

# RotorSport UK Ltd

## Service Bulletin

This form is the response from RotorSport UK Ltd either against a problem found in the product in service requiring a containment or rectification action, or as service information for aircraft modification incorporation. Upon completion of the action, the person responsible must enter details into the aircraft logbook/worksheet with the SB and/or CAA MPD (Mandatory Permit Directive) number and sign as normal (see instructions below). For help, contact RotorSport on 44(0)1588 650769, or email [info@rotorsport.org](mailto:info@rotorsport.org).

**SB No.: 039 issue 1**

CCAR No.: None

Classification:

Aircraft type & model  
(applicability)  
RotorSport UK Calidus

Aircraft serial Nos. effected  
RSUK/CALS/all

~~OPTIONAL~~ or  
**RECOMMENDED or  
MANDATORY**

Problem description & cause of problem if known

A recent comprehensive study on the flight loading conditions of the rotor system used on both Calidus and the MT-series has shown that, whilst the rotor system is safe and robust, the system can be significantly improved. A complete new rotor system has now been developed and approved by CAA.

A field-service kit has also been developed to enable upgrade to the new rotor system (Rotorsystem II) without the need to return the aircraft to the factory. Fitment of this rotor system to a Calidus aircraft will reinstate the planned Vne of 120mph instead of the present limitation of 90mph.

Important note: The new rotors by themselves (identified by red end-caps) are not interchangeable with any other rotors (black, grey or orange end-caps). The whole rotor system must be changed.

Note that the UK CAA only permit this SB to be embodied by RotorSport UK Ltd.

Effective date:  
09.09.11

Safety effect

Improved by reduction of stress in rotor blades, leading to improved service life.

Weight and CG effect

Rotorsystem II (8.4m) installed is 0.2kg lighter than the original orange end-cap system. The reduced weight on top of the mast will lower the CG a small amount but the effect is insignificant. There is therefore no change in the certified max take off weight or CG limitations of the aircraft

Continued Airworthiness / Maintenance aspects

Once Rotorsystem II has been fitted under this Service Bulletin the only change in the ongoing airworthiness requirements is the increased time interval to first inspection, and increase in rotor system safe life to 2,500hrs. There is a change to the performance/limitations of the aircraft in that after embodiment of this SB the Vne is approved as 120mph, once the CAA have re-issued the Permit to Fly.



The different teeter-towers and teeter stops.  
Rotorsystem II (red end-caps) is used with the taller tower shown on the left  
An original rotor (orange end-caps) must NEVER be fitted to the taller tower

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Action required to implement this service bulletin – full head removal, rebuild and replacement.

(i) Remove from aircraft

1. Position the aircraft on level ground and apply brakes/chock wheels. Remove the rotor as described in the Maintenance Manual.
2. Cover the canopy with thick fabric to protect against any dropped tools
3. Remove the upper engine cowling and the two mast cowlings
4. Disconnect the pitch control cable and remove the damper from the rotor head. Retain the 19mm conical spacer and discard the two smaller ones.
5. Disconnect the pitch trim cylinder air-pipes noting the relative positions, and blank open pipes. Remove the cylinder from its mast mounting.
6. Disconnect the roll control cable and roll trim cylinder from the rotor head. Note the spacer positions and orientation.
7. Remove the plug from the rotor-speed sensor and cut any cable ties so that the cable can be held clear and the rotor bearing temperature sensor can be unplugged
8. Disconnect the 4mm pneumatic pipe from the bendix drive cylinder, blank open pipe, and tie clear
9. Remove the split pin, and unscrew the nut from the pitch-pivot-bolt. Remove the bolt and lift the rotor-head away from the aircraft whilst sliding the pre-rotator shaft apart on its splines.
10. Remove the complete damper assembly from the mast and discard.

