JAVA 155

Owner's Manual

BHPA certificate of air worthiness
number: 9604113

Serial Number

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Before flying your glider please read this manual completely, check all your battens against the batten profile (adjusting them if necessary) and do a thorough pre-flight check.

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SECTION Page Number

INTRODUCTION

Congratulations on your purchase of an Avian Java. The Java is the "state of the art" high performance hang glider. We hope that you will experience many hours of safe and enjoyable flying on your Java.

This manual is designed to help you get the most out of your Java:
Please read this manual completely before flying, check all your battens against the batten profile (adjusting them if necessary) and do a thorough pre-flight check.
In your pre-flight include checking the operation of the VB. This is especially important if instruments are attached to the right hand (VB.) upright.

If you are uncertain, or have any problems with your glider, **DO NOT FLY**. We have a section on trouble shooting in this manual that features some of the more common problems that pilots have encountered, and our recommended solutions. If you are still not sure contact your local dealer or the Avian factory. Both will be pleased to help you. Make sure your first flight on your new glider is in perfect conditions from a site that you are familiar with.

PLEASE NOTE

Avian Ltd do not have commercial product liability insurance.

Avian hang gliders are built using materials and fittings to the industry standard or better. Avian hang gliders are subject to Avian quality control and testing prior to delivery to the customer.

Once possession of the glider passes to the customer, its maintenance and condition becomes the responsibility of the owner or pilot. Any concerns or queries about the glider's subsequent air worthiness MUST be referred back to the local dealer or the Avian factory.

Hang gliders like most aircraft must be:

- stored correctly,
- treated with respect,
- checked before take off and after heavy landings,
- flown within their flight envelopes,
- regularly maintained.

Failure to do any of these courts disaster. ***Look after your aircraft!!***

OPERATING LIMITS

1. Minimum pilot rating: BHPA rating *Pilot* or equivalent.

2 Manoeuvres:
1. Aerobatic manoeuvres are not permitted.
2. Pitching the nose up or down more than 30 degrees from the horizontal is not allowed.
3. Do not exceed more than 60 degrees of bank
4. Do not fly the glider inverted or backwards.
5. Do not fly with auxiliary power without factory approval.
6. Do not fly with more than one pilot

3. Hang Glider Payloads:

Pilot Clip in Weight range	Min	Max.
	11 Stone	17 Stone
	154lbs	238lbs
	70Kg	110Kg

4. Hang Point Position Range (Pitch trim)

This is a king post hang point glider. There are three settings to alter the position of the KINGPOST and therefore the hang point. These are on the kingpost channel. (see appendix part (3)). The standard factory setting is the centre hole.

Centre hole	62 1/8"	1578mm	from the front of the of the keel tube. (measured without the plastic bung)

5. Speed range

Speed range	15 - 70 mph.	24 - 113 km/h
Maximum speed (rough air) (VNE rough air)	45mph	72km/h
Maximum speed (smooth air) (VNE)	70mph	113km/h

SPECIFICATIONS

Wing span	32' 9"	10 m
Wing area	155sq.ft	14.4 m^2
Aspect ratio	7	
Min sink rate	170ft/min	0.86m/s
(wing loading = 1.4 lbs/sq.ft	10.3kg/m^2)	
Max. L/D ratio	13	
Speed range*	15 - 70 mph.	24 - 113 km/h
Maximum speed (rough air)		
(VNE rough air)	45mph	72km/h
Maximum speed (smooth air)		
(VNE)	70mph	113km/h

Normal packed length	19' 4"	5.9m
Breakdown length	15' 2"	4.6m
Glider weight rigged	65 lbs	29.5 Kg
Glider weight in bag	68 lbs	31 Kg

*Speeds measured using Davron 808 vario and ASI (Air speed indicator).

RIGGING THE JAVA

The glider can either be rigged flat on the ground, or with the glider supported on its control frame. The latter should only be attempted in very light wind conditions but is useful in confined spaces or where the terrain is likely to cause soiling or damage to the sail.

Rigging the Java flat

1. Lay the glider on the ground with the nose pointing into wind. Unzip the bag and roll the glider so it is the right way up. Take the bag off. (If you tread on the inside of the bag any dirt that you get on it will be transferred to the glider when you put the bag on later.)

2. Take the glider ties off and take the battens out from alongside the kingpost. Raise the aerofoil kingpost checking that the sail is not caught by the base of the kingpost. Hook in the top rigging making sure that the anti-luff lines are not tangled.

