, FL, followed by Palm Beach County Park Airport (KLNA), West Palm Beach, FL, then to San Andros Airport (MYAN), Andros, Bahamas.

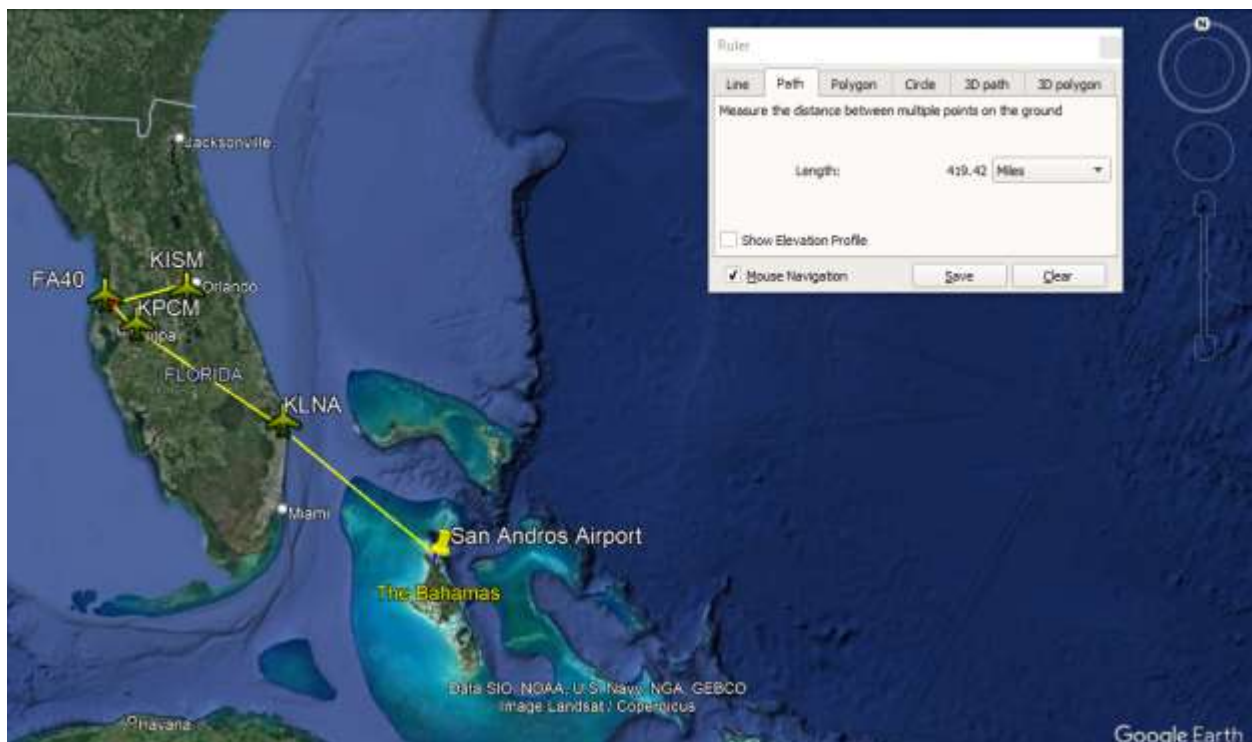


Fig. 2: Aircraft route prior to accident flight

Before departing MYAN, an additional 25 gallons of Avgas fuel was purchased. The pilot in command of the aircraft advised that at no point prior to the accident flight was there any indication of a malfunction or fault observed with the aircraft.

At approximately 2:20 pm, N3790W departed MYAN on an Instrument Rules (IFR) flight plan with a filed altitude of 8,000 ft. The pilot in command indicated that upon transitioning to cruise flight and while at an altitude of 6,000 feet, he observed a loss of engine power.

Subsequently, he commenced emergency procedures in accordance with the manufacturer's checklist, also attempting to restart the engine. Those efforts were unsuccessful. Miami Center (Air Traffic Control) was advised of the emergency situation by the pilot, and he stated his intention to return to MYAN. Miami Center transferred the aircraft to Nassau Air Traffic Control and the pilot, upon realization that he would be unable to make the field, opted to ditch the aircraft in shallow waters (depth 8 – 10 feet) approximately 20 miles northwest of MYAN.

Nassau Air Traffic Control initiated emergency response protocol and notified the Royal Bahamas Police Force (RBPF), Royal Bahamas Defense Force (RBDF), US Coast Guard, and the Bahamas Air Sea Rescue Association (BASRA).

