

No: 12/90

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Category: 1c

**Aircraft Type and Registration:** Rockwell Commander 112A, G-BDAK

**No & Type of Engines:** 1 Lycoming IO-360-C1D6 piston engine

**Year of Manufacture:** 1975

**Date and Time (UTC):** 27 August 1990 at 1448 hrs

**Location:** Shoreham Airport, Sussex

**Type of Flight:** Private

**Persons on Board:** Crew - 1 Passengers - 1

**Injuries:** Crew - None Passengers - None

**Nature of Damage:** Propeller ground contact, major damage to the right wing

**Commander's Licence:** Private Pilot's Licence

**Commander's Age:** 41 years

**Commander's Total Flying Experience:** 148 hours (of which 102 were on type)

**Information Source:** Aircraft Accident Report Form submitted by the pilot and engineering report.

The pilot carried out a standard circuit joining procedure from the dead side for runway 25. The wind reported was 240°/14kt. Downwind he lowered the landing gear and confirmed three greens. On base leg he lowered 20° of flap and on finals he set full flaps and again checked three greens. At no time did he hear a warning bell and a normal touchdown was made. After a ground roll of about 300 metres first the noseleg collapsed and then the right mainleg. The aircraft slid for about 40 metres before coming to a halt. The pilot and his passenger evacuated the aircraft through the normal exits without difficulty, the pilot having gone through the shut-down procedure.

An investigation was carried out for the insurers by a local engineering company. The aircraft was supported on jacks and the engine cowlings removed. There was no obvious damage or failure in the landing gear, supporting structure or hydraulic system. Though some hydraulic fluid had been lost during salvage its quantity had evidently been adequate at the time of the accident.

When the system had been topped up and bled it appeared to operate normally with correct indications.

The landing gear is held or locked in the "down" position by three separate systems; spring assisted over-centred drag links, locking pins within the jacks and hydraulic pressure from the electrically driven

pump which is activated whenever a green indication is not obtained for any of the three legs. The nose landing gear has two microswitches; one on the locking pin in the jack and one on the drag brace. Both microswitches must be made to obtain a green indication. With "down" selected the hydraulic pump is de-activated only when "three greens" indicate.

Examination of the nose landing gear showed that the locking pin was worn and ineffective, the locking pin microswitch was not being operated at all because of bad adjustment and the drag brace switch was so far out of adjustment that the landing gear was able to retract over 45 degrees before the switch operated and energised the pump.

These deficiencies robbed the nose landing gear of two of its downlock safeguards and left only the over-centred drag-brace. An hypothesis was formed that the over-centre lock had been broken under the vibratory loads experienced during the landing run. (The runway was grass covered but was reported by the pilot as being smooth). With the drag brace "broken" the worn locking pin within the jack would be incapable of preventing retraction of the nose landing gear and, because of the faulty adjustment of both microswitches the leg would retract to 45 degrees before the pump would be switched on. At that point it would be too late to prevent the leg retracting further. During the nose landing gear's collapse its jack would develop a back-pressure in the hydraulic system which would tend to unlock either main landing gear and would do so if the pressure generated were high enough. This effect was demonstrated during the investigation. It was considered that after the initial breaking of the downlock the nose landing gear's rearward collapse would have been an accelerating one and would have become sufficiently rapid to cause this effect so explaining the collapse of the right main landing gear.