3. Making sure that you do not lift the tip high above the ground (to ensure that you do not bend the nose plates), swing one wing out about a quarter of its maximum travel. Swing the other wing half of its maximum travel. Continue until both wings are about three quarters of their maximum travel. Lift the wing preferably by the wing tip but if you must use the sail hold it by the batten pocket ends on the trailing edge. If there is any resistance check to see what is causing it and free the problem before continuing. Do not attempt to force the wings apart.

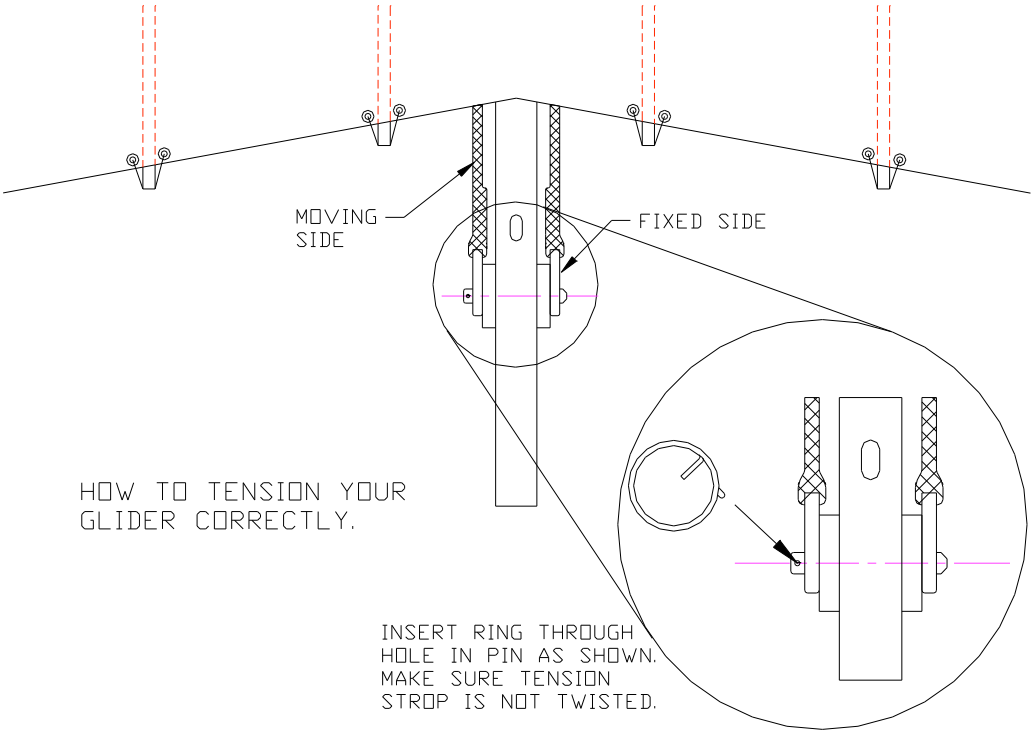
4. Put the bottom bar on and insert the two stainless pins from the back of the base bar and fit the safety rings. **PUT THE RINGS IN IMMEDIATELY. DO NOT LEAVE IT UNTIL LATER.** Thread the VB. cord through the eye of the quick ring and through the cleat on the base bar. Tie a knot in the end of the cord.

5. Lay the battens on the ground and pair them up, red with green, and check that corresponding batten pairs have the same profile. This is a good habit to get into as it will reduce the chances of taking off on a glider with a turn caused by asymmetric shaped battens. (Periodically the battens should be checked against the batten profile.)

6. Put the curved battens in their pockets working from the tip towards the centre chord. Keep the trailing edge low and slowly ease the battens into their respective pockets. This makes the job easier and the batten pockets last longer.

7. The glider can now be tensioned. Remove the split ring from the special bolt located through the rear of the keel tube. Using the attached elastic cord, pull the cross tube restraint webbing back. (Check that the side wires are not caught around a batten end or the ferrules caught in the under-surface of the sail.) Locate the stainless tang over the stub of the bolt and replace the split ring. **DO THIS OPERATION**

IMMEDIATELY. DO NOT LEAVE IT UNTIL LATER. (If the tension feels too tight stop and see what is causing the problem. **DO NOT JUST FORCE IT.** Consult the trouble shooting area of this manual for possible causes.)



