Maintenance Manual

Wing Type :

IXess 13

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1 Table of Contents

2 Amendment Record Sheet

2.1 Table of Amendments

Amendment date	Affected sections	Affected pages	Date inserted	Signature

2.2 Amendments

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 Air Création website (http://www.aircreation.fr) in PDF format. This should be printed out and added to the manual. The amendment table should at that time be updated with the appropriate details and date. Therefore it is important for operators to check the website regularly for any amendments that have been made. If any errors or omissions are found in this manual please advise the factory.

3 Introduction

This manual contains factory recommended procedures and instructions for servicing, inspecting and maintaining the iXess wing. The procedures described are to be used in addition to the particular governing body regulations for each country where the aircraft is flown.

The operator is directed to reference the trike maintenance manual for any issues related to the trike component of the aircraft.

3.1 Skills

It is assumed that only people with an adequate skill level will perform maintenance on this aircraft. A sound understanding of mechanical systems, experience with the necessary tools and procedures and knowledge of the specific flight mechanics of weight-shift controlled aircraft is required – as the continuing airworthiness of the aircraft depends on the competence of the person performing the maintenance. If there are any doubts regarding the required and appropriate maintenance then an Air Creation technical station should be contacted for the correct procedures and/or servicing.

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

3.2 Tools

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

Loctite® will be required in certain locations and should always be replaced after disassembly.

- Loctite® 243 for the frame
- Open ended metric spanner set (6, 10, 13, 17mm)
- Dry lubricant – lubricant that doesn't attract dust after application, like Teflon lubricant.
- Hex key set up to 8mm
- #2 Phillips screwdriver
- Various general care items, specified where needed

This list may not be exhaustive.

3.3 Air Creation Directives

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.

Air Creation will from time to time issue airworthiness directives, which detail any changes to the maintenance manuals, pilot's operating handbook, or any other details that air creation deems necessary for owners to be notified of.

The web address for Air Creation directives is:

http://www.aircreation.fr

3.4 Units

3.4.1 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 Millimeters (mm)
1 Foot (ft) = 0.3048 Meter (m)
1 Statute mile = 1.609 Kilometers (km)
1 Nautical mile (NM) = 1.852 Kilometers (km)
1 Millibar (mb) = 1 Hectopascal (hPa)
1 Millibar (mb) = 0.1 Kilopascal (kPa)
1 Imperial gallon = 4.546 Liters (L)
1 US gallon = 3.785 Liters (L)
1 US quart = 0.946 Liter (L)
1 Cubic foot (ft3) = 28.317 Liters (L)
1 Degree Fahrenheit (F) = (1.8 X C)+32
1 Inch Pound (in lb) = 0.113 Newton Meters (Nm)
1 Foot Pound (ft lb) = 1.356 Newton Meters (Nm)

3.5 Main Airframe Description

The wing is a very specific part of the aircraft.

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.

3.5.1 Keel

The keel of the wing is mainly constructed from 2017A aluminum. Each of the major components of the wing is attached to the keel. Major components from the front to the rear of the keel:

3.5.2 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 nose plate bolts also fasten the U-channel to the keel. The gooseneck catch fastens the front wires to the U-channel.

3.5.3 U-Bracket

The U-bracket is the major junction for the three main components of the aircraft, the wing (keel attachment), trike (mast attachment) and control frame (top knuckle attachment). The U-bracket has two components, a U-shaped channel, and an internal nylon sleeve.

The U-bracket is allowed to rotate around the keel, and is held in position longitudinally by nylon rings that are bolted to the keel.

The U-bracket should be checked thoroughly after any unusual loads, especially torsional ones.

3.5.4 King Post

The king post assembly is a vertical post perpendicular to the keel of the wing, which supports the reflex bridles, the top front and back wires, and the top side wires. The king post works in compression, and is secured to the keel using a locating foot. The main material is 6082 aluminum.

3.5.5 Tensioning U-channel

The cross bars tensioning U-channel is bolted to the keel with two bolts. These bolts are used to attach the rear wires.

3.5.6 Control Frame

The control frame is constructed mainly from 6082 and 2017 aluminum. 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 to the keel through the U-bracket. 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.

3.5.7 Leading Edge

The leading edges are mainly constructed from 7075, 2017 and 6082 aluminum. The leading edges are mainly loaded in bending and compression .they 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 and the outboard wires. 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 a part of the leading edge, but are made in order that they may be removed for ease of shipping.

3.5.8 Cross Bars

The cross bars are mainly constructed from 7075 aluminum .the cross bars serve the purpose of holding the leading edges forwards and spread against the sail, they share the loading with the leading edges during positive and negative flight loads.

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 cross bars are attached to the leading edges using a bolt assembly. The top and bottom side wires are a part of the bolting arrangement.

3.5.9 Battens

The battens are mainly constructed from 7075 aluminum. The battens are secured by batten pockets sewn into the sail. The batten ropes at the trailing edge secure the battens into their pockets.

The battens help to maintain the profile of the wing during flight, and are important to the correct and stable operation of the wing.

⚠ *Do not fly the wing with any other batten profile than that supplied by Air Creation, as variation may have serious effects on flight performance and stall characteristics of the wing.*

3.5.10 Top and Bottom Side Wires

The bottom side wires are stainless steel braided wires that are attached to the cross bars and the knuckle at the bottom of the control frame by stainless steel plates, thimbles and swaged Nicopress sleeves. The top side wires are attached to the kingpost head.

3.5.11 Top and Bottom Front Back Wires

The bottom front back wires are stainless steel braided wires that are attached to the nose catch, control frame and keel by stainless steel plates, thimbles and swaged Nicopress sleeves. The top front back wires are attached to the kingpost head.

3.5.12 Reflex Bridles

The reflex bridles are mainly stainless steel wire swaged together using Nicopress sleeves and attached to the top rear wire via a pulley, and to the sail using shackles.

Reflex bridles produce longitudinal stability when the wing is at zero or negative angles of attack. The reflex bridles work by preventing the trailing edge of the wing from 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.

3.5.13 Trim

There is a trim speed control device on all the iXess wings. The trim control is achieved by a pulley system, which raises the reflex bridles. Raising the bridles causes the root airfoil of the wing to be reflexed. The reflexed section causes the centre of pressure of the airfoil to move forward resulting in a reduction in trim speed.

3.5.14 Sail

The sail comprises the lifting surface of the wing. It is mainly constructed of UV protected Trilam and Dacron polyester fabric, with some ABS and 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 provides zippers that facilitate easy preflight inspection of all the members inside the double surface wing.

3.5.15 Special purpose equipment

Training Bars

The training bars are attached to the control bar and uprights in order to extend the possibility to fly the aircraft from the back seat. They are supplied as an option for use by qualified flight instructors.

3.6 Assembling from Shipping Crate

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 Air Creation factory.

3.6.1 Reassembly Guide

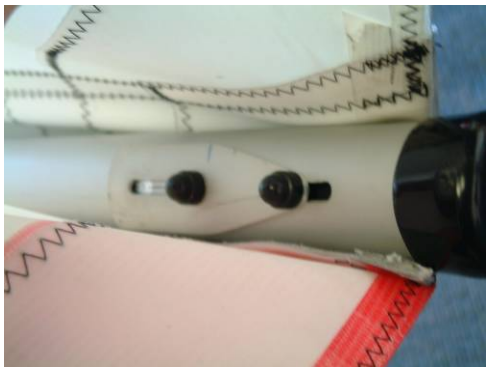
1. Remove wing from box. Take care that no staple damages the bag or the sail during this operation.
2. Unzip bag
3. Remove all wing straps. Remove padding from control bar and rear leading edges.
4. Unfold the ends of the sail
5. Assemble the control bar on the revolving base fixed to the left A-frame strut with the 6mm CHC bolt, washers, thread locker and Nylstop nut and on the right with the push pin. Close the leather protections.
6. Rotate the wing so that it is lying flat on the ground
7. Spread both leading edges approximately ½ meter. Remove the tip covers, which have been used as protection on the rear of the front leading edges.
8. Insert rear leading edges in the tips opening of the sail with the plastic lugs at the rear of the tubes positioned horizontally and to the inside. Finish sliding the rear leading edges in the front part. Turn slightly and push in order to line up the half-hole and the horizontal bolt connecting the crossbars on the front part of the leading edge. Make sure that the plastic lugs at the rear of the tubes are face-to-face. Once installed the rear leading edge slot should be located on the channel horizontal bolt. it should be impossible to rotate the leading edge, if correctly assembled.

