**Registration:** G-XXXX  
**Owner’s name:** Mr X XXXX  
**BMAA #:** XXXX

<table>
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<tr>
<th>Aircraft type:</th>
<th>XXXX</th>
<th>Author (if different):</th>
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**Description:** Hypothetical repair to undercarriage, fuselage and tail-plane cover.

<table>
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<tr>
<th>Issue #</th>
<th>Date</th>
<th>Author</th>
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<td>17/12/2009</td>
<td>XX</td>
<td>First version</td>
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<td>1.1</td>
<td>18/12/2009</td>
<td>XX</td>
<td>Corrections to section 3</td>
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This template is intended to streamline the assessment of proposed repairs by the BMAA Technical Office by prompting the applicant to make a full and properly justified submission, and reducing the documentation that needs to be written by the BMAA Technical Office. Use of this template is optional.

- This document should be submitted with form BMAA/AW/002b: Application for Assessment by BMAA of Proposed Microlight Aircraft Repair.
- The size of this document should not exceed 1MB unless agreed with the BMAA Technical Office. Images should be converted to JPEG (or other suitable format) and compressed before being inserted.
- Applicants should expect to provide copies of all references in section 7.
SECTION 1 – DAMAGE REPORT

- Use this section to document the damage to the aeroplane.
- It is recommended that good quality photographs or drawings be embedded in the document.
- If close-up photographs are used ensure it is clear what the photographs are of; another (wider-angle) photograph or diagram is often more useful in this respect than just text.
- If appropriate (e.g. following a crash), include details of the inspections / tests performed to ensure that all damage has been discovered.

**Undercarriage and fuselage**

The aircraft landed heavily on the starboard main wheel. The starboard tyre burst, the starboard undercarriage leg buckled and the lower, starboard, fuselage longeron was dented where the forward undercarriage bracket is attached.

The fuselage is of welded, steel tube construction with Dacron covers. The cockpit has a plywood floor.

Figure 1.1 is a side view (from starboard) of the aircraft highlighting the location of dented longeron. Figure 1.2 is a close-up photograph of the dented longeron. The forward undercarriage bracket is welded to the longeron at a station (point at which tubes meet and are welded together). In addition to the dent in the longeron there is some cracking of the welds attaching the other tubes at the station. Slight deformation of the other tubes cannot be ruled out. None of the tubes are buckled or bent and the geometry of the fuselage frame has not been affected.

The cockpit floor has been removed and the Dacron covers removed from the damaged area so that the extent of the damage can be assessed.

![photograph unavailable](hypothetical repair)

**Figure 1.1:** side view of aircraft (from starboard) with location of damage to fuselage highlighted

**Figure 1.2:** photograph of dented longeron
Tail-plane

While recovering the aircraft to the hangar, the port stabiliser contacted the hangar door damaging the leading edge stitching and abrading the fabric on the leading edge near the tip.

The tail-plane is welded steel tube construction with Dacron covers.

Figure 1.3 is a top view of the tail-plane highlighting the location of the damaged fabric. Figure 1.3 is a close-up photograph of the damaged cover.

The covers have been removed so that the stabiliser frame can be inspected. There is no damage to the frame.

Figure 1.3: top view of tail-plane with location of damage to leading edge of cover highlighted

Figure 1.4: photograph of damage to sail
SECTION 2 – REPAIR OVERVIEW

- Use this section to provide an overview of the proposed repair.
- Do not provide detail here that should be provided in the following sections.
- This section should describe the proposed state of the aircraft post-repair; it should not include a step-by-step procedure for accomplishing the repair.

**Undercarriage**

Damaged undercarriage components will be replaced with new supplied by the manufacturer.

**Fuselage**

The damaged sections of fuselage tubes will be cut out and replaced with new sections spliced in using inner sleeve splices. A new undercarriage bracket will be welded on.

**Tail-plane**

A Dacron patch will be sewn over the damage to the stabiliser covers.
SECTION 3 – DESIGN CHANGES

- Use this section to describe, in detail, those parts of the proposed repair that change the design of the aeroplane.
- It is recommended that good quality drawings be embedded in the document when appropriate.
- Where possible, standard repair schemes should be used (reference external documents in section 7).

Fuselage

The station at which the forward starboard undercarriage bracket will be removed in its entirety by cutting the longeron forward and aft of the undercarriage bracket, and cutting the other three tubes that terminate at the station. New sections of tube will be spliced in using inner sleeve splices. See figure 3.1. Inner sleeve splices will be in accordance with AC 43.13-1b CHG 1 paragraph 4-95. See figure 3.2. A new undercarriage bracket will be welded on.

![Figure 3.1: proposed repair to fuselage. View from starboard and view from top, at left and right respectively. Inner sleeve splices highlighted.](image1)

![Figure 3.2: inner sleeve splice in accordance with AC 43.13-1b CHG 1 paragraph 4-95. (AC 43.13-1b CHG 1 figure 4-37 partial.)](image2)
Tail-plane

The port stabiliser cover will be repaired by sewing on a Dacron patch. In effect two patches will be attached – one to the top surface and one to the lower surface – which will then be sewn into the leading edge. See figure 3.3. Each patch will be attached to the covers using zigzag stitch of pitch 5mm on the three ‘external’ sides (rear and two short sides). The front (leading edge) side will be sewn into the leading edge using straight stitch of pitch 5mm.