8. Push the battens home the last little bit. (With a new sail the battens may not go fully home unless pushed.) The batten elastics should be put on double on each batten. The batten nearest the wing tip can only be inserted when the glider has been tensioned. They locate on a plastic cleat on the leading edge. (These battens, sometimes called compression struts, are profiled on the Java. Like all the other top surface battens the curve should be up. The top surface of the wing should be convex **NOT** concave.)

9. The under surface battens should also be inserted when the glider is tensioned. They should be pushed home so that only the rope projects from the batten pocket. Put the most outboard U/S batten in first. The under surface battens can be pushed home with another under surface batten.

10. Put in the nose batten. This is easier with the VB. on full. Some people prefer to put the nose batten in before the wings are moved out at all or to leave the nose batten in the glider when packed. (If you do this don't forget to check its profile when you check the profile of the other battens.)

11. Make sure that the wires are not twisted, then stand the glider on its control frame and attach the swan catch, pip pin and safety washer.

12. Make sure that the nose catch is correctly attached and then put the nose cone on.

13. The glider is now fully rigged. You should now make sure that you do a thorough pre-flight check before you fly.

We suggest that if there is significant wind that the glider is left flat on the ground, nose into wind and securely weighted or tied down at the nose until you are ready to fly.
In light winds the Java maybe left standing on its 'A' frame tail into wind. In this position it is obviously prone to being ground looped by gusts of wind, thermals or, in hotter countries, dust devils. We strongly recommend that you keep a close eye on it.

Rigging the Java standing on its A-frame

This is useful in confined spaces or where the terrain is likely to cause soiling or damage to the sail. It is essentially very similar to rigging the glider flat:

1. Lay the glider on the ground. If there is any wind the nose should be pointing cross or down wind. Unzip the bag and take enough ties off to assemble the A frame. Assemble the A frame. Put the bottom bar on and insert the two stainless pins from the back of the base bar and fit the safety rings. **PUT THE RINGS IN IMMEDIATELY. DO NOT LEAVE IT UNTIL LATER.** Thread the VB. cord through the eye of the quick ring and through the cleat on the base bar. Tie a knot in the end of the cord.

2. Stand the glider on its A-frame and then take the bag and remaining ties off, and remove the battens from alongside the kingpost.

3. Walk the wings out to about three quarters of their full extension. As before the wings should ideally be walked out together. If you are rigging by yourself move one wing a bit and then move the other. NB: Whilst spreading the wings, particularly when the glider is standing on its A frame, it is essential that the leading edges and keel are kept in the same plane. (This is to avoid distortion to the nose plates or any other components.)

4. Take care to place the tips on a piece of ground that is not likely to cause them damage. Leave the tip socks on as this will protect them. The glider should now be standing on its A frame, wing tips and keel.

5. Raise the aerofoil kingpost checking that the sail is not caught by the base of the kingpost. Hook the top rigging in making sure that the anti-luff lines are not tangled. Now making, sure that the wires are not kinked, attach the swan catch, pip pin and safety washer. (You should always hook in the top rigging before attaching the swan nose catch.)

6. Lay the battens on the ground and pair them up, red with green, and check that corresponding batten pairs have the same profile. This is a good habit to get into as it will reduce the chances of taking off on a glider with a turn caused by asymmetric shaped battens. (Periodically the battens should be checked against the batten profile)

7. Put the curved battens in their pockets working from the centre chord towards the tip. Keep the trailing edge low and slowly ease the battens into their respective pockets. Do not put in the last three or four battens each side.

8. The glider can now be tensioned. Remove the split ring from the special bolt located through the rear of the keel tube. Using the attached elastic cord, pull back the cross tube restraint webbing, locate the stainless tang over the stub of the bolt and replace the split ring. **DO THIS OPERATION IMMEDIATELY. DO NOT LEAVE IT UNTIL LATER.**
This operation is much easier if you get a friend to lift a wing while tensioning. **DO NOT JUST FORCE IT**. (If the tension feels too tight stop and see what is causing the problem. Consult the trouble shooting section of this manual for possible causes.)

9. Take off the tip socks and put in the last battens near the tip. Push all the battens fully home. (With a new sail the battens may not go fully home unless pushed.) The batten elastics should be put on double on each batten. The tip battens in locate on a plastic cleat on the leading edge. (These battens, sometimes called compression struts, are bent and should be profiled correctly and put in the right way up. Like all the other battens the curve should be up. The top surface of the wing should be convex **NOT** concave.)

10. The under surface battens are more easily inserted once the glider has been tensioned. They should be pushed home so that only the rope projects from the batten pocket. Put the most outboard U/S batten in first. The under surface battens can be pushed home with another under surface batten.

