ACCIDENT

Aircraft Type and Registration:	Piper PA 30, M-ALAN
No & Type of Engines:	2 Lycoming IO-320 piston engines
Year of Manufacture:	1969
Date & Time (UTC):	16 December 2009 at 1215 hrs
Location:	Morecambe Bay Gas Field, Irish Sea
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Aircraft destroyed
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	48 years
Commander's Flying Experience:	2,975 hours (of which 132 were on type) Last 90 days - 11 hours Last 28 days - 5 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and subsequent AAIB investigation

Synopsis

Approximately 38 nm south-east of Ronaldsway, at FL080, the pilot identified a "runaway" (overspeed) of the right engine. She shut down the engine and commenced a diversion to Blackpool Airport. Six minutes into the diversion the left engine also lost power. Despite conducting relevant cockpit procedures the pilot was unable to restore power. Unable to maintain level flight, and having calculated that Blackpool was too far away, she ditched the aircraft and was picked up by a rescue boat from a nearby rig support vessel.

History of the flight

The pilot stated that she planned to fly from Guernsey Airport, Channel Islands, to Ronaldsway Airport, Isle of Man. She donned an immersion suit and a life jacket before takeoff and had a life raft on board the aircraft.

During her pre-flight checks the aircraft's main tanks were filled to 28 US gallons each and an extra 3.5 US gallons was put in each of the auxiliary tanks; she calculated this would give her an endurance of 4 hours. The fuel in the tanks showed no sign of water contamination and each engine indicated 7 quarts of oil remaining. The aircraft took off at 1002 hrs after an uneventful start and power checks. After cruising initially at FL100 the aircraft descended to FL080 to remain clear of cloud north of Cardiff, Wales.

Approximately 38 nm south-east of Ronaldsway the right propeller began overspeeding (in excess of 2,800 rpm). Having attempted unsuccessfully to stabilise it by retarding the throttle and rpm levers, the pilot shut it down and commenced a diversion to Blackpool Airport, Lancashire.

Six minutes into the diversion, after the aircraft had descended to 4,000 ft amsl to enter VMC, the left engine lost power with the manifold pressure (MP) gauge indicating 17 inches. After completing cockpit procedures intended to restore power the MP remained at 17 inches, insufficient to maintain level flight. Calculating that the aircraft could glide a further 12 nm, with Blackpool 18 nm away, the pilot decided to ditch the aircraft near to some gas rigs (believing that rescue personnel were likely to be nearby) and communicated her intention to ATC. Spotting a rig support vessel, she advised ATC that she would ditch near to this instead; ATC responded that a rig helicopter was monitoring her. She prepared for the ditching by unlatching the door and placing her life raft and a 'grab bag' of essential supplies on the front seat. At approximately 100 ft amsl she shut down the left engine. She then maintained 80 kt until the aircraft was approximately 10 ft amsl, then 'hauled back on the control column' in order to touch down tail first. This caused the aircraft to "belly flop" onto the water.

After vacating the aircraft and inflating her life jacket the pilot climbed onto the wing and discovered that the life raft was already in the water. She swam to the life raft and inflated it but found that there were no steps or handholds to aid her boarding. Accordingly, she hung onto straps fitted to the outside of the life raft to await rescue. She was picked up shortly afterwards by a rescue boat from the rig support vessel.

The pilot was examined aboard the support vessel by medical personnel and found to be uninjured. She was subsequently airlifted to hospital in Blackpool and released that night.

Weather information

An aftercast for the Morecambe Bay Gas Field, obtained from the Met Office, indicated that at the time of the accident there was an area of high pressure centred to the south-east of Iceland and an area of low pressure centred to the east of Denmark. The weather at the accident site included cloud broken to overcast above 2,000 ft, with tops at 6,000 ft. The freezing level was approximately 3,000 ft, with a risk of moderate icing within the cloud. The temperature was between 5 and 7°C and the dew point between 3 to 5°C. The surface wind was from approximately 340° at 5 to 10 kt, locally up to 15 kt. Visibility ranged between 14 and 50 km. The estimated sea surface temperature was approximately 9°C and sea state slight, locally slight to moderate, equating to a wave height of between 0.6 m and 1.5 m.