(ii) Bench work

1. Place a 30mmAF ring spanner on the hex-head bolt on the underside of the rotor-head. Clamp this ring spanner in a substantial vice.
2. Remove the split-pin from the castle-nut. With an assistant to steady the assembly in the vice, use a 30mmAF socket to unscrew the castle-nut from the bolt. It will be very tight.
3. Remove the M20bolt, M20 plain washer and aluminium spacer (with bonded-in sensor)
4. Note the orientation of the ring-gear on the teeter tower. Clamp the tower in the soft-jaws of a vice and remove the six low-profile capscrews retaining the gear to the tower. If necessary use a temperature-controlled heat-gun to heat the bolt-heads and degrade the Loctite bond (NB: 120degC max to avoid damage to the alloy teeter-tower).
5. Using a nylon hammer carefully drift the gear off the spigot of the teeter tower.
6. Clean-up the gear mating surfaces using Amberklene LO30 solvent and a soft rag.
7. Position the ring gear on the new tower's spigot so that the witness-mark from the rotor brake is on the underside and the welded-plug is at the 11-o'clock position relative to the rotor axis
8. Replace the M8 low-profile screws using new M8 friction washers and Loctite 243. Progressively tighten the screws to 20Nm.
9. Temporarily fit the bolt into the aluminium collar and bond the temperature sensor into the collar with a bead of hot-melt adhesive RSD4659. When the adhesive has solidified the bolt may be removed.
10. Reassemble the ring-gear/teeter-tower to the rotor-head bridge using this collar, the new (special) castle-nut, the new bolt and plain washer. Holding the assembly in the vice as described in (1) above tighten to 160Nm +/-20Nm and fit the new split-pin supplied in the kit. Check that the ring-gear/tower rotates freely both with and without the bendix gear engaged. Adjust clearance by slackening the bearing nut and moving the head to suit, and re-tightening.
11. Fit the new split-pin supplied in the kit. Back-off to nearest split-pin hole is acceptable but minimum torque 140Nm must be realised. Fit pin in nut as shown in later bulletin photo.

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- (iii) Reassemble to aircraft
1. Offer the rotor-head assembly to the gimbal-block, engaging the pre-rotator shaft on its splines. Replace the pitch-pivot bolt so that its head is inside the roll arm and oriented so that its flats are held by the sides of the roll arm. Refit the washers, and castle-nut, tighten the nut to 15Nm then back-off so that the head moves freely and there is no free-play. Fit the split-pin.
  2. Reattach the pitch trim cylinder to its mast mounting using Loctite 243 and a new nyloc nut (M8).
  3. Refit the pneumatic pipes to the trim cylinder, confirming correct orientation
  4. Refit the pneumatic pipe to the bendix air-cylinder
  5. Refit the roll control cable and roll trim cylinder ensuring that the spacers are correctly positioned and orientated. Use Loctite 243 and a new nyloc nut (M6). Paint-mark the nut after tightening
  6. Refit the pitch control cable. In place of the damper rod-end a new 19mm conical spacer is used and this is provided in the conversion kit. It should be installed along with the original 19mm conical spacer as shown in the photograph below. Use Loctite 243 and a new nyloc nut (M8). Paint-mark the nut after tightening
  7. Refit the electrical cables to the rotor-speed sensor and rotor-bearing temperature sensor. Route and attach the cables with cable-ties so that they are clear of all mechanical movement.
  8. Using the control stick verify that the control system has full-and-free movement and correctly reaches the mechanical stops in pitch and roll. With the stick in mid-position, fully forward, the rotor head is set 1 degree to the left.
  9. Assess the stick force/stiction effect when moving aft and fwds. The stick should be moved slowly away from each end-stop until the "stiction" effect is overcome. The maximum allowable forces are: moving aft 0.9kg, moving fwds 2.1kg. NB: the difference in force is due to the weight of the rotor-head acting on the control cable. Process document PDCD-067 refers.
  10. Verify that the rotor head rotates freely without and binding or bearing noise.
  11. Switch on the a/c master switch and check that the trim/brake system functions correctly and that there is no leakage of air pressure. Set the rotor-brake fully on (stick will move forwards) and switch off the master switch.
  12. Refit the mast cowlings and upper engine cowl.
  13. Fit the new red end-cap rotor as described in the Pilots Handbook and Maintenance Manual, positioning the new shims provided against the appropriate dot-marks. Note that the new rotor has been tracked but in-flight balancing may be required – see below
  14. Remove the "Limitations" placard from the right side of the enclosure, clean the composite surface with Amberklene LO30 and fit the new placard
  15. Using a scalpel lift and remove the red segment placard/radial marker from the ASI. Wipe the perimeter surface of the ASI glass with a cotton bud or rag dampened with Amberklene LO30 and fit the new red radial marker across the end of the amber segment placard at 120mph.
  16. Complete the inspection sheet appended to this SB to ensure correct task completion
  17. Carry out flight test to verify that the new rotor system is satisfactorily balanced.

