

### BRITISH MICROLIGHT AIRCRAFT ASSOCIATION SERVICE BULLETIN

**Reference**: BMAA Service Bulletin 2759 issue 1 **Title**: Upper port engine mounting bolt failure

Applicability: All UK (BMAA) Sky Ranger aircraft with Rotax 912-series engine

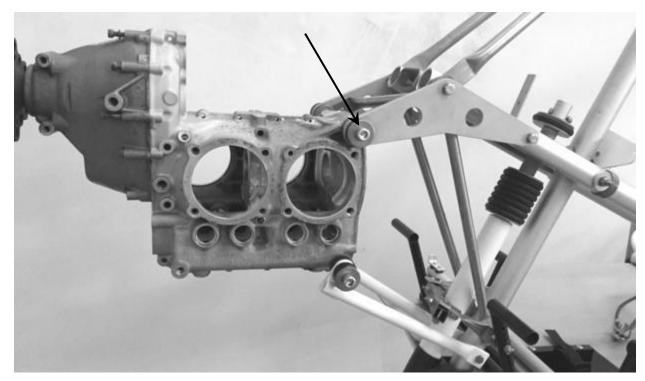
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**Classification**: Advisory Service Bulletin

#### 1 Introduction

There have been three reported failures of the upper port (left) engine mounting bolt on UK Sky Rangers. (There have also been multiple occurrences abroad, although the foreign design standard is not necessarily identical). The bolt in question is highlighted in the photos below; the bottom photo shows a failed bolt. This bulletin is issued to advise owners and BMAA Inspectors of this potential problem, and how to minimise the risk of its occurrence.





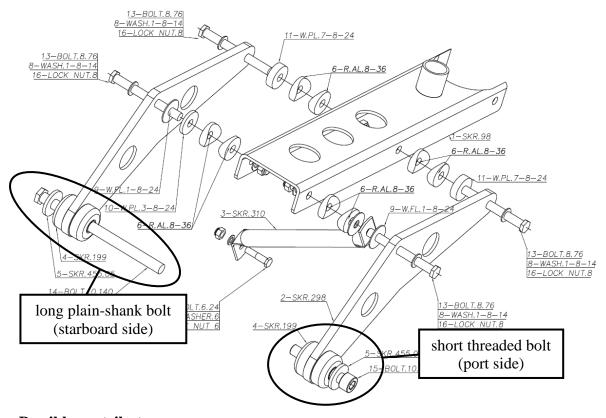
### Why the upper port mounting bolt?

The Rotax 912-series engine is mounted in the Sky Ranger using the four mounting points at the rear (magneto end) of the crankcase. The mounting points on the port side of the crankcase are tapped holes, which means that they are internally threaded. The bolts that screw into them are therefore required to be threaded where they exit the crankcase. This works satisfactorily as long as the bolts are correctly torqued up. However, if the bolts are not fully tight, they become subject to bending loads - rather than just being in tension - which can cause premature failure of the bolts at the base of a thread where they exit the crankcase.

The mounting points on the starboard side of the crankcase are clearance holes (not threaded). Long bolts are used that pass through the starboard half of the crankcase and screw into the port half, helping to hold the crankcase together as well as mounting the engine in the aircraft. These long bolts have a plain (unthreaded) shank where they enter the crankcase, and are therefore much less prone to failure.

On the Sky Ranger the upper engine mounts are much more highly loaded than the lower engine mounts (engine torque and associated vibration are solely reacted by the upper mounts). The upper port engine mounting bolt is therefore the critical bolt when it comes to the potential for failure if not fully tight.

The upper mounting bolts are highlighted in the exploded diagram of the top engine mount below.



## 3 Possible contributory causes

- The bolts are not correctly torqued when installed. The bolts must be torqued up using a torque
  wrench to the torque specified in the Build Manual. Build Manuals are available on the Sky Ranger
  website (www.skyranger.co.uk).
- o **Incorrect rubber anti-vibration mounts fitted**. The correct mounts have a steel inner sleeve. Similar 'pattern' mounts may have an aluminium (or thinner steel) sleeve which deforms over time so that the tension in the bolt decreases.
- O Anti-vibration mounts not replaced when worn. The Operator's Manual provides instructions on how to check the anti-vibration mounts. It is very easy to do. This check must be performed every 50 hours. Use new bolts when replacing the anti-vibration mounts. Operator's Manuals are available on the Sky Ranger website (<a href="www.skyranger.co.uk">www.skyranger.co.uk</a>).

O **Difficulty starting the engine**. If the sprag clutch is worn, the starter motor intermittently disengages during starting making starting difficult and putting nasty shock loads through the engine mounts. If these symptoms appear do not leave it but have the sprag clutch replaced as soon as possible. Replace the anti-vibration mounts and mounting bolts as well: their condition is likely to have been affected.

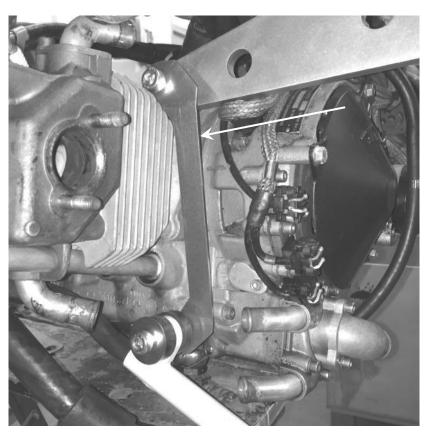
## 4 Bracing strap

A bracing strap is available as an option which is intended to support the outside of the upper port mounting bolt to eliminate, or at least reduce, the bending loads that this bolt is subjected to. At the time of writing no failures of the upper port mounting bolt have been reported, but this modification does not yet have sufficient service experience to prove that it eliminates the problem.

The latest Build Manuals incorporate the bracing strap on Rotax 912ULS engine installations, which give the bolt a harder time than the Rotax 912UL engine. For existing Rotax 912ULS engined Sky Rangers that were built before this option was devised, it is recommended to fit the bracing strap at a suitable juncture such as the next major engine service. Use new anti-vibration mounts and mounting bolts. Build Manuals are available on the Sky Ranger website (<a href="www.skyranger.co.uk">www.skyranger.co.uk</a>).

It is also possible to incorporate this modification on Rotax 912UL engined Sky Rangers if desired.

As with any approved optional modification it must be inspected and signed-off in the airframe logbook by a suitably qualified BMAA Inspector.



# 5 Reporting

Report all cases of bolt failure to the BMAA Technical Office (<a href="technical.office@bmaa.org">technical.office@bmaa.org</a>) so that we are aware of the extent of the problem. Please also report any related problem such as unexpected engine mounting bolt loosening or anti-vibration mount degradation.

All replacement parts must be original, or otherwise approved by the Technical Office.

Note: The technical content of this document is approved by the BMAA, UK CAA organisation approval ref. DAI/8909/84