

No: 5/89

Ref: EW/G88/12/04

Category: 1c

**Aircraft Type
and Registration:**

Piper PA28-161 Warrior, G-BPBM

No & Type of Engines:

1 Lycoming O-320-D3G

Year of Manufacture:

1979

Date and Time (UTC):

11 December 1988 at 1400 hours

Location:

Sandtoft Airfield, Lincs.

Type of Flight:

Private

Persons on Board:

Crew - 2

Passengers - 1

Injuries:

Crew - None

Passengers - None

Nature of Damage:

Landing gear, right wing, propeller and engine

Commander's Licence:

Private Pilot's Licence with IMC, Night and Full Instructor's rating

Commander's Age:

63 years

**Commander's Total
Flying Experience:**

7,934 hours (of which 6 hours were on type)

Information Source:

Aircraft Accident Report Form submitted by the pilot and AAIB telephone inquiries.

The Commander, a Qualified Flying Instructor, was conducting a Dual Check on the handling pilot, the holder of a Private Pilot's Licence. After external and internal checks and a power check had been conducted, the aircraft took off on Runway 23 at Sandtoft Airfield with the wind from 270° at 10 kt. Runway 23 is 799 m long. At about 50 - 100 ft agl during the initial climb the aircraft suffered total engine power loss. The Commander, seated on the right, took control. On lowering the aircraft's nose from the climb attitude the engine surged to full power but lost all power output again about 4 seconds later.

With a road and trees at the upwind end of the runway, the aircraft was turned right and landed about 100 m from the edge of the runway in a ploughed field, the only area available for a forced landing. The surface of the field was soft and, after touching down in a tail-down attitude, the main wheels dug in, followed by the nose wheel. The nose landing gear collapsed, allowing the propeller to strike the ground, and the right main wheel sank in, causing the right wing tip to contact the ground, bending the wing back.

The occupants were wearing harness with diagonal upper torso restraint. They were uninjured with the exception of bruising to the front right seat occupant, and all were able to evacuate rapidly without difficulty.

Inspection after the accident found that the fuel tanks were approximately $\frac{3}{4}$ full and that the electric fuel pump delivered fuel satisfactorily to the carburettor. It was also found that the engine had suffered no major pre-accident mechanical distress. However, it was reportedly noted during recovery of the aircraft that fuel was flowing from the fuel filter drain valve. This was a Curtiss type valve, (Fig 1) which is opened by manually pushing a plunger off its seat by means of a cross-bar and closed by spring pressure. The cross-bar travels in an L shaped slot in the valve body, which allows the plunger to be locked in the valve-open position.

