MAINTENANCE MANUAL

Manufacturer: AirBorne WindSports Pty Ltd
Unit 22/30 Kalaroo Rd
Redhead, NSW 2290
Australia
Phone: + 61 2 4944 9199
Fax: + 61 2 4944 9395
Website: http://www.airborne.com.au/

DATA PACKAGE
This manual constitutes one part of the complete data package that accompanies the aircraft. Following is a list of the components making up the data package.

• **Aircraft Operating Instructions**	
• **T-Lite Maintenance Manual**	
• **T-Lite Illustrated Parts Catalogue**	
• **Wing Maintenance Manual**	+
• **Wing Illustrated Parts Catalogue**	
• **Engine Owners Manual**	
• **TinyTach Manual**	
• **Variometer Manual – if installed**	
• **Parachute Manual – if installed**	

Table 1 Core Data Package

AMENDMENT RECORD SHEET

Amendment Date	Affected Sections	Affected Pages	Date Inserted	Signature

Table 2 Amendment Record Sheets

NOTE
Airborne data packages will be revised from time to time. Owners registered on AirBorne's database will be notified of any changes to data and directed to the AirBorne web site (http://www.airborne.com.au/) for the applicable pages. The amended pages should be printed and the prior page replaced in the folder as soon as possible. The amendment table should at that time be updated with the appropriate details and date. Revised pages will be sent by mail if requested.

LOG OF ALL EFFECTIVE PAGES

Page	Issue	Date	Page	Issue	Date

Table 3 Log Of Effective Pages

INTRODUCTION

This manual contains factory recommended procedures and instructions for ground handling, servicing and maintaining the CORE wing. The procedures described are to be used in conjunction with those required by the National Airworthiness Authority (NAA) of the country of registration. Any NAA maintenance requirement takes precedence over this manual.

This manual should be used in conjunction with a certified base, and therefore the operator is directed to reference the base maintenance manual for any issues that are related to the base component of the aircraft.

NOTE
Where the aircraft is operated under Part 103 certification, the maintenance standards as prescribed in this manual are recommended but not mandatory.

Skills

Only people with an adequate skill level should perform maintenance on this aircraft. A sound understanding of mechanical systems, and good experience with the necessary tools and procedures is required - as the continuing airworthiness of the aircraft relies on the competence of the person performing the maintenance. Assessment and judgement of the condition of each individual component is required, which necessitates a sound understanding of the purpose of each component in the system. All maintenance and repairs must be carried out in accordance with good aeronautical practices.

Skills and authorisations specific to Special Light Sport Aircraft

Maintenance tasks are rated in the categories listed below, according to the applicable category of registration and skill levels required to perform those tasks:

Owner— FAA regulations authorize SLSA aircraft owners who hold at least a sport pilot certificate to perform maintenance as outlined in 14 CFR Part 43. To perform inspections on aircraft condition, functional checks and maintenance in between inspections carried out by LSA Repairman Maintenance certificate holders.

LSA Repairman Maintenance— This certification authorizes a certificate holder to perform line maintenance, repairs and alterations to S-LSA as the task allows. Includes 100 hourly and yearly inspections on S-LSA.

A&P—Mechanic Certificate with airframe and or power-plant rating. To perform heavy maintenance on airframes or power-plant as the rating allows.

Task Specific—Applicable to the following ratings:

LSA Repairman Maintenance with appropriate task specific training or;

A *Mechanic Certificate* with appropriate task specific training.

Authorizes the holder of mechanic certificate or a repairman certificate who has received task specific training, to perform the tasks approved under that training. Allows a repairman certificate holder to perform, heavy maintenance, repairs and alterations on the SLSA.

E.g. The Mechanic Certificate holder may obtain Task Specific training on Bailey engines, to allow overhaul etc.

Skills and authorisations specific to Experimental Special Light Sport Aircraft

LSA Repairman Inspection— To perform line maintenance and inspections to be completed on an E-LSA by a responsible owner, who holds an FAA repairman certificate (light sport aircraft), with an inspection rating or equivalent.

There are no requirements for minimum certification to perform any other task on an experimental aircraft. However, Airborne recommend that only people with an adequate skill level should perform maintenance on this aircraft as described at the start of this section.

Other Categories of Registration

This aircraft is a Light Sport eligible aircraft. This manual is created to be compliant to the standards applicable to Special Light Sport Aircraft.

The category of registration may be quite varied; as such the maintenance requirements of this aircraft are to be applied in conjunction with the requirements of the National Airworthiness Authority (NAA) of the country of registration. Any NAA maintenance requirement takes precedence over this manual.

In the event that the owner is permitted to perform maintenance in their country and category of registration, if there are any doubts regarding the required and appropriate maintenance then the safety of the aircraft may be jeopardised in continuing with self-maintenance. In this situation an Airborne Dealer should be contacted for the correct procedures and or servicing.

Tooling

There are no specialised tools needed for the maintenance described in this manual, following is a list of the type of tools that may be required.

- Open ended Imperial Spanner set
- Open ended Metric Spanner set
- Bettsometer Instrument
- Various general care items, specified where needed
- Socket Set Imperial and Metric
- Medium Phillips head screwdriver

This list may not be comprehensive.

Format

The manual has been prepared using the ATA format, which provides a standard layout of the chapters to be included, and their content. Some of the chapters are not included as they are deemed to be not applicable to this aircraft.
The information in this manual is based on the data that was available at the time of its publication. The latest amendments to this manual will be issued on the Airborne website in PDF format. This should be printed out and added to the manual. Therefore it is important that operators keep a regular check on the website for any amendments that have been made. If any errors or omissions are found in this manual please advise the factory.

Service Difficulty Reporting

Any service difficulties or defects should be reported to Airborne using the form contained in appendix A.

WARNING

THE INFORMATION IN THIS MANUAL NEEDS TO BE FOLLOWED, AND IT IS NOT ACCEPTABLE TO MAKE CHANGES TO THE MATERIALS AND OR PHYSICAL FEATURES OF THIS AIRCRAFT. IN PARTICULAR THE GRADES OF BOLTS THAT HAVE BEEN UTILISED IN THE MANUFACTURE OF THIS AIRCRAFT ARE CRITICAL FOR ITS CONTINUING AIRWORTHINESS. NEVER REPLACE BOLTS WITH ANY OTHER SIZE OR GRADE. GRADE 8 BOLTS ARE NOT INTERCHANGEABLE WITH AIRCRAFT (AN) GRADE BOLTS. THE FATIGUE CHARACTERISTICS OF AIRCRAFT GRADE BOLTS ARE SUPERIOR TO OTHER BOLTS AND ALLOW LONGER SAFE SERVICE LIFE UNDER CYCLIC LOADS LIKE THOSE EXPERIENCED IN AIRCRAFT. THE LENGTH OF THE BOLT IS IMPORTANT. IF A SHORTER BOLT IS USED THE THREAD MAY ENCROACH ON THE LOAD BEARING AREA, WHICH INCREASES THE STRESSES EXPERIENCED BY IT.

MANDATORY SERVICE BULLETINS

AS THE SERVICE HISTORY OF THE AIRFRAME EVOLVES AIRBORNE WILL FROM TIME TO TIME ISSUE AIRBORNE DIRECTIVES, WHICH DETAIL ANY CHANGES TO THE MAINTENANCE MANUALS, PILOT'S OPERATING HANDBOOK, OR ANY OTHER DETAILS THAT AIRBORNE DEEMS NECESSARY FOR OWNERS TO BE NOTIFIED OF.
THE WEB ADDRESS FOR AIRBORNE DIRECTIVES IS:
HTTP://WWW.AIRBORNE.COM.AU/
IT IS THE RESPONSIBILITY OF THE OPERATOR TO KEEP UP TO DATE WITH ANY ROTAX DIRECTIVES THROUGH THE ROTAX WEBSITE.

USE OF METRIC/ IMPERIAL UNITS

This Service Manual uses the metric unit system as the basic system of measurement. Where common usage or available instrumentation refer to the Imperial system, both units are quoted. The following conversion factors are presented as a ready reference to the conversion factors that have been used in this manual.

1 Pound (lb)	=	0.4536 Kilogram (kg)
1 Pound per sq in (psi)	=	6.895 Kilopascal (kPa)
1 Inch (in)	=	25.4 Millimetres (mm)
1 Foot (ft)	=	0.3048 Metre (m)
1 Statute mile	=	1.609 Kilometres (km)
1 Nautical mile (NM)	=	1.852 Kilometres (km)
1 Millibar (mb)	=	1 Hectopascal (hPa)
1 Millibar (mb)	=	0.1 Kilopascal (kPa)
1 Imperial gallon	=	4.546 Litres (l)
1 US gallon	=	3.785 Litres (l)
1 US quart	=	0.946 Litre (l)
1 Cubic foot (ft^3)	=	28.317 Litres (l)
1 Degree Fahrenheit (F)	=	(1.8 X C)+32
1 Inch Pound (in lb)	=	0.113 Newton Metres (Nm)
1 Foot Pound (ft lb)	=	1.356 Newton Metres (Nm)

Table 4 Imperial / Metric Conversions

CONTENTS

AMENDMENT RECORD SHEET **3**
USE OF METRIC/ IMPERIAL UNITS **8**
CONTENTS **9**
Tables **10**
0. ASSEMBLY AFTER SHIPPING **11**
0. ASSEMBLY AFTER SHIPPING **11**
4. AIRWORTHINESS LIMITATIONS **13**
5. TIME LIMITS/MAINTENANCE CHECKS **14**
6. DIMENSIONS AND AREAS **41**
9. GROUND HANDLING **42**
10. DERIGGING **43**
11. REQUIRED PLACARDS **43**
20. STANDARD PRACTICES - AIRFRAME **43**
27. FLIGHT CONTROLS **46**
57. WINGS **46**
95. SPECIAL PURPOSE EQUIPMENT **55**
APPENDIX A – Condition Inspection Checklist **56**
APPENDIX B – Feedback Form **57**

