Piper PA-28R-180, G-AVWU

AAIB Bulletin No: 6/99 Ref: EW/C98/7/11 Category: 1.3

Aircraft Type and Registration:	Piper PA-28R-180, G-AVWU
No & Type of Engines:	1 Lycoming IO-360-B1E piston engine
Year of Manufacture:	1968
Date & Time (UTC):	5 July 1998 at 1024 hrs
Location:	Wycombe Air Park, Buckinghamshire
Type of Flight:	Private
Persons on Board:	Crew - 1 - Passengers - 1
Injuries:	Crew - None - Passengers - None
Nature of Damage:	Left flap, main landing gear and wing
Commander's Licence:	Private Pilot's Licence
Commander's Age:	39 years
Commander's Flying Experience:	286 hours (of which 145 were on type)
	Last 90 days - 7 hours
	Last 28 days - 7 hours
Information Source:	AAIB Field Investigation

History of the flight

Following take off from Wycombe Air Park, with an intended destination of Le Touquet, the landing gear failed to retract when selected up. The pilot re-cycled the landing gear selector and yawed the aircraft but could not achieve either an up or down and locked indication. He then selected override with the emergency landing gear selector (see landing gear system description) in an attempt to achieve landing gear extension but could not achieve three greens. At this point in time he elected to carry out a low pass of the control tower and asked for a visual assessment of the landing gear status. Personnel in the tower reported the landing gear to appear to be down. The pilot carried out one more circuit and with AFS in position landed the aircraft on Runway 25. The left main landing gear collapsed during the ground roll. The pilot was able to maintain directional control until the left wing dropped when the aircraft swung through 90û to the left and came to rest on the grass. There were no propeller strikes or fire and the two occupants exited the aircraft unaided as the fire vehicle arrived. The AFS lifted the aircraft but did not get the left main gear to lock down using the emergency gear lever and so secured the leg with wire to allow it to be moved to its parking place.

Landing gear system description

The aircraft was equipped with a retractable tricycle landing gear activated by an electrically powered reversible pump. The pump is controlled by a selector switch on the instrument panel to the left of the control quadrant. Also incorporated in the system is a pressure sensing device which lowers the gear regardless of gear selector position, depending upon airspeed and engine power (propeller slipstream). Gear extension is designed to occur, even if the selector is in the up position, at airspeeds below approximately 105 mph with power off. The device also prevents the gear from retracting at airspeeds below approximately 85 mph with full power, though the selector switch may be in the up position. This speed increases with reduced power and/or increased altitude. The gear will not retract above a speed of approximately 125 to 130 mph; this is a landing gear system limitation, not a function of the back-up gear extender.

The sensing device operation is controlled by differential air pressure across a flexible diaphragm which is mechanically linked to an hydraulic valve and an electrical switch which actuates the pump motor. A pitot and static air source for actuating the diaphragm is provided from a mast mounted on the left side of the fuselage above the wing. Manual override of the device is provided by an emergency landing gear selector lever located between the front seats to the left of the flap handle. (Figure 1)

The emergency gear lever, used for emergency extension of the gear, manually releases hydraulic pressure to permit the gear to free-fall with spring assistance on the nose gear. The lever, sprung to the mid position, must be held in the forward-downward position for emergency extension. This same lever, when held in the raised-rearward position, can be used to override the system, when gear position is controlled by the selector switch regardless of airspeed/power combinations. A lock pin on the left side of the emergency gear lever/flap handle cover can be used to retain the lever in the override position. (The locking pin was introduced on the Cherokee Arrow II and could be retrofitted to earlier aircraft by the incorporation of Piper Service Bulletin No 769 and Piper Kit No 760 542V)

The following placard was required to be located on the flap handle cover and was positioned just to the rear of the lever override position:-

Override engaged Auto - Ext - Off

Lock pin on side

To engage override:

Pull lever full up, push lock pin

To release override:

Pull lever full up and release

Emergency landing gear extension

The following emergency landing gear extension procedure is stated in the aircraft Flight Manual.

Instructions for emergency extension of landing gear are:

(a) Reduce airspeed below 100 mph IAS (87 kt).

(b) Move landing gear selector switch to gear down position.

(c) If gear has failed to lock down on aeroplanes equipped with the back-up gear extender, raise emergency gear lever to "Override Up" position.

(d) If gear has still failed to lock down, move emergency gear lever to "Emergency Down" position.

(e) If gear has still failed to lock down, yaw the airplane abruptly from side to side with the rudder.

Examination of the aircraft

Following recovery, the aircraft landing gear system was examined and the electrically powered reversible pump motor was found to be contaminated with hydraulic fluid due to a seal leaking. In this condition, which had existed for some time, the motor had finally failed, explaining why the landing gear initially would not retract and subsequently would not extend using the normal system. Selection of the override position would still require the pump to function to lower the landing gear, consequently using the override position also failed to achieve a down and locked condition. After the accident, when the aircraft had been removed to a maintenance facility, the free-fall was checked using the emergency down selection and the gear achieved the down and locked condition.

The placard, as described above, was type written on a paper label which had become soiled and curled up at the edges rendering it quite difficult to read from the pilot's seated position (Figure 1).