11. Put the nose batten in and locate it on its seat just in front of the nose plate. This operation is easier if the VB. is pulled on first. When the batten is in release the VB. (Some pilots only remove the nose batten occasionally to check its profile.)

12. Double check that the nose catch is correctly attached and put the nose cone on.

13. The glider is now fully rigged and you should now make sure that you do a thorough pre-flight check before you fly.

As the glider is standing on its A frame it is prone to being ground looped by gusts of wind, thermals or, in hotter countries, dust devils. It is safest with its tail into wind but we strongly recommend that you keep a close eye on it.

PRE-FLIGHT CHECK-LIST

Detailed pre-flight checks must be carried out during assembly. Always use the same assembly and packing up procedure. The following must be checked:

1. All tubes are straight and not dented.

2. Cross-tube hinge, nose plates and A frame fittings OK.

3. **'LUFF LINES ARE NOT TWISTED AT THE KINGPOST AND ARE CLEAR OF ALL BATTENS WITH RINGS SECURE ABOVE AND BELOW THE SAIL.**
(Small rings above the sail and large below the sail.) 'luff lines must be checked every flight. Incorrect rigging, for instance, catching a 'luff line under a batten end, could cause a serious turn in the glider.

4. All sail seams intact with no frayed stitching, particularly
in high stress areas (e.g. wing tips, junction of keel pocket and sail etc.)

5. Battens correct shape and undamaged with no cracks or splits in the fibreglass section.

6. All nuts and bolts secure.

7. All quick release fittings secure.
(i) cross tube tensioner
(ii) nose catch (check the clevis pin and split ring as well)
(iii) tip battens correctly located on leading edge and the right way up
(iv) quick pins and rings on bottom bar secure
(v) outboard leading edge section fully engaged. (Be especially vigilant if the L/E has been packed short recently.)

8. Cross tube tensioner strop not frayed and twist free.

9. All zips done up.

10. Batten elastics symmetrical on both sides of the glider. They should also be in good condition and engaged over the batten ends.

11. Hang loops in good condition.

12. The glider is symmetrical when viewed from the front.

13. The king post is straight and joint at its base is secure.

14. The four nose plate bolts are secure.

16. Walking along the length of the leading edges feel with your fingers to check that they are free from dents. Check that there is a similar leading edge curvature when looking down the inside of the wing from the nose to each wing tip.

17. Check through the sail inspection zip to ensure that the wing wire and cross tube leading edge bolts are secure.

18. Check that the keel is straight and then check that the tensioning strap is secure, correctly fitted and that the split ring is in place. As shown in the previous diagram.

19. Check that the cross-tube ends are meeting correctly (the ball should be engaged in both fittings). Also check that the cross-tubes are straight and dent free.

20. Check that the wires are undamaged. Look out for corrosion and fraying. Pay particular attention to inspection of the wing wires as, in normal flight, these are the most heavily loaded. **INSPECT BOTH ENDS: THE BASE BAR END AND THE CROSS TUBE JUNCTION END.**
REMEMBER: IF IN DOUBT DO NOT FLY!! RETURN YOUR GLIDER TO AVIAN LTD FOR A THOROUGH STRIP-DOWN.

21. Check operation of the VB. Pull the VB. rope and check that it pulls on smoothly and releases. If it is jammed check and release if caught. **NOTE:** If instruments are attached to the right hand upright it may interfere with the VB. operation. The VB. cord runs down the rubber back of the right hand upright. Crushing the rubber back impedes the movement of the cord. It may then be possible to pull the VB. but not to release it. This is easily cured by inserting a length (30cm) of batten material inside the rubber back of the upright. (This stops the rubber back from being crushed.)

22. Finally check that all the quick release fasteners are secure. Pay particular attention to the base bar quick pins. **NOTE**: As the glider is moved and placed on the ground the safety rings in the base bar quick pins may contact the ground. Long grass seems most likely to cause the problem but it is possible to remove the safety ring from the pin. The problem is minimised if you put the pins in from the back of the base bar. (Thus when the glider is sitting on its keel the head of the pin will contact the ground rather than the safety ring.) Special attention should be given to checking quick release fasteners.

FLYING THE JAVA

Please note the following is not meant to be an exhaustive flying manual but merely a brief note and should be read with that in mind.