Figures

Figure 1 Insertion of Rear Leading Edges 11
Figure 2 Locating Sail Webbing on Rear Leading Edges 12
Figure 3 Assembling control frame 22
Figure 4 Standing glider on control frame and spreading wings 22
Figure 5 Removing pull back bungie 23
Figure 6 Removing zip tie and under surface zipper 23
Figure 7 Removing Nose Webbing 24
Figure 8 Removing pull back quick clip 24
Figure 9 Removing rear top wire 24
Figure 10 Removing king post 25
Figure 11 Removing top and bottom side wires 25
Figure 12 Removing top front wire 26
Figure 13 Removing sail webbing loops 26
Figure 14 Removing Rear Wires 27
Figure 15 Removing airframe 27
Figure 16 Preparing airframe for fitting sail 28
Figure 17 Sliding leading edges into sail 29
Figure 18 Inserting keel into sail 29
Figure 19 Sliding leading edges out the tips of the sail 30
Figure 20 Sliding keel pocket into place 30
Figure 21 Sliding sail completely onto airframe 31
Figure 22 Spread The Wings Apart 32
Figure 23 Locate Tip Webbing 34
Figure 24 Fitting front top wire 33
Figure 25 Fitting undersurface zipper 33
Figure 26 Fitting undersurface safety zip tie 34
Figure 27 Fitting top and bottom side wires 35
Figure 28 Routing pull back wires and attaching rear top wire 35
Figure 29 Fitting pull back quick clip 36
Figure 30 Attaching king post 36
Figure 31 Fitting battens 37

Figure 32 Tying pull back bungie and pulling tension 37
Figure 33 Attaching sail webbing tangs at the nose junction 38
Figure 34 Attaching front bottom wires 38
Figure 35 Major Dimensions of Airframe 41
Figure 36 Inserted Batten End Unloaded Angle Check 48
Figure 37 Batten End Fitting Dimension Check 48
Figure 38 Bettsometer Instrument 51
Figure 39 Adjusting Batten Tension 54

Tables

Table 1 Core Data Package 2
Table 2 Amendment Record Sheets 3
Table 3 Log Of Effective Pages 4
Table 4 Imperial / Metric Conversions 8
Table 5 Airframe Limitations 13
Table 6 Maintenance Privileges 16
Table 7 Scheduled Maintenance 20
Table 8 Airborne Final QA Inspection Sheet 40
Table 9 Dimensions and Areas 42
Table 10 Torque settings for the wing 44
Table 11 Tuning Procedure 53

0. ASSEMBLY AFTER SHIPPING

00.00.00 Wing Assembly After Shipping.

This procedure is to be followed if the wing arrives in a short packed configuration. An approved dealer is responsible for assembly from the short packed configuration. The short packed wing has had the rear leading edges removed to reduce the packed size for transport.
The correct reassembly of the wing is critical for safety and performance of the wing. If there are any doubts about the correct procedure for assembly after shipping contact AirBorne.

00.10.00 Reassembly Guide

Remove wing from box
Ensure that all staples are removed before pulling the wing from the box. Damage to the sail may result if caught on box staples.

Unzip bag
Remove padding from the nose of the wing. Remove all wing straps. Remove padding from control bar and rear leading edges.

Spread Leading Edges
Spread both leading edges approximately ½ metre. Remove the tip bags, which have been used as protection on the rear of the front leading edges.

Insert Rear Leading Edges
NOTE
Insert rear leading edges in the correct side (left and right hand sides are marked) with the slot positioned horizontally.

Figure 1 Insertion of Rear Leading Edges

The rear leading edges are located with their slots and held in place by the sail loops.

Figure 2 Locating Sail Webbing on Rear Leading Edges

CAUTION

ONCE INSTALLED THE REAR LEADING EDGE SLOT SHOULD BE LOCATED ON THE CHANNEL HORIZONTAL BOLT. IT IS IMPOSSIBLE TO ROTATE THE LEADING EDGE IF CORRECTLY INSTALLED.

Assemble

Assemble in accordance with section 4 of the Aircraft Operating Instructions.

Preflight

CAUTION

A THOROUGH AND COMPLETE PREFLIGHT IS ESPECIALLY NECESSARY AFTER REASSEMBLY. THOROUGHLY CHECK ALL NUTS AND BOLTS (REFER TO SECTION 5 FOR TORQUING PROCEDURES BEFORE TIGHTENING ANY NUTS), WIRE ROUTING, SAIL FIT, MYLAR SHAPE AND OVERALL SYMMETRY OF THE WING BEFORE FLIGHT.

Preflight as described in section 4 of the Aircraft Operating Instructions paying particular attention to possible damage to the airframe during transport.

4. AIRWORTHINESS LIMITATIONS

4.00.00 General

This section sets forth each mandatory replacement time, structural inspection interval, and related structural inspection procedure required for type certification.

4.20.00 Airframe Limitations

Component	Maintenance Period	Requirement
Heart Bolt	100 hours	Mandatory Replacement
Wires and attachment fittings	2 years or 200 flying days	Replace or overhaul
Sail	1000	Mandatory Replacement

Table 5 Airframe Limitations

The maintenance periods are based on service history from Airborne's service experience of our range of weight-shift microlights and hang gliders. The time maintenance periods that have been defined do not take into account any extreme loads, which will reduce the fatigue life of the airframe. Hard landings, dropping while packed up, and any other unusual treatment requires thorough inspection of all parts of the airframe.

As the service history of the airframe evolves these time life estimates are expected to be revised. Amendments should be checked for regularly.

5. TIME LIMITS/MAINTENANCE CHECKS

5.00.00 General

The time limits and maintenance schedule provided are in addition to any regulation of the governing body where the aircraft is being flown. The pilot of the aircraft must ensure that the required maintenance is carried out and documented in the correct manner.

Airborne nanolights have been designed to permit easy inspection, and operators should have no difficulty in assessing problems or recognising damage if visual checks are carried out correctly.
Maintenance checks may require partial disassembly of the wing. Inspection should include a thorough visual check of the condition of the component and the attachment point in adequate lighting conditions. Cleaning of the component may be required for proper inspection. Significant scratches, cracks, galling, corrosion or any other mechanical wear of the component is reason for replacement. The sail requires special attention to the condition of the fabric, and Bettsometer tests will be required after significant amounts of environmental exposure to things such as UV radiation, chemicals and heat, as well as mechanical wear (and or tears). For instructions on Bettsometer testing see Section 57.30.10 Bettsometer Testing.

The Aircraft Operating Instructions Section 4.3 details checks required prior to each flight.

Extreme operating conditions may reduce the time limits for components. Unscheduled maintenance is detailed in Section 5.50.00. AirBorne will from time to time amend these maintenance checks as the service history of the aircraft evolves. It is the responsibility of the pilot to ensure compliance with new directives. Information is published on the Airborne website:
http://www.airborne.com.au/pages/directive.php

5.00.10 Inspection Notes

Installation & Removal
When removing or installing tubing do not bend or force tubes.

Inspection
Inspect tubing for cracks, damage from abrasion, elongated holes or distortion in tube surface. Inspect holes in tubing and corners / radiuses for cracks during scheduled inspections. Ensure that the areas are clean. A 10X magnifying glass and good lighting will improve this visual inspection for cracks.

WARNING
NEVER ATTEMPT TO REPAIR TUBING. ALWAYS REPLACE WITH A GENUINE NEW PART.

Corrosion
Inspect tubing for corrosion inside and out. Discolouration of the metal may indicate corrosion. Salt is the most common cause of corrosion during coastal operation. Parts affected by salt must be stripped and thoroughly cleaned before reassembly. The cause of the corrosion must be identified and eliminated. If corrosion (pitting or oxidation) is present the component must be removed and replaced with a new part.

Exposed wires may be protected from corrosion by applying water dispersant such as WD 40, RP7 or Inox using a rag wetted with the water dispersant. Such treatment is only required in corrosive environments. Preventative treatment may be applied as required.

Is Replacement
Aluminium tube comes in many different sizes and grades. As sections of the airframe are manufactured from tube made specifically to Airborne's specification it is important that only genuine replacement parts as supplied by Airborne WindSports Pty. Ltd are used.

Airframe Bolts
All airframe bolts are either aircraft quality or high tensile bolts. If it necessary to replace any bolts or nuts it is important that the specification of the original bolt are matched when a replacement is selected. This applies not only to the grade of the bolts but to the length as well.

Installation & Removal
- After tightening, all bolts should have thread protruding out of the nyloc.
- All self-locking nuts should not be installed more than 2 times.
- Be sure not to over-torque bolts when installing.
- Check assembly instructions for correct bolt placement, eg insert from front to back.

Inspection
Check bolts for worn shanks, bad threads or corrosion.

Wire Inspection
Inspection of wires should include inspection of the whole length of wire for corrosion and broken strands, and condition of the wire around thimbles and through swages. Inspection should also concentrate on any areas where the wires come into physical contact with other components. These areas may cause stress concentration and mechanical wear. Some areas may need to be partially disassembled to fully inspect wires. Kinks created during packing up, transport and storage should also be checked. Any degradation of wires requires replacement.

5.20.00 Scheduled Maintenance Checks

General care should include:
- Washing down tubes with warm water and a light detergent followed by rinsing with fresh water.
- Fabric sponged with warm water and a mild detergent and rinsed with fresh water.

Apart from the consequences of heavy landing, or of exceeding flight limitations, the major factors requiring attention are corrosion, fatigue, wear, UV exposure and heat.
There are no known fatigue problems with Airborne nanolights, but excessive loads and vibration can weaken the structure. Regular inspection for hairline cracks in areas under high stress, such as bolt holes and tube junctions is recommended.
Many components can be replaced with ease, for difficult repairs or if the repair process is not fully understood consult your Airborne Dealer or the Airborne factory.
The registration of nanolights is only valid provided that all necessary maintenance, modification and service requirements are fulfilled.

