Aircraft Accident Investigation Authority of the Bahamas

N522AR Accident Final Report

Published 27th December 2023

Location	Accident number
Norman's Cay Airport (MYEN), Norman's Cay, Exuma, Bahamas	OCC – 2023/0018
Occurrence Date & Time 26th May 2023 9:40 am EDT (1340 UTC)	**Registration** N522AR
Aircraft	**Aircraft Make/Model**
Flight Conducted Under Instrument Flight Rules	Cirrus SR22

Information:

Narrative:

On the 26th May 2023 at approximately 9:40 am EDT (1340 UTC), a Cirrus SR22 aircraft with United States registration N522AR was involved in an occurrence (Fire/Smoke Non-Impact) after landing at the Norman's Cay Airport (MYEN), Norman's Cay, Exuma, Bahamas.

The private flight departed from the Pompano Beach Airpark (KPMP), Pompano Beach, FL, USA with three (3) persons on board on an Instrument Rules (IFR) flight plan enroute to the Exuma International Airport (MYEF), Exuma, Bahamas. During cruise flight to MYEF, the pilot in command observed the aircraft engine "running rough" and subsequently made the decision to divert to the nearest aerodrome, which at that point was the Norman's Cay Airport (MYEN).

Fig.1: N522AR after landing MYEN

The pilot successfully landed the aircraft at Norman's Cay Airport, but upon landing the aircraft, smoke was observed coming from the aircraft's engine and after quickly exiting the aircraft, fire was seen emanating from the engine. A fire extinguisher on wheels was used to suppress the flames and it was brought under control and extinguished a short while after.

There were no injuries reported in relation to this occurrence and the aircraft's engine and front of fuselage was fire damaged.

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Aircraft Information:

Manufacturer	**Cirrus Design Group**
Type, model and Registration	**SR22; N522AR**
Year of Manufacture	**2005**
Serial Number	**1534**
Certificate of Airworthiness issue date	**07/25/2005**
Total airframe time as of last annual (11/16/22)	**1712.6 hours**
Engine type	**CONT Motor IO-550**
Propeller type	**Hartzell Propeller**

The SR22 is a single-engine piston (available) in both naturally aspirated and turbocharged versions, low-wing, civil utility aircraft with fixed tricycle landing gear. It is derived from the SR20 and is similar to its predecessor in design.

Like all Cirrus single-engine aircraft, the SR22 is powered by a horizontally opposed, air-cooled, fuel-injected Continental 550 engine.

The SR22 is the most produced general aviation aircraft to be made out of composite materials. The use of composites allows the aircraft to be light and fuel-efficient, while still being strong enough to carry high payloads. The body is also designed to have a very low drag coefficient which increases performance and further reduces fuel consumption.

The composites used in the body of the SR22 are not only lighter than conventional materials, but it is also significantly stronger according to the crash tests conducted by Cirrus. The fuselage of the SR22 is made in two halves using molds. These halves are then joined together in a curing process. The wings are also built as a single piece and are joined to the aircraft using a spar.

The Cirrus SR22 is chock-full of safety features, but the one that put the SR series on the map is the Cirrus Airframe Parachute System (CAPS). When deployed, this ballistic parachute will safely bring the aircraft down at a rate of 1,680 feet per minute at MTOW.

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Pilot Information:

The pilot in command of the aircraft was 39 years old at the time of the occurrence. He possessed a Commercial Pilot certificate issued by the Federal Aviation Administration (FAA) on 1st February 2023 with Airplane Single-Engine and Multi-Engine Land and Instrument Airplane Ratings. Additionally, he held a Private Pilot – Rotorcraft – Helicopter Rating.

The airman held a 3rd Class Medical Certificate with no limitations issued on 18th July 2019.

Prior to the accident flight, the pilot in command had accumulated approximately 1,584 hours of total flight time, with approximately 1,440 hours of pilot in command (PIC) time and 1,233 hours on the SR22 type.