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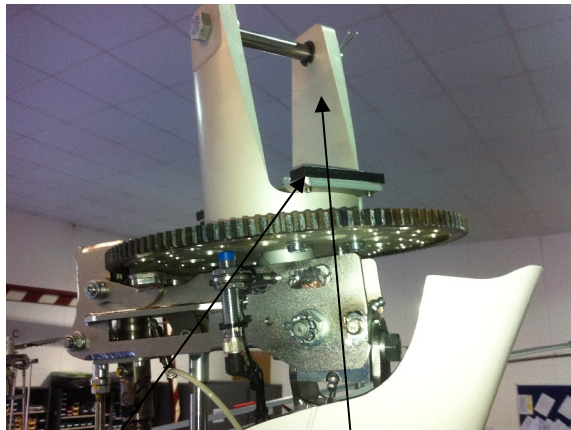
### Photographs



Calidus installation ready for removal



Original 18.8mm teeter-stop



Rotorsystem II 7mm teeter-stop. Note the 30mm taller tower.



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Head assembly held in bench-vice



Low-profile capscrews (6-plcs)



Installation kit C.RK38



Welded plug at 11-o'clock position to rotor axis



Top view of rotor bearing nut with split pin fitted.

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19mm conical spacers either side of pitch control cable

Note: Each coned end may be dressed with a fine file (by no more than 0.1mm/.004”) in order to fit the assembly between the side-plates of the rotor bridge. Ensure that the filed surface is square to the bore.



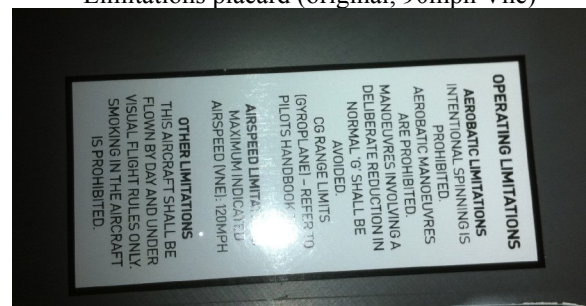
ASI placard (original, 90mph Vne)



Limitations placard (original, 90mph Vne)



ASI placard (120mph Vne)