Marine and aerial assets were dispatched to the area, and all five occupants were located and rescued a while later. They were transported to North Andros, Bahamas where they were seen by medical professionals and there were no injuries reported in relation to this occurrence.

The coordinates where the aircraft came to rest was identified as latitude 25°21'15.0"N and longitude 78°11'50.6"W.

The aircraft was recovered and transported during the period 13th – 16th June 2023, first from North Andros to New Providence, Bahamas and then on to the facilities of Florida Air Recovery in Fort Pierce, Florida, USA where an aircraft teardown and analysis was conducted on 2nd August 2023 by the AAIA with the assistance of Piper Aircraft and Lycoming Engines.

Aircraft Information

The Piper PA-32 Cherokee Six is a series of single-engine fixed landing gear light aircraft manufactured in the United States by Piper Aircraft between 1965 and 2007. The PA-32 is used around the world for private transportation, air taxi services, bush support, and medevac flights.

The PA-32 series began life in 1965 as the 260 horsepower (190 kW) PA-32-260 Cherokee Six, a significantly modified six- (or seven) seat development of the PA-28 Cherokee. The Cherokee Six and its successors feature a baggage compartment in the nose between the cockpit and the engine compartment as well as a large double door in the back for easy loading of passengers and cargo.

The airplane is a seven-place, low wing, single engine airplane equipped with tricycle landing gear, and of all metal construction.

This airplane is certified in the normal category. In the normal category all aerobatic maneuvers including spins are prohibited. The airplane is approved for day and night VFR/IFR operations when equipped in accordance with F.A.R. 91 or F.A.R 135.

Engine and Propeller

The Lycoming O-540-E4B5 engine installed in the Cherokee six, PA-32-260 is rated at 260 horsepower at 2700 rpm. This engine has a compression ratio of 8.5 to 1 and requires 100/130 minimum octane fuel. The engine is equipped with a geared starter, a 60 ampere alternator, dual magnetos, vacuum pump drive, a diaphragm type fuel pump, and a float carburetor.

Exhaust gases are carried through a system constructed of heavy gauge stainless steel which incorporates two heater shrouds, one for cabin heat and the other for carburetor icing.

The propeller used on the PA-32-260 is either the McCauley 1P235PFA82 fixed pitch aluminum alloy unit or the Hartzell HC-C2-YK-1A/8477-2 constant speed propeller.

Magneto

The magneto is a self-contained generator of high voltage that provides ignition to an engine through spark plugs (Source of fire/spark to fuel air mixture within the engine).

A magnet—hence *magneto*—spins in close proximity to a coil of wire. As the magnet spins (or the magnet rotor is turned), it generates a strong magnetic force that is “held back” by a primary coil. The moment the contact points open, a rapid magnetic flow generates a high voltage in the secondary coil, which ignites the spark plug, thus firing the engine, producing power.

There are two magnetos on most piston aircraft engine -the left (mag) and the right (mag)—each fire one of two spark plugs on each cylinder. There are two magnetos so that if one fails the engine continues to run, but will be less efficient.

They are not attached to the battery or any electric systems in the aircraft, allowing the engine to continue to run even during a battery or electrical failure.

Aircraft Manufacturer		Registration
Piper		N3790W
Serial Number		Registered Owner
32-715		Adam Scudder
Model/Series		Aircraft Category
PA-32-260		Normal
Engine Manufacturer		Engine Model
Lycoming		0-540-E4B5 Series
Engine Type		Airworthiness Date
Reciprocating		08/01/1966

At the time of the aircraft last annual inspection, conducted on 8th May 2023, the aircraft had accumulated a total airframe time of 6,093.90 hours. The aircraft engine (Lycoming 0-540-E4B5) S/N: L-14700-40 accumulated Total Time since New (TTSN) 5250.15 hours.

Wreckage and Impact Information

Crew Injuries	Aircraft Damages
None	Impact and water related damage
Passenger Injuries	Aircraft Fire
None	None
Ground Injuries	Aircraft Explosion
None	Not Applicable
Total Injuries	Coordinates
None	25°21'15.0"N 78°11'50.6"W

General condition – post recovery

The airframe and fuselage displayed evidence of submersion in salt water. Corrosion was apparent overall.

