No: 2/90 **Ref: EW/G89/11/02** **Category: 1c**

Aircraft Type and Registration:	Piper PA-28-180, G-BHFL
No & Type of Engines:	1 Lycoming O-360-A4A piston engine
Year of Manufacture:	1973
Date and Time (UTC):	1 November 1989 at 1134 hrs
Location:	Coventry Airport
Type of Flight:	Training
Persons on Board:	Crew - 2 Passengers - None
Injuries:	Crew - 2 (minor) Passengers - N/A
Nature of Damage:	Aircraft destroyed
Commander's Licence:	Private Pilot's Licence with Full Instructor Rating
Commander's Age:	38 years
Commander's Total Flying Experience:	691 hours (of which 115 were on type)
Information Source:	Aircraft Accident Report Form submitted by the pilot, followed by examination of salvaged wreckage by AAIB Engineering Inspector and discussions with pilot, Air Traffic Controller and other witnesses.

The aircraft had just been re-fuelled and was due to be used on a dual instructional cross-country flight. The instructor reported that the student carried out the pre-flight inspection of the aircraft whilst he, the instructor, checked her flight planning, before joining her for the cockpit checks.

During subsequent taxying the control-tower received a telephone call, relaying a message from an observer on the airfield stating that the aircraft was releasing fuel. The tower controller accordingly notified the aircraft's occupants, and the instructor was seen to leave the aircraft and carry out an external examination. He subsequently reported that before doing so he had asked the student to hold the aircraft against the brakes with approximately 2,000 RPM selected and the electric fuel boost pump on. During his inspection he noted a small amount of fuel flowing from the vent pipe of one of the fuel tanks, a normal occurrence on a PA28 which has just been refuelled.

The instructor then re-entered the aircraft and the power checks were carried out. These were normal, revealing no problems. After entering the runway and backtracking, the aircraft was lined up to await take-off clearance. Once this was granted the take-off was normal until a height of approximately 70 ft was reached whereupon there was a total loss of power from the engine.

The instructor lowered the nose, checked that the mixture was rich, the fuel pump was on, and the throttle was open, and headed for the only area of open ground available. Unfortunately this was far too small to enable the aircraft to be brought to a halt.

As the aircraft touched down, the engine burst into life. The instructor quickly closed the throttle and selected mixture fully lean, then steered the aircraft so that the fuselage passed between trees which bordered the small open area in which the landing took place. This resulted in both wings separating at their roots by contact with the trees and the tailplane also being demolished. The fuselage came to rest on its side in a ditch, creating difficulties in escape for the occupants who nonetheless believe that they succeeded in vacating the aircraft quickly.

The wreckage of the aircraft was examined by AAIB some time after it was salvaged. Although little damage had occurred to the underside of the engine cowling, the strainer drain valve assembly under the gascolator on the left side of the cowling was bent as a result of an impact. The spring-loaded valve was found to be latched and trapped in the open position. It was not possible to determine whether this position was a feature of the impact or preceded it.

The person who telephoned the tower later stated that he had not seen the aircraft closely but had relayed information supplied to him by another person who had commented that fuel was flowing from below the engine cowling. When contacted the original observer confirmed that this was correct.

The fuel strainer drain on the PA 28 aircraft is of a size which can produce a large, readily visible flow when open (whereas the fuel tank vent pipe is of less than half the internal diameter and any flow of fuel from there is only visible on close examination). If however, the strainer drain valve is operated with the fuel selector switched off the flow is small and rapidly stops even if the drain valve remains in the open position. The fuel system is such that with the drain valve latched open, the fuel selected on and the engine running at low power, fuel will flow freely out of the drain valve. At higher power settings with the boost pump on, the flow overboard will cease although the engine will continue to run for a considerable period. It is known, however, that under conditions of take-off power and climb attitude the carburettor float chamber fuel level will fall as air is drawn in through the open drain valve. Unfortunately this does not normally become evident until the aircraft is established in the climb, when the engine suddenly loses power.