New limitations placard stating 120mph Vne



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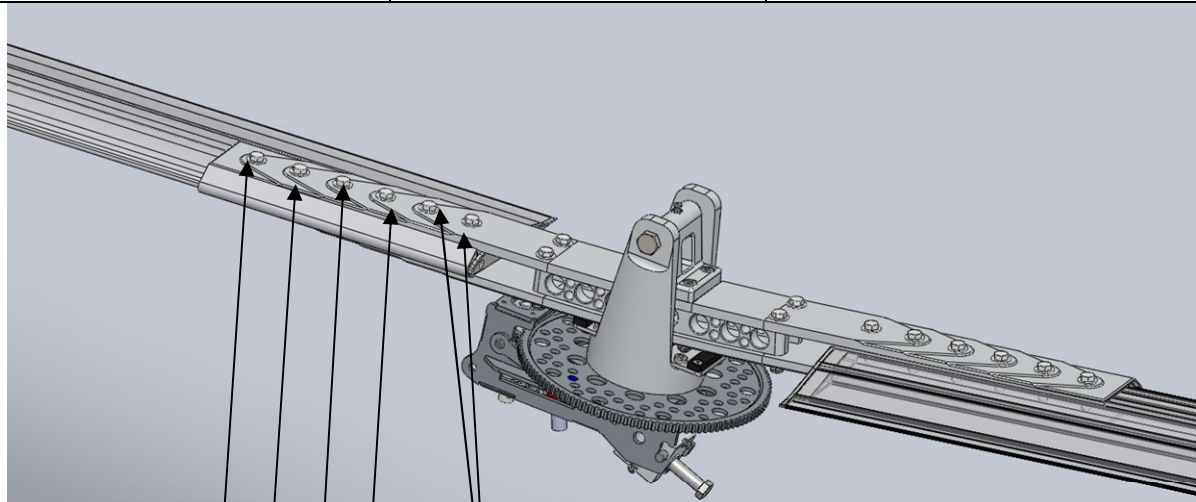
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Bolt BT3697, 49mm  
Bolt BT3698, 52mm  
Bolt BT3699, 55mm  
Bolt BT3670, 58mm  
Bolt BT661, 60mm long

Schematic view of Rotorsystem II. Note the different length bolts.

**WARNING!** It is important to fit the correct length bolt in the associated hole! Fitting the wrong length bolt may result in insufficient safety protrusion through the nylock nut, or that the nut jams on the shank of the bolt before the joint is properly tightened.

### Parts required to implement this service bulletin

C.RK38 (BG1895) Conversion kit Rotorhead II  
C.RK35 (BG1793) Red end-cap rotor assembly (8.4m)  
6-off M8 friction washer RSD6068  
2-off Split pin RSD6054  
2-off M8 nyloc nut RSD6009  
1-off M6 nyloc nut RSD6008  
RSD 4655 Amberklene LO30 solvent  
RSD4000 Loctite 243  
RSD4659 Hot-melt adhesive  
Cable-ties (as required)  
Wire-locking wire (as required)  
New placard for ASI (from placard set RSD4594)  
New limitations placard (from placard set RSD4594)

### Disposal of removed parts

Return to RSUK

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Intentionally blank

Effect on Pilots Handbook or Maintenance Manual?

Yes, Pilot's Handbook RSUK0060 issue 2 and Maintenance Manual RSUK0061 issue 3 released.

Service Bulletin Completion action:

Issue Permit Maintenance Release Certificate

CAA BCAR A3-7 Authorised Person to certify that the work is completed by writing 'SB-039 Rotorsystem II serial no.... fitted' in the aircraft logbook white pages, and record the action in the pink pages entitled 'Aircraft Modifications'. Both entries must be signed by the CAA Authorised Person with their CAA Authorisation number. If a primary control has been disturbed a second authorised person must check that the control system installation is correct and countersign the log-book together with their CAA authorisation number.

**OWNER ACTIONS**

This SB requires the re-issue of the aircraft permit to fly, and may NOT be operated with 120mph Vne until a replacement 'Conditions of Permit to Fly' has been issued by the CAA! It is the owner's responsibility to write to CAA Applications and Approvals to request this change, using the attached form.