Figure 3-1

9. Remove the self-tapping **screws B 199010** (Refer to drawing **OP10-24CA**) which hold the sail on the leading edge at the nose of the wing. This way, the sail will move back easily. Thread a piece of string through the eyelets on the sail at the nose and tie it to the nose plates. You will have to replace the nose screws using this string once the wing is fully open and tensioned. (See Figure 3-1.)
10. Attach the sail to the sleeves with the 4 **screws FHC 6-70 (B167210).** Make sure that the aluminum guide retainer, which adjusts the tension, is facing the slot of the sleeve, at the tip of the leading edge.

11. Insert the sleeves in the aft part of the leading edges, using the sleeves like levers. Apply thread lock to the sail attachment nuts and tighten with the **tip position indexer (D128410)**

Figure 3-2



12. Position the wing tip sleeves by rotation and align the marks on the sleeves with the "0" showing on the scale located on the leading edge tube. Unfold the wing as described in the pilot operating hand book. Check the position of the fabric around the nose plates and the nose batten on the stop pin at the front of the keel while opening the sail. Use the string to pull the sail firmly forwards on the frame.
13. Go to the nose and replace the nose screws once the wing is fully open and tensioned.

A thorough and complete preflight check is especially necessary after reassembly. Thoroughly check all nuts and bolts, wire routing, sail fit, Mylar shape and overall symmetry of the wing before flight.

Perform preflight check as described in the Pilot's Operating Handbook paying particular attention to possible damage to the airframe during transport.

3.7 Ground Handling

The wing should only be moved when properly packed or, if necessary, when attached to the trike.

When moving the wing in the assembled position it is recommended to lift the wing with the shoulders while 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 side wires. The wing should be moved with the nose facing into the wind. In windy conditions, the nose must be kept low. The windward tip should also be kept lower to avoid the wing rising.

3.8 Transportation & Storage

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 or to use a ladder to spread the load. 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.

4 Maintenance Checks

4.1 General

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

The time limits and maintenance schedule provided are in addition to any regulation of the governing body where the aircraft is flown.

The pilot of the aircraft must ensure that the required maintenance is carried out and documented in the correct manner.

4.2 Time Limits

Extreme operating conditions and any extreme loads will reduce the time limits for components and the fatigue life of the airframe. The fatigue life of these components is dependent upon rigid adherence to maintenance schedules.

Air Creation 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 available on the website http://www.aircreation.fr).

The following components are time limited and should be overhauled or replaced as indicated. This table may be updated to include more components in the future as airworthiness directives are amended.

Wing Component Life

Component	Life
Control frame and cross tubes	On inspection, no fatigue limit
Leading edges	900 hrs
Keel	1500 hrs
Rigging wires	600 hrs
Roll bracket	1500 hrs
Bolts	300 hrs
Hang bolt	300 hrs

4.3 Scheduled Maintenance

4.3.1 Wing Maintenance Schedule

Item	Maintenance Requirement	Hours of Operation					
		50	100 1 yr	150	200 2 yrs	250	300 3 yrs
Wing Sail	Wing fabric deterioration and tears		2		2		4
	Wing fabric stitching condition and abrasion		2		2		2
	Wing fabric attachments points	2	2	2	2	2	2
	Battens retaining strings for condition		2		2		5
	Inspection zippers		3		3		
	Wing fabric sample factory test						2
	Sail removal for general overhaul						4
Wing Airframe	Battens profile		2		2		2
	Battens fittings		3		3		3
	Wires and attachment fittings for tension, corrosion, fraying, kinking or fretting	2	2	2	2	2	4
	Trimmer assembly and operation		3		3		4
	Condition and security of all screws, bolts, nuts & washers	2	2	2	2	2	6
	Condition and operation of all push pins	2	4	2	4	2	4
	Outer part of leading edges		4		4		
	Keel and visible tubing	2	3	2	3	2	
	Hang bracket for condition, deformation	2	3	2	3	2	4
	Main hang bolt	2	4	2	4	2	6
	Nose assembly, U-channel and cable gooseneck catch for condition		3		3		4
	Tensioning u-channel and cable gooseneck catch for condition		3		3		4
	Central cross-bar assembly, protection and webbing for condition		3		3		4
	Cross-bars to leading edges assembly for condition		3		3		4
	Tip assembly		3		3		4
	All rig/unrig points for condition and operation		3		3		4
	All airframe tubing for cracks, dents, deformation, corrosion or fretting						4
	All airframe fittings for cracks, dents, deformation, corrosion or fretting						4

Code:

1. Oil, lubricate, clean and service
2. Check as directed
3. Check for security, cracks, wear and faulty operation
4. Remove, inspect and replace if necessary
5. Recommended replacement or overhaul
6. Mandatory replacement

4.4 Unscheduled Maintenance

4.4.1 General

Unscheduled maintenance is required due to abnormal loads such as 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 affected 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.

4.4.2 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 or the keel, as well as all of the other effected components. If the landing resulted in a jolt on the ground then a 300-hour overhaul must be performed. The tubing relies on being intact and in perfect condition for full strength. If tubing is bent or kinked in any way then it should be replaced prior to flying.

4.4.3 Inspection after Heavy Turbulence

Turbulence is more likely to structurally affect the wing of the aircraft than the trike.

The main areas 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.

5 Standard Practices – Airframe

5.1 Torque and Safety procedures

This chapter provides standard torque and safety procedures that are to be used in all areas of the aircraft unless otherwise specified. The use of these procedures will ensure the security of installation and prevent overstressing the components.

5.1.1 Torque Procedures

Correct Torque 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 crush components.

Definition of "Just Not Loose"

A definition of torque has been established for the assembly of this wing that is 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 (e.g. A wire tang).

⚠ *The correct torque of the bolts for the wing section of the airframe is especially important for the safety and longevity of the wing. In general standard torque values will not be applicable, because of the nature of the thin wall aluminum tubing that has been used to construct the majority of the wing structure.*

Never tighten nuts so that the aluminum tubing is deformed from its circular cross sectional shape.

Always have at least one full thread showing past any Nylok nut that is used.

Where stainless steel washers are used, the rounded edge should be placed towards the aluminum tube, if any, or towards other aluminum part, if not.

5.1.2 Safety Procedures

- Nylstop Nuts

  Nylstop nuts are used throughout the airframe. Nylstop nuts may not be reused.

- Loctite

  On any bolt that does have or not a Nylstop type locking mechanism, Loctite 243 should be used to prevent premature loosening.

⚠ *Do not fit the plastic nut caps until the airframe has been inspected.*

5.2 Sail Removal

The sail should be removed for close inspection of the airframe if the frame is suspected of having bent tubes following a heavy landing, blow over or crash.

It is mandatory that the sail should be removed from the frame every 300 hours to check for any signs of fatigue or damage from general wear and tear. The removal of the sail may only be performed by an approved Air Creation technical station.

The main points to check are:

- Cross bar hinge joint
- Cross bar/leading edge joint
- Leading edge nose joint
- Nose plates
- Straightness and condition of the tubes
- Elongation of bolt holes
- Damaged wires
- Replacement of all bolts, nuts and push-pins
- Damage to sail
- Factory test on one of the sailcloth samples

Special Requirements and Tips

When installing or removing the sail you will need a large unobstructed area of approximately 12 meters by 3 meters. 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 practice to note the order of washers and other fittings prior to disassembly and to have a small container to put the hardware in. The Illustrated Parts Catalogue should be referenced for correct assembly.

