

Serious Incident

Aircraft Type and Registration:	Fournier RF4D, G-AWGN	
No & Type of Engines:	1 Volkswagen Rectimo 4AR-1200 piston engine	
Year of Manufacture:	1968 (Serial no: 4084)	
Date & Time (UTC):	23 July 2023 at 1300 hrs	
Location:	Stow Maries Great War Aerodrome, Essex	
Type of Flight:	Private	
Persons on Board:	Crew – 1	Passengers – None
Injuries:	Crew – None	Passengers – N/A
Nature of Damage:	None	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	74 years	
Commander's Flying Experience:	22,200 hours (of which 1,000 were on type) Last 90 days – 23 hours Last 28 days – 9 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

The pilot of G-AWGN was flying his usual aerobatic display routine for an air display at Stow Maries Great War Aerodrome. During the eighth manoeuvre of the routine the propeller stopped. Unable to restart the engine the pilot positioned the aircraft for an abbreviated circuit and landed off the subsequent glide approach.

Both wingtip smoke generators were still emitting. Whilst the right generator stopped smoking soon after the aircraft had stopped, the left canister began burning with a yellow flame visible. Very shortly after the canister began to flame, the airport fire service arrived and were able to extinguish the flames with a short blast of a powder extinguisher.

The pilot commented that although he regularly practised glide approaches to ensure that he was prepared for an engine failure, he always did this to the runway threshold. During this flight, with the engine actually failed, he also made his glide approach to the threshold, as he had always practised, rather than initially aiming further up the runway.

History of the flight

The pilot of G-AWGN took off at 1253 hrs to commence his display. The aircraft was fitted with two smoke canisters, one on each wingtip. At around 1258 hrs the pilot commenced the eighth manoeuvre of his sequence which consisted of an upwards quarter vertical roll to a canopy-down 'humpty-bump.' As the pilot pulled over the top of the humpty-bump, at

around 40 kt and at 850 ft aal, the propeller stopped. This had happened previously to the pilot during a practice flight, and the engine had restarted successfully on the subsequent dive. On this flight, despite diving to 135 kt, the propeller only turned through 90° before stopping completely. At 400 ft aal the pilot decided to use the aircraft energy to position for an abbreviated circuit and glide approach onto the runway at the airfield. The approach and landing were flown onto Runway 20 with the wind from the south or south-west at 10-16 kt. Both smoke canisters were still emitting orange smoke. After landing the pilot turned the aircraft into wind to blow the smoke away from the fuselage. The pilot shut down and vacated the aircraft without injury.

The right smoke canister stopped emitting very shortly after the pilot left the cockpit but the left developed a yellow flame, described by the pilot as being around six inches long. Within a few seconds of the flames appearing the airport fire service arrived and were able to extinguish the flames using a powder extinguisher. Despite the flames, there was no damage to the aircraft.

Results of engine examination

The pilot initially believed that the engine failure had strong similarity to that which occurred to an aircraft with a similar engine when the cause was found to be an increase in the tightness of the centre bearing, which created increasing friction within the engine, especially when it was hot. However, detailed examination of the engine arranged by the pilot, showed that there were a number of causes of the engine issue. The centre bearing was slightly tighter than required but there were also signs of scoring in the pistons. The air filter had been incorrectly cleaned and the aircraft had recently used a taxiway where there was a lot of concrete dust due to the poor quality of the surface. Some of this concrete dust had entered the cylinders and caused the scoring.

The issue with the centre bearing was shown to be caused by the fretting of the two crankcase halves.

Other information

Glide approach

The pilot practised glide approaches almost every flight and was therefore very well versed on the actions when his engine failed. He routinely flew these practice approaches to the runway threshold rather than aiming further down the runway initially as is suggested. When the engine failed during his routine, he conducted the approach exactly as he had done in all his practises despite the fact that he did not have the windmilling engine. Aiming at the runway threshold leaves no room for changing conditions or any slight mistakes on the approach. Whilst the approach and landing were successful with no damage to the aircraft or injuries to the pilot, the pilot felt he had reverted to what was familiar despite the actual engine failure condition.

Smoke generators

The smoke generators used on G-AWGN use a chemical reaction to generate the orange-coloured smoke. They are electrically triggered by the pilot at the beginning of his display. They are three-minute devices which you also might find on maritime vessels and with rescue organisations. The chemical reaction is exothermic, meaning that it generates heat although there is no flame or burning involved in the reaction. The pilot reported that whilst he had never landed with one generator still smoking before, others have without issue. The chemical reaction generating the smoke is very difficult to stop once it has started although the flames the pilot saw were rapidly extinguished using a powder extinguisher by the airfield fire service.

Analysis

An inspection of the engine arranged by the pilot showed that there were a number of issues generating increased friction within the engine. The additional internal engine friction caused the propeller to stop rotating in the manoeuvre and prevented it from restarting during the subsequent attempt at windmilling.

The actions of the pilot proved that being in very current practice for engine failures is extremely valuable for ensuring a successful outcome. However, regular rehearsals should use the same techniques that would be used in a real event, for if they do not then there is a risk that a pilot may revert to what is more familiar rather than what is best practice. The pilot in this event changed his regular glide approaches to initially aim one third of the way down the runway rather than at the runway threshold.

Although the smoke generators rely on a chemical reaction rather than flames or burning to produce the smoke, the reaction is exothermic. After landing one of the smoke generators emitted flames but these were rapidly extinguished using a powder extinguisher.

Conclusion

The engine of G-AWGN failed during an aerobatic display due to a combination of internal faults causing increased friction within the engine. The pilot rapidly recovered the aircraft to the runway without damage to it or injury to himself. One smoke generator emitted some flames, but these were rapidly extinguished and there was no damage to the aircraft.