

ACCIDENT

Aircraft Type and Registration:	Piper PA-28-161 Cherokee Warrior II, G-BODR	
No & type of Engines:	1 Lycoming O-320-D3G piston engine	
Year of Manufacture:	1979	
Date & Time (UTC):	2 August 2006 at 1330 hrs	
Location:	A field south of Wycombe Air Park, Buckinghamshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Damage to the landing gear and left wing	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	59 years	
Commander's Flying Experience:	19,840 hours (of which 175 were on type) Last 90 days - 227 hours Last 28 days - 93 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and a report by a locally-based licensed engineer	

Synopsis

During the climb out following a touch-and-go landing, after a cross-country flight, the engine rapidly lost power and subsequently stopped. A forced landing in a field was carried out during which the landing gear and left wing were damaged. Subsequent examination revealed that there were 50 litres of fuel in the left fuel tank but only 150 millilitres in the right tank.

History of the flight

On the day of the accident the pilot planned to fly from Wycombe to the Isle of Wight and return without landing. The expected flight time was to be approximately 1 hour and 20 minutes. During the initial internal checks the pilot noted that the fuel gauge for the left tank was

registering approximately 17 gall US (64.6 litres) and the gauge for the right tank between $\frac{3}{4}$ and full (67 to 90 litres). He completed the pre-flight aircraft checks, including a visual check of the contents of both fuel tanks. The left tank contained fuel to the tab indicator. The right tank contained fuel to a level very slightly below the tab indicator. The technical log/authorisation sheet indicated that the aircraft held a total of 97 litres of fuel. The Pilot's Operating Handbook states that the aircraft's total usable fuel capacity is 180 litres divided equally between the left and right tanks.

The pilot started up using the right tank, which appeared to contain the lesser amount of fuel. Prior to changing

to the left tank he had to return to the aircraft dispersal to change a defective headset, entailing some delay. For engine power checks, takeoff and departure the pilot had the left tank selected in accordance with the checklist. The aircraft departed Wycombe at 1205 hrs, airborne time. When approximately abeam Farnborough, about 10 to 15 minutes after takeoff, he changed from the left to the right tank, which he intended to use until the approach check when returning to Wycombe. During the flight the pilot deviated from his planned track around Lasham to avoid gliding activity in that area, climbed to 4,000 ft to transit over the Solent and carried out an orbit around Hurst Castle. The aircraft performed normally except that, towards the end of the return leg to Wycombe, the pilot noticed a tendency for it to roll slightly to the left. He adjusted the rudder trim and checked the fuel gauges for a possible reason, but both tanks showed roughly equal quantities, around 15 gall US (57 litres).

Shortly afterwards, and just prior to entering the Wycombe ATZ, the pilot carried out a fuel, radio, engine, direction indicator, altimeter (FREDA) check and noted that both fuel tanks were indicating approximately 15 gall US (57 litres). The flight time prior to this point was approximately 1 hour and 10 minutes. The pilot joined the circuit directly onto the downwind leg for Runway 24 and completed the 'downwind' checks. The fuel gauge readings appeared similar to those observed in the FREDA check. At the end of the downwind leg he elected to carry out a touch-and-go instead of a full-stop landing. The extra circuit and landing were to be for handling practice. The touch-and-go landing was uneventful and the aircraft was climbed towards circuit height following the noise abatement procedure.

At approximately 100 to 200 feet (just after retraction of 'drag' flap) the engine rapidly lost power, at which point the pilot lowered the aircraft's nose and altered

course by approximately 60° to the left and headed towards a field. During the brief approach to this field he carried out visual engine failure checks which did not determine a cause for the failure. He notified the control tower that the aircraft had suffered an 'engine failure' and positioned the aircraft for a landing. At about 100 ft agl the engine power was momentarily restored but then failed again. This power surge provided the pilot with the opportunity to reselect a slightly better landing area beyond the original aiming point. There was insufficient height or time for further trouble-shooting so he committed to a landing, closed the throttle and touched down in the selected field on a heading of about 070°. During the landing roll, despite maximum braking, it appeared that the aircraft was not going to stop before contacting the far hedge and tree-line, so rudder and differential braking were used to yaw the aircraft to the left. The aircraft came to a halt at approximately 1320 hrs, about 15 to 20 m from the hedge and on a heading of around 360°. The time from when the right tank was selected until the accident was approximately 1 hour and 15 minutes.