*The technical content of this document is approved under the authority of the UK CAA  
Design Organisation Approval Ref: DAL/9917/06*

SB authorised by: (name, signature, and date of signature)

Quality Conformance Manager <i>[Signature]</i> 15/9/11	Engineering Manager <i>[Signature]</i> 15/9/2011	Chief Test Pilot (if flight performance or safety effect) <i>[Signature]</i> 15/9/2011	Structures (where required) <i>[Signature]</i> 15/09/2011
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Document completion date:	Issued to:	When	Issuer name	Signature
	Internal			
	CAA			
	Owners			



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## Service Bulletin

Appendix 1 to SB-039

Aircraft serial no.  Registration G-	<b>Service Bulletin implementation Worksheet</b>	Date raised:  Raised by:	
Purpose – record service bulletin implementation actions and return to service information.		Document reference: <b>SB-039</b>	
Aircraft Maintenance Manual (AMM) referred to and issue level/date:			
Note; attach SB sheets to this document			
<b>Task</b>	Notes	Eng'r check/date	Inspector check/date
Record serial number of rotor blades fitted as new items (i.e. zero time) <i>Delete as appropriate</i>	Blade serial no:  Blade serial no:  Rotor safe life is 2,500 hrs		
Confirm all electrical cables re-installed and cable-tied (Temperature sensor and rotor-speed sensor)			
Confirm trim cylinder pneumatic pipes re-installed and properly cable-tied.			
Confirm pitch and roll cables correctly refitted and control system limited by head stops. Confirm pitch and roll pivot bolt and main bearing bolt split pins in place (3-off items)			
Confirm rotor teeter action free and reaching teeter stops. Confirm teeter bolt split pin in place			
Confirm pre-rotator bendix engages and releases and that air-pipe is reconnected.			
Confirm all cowlings correctly re-attached			
Confirm stiction force to move the stick (item 9, page 3)			
Confirm placard changes made			
Confirm trim/brake function, rotor speed detection and bearing temperature indication satisfactory	Refer to Aircraft Maintenance Manual (AMM)		
Confirm logbook entries completed, with blade serial numbers shown			
Issue PFRC to release aircraft for flight-test (general handling and rotor balance as required). Balance rotors as described in AMM. When satisfactory sign PMR in aircraft log-book. Note: Flight test must be conducted by an approved Test Pilot			
Customer acceptance: Name:  Signature/date:	Aircraft hobbs meter reading  Confirm logbooks annotated:		
<b>Permit Maintenance Release: The work recorded above has been completed to my satisfaction and in that respect the aircraft is considered fit for flight.</b>			
Engineer/Inspector signature  Name: CAA Authorisation code :	Date of work  Location where work completed		

PLEASE FAX THIS BACK TO 01588650769 (or send by email to [info@rotorsport.org](mailto:info@rotorsport.org)).

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Appendix 2 to SB-039

<b>Permit Change Application</b>	
The purpose of this document is to provide sufficient information to the CAA to allow a change of the Permit to Fly to incorporate a specific aircraft modification or upgrade.	
Aircraft reg no <b>G-</b>	Aircraft serial No. <b>RSUK/</b>
AAN that has been incorporated: AAN29266 Addendum 1	Service Bulletin number incorporated: SB-039 Rotorsystem II and Vne increase to 120mph
Owners name and address	
Daytime telephone number	
Email	
Summary of change required: (cross out as required)	
Vne increase to 120mph by embodiment of SB-039 Rotorsystem II using new rotor assembly BG1793 (as approved under AAN29266 Addendum 1)	
Documents to be included with this application: Photocopy of aircraft and/or engine logbook pages with certifying signatures that confirm embodiment of the Service Bulletin(s) and Permit Maintenance Release certification. Existing CAA Permit to Fly. Application fee as specified in the CAA Scheme of Charges paragraph 6.1 ( <a href="http://www.caa.co.uk/application.aspx?catid=33&amp;pagetype=65&amp;appid=11&amp;mode=list&amp;type=subcat&amp;id=1">http://www.caa.co.uk/application.aspx?catid=33&amp;pagetype=65&amp;appid=11&amp;mode=list&amp;type=subcat&amp;id=1</a> )	
Send to: CAA Applications and Approvals Aviation House Gatwick Airport South West Sussex England RH6 0YR	