Fuselage

The fuselage was intact and revealed impact related damage. The left side of the aft fuselage revealed deformation at the aft most 36 inches. The right side of the aft fuselage was damaged in the aft most 12 inches. The nose landing gear was broken from its mounts.

Wings

The wings and aileron cables had been cut from the airframe by salvors at the main spars and leading-edge attachments. The right wing flap had been cut from the mounting track. The left flap inboard mounting track was cut. The left flap separated at the outboard two tracks. The left and right ailerons were torn from their mounting hinges and the aileron control rod ends were broken. The left and right aileron bellcranks remained attached to their respective wings. No fuel caps were observed on the wings. The wings were equipped with fuel tip tanks. The right main landing gear remained attached and in place. The left main landing gear was damaged and the tire was broken off. Both aileron balance weights remained attached to their respective aileron. No fuel located in either wing.

Control Continuity

Aileron continuity was confirmed from the root of each wing to the respective aileron bellcrank. The cables were separated at the wing.

Stabilator continuity was established from the stabilator to the control column. Both stabilator control cables remained attached at the empennage. Correct movement of the stabilator bellcrank and bobweight was observed when the control column was moved.

The stabilator trim actuator was found with a 0.35 inch extension on the top of the actuator rod. This equates to a position between nose down and neutral. No threads were showing on the top of the actuator rod. The indicator in the cockpit was found half way between nose up and neutral.

Rudder cable continuity was established from the left rudder pedals to the rudder horn at the empennage. Efforts to move the right rudder pedal did not reveal any movement. Rudder pedal assembly was rusted. The rudder cables remained attached to both horns at the empennage.

The vertical stabilizer remained intact and attached to the empennage. The rudder remained attached to the vertical stabilizer and revealed some deformation along the span. The upper 18 inches of the rudder revealed more pronounced buckling.

Instrument Panel and flight controls

The throttle was found in a full forward power setting. The propeller control was full forward (full increase). The mixture control was 1.5 inches aft of RICH.

The flap selector was found in the 25 degree flap extended position and was in the detent for this position. This position was verified at the right and left end of the flap torque tube.

Oil pressure – zero

Oil temperature – Broken

Cylinder head temperature – 470 C

Fuel pressure – zero

Fuel boost switch ON

Alternator – zero

All four fuel gauges – all read empty

Manifold pressure – 34 inches Hg.

Tachometer – zero – Hour meter 6,102 hours

Suction gauge - zero

DG – 322 degrees

VSI – Minus 2000 FPM (down)

Turn coordinator – Left bank ball centered

Airspeed – zero

Attitude Indicator – nose low – right turn of about 28 degrees

Altimeter – 7,330 feet Setting 28.88 inches Hg.

HIS – needles right and down – heading 153 degees – showing nav flag

VOR – heading 080 degrees, needle right, nav flag showing.

Pitot heat – ON

Landing lights and strobes – ON

Magneto key – OFF

Master – OFF
Comm radios – digital
Transponder – on ALT – setting 4534

Fuel System

The fuel selector control was found in the left main tank selected position. Fuel was drained from the fuel sump into a dry container. The fuel appeared to be a mixture of water and fuel and had a minor smell of aviation fuel. Kolor Kut water detecting paste was used to test for water. The paste turned bright red indicating the presence of water in the fuel. The fuel sump screen appeared primarily clean with some sand and other debris particles present as well as some corrosion.

The fuel selector valve was field tested with low pressure air and was operational in all positions.

Engine

Lycoming model O-540-E4B5, Serial number L-14700-40, six cylinder, normally aspirated. The engine remained attached to the firewall. The engine displayed evidence of salt water submersion, with some portions being heavily corroded. The engine was rotated by hand. Compression and suction was confirmed using the thumb test method. Valve train continuity was confirmed during rotation.

Magnetos

Both magneto distributor caps were found un-attached from their respective magnetos when the airplane was removed from the ocean, as documented during the recovery process. The three screws on each magneto that would normally hold these caps in place were not present.

Right- Slick model 6350, S/N 06061396

Left - Champion – model 6355, S/N 08022173

The magnetos were tested – Neither magneto sparked when rotated. Internal examination of the magnetos revealed corrosion on the internal components.

Spark plugs – Tempest UREM – 38E – massive electrode – Appeared normal color and wear.

Carburetor – Marvel Schebler – model MA-4-5, S/N: BZ212887, P/N: 10-5054

Corrosion noted on exterior and interior components.