5.2.1 Wing Dismantling Procedure

Wing folded on the under surface on a pair of trestles, one at the nose, and the other at the tips:

- Check and mark the rotation and tension positions on the back adjustable sleeves. Label left and right.
- Decrease tension of sail on the leading edges using the **bolts B126410** at the tips. (Note if any adjustment have been made.)
- Unscrew the 2 sail locator self-tapping screws from the nose. (Refer to drawing **OP10-24CA**; part # **B199010**.)
- Take off the screw of the retaining sail strap at the end of the keel tube.
- Remove the nose batten.
- Take off the 4 **FHC B167210 screws** of the two back adjustable sleeves on the leading edges.
- Open the Velcro straps fixing the sail to the crossbar at the leading edge junction.
- Remove the luff-line quick links at the trailing edge.
- Dismount all parts of the trimmer system on kingpost and uprights (mark position of the stop on the right upright).
- Dismount trim control cable and pulley from trim luff line.
- Dismantle the front and the back lower cables on keel and uprights.
- Dismantle the bolts fixing the lateral lower cables on the control bar.
- Dismantle the bolts fixing the uprights on the upper U-brackets, and remove the U-brackets from the RAP.
- Remove the bolt fixing the front upper cable to the nose plate, and pull cable free of sail.
- Remove the bolts fixing the lateral upper and lower cables to the cross bar, and pull cables free of sail.
- Dismantle the luff line pulley assembly.
- Dismantle the tensioning rail at the rear of the keel.
- Slide the sail off the rear of air frame taking care to keep sail clear of the RAP and king post foot.
- Remove the king post foot, the hang bracket body and rings. Insert zip-tie in the king post hole to keep internal sleeve from moving during maintenance work.
- Dismantle the bolts connecting cross bar to leading edge.
- Slide the crossbars backward to disengage them from the keel.
- Remove the aft section of leading edge.
- Remove the protective sleeve at the central junction of the crossbars.
- Dismantle all parts fixed on the crossbars.
- Dismantle all parts remaining on the keel.
- Dismantle all parts remaining on leading edges.

If the sail needs to be stored or shipped for repair, follow the instructions in 7.2.

5.2.2 Wing Reassembly Procedure

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.

Refer to drawings of the “Illustrated Parts Catalogue”

It is mandatory that all nuts that are removed are replaced with new ones.

1. Cross-Tube Junction Webbing
   - Refer to the drawing **OP10-09TR** and Figure 5-1 and Figure 5-2 below.
   - The cross tubes (crossbars) are not defined for port/starboard, therefore it does not matter which you choose to be port or starboard. The ball and socket parts have been drilled in position and are therefore matched to each cross-tube. The inner sleeve in the cross-tubes is constructed by slicing the same tube as the outer tube, squeezing it down, and inserting it in the outer tube. Therefore the split visible at the end of the cross-tube is not a defect!
   - Lay the cross-tubes **(D140633-35)** out in their approximate flying position: slightly swept back, ball and socket joint in the middle, tapered ends outwards with tapered side uppermost.
   - Temporarily secure the ball and socket joints with screw **BHC 6-94/10 (B069410)** and remove any other securing tape etc.
   - The crossbar linking strap **(D075210)** must be secured to the rear of the cross-tubes using two self-tapping screws **(B199010)** with **6 x14 stainless steel washers (B810610)** between the screws and the webbing.
   - The webbing should be oriented with the central split towards the cross-tubes.

Figure 5-1

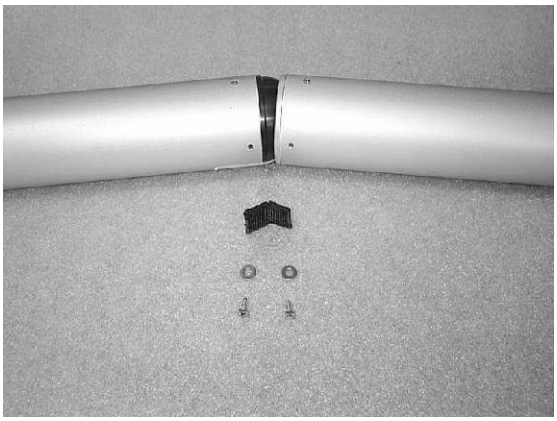


Figure 5-2

2. Cross-tube Junction
    - Refer to Figure 5-3,Figure 5-4, and Figure 5-5.
    - The upper and lower pull back **tensioning cables (D204590)** cables are the same length. Any plastic sleeves should be placed at the cross-tube end.
    - The central bolt, **screw BHC 8-65 (B086710)** has the nut down.
    - Assemble all four plates **crossbar linking lugs (I220010)** on bolt with one cross-tube's pair top and bottom on the bolt, with the other cross-tube's pair on the inside of those (i.e. not staggered).
    - **8 x 18 Stainless steel washers (B810810)** are used between the parts on the central bolt.
    - The **crossbar securing lugs (I220021)** are attached to the keel protection sleeve, do not fit them at this stage
    - The cross-tube attachment bolts **screw BHC 6-94/10 (B069410)** have the nuts up, assemble with **6-14 nylon washers (B820610)** between the stainless steel plates and the aluminum tubes but do not tighten the nuts yet.
    - Apply thread lock to the central bolt and tighten gently, leaving plenty of movement of the pull back cables, as can be seen in Figure 5-5.

Figure 5-3

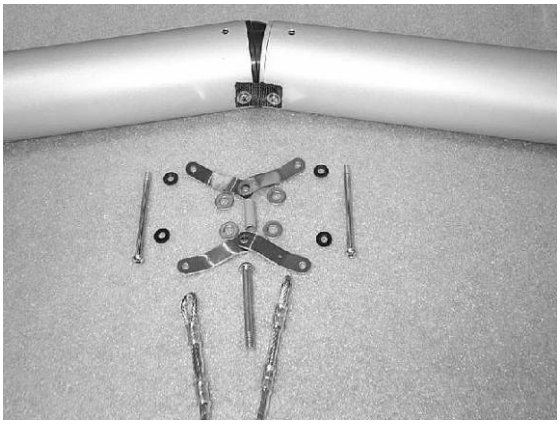
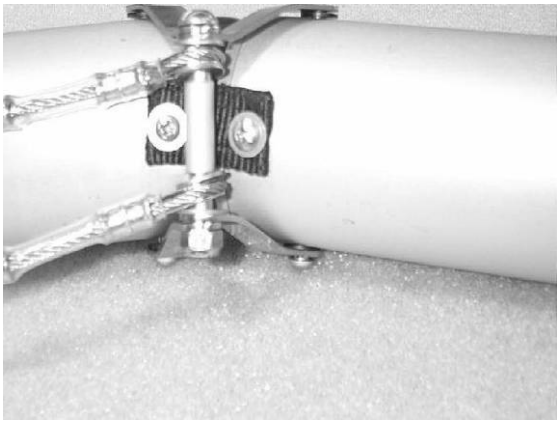


Figure 5-4

Figure 5-5



3. Cross-tube/keel protection sleeve
    - Take the cross-tube junction/keel protection sleeve **(D074327)** and pass the lower pull back cable through the small loop at its rear end, Figure 5-6.
    - Fold the backup bridle around the front of the cross-tubes, and pass both pull back cables through it, Figure 5-7.
    - Cable-tie the small loop tight to secure it, Figure 5-8.
    - Mount the **crossbar securing lugs (D074327)** on the back-up pull back bridle to the end of the cross-tube attachment bolts, but do not tighten yet.

Figure 5-6

Figure 5-7

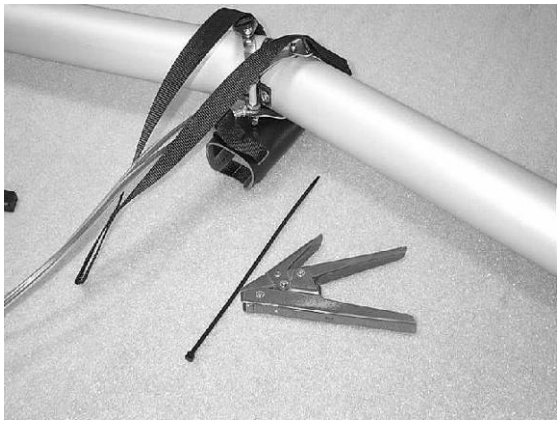


Figure 5-8

4. Nose Plates
    - Place the keel and the leading-edge tubes on a pair of trestles.
    - The leading edges are not defined for port/starboard, but do have a front and rear. Examine the holes close to the outer end, where the cross-tubes attach: the smaller (8mm) hole should be turned to the outside of the frame, with the larger (10mm) hole turned to the inside.
    - Place the two large **nylon cup washers (P355010),** located on the underside of the keel, to align with the bolt holes.
    - Assemble the nose-catch **tensioning rail (D251010)** pointing rearward from the bolts.
    - The 6-14 and 8-18 nylon washers **(B820610** and **B820810)** should be used between the aluminum tubes and the aluminum nose plates **D255010**.
    - Note that the nose plates are positioned so that the longest side faces forwards.
    - Note that the rear keel bolt, **screw FHC 6-85-15 (B168710)** is longer than the front one, **screw FHC 6-80-12 (B168310),** with two **6x14 stainless steel washers (B810610)** on top of the upper nose plate to hold the upper rigging cable later. Do not tighten this nut yet.

