

No: 8/91

Ref: EW/G91/03/07

Category: 1c

Aircraft Type and Registration: Rockwell Aero Commander 114, N5834N

No & Type of Engines: 1 Lycoming IO-540-T4B5D piston engine

Year of Manufacture: 1978

Date & Time (UTC): 13 March 1991 at 1924 hrs

Location: Cardiff Airport, Wales

Type of Flight: Private

Persons on Board: Crew - 1 Passengers - 4

Injuries: Crew - None Passengers - None

Nature of Damage: Right main landing gear actuating cylinder broken, ground-scrape damage to right wing tip, flap and passenger step.

Commander's Licence: Private Pilot's Licence with Night rating

Commander's Age: 47 years

Commander's Flying Experience: 163 hours (of which 66 were on type)

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

The aircraft had taken off for a local flight and the individual green landing gear safe lights and the orange gear warning light sequenced and extinguished normally. On return the pilot selected gear down on the base leg at about 95 KIAS (knots indicated airspeed). The gear warning light came on and the green gear safe lights started to illuminate. After he had selected flaps to 10 degrees and had made a power adjustment to maintain 80 KIAS, the pilot saw that the gear warning light was still on and the right-hand main gear safe light had not illuminated. The pilot informed Air Traffic Control of the problem and was cleared to go around.

In attempts to release the right landing gear the pilot increased the 'g' loading by executing a steep turn, he recycled the gear selector lever a number of times and operated the emergency extension valve but to no avail. The pilot flew the aircraft past the tower for an external inspection and this was repeated a second time so that the fire service could train a searchlight on the aircraft's underside. ATC reported that all three legs appeared to be down and the pilot elected to attempt a normal landing. He opted for a full flap glide descent at a target speed of 61 KIAS and managed a gentle touch-down. About 3 seconds after the nosewheel had been lowered onto the runway the right mainleg began to collapse.

The pilot switched off the electrics and fuel and stopped the engine as the aircraft slid to a halt with the right wing tip, flap, flap hinge and passenger step scraping the runway.

The aircraft was quickly vacated as soon as it came to a standstill and no one was injured.

The main gear is illustrated in the attached figure. There is no mechanical uplock; the leg is held in the up position by an hydraulic fluid lock in the cylinder, caused by a check valve closing when the retraction process is complete. During gear extension the cylinder retracts pulling the leg down. Emergency lowering of the gear is effected by release of the hydraulic lock through a venting valve. A large spring is intended to assist the side brace assembly to achieve its over-centred locking condition.

The outboard eye-end of the right main gear actuating cylinder had failed in tensile overload leaving its spherical bearing attached on its pivot bolt on the main gear trunnion. The cylinder is under tensile load when it retracts to lower the mainleg and so the failure would appear to have occurred when the gear was first selected down during the accident flight. From photographs it appears that the cylinder was almost fully extended as found and so the failure must have occurred at the start of the extension sequence. It was found that all the rod ends and pivot points in the leg assembly and its door links and hinges were severely corroded to the point that they were stiff to operate or seized. The trunnion pivots themselves were also stiff to rotate. It would appear that once the actuating cylinder had broken under its own applied load the leg, which presumably had moved by at least a small amount, continued to descend under its own weight, perhaps helped by the aircraft manoeuvres, but failed to achieve the locked condition because of friction in the pivots.

The aircraft had been bought in the USA and had been subjected to an Annual Inspection in August 1990 by Commander Aircraft before being ferried to the UK. At the time of the accident the aircraft had completed 78 hours since that inspection.

ROCKWELL AERO COMMANDER 114
RIGHT MAIN GEAR LEG