These requirements include:
(a) Maintenance of aircraft as per the Maintenance Schedule in this manual.
(b) Modifications as detailed in any relevant Service Bulletins.
(c) Modifications to approved details, obtained from Airborne WindSports Pty. Ltd.
(d) Repairs necessary to replace minor damage, wear or ageing.
(e) Servicing, replacement and overhaul, inspection and checking in compliance with the Maintenance Schedule.
(f) Any Airworthiness Directory (AD) issued by CASA or the NAA of the country of registration

5.20.01 Maintenance Privileges

This manual lists tasks to be performed on the maintenance schedule. The minimum qualification required to perform that task is prescribed. A simple explanation of maintenance privileges permitted according to LSA category of registration is described in the table below:

	Experimental LSA				Special LSA			
	Sport Pilot	Owner Sport Pilot	LS – I Sport Pilot	LS - M / A&P / part 145 repair	Sport Pilot	Owner Sport Pilot	LS – I Sport Pilot	LS - M / A&P / part 145 repair
Modifications								
Daily Inspections								
Preventative Maintenance								
Repairs, Major Maintenance.								
100 hour inspection								
Annual Inspection								

Authorized to perform.

May perform only if the Repairman Inspector is the owner of the aircraft.

May perform only if the modification is included in the aircrafts Maintenance Manual or if the repairman is authorized to do so by the manufacturer.

May perform if the Repairman Inspector is the owner of the aircraft and not using the aircraft for compensation (training or towing), or

When using the Experimental aircraft for compensation (Training or towing) until January 31 2010, the inspection must be performed by an LS - M / A&P or part 145 repair facility.

Not authorized to perform.

Table 6 Maintenance Privileges

_____

Note that owners and pilots are permitted to perform preventative maintenance tasks as prescribed by FAR document: Part 43, Appendix A Sec. A43.1

Limitations Due to Registered Category

S-LSA

Maintenance on a Special LSA, 100 hourly and annual inspections are to be performed by the holder of a LSA Repairman Maintenance certificate or an appropriately rated A&P mechanic.

Note: owners and pilots are permitted to perform preventative maintenance tasks as prescribed by FAR document: Part 43, Appendix A Sec. A43.1

E-LSA

The owner of an aircraft registered as an Experimental LSA has operations limited to private use and has additional maintenance privileges.

The 100 hourly or annual inspections on an E-LSA are to be performed by:

a) the holder of a LSA Repairman Maintenance certificate, or

b) an appropriately rated A&P mechanic, or

c) the owner when the owner is the holder of a LSA Repairman Inspection certificate.

The pilot of the E-LSA aircraft is responsible to see that the maintenance and inspection has been performed on this aircraft as per the maintenance schedules prescribed in this maintenance manual. The maintenance schedule tasks remain applicable, where there is no minimum level of qualification required to perform maintenance on E-LSA, however a minimum skill level continues to apply to tasks. Only people with an adequate skill level should perform maintenance on this aircraft. A sound understanding of mechanical systems, and good experience with the necessary tools and procedures is required - as the continuing airworthiness of the aircraft relies on the competence of the person performing the maintenance. Assessment and judgement of the condition of each individual component is required, which necessitates a sound understanding of the purpose of each component in the system. If there are any doubts regarding the required and appropriate maintenance then the safety of the aircraft may be jeopardised in continuing with self maintenance. In this situation an Airborne Dealer should be contacted for the correct procedures and or servicing.

All maintenance and repairs must be carried out in accordance with good aeronautical practices.

5.20.02 Description of Task Classification

Preventative Maintenance

The preventative maintenance that is permissible to be performed by pilot certificate holders is defined in FAR document Part 43, Appendix A Sec. A43.1.

Line Maintenance

Line maintenance includes inspections, servicing of fluids. Tasks where specific instructions are described in the manual that do not require specialised training, for replacement, repair of parts and structure or alterations described in the manual. Includes compliance with service directives that prescribe repairmen as the minimum qualification to perform the task.

Heavy Maintenance

Heavy Maintenance tasks are tasks that require a repairman rating with specialised training or Mechanic with A&P rating, such as major engine work, repair of landing gear assemblies. It also includes alterations to structure where instructions are provided in the manual, such as fitment of an undercarriage kit or a tow kit.

5.20.03 Qualification Descriptions

Certification Required to Perform Light Sport Aircraft Maintenance Tasks

[O] **Owner** – Items that can be expected to be completed by a responsible owner who holds a pilot certificate but who has not received any specific authorized training.

[R] **E-LSA Repairman Inspection** – Applicable to E-LSA registration. Repairman Inspection— Items that can be expected to be completed on an ELSA by a responsible owner, who holds an FAA repairman certificate (light sport aircraft), with an inspection rating or equivalent.

[R] **S-LSA Repairman Maintenance** – Applicable to S-LSA registration. Repairman Maintenance— Items that can be expected to be completed on a S-LSA or E-LSA by a responsible individual, who holds a FAA repairman certificate (light sport aircraft), with a maintenance rating or equivalent.

[A&P] **Mechanic Certificate** with **Airframe** and or **Powerplant** Training - A&P – items that can be expected to be completed by a responsible individual who holds a mechanic certificate with airframe or powerplant ratings, or both, or equivalent.

[RS] **Part 145 Repair Station** – Items that can be expected to be completed by a responsible organization that holds a part 145 repair Station approval.

[TS] **Task Specific** – Items that can be expected to be completed by a responsible individual who holds either a mechanic certificate or a repairman certificate and has received task specific training to perform the task. When specifying the "task specific" level of certification, the specific training is also specified where it is appropriate.

Note that **dealers may be authorized** by the manufacturer to perform a maintenance or modification task for which they are specifically trained. These tasks are not necessarily included in the Maintenance Manual.

This Maintenance manual is created with the focus to maintain Special Light Sport Aircraft (S-LSA). This category of registration allows the aircraft to be used for hire and reward. Maintenance requirements are given in the maintenance schedule tables. Note that the level of qualification is given for each of the tasks.

Notice that this manual prescribes owner maintenance and repairman maintenance. The minimum applicable repairman ratings for each category of registration are as follows:

E-LSA registered - LSA Repairman Inspection certificate **(LS-I)**.

S-LSA registered - LSA Repairman Maintenance certificate **(LS-R)**.

In both cases of E-LSA and S-LSA, a person who holds a mechanic certificate with A&P rating, or a part 145-repair station may perform maintenance and inspections on the LSA.

The 100 hourly or annual inspections on a S-LSA are to be performed by the holder of a LSA Repairman Maintenance certificate, or an appropriately rated Mechanic with Airframe and Powerplant (A&P) rating, or a part 145 Repair Station.

The holder of a sport pilot certificate may perform preventive maintenance on an aircraft owned or operated by that pilot and issued a special airworthiness certificate in the light-sport category. Items of preventative maintenance that may be performed by an owner are listed in FAR 43 appendix A, Section A43.1 (c)

5.20.05 Maintenance Task Legend

Your nanolight should be maintained in accordance with the following schedules. When registered under LSA, the following schedules are mandatory. The following codes are used in these schedules:

Code

1 Oil, lubricate, clean and service.
2 Check as directed.
3 Check for insecurity, cracks, wear legibility and faulty operation.
4 Remove, inspect and replace if necessary.
5 Recommend replacement or overhaul.
6 Mandatory Replacement
7 Refer to engine manual and engine maintenance logbook.

Certification required to perform Light Sport Aircraft maintenance tasks

[O] Owner
[R] E-LSA Repairman Inspection (experimental registered aircraft only)
[R] S-LSA Repairman Maintenance
[A&P] Mechanic Certificate Airframe and or Powerplant
[TS] Task Specific

5.20.06 Log Book

When maintenance is performed always fill out the appropriate check sheet supplied in Appendix A at the rear of this maintenance manual. The aircraft logbook should also be filled out when maintenance has been done.

When Service Bulletins have been completed both the maintenance manual and the log book should be filled out. A copy of the Service Bulletin form should be sent to the factory to be stored with the aircraft QA papers.

A separate maintenance manual is supplied with the trike base. The wing maintenance log should be filled out in the wing maintenance manual and aircraft log book.

5.20.10 Wing Airframe Maintenance Schedule

WING MAINTENANCE SCHEDULE Inspection Items	Manual Section Reference	HOURS OF OPERATION									
		100	200	300	400	500	600	700	800	900	1000
Sail Bettsometer testing	57.30.00		2[R]		2[R]		2[R]		2[R]		2[R]
Wing sail fabric & stitching	57.30.00	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]
Wing sail attachment points	57.30.00	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]
Tip assembly and webbing.	00.10.00	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]
Inspection zips operational	As directed	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]
Batten fitting latches secure	57.10.00	3[R]	3[R]	3[R]	3[R]	3[R]	3[R]	3[R]	3[R]	3[R]	3[R]
Check battens against template	57.40.00	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]
Wires & attachment fittings	As directed	3[R]	3[R]	3[R]	3[R]	4[R]	3[R]	3[R]	3[R]	3[R]	6[R]
Leading edges, keel, cross bars and down tubes for straightness, dents and corrosion	As directed	2[R]	2[R]	2[R]	2[R]	4[R]	2[R]	2[R]	4[R]	2[R]	6[R]
Remove frame from sail, disassemble and check for fatigue cracks radiating from drilled holes	5.50.50					4[R]					6[R]
Loose bolts / nuts	20.10.00	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	2[R]	6[R]
Universal joint / keel roller free moving and in good order	As directed	2[R]	2[R]	2[R]	2[R]	4[R]	2[R]	2[R]	2[R]	2[R]	6[R]
Heart bolt (See time life 4.20.00)	As directed	6[R]	6[R]	6[R]	6[R]	6[R]	6[R]	6[R]	6[R]	6[R]	6[R]
Placards: Data plate	As directed	3[R]	3[R]	3[R]	3[R]	3[R]	3[R]	3[R]	3[R]	3[R]	3[R]

Table 7 Scheduled Maintenance

5.50.00 Unscheduled Maintenance Checks

Unscheduled maintenance is required due to abnormal flight loads such as severe turbulence or heavy landings. If any abnormal loads are encountered during transport or storage then the airframe needs to be checked.

The pilot will be responsible for identification of these extreme operating conditions and identification of the effected components. Where damage is found further checks should be carried out upon areas that may also be affected.

