No: 10/90 **Ref: EW/G90/07/07** **Category: 1a**

Aircraft Type and Registration:	Cessna 550, G-BNSC
No & Type of Engines:	2 Pratt and Whitney JT15D-4 turbofan engines
Year of Manufacture:	1987
Date and Time (UTC):	12 July 1990 at 1727 hrs
Location:	Bournemouth International Airport, Dorset
Type of Flight:	Public Transport
Persons on Board:	Crew - 2 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Abrasion damage to flaps and fuselage underside
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	37 years
Commander's Total Flying Experience:	6,000 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Following take-off from Olbia, Sardinia, en route for Hurn, the pilot retracted the gear and flaps. On passing 2000 ft the crew noticed the Hydraulic Low Level light flickering, although this later extinguished. The aircraft continued the climb, and at approximately 25,000 ft the Hydraulic Low Flow lights for both engines started to flicker, although the Low Level light remained out.

During the cruise the captain decided it was probable that most, if not all, of the hydraulic fluid had been lost, and so he and the co-pilot ran through the checks, including those for extending the landing gear. They also considered the possibility that the thrust reversers and airbrakes might not work. During the

flight, the captain contacted his Operations Department at Hurn on high frequency radio, informing them of the problem and requesting that engineers be made available to provide advice if necessary.

On passing 8000 ft during the descent, the Hydraulic Low Level light illuminated again. While on right base for runway 17 at Hurn the captain selected the landing gear handle down at 140 kts, with the flaps retracted. However nothing happened He then checked the circuit breakers and recycled the landing gear lever, with no effect. The emergency system was then operated. This is activated by a red 'T handle', which when pulled, allows the landing gear to 'free-fall'. The handle moved about 1 inch and the red GEAR Unsafe light illuminated, followed by the nose landing gear green light. The captain

reported that it required several attempts, using all his strength, to pull the handle fully out and twist it into its locked position. The main landing gear still failed to extend and so the crew resorted to yawing the aircraft from side to side. However this had no effect and so the pneumatic "blow down" system, operated by pulling a red knob on top of the T handle was used, still to no avail. For the next hour, following advice from the engineers on the ground, the crew tried positive and negative G, low airspeed, more yawing from side to side, and relaxing pneumatic pressure by using the emergency brake (which used the same reservoir as the blow-down system). Finally, with only 30 minutes of fuel remaining, the aircraft was landed at Hurn with full flap and at a speed of approximately 85 kts. The aircraft came to a standstill halfway along runway 17, with minimal damage.

Subsequent examination of the aircraft revealed that the original loss of hydraulic fluid was due to the left hand main landing gear retract line having been chaffed-through by the right hand rudder control cable, at a point 5 inches aft of the rear pressure bulkhead. The line had been distorted downwards, either during aircraft build or maintenance. The maintenance organisation informed the manufacturer of the problem, suggesting that the line be re-routed.

A mechanical lock in the emergency landing gear control is designed to prevent the pneumatic system from operating before the uplocks are released, *ie* with the T handle in its pulled and twisted position. Otherwise the problem is compounded by pneumatic pressure forcing the uplock roller against the uplock hook, jamming the latter and thus preventing its release via the T handle. However, in this case it was clear that the T handle had been moved far enough to allow the pneumatic system to operate, even though the landing gear uplocks had not released.

The free-fall system on the landing gear operated satisfactorily after the accident although it was clear that the main landing gears had not previously released from the uplocks. The reason for this was not positively established although it was surmised that the rigging may have been on the tolerance limit. However, the system met the maintenance manual requirements in this respect and had operated successfully on a test flight in October 1989.