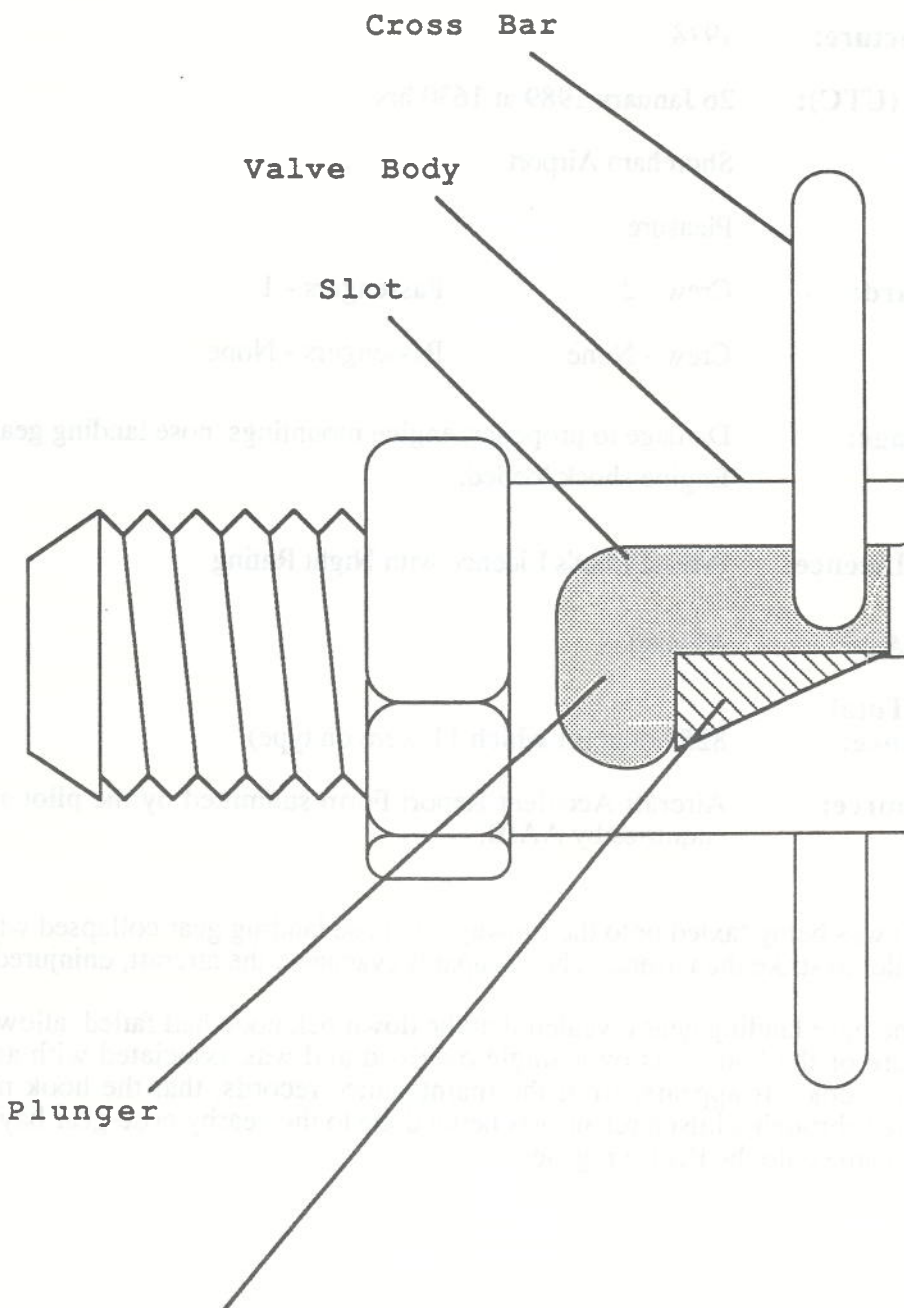
The filter drain valve had been operated momentarily during pre-flight checks, in accordance with normal practice, to drain any water that might have collected in the filter. The evidence indicated that the drain valve had inadvertently been left locked open after this check, but that this had not been apparent because the fuel cock had been off and this had caused drainage to cease after a short time. Reportedly some initial fuel drainage from the filter may occur when the drain valve is opened even with the fuel cock off. Previous experience indicates that, after opening the fuel cock, the pressure loss associated with an open filter drain valve can be insufficient to prevent fuel from reaching the carburettor and feeding the engine normally until the pressure at the filter inlet is reduced somewhat by take-off and climb accelerations. Thus the engine can start and run, apparently normally, with the drain valve open but can experience starvation of fuel supply to the carburettor during take-off and climb.

Two such cases concerning PA28-161 aircraft are described in General Aviation Safety Information Leaflet (GASIL) 12/88 published by the CAA. In one case, during climb-out, "At 150 ft, the engine RPM dropped to idle, but on lowering the nose engine power returned immediately. On every occasion that the nose was raised, the engine power ceased only to return again when the nose was lowered. Upon examination, it was found that the strainer bowl fuel drain at the cowling had remained locked in the open position."

The CAA commented in the GASIL that it had recommended, on numerous occasions, the removal of the locking feature on the Curtiss fuel cock, and reproduced CSE Service Bulletin 6/75 of Oct 1975 which accomplishes this by filing off of the shoulders on the valve body forming the angle of the L-shaped slot. (Fig 1) The Bulletin lists the models affected as All Piper Single and Twin Aircraft, and recommends compliance within the next 50 hours of operation or at the next inspection whichever occurs first. It was also noted, however, that the second case described in the GASIL related to a modified drain valve which had stuck open due to a fault.

AAIB has recommended that the CAA requires the deletion of the drain valve locking feature on British registered aircraft that can be affected in the above way should the valve inadvertently be left open.

SCHEMATIC OF CURTISS DRAIN VALVE



Shaded area of slot for filing off in accordance with CSE Service Bulletin 6/75 (schematic only)

FIG 1