Take off

Before take-off MAKE SURE that you have pre-flight checked the glider, that you are clipped in and that you have performed an adequate hang check.
On take-off the wings should be held level with the nose slightly raised. A strong and committed take off run is always recommended. Keep the angle of attack low until you are running fast. Once sufficient air speed has been achieved increase the angle of attack gradually to take off. Once settled in flight move your hands to a comfortable position on the base bar.

In Flight

The control in both pitch and roll is light and precise. Accordingly the glider should be flown with moderate and precise inputs. The glider should not be flown too slow or in a semi-stalled condition as the roll response becomes much slower.

Stall

The Java recovers quickly from stalls but will lose height doing so. A wing close to the stall becomes difficult to control. For both these reasons the glider should be flown with sufficient airspeed close to the ground, hill or any other aircraft.

Spin

Hang gliders are generally resistant to spin. It is very unlikely that you will ever experience a spin in normal flight. To recover from a spin pull the bar in and increase speed BEFORE applying opposite bank.

Flying with a wet glider

DO NOT TEST YOUR NEW GLIDER IF IT IS WET. Wet gliders do not fly nearly as well as dry gliders. This is because the water droplets on the leading edges disturb the airflow over the wing. The result is that the glider does not perform so well and stalls at a much higher airspeed. I.E. you will not be able to fly the glider as slowly as if it were dry. You may also find that the glider stalls more easily, takes longer to recover from a stall and as a result is more prone to spinning.

If you get caught in the rain as the glider gets wetter you will notice the above effects increase. You will have to fly faster to avoid stalling and should be especially careful on landing. We advise that you fly with a lot of excess speed when doing any manoeuvres near the ground or other aircraft with a wet glider.

Landing the Java

The secret of a good landing is good field selection followed by a precise approach with plenty of airspeed.

Always plan your landings from high up, check that the VB. is in the fully released position and make sure you can get your feet out of your harnesses well before landing. Check the surrounding air for other aircraft preparing to land. Look and check that your approach and over-shoot path have as few obstacles as possible. (Never choose to land immediately behind other gliders or obstacles but land to one side. You might make a lot more friends on the hill!)

DE-RIGGING

This is largely the reverse of the assembly sequence:

De-rigging the glider flat

1. Lay the glider flat on the ground and into wind. Remove the under-surface battens and the tip battens (or compression struts). Remove the nose batten before releasing the cross tube tension. (If you intend to remove it from the sail. Swing the wings in a few feet and then remove the other battens.

2. The wings can then be closed further and the king post lowered. The 'luff lines can be clipped to the ring sewn to the edge of the king post hole.

3. Place the padding around the tension bolt. Bring the leading edges in further and then dismantle the 'A' frame. Make sure that the packing wings (the pieces of packing sewn to the sail) are out of the sail and alongside the top of the uprights. Check that the spreader bar on the hang loop is not caught between the uprights. Connect the ends of the uprights with the spacer provided. The side wire can then be threaded though the 'A' frame padding which is located around the bottom of upright castings. When packed the side wires should loop out of the bottom of this padding so that they are not kinked.

4. The wing tips can then be brought together. Next the sail should be rolled and tucked inside the Mylar of the leading edge. One side can be rolled and retained with a tie and tip sock while the other is being done. A little slack can be pulled into the under surface where it passes over the cross tube - leading edge junction.

5. The battens can be stowed at the front of the glider between the leading edges with the curves over the nose section. The ties can then be placed round the glider holding the leading edges neatly together. Place the glider bag over the glider and then turn the glider on its back. Make sure that the packing wings are out of the sail and protecting the sail from the top of upright castings. (Packing 'wings' are the pieces of

packing sewn to the inside of the sail along side the keel pocket inside the double surface.)

6. Put the speed bar in the sail near the wing tip. Any remaining ties should be put around the glider. Tuck the nose cone under the tie near the nose of the glider.

7. Zip the bag up and store the glider dry in a cool dry dark place.

De-rigging the glider upright on the keel

This is useful in confined spaces or where the terrain is likely to cause soiling or damage to the sail. It is essentially very similar to de-rigging the glider flat:

1. Put the glider keel down and tail into wind. Remove the under-surface battens. Loosen all the batten elastics and remove the tip battens (or compression struts). Remove the last three normal battens each side. (The battens nearest the wing tips.)

2. Make sure that the packing 'wings' are out of the sail and alongside the top of the uprights.

3. Roll the last few feet of the sail and put the protection 'socks' on the wing tips.

4. Release the X tube tension and move the wings in slightly. The keel remains on the ground.

5. Remove the rest of the battens except the nose batten.

6. Remove nose cone and release the lower nose wires.

7. Unhook the top rear wire and 'luff lines and clip them to the ring on the sail. The kingpost can now be tilted forwards.