The carburetor fuel screen appeared clean. The carburetor floats were intact and attached.

Engine driven fuel pump - The gaskets in the engine driven fuel pump appeared intact and in place. No anomalies were noted on the internal components.

The propeller governor remained attached to the engine with the control linkage attached. The propeller governor oil screen appeared clean.

The engine oil screen appeared clean.

The engine oil filter was opened for examination. The element appeared clean and revealed no evidence of metal particles.

Vacuum pump – Rapco Part number RAP215CC, serial number A49204. Drive intact.



Fig. 3: Photo of aircraft submerged in waters off North Andros, Bahamas

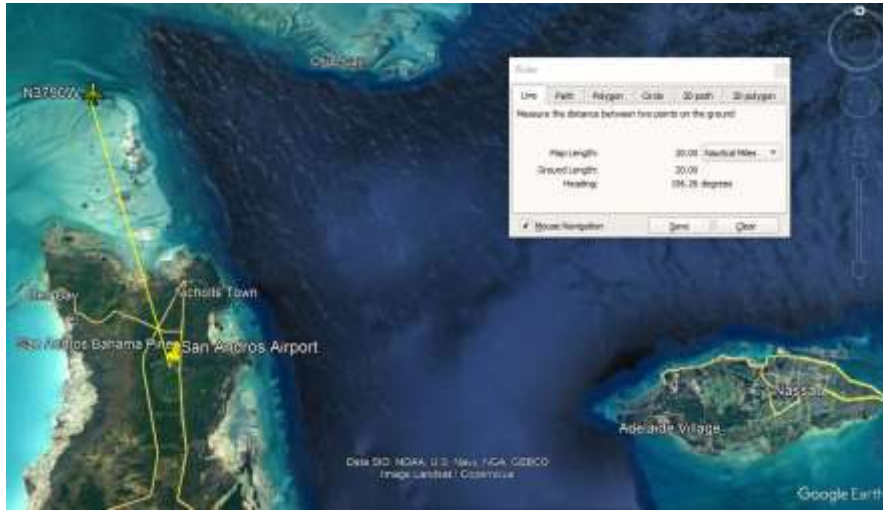


Fig.4: Google Earth imagery of accident site location

Investigation Findings

Pilot

The pilot in command of the aircraft was 40 years of age at the time of the accident. He possessed an Airline Transport Pilot license issued by the Federal Aviation Administration (FAA) on 19th March 2021 with an Airplane Multiengine Land rating. He also held commercial privileges for Airplane Single Engine Land. He was type rated in the following aircraft: CL-65; DHC-8; ERJ-170; ERJ-190. Limitations include DHC-8 SIC¹ privileges only and CIRC. APCH². VMC³ Only

He held a First Class medical certificate issued 13th December 2022 with no limitations.

At the time of the accident, the pilot had accumulated approximately 14,000 hours of total flight time with approximately 500 hours of flight time on the Piper PA-32-260 make and model.

Weather

Meteorological Information:

Conditions at Accident site	Condition of Light
Visual Meteorological Conditions	Day
Observation Facility Location	Observation Time
Lynden Pindling Int'l Airport (MYNN) Nassau, Bahamas	1800 UTC
Distance from Accident Site	Temp /Dewpoint
50 nautical miles	29°C/25°C
Lowest Cloud Condition	Wind

¹ SIC – second in command pilot is also known as the first officer or copilot.

² CIRC. APCH – circling approach is a type of landing maneuver that pilots use to align their aircraft with the desired runway following an instrument approach in cases when an instrument approach straight-in landing is impossible or undesirable.

³ VMC – visual meteorological conditions are the meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling equal to or better than specified minima

SCT020	230/05KT
Altimeter Setting	Visibility
29.89 in.HG	>6 statute miles

Analysis

During post-accident recovery of the aircraft and inspection, the top and bottom cowlings for the engine were removed where it was observed that both magneto leads/distribution caps were found to be fully detached from each of the magneto housings (left and right) at the rear/back of the engine.



Fig. 5: Left magneto cap detached from housing

It could not be determined at which point and time both of the magneto distribution caps would have become detached from their respective magnetos. If it were the case that the detached position of both magneto caps, as they were observed post-accident, were to have taken place sometime prior to the accident sequence, a subsequent loss of power event would be a logical result.

Of note however, was that the pilot in command of the aircraft did not identify or indicate observing any abnormality or issue during preceding flights.

