

MICROLIGHT AIRWORTHINESS APPROVAL NOTE

MAAN NO: 1633

ISSUE 2

DATE: 29 NOVEMBER 2006

TITLE: Microlight Airworthiness Approval Note 1633, Powerchute Kestrel - redesigned anchor plate assembly. (Mandatory)

REG: Initially: G-MYEX
Subsequently: All Powerchute Kestrel Aircraft

STAGE: Approval.

1. INTRODUCTION

The Powerchute Kestrel is a type approved microlight described in Microlight TADS BM 36.

This MAAN refers to a modification designed by BMAA CTO Guy Gratton, with technical oversight jointly by Medway Microlight's senior Stressman Martyn Ingleton, and partly by CAA Head of Loads and Dynamics Section, Jon Howes, and then manufactured by Medway Microlights, Middle Stoke, Rochester, Kent, ME3 9RN.

The modification is to redesign the anchor plate assembly, front struts, and wing suspension shackles. This is in response to investigations, after identification of severe cracking in the anchor plate of several low-hour examples of the type, which led to grounding of all aircraft of the type from 27 May 2002.

BMAA acknowledges with gratitude the considerable help given by Medway Microlights in the development of this modification.

This MAAN has been re-issued at issue 2 to optionally permit a reduced wall thickness for the front struts, part no. BM32/GBG/2002/1/4. The new optional wall thickness is 13 SWG (0.092" / 2.337 mm), down from 10 SWG (0.128" / 3.251mm). Outside diameter, all other dimensions and material specification remain unchanged.

2. BASIS FOR MODIFICATION APPROVAL

The basis for approval of this modification is BCAR Section S in the current amendment state on 26 November 2002, selecting the paragraphs which affect this modification.

The basis for approval of issue 2 (optional reduced wall thickness front struts) is BCAR Section S issue 3 paragraphs S303, S305, S307, S333/S337, S619/S625 and S627.

3. DESCRIPTION

The modification is described in attached drawings numbered BM32/GBG/2002/1 → BM32/GBG/2002/5. The following is the complete list of parts to be added to the aircraft:-

<u>List of Parts – Full mod kit</u>	
<u>Description</u>	<u>QTY</u>
Bolt AN6-17A	6
Bolt AN5-37A	2
Bolt AN5-6A	6
Bolt AN5-16A	8
Front strut, part No. BM32/GBG/2002/1/4	2
L-Bracket, part No. GBG/2002/1/3	2
New Anchor plate, part No. BM32/GBG/2002/3/1	1
Saddle Washer, A/C Spruce part S4452 or Maxair part S-216	2
Saddle Washer, Medway Part No. 1071 drilled through 3/8	2
Saddle Washer, Medway Part No. 1071 drilled through 3/8	6
Shackle block, part No. GBG/2002/1/2	4
Stiffnut 3/8 UNF	14
Stiffnut, 5/16 UNF	8
Tube insert, part No. BM32/GBG/2002/5/1	2
U-bracket, part No. BM32/GBG/2002/1/1	2
Washer, ID 3/8 x 1/16	28
XM Yachting Ltd Long D-shackle 10mm forged (AISI 316 / code 0243)	4

Note that the arrangement of all of these is given in the following five drawings:-

Dwg No.	Issue State	Issue Date	Title
BM32/GBG/2002/1	1.1	1 Oct 2002	Powerchute Kestrel New Alloy Parts
BM32/GBG/2002/2	2.0	9 Oct 2002	Powerchute Kestrel lower front strut fitment assembly
BM32/GBG/2002/3	1.1	1 Oct 2002	Powerchute Kestrel new anchor plate (1 per aircraft)
BM32/GBG/2002/4	1.1	1 Oct 2002	Powerchute Kestrel new anchor plate assembly (part exploded)
BM32/GBG/2002/5	1.0	9 Oct 2002	Powerchute Kestrel new alloy part

The front struts, part no. BM32/GBG/2002/1/4, may optionally be fabricated from reduced wall thickness tube: 13 SWG (0.092" / 2.337 mm), down from 10 SWG (0.128" / 3.251mm). Outside diameter, all other dimensions and material specification remain unchanged.

4. TECHNICAL INVESTIGATION

Technical investigation of the cracking found in Powerchute Kestrel aircraft was considered on a joint BMAA/CAA investigation to be primarily due to the use of cables between the forward lower seat frame and the leading edge of the anchor plate. These cables tended to compress in normal use, causing bending at the rear edge of the anchor plate, and leading to cracking in the bent trailing edge of the anchor plate. It was considered that this could be rectified by replacing these cables with rigid struts; however, during redesign the following other design faults were also identified and have also been rectified:-

- Use of non-smooth surface shackles, likely to be prone to fatigue, in the primary flight load path.
- Use of cut thread bolts, in tension, in the primary flight load path.
- Shear loads upon bolt threads.
- Use of scribed bend lines on the anchor plate, which is in the primary flight load path.

The resultant design, which replaces the front cables with struts, redesigns the anchor plate, uses smooth forged shackles, and eliminates any load on bolt threads, is considered to solve these potentially dangerous faults. Beyond an effective shortening of the control wires by approx. 1½” however, there is no significant alteration to the geometry of the aircraft.

Structural analysis has been done on the basis that at 4g x 1.5 safety factor, the flight load should be distributed between any two suspension points without any permanent deformation. This has been shown by analysis with sufficient reserve that physical structural testing is considered unnecessary.

Further to this, an aircraft modification kit has been made-up, fitted to the test aircraft G-MYEX, and inspected by the BMAA CTO and separately by a BMAA Senior Inspector. Both considered the fitment satisfactory.

The reduced wall thickness front struts have been analysed in a similar way to the original structural analysis and found to be satisfactory. The analysis is kept on file by the BMAA.

5. FLIGHT TESTING

The sample aircraft, G-MYEX has been test flown by a BMAA check pilot familiar with the type for 2 hours. No change in handling or performance, or any subsequent post-flight strain or damage was found.

6. MANUALS, PLACARDS AND INFORMATION

The latest version of this MAAN is to be annexed to the operators manual for each aircraft.

7. NOISE CERTIFICATION

Not affected.

8. RADIO

Not affected.

9. INSPECTION

To TADS BM 36 issue 4 (or any later version), this MAAN and drawings BM32/GBG/2002/1 → BM32/GBG/2002/5 as listed at part 4 above.

10. WEIGHT AND BALANCE

This modification increases the empty weight of the aircraft by 3.5kg.

The maximum permitted empty weight of the Powerchute Kestrel is 99kg. Therefore, any aircraft which at last weighing had an empty weight greater than 95kg should be re-weighed after fitment of this modification. Other aircraft must have a modified weight entry made into the airframe logbook.

Should any aircraft be found to have an empty weight greater than 99kg, then either weight reduction is required or the aircraft must be operated only as a single seater.

11. SIGNIFICANT FEATURES AND LIMITATIONS

The front strut and anchor plate assembly are redesigned in accordance with drawings BM32/GBG/2002/1 → BM32/GBG/2002/5. The main visual changes are that the steel cable front struts are now rising alloy tubes, the anchor plate flanges are longer, and the shackles to which the canopy is attached are now smooth surfaced.

12. CERTIFICATION

I certify that any Powerchute Kestrel modified in accordance with issue 1 or issue 2 of this MAAN is:

- No longer affected by the applicable CAA Mandatory Permit Directive issued on 27 May2002;
- Suitable for continued revalidation of a type-approved permit to fly.

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