8. Bring the wing tips together. Pull the sail between the leading edge and keel so that it is all above the leading edge. Roll it carefully and tuck it inside the leading edge. One side can be rolled and retained with a tie and tip sock while the other is being done. A little slack should be pulled into the under surface where it passes over the cross tube - leading edge junction.

9. Remove the nose batten if you intend to. Put all the battens into their batten bag.

10. The battens can be stowed at the front of the glider between the leading edges with the curves over the nose section. The ties can then be placed round the glider holding the leading edges neatly together. Take off the ties holding the sail in place and put them around the whole glider in the normal way.

11. Place the glider bag over the glider and then turn the glider on its back.

12. Dismantle the 'A' frame. Make sure that the packing 'wings' are alongside the top of the uprights. Check that the spreader bar attached to the hang loop is not caught between the uprights. Connect the ends of the uprights with the spacer provided. The side wire can then be threaded though the 'A' frame padding which is located around the bottom of upright castings. When packed the side wires should loop out of the bottom of this padding so that they are not kinked.

13. Put the speed bar into its bag and store in the sail near the wing tip. Any remaining ties should be put around the glider. Tuck the nose cone under the tie near the nose of the glider.

14. Zip the bag up and store the glider dry in a cool dry dark place.

POST FLIGHT INSPECTION

After landing, especially if heavily, the glider should be inspected as outlined in the pre-flight inspection.

VB. (VARIABLE BILLOW)

The variable billow (VB. sometimes called variable geometry VG.) is used to change the flying characteristics of the glider while in flight.

As mentioned else where in this hand book, when the glider is rigged the VB. cord should be threaded through the cleat on the speed bar and knotted. (This is a good habit to get into. The knot will prevent the end of the VB. cord being lost.)

If anything is attached to the right hand upright (the one down which the VB. cord runs) it could adversely effect the operation of the VB. (See 'trouble shooting'.)

For take off it is recommended that the VB. is in the fully released position. (This is with very little cord sticking from the upright.) In this position the glider is easiest to turn. (You may find with experience, and especially if aero-towing, that you prefer to take off with a little VB. pulled on.)

In normal flight a little VB. (Say 70cm of cord) might be pulled on. This will give a better sink rate with little loss of handling.

For flying fast or for best glide performance (for example, flying between thermals) use full VB. With full VB. be aware that the roll rate of the glider is significantly reduced especially if flying slowly. **Do not use full VB.** near the ground, near other aircraft or near any other obstacle.

For flying near the ground, other aircraft, other obstacles, in rough air or landing it is recommended that the VB. is in the fully released position. This position will give the most effective roll control.

Release the VB. in a smooth manner. Do not just pull the rope out of the cleat and let go. This will give a needless shock loading to the airframe .

VB. Maintenance

Due to the design of the Java VB., its operation should be smooth and much easier than other hang gliders.

To keep it this way, make sure that the ropes not twisted and clean. Remove grit or dirt from the upright casting and replace the ropes if they show signs of wear. It is also important to keep the tension strop of the glider untwisted.

VB. Set-up

The VB. on your glider should be factory set. However the ropes do stretch a little and you may need to adjust or change a rope in time.

Please refer to the appendix for diagrams of the VB.

The white retaining cord (2) limits the travel of the rear triple pulley block (3). If this is too long the block will come out of the keel pocket with the VB. in the released position. When pulling the tension on this block might then get caught on re-entry to the sail and limit use of the VB.

The cross tube VB. rope (6) should be tight with the VB. in the fully released position. To check this there should be a little bit of slack in the tension strop (7) (static side) with the VB. in the released position. To alter this re-tie the knot attaching this rope to the triple pulley block (3). **ALWAYS USE A BOWLINE KNOT**.

When VB. tension is pulled on the tension strop (7) will become progressively more slack. The side wires on the glider will become tighter. When the two blocks (1) and (3) meet the VB. is full on and the side rigging should be just tight.

NEVER ALTER YOUR VB. IN SUCH A WAY AS TO INCREASE THE MAXIMUM TENSION OR REDUCE THE MINIMUM TENSION.

TUNING INSTRUCTIONS

Trim speed - The trim speed is adjustable by moving the base of the king post and thus hang point. Forward movement will speed the glider up, whilst rearward movement will slow it down. See section on changing hang position (page 19).