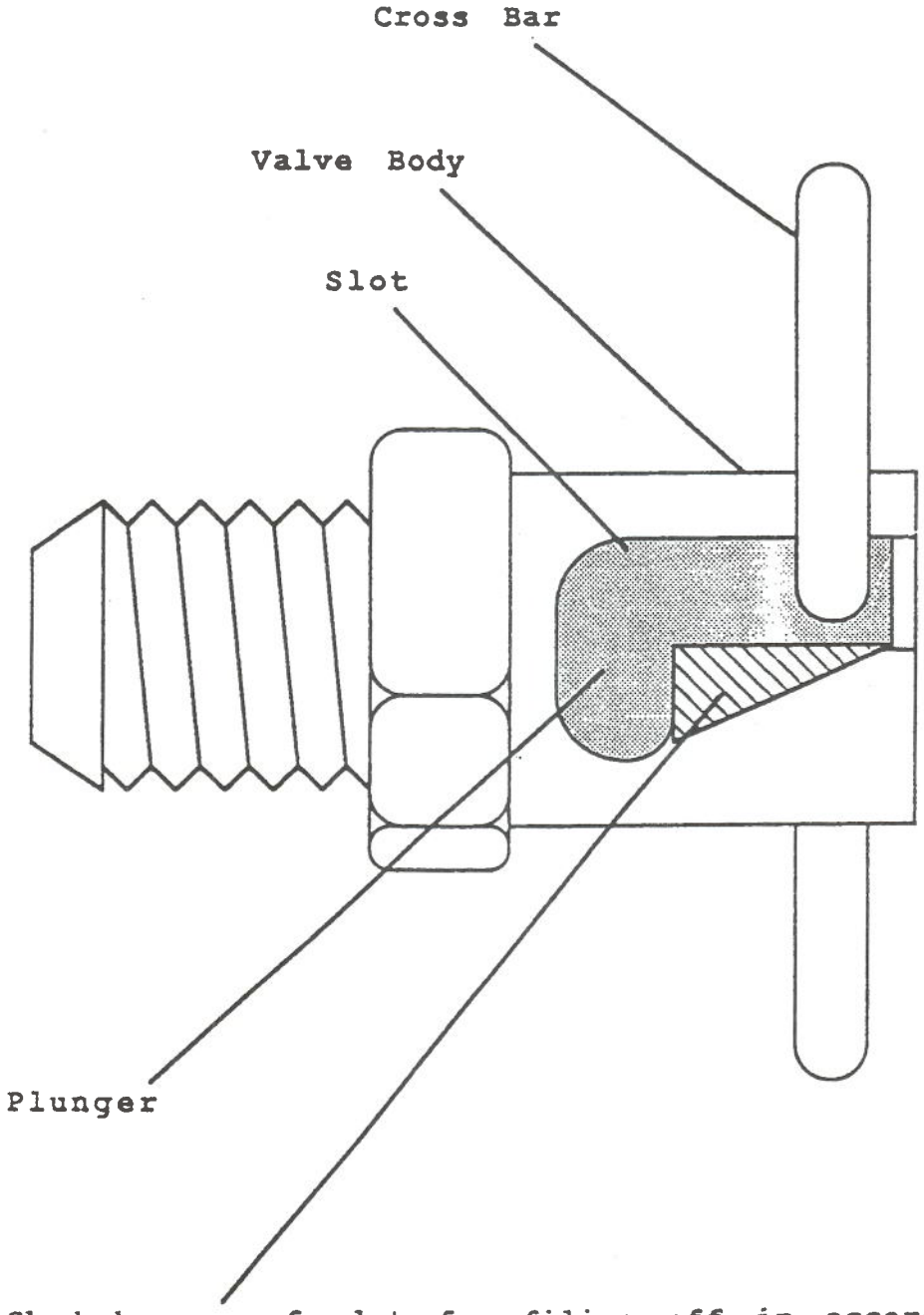
Once the engine RPM drops and the nose is lowered it is generally possible for sufficient fuel to flow through the system for the float chamber to re-fill and restore power temporarily often at about the time the aircraft reaches the ground.

This particular problem has caused a number of accidents and incidents to PA 28 series aircraft over a long period.

The most recent of these is described fully in AAIB Bulletin No 5/89 which makes it clear that this type of valve is capable of being locked in the open position during a pre-flight drain check. In 1975 CSE Service Bulletin 6/75 was issued recommending removal of the locking feature by filing away a portion

of the valve body so that the valve could only remain open if actively held in that position. The CAA publication General Aviation Safety Information Leaflet 12/88 (GASIL 12/88) also commented on this problem reiterating numerous recommendations that this Service Bulletin be implemented. As stated in AAIB Bulletin 5/89 the AAIB has recommended that the CAA requires the deletion of the locking feature on any aircraft on the British register that can be effected adversely by this type of valve being left open. Since the locking feature was still present on G-BHFL, the AAIB has reiterated its recommendation to the CAA that mandatory action be implemented.

SCHEMATIC OF CURTISS DRAIN VALVE



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

FIG 1