In the aftermath of the aircraft/engine teardown and analysis that was conducted by the AAIA with support of engine manufacturer Lycoming and airframe manufacturer Piper on 2nd August 2023, it was determined that there was nothing identified or observed that would suggest that there was an issue or malfunction that could have contributed to a loss of power event.

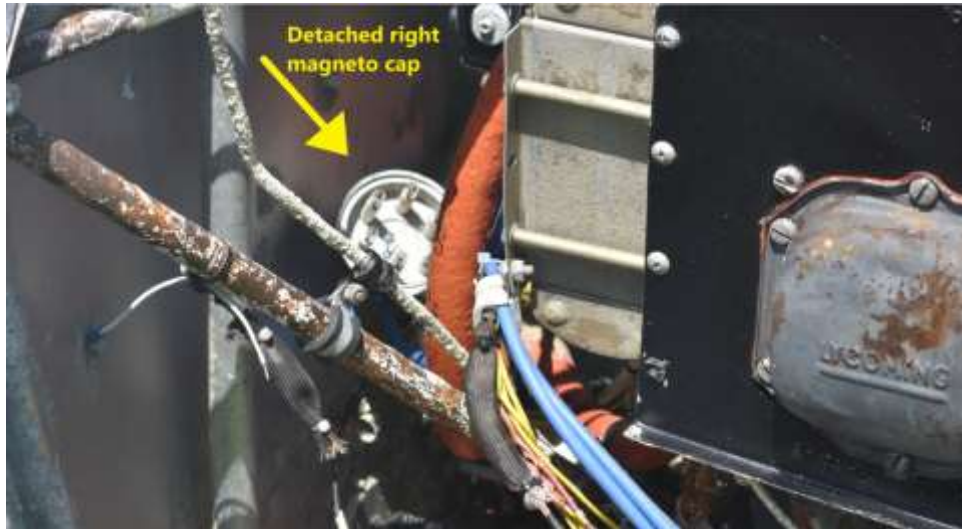


Fig. 6: Right magneto cap detached from housing

Findings

These findings should not be read as apportioning blame or liability to any particular organization or individual.

- 1) The aircraft was certified, registered and equipped in accordance with applicable United States Aviation Regulations and approved procedures.
- 2) The maintenance records indicated that the aircraft was maintained in accordance with existing United States Aviation Regulations and approved procedures.
- 3) The most recent annual inspection conducted on the aircraft was at an airframe total time of 6,093.90 hours and engine Total Time since New (TTSN) 5250.15 hours completed on 8th May 2023.
- 4) The pilot in command was appropriately licensed for the flight in accordance with existing United States Aviation Regulations, possessing an Airline Transport Pilot License with Multi-Engine Rating issued by the United States Federal Aviation Administration (FAA) on 7th April 2019.
- 5) The pilot in command of the aircraft held a valid First Class Medical issued 13th December 2022 with no waivers or limitations.
- 6) Weather was not a factor in this occurrence.
- 7) The aircraft was not equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR); neither was required by regulations
- 8) There was no evidence of any defect or malfunction in the aircraft, prior to the accident flight, which could have contributed to the accident.
- 9) There was no evidence of airframe failure or engine malfunction prior to the accident.
- 10) The pilot in command of the aircraft observed a loss of engine power during transition to cruise flight at an altitude of 6,000 feet after departing MYAN.
- 11) Upon realization that he would be unable to return to MYAN, the pilot in command opted to ditch the aircraft in shallow waters (depth 8 – 10 feet) approximately 20 miles northwest of MYAN.
- 12) Post-accident during recovery and inspection of the aircraft, it was observed that both magneto leads/distribution caps were found to be fully detached from each of the magneto housings (left and right) at the rear/back of the engine.

13) During aircraft teardown and analysis, there was nothing identified or observed that suggested that there was an issue or malfunction with the aircraft that could have contributed to a loss of power event.

14) The cause of the observed detached magneto distributor caps was undetermined.

Probable Cause

The AAIA has determined the probable cause of this accident to be loss of engine power resulting in subsequent controlled flight into terrain (C-FIT).

Contributing factor to this occurrence include:

- Inability of aircraft to produce sustainable power due to detachment of left and right magneto distributor caps from their respective magnetos (cause undetermined).

Safety Recommendation(s)

There were no safety recommendations issued in relation to this occurrence.