- Apply threadlock and tighten the other bolts gently, being careful not to crush any of the tubes by over-tightening the bolts! The leading edges must be free to pivot when rigging and unrigging, so only tighten the bolts until there is no more free play, and make sure to tighten them evenly. This can be checked by making sure the plates remain parallel.
- *Do not assemble the goose neck and lower front cables at this point.*

5. Fitting Cross-tubes to Keel
   - Holding the cross-tubes above the end of the keel, slide the protection sleeve over and up the keel to within about a foot of the nose plate.
   - Place a spacer (e.g. a broom handle or the kingpost) between the cross-tubes and the keel, Figure 5-9.
   - Apply threadlock and tighten the nuts holding the pull back bridle to the cross-tubes, leaving enough slack to allow forceful rotation of the back-up pull back bridle guide plates. Some thread (just a little) should show from the nut. It may help to tighten the nuts quite firmly, and then back-off a little to allow the required movement.
   - Pull the back-up pull back bridle firmly down the sides of the cross-tubes and carefully secure them with a **self-tapping screw (B199010)** into the hole in the cross-tube, placing a **countersunk washer M6 (B830610)** between the screw and the back-up pull back bridle, Figure 5-10.
   - Remove the spacer.

Figure 5-9

Figure 5-10

6. Leading-Edge Fittings
   - The hole in the leading edge is 8mm on the front and 10mm on the rear (as mentioned earlier) to receive the **spacer (D252360)**.
   - Apply Teflon® lubricant spray on the flat side of the **aluminum cup washer (D264550)** and its mating part.
   - Assemble the parts as per the drawing OP10-07CA.
   - The nut should be threadlocked and tightened to remove all free-play, but still allow smooth rotation of the leading edge cardan.
7. Leading-Edge to Cross-tube Junctions
   - Slide the aluminum fittings **crossbar V (D264520),** into the ends of the cross-tubes and check the fit of the bolts **screw CHC 8-50-15 (B085110)** and **screw BHC 8-96/11 (B090960)**.
   - Note that the upper wing wire, **kingpost head (D206556)** connected to the head of the kingpost should not be attached yet, therefore do not tighten the nut on this bolt. **Lateral lower cable N1 (D203665)** is the inner wing wire, numbered 1. **Lateral lower cable N2 (D203668)** is the outer wing wire, numbered 2.
   - Remember the nylon washers between the aluminum tubes and the steel tangs on the wing wires.

- Apply threadlock and tighten the outer wing wire bolt, **screw CHC 8-50-15 (B085110)**, leave no play, but ensure easy rotation of the tang on the wing wire number 2.
- Note there is no washer between the **crossbar V (D264520)** and the **leading edge cardan (D264540)** on leading edge.
- Apply threadlock and tighten bolt **screw BHC 10-65/17 (B106517)**. However, do not over-tighten the bolt: allow rotation of the bolt using firm hand pressure.

8. Hang-Bracket
   - The hang-bracket is positioned so that the lowest point on the hang-bracket points towards the rear of the wing. Slide the nylon bearing, **nylon apr (D261211),** into the hang-bracket from the rear. Slide the hang point adjustment sleeves, **RAP stop ring (D263010),** and the hang bracket onto the keel.
   - Do not use any oil, grease, or silicone spray to lubricate the hang-bracket, as this will serve only to collect abrasive dirt after a short time in service.
   - Secure the adjustment sleeves, **RAP stop ring (D263010),** in the front hang-point location , with their bolts, **screw CHC 6-80 (B068310),** inserted from the left side. Insert all bolts in the vicinity of the hang-bracket from the left to ease pre-flight checks.
   - Apply threadlock to the bolts, **screw CHC 6-80 (B068310),** and tighten gently. Do not over-tighten, the adjustment sleeves remain free to pivot even when bolt is fully tightened.
   - Do not fit the nut caps **(P300610)** at this stage.
9. King-post foot/Tensioning rail
   - Assemble the parts as per the drawing **U028245-M020**.
   - Apply threadlock and tighten bolt **screw BHC 8-85/15 (B088515),** gently.
   - Do not fit the king-post until the sail has been fitted.
   - Assemble the pull-back attachment rail, **tensioning rail (D251010)**, noting that the rail points forward from the bolts. Do not tighten the nuts yet. Install the swan catch positioning bolt in the most forward hole on the rail.
10. Keel Protective Tape
    - Replace the four pieces of protective tape (prop tape) on the keel, as shown on drawing OP10-03QU.
11. Wing Structure Inspection Stage
    - An inspection must be performed before you put the airframe into the sail.
    - Use the structure control form provided in 7.1.1 to record the inspection.
    - The structure inspection stage is most easily performed with the wing opened up on four trestles, one each at the nose, at the end of the keel, and at each wingtip.

5.2.3 Sail Reinstallation

1. Preparation for Fitting the Sail
   - At this stage a workspace large enough to open the wings fully is required.
   - Place the airframe cross-tubes uppermost on a pair of trestles, one at the nose, the other at the cross-tube ends.
   - Insert the two outer leading edges. These have a notch to engage on the bolt within the inner leading edge, and should be positioned with the mount for the tip-rods innermost (rearwards). The outer leading edges are not defined for port/starboard.
   - Using clean rags, bubble pack or similar padding at the end of the keel, the hang-bracket, and the ends of the leading edges to protect the sail, Figure 5-11.
   - Hang a weight on the nose, Figure 5-12, approximately enough to balance the weight of the sail when laid half-way between the rear trestle and the end of the leading edge, approximately 5kg.
   - Pull the leading edges together, still with the cross-tubes on top.

Figure 5-11

Figure 5-12

2. Fitting the Sail to the Airframe
   - Lay out the sail in a straight line back from the end of the leading edges, with the nose towards the structure.
   - The upper wing surface should be uppermost at the nose, folding over to show the undersurface further down the wing, aiming to achieve a straight run for the tubes down the leading edges of the sail.
   - The sail has an inner membrane between the top and bottom surfaces located inboard of the leading-edge/cross-tube junctions.
   - Figure 5-13 taken inside the wing from the leading-edge/cross-tube junctions shows the membrane from the top to bottom surfaces, behind the cross-tube.
   - The leading-edges and the cross-tubes must pass in front of the membrane during sail fitting.
   - Taking care not to catch the sail on anything as you pull it over the structure, pass the nose opening of the sail over the two leading edges and slide it up to the cross-tubes, observing the need to pass all tubes in front of the membrane.
   - Slide the rest of the sail onto the leading edges.

- Place another trestle under the end of the leading edges and remove the trestle from the cross-tube end area.
- Remove the nose weight.
- Slide the nose of the sail over the leading-edges/cross-tubes junctions and the keel.
- Pass the hang-bracket through the nose of the sail. You may need to rotate the hang-bracket in order to pass the sail over it.
- Check for the keel reaching the hang-bracket position on the underside of the sail. The keel needs to come out of the sail at this position and then back into the flat keel pocket at the rear of the sail, Figure 5-14. It may help to spread the wingtips by about 1m around this point.