Survival aids

The pilot commented that although she had conducted sea survival training when she was in the Royal Navy she had not practised using the type of life raft carried on this flight.

Description of aircraft

The Piper PA-30 Twin Comanche is a four-seat, low-wing, twin engine aeroplane of metal construction. The engines on the accident aircraft were fuel injected and fitted with feathering constant speed propellers. The propellers are fitted with start lock latches, which prevent the propeller moving to the feather position during normal shutdowns, to aid subsequent starting.

Fuel is contained within four integral fuel cells located in the leading edge sections of the wings. The main cell in each wing has a capacity of 28 US gallons of useable fuel and the auxiliary cell in each wing has capacity for a further 15 US gallons. Fuel is fed from the cells in each wing to a selector valve for the engine on that wing. It is also possible to cross-feed fuel from the fuel cells in one wing to the opposite engine. An electric auxiliary fuel pump was provided for each engine to back up each engine's mechanically driven fuel pump.

Examination of wreckage

The wreckage was not recovered for five months after the ditching and was therefore heavily contaminated by exposure to the sea and sea bed. The structure sustained damage during the ditching. It suffered further damage when it became caught in the nets of a fishing boat and subsequently during the recovery operation.

Approximately 6.5 US gallons of AVGAS were recovered from the right main tank. No other fuel was recovered but fuel supply lines from the left main and auxiliary tanks to the left selector were fractured.

The control positions of both engines were examined.

Right engine

The throttle, propeller and mixture control levers were all in the fully forward positions. This was likely to be as a result of engine detachment, during the recovery operation, pulling on the operating cables and thereby moving the levers. Both magneto switches were in the OFF position. The fuel booster pump switch was in the OFF position and the fuel selector lever was close to the OFF position; disruption of the fuselage floor between the selector lever and the selector valve most likely accounts for the misalignment. The propeller pitch was engaged in the start lock latches.

Left engine

The throttle, propeller and mixture controls were all in the fully aft position. Both magneto switches were in the ON position. The fuel booster pump switch was in the OFF position and the fuel selector lever was between the MAIN and AUX TANK positions. As with the right engine, this misalignment is most likely due to disruption of the fuselage floor in the area between selector lever and selector valve. The propeller was in the feather position.

No examination of flying controls or other systems was conducted as the pilot did not report any abnormalities with them.

Detailed examination

Right engine

The pilot reported that the propeller rpm ran away and oversped the engine. When she could not stabilise it, she shut the engine down. The examination therefore focussed on the propeller control governor and the propeller.

The propeller control governor was removed from the engine and taken to a specialist overhaul organisation for examination. It was not possible to conduct a function test of the governor due to the contamination but it was disassembled to check its mechanical condition. No mechanical anomalies were identified.

The right engine propeller was removed from the aircraft and taken to a specialist overhaul organisation for examination. The propeller was confirmed to have the start lock latches engaged and the pitch was measured as 12°, which is the value specified in the overhaul manual. The air charge pressure was under 10 psi compared to the 45-50 psi expected. The

propeller was function-checked through its normal range using compressed nitrogen. The propeller operated smoothly throughout the normal pitch range. The propeller operating mechanism was disassembled and no mechanical anomalies were identified.

Left engine

The pilot reported the left engine lost power to such a degree that level flight was no longer possible. She later feathered the propeller and shut down the engine in preparation for ditching. The examination of this engine concentrated on the mechanical condition of the engine and its fuel and ignition components.

The magnetos and fuel system components were removed for separate examination. The alternate air inlet door was in good condition and opened smoothly against its spring.

The engine was partially disassembled to allow inspection of the main internal components. No mechanical defects were identified and wear patterns were consistent with normal in-service expectations. The magnetos were disassembled and were found to have no mechanical defects. It was not possible to check their electrical condition due to the corrosive effects of the seawater.

The fuel system components were disassembled and found to be in good condition with normal wear patterns. The throttle servo valve fuel inlet filter was free of contamination.

