No: 12/91 **Ref: EW/G91/09/14** **Category: 1c**

Aircraft Type and Registration:	Rans S10 Sakota, G-BRSC
No & Type of Engines:	1 Rotax 532 piston engine
Year of Manufacture:	1990
Date & Time (UTC):	20 September 1991 at 1515 hrs
Location:	Warwick Bridge, Cumbria
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - Minor Passengers - N/A
Nature of Damage:	Damage to landing gear, engine and engine mounts
Commander's Licence:	Private Pilot's Licence
Commander's Age:	21 years
Commander's Flying Experience:	219 hours (of which 33 were on type)
Information Source:	Aircraft Accident Report Form submitted by the pilot and AAIB examination of propeller bolts.

The aircraft had taken off from Carlisle airport when, whilst climbing through 1000 feet, the pilot noticed a slight vibration which was immediately followed by a rapid increase in engine rpm and noise. It was subsequently apparent that the propeller had become detached from the aircraft. The pilot closed the throttle and shut down the engine before executing a successful forced landing in a field. The surface proved to be somewhat rutted and the aircraft sustained some damage to the landing gear.

The wooden propeller is attached to the hub by means of six 1/4 inch bolts passing through the propeller and into threaded holes within the hub. The bolts are wire-locked after assembly. Thus engine torque is transmitted to the propeller by friction between the flange and the propeller. Although the propeller was not recovered, the bolt tails remained with the hub, and five of these were sent to AAIB for examination. It was apparent that all the bolts had failed in reverse bending fatigue, suggesting that there had been some loss of assembly torque.

This engine/propeller combination is common to a number of aircraft types, including microlights. On some of these, the propeller is attached by means of larger diameter bolts passing through non-threaded holes in the flange. They are secured with nuts, and are arranged such that any shear/bending

loads are carried by the non-threaded shank of the bolts. This attachment method appears to offer an improvement in fatigue resistance compared to the installation on G-BRSC in that it would be more tolerant of any loss of bolt torque.

The following recommendation has been made to the CAA:-

> It is recommended that for aircraft types using the Rotax 532 engine, the method of propeller attachment be reviewed with the aim of, wherever possible, replacing currently used 1/4 inch diameter bolts with larger diameter items located in non-threaded holes in the propeller flange.