

Piper PA-30 Twin Comanche, G-ASMA

AAIB Bulletin No: 4/2003	Ref: EW/C2002/03/09	Category: 1.3
Aircraft Type and Registration:	Piper PA-30 Twin Comanche, G-ASMA	
No & Type of Engines:	2 Lycoming LIO-320-C1A piston engines	
Year of Manufacture:	1963	
Date & Time (UTC):	8 March 2002 at 1657 hrs	
Location:	One mile from Wolverhampton Business Airport	
Type of Flight:	Proving flight	
Persons on Board:	Crew - 2	Passengers - Nil
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Damage to left wing, main landing gear and propeller	
Commander's Licence:	Private Pilots Licence	
Commander's Age:	54 years	
Commander's Flying Experience:	761 hours (of which 1 hour was on type)	
	Last 90 days - 15 hours	
	Last 28 days - 1 hour	
Information Source:	AAIB Field investigation	

Background

The aircraft was positioned to Wolverhampton Airport in November 2001 where it was parked in an unheated hanger and offered for sale. The handling pilot on the accident flight had examined the aircraft with a view to purchasing it and had agreed the terms of sale with its owner. As part of the purchase preparation, the prospective new owner arranged for a handling check flight with a locally based instructor. This flight would be the first for the aircraft since it was flown to the airport in November, more than three months previously.

History of flight

Following a comprehensive pre-flight inspection by the prospective owner, which included a thorough fuel drain check, the aircraft was taxied to the refuelling pumps where 103 litres per side were uplifted; 75 litres per side into the main tanks and 28 litres per side into the auxiliary tanks. G-ASMA was the eighteenth aircraft to be replenished with Avgas that day and there had been no bulk fuel deliveries. After refuelling, the aircraft was taxied to the runway holding point where

power and pre-departure checks were carried out. Both engines performed satisfactorily, including the idle check. The fuel selectors were set to the MAIN tank positions where they remained for the duration of the flight. After a normal take-off and climb the aircraft was levelled at about 3,000 feet altitude where the prospective owner carried out some gentle handling exercises. These exercises took place over a period of about 30 minutes and both pilots noted how 'smooth' the engines were. Following the handling exercises, the aircraft was flown back towards the departure airfield to join the circuit and land.

On joining the downwind leg, the instructor noticed that the sound from the propellers indicated that they had gone out of synchronisation. Thinking that the prospective owner, who was the handling pilot, had moved the power levers disproportionately, the instructor moved them both forward but there appeared to be no response from the right engine. The prospective owner stated that the right engine had totally lost power by the end of the downwind leg and that at that time, the engine power levers were not at their fully retarded (idle) positions. Moreover, the right propeller control lever was not selected to feather.

The instructor assisted the handling pilot to turn the aircraft onto the final approach. The landing gear was selected DOWN when the aircraft was at approximately 500 feet, but the green DOWN AND LOCKED indicator light in the cockpit did not illuminate. A request for the Tower to observe if the landing gear was down was considered but the RTF frequency was in use by another aircraft. The landing gear was cycled twice but on neither occasion did the green DOWN AND LOCKED light illuminate. The landing gear lever was left in the DOWN position. By this time the instructor had taken control of the aircraft and, at a height of about 300 feet, pushed everything forward to initiate a go-around. The left engine appeared to respond fully but the aircraft did not climb or maintain height. Because there was not enough runway distance remaining in which to land, the instructor initiated a left turn and landed in a nearby ploughed field. Towards the end of the landing roll, the instructor turned the aircraft sharply to the left to avoid colliding with a hedgerow; during this manoeuvre the left landing gear collapsed.

Engineering examination

Following the recovery of the aircraft to the departure airfield, an engineering examination was carried out.

Examination of the main landing gear indicated that it was in the DOWN AND LOCKED position at the time of the initial landing in the field but the bulb that illuminated the single green DOWN AND LOCKED indicator light in the cockpit had failed.

