

Accident

Aircraft Type and Registration:	Tekever AR3	
No & Type of Engines:	1 Sky Power piston engine	
Year of Manufacture:	2021 (Serial no: 335)	
Date & Time (UTC):	2 July 2022 at 0738 hrs	
Location:	English Channel	
Type of Flight:	Commercial Operations (UAS)	
Persons on Board:	Crew - N/A	Passengers - N/A
Injuries:	Crew - N/A	Passengers - N/A
Nature of Damage:	Damage from seawater immersion and recovery	
Commander's Licence:	Other	
Commander's Age:	35 years	
Commander's Flying Experience:	1,166 hours (of which 185 were on type) Last 90 days - 100 hours Last 28 days - 56 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and subsequent AAIB enquiries	

Synopsis

During a Beyond Visual Line of Sight (BVLoS) flight over the English Channel, the engine stopped. The aircraft descended on a parachute into the sea and was subsequently recovered. Investigation revealed an issue with the Low Pressure fuel pump which caused it to fail and trip its associated electrical fuse. This fuse also provided electrical power to the High Pressure fuel pump and, with both pumps stopped, the engine was starved of fuel.

The operator ceased operating the aircraft type until a number of improvements had been implemented.

History of the flight

Prior to takeoff, the preflight Normal Operational Checklist was completed with no defects or faults found. Engine tests were also performed which all passed as expected. Takeoff commenced at 0502 hrs in good weather from a site near Dover. The aircraft proceeded to the mission area over the English Channel where it commenced a Beyond Visual Line of Sight (BVLoS) maritime surveillance operation in Temporary Danger Area (TDA) D098.

The aircraft was monitored at all stages by two remote pilots who reported that the initial part of the flight progressed as normal. After approximately one hour and eleven minutes of flight, the aircraft was in a loiter mode at 800 ft amsl. The pilots then noted that the engine

rpm had dropped to zero and throttle command had risen to 98% which is the maximum. The altitude started to reduce, and the pilots realised that the engine had stopped. The aircraft continued to navigate on the programmed route until reaching 550 ft amsl after which the emergency procedure for activating the parachute was triggered automatically and the aircraft descended under parachute into the sea, within the TDA. The operator stated that there were no other vessels in the vicinity at the time.

The operator advised the Coastguard, activated the Emergency Response Plan and informed the CAA. The aircraft was subsequently found floating by a fisherman who recovered it and returned it to the operator for investigation.

Aircraft information

The UAS was manufactured and operated by the same company. It has an operating range of up to 60 km, an endurance of between 8 and 16 hours and a MTOW of 23 kg. There was a real-time data link from the aircraft to the remote pilots which included relevant aircraft parameters and a video feed from the onboard camera.

The single piston engine was supplied with fuel from a high pressure (HP) fuel system. This system used the HP fuel pump to pressurise the fuel from a header tank. Fuel was supplied to the header tank using the low pressure (LP) fuel system which used a separate LP fuel pump to transfer fuel from the main tank to the header tank via a fuel filter / strainer.

Both the HP and LP fuel pumps were controlled by the Engine Control Unit (ECU) and both pumps need to be operating for the engine to continue running. Electrical power to both fuel pumps shared the same electrical fuse which meant that if the fuse tripped, both fuel pumps would stop.

Operator's investigation

The operator performed an extensive investigation using telemetry data and examination of the recovered aircraft. They elected not to fly the aircraft type until the cause was known and their internal investigation was complete.

The aircraft, propeller and engine components were examined and found to be in good condition apart from effects of the saltwater environment and minor damage from the recovery operation.

Review of the telemetry data suggested an engine rpm response typical of fuel starvation. The fuel system was examined, and the only issue identified was damage to internal components of the LP fuel pump. The cause of this damage remains unexplained.

Review of the recorded fuel system electrical parameters suggested that the effect of this damage resulted in an electrical short circuit. This short circuit was expected to trip the associated fuse and cut the power supply to the LP fuel pump. As the HP fuel pump also shared the same fuse, it would also become isolated. This sequence of events would lead to engine fuel starvation.

Safety action

The operator identified that the loss of the LP fuel pump, triggering of the fuel pump fuse and the internal failure of the LP fuel pump were all design issues that could lead to engine fuel starvation.

As a consequence, the operator has implemented the following design improvements:

- A modification to the fuel tank such that if the LP pump fails, the HP pump is able to draw fuel into the header tank.
- The LP and HP fuel pumps are provided with separate electrical fuses.
- Use of an upgraded version of the LP fuel pump.

The operator advised that the CAA has been informed of the investigation details and the subsequent modifications.