Cessna F337G Super Skymaster, G-BFJR

AAIB Bulletin No: 11/2003	Ref: EW/G2003/07/25	Category: 1.3
Aircraft Type and Registration:	Cessna F337G Super Skymaster, G-BFJR	
No & Type of Engines:	2 Continental IO-360-G piston engines	
Year of Manufacture:	1977	
Date & Time (UTC):	11 July 2003 at 1133 hrs	
Location:	Gloucestershire Airport, Cheltenham, Gloucestershire	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Underside of fuselage and undercarriage doors damaged	
Commander's Licence:	Private Pilot's Licence with Instrument Rating	
Commander's Age:	59 years	
Commander's Flying Experience:	1,560 hours (of which 472 were on type)	
	Last 90 days - 10 hours	
	Last 28 days - 0 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot and telephone enquiries by AAIB	

Synopsis

During the downwind leg, the landing gear failed to extend, despite repeated attempts which included operation of the hand pump and increased 'g' manoeuvring. Post accident inspection of the aircraft, which landed with both engines shut down, revealed no mechanical defects within the landing gear operating systems, but the hydraulic reservoir of the landing gear power pack was found to be empty. Engineering investigation failed to uncover the reason for the loss of hydraulic fluid, although a more detailed examination will be conducted when the aircraft is repaired.

History of the flight

Following an IFR departure from East Midlands Airport, the aircraft flew VFR to Gloucestershire Airport at 3,000 feet, before joining overhead at 2,000 feet for a right hand circuit to Runway 27. On the downwind leg, the landing gear was selected down but failed to extend. After making a PAN call and being asked to change to a radar frequency the pilot, at is own request, was directed to clear airspace at 3,000 feet where he attempted to resolve the problem.

Using a convex mirror mounted beneath his port wing-tip, the pilot could see that the landing gear doors were open but no wheels were visible. The pilot reports that the landing gear up indicator light in the cockpit remained on, but attempts to cycle the gear had no effect, except that the circuit breaker tripped repeatedly. An attempt to lower the gear using the manual emergency pump was tried, but despite pumping the pump handle 150 times (compared with the expected 90 pumps normally required to lower the gear), the configuration of the landing gear remained unchanged. Throughout this attempt, movement of the pump handle required very little effort and it was clear to the pilot that further attempts using the hand pump would not achieve anything.

After seeking the advice of the Chief Engineer of the company which maintained the aircraft, a series of high 'g' manoeuvres were flown, including steep turns and pull-ups, in an attempt to encourage the gear to deploy but these were unsuccessful. Following a visual assessment by this engineer in the tower during a low fly-past, and after nearly two hours of unsuccessful attempts to lower the gear, the decision was made to land and the emergency services were advised accordingly.

Following a dummy run to assess the situation, the pilot prepared the aircraft for landing. After one more unsuccessful attempt had been made to close the landing gear doors by briefly holding in the circuit breaker, a steeper than normal approach was flown at a 4.5° degree angle, using the DME and altimeter as a guide. At two miles out, the front engine was shut down, the propeller feathered, and the fuel shut off to that engine. The master switch was also turned off at this stage. Once the pilot was confident that he could reach the runway, he shut down and secured the rear engine, and feathered the propeller. Both propellers stopped in a position close to the horizontal.

With a wind of 10 to 15 kt along the runway, the aircraft was flared into a three-point attitude and held-off for as long as possible, before it settled gently onto the runway with full up elevator applied. After sliding a short distance, it came to rest in a level attitude, and the pilot was able to vacate the aircraft without difficulty.

Engineers subsequently recovered the aircraft from the runway by lifting it sufficiently high with airbags to allow the main landing gear to be manually lowered and locked down, which enabled them to move it clear on the main wheels. Subsequently, after the aircraft had been properly supported and raised to give sufficient clearance, the nose landing gear was manually lowered and also locked down. The engineer in charge of the recovery and post accident inspection of the aircraft reported that both the main landing gear and the nose gear retraction mechanisms operated freely, and he found no indications of any mechanical failure of either mechanism.

The landing gear on the Cessna 337 is hydraulically operated and powered from an electrically driven 'power pack'. However, the hydraulic pack reservoir was found empty and it appeared that the fluid had become exhausted at some stage after completion of the 'doors open' phase of the landing gear extension cycle, but before completion of the 'uplock retraction' phase. The engineer could find no obvious cause of the fluid loss, but will investigate further during the course of work to repair the aircraft, scheduled to begin in November 2003. Any further, relevant, information gained from this work will be published as an AAIB Bulletin addendum at the appropriate time.