Thorough checks should also be carried out after transportation of the aircraft, and after extended storage periods.

5.50.10 Inspection after heavy landing.

The main attachment point for the wing to the aircraft base should be inspected carefully for any permanent deformation of the U-bracket, the main bolt, the keel, as well as all of the other affected components. If the landing resulted in contact with the ground then obviously these parts will require extra attention. The tubing relies on being intact in perfect condition for full strength. If tubing is bent or kinked in any way then it should be replaced prior to flying. This includes attachment point to bolts. The battens should be checked against the supplied batten profile and the opportunity should also be taken to inspect the batten fittings.

5.50.20 Inspection after heavy turbulence.

The main areas of wing structure that require attention after severe turbulence are the attachment points for structures. These include the front and rear wires, the side wires and the main hang point. The sail should also be inspected for any strain or tearing that may have occurred – though this is very unlikely. All of the tubing should be inspected for bending, including the battens against the supplied batten profiles. The opportunity should be taken to inspect the batten fittings at the same time.
If the base bar has made contact with the mast brace at any time during flight then they should both be checked.

5.50.50 Sail removal

The sail should be removed for close inspection of the airframe if the frame is suspected of suffering any damage for example, having bent tubes following a heavy landing, blow over or crash. If the wing suddenly develops a turn after severe turbulence it is possible that some tubes may be bent, therefore close inspection of all the tubes is necessary. It is suggested that the sail should be removed from the frame every 500 hours to check for any signs of fatigue or damage from general wear and tear.

The main points to check are

-Cross bar hinge joint
-Cross bar /leading edge joint (deformation in the bushes)
-Leading edge nose joint (deformation in the bushes)
-Nose plates
-Wire attachment points
-Straightness of the tubes
-Elongation of boltholes
-Damaged wires
-Damage to bolts
-Damage to sail

NOTE

If any part of the aircraft has any signs of damage the part should be replaced prior to re-installing the frame.

Special Requirements and Tips

Removing and installing the sail is, by design, a relatively easy process. When installing or removing the sail you will need a large unobstructed area of approximately 12 metres by 3 metres. Make sure the surface is clean and not abrasive. Rough concrete will damage the sail, a grass area will not damage the wing, but will provide many hiding places for bolts, nuts and washers – short carpet is ideal.

It is a good practise to note the order of washers and other fittings prior to disassembly. Photos taken with a digital camera of the assemblies, fittings and junctions before and during disassembly is a great aid and greatly eases the reassembly process, as is the use of containers to put hardware in.

The Illustrated Parts Catalogue should also be referenced for correct assembly.

NOTE
Wherever possible perform an operation on one side of the wing, and completely reassemble it before continuing with the other side. This method gives an easy reference to the reassembly sequence that is required for correct and safe operation.

This procedure starts from the wing packed in its bag.

Unzip bag and remove straps

Assemble control frame

Figure 3 Assembling control frame

Stand glider on control frame and spread wings

Figure 4 Standing glider on control frame and spreading wings

Untie pull back bungie

-Untie bungie from pull back handle and re-tie around pull back pulley to aid re-installation of sail.


Figure 5 Removing pull back bungie

Remove Zip

-Cut off zip tie at nose junction.
-Remove zip slider from zip.


Figure 6 Removing zip tie and under surface zipper

Remove Nose Webbing

-Undo sail webbing nut and remove sail webbing. Replace nut finger tight.

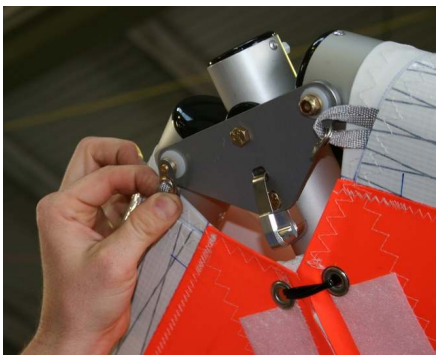

Figure 7 Removing Nose Webbing

Remove Pull Back Quick Clip

Figure 8 Removing pull back quick clip

Remove Rear Top Wire

-Undo shackle and remove rear top wire (the centre one). Replace pull back wires and nut finger tight.

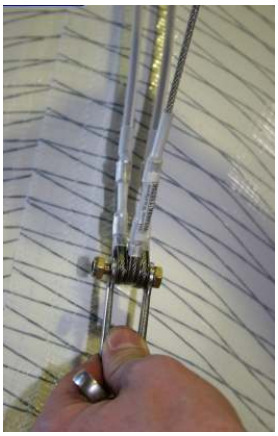

Figure 9 Removing rear top wire

Remove Reflex Bridle Wires From Sail Trailing Edge

-Undo split rings, remove washers, and pull reflex bridle wires from trailing edge of the sail. Replace the washers and rings or put them aside in a safe place for easy finding at sail re-installation.

Remove King Post

-Undo king post nut and remove king post. Replace nut finger tight.

Figure 10 Removing king post

Remove Top and Bottom Side Wires

-Undo nut and bolt at cross bar ends to remove all side wires, put wires aside in a safe place for easy finding at sail re-installation.

Figure 11 Removing top and bottom side wires

Remove Top Front Wire

-Undo front centre bolt and nut at nose junction to remove top front wire. This is easier when sail zip tie is removed, and zip and sail nose webbing tangs are undone.


Figure 12 Removing top front wire

Unhook Sail Webbing Loops on Rear Leading Edges

-Undo the Velcro retaining straps. Grasp the rear leading edge firmly in one hand, place a finger or two through the outside loop and lift the inner loop out of its slot. It may come off easier if you walk the wing in and out a little as you pull the webbing.

Figure 13 Removing sail webbing loops

Remove Rear Wires

- Remove sail Tang and rear wires. Using a friend or support to hold the nose up at this time will make this task easier.

Figure 14 Removing Rear Wires

Remove Sail from Airframe

-Leave control frame attached and carefully slide the sail off the airframe.

Figure 15 Removing airframe

CAUTION

DO NOT FORCE SAIL. IF IT SNAGS, STOP AND FIND WHAT IT'S CAUGHT ON.

5.50.60 Frame Reinsertion

After the frame has been removed for inspection the frame must be properly reinstalled to maintain a high level of safety. Particular attention must be paid to the correct orientation of bolts and washers.
It is advisable that all nuts that are removed are replaced with new ones, or as a rule Nyloc nuts should not be reinstalled more than twice.

WARNING

REFER TO SECTION 20 (STANDARD PRACTICES) FOR CORRECT TORQUING PROCEDURES, FAILURE TO READ AND UNDERSTAND THE SPECIFIC TORQUING METHODS THAT ARE NECESSARY FOR THIS THIN WALLED TUBULAR STRUCTURE WILL RENDER THE AIRFRAME UNSAFE TO FLY.

Prepare Frame For Fitting Sail

-With control frame assembled, stand the airframe with the rear leading edges spread about 500mm apart. The rear wires are connected finger tight only at the keel. The nose wires are not connected at the nose junction. The pull back bungie is tied at the keel pull back pulley.

Figure 16 Preparing airframe for fitting sail

Slide Sail Onto Airframe

-Lay the sail out in line with the leading edges. Confirm left wing matches left leading edge; right wing matches right leading edge. Ensure leading edge rears are correctly inserted.

-Lift rear leading edges and guide them into either side of the sail. Gently guide the leading edges into the sail one side at a time. Continue sliding the leading edges into the sail until the sail is about halfway up the leading edges.


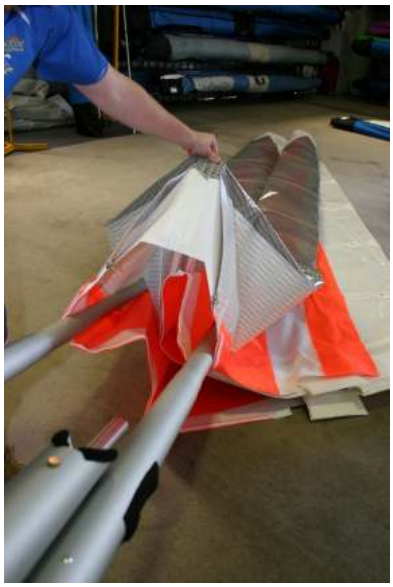

Figure 17 Sliding leading edges into sail

Insert Keel into Sail

-From underneath the sail, locate the keel pocket and guide the end of the keel into it. Gently pull it up until the keel protrudes from the other end of the keel pocket. It should slide all the way up to the rear wires / keel attachment.

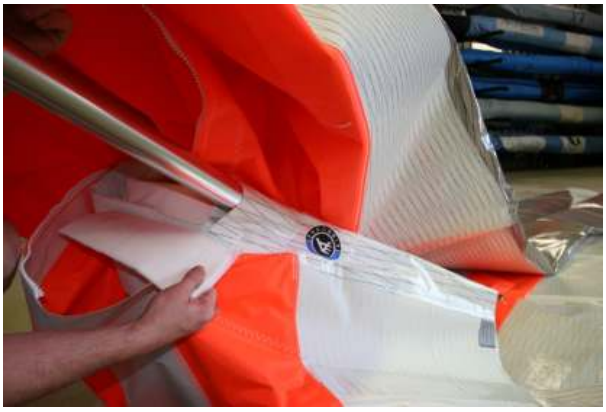


Figure 18 Inserting keel into sail

Slide Leading Edges Out The Ends Of The Sail

-Continue gently pulling the sail onto the airframe one side at a time until the leading edge rears protrude out the ends of the sail.

Figure 19 Sliding leading edges out the tips of the sail

Insert Keel Into Keel Pocket

-Have a friend or use a support to hold the nose of the wing up so that the rear bottom wires become slack. Undo the rear wires, and slide the keel pocket of the sail up past the rear wires bolt hole. Attach the sail keel pocket webbing tang; re-attach the rear bottom wires, and tighten the nut and bolt. Replace the bolt head cap. Let the nose down.