A turn in the Java is unusual. If your glider previously flew straight then the most likely explanation is that you have bent a leading edge. If a turn is detected first check the battens. Check them against each other (making sure that they are the same on both sides) and then against the profile. Next check that the batten elastic tension is the same on both sides of the glider. If there is still a turn check that the leading edges are straight and undamaged.

A slight turn may be tuned out using the tip adjusters:
The black plastic caps have a small hole drilled as a reference. This reference is lined up with the self-tapping screw for initial assembly. (This is the datum)
The self-tapping screw should be removed and the black plastic cap turned slightly. The wing that is lifting should have the washout increased (i.e. trailing edge lifted) while the wing dropping should have the washout reduced (i.e. trailing edge lowered). Mark the leading edge with a pen or pencil before removing the self-tapping screw and **ONLY ALTER THE WASHOUT AT THE TIP IN SMALL INCREMENTS**. (MAXIMUM 3mm at a time.) The total movement should **NOT** exceed 10mm each side of the datum (the hole for the self tapping screw. **DON'T FORGET TO REPLACE THE SELF-TAPPING SCREW.**

Other tuning should **NOT** be carried out without reference to Avian Ltd., or an approved dealer.

BATTENS AND BATTEN PROFILE

The Java battens should be maintained in the correct profile. Failure to do this could result in adverse flying characteristics.

How often should your battens be checked?

At first check your battens regularly. This will give you some idea of how fast they are changing profile. The Java has 7075 battens which tend to hold their shape well. The nose and tip battens are made of a softer 6082 alloy. 6082 battens tend to get harder, and hold their shape better, once they have been re-profiled a few times. On the Java the batten most likely to require re-profiling is the nose batten.

Don't forget: If you don't know how the glider has been treated while it is out of your care (for instance if it has been sent by carrier or on an aeroplane) check the battens against the profile and do a very thorough pre-flight check **BEFORE** flying.

Checking the profile

The best place to check the profile of your battens is at home on a flat surface. (It is very difficult to do on the hill with no flat surfaces and the wind blowing the paper profile away.)

The printed profile should be rolled out flat and a book placed at either end to hold it down.

The battens can then be compared to the profile:

Place green (right) number 1 batten against number 1 profile. Place the front end of the batten against the profile and check that it matches the profile along its whole length.

If it does not match the profile see where it deviates and adjust the batten accordingly in that area. (See below.) Continue this process until the batten matches the profile. Then do the same for red number 1 batten. Check that both number 1 battens are exactly the same shape. It is more important that the battens are symmetrical than that they are a perfect copy of the profile. Asymmetrical battens could cause a turn in your glider.

Then move onto batten number 2 and so on until you have checked all the battens. Do not forget to check number 9 batten, the compression strut.

Nose batten

The nose batten profile should not be under-cambered but can be a little over-cambered. This is because the cut of the sail will tend to flatten the batten if it is over-cambered. The objective with the nose batten is to get the sail to fit tightly around the nose area.

How to alter the shape of the batten

The objective is to get a smoothly curved batten but it is not quite as easy as it looks. It is very difficult to bend the batten very close to its front end. Do not attempt to alter the profile over the first 3-5cm of the batten. If your battens need profiling do the 6082 (see below) battens first as they are much softer.

To increase the curve in the batten hold the batten either side of where you want to increase the curve and run the batten over your knee or leg exerting a gentle pressure. (It helps if you are wearing something slippery.) Compare with the profile and repeat if necessary. Try to avoid point bends and make sure that the bends are all in the same plane. (7075 is a hard aluminium alloy and extra care must be taken while profiling to avoid broken battens.) To reduce the curve, do the opposite of the above either over your knee or preferably by pressing on a flat surface. If you have a point bend try and remove it.

