

## Piper PA-34-220T Seneca III, G-LENY

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| <b>AAIB Bulletin No: 1/2004</b>        | <b>Ref: EW/G2003/10/04</b>   | <b>Category: 1.3</b> |
| <b>INCIDENT</b>                        |  |                      |
| <b>Aircraft Type and Registration:</b> | Piper PA-34-220T Seneca III, G-LENY  |                      |
| <b>No &amp; Type of Engines:</b>       | 2 Continental TSIO-360-KB piston engines   |                      |
| <b>Year of Manufacture:</b>            | 1982   |                      |
| <b>Date &amp; Time (UTC):</b>          | 4 October 2003 at 0900 hrs   |                      |
| <b>Location:</b>                       | Over the English Channel   |                      |
| <b>Type of Flight:</b>                 | Public Transport (Passenger)   |                      |
| <b>Persons on Board:</b>               | Crew - 1   | Passengers - 5       |
| <b>Injuries:</b>                       | Crew - None  | Passengers - None    |
| <b>Nature of Damage:</b>               | None   |                      |
| <b>Commander's Licence:</b>            | Commercial Pilot's Licence   |                      |
| <b>Commander's Age:</b>                | 28 years   |                      |
| <b>Commander's Flying Experience:</b>  | 823 hours<br>(of which 106 were on type)   |                      |
|  | Last 90 days - 140 hours   |                      |
|  | Last 28 days - 63 hours  |                      |
| <b>Information Source:</b>             | Aircraft Accident Report Form submitted by the Commander plus report from the operator's Chief Pilot |                      |

### History of the Flight

The aircraft was scheduled to fly from Oxford to Toussus le Noble in France with five passengers. The day before the incident, in accordance with the operations manual, the commander calculated the fuel required for the flight as 242 litres (63.7 Gall US). A facsimile message (fax) was sent to the refuelling organisation the evening before the flight, requesting replenishment with 100 litres of fuel, which should have given a total fuel onboard the aircraft of 278 litres (73.2 Gall US). However, the fax machine at the refuelling point had run out of toner. The fax request did not print with the result that the refuelling organisation was unaware that the aircraft required refuelling and it was not refuelled.

On the morning of the incident, the commander carried out the Check A and pre-flight inspection, which included a visual check inside the fuel tanks and confirmation that the fuel gauges were indicating the correct amount of fuel. The commander could not see any fuel in the tanks but given the reduced amount to be carried, she was not concerned. The fuel gauges indicated approximately 30 Gall US in the left-hand tank and 15 Gall US in the right-hand tank. The commander should have

expected to see indications of about 36 Gall US in each tank but she doubted the accuracy of light aircraft fuel gauges.

The aircraft departed Oxford at 0810 hrs and climbed to a cruising altitude of 3,000 feet for the VFR transit. The weather for the flight was wind from 330° at 10 kt with visibility in excess of 10 km and broken cloud at 3,500 feet. After approximately one hour's flying the right hand engine lost power and began to run roughly. The commander saw that the right hand tank fuel gauge indicated empty and that there was zero fuel pressure indicated to the right hand engine; the left fuel tank indicated 10 Gall US. The commander decided to shut down and feather the right hand engine and divert to the nearest suitable airfield. She advised ATC of the problem and diverted to Dieppe where the aircraft made a safe single-engined landing.

The commander disembarked the passengers and contacted the company for assistance. Fuel was cross fed to the right hand tank and a series of engine runs and power checks carried out on the right hand engine to confirm that fuel starvation and not a mechanical problem was the cause of the rough running. Having completed the checks, the maintenance organisation authorised the flight to continue to the destination. The aircraft was refuelled, passengers boarded and an uneventful transit to Toussus le Noble completed.

### **Seneca III Fuel System**

The Seneca III has two main fuel tanks, one in each wing, with a total fuel capacity of 371 litres (98 Gall US). The aircraft's wings have significant dihedral and the filler cap for each fuel tank is, of necessity, at the outboard end of the tank. Consequently, if the tanks are less than about 75% full it is not possible to 'dip the tanks' or see fuel when removing the filler cap to inspect a tank's contents. However, the maximum tolerated discrepancy in fuel gauge accuracy within the lower half of each fuel gauge was 1 Gall US.

### **G-LENY fuel consumption history**

Following its return to Oxford, the accuracy of G-LENY's fuel gauges was tested and found to be satisfactory. The aircraft had not been refuelled to full tanks at any time during the 11 hours of flight that preceded the incident flight. During that time, the right-hand engine, which was approaching its TBO (Time Before Overhaul) was using slightly more fuel than the left-hand engine. This led to a significant and cumulative fuel imbalance which was not corrected by any of the pilots who flew the aircraft during the 11 previous flight hours.

### **Analysis**

The commander had correctly calculated and requested the fuel required in order to complete the flight to the intended destination but the aircraft had not been refuelled to achieve that state.

The fuel quantity on board the aircraft was as indicated on the aircraft fuel gauges but the commander was not concerned when unable to see fuel in the tanks during the visual check since the fuel load she expected was about 75% of maximum. She assumed that the fuel tanks had been replenished and her personal doubts about the reliability of 'light aircraft' fuel gauges led her to believe that the fuel gauges were not indicating accurately. This belief was reinforced by the imbalance between the two tanks.

When the right engine was shut down, the aircraft was mid-channel and the commander believed a greater range was available on one engine so, to ensure adequate range was available to reach Dieppe, she did not cross-feed fuel from the left tank to the right engine.

## **Conclusion**

The incident occurred because there was insufficient fuel onboard to complete the flight because the aircraft had not been refuelled. The lack of fuel visible in the tank and the fuel gauge readings did not alert the commander to the situation due to her mistaken belief that the fuel gauges on G-LENY were unreliable. It was fortunate that the imbalance of fuel between the left and right hand tanks exposed the problem when sufficient fuel remained in the left tank for the aircraft to land at the diversion airfield.

## **Safety action**

The operator has reviewed the company operating procedures for refuelling and fuel management in flight. The commander was given additional training and the refuelling organisation now indicates on the fuel order form how much fuel has been loaded into each tank once the refuel has been completed.