Figure 20 Sliding keel pocket into place

Pull Sail Completely Onto Airframe

-Holding the nose of the airframe, gently but firmly draw the sail completely onto the airframe by pulling the front sail webbing tangs towards the nose junction. You may need to lift the sail along the leading edges as you guide the sail on. Note, the front sail tangs may not yet fit over the nose junction bolts at this stage.





Figure 21 Sliding sail completely onto airframe

Spread Wings

-Spread each wing apart ¼ of the way alternately on each side until fully open, making sure sail is loose and free at all times.

Figure 22 Spread The Wings Apart

Fit Top Front Wire

-Place the king post and wires assembly along the keel. Insert the top front wire through the top of the sail, fit on the front centre bolt of the nose junction and tighten. Note, this is easier when the sail tangs, undersurface zip, and undersurface safety zip tie are undone.

Figure 23 Fitting front top wire

Fit Undersurface Zipper

-Align the zipper halves so that the lines match up. Feed the wide end of the zipper onto the zipper halves so that the handle hangs down.

Figure 24 Fitting undersurface zipper

Fit Undersurface Zip Tie

-Close zipper past the sail eyelets to confirm it is on straight and to aid fitting the zip tie. Tuck the end of the zipper up and back along the inside of the sail. Start a zip tie through an eyelet from above, loop it twice through the eyelets and then close it. Trim off excess.

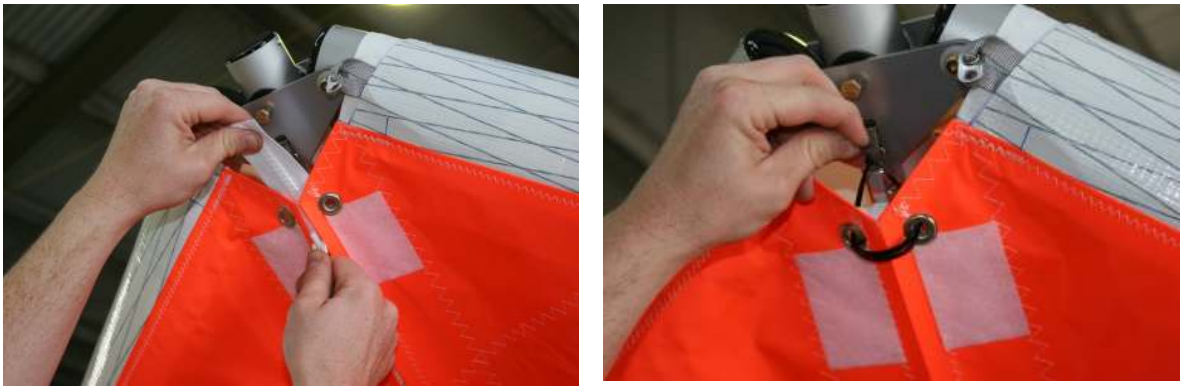

Figure 25 Fitting undersurface safety zip tie

Locate Tip Webbing

-Locate tip webbing over rear leading edge and secure retaining Velcro. It may be necessary to close the wings a little to aid sliding the webbing on.

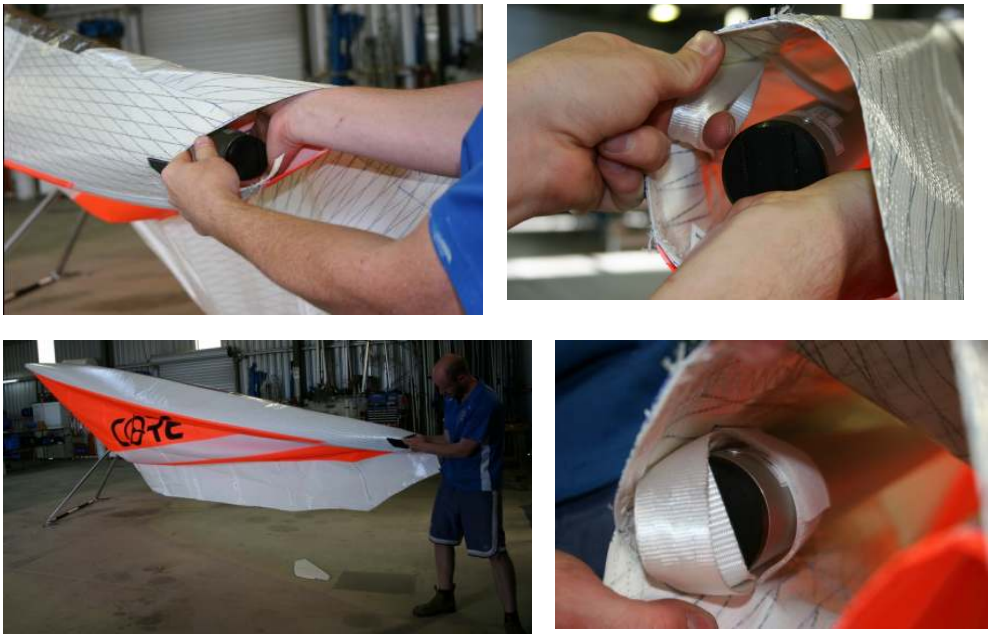

Figure 26 Locate Tip Webbing

Fit Side Wires

-Insert top and bottom side wires through their holes in the sail and reattach through the cross bars at the leading edge. Note the nut goes to the bottom.

Figure 27 Fitting top and bottom side wires

Route Pull Back Wires And Attach Rear Top Wire

-Guide the pull back wires through the hole in the sail at the king post pillar. Undo the pull back shackle nut and bolt, and place the rear top wire in the centre of the pull back wires and shackle. Tighten.

Figure 28 Routing pull back wires and attaching rear top wire

Fit Pull Back Wires Quick Clip

-Fit pull back quick clip. Tighten.

Figure 29 Fitting pull back quick clip

Attach King Post And Fit Reflex Bridle

-Fit king post to king post bracket. Confirm pull back wires are routed on either side of the bracket, without twists in the wires. Locate the pull back handle and bring out through the right hand side of the king post. Connect reflex bridle wires to the trailing edge of the sail.

Figure 30 Attaching king post

Insert Battens

-Insert battens. Red tips on left, green tips on right. Take care to locate batten tips correctly and close them firmly.

Figure 31 Fitting battens

Apply Tension And Tie Pull Back Bungie

-Pull tension on the wing by smoothly drawing the pull back wires toward the end of the keel, and looping the shackle into the quick clip. Note, if you experience any catching or the wires are hard to pull back, immediately stop and check all wires for correct routing, fouling, twists, and kinking. Untie bungie from pull back pulley, loop through the pull back handle and tie with a bowline knot.

Figure 32 Tying pull back bungie and pulling tension

Attach Sail Webbing Tangs At The Nose Junction

-Attach sail webbing tangs at the front nose junction. Tighten.

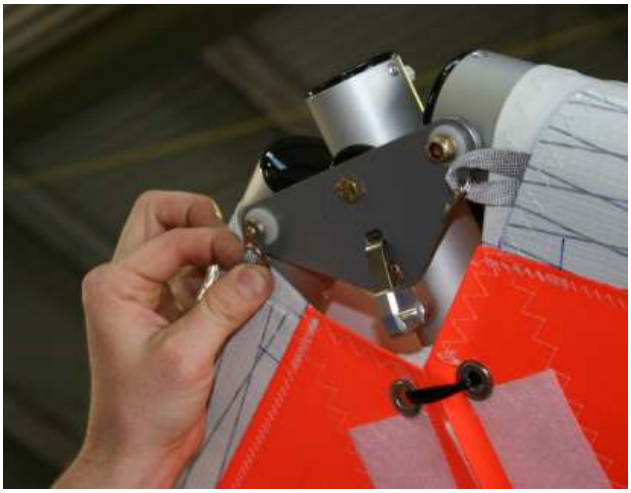

Figure 33 Attaching sail webbing tangs at the nose junction

Attach Front Bottom Wires

-Attach nose wires.

Figure 34 Attaching front bottom wires

Quality Assurance

After this procedure is completed recheck all nuts, bolts and connections, make sure that there are no parts left over or missing from the assembly.

NOTE

It is good practice to have an independent person check the airframe. AirBorne WindSports use a different person for checking the assembly process. Following is the Final assembly QA sheet, which may assist in performing the final inspection process. This QA is used by trained personnel and does not represent all of the instructions that are necessary for a safe aircraft. It is to be used as a reference only.

QA Inspection Form

ASSEMBLY TRACE – WING PL SERIES	*GJP-277 pg 2/3*

Work Order No

FINAL QA

Line	Check Operation, Security and Finish	PL SERIES	
		Left Hand Side	Right Hand Side
1.	Nose Assembly		
2.	Nose Catch		
3.	Nose webbing secure		
4.	Nose Battens		
5.	Nose Cone		
6.	Keel Roller / U-Bracket .		
7.	Down Tubes top assembly		
8.	King Post Base		
9.	Cross Bar Hinge		
10.	Cross Bar Padding		
11.	Undersurface Zip		
12.	Down Tube Bottom Corners		
13.	Bottom / Front Wires		
14.	Side Wires		
15.	Base Bar Pip Pins		
16.	Cross bar / Leading Edge Junction		
17.	Top Side Wires		
18.	Bottom Side Wires		
19.	X/Bar L/Edge Zip		
20.	Tip Webbing Located Correctly		
21.	Tip Scuff Pads		
22.	Main Sail Battens Adjusted		
23.	Reflex Bridles Secure		
24.	Pull Back Wires / Quick Clip		
25.	Bottom Rear Wires		
26.	King Post Top Assembly		
27.	MTOW / Compliance Placard on U-Bracket		
28.	Serial Number Attached		
29.	Include Test Fly Sheet		

Final QA	Appointed Signatory (As per 03/122/OI)	Name: Signed:	Date	

Table 8 Airborne Final QA Inspection Sheet

6. DIMENSIONS AND AREAS

6.00.00 General

This section gives general dimensions for the wing. It should be noted that this is a flex wing aircraft and the dimensions that are given will be different depending on the loads on the wing. In general the dimensions that have been supplied are those without the sail on the wing, (which bends the leading edge and slightly reduces the wing span) and with the wing on the ground, resting on the base bar.