Engineering examination

A locally-based licensed aircraft engineer attended the aircraft some 30 minutes after the event. On inspection there was no fuel visible in the right tank but the left tank was showing slightly below the tab (the tab indicates approximately 64 litres out of a total usable capacity of 90 litres). There were no signs of any fuel leakages from either tank or their drain valves. On checking the engine, there were no signs of any leaks and the engine turned over freely.

On entering the aircraft, the fuel, magneto and battery master switches were all found switched off although all the other electrical services switches were selected on. On selecting the battery master switch ON there

was no indicated fuel pressure (normally on this aircraft type there is fuel pressure indicated on the gauge for a considerable time after the engine is switched off). The left fuel gauge indicated approximately half full (12 gall US/45.6 litres), whilst the right fuel gauge indicated about 2 gall US/7.6 litres. With the fuel selected to the right tank and the electric fuel pump switched on the fuel failed to prime (rapid ‘clicking’ heard) and the fuel pressure gauge needle did not move. On selecting the left tank the fuel pump primed (‘clicking’ slowed) and the fuel pressure gauge indicated 4 psi, which is normal.

Having ascertained that the undercarriage was not in danger of collapsing, the engine was started with the left fuel tank selected and it started and ran normally. A full-power engine run was carried out and all indications were normal. The results of magneto and carburettor heat checks were found to be normal. The right fuel tank was then selected with the engine speed set at 1,500 rpm. After 65 seconds the fuel pressure smoothly dropped to zero and 15 seconds later the engine stopped and would not restart. On selecting the left fuel tank the electric fuel pump was used to reprime the fuel system and the engine started and ran normally again.

Prior to recovery of the aircraft from the accident site, approximately 50 litres of Avgas was drained from the left tank and 150 millilitres drained from the right tank (both through their respective drain valves). The Pilot’s Operating Handbook states that the unusable fuel in critical flight attitudes is 1 gall US (3.8 litres); the Maintenance Manual gives an unusable quantity of 0.125 gall US (0.47 litres) per tank.

Analysis

The pilot gave a very full and frank account of the circumstances of this accident and made the following assessment of why it occurred:

“The primary cause was my failure to select to the left tank during the FREDAs and the downwind checks when returning to the Wycombe airfield.

The secondary causes were:-

- 1. Possible visual overestimation of fuel quantity in right tank.*
- 2. Optimistic right fuel gauge.*
- 3. Increased fuel burn due to:*
 - a. Long taxi time due to change of a defective headset,*
 - b. Diversion around Lasham due to gliders,*
 - c. Climb to 4000 ft over the Solent,*
 - d. An orbit over Hurst Castle*

I had estimated that there should have been 15 minutes endurance remaining in the right tank when I returned to Wycombe airfield. The above factors had reduced this to just a few minutes.

I have tried to understand why I failed to change back to the left tank, as I had planned to do so, on the return leg. After leaving the Farnborough MATZ there were a number of distracting factors:

Radio frequency change from Farnborough to Wycombe, with associated RT calls.

Descent due to LHR TMA ahead.

Moderate turbulence.

The attempted diagnosis of increasing roll tendency.

I believe that my observation of equal (and sufficient) fuel quantities, at this point, persuaded me to leave the fuel selection as it was for the remaining 10 minutes of the flight.

I believe now that I should have been more pessimistic in my fuel calculation in view of the factors in (3) above and certainly not have attempted an extra unplanned circuit, without reconfiguring the fuel system.”