Figure 5-13

Figure 5-14

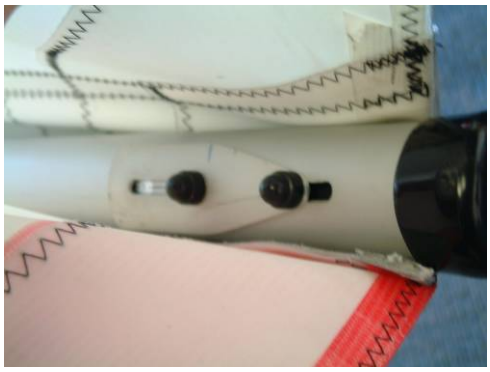
- The keel should emerge from rear end of the keel pocket as the sail is pulled up to the nose.
- The sail should now be completely on the frame, with the keel protruding from the keel pocket and the wing tips close to the ends of the sail. Check that all the tubes have passed down the leading edge side of the membrane.
- Now remove the protective packing from the ends of the keel and leading-edges.

3. Top Rigging
   - The upper rigging is attached to the king-post head and comprises two upper wing wires, the upper forward rigging wire, and a short part of the rear upper rigging wire.
   - Lay out the upper rigging with the king-post upper fitting laid on top of the sail close to the nose.
   - Thread the upper forward rigging wire down through the opening in the sail close to the nose and to the rearmost bolt on the nose plate above the keel.
   - Apply threadlock and tighten the nut, while still allowing rotation of the tang as usual.
   - Insert the upper wing wires through the openings in the top surface of the sail close to the cross-boom/leading edge junctions.
   - The wing wire can now be attached on top of the cross-tube as per Drawings **UO28245-M050**.
   - Apply threadlock to bolt, screw **BHC 8-96/11 (B090960),** and tighten gently, allowing rotation of the cable tang.
   - Pull the lower wing wires through the opening in the lower sail surface.

4. Nose Batten
    - Spray dry lubricant onto the nose batten, **(D194548),** and insert into the batten pocket from the nose. Make sure that the batten doesn't catch as it goes in.
    - Position the batten over the protruding piece on the keel.
    - Thread a piece of string through the eyelets on the sail at the nose and tie to the nose plates.
    - Lift the sail over the leading edges to lie between the cross-tubes.
5. Tips
    - Refer to Drawing **OP10-20ST** and Figure 5-15, Figure 5-16, and Figure 5-17.
    - Prepare adjustable sleeve assembly.
    - Insert the bolts **screw FHC 6-70 (B167210),** from the leading-edge of the sail to the inside of the sail, not forgetting the **countersunk washers (B830610).**
    - Set the zero position with the adjusting screw **HM 6-45 (B126410),** so that the bolts, **screw FHC 6-70 (B167210)**, are at the end of the slot. Insert the tips into the leading edges if not already in place. The **tip position indexer (D128410)** located to the rear of the bolts, **screw FHC 6-70 (B167210),** and has a slot in it to enable you view the position of the tips via the **position indicator sticker**. It also has a piece of rubber stuck onto it to stop the tips from rotating once the bolts are tightened.
    - Apply threadlock to the sail attachment bolts, **screw FHC 6-70 (B167210),** and tighten gently, then loosen by one turn to allow the tips to slide as the tension screw is adjusted. Figure 5-16.

Figure 5-15

Figure 5-16

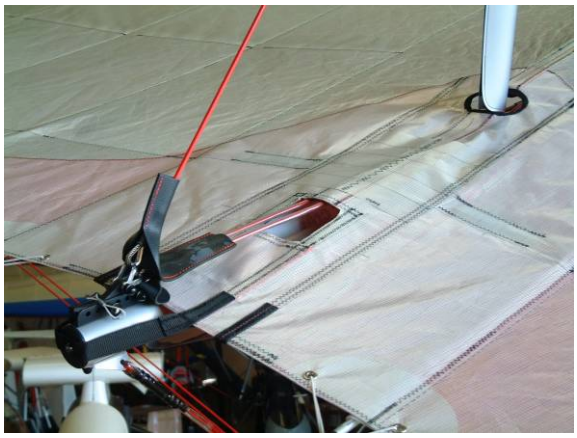


- Do not apply threadlock to the tensioning bolt **screw FHC 6-45 (B126410).**
- Go to the nose; use the string to pull the sail firmly forwards on the frame, Figure 5-17.

Figure 5-17

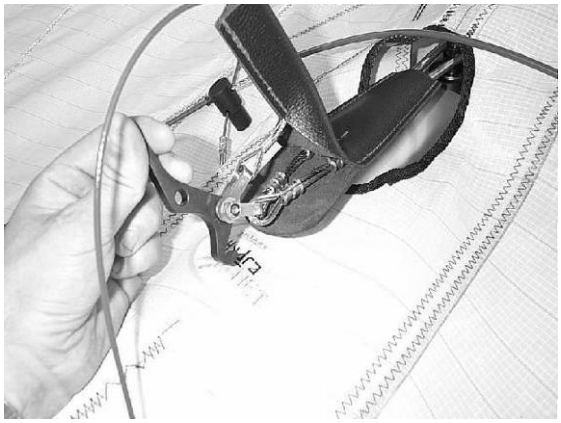
6. Battens
    - Support the wing on trestles at the nose, keel and wing-tips
    - Open the wings out all the way, checking the straightness of the cable ends as you do so.
    - Generally settle the sail on the frame by pulling the sail down the keel, and at the tips if not central.
    - Insert the upper surface battens.
7. Pull Back Attachment
    - Check from the underside of the wing that the pull back bridle is not crossed or wrapped around the keel, the iXess has two holes in the top of the sail, one for the kingpost and the other for the pull back cables, see Figure 5-18. Initially thread the pull back cables through the kingpost hole.

Figure 5-18



- Thread the **upper rear wire (D206567)** through the anti-chafe **leather boot (D074810),** Figure 5-19.

Figure 5-19



- Pass the pull back cables **(D204590)** through the boot **(D074810)** one at a time (they may be a tight fit).
- Check cables inside sail again for straight runs, no twists
- Fit the **rear lower cables (D202566)** onto the bolts under the keel, with the tang directly against the keel, with no washers in between.
- Apply threadlock to the tensioning rail bolts, **FHC 6-70 (B167210),** and tighten the bolt.
- The standard position for the catch bolt, **screw CHC 6-30-10 (B063210),** is the most forward hole. Apply threadlock and tighten.
- The standard position for the catch bolt **screw CHC 6-30-10 (B063210),** is the most forward hole. Apply threadlock and tighten.

- Take two **stainless steel shackles (I112510)**, squeeze one inside the other and place one onto the **rear upper cable (D206567)**, the other onto the pull back cables. Fit the haul-back **goose neck (D251510)**, checking the correct orientation of the catch.
- Apply threadlock and tighten the bolt **screw CHC 6-30-10 (B063210),** on the goose neck catch.

8. Upper Rear Rigging
   - Pass the goose neck catch and wires back through the kingpost hole and out through the second hole in the sail as shown in photograph 17. Pull the **rear upper cable (D206567)** right out of the hole in the sail and lay it on top of the sail.
   - Assemble the rear upper cables and the reflex bridle lines, **luff-line N2 (D206686)** and **trim luff-line (D206688)** on the **luff-line pulley (D255510). (refer to drawing OP10-26CA)**
   - The upper of the two **shackles (I112510)** should be squeezed to fit within the lower, as this prevents the cables passing down the side of the pulley wheel.
   - Apply threadlock and tighten the connecting bolt, **screw CHC 6-35 (B063810),** gently.
   - Check that the pulley is free to rotate.
9. Uprights
   - Check that the wing is still opened out fully.
   - Slide the **A-frame stop (D271610)** with the largest hole on top onto the starboard upright. This is for the trimmer which will be fitted later.
   - Assemble the upright attachments, **A-frame top (D257410),** to the uprights, **A-frame strut (D150420),** and to the hang bracket on the keel. Refer to drawing **OP10-32MO**
   - Apply threadlock and tighten the upright securing bolts, **screw BHC 8-63/13 (B086313).** Also tighten the main bolt, **screw CHC 10-125-15 (B112810).**
   - Do not over-tighten the bolts in order to allow rotation of the parts.
10. Wing Tensioning
    - Settle the wing by giving the pull back cables a pull and release.
    - Slide the **trim kingpost stop (D271810)** on the kingpost, taper slanting downward.
    - Fit and stand up the king-post.
    - Check the straightness of all the wires onto their tangs and bolts and that they are not obstructing the opening of the sail on the leading edges.
    - Tension the sail fully with the pull back cables and lock the goose neck catch with the securing pin.
    - Secure the back-up pull back bridle webbing to the main pull back cables with a cable tie to keep it close to the hang-point. This will ease access when rigging, as the hangpoint backup cable also threads through this back-up loop.
    - Secure the rear sail webbing strap with a **self-tapping screw (B199010)**, as shown on Drawing **UO245-M010**.
11. A-Frame Corner
    - Refer to the drawing **OP10-32MO** which shows the front view of the port side control frame.
    - Thread the wing wires through the **control bar leather protection boots (D074910)**.
    - **Side lower cable N1 (D203665)**, attached to leading edge inboard, goes to the front of the assembly.
    - **Side lower cable N2 (D203668)**, attached to the leading edge outboard, goes to rear of the assembly.
    - Apply threadlock and gently tighten the nuts, allowing easy rotation.