The pilot in command satisfactorily completed a flight review in accordance with FAR 61.56 and an instrument proficiency check in accordance with FAR 61.57 (d) (2) on 24th July 2021.

Meteorological Information and Flight Plan:

Conditions at Accident site	**Condition of Light**
Visual Meteorological Conditions	Day
Observation facility Elevation	**Observation Time**
16 feet	1300 UTC (9:00 am)
Distance from Site	**Temp /Dewpoint**
50 nautical miles	28°C/23°C
Lowest Cloud Condition	**Wind Direction/Speed**
SCT015CB	230/11KT
Lowest Ceiling	**Visibility**
BKN020	>6 statute miles
Altimeter Setting	**Type of flight Plan Filed**
29.82 in.HG	Instrument Flight Rules

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Departure Point	Destination
Pompano Beach Airpark (KPMP), Pompano Beach, FL, USA	Exuma Int'l Airport (MYEF), Exuma, Bahamas

Wreckage and Impact Information:

Crew Injuries	Aircraft Damage
None	Fire Damage to engine and fuselage
Passenger Injuries	
None	**Aircraft Fire** Yes
Ground Injuries	**Aircraft Explosion**
None	Not Applicable
Total Injuries	**Latitude, Longitude**
None	243546.83N 0764908.13W

Fig.2: Location of aircraft on runway at MYEN

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.

In the aftermath of the occurrence, a thorough review was conducted of the aircraft maintenance records. Based on the review, it was determined that the aircraft was maintained in accordance with the aircraft manufacturer and applicable regulatory requirements.

Further investigations revealed that the cylinder head of #3 cylinder assembly had separated from the barrel of that assembly. The barrel is made of steel whereas the cylinder head is made of aluminum and the two are joined by a threaded interface. They are screwed together in a permanent manner during the manufacturing process and are not designed to be disassembled. The exact cause of the separation was not determined.

Fig.3: Photo of aircraft engine at MYEN

The result of the failure of the cylinder assembly was an engine compartment fire. It would appear that the fire may have started due to the fuel injection line being torn off the cylinder assembly, which would then have led to raw fuel being pumped directly on top of the hot cylinder assembly which had an ignition source in the form of two exposed spark plugs. The spark plugs would likely still be firing and the engine driven fuel pump would continue pumping fuel as long as the engine continued to rotate.

As the pilot continued to operate the engine through the remaining time airborne, and then during landing and taxiing, this continued to feed to the existing fire resulting in substantial damage to the aircraft.

Conclusion

Findings

1. The aircraft was certified, equipped and maintained in accordance with existing applicable US CFR regulations 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. Prior to the accident flight, there was no indication of any malfunction or failure with the aircraft or its systems.

5. The pilot in command of the aircraft was appropriately licensed, current, and qualified in accordance with existing US CFR regulations Part 61.

6. The pilot in command of the aircraft possessed a Commercial Pilot certificate issued by the FAA on 1st February 2023 with Airplane Single-Engine and Multi-Engine Land and Instrument Airplane Ratings. Additionally, he held a Private Pilot – Rotorcraft – Helicopter Rating.

7. The pilot in command possessed a 3rd Class Medical Certificate with no limitations issued on 18th July 2019.

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

9. After observing a "rough running" engine, pilot made the decision to divert to Normans Cay Airport (MYEN), Exuma, Bahamas.

10. After landing at MYEN, smoke was observed emanating from the engine that later caught on fire and was suppressed by a fire extinguisher; aircraft engine and fuselage received fire damage.

11. Investigations revealed that the cylinder head of #3 cylinder assembly had separated from the barrel of that assembly for reasons undetermined.

12. The result of the failure of the cylinder assembly was an engine compartment fire.

The AAIA lists the probable cause of this accident to be separation of the #3 cylinder head from the cylinder assembly resulting in an engine compartment fire.

Contributing Factor(s)

- **Undetermined**

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Administrative Information:

Investigator in Charge

Mr. Kendall Dorsett Jr.

Additional Information

Accredited Representative: Ms. Leah Reed – National Transportation Safety Board (NTSB)