Other information

The FAA promulgated information relating to induction icing problems associated with fuel injection systems in their General Aviation Airworthiness Alerts No 231, published October 1997. The publication states:

'The FAA continues to receive reports of induction icing problems associated with fuel injection systems having metering components on which impact ice may accumulate. (Reference Title 14 of the Code of Federal Regulations (14 CFR) part 23, section 23.1093(a)(5).) In some situations, the FAA has written airworthiness directives (AD's) on aircraft certificated to earlier regulations to require compliance with the intent of section 23.1093(a)(5). However, the reports of induction icing problems on some aircraft models, equipped with the type of fuel metering systems described above, are not numerous enough to justify design changes to meet the later regulations.

When in-flight engine induction icing problems are encountered on aircraft that do not meet the intent of section 23.1093, the pilot has no choice except to descend to warmer air. The cause of induction icing problems is often that the pin size impact tubes, which are upstream of the throttle plate, become obstructed with frozen water droplets that pass through the induction air filter. When these tubes become obstructed, fuel flow is rescheduled to idle fuel flow when the throttle plate is in the normal cruise or takeoff position.

Pilots, operators, and mechanics are encouraged to submit accurate, descriptive reports of induction icing problems on aircraft equipped with fuel injection systems having metering components on which impact ice may accumulate.'

Analysis

Engineering

Due to the extended period of submersion it was not possible to draw any firm conclusions about the fuel

quality or quantity on board. The aircraft was refuelled in Guernsey and no other aircraft using the facility have reported any problems with the fuel supplied. The pilot reports that sufficient fuel was uplifted for the flight and en-route checks did not indicate any leaks or excessive consumption.

Right engine

The pilot reported that she was unable to control the right engine propeller rpm. The positions of the right engine fuel selector and magnetos indicated that the right engine had been shut down as described by the pilot.

The symptoms described by the pilot were used to reference the troubleshooting section of the Propeller Owner's Manual. This indicated that a propeller overspeed condition could be caused by a sticking governor pilot valve or low air charge pressure. No mechanical anomalies were found with the governor or the propeller. The air charge pressure was low but it was not possible to prove whether or not the governor pilot valve had stuck.

The propeller was found engaged in the start lock latches which indicated the propeller rpm had decreased to below 800 rpm by the time the propeller pitch had reached this position. The low air charge pressure could lead to a failure to feather or feather slowly according to the troubleshooting section of the Propeller Owner's Manual.

Left engine

Examination of the left engine and its fuel and ignition components did not reveal any mechanical anomalies that would account for the loss of power. It was not possible to check the electrical condition of the magnetos but it is unlikely that both would suffer the same fault at the same time.

The left fuel selector and magnetos were found in positions typical of normal operation, but the throttle, mixture and propeller lever positions indicated the engine had been shutdown. As this engine was shutdown at a late stage in the flight and the pilot had achieved its desired configuration, she was probably concentrating on flying the aircraft on to the sea rather than completing the remaining selections.

The left propeller appeared to be working correctly as no problems were reported by the pilot and it was found in the feather position as selected.

Conclusion

The two engines appeared to have suffered different failures.

Due to the long period of immersion it was not possible to conclude any meaningful analysis of the fuel quantities or quality at the time of the accident.

Right engine

The pilot shut the right engine down after experiencing an uncontrollable propeller overspeed. This was possibly due to the low air charge pressure or a stuck governor pilot valve. No mechanical anomalies were found with the governor but it was not possible to prove whether or not the pilot valve had stuck and therefore it cannot be ruled out.

Left engine

No mechanical reason could be found for failure of the left engine to produce sufficient power for level flight. It is possible that ice formed on the impact tubes of the throttle servo valve and this reduced fuel flow to the engine and thereby limited power regardless of the throttle position.

Survival equipment training

The commander stated that she had performed sea survival training while in the Royal Navy but had not practised using the type of life raft carried on the aircraft. Had she done so she might have known that the life raft had no straps or steps to aid her boarding, and would also have been able to practise boarding it in a controlled environment. Unable to board the life raft, her survival time would have been greatly reduced without expeditious rescue.