12. Tip Adjustment
    - The tips should be adjusted so that the slot in the **tip position indexer (D128410)** shows the tips in the zero position (or the position that was previously checked before dismantling the wing if particular settings need to be reproduced). This is done by slackening the wing tip bolts, **screw FHC 6-70 (B167210**), then twisting the tips and then re-tightening the bolts so that the tip position indexer locks the tips in the correct position.
    - Each tip should now be tensioned 10 full turns of the tensioning screw, **screw HM 6-45 (B126410)** (or the value that was previously checked before dismantling the wing if particular settings need to be reproduced).
    - This should be counted from the start of the slot, or when the slackness in the adjuster screw is first felt to be taken up.
    - Each turn is equivalent to 1mm of sail tension.
    - Pop the plastic **covering caps (P201610)** over the tips.
13. Batten Strings
    - Each batten string should be one continuous loop passing down through one sail eyelet then up through the other to meet in a simple overhand/half-hitch knot.
    - Firmly push the battens in by hand.
    - Position the string with the lower portion across the batten end and determine the approximate position of the knot.
    - Remove the string from the batten end, and tie the knot a few millimeters further up the string.
    - Try the tension. It should be quite tight, resistant to squeezing the strings inwards from the sides, but not so tight that you can't get the strings on reasonably easily.
    - The strings should not be so tight that they make the sail wrinkle between the eyelets.
    - A bit of practice is needed, but there are plenty of battens to do!
    - Once you have got the tensions correct, tie a second knot a couple of inches further down the string to form a convenient handle, and cut the remainder off.
    - Note that the string on the last curved batten at the tip should be rather tighter than the rest, to the point of being a distinct challenge to get on and off.
    - The tip-rod has two strings, one from the upper surface and one from the lower surface. The tension in each should be similar.
    - Tension the lower surface string first, tight enough to smooth out any wrinkles in the lower surface close to the tip.
    - Roughly tension the upper surface string, aiming to do the same to the upper surface.
    - Now the tricky part: the correct tip-rod string tensions should produce a constant gap between the lower and upper surfaces, along the part where the lower and upper surfaces Velcro together.
    - When this is so, the string tensions should be equal, the tip-rod should be sticking slightly upwards, and the upper and lower surfaces should be smooth and free of wrinkles. There is a pen line under the upper surface and when the two surfaces are brought together the under surface should butt up to this line. It may take a few tries to achieve this!
14. Reflex Bridle
    - Attach the reflex bridles to the webbings running up through the eyelets with stainless steel shackles **(I120310)**.
    - Do not threadlock the shackles.
    - Check the positions of the reflex lines on the pulley arrange them so that they do not wrap around or run over each other.
15. Nose of Sail
    - Check the symmetry of the sail leading edges at the nose plates, move the sail into the middle.
    - Check the tension of the upper part of the sail leading edge at the nose plate, pull downwards on the strings if necessary to achieve a smooth profile.

- If the front part of the leading-edge has been changed, drill a 4mm diameter hole into each leading edge through the eyelet, remove the string and secure with a self tapping screw. If not, align the eyelets with the existing holes and secure with the **self-tapping screw (B199010)**.

16. Front Lower Rigging
    - To maintain the correct cable tensions, for the front hang-point position, the nose catch bolt **screw CHC 6-30-10 (B063210)** should be placed in the rearmost hole in the **tensioning rail (D251010).**
    - Apply threadlock and tighten the nose catch bolt.
    - Slide the **transparent sleeve (S402010)** over the **front lower rigging cables (D201587)**.
    - Attach the nose-catch **goose neck (D251510),** to the cables, remembering to apply threadlock to the bolt and tighten gently. Don't forget to place the **leather tab (D074815)** between the lower front cables. Also don't forget the nylon washers between the shackle and the nose catch goose neck.
    - Apply a little cleaning liquid or soap to the cables and slide the transparent sleeve up to the goose-neck.
17. Rig the Wing
    - Go to iXess wing final assembly stage inspection and perform steps 1 & 2 in the **While Rigging** section of 7.1.2.
    - Lift the wing onto the control frame and attach the nose catch.
    - Place the wing on its nose.
    - Install the undersurface battens.
    - The recesses in the batten tips should seat against the underside of the leading-edges.
    - Attach the Velcro holding the sail on the crossbars near their junction with the leading edges.
18. Trimmer
    - Refer to drawings OP10-28ET & OP10-32MO.
    - Fit the trimmer knob on the starboard upright, with the knob side of the clamp 56mm from the bottom of the aluminum tube.
    - The **A-frame stop (D271610)** should be 250mm from the top of the upright (or the position that was previously checked before dismantling the wing if particular settings need to be reproduced).
    - On the king-post, the **trim kingpost stop (D271810)** should be mounted 350mm above the keel.
    - Attach the **trim control cable (C201810)** to the **trim luff-line (D206691)** via the **trim pulley (D255515).**
    - Check the operation of the trimmer knob and tighten the nut **Nylock nut (B801010)** if necessary.

Inspection after Reassembly

It is good practice to have an independent person check the airframe. Air Creation always uses a different person for checking the assembly process. Included in 7.1.2 is the Final 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.

5.3 Inspection Notes

Air Creation wings have been designed to permit easy inspection and operators should have no difficulty in assessing problems or recognizing 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, after significant amounts of environmental exposure to elements such as UV radiation, chemicals and heat, as well as mechanical wear (and or tears).

The Pilot's Operating Handbook outlines checks required prior to each flight.

5.3.1 Tubing

Inspection

Inspect tubing for cracks, damage from abrasion, corrosion, elongated holes or distortion in tube surface.

Inspect holes in tubing and surrounding areas 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.

General Care

The tubes can be washed down with warm water and a light detergent followed by rinsing with fresh water.

There are no known fatigue problems with Air Creation wings, 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.

Some components can be replaced with ease, for difficult repairs or if the repair process is not fully understood consult your Air Creation technical station or the Air Creation factory.

Installation & Removal

When removing or installing tubing do not bend or force tubes.

Corrosion

Inspect tubing for corrosion inside and out. Discoloration 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.

Straightness

Inspect tubing for bending using a perfectly flat surface. The following table gives the maximum admissible bending per meter:

Max Bending Admissible/Meter

Tubes	Tolerance
Keel	2 mm
Front leading edge	5 mm
Crossbar	3 mm
Rear leading edge	4 mm
A-frame struts	2 mm
Control bar	2 mm
Kingpost	2 mm

Replacement

Aluminum tubing comes in many different sizes and grades. As sections of the airframe are manufactured from tubing made specifically to Air Creation specification, it is mandatory that only genuine replacement parts, supplied by Air Creation are used.

⚠ *Never attempt to repair tubing. Always replace with a genuine new part.*

5.3.2 Bolts

All airframe bolts are High Tensile Bolts. If it is necessary to replace any bolts or nuts it is important that the specifications of the original bolt are matched when a replacement is selected.

⚠ *Never replace bolts with any other size or grade. 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 stress.*

Installation & Removal

- After tightening, all bolts should have at least 1 to 2 threads showing.
- All Nylstop nuts should not be installed more than once.
- Be sure not to over-torque bolts when installing.
- Check assembly instructions for correct bolt placement.

Inspection

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

5.3.3 Cables & Terminals

Wire Inspection

When necessary, pull protective covers back to expose cable nearest to the Nicopress sleeve. It may be necessary to slide the red PVC coating back to see the cable next to the sleeve.