Figure 3.3: proposed patch repair to stabiliser covers.
View from top and view from front, at left and right respectively.
SECTION 4 – REPLACEMENT PARTS / MATERIALS

- Use this section to describe the parts / materials to be used in the repair.
- Normally part numbers or material specifications / dimensions must be specified. Explain how these are known (reference sources in section 7). State from where the parts / materials are to be acquired.
- Parts / materials to be supplied by the aeroplane manufacturer specifically for the intended application normally need not be described in detail. The suitability of such parts / materials does not normally require further justification.
- If parts are to be fabricated engineering drawings must normally be provided (reference drawings in section 7). Explain from where the drawings were obtained or how they were generated.
- State whether dimensions have been determined by measuring or from documentation (reference sources in section 7).

**Undercarriage**

Damaged undercarriage components will be replaced with new supplied by the manufacturer.

**Fuselage**

The replacement fuselage sections and inner sleeves will be from AISI 4130N, chrome-moly, steel tube. The frame will be GTAW (TIG) welded using ER70S-2 filler. These are the materials from which the fuselage was originally constructed. See reference 1 and reference 2.

The wall thicknesses of the tubes are not known but the tubes are known to be in imperial dimensions. See reference 1 and reference 2. Suitable replacement tubes and inner sleeves will be selected once the tubes are cut and their wall thicknesses can be measured.

A new undercarriage bracket will be sourced from the manufacturer.

**Tail-plane**

The Dacron patches will be cut from Dimension-Polyant 170 TNF MT, which is the sailcloth from which the covers were originally constructed. See reference 3.

The covers were originally sewn using a Polyester thread. This repair will be implemented using Tenara (PTFE) thread. Unlike Polyester thread, Tenara thread is UV-stable. Tenara thread is now widely used on UK microlights with unpainted fabric coverings. See reference 5 and reference 6.
SECTION 5 – REPAIR PROCESSES AND PROCEDURES

- Use this section to describe fabrication processes and any key procedures.
- Processes and procedures of particular interest are those that are not satisfactorily inspectable after completion or where it is not intuitive how the end result will be achieved.
- It is not normally necessary to describe the whole repair procedure step-by-step.

Fuselage

The welding will be performed by a CAA-approved welder. His approval includes sheet-to-tube and tube-to-tube TIG welding of carbon steels.

The fuselage will be accurately measured before the damaged tubes are removed so that the geometry can be checked post-repair. This is valid because the geometry of the fuselage frame has not been affected (the damaged tubes are dented, but not buckled or bent). Also, the affected longeron will be rigidly clamped either side of the damaged section prior to removal to minimise the chance of the fuselage warping when the section is removed.

Tail-plane

The repair will be performed by the sail loft of an A1 UK flex-wing manufacturer.

The cover will be removed from the aircraft and the trailing edge seam unpicked so that the covers can be opened out. The leading edge seam will then be unpicked in the area of the damage before the patches are sewn on. The leading edge seam will then be re-sewn in the area of the damage. The trailing edge seam will then be re-sewn.
SECTION 6 – TECHNICAL JUSTIFICATION

- Use this section to justify design changes, changes to material specifications and/or dimensions, and use of non-approved parts.
- Repairs are normally justified by comparison with the original design. For instance, repairs to damaged structure are normally justified by demonstrating that the strength of the original, undamaged structure is regained.
- Repairs may also be justified by demonstrating compliance with the appropriate requirements in the approval basis (e.g. BCAR Section S) directly.
- Normally the same form, fit and function is satisfactory justification for the suitability of a replacement for a non safety-critical item.

Fuselage

The only changes to the design are the inner-sleeve splices in the tubes converging on the station (to which the forward starboard undercarriage bracket is attached). These splices will be in accordance with AC 43.13-1b CHG 1 paragraph 4-95. Therefore the strength of the original, undamaged structure will be regained.

Tail-plane

The patches will be cut from the same specification sailcloth as the covers were originally constructed. The patches will be attached using a 5mm pitch zigzag stitch pattern. This is stronger than the 5mm pitch straight stitch pattern with which the leading edge is closed. See reference 5 and reference 6. Therefore the leading edge seam remains critical and the strength of the original, undamaged cover is regained.

The strength of the original Polyester thread is not known (however the strength of Tenara thread is believed to be comparable to the strength of Polyester thread in general). The suitability of the Tenara thread will be demonstrated by Betts testing the finished seams to the load specified in the TADS.
SECTION 7 – REFERENCES

- Use this section to list all references.

1. Email from owner to manufacturer dated 8 December 2009.
2. Email from manufacturer to owner dated 12 December 2009.
4. AC 43.13-1b CHG 1.
5. Email from owner to A1 flex-wing manufacturer dated 8 December 2009.