6.10.00 Major Dimensions of the Core Airframe

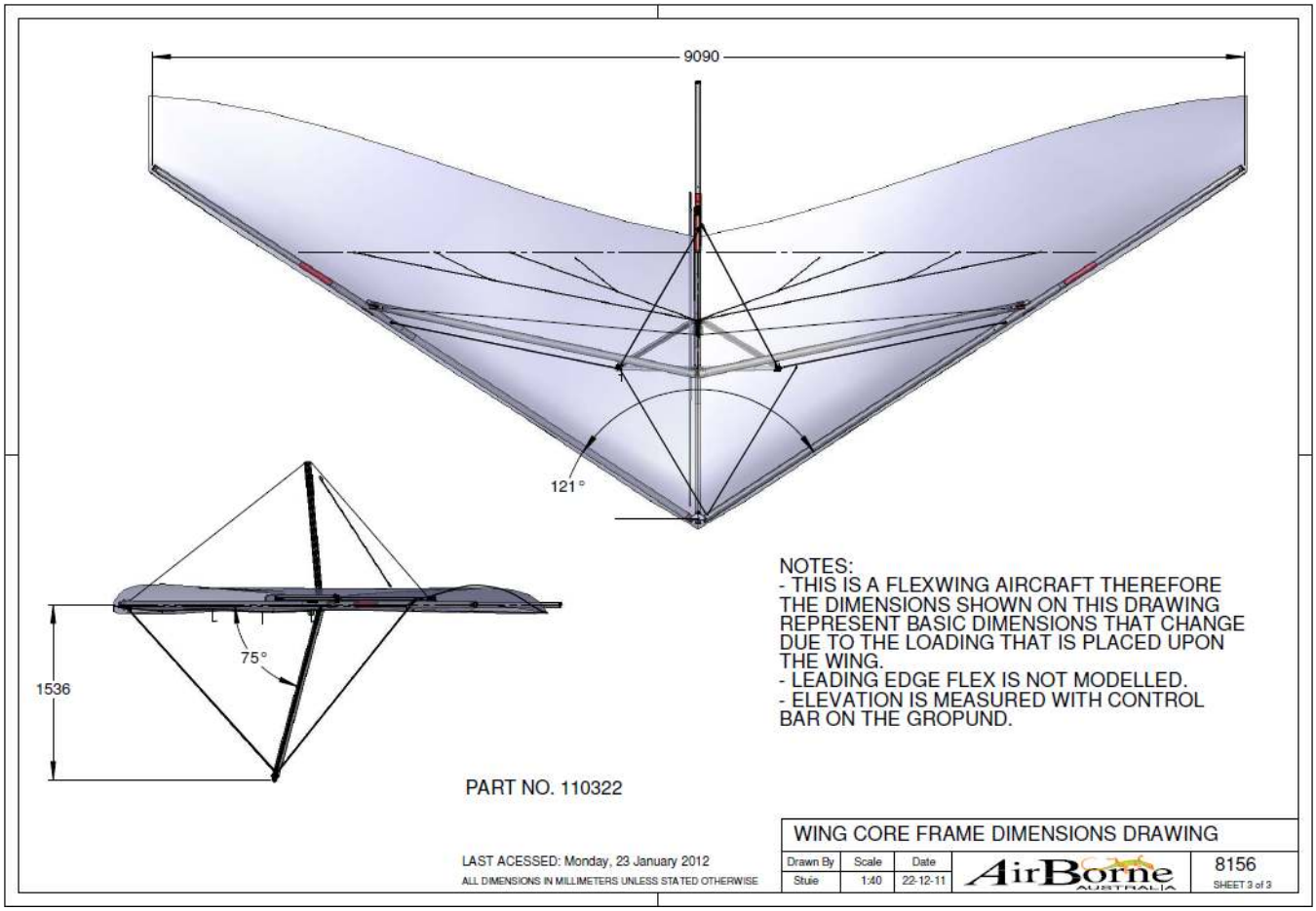

Figure 35 Major Dimensions of Airframe

6.30.00 Significant Dimensions and Areas

General
The Major dimensions of the wing are listed below.

	Core	
	Metric	Imperial
Sail Area	15.60 m^2	168 ft^2
Control Frame Rake Angle	75^0	75^0
Wingspan	9.5 m	31.1 ft
Control Frame Height From Keel	1.536 m	5.04 ft
Nose Angle (With Sail Installed)	121^0	121^0

Table 9 Dimensions and Areas

9. GROUND HANDLING

9.00.00 General
When moving the wing in the assembled position it is recommended that the wing be lifted with the shoulders whilst standing in the control frame. It is suggested that an assistant is used to support the weight on the rear of the keel tube.

If there is wind or gusts the wing can easily be caught by the wind without proper handling. If there is a significant amount of wind, it is advisable to have assistants to hold the wires. The wing should be moved with the nose facing into the wind.

CAUTION
ENSURE THAT WHEN MOVING THE WING IN WINDY CONDITIONS THAT THE NOSE IS KEPT LOW WHEN FACING INTO THE WIND. THE WINDWARD TIP SHOULD ALSO BE KEPT LOWER TO AVOID THE WING RISING.

9.10.00 Ground Transportation
Avoid damage to your wing by using well-padded racks. Careless transportation can cause considerable damage to your wing.

We recommend that you support the wing in at least 3 places to spread the load. The wing should be transported with the control frame down (U Bracket on top) to minimise the chance of damage to the cross tubes.
Flat straps should be used for tie downs to avoid damage to leading edge mylar.

Store the wing in a dry room off the ground. Air the wing out regularly to avoid mildew, and never store wet.

10. DERIGGING

10.00.00 General

For de-rigging and storage see Sections 4 of the Aircraft Operating Instructions or Pilots Operating Handbook as applicable.

11. REQUIRED PLACARDS

11.00.00 General

The placards that are present on this aircraft are a legal requirement showing safety information, emergency information and identification of the aircraft. The placards must be repaired or replaced if they become illegible or damaged in service. Replacement placards may be purchased from an Airborne dealer or direct.

11.10.00 Required Placards

The placards on the aircraft are designed to provide information regarding general aircraft limitations and other details for the safe operation of the aircraft.
The placards that are required for operation of this aircraft are available in Section 2, "Placards", of the Aircraft Operating Instructions or Pilots Operating Handbook as applicable.
.

20. STANDARD PRACTICES - AIRFRAME

20.00.00 General

This chapter gives details for each of the bolts that are used on the wing. This is because there are few fittings that require standard torques.

20.10.00 Torquing Procedures

Correct torquing of fasteners is critical. If a bolt or fastener is too loose it may cause unnecessary movement resulting in wear or fatigue damage, while over tightening may cause tensile failure of the bolt, or crushing of components. Specific torques should be determined using an accurate torque wrench. The torque required after the nut is fully on the shaft, but not against the mating surface should be added to the final torque value.

WARNING

THE CORRECT TORQUING OF THE BOLTS FOR THE WING SECTION OF THE AIRFRAME IS ESPECIALLY IMPORTANT FOR THE SAFETY AND LONGEVITY OF THE WING. IN GENERAL STANDARD TORQUING VALUES WILL NOT BE APPLICABLE, BECAUSE OF THE NATURE OF THE THIN WALL ALUMINIUM TUBING THAT HAS BEEN USED TO CONSTRUCT THE MAJORITY OF THE WING STRUCTURE.
NEVER TIGHTEN NUTS SO THAT THE ALUMINIUM TUBING IS DEFORMED FROM ITS CIRCULAR CROSS SECTIONAL SHAPE.
ALWAYS HAVE AT LEAST ONE FULL THREAD SHOWING PAST ANY NYLOC NUT THAT IS USED.
NEVER REPLACE COMPONENTS WITH A SUB STANDARD PART. TO REITERATE, OTHER GRADES OF BOLTS – SUCH AS GRADE 8 DO NOT HAVE THE SAME STRENGTH / FATIGUE CHARACTERISTICS AS AN (AERONAUTICAL GRADE) BOLTS.

Special Torquing Procedures

Special Notes for each of the bolts on the wing are given in the table below, along with references to the illustrated parts catalogue, which should be used to ensure that the components are reinstalled in the correct sequence.

Definition of "Just Not Loose"

A definition of torque has been made for the assembly of this wing which has been called "just not loose", a setting which is used to achieve the best combination of strength characteristics of the tubing while not allowing any vibration or relative movement of the bolt in the axial direction. In practice this means that the nut shall be tightened adequately to ensure that each of the components that are held by it are in contact with each other, and then approximately ¼ turn more should be made. The resulting fit should not allow any axial movement of the bolt in its location, but will allow rotation (using fingers) of a held component to be achieved with approximately 20mm of lever arm; (eg. a wire tang).

No.	Area	Instructions
1.	Nose Assembly	"Just not loose".
2.	Nose Catch	"Just not loose".
3.	Keel Roller / U Bracket / Neg bush	"Just not loose", all gaps between fittings are closed.
4.	Down Tubes Top Assembly	The down tubes need to move for set up, pack up and spreading apart to fit control bar, therefore it is important that they are able to move after tightening. Tighten until 1-2 threads are showing.
5.	King Post Base	"Just not loose".
6.	Cross Bar Hinge	The central bolt should be tightened to "just not loose", the black acetal cross bar protector should still be able to be rotated by hand.
7.	Base Bar Bolts	"Just not loose".
8.	Cross Bar Leading Edge Junction	"Just not loose".
9.	Top Side Wires	"Just not loose".
10.	Bottom Side Wires	"Just not loose".
11.	Pull Back Wires	"Just not loose". **NOTE** The wires that locate on the bolt will float slightly from side to side - there will be three wires in the pull back shackle, with the inclusion of the top front back wire.
12.	Quick Clip Bolt & Bottom Rear Wires Bolt	"Just not loose".

Table 10 Torque settings for the wing

20-20-00 SAFETYING PROCEDURES

All bolts and nuts, except the self-locking type, should be safetied after installation. This prevents them from loosening in flight due to vibration.

