

ACCIDENT

Aircraft Type and Registration:	Piper PA-28RT-201T Turbo Cherokee Arrow IV, G-OPJD	
No & Type of Engines:	1 Continental Motors Corp TSIO-360-FB piston engine	
Year of Manufacture:	1982 (Serial no: 28R-8231028)	
Date & Time (UTC):	14 January 2014 at 1405 hrs	
Location:	Thruxton Airfield, Hampshire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - 2
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Damage to right wingtip and flap, right entry step, right landing gear and underside aerial	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	55 years	
Commander's Flying Experience:	1,565 hours (of which 1,435 were on type) Last 90 days - 20 hours Last 28 days - 6 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

Synopsis

On approach to Thruxton Airfield, the pilot was unable to obtain a green DOWN-AND-LOCKED indication for the right Main Landing Gear (MLG). Despite several attempts to recycle the gear, he was unable to obtain the correct indication and eventually landed, during which the right MLG collapsed. It was found that a broken seal in a valve which allows the gear to free-fall was preventing normal hydraulic extension and that a stiff downlock hook mechanism was hampering engagement of the downlock when extending under gravity.

History of the flight

The aircraft was on a flight from Alderney to Thruxton Aerodrome. The flight had proceeded entirely normally and the pilot was cleared for a straight-in approach to Runway 25 at Thruxton. At about 5 nm finals, he noticed that the green indication light for the right MLG was not illuminated, so he recycled the gear but the light remained extinguished. He declared a go-around to the control tower and tried recycling again whilst flying a circuit, this time asking the tower for visual confirmation of the right gear status as he flew along the runway. He was not given a definite answer so he flew more circuits whilst he tried to recycle the gear several more times, eventually pulling the manual free-fall release lever.

After about 45 minutes, with the right gear green indication still unlit and with the emergency services in position, the pilot performed an emergency landing, cutting the fuel before touchdown. The right main gear collapsed during the landing roll but the airframe damage was relatively light; it was noted that the Airfield Fire Service sprayed foam into the cabin interior, although there had been no fire.

Description of the landing gear extension/retraction system

This model of aircraft uses hydraulic power supplied by a single reversible electric pump/reservoir to raise and lower the landing gear. Normal gear selections are made using a handle on the instrument panel labelled UP and DOWN.

When UP is selected, fluid pressure on the retract side of the pistons acts in that sense and the down line returns fluid to the reservoir. When fully retracted, the gears remain in that position due to hydraulic pressure in the actuator jacks; there are no uplocks.

When a DOWN selection is made, the pump rotates in the opposite direction and the up line becomes the return line.

If hydraulic pressure is lost, all three gears should drop under their own weight, although some spring assistance is used on the nose gear. In addition to a loss of hydraulic pressure, the gears are designed to extend under two further circumstances, if:

- The emergency extension lever between the front seats is lowered, or
- A combination of low airspeed and low engine power is sensed via a pressure-sensing chamber (Auto Extension)

In either case the same valve, the Automatic Gear Down and Emergency Free Fall Gear Valve, opens to allow pressure to be dumped from the up side and the landing gears to extend.

The main gear downlock mechanism comprises a conventional over-centre sidestay, kept in lock by a hook engaging on a pin (Figure 1). Engagement of the hook also actuates a microswitch to illuminate the associated DOWN AND LOCKED green light in the cockpit. Under a normal, powered extension, the final movement of the actuator engages the hook, but in a free-fall extension, a spring is used to engage the downlock hook.

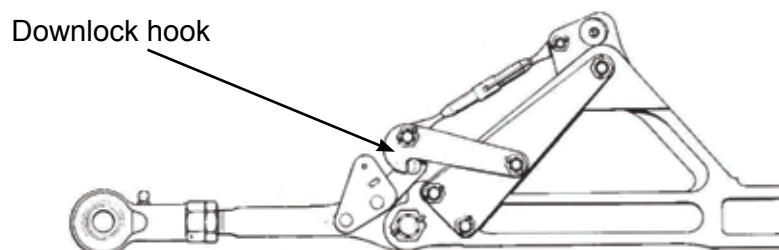


Figure 1

Downlock mechanism with hook correctly engaged on pin

Examination of the aircraft

The aircraft was examined during and after recovery. It was initially found that the downlock hook had not engaged on the pin and that the hook movement was stiff due to an apparent build-up of dirt and/or light corrosion; light finger assistance was, however, sufficient to get the hook to engage.

It was also found that the gear could not be raised either on a hand pump or using the aircraft's electric pump. Isolating the Automatic Gear Down valve allowed both these to operate the gear, so it was removed and strip-inspected. A seal was found to have broken up and pieces were blocking the normal gear down port. It was reasoned that, on the first and subsequent gear down selections, the gear had actually free-fallen rather than having been hydraulically powered down. The increase in friction of the right downlock hook mechanism had hampered its engagement during gravity extensions of the landing gear.