Inspection of wires should 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. Check thimbles and stainless steel tangs for deformation.

Control Cables

There is a single control cable on the iXess wing, used for the trim system. The trim system wire is routed along the right hand down tube. The trim system should be checked regularly for excessive friction and wear. Wear is most likely to occur at the ends of the cables at the attachment points and the areas where the wire is bent.

5.3.4 Sail

Apart from the consequences of heavy landing, or of exceeding flight limitations, the major factors requiring attention are fatigue, wear, UV exposure and heat.

Inspection

- Check for tears in the sailcloth or any loose or unraveled seams.
- Check that all webbing securing points (nose, keel end, tips) are not damaged or worn.
- Check all inspection zippers to see if they function smoothly and close completely.

Fabric samples are stitched in the middle of the sail and above the keel pocket, behind the kingpost. Each strip is made of two pieces of sailcloth sewed together. During each overhaul, a strip must be cut off along the lateral stitching and on one of the transversal lines, and sent to the Air Creation factory to be submitted to a test of wear and tear in our premises. The results of the test will determine when the replacement of the sail becomes essential for safety reasons.

Protection

Ultraviolet radiation from strong sunlight can ultimately reduce the strength of the sailcloth, 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. The sailcloth may be cleaned with warm soapy water. Strong detergents must not be used. Thoroughly rinse with plenty of clean water.

Minor Tears or Rips in the Sail

Minor repairs may be carried out by the owner of the aircraft, unless local regulations prohibit owner maintenance for sails. A repair is classified as minor if tears are less than 20mm 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 are considered minor.

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 to both sides of the fabric.

This tape is available from Air Creation.

Any other significant damage should be discussed with Air Creation or a technical station for an assessment of the best repair option.

5.3.5 Special Purpose Equipment

Training Bar Maintenance

The training bars are likely to be installed and removed often, therefore it is important that the components are accounted for each time that they are removed and installed. The bars are port and starboard sides, and need to be installed on the inside of the down tubes. They should be inspected for bending, and at each of the bolt holes and welds as well as any other wear that may occur each time they are installed. Check the condition of the rubber top fitting too and change them if there is any kind of cracks. If they are permanently affixed to the aircraft they need to be inspected at regular intervals. The frequency of inspection will depend on the amount that they are used. Prior to each flight they should be checked to ensure that they are securely attached to the uprights and base bar.

The welded base bar attachment has been made to be slightly loose, for ease of assembly.

6 Tuning

6.1 General

Your wing was test flown and delivered in good flying order.

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 that the rotating sleeves at the tips are correctly positioned.
- Ensure that the wires, especially the reflex bridles are correctly routed.
- Check the battens profile.
- Check that the leading edges are straight and that the rear leading edges are located correctly.
- Check the keel is straight.

After checking as outlined at the beginning of this section an adjustment can be performed by the following methods:

6.2 Adjustments

⚠ *Never adjust reflex line settings.*

Never adjust the internal membrane setting.

Never alter batten shape except to match the batten profile plan.

The reflex lines are designed never to be adjusted, and their primary effect is for stability **outside the normal flight envelope**, so adjustment for flight within the envelope is pointless anyway.

The internal membrane is designed to be adjustable, but only by qualified and trained persons. Their effect on the stability and handling of the wing is complicated, and adjustment by unqualified persons could easily result in unexpected stability problems.

The batten shape is intrinsic to stability, stall behavior and handling. Some aircraft require batten shape adjustment to correct for turns. This is not necessary for Air Creation wings.

Hang point position

As the trim is a fitted on all iXess 13, moving the hang point to another position than the front one is not necessary under normal use conditions.

If the wing is trimming outside the 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 knots. Moving the roller to the forward position will increase the trim speed while moving the roller rearward will reduce the trim speed.

Move the hang point piece along the keel to adjust the hang point position. The nylon locking rings must be fixed according to the chosen hanging point position (3 positions available). Each position may be used. It only changes the cruising speed, without any influence on stability and performance.

Warning: Any change in the hang point position means a variation of the A-frame angle and therefore a different tension of the lower longitudinal cables. Various adjustment holes are designed in the cable fixation U-shape rail at the nose of the wing, allowing them to keep the correct tension according to the hang point position you choose.

For the normal forward setting of the hang point piece, the bolt that holds the swan catch of the front inferior cables must be at the most reward hole on the rail. If the hang point is moved backward, then the bolt must be moved forward.

Position of the pivot sleeves at the leading edges tips

The pivoting sleeves have been originally set to place the positioning marks glued on the leading edge tube in front of the mark 0. Their differential rotation may be used for correcting a tendency to turn on one side. They work in the same sense as ailerons on a conventional aircraft – rotate the trailing edge down and more lift will be produced and vice versa. If the wing pulls to the right, turn the left wing sleeve 2.5 millimeters counterclockwise in order to increase the twist (toward +), and the right wing sleeve counterclockwise too, with the same value, in order to decrease the twist (toward -). For a wing pulling to the left, turn the sleeves clockwise. If the correction is insufficient for perfect wing adjustment, repeat the operation until you reach the correct adjustment. Always proceed in the opposite direction on the sleeves of each half-wing. Separate the strings holding the tip adjuster's last straight batten and detach the Velcro patches joining the upper and lower surfaces before rotating the sleeves and adjust the length of these strings after pivoting in order to balance the tensions, and to limit the wrinkles in the fabric, and to ensure the fit of the sleeve in its new position.

A coupled rotation (toward + or - on each side) of both sleeves changes speed and stability in pitch. A maximum of 2.5 mm is suitable. Rotation in the positive direction means slowing down and rotation in the negative direction means speeding up.

Sail tension

Modify the sail tension at the wing tip to counterweight any aging effects on the sail. To perform this adjustment, remove the protective cap from the wing tips and rotate the bolt placed at its end with a 10mm wrench. Put the cap back and readjust if necessary the tension of the small ropes of the inner and upper surface last wing tip batten, because of the modifications of the sail position on the leading edge tubes. Tense them with a maximum of 5 turns (5mm) and control with a fly-test.

The leading edge tension can also be adjusted to correct a tendency to turn (if the sleeve rotation has not completely corrected the problem. Increase the tension on the wing which is trying to lift and decrease tension on the opposite wing, i.e. for a right turn increase the tip tension on the left wing and decrease tension on the right wing. This is done by removing the plastic end cap from the wing tips and rotating the 10mm bolt. Proceed in adjustments of no more than 2.5 turns (2.5mm adjustment), with the same value on both sides and then test the aircraft. This adjustment will change the tension of the end batten strings. These must be re-tensioned before flying the aircraft.

Trimmer system adjustment

The trim system looses efficiency with time and aging of the sail. It might be necessary to adjust it to recover the normal speed range efficiency (35 km/h – 22 mph in one-seater configuration, 25 km/h – 15 mph with two people aboard). For this adjustment, more tension has to be put in the acting cable, by moving upward the stop of the cable's cover (1 to 2 cm) on the upright. The screw-stop on the cable has to be moved in the same way and value in order to keep the Nicopress mark in the trim's window at the right place.

7 Appendix

7.1 Wing Inspection Forms

7.1.1 iXess 13 Wing Frame Stage Inspection (1)

Wing serial number and registration: _____

General

This stage inspection should be carried out when the wing frame has been assembled and is ready to be fitted in the sail. It is not possible to properly inspect once the sail has been fitted.