Self-Locking Nuts

Self-locking nuts are used throughout the airframe. Self-locking nuts may be reused but not if they can be run on the thread by hand without using tools. After a self-locking nut has been tightened at least one full thread pitch of the male thread must protrude through the nut-locking feature.

27. FLIGHT CONTROLS

27.00.00 General

The Core wing uses weight shift control. This means that there is no need for most of the traditional flight control surfaces such as flaps and rudders. The pilot uses the control bar to shift weight relative to the attachment point of the base to the wing, which in turn causes a reaction in the wing and the control response of the aircraft.

27.30.00 Reflex Bridles

Reflex bridles produce longitudinal stability when the wing is at zero or negative angles of attack. The reflex bridles work by stopping the trailing edge of the wing moving downward, as they are tethered to the king post assembly. When the wing has any negative load on the top surface the rest of the lifting surface will move downward relative to the trailing edge, effectively creating elevator type control surfaces that produce a positive pitching moment, helping to restore level flight.

57. WINGS

57.00.00 General

The main structure of the wing comprises of aluminium tubing and stainless steel wire. The lifting surface is constructed from Dacron or mylar fabric. The wing is subject to maintenance checks and preflight procedures that must be carried out prior to flying. Any dents, crazing, bends (except for tube bending caused by normal flight and set up loads), corrosion or other distortion of the wing structure renders the wing unsafe to fly. Secondary structures of the aircraft are limited to:

- Keel extension structure
- The pull back assisting rope and pulley system

CAUTION

IT SHOULD BE NOTED THAT ALL OF THE TUBES THAT ARE USED ARE SPECIFIC GRADES OF ALUMINIUM DESIGNED FOR FLEX, STRENGTH AND FATIGUE CHARACTERISTICS. ALL OF THE TUBES ARE SLEEVED FOR STRENGTH AND WHERE STRESS CONCENTRATIONS EXIST. IF ANY TUBING IS TO BE REPLACED IT SHOULD BE REPLACED WITH AIRBORNE SPARE PARTS ONLY.

57.10.00 Main Frame Description

This section allows the user to understand the main function of each of the components of the wing, which should help the operator, or maintenance personnel to properly inspect the wing.

Keel

The keel of the wing is mainly constructed from 6061 T6 aluminium. All of the major components of the wing are attached to the keel. Major components from the front to the rear of the keel are:

Nose Plates

The nose plates are bolted to the keel and provide attachment points from the leading edges to the keel. They are attached to the keel with bolts. The top and bottom front wires also attach to the nose plates.

U-Bracket
The U-bracket provides a mounting point for the trike mast, the main attachment point for the base to the wing. The U-bracket is allowed to rotate around the keel, and is held in position longitudinally with nylon bungs, which are bolted to the keel.

King Post
The king post is a vertical post that is mounted behind the U-bracket to elevate the top wires and reflex bridle. The king post assembly is constructed primarily from 6061 T6 aluminium, is attached via a bolt and folds down for ease of transport and shipping.

Control Frame
The control frame is constructed mainly from 6061 T6 aluminium. The control frames down tubes work mainly in compression due to the positive loading of the wing, which is reacted through the side wires and base bar sections. The base bar works mainly in tension through the side wire loads from the crossbars and leading edges.

The control frame is bolted through the keel behind the U-bracket and king post. The fittings at the top of the control frame allow relative movement between the U-bracket and the control frame. This is necessary because of the movement between the base and the wing during the weight-shift control actions. The control frame is designed to be easily put together and taken apart for transport and shipping.

Quick Clip
The quick clip is bolted to the keel behind the rear wires, and is the attachment point for the pull back wires. The bottom rear wires attach to the keel forward of the quick clip to allow clearance of the prop.

Leading Edges
The leading edges are constructed mainly from 6061 T6 aluminium and 7075 T6 aluminium. The leading edges are mainly loaded in bending and compression and share loading with the cross bars during positive and negative flight loads.

The leading edges are attached to the keel through the two nose plates at the front of the wing, and via a bolt assembly to the cross bars. The rear leading edges fit inside the leading edge tubes, which locate onto a horizontal bolt in the leading edge assembly. The rear leading edges are held in place by webbing loops sewn into the sail. The rear leading edges are a part of the leading edge, but are made to be easily separated from the fronts in order that they may be removed for ease of shipping.

Cross Bars
The cross bars are mainly constructed from 6061 T6 aluminium. The cross bars serve the purpose of holding the leading edges forwards and spread against the sail, and share the loading with the leading edges during positive and negative flight loads. Pull back wires that connect to the rear quick clip are used to hold the cross bars in place for flight, and to allow easy connection when assembling the wing for use.

The cross bars are attached to each other at the keel using a ball joint that allows relative movement. They are also tethered to the keel via a webbing loop. The outside of the cross bars are attached to the leading edges using a bolt and bracket assembly, and are also separately bolted to the top and bottom side wires.

The cross bars and leading edges are built and attached in a manner that allows the wings to be folded for packing to allow ease of transport.

Battens

The battens are mainly constructed from 7075 T6 aluminium. The battens are located with batten pockets sewn into the sail. The batten fittings at the trailing edge secure the battens into their pockets.
The battens act to maintain the profile of the wing during flight, and are important for the correct and stable operation of the wing. For this reason there is a batten profile that is supplied with each wing for the battens to be checked against.
Battens should always be inserted into the same side of the wing, red is always inserted on the left hand side, and green is always inserted on the right hand side. A useful mnemonic is “red is never right”.

WARNING

DO NOT FLY THE WING WITH ANY OTHER BATTEN PROFILE THAN THAT SUPPLIED BY AIRBORNE, AS VARIATION MAY HAVE SERIOUS EFFECTS ON THE FLIGHT PERFORMANCE STALL AND STABILITY CHARACTERISTICS OF THE WING.
BATTENS MUST ALWAYS BE CORRECTLY INSTALLED WITH RED BATTENS IN THE LEFT HAND SIDE AND GREEN IN THE RIGHT HAND SIDE OF THE WING. BATTENS MAY BE DELIBERATELY DIFFERENT FROM SIDE TO SIDE.

Batten end fittings

When inserting batten end fittings prior to closing, batten fittings should sit inserted in the trailing edge. The angle before loading is applied should not exceed 30°.

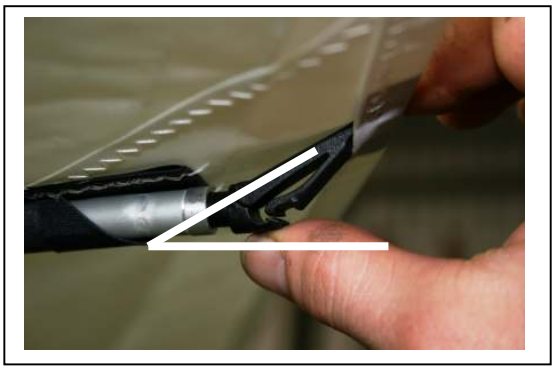

Figure 36 Inserted Batten End Unloaded Angle Check

Latch fittings should be sharp and not rounded. Rounded edges can occur from unloading without depressing the latch. Check the unloaded measurement of latch to body of the outer fitting is not less than 2mm to maintain loaded retaining force.

Figure 37 Batten End Fitting Dimension Check

WARNING

ALWAYS ENSURE THE BATTEN END FITTINGS ARE CLOSED AND LOADED SECURELY BEFORE TAKE-OFF. BATTEN ENDS BECOMING UNLOADED DURING FLIGHT AT HIGHER AIRSPEEDS MAY HAVE SERIOUS EFFECTS ON THE FLIGHT PERFORMANCE AND STABILITY CHARACTERISTICS OF THE WING.

Top Wires

The top wires run over the king post, front to rear from the top nose plate to rear attachment, and side to side from cross bar junction to cross bar junction. The top wires act in tension in the case of negative loading.

Bottom Side Wires

All the wires are stainless steel braided wires. The bottom side wires are attached to the cross bars and the knuckle at the bottom of the control frame through swaged fittings. The control frame end is attached via a stainless pip-pin and bush, while the cross bar end has a fitting that allows a bolt to secure it. Bottom side wires may have slack in them while the wing is sitting on the ground or trike base, and operate in tension in flight.

Bottom Front to Rear Wires

The front and back wires are stainless steel braided wires that have swaged fittings at each end for attachment to the nose catch, control frame and keel.

The lengths of the bottom side and front to rear wires are set to allow correct positioning of the control bar relative to the pilot's seated position. This raking of the control frame is different to that required in a similar hang glider and wires are not interchangeable.

Reflex Bridle

The reflex bridle is constructed mainly of stainless steel wires swaged together.

The reflex bridle attaches from top of king post to along a line inside of the trailing edge of the sail. The reflex bridle provides pitch stability at low angles of attack; correct attachment of the reflex bridle is essential for maximum stability.

57.30.00 Sail

The sail comprises the lifting surface of the wing. It is mainly constructed of Dacron or Mylar polyester fabric, with some Mylar material making up the leading edge areas. The sail is constructed from many individual panels, which are sewn together using polyester thread to form the required shape. The sail has attachment points sewn into it to attach to the frame at various points and to hold the battens in place. The sail also has zips that facilitate easy preflight inspection of all the members inside the double surface wing.

The sail should be kept out of the sun as much as possible as sunlight will damage the sail, and in time will cause it to fail the required sail strength Bettsometer tests.

Inspection

- Check for tears in the sailcloth or any loose or unravelled seams.
- Check all webbing securing points are not damaged or worn.
- Check all inspection zippers to see if they function smoothly and close completely.

Protection

Ultraviolet radiation from strong sunlight ultimately reduces the strength of Dacron and Mylar, but this may be reduced to an acceptable level by careful consideration of the wings use and exposure. In its bag the wing is fully protected. Sunlight will eventually cause it to fail the required Bettsometer tests.

KEEP THE SAIL COVERED WHEN NOT IN USE AS CONTINUED EXPOSURE TO ULTRAVIOLET RADIATION DRAMATICALLY REDUCES SAIL LIFE.

The sailcloth may be cleaned with warm soapy water. Strong detergents must not be used. Thoroughly rinse with plenty of clean water.