A detailed external examination of the right engine and its fuel system found no obvious fault that would explain the failure of that engine. The right propeller blades were undamaged and found to be in the flight fine position whereas the left propeller blades had tip damage consistent with low engine power. Both main fuel tanks were found to contain a reasonable quantity of fuel.

Both engines were started and engine ground runs carried out. The left engine performed satisfactorily. Initially the right engine would not start and it was observed that the right fuel pressure gauge did not show any indication of pressure although the electric boost pump could be heard working. The fuel line to the engine was disconnected at the engine fuel pump inlet and the line bled by switching on the electric boost pump. It was found that approximately 100 millilitres of water came out of the pipe ahead of some air and fuel. The fuel line was reconnected and the

engine was started successfully. Engine runs were subsequently carried out and the right engine performed satisfactorily except that it stopped each time the throttle lever was fully retarded.

Other information

The owner of the aircraft stated that the right engine would not idle on the ground but that there had never been a problem in the air. He also stated that the aircraft would not maintain height on one engine if the airspeed were allowed to go below the blue line speed (the optimum for single-engined climb performance).

The prospective owner stated that he carried out a thorough fuel drain check two days prior to the accident flight in addition to the fuel drain check on the day. On each occasion he collected the drained fuel in a container and examined it for contamination but none was observed.

The fuel tanks in the PA 30 aircraft are flexible bladders located within the wings. When left for an extended period of time with low fuel contents, these bladder tanks can distort and wrinkle leading to the development of valley and ridge features. These valley and ridge features have been known to collect water and prevent it from running off to the fuel tank drain point. Internal examination of G-ASMAs fuel tanks revealed extensive chordwise wrinkling which had formed numerous valley and ridge features.

It is understood by AAIB that there have been previous cases of in-flight engine failures to Piper PA-30 aircraft that were thought to have been caused by water contamination. In May 2001 a Piper PA-30, registration G-ASRH, had an engine failure in-flight approximately 35 minutes after departure which was followed, approximately 3 minutes later, by the second engine failing. This resulted in the aircraft ditching into the Irish Sea (AAIB Bulletin No 1/2002). The aircraft's previous flight had been in June 1997, some 47 months prior to the accident flight. Before the accident flight the fuel lines and filters had been purged, fuel drain checks had been carried out and engine ground runs performed. One possible cause for this accident may have been water contamination of the fuel because of distortion and wrinkling of the flexible bladder fuel tanks. The aircraft was not recovered and therefore no determination of the condition of the bladder tanks could be made.

In August 1978 the aircraft manufacturer issued Service Letter No.851, Part B, which applied to PA-30 and PA-39 aircraft. It described the fuel system draining procedure to minimise water contamination. Paragraph 1 of the procedure states

The cells should be kept full of fuel during storage and the aircraft refuelled as soon as possible after each flight to prevent accumulation of moisture and deterioration of the cells.

The accompanying documentation recommended that Part B of the Service Letter be detached and included with the aircraft operating paperwork.

Recommended safety action

The risk of water retention within the PA 30 Twin Comanches fuel tanks due to deformation of the bladder tanks could be reduced if owners and operators recognised the risks of parking the aircraft with low fuel contents as indicated in Piper Service Letter No 851. Furthermore, other aircraft types also have bladder fuel tanks. Therefore, the following safety recommendations were made:

Safety Recommendation 2003-10

It is recommended to the New Piper Aircraft Corporation that Part B of Service Letter No 851 should be re-issued to include a warning of the possibility of bladder tank distortion and the consequent retention of water in the bladder tanks when aircraft are parked for extended periods of time with part-filled fuel tanks.

Safety Recommendation 2003-11

It is recommended to the Civil Aviation Authority that an article be published warning owners and operators of all aircraft that have flexible bladder fuel tanks of the potential problems associated with parking aircraft for extended periods of time with part-filled fuel tanks.