No: 12/92 **Ref: EW/G92/09/12** **Category: 2c**

Aircraft Type and Registration:	Bell 206B Jet Ranger III, G-SHCC
No & Type of Engines:	1 Allison 250-C20B turboshaft engine
Year of Manufacture:	1973
Date & Time (UTC):	12 September 1992 at 1500 hrs
Location:	Field near Brooklands Farm, Whitstable, Kent
Type of Flight:	Public Transport
Persons on Board:	Crew - 1 Passengers - 4
Injuries:	Crew - None Passengers - None
Nature of Damage:	Heavy landing damage
Commander's Licence:	Commercial Pilot's Licence (Helicopters)
Commander's Age:	34 years
Commander's Flying Experience:	500 hours (of which 330 were on type) Last 90 days - 58 hours Last 28 days - 20 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and examination of the aircraft by an AAIB Inspector

The pilot landed the helicopter in a pre-planned landing area following an uneventful positioning flight. After landing the pilot closed the throttle to the ground idle position and, with the aid of a company ground handler, four passengers boarded the helicopter. The pilot then carried out the pre-flight checks, lifted-off the helicopter into the hover and hover-taxied to the downwind end of the landing area. After turning into wind the pilot commenced the climb-out, which was normal until, at about 200 feet agl, the engine lost power. The pilot carried out an emergency landing in an open field containing a herd of cows; however just before touchdown he had to manoeuvre to avoid some of the cows and a heavy landing occurred.

Examination of the aircraft revealed that the nut (of a type known as a 'B' nut), securing the compressor delivery pressure sensing (Pc) pipe to the Gas Producer Fuel Control, was undone and the pipe had separated from the coupling. No 'torque paint' had been applied to any of the B nuts in the Pc sensing line to provide an indication of loss of torque during inspections, or on any of the other B nuts associated with the engine. Disconnection of the Pc line during engine operation will result in the

complete loss of engine output power. The engine gas generator speed will decrease to below ground idle and then stagnate, providing a 'flameout' does not occur.

The helicopter's maintenance records showed that the last time that this particular area of the Pc sensing system may have been disturbed was on 11 May 1990, 234 airframe hours prior to the accident when the Power Turbine Governor was replaced. Since then numerous maintenance checks had been carried out, including two annual inspections, a 100 hour, 300 hour and numerous 50 hour inspections.

The Allison 250-C20 Series Operation and Maintenance Manual, page 3-30 states;

"3-26 When proper free-state alignment is attained, complete the tubing installation by simultaneously securing the coupling nuts and tightening them to proper torque .

WARNING

TUBING B-NUTS USED IN INSTALLATIONS EXPOSED TO A HIGH DEGREE OF VIBRATION AND PRESSURE SURGES ARE SUBJECT TO TORQUE RELAXATION WHEN IMPROPERLY TIGHTENED.

USE ACCEPTABLE TECHNIQUES AND PRACTICES TO PREVENT TORQUE PAINT OR TORQUE PAINT REMOVER FROM CONTACTING RUBBER OR PLASTIC MATERIALS OR ENTERING EXPOSED AREAS.

3-26A. After all B-nuts are properly tightened to the correct torque values, apply a slippage mark (torque paint) of contrasting colour approximately 0.063 inch (1.60 mm) wide minimum. The mark shall extend down the side of the B-nut and onto the mating fitting. Install necessary clamping. (Refer to 250-C20 Illustrated Parts Catalog, Pub. No. 10W4, for clamping requirements.)

3-26B. B-nuts shall be inspected for indications of slippage at 100 hour maintenance intervals."

There is no specific mention of inspecting the B nuts for slippage in either the 100 hour Inspection Checklist, page 3-86 of the Allison 250-C20 Series Operation and Maintenance Manual or the Preflight and Postflight Inspection Checklist.

The AAIB have reported on three previous accidents, (to which Bulletins 10/84, 3/90 and 2/91 refer; the last accident having involved a fatality) in which this B nut in the Pc sensing line came loose in flight, causing engine power failure. In addition, the CAA have reports of a further three incidents but which did not result in reportable accidents. The AAIB recommended the torque painting and additional inspection of such Pc line B nuts to the CAA following its investigation of the above fatal accident to a Hughes 369, G-OAIM , on 31.8.90 (AAIB Bulletin 2/91).

In view of the continuing occurrence of such accidents and incidents due to this problem, the following Safety Recommendations are made:

92-85 The CAA, in conjunction with the FAA, take action with the engine manufacturer to introduce some form of positive locking of the B nuts on the compressor delivery pressure (Pc) sensing line on all Allison 250 Series engines, to prevent the loosening of such nuts and consequent sudden loss of engine power.

92-86 The engine manufacturer of the Allison 250 Series engine should amend the associated Operation and Maintenance Manual Inspection Checklists to specifically require an inspection of the B nuts associated with the compressor delivery pressure (Pc) sensing line pending the introduction of positive locking of these nuts, to prevent the loosening of such nuts and consequent sudden loss of engine power.