Calls made for easier ways to check fuel contents after trainer crashes due to engine running out of fuel

THE training flight was planned as a circuit detail using Runway 32 and the student carried out the pre-flight inspection. The fuel gauge indicated full. The student was briefed for a short field take-off and once airborne started a left hand circuit. As the aircraft positioned downwind the pre-landing checks were completed but the engine lost power. The instructor immediately checked the mixture control, took control of the aircraft and transmitted a Mayday call.

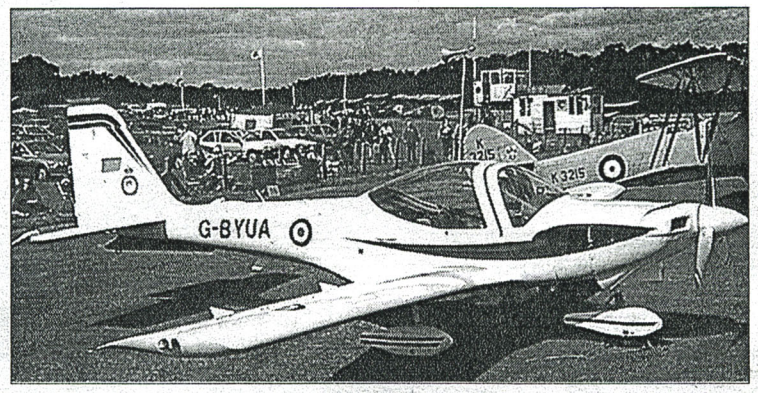
He considered a left turn to land back on Runway 09 but the risk of hitting nearby pylons and power cables was too high so he selected a golf course fairway, told the tower, selected full flap, switched off the battery master switch and completed all the emergency checklist items.

As the aircraft landed he braked heavily but was unable to prevent it striking a grass bank around the green. The nose gear failed on impact and the aircraft skidded to a halt. Both occupants vacated the aircraft without injury.

Personnel from the maintenance organisation arrived on the scene and found that the fuel tank was empty: however, when the battery master was switched on the gauge indicated full.

The annual inspection for the aircraft had been completed that day. This did not involve any work on the fuel indicating system, but the fuel tank had been removed to provide access. Once the inspection had been completed the aircraft was refuelled with about 30 litres of fuel. The engineer recalls checking that there was an indication on the fuel gauge, but he did not register that the full fuel indication on the gauge did not agree with the amount he had put in the tank. A 20 minute engine ground run was then performed.

When the aircraft was returned to service the instructor did a thorough external check and, because he knew the fuel tank had been removed and subsequently replaced, took a large sample of fuel by operating the drain. He also noted that the fuel contents gauge indicated full. He then flew the aircraft in the circuit for an hour and reported that the fuel gauge was not stuck and had responded to gusts. On landing he reported that the gauge indicated 'nearly full'.



This contemporary Grob is in service with one of the University Air Squadrons and has fuel tanks in its wings, unlike the Grob 115 subject of this accident report. The accuracy, or otherwise, of light aircraft fuel gauges and the difficult-to-check positioning of some types of aircraft fuel tanks is the subject of constant debate

The aluminium fuel tank has a capacity of 100 litres and is aft of the seats and beneath the the baggage compartment floor. Because of its location the fuel contents cannot be checked visually. The level of fuel in the tank is sensed by a plastic float, housed in an immersion tube, which is connected to a resistance wire sensor that transmits an electrical signal proportional to fuel quantity, which is displayed on a gauge on the instrument panel. Operating experience has shown that this gauging system is historically very reliable.

The maintenance organisation carried out an investigation into the fuel indicating system following the accident and no faults were found. It was concluded therefore that the 'full' indication was probably caused by the fuel tank transmitter float having stuck at the full position.

There is a manufacturer's option to fit a visual sight gauge to the aircraft. This adds a clear tube alongside the tank. A clear panel is installed into the side of the fuselage adjacent to the tank to allow the pilot to view the fuel level in the tube. This early model of Grob115 was type certificated in 1985 by the LBA in Germany, and accepted by the CAA under Airworthiness Approval Note No 20405. Later models of Grob 115, namely the G115D2, are fitted with wing tanks where it is possible to visually check the fuel.

It was concluded that the engine failed due to lack of fuel. Several opportunities existed however for the fuel gauge inaccuracy to be noticed:

1 The fuel tank had been removed during maintenance and the engineer, when refitting the tank, had not noticed that the full indication was inconsistent with the amount of fuel he had added.

2 Two instructors had accepted the 'full' indication on the fuel gauge as being correct and it was apparent that it was not common practice for pilots to reconcile the aircraft's previous flight times and fuel burn against fuel remaining and fuel uplift.

The flying club had operated two Grob 115 aircraft for 12 years and the fuel gauging system had always been reliable. With no visual means of checking the fuel quantity they therefore had to rely solely on the fuel gauge to assess fuel quantity.

The aircraft is not normally refuelled to full because, with two occupants of medium or large build, the maximum take-off weight could be exceeded. This time, both the instructor and student were lightly built and therefore could have accepted the aircraft with a full tank.

Around 100 examples of the aircraft with this fuel tank configuration have been manufactured. The manufacturer has no record of fuel gauging failures. In Australia however, there have been reports from operators of eight of the type of unreliable indications caused by corrosion.

The CAA recognises that fuel gauges fitted to light aircraft can sometimes be unreliable and publishes advice to private pilots. The CAA General Aviation Safety Sense Leaflet 1C *'Good Airmanship Guide'* emphasises that pilots should determine visually that there is enough fuel of the right typ and, if necessary, a dip-stick should be used to check fuel levels.

However, in this model of aircraft it is not possible to visually check the fuel. Furthermore, because the fuel tank is located below and forward of the filler cap, it is not possible to 'dip' the tank.

The exact amount of fuel can only be confirmed when the tank is overfilled, allowing fuel to spill out.

In the General Aviation Safety Information Leaflet Issue 5 of 2000 owners and operators were reminded of the unreliability of many light aircraft fuel gauges and advised to regularly refuel to a level which can be visually checked.

On this aircraft the only indication available was that displayed on the fuel gauge, which on this occasion was inaccurate. Furthermore, no fuel reconciliation procedure was in place.

Recommendation 2002-10

It is therefore recommended that the Design Authority in Germany, with the help of the aircraft manufacturer, Grob Werke, reviews the reliability of the fuel gauging system on the Grob G115, G115A and G115B and considers mandating the installation of an additional way for the fuel quantity to be checked.

Recommendation 2002-11

It is further recommended that the CAA encourages flying clubs to have an effective procedure for pilots to reconcile aircraft fuel state against fuel used and fuel uplifted to act as a back-up procedure to cater for the possibility of unreliable aircraft fuel gauge(s).

International Flight Training News

Head Office and Editorial:
Naunton Pugh, Editor,
Middle Paddock, King Street,
Over, Cambridge CB4 5PS, England.
Freephone: 0800 783 1061
Fax: 01954 231833
Email: iftn@aol.com
Website: www.iftnews.co.uk

Advertising Manager:
Brian Garside
Telephone 01954 202338
Fax: 01954 202674
Email: briangarside@aol.com

IFTN Website Manager & Sales:
Bruce Dixon
Telephone 01480 213249