Inspection schedule

Nose plate assembly _____ Sat / Unsat

1	General assembly correct (check with drawings M030)	☐	☐
2	Plastic spacer washers in position between plates and tubes	☐	☐
3	Check for over tightening (distortion of plates/tubes)	☐	☐
4	Length of the thread of bolt B168710 (nut not tightened at this stage)	☐	☐
5	Correct position of nose-catch rail (pointing rearward from the bolts) and catch bolt	☐	☐
6	Nose batten stop plug fitted and secure	☐	☐

Leading edges _____ Sat / Unsat

1	Inspect both forward sections for damage and straightness	☐	☐
2	Inspect both rear sections for damage and straightness	☐	☐

Keel _____ Sat / Unsat

1	Inspect for damage and straightness	☐	☐
2	Hang bracket fit and orientation (hang bolt hole on rear face)	☐	☐
3	Forward hang point position used (middle for the training version)	☐	☐
4	Stop rings not over tightened	☐	☐
5	Kingpost fitting correctly assembled and not over tightened	☐	☐
6	Length of the thread of bolts B167010 (fixing nuts on tensioning rail not tightened at this stage)	☐	☐
7	"Prop tape" protection patches R108810 fitted and correctly positioned	☐	☐

Cross-tubes central junction _____ Sat / Unsat

1	Check cross tubes for damage and straightness	☐	☐
2	Correct fitting of webbing hinge D074330	☐	☐
3	Check that the cross-tubes are free to rise up, limited by the keel protection sleeve	☐	☐
4	Correct assembly order of stainless plates (no stagger, check with drawings M040)	☐	☐
5	Thread showing through each nut on bolts B069410 (just)	☐	☐
6	Centre bolt B086710 not over tightened (cables should wiggle freely), correct length of aluminum spacer D252300	☐	☐
7	Tension cables direction (plastic over sleeves forwards)	☐	☐
8	Leather/webbing protection sleeve D074327 correctly fitted and screws in	☐	☐
9	Check ball and socket for damage/distortion	☐	☐

Cross tube to leading edge assembly_____ Sat / Unsat

1	Check general assembly correct (check with drawings M050) _____	☐	☐
2	Check rotation of vertical hinge bolts B106517 (free to move but play taken up)_____	☐	☐
3	Check rotation of horizontal hinge bolts B088515 (free to move but play taken up) _____	☐	☐
4	Confirm that internal spacer is fitted in leading edges on bolt B088515 _____	☐	☐
5	Confirm Teflon® lubrication between aluminum parts D264550 and D264540 _____	☐	☐
6	Correct flying wire fitting and orientation (No2 D203668 nearest to hinge) (Top rigging not fitted at this stage) _____	☐	☐

Wires _____ Sat / Unsat

1	Check all cables are free to rotate where attached to the structure_____	☐	☐

Snags/rectification work required _____

_____

_____

I have inspected the wing frame to the above schedule and it has _____ Passed/Failed

Inspector Name _____

Date _____

7.1.2 iXess 13 Wing Final Assembly Stage Inspection (2)

Wing serial number and registration _____

General:

This stage inspection should be carried out when the wing assembly is complete. This is the final inspection before the test pilot gets his hands on it, so please look carefully!

Inspection schedule:

While Rigging

	_____	Sat	Unsat
1	Check control frame upright rotates smoothly on upper hinge bolts _____	☐	☐
2	Observe for snagged/crossed rigging wires _____	☐	☐

With wing rigged and placed on control frame

	Control frame assembly _____	Sat	Unsat
1	Check for straightness/damage of all tubes _____	☐	☐
2	Check hand bracket area for correct assembly (drawing M060) _____	☐	☐
3	Upper hinge bolt B112810 should be tight enough to pull control frame brackets snug, but also allow easy rotation _____	☐	☐
4	Check that hang bracket position is fully forwards. _____	☐	☐
5	Check lower corners for correct assembly (drawing M065) _____	☐	☐
6	Bolts B086010 should be tight enough to pull tangs snug but also allow the side wires thimbles to rotate under light pressure _____	☐	☐
7	Check leather corner covers fitted and correctly positioned (seam rearwards) _____	☐	☐
	Keel nose assembly _____	Sat	Unsat
1	Refer to drawing M030 and check area for correct assembly and security of all fastenings _____	☐	☐
2	Check nose area for correct position of nose batten _____	☐	☐
3	Check sail opening is centrally positioned, symmetrical and holding screws are in place _____	☐	☐
4	Check forward upper rigging wire is correctly positioned and secure _____	☐	☐
5	Check that forward lower rigging wires/goose neck catch are correctly assembled and bolt is secure, push pin functioning correctly, wires in good condition and tension _____	☐	☐
	King post assembly _____	Sat	Unsat
1	Refer to drawing M020 and check king post for correct seating at base (it is normal for the sail opening to be closed to the forward edge of kingpost) _____	☐	☐
2	Refer to drawing OP10-28ET & OP10-32MO and check that trimmer bridle clamp is correctly positioned and secure, cable positioning, and trim knob assembly, stop on upright, and correct friction and overall functioning of trim system _____	☐	☐
3	Refer to drawing M070, and check kingpost head area for condition and tension of wires and correct assembly of rear wire/reflex lines and pulley assembly (upper shackle should be inside lower shackle, reflex lines untangled) _____	☐	☐

Keel rear assembly _____ Sat / Unsat

1 Refer to drawing M010 and check area for correct assembly, security of all fastenings and catch bolt front position _____ ☐ ☐
2 Check lower and upper rear rigging wires for general condition and tension _____ ☐ ☐
3 Check tensioning cables for condition, tension and straightness along the keel _____ ☐ ☐
4 Check webbing sail stop strap is secured in keel end cap with screw (it is normal for this strap to be quite loose) _____ ☐ ☐
5 Check the correct fitting of the leather boot (D074810) _____ ☐ ☐

Cross tube to leading edge assembly _____ Sat / Unsat

1 Refer to drawing M050 and check the correct position and assembly of all wires and tightness of all nuts (the tangs should be snug but free to rotate under moderate hand force) _____ ☐ ☐
2 Check that the openings of the sail are well positioned with the cables _____ ☐ ☐
3 Check general condition and tension of lower and upper wires _____ ☐ ☐

Tip assembly _____ Sat / Unsat

1 Refer to drawing M080 and check correct assembly of tips (bolts B167210 should be just tight enough to prevent easy rotation of sleeve D128310) _____ ☐ ☐
2 Verify even tension, left and right tips, and set at 10 full turns of bolt B126410 _____ ☐ ☐
3 Set angle of tips so that the slot in the tip position indexer (D128410) shows the tips in the zero position _____ ☐ ☐

Sail trailing edge _____ Sat / Unsat

1 Refer to paragraph 5.2.3/13 (batten strings) and check that all batten strings are correctly tied and tensioned. Pay particular attention to the strings on the very end batten/tip rod _____ ☐ ☐
2 Check all reflex lines for general condition, that all attachment shackles are done up securely, and make sure that the lines don't wrap around each other _____ ☐ ☐

Sail General _____ Sat / Unsat

1 Carefully check sail all over for good condition of all attachment points, stitching and general condition _____ ☐ ☐
2 Check sail for wrinkles. Large wrinkles may require adjustment of batten strings. Folding wrinkles in sail are normal _____ ☐ ☐
3 With a helper holding the wing in a level attitude at the rear of the keel, sight the wing from some distance in front and check for overall symmetry _____ ☐ ☐

Finally

1 All plastic caps can be fitted to nuts _____ ☐ ☐
2 The nose cap can be fitted and checked _____ ☐ ☐
3 The plastic fairings for the kingpost and uprights can be fitted and checked _____ ☐ ☐

Snags/rectification work required _____

_____

_____

I have inspected the aircraft to the above schedule and it has _____ Passed/Failed

Inspector name _____

Date _____

7.2 Method for Folding the Sail

Caution: If the Mylar is still installed in the wing, avoid sharp creases in this process or the Mylar may be damaged.

1 Put the wing flat on the ground, upper surface on top.

2 Take the right wing tip and fold it over the left wing tip.

3 Take the two wing tips and bring them on the nose of the wing.

4 Proceed with a second person. One stays at the leading edge, the other holding down the inner surface panel. Fold the leading edge (which is stiffened by the Mylar insert) onto the sail.

5 Take the keel pocket and fold it so that it lies parallel to the leading edge.

6 Take the rest of the wing trailing edge and fold it on the keel pocket.

7 At this stage, the wing looks like a rectangle. Fold this rectangle in 3 equal parts, beginning from the nose.

8 Keep it folded with a fastening Velcro without tightening too hard. The Mylar of the leading edge must not be broken.

7.3 Maintenance Operation Board

Wing Type: _____ Serial Number: _____

Date	Hours Flown	Type of Operation Performed	Operator Name, Address, Stamp

Date	Hours Flown	Type of Operation Performed	Operator Name, Address, Stamp