NEVER USE CHEMICAL SOLVENTS OR APPLY WATER REPELLENT COMPOUNDS.

57.30.10 Bettsometer Testing

Bettsometer testing is a method of determining the tensile strength of the sail fabric and stitching, which is known to degrade during the life of the sail.

Hour or Time Related Check Limits

Annual Bettsometer test with a 1.2mm diameter needle, with wing sails fitted and tensioned for flight is to be carried out to:
Upper & lower surface: 1360 grams.
Stitches: 1360 grams using a 1mm or 1.2mm diameter hook, pull upwards.

As well as the annual check there are several criteria for testing of sails, which are highly dependent on the conditions that the sail fabric is exposed to. The pilot/operator of the aircraft is responsible for determining the level of exposure that the sail experiences.
Generally the method used for fabric testing is a Bettsometer test (on an annual basis). Annual testing has been found to be adequate for recreational user where the operator takes care to avoid unnecessary exposure to UV.
More frequent testing (200 operating hours or 750 UV hours) is applied where operators exceed these hours prior to the annual test.

NOTE

- If a wing is stored under a roof, but the roof does not have doors on the front – i.e. an open hanger, the wing will still experience UV degradation.
- If a wing is flown, and or left in the open for a day, this will equate to 8-10 hours of UV exposure.

Where aircraft have been exposed to high levels of UV over an extended period (such as being left set-up in the open for 3 months or more - equivalent to 750 UV hours), then testing prior to return to service is recommended.

The instructions that are supplied with the Bettsometer should be followed to ensure proper testing.

NOTE

Some instructions that may be helpful,

- The instructions that come with the Bettsometer recommend that *"any flat section of the sail, clear of obstructions"* is suitable for fabric testing. Single layer sections of the sail would give a more relevant test result than patched or multi-layered sections and obviously those areas most exposed to UV damage (usually the top surface) would be the most useful to test.
- Likewise the stitching exposed on the top surface would show the most UV degradation and will give a better indication of the strength left in the thread than that on the under surface.
- Bettsometers are available from Airborne Windsports.

Figure 38 Bettsometer Instrument

57.30.20
Minor tears or rips in the sail

Minor sail repairs are a Line Maintenance task that Sport Pilots are suitable to perform unless local regulations prohibit owner maintenance for sails. A repair is classified as minor if tears are less than 30mm long, provided that no free edges (such as the wing trailing edge) are broken and that the tear is isolated and not within 50mm of an existing seam line or 100mm of the trailing edge. Also, abraded holes no more than 15mm in diameter. Such damage may be replaced with self-adhesive patch material (Often called “sail tape” or “sticky back sail repair tape”) such as used for registration letters. If possible a patch should be applied to both sides of the fabric.
(Reference BMAA TIL No. 015 Issue 1.)
The tape is available from Airborne as a spare part.
Any other significant damage should be discussed with Airborne or a dealer for an assessment of the best repair option.

57.40.00 Tuning

Roll Tuning

Your aircraft was test flown and delivered to you in good flying order.

WARNING

EXPERIENCED PERSONNEL SHOULD ONLY CARRY OUT ADJUSTMENTS TO THE WING, IDENTIFICATION OF A TURN SHOULD ALSO BE CARRIED OUT BY AN EXPERIENCED PERSON. ANY ADJUSTMENTS SHOULD BE RECORDED IN THE MAINTENANCE LOG. CHANGES REQUIRED FOR TUNING ARE SMALL AND INCREMENTAL. MAJOR CHANGES WILL CAUSE THE WING TO PERFORM BADLY, AND MAY BE DANGEROUS.

If you feel that the wing requires adjustment to trim in the roll or the pitch axis you should check that the problem is not caused by something asymmetrical in the frame or the battens. In order of priority check the following:

- Check the battens against the template
- Check that the sail webbing is correctly mounted on the leading edges and tensioned to the correct mark
- Check the keel is straight
- Check that the leading edges are straight and that the rear leading edges are located correctly
- Check front and rear wires are routed correctly

To check your battens use the following procedure:

- Remove the battens from the wing after the wing is de-tensioned as required during the pack up phase. See Aircraft Operating Instructions for pack up procedures
- Lay the template out on a flat surface.
- Note whether the battens have been reflexed. Do not change the reflex initially. The battens may have already been reflexed to correct a turn.
- Start with the keel batten lining the nose of the batten up with the start of the line. The line should be above the batten.
- If the batten does not line up, gently apply pressure using your hand or knee to get a smooth curve.

After checking as noted above a turn can be remedied by adjustments as outlined in the following table.

Roll Tuning Matrix

The following table outlines procedures for tuning a wing to correct a turn.
NOTE: We refer to the fast wing as the wing on the high side of the turn i.e. The right wing is the fast wing if the wing is turning left and vice versa.

	ADJUSTMENT METHOD	Remedy left turn	Remedy right turn
MILD TURN VG OFF	DIFFERENTIAL BATTEN TENSION. If the turn is mild, then increasing and decreasing the batten tension on either side can adjust it. If you increase the tension on the slow side you are effectively putting more camber in the airfoil therefore creating more lift on that side. If you decrease the tension on the fast side you are decreasing the camber and reducing the amount of lift. The batten hinge clip can be rotated clockwise to decrease tension or anti-clockwise to increase tension.	Increase tension on last 3 battens on left hand side by 1 turn at a time. Decrease tension on last 3 battens on right hand side by 1 turn at a time.	Decrease tension on last 3 battens on left hand side by 1 turn at a time. Increase tension on last 3 battens on right hand side by 1 turn at a time.
	TIP PLUG ADJUSTMENT The tip plug can be rotated to increase or decrease lift on either wing. The fast wing should have the tip fitting rotated upward to increase washout on that side. Requires 5/32" drill and rivet once rotated.	Rotate the right hand tip fitting clockwise if viewed from the rear of the leading edge. The tip fitting should be rotated a maximum of 5 mm.	Rotate the left hand tip fitting anti-clockwise if viewed from the rear of the leading edge. The tip fitting should be rotated a maximum of 5 mm.

Table 11 Tuning Procedure

If, after tuning, the turn persists consult your authorised dealer or the factory.

ADJUSTING MAINSAIL BATTEN TENSION

Batten tension can be set using the following guide:

- Check batten is inserted fully into its pocket by pressing firmly on the end of the batten beak with the heel of your hand. The batten beak should protrude 5-7mm past the trailing edge when clip is closed.
- Hook the beak in the sail and start to clip the batten, the beak should be at approximately 30 degrees to the batten shaft as tension starts to come on the clip, and should not be difficult to close.
- With your eyes level with the trailing edge, look along the length of the batten toward the leading edge. As you close the clip and the sail tightens, the batten should start to make a small ridge on the sail near the leading edge - no more then a couple of millimetres.
- Make adjustments of one full-turn at a time in between checking.

ADJUSTING BATTEN STRUT TENSION

- As you start to close the folding clip, tension should start to come onto the clip at approximately 30 degrees.
- As the clip is closed, the sail should become tighter without obvious wrinkles. The clip should not be difficult to close.
- Make adjustments of one full-turn at a time in between checking.

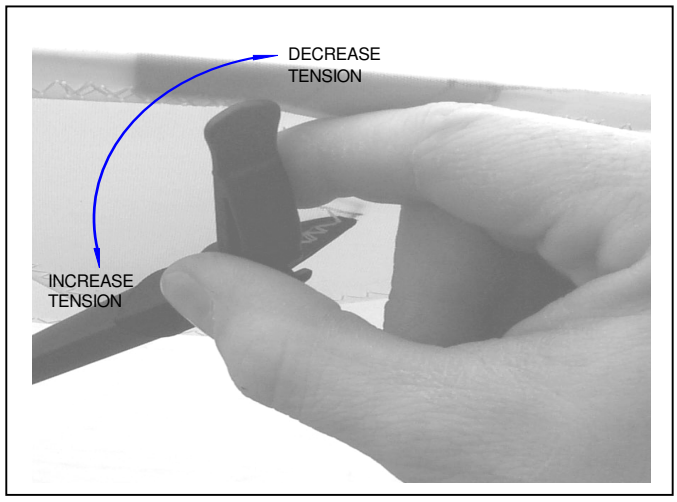

Figure 39 Adjusting Batten Tension

Pitch Tuning

Trim speed at MTOW is:

28- 32 mph

If the wing is trimming outside the specified trim range a forward or aft movement of the keel roller on the keel tube can be used to trim the wing.

A one-hole adjustment will see a typical change in trim of 5 mph. Moving the roller to the forward position will increase the trim speed whilst moving the roller rearward will decrease the trim speed. The illustrated parts catalogue should be referenced for correct reassembly.

57.50.00 Attach Fittings

U-bracket
The U-bracket is the main attachment point of the wing to the base structure, as well as to the keel of the wing. It is the major junction for the three main components of the aircraft, the wing (keel attachment), base (mast attachment) and control frame (top knuckle attachment). The U-bracket has two components, a ∩ shaped channel, and a negative block that is attached below the keel to preclude the keel from moving out the bottom of the bracket.

The U-bracket should be checked thoroughly after any unusual loads.

95. SPECIAL PURPOSE EQUIPMENT

95.10.00 No special purpose equipment is fitted

APPENDIX A – Condition Inspection Checklist

Wing Maintenance Log. S/N: _____

Date	Hours	Maintenance Section or Service Bulletin	Work Performed	Maintained by

APPENDIX B – Feedback Form

***Operation and Maintenance* Feedback Form**	
AirBorne AUSTRALIA	Please use a copy of this form to provide notification to the manufacturer about issues or anomalies identified during the operation or maintenance of the aircraft or in the content of the manual.
Return to AirBorne WindSports Pty Ltd PO Box 7042 Redhead New South Wales 2290 Australia Fax +61 2 4944 9199 Email trikesupport@airborne.com.au	Please provide your own contact details below
Issue Description	
If you have a proposal to remedy the issue please provide it here: Number of pages submitted including this cover page_____	

End Core Maintenance Manual