Batten Material

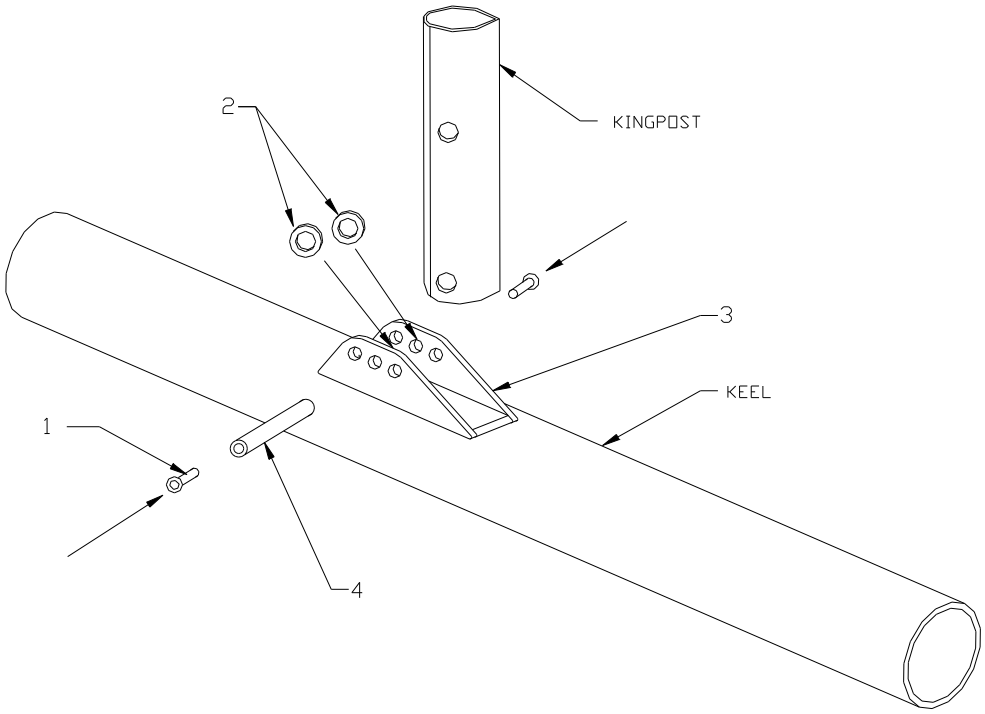
The nose batten and compression struts are made from 1/2" OD 6082 tube.

All other battens are made from 10.8mm OD 7075 tube.

6082 Aluminium is easier to bend. 7075 aluminium is brittle and more difficult to bend but it holds its shape much better.

CHANGING HANG POSITION

Changing the hang position changes the pitch trim (or trim speed) of the glider. Moving the hang point forwards increases the speed at which the glider will fly without pilot input and moving it rearwards reduces the trim speed. The trim speed must not be reduced too far. For safety the glider should always be trimmed faster than stall speed. When changing the trim speed only move one hole on the channel at a time.



The procedure for altering the hang position

Two 4mm Allen keys and some thread lock will be required. The Allen keys should be in good condition. i.e. If the ends of the Allen key are at all rounded grind them off or buy a new Allen key. Thread lock (e.g. Loctite Screwlock 222) can be purchased from a car accessory shop.

The glider is easiest to work on in one of two positions:

With the wings open and the glider flat on the ground the kingpost channel can be worked on from above.

Perhaps more easily with the glider fully rigged tail into wind and working from below the sail. This can only be done in light winds. In this case release the nose catch and unclip the tack hook on the top rear wire.

Place an Allen key in both of the Allen screws (1)
Undo one of the Allen screws (1)
Using an Allen key push the barrel (4) slowly out trying not to disturb the two nylon washers (2).
Ease the base of the kingpost towards the required hole. Hopefully the washers will move with the kingpost.
Re align the washers using an Allen key through the new hole.
Re insert the barrel (4)
Place one drop of thread lock on the screw, one in the end of the barrel, fit the screw and re tighten it.
Give the glider a thorough pre-flight check.

If you 'loose' a nylon washer

Find the two nylon washers.
Move the kingpost so that you can access the desired hole on the channel.
Push barrel through desired hole then place one washer on the end of the barrel.
Move the kingpost into position.
Push barrel through kingpost.
You now have one remaining washer to insert which is the difficult bit.
Place remaining washer between kingpost and channel. You may need the blade of a knife to push it nearly into position. Final adjustment can be done through the hole with one of the Allen keys.
Push barrel through remaining distance
Place one drop of thread lock on the screw, one drop in the end of the barrel, fit the screw and re tighten it.
Give the glider a thorough pre-flight check.

Note: Remember that if you do need to move the hang position you are only likely to have to do it once so make a good job of it!
Both Allen screws are locked in position using thread lock. If the wrong type of thread lock is used the Allen screws may be almost impossible to remove. If thread lock is not used the screws could work loose. When putting the thread lock on the second screw fluid should be put in the barrel as well as on the screw. (If it is just put on the screw it is possible for hydraulic action to prevent the fluid giving a large contact area.)

MAINTENANCE

Annual strip down and factory inspection

Avian recommend that the Java has a factory inspection every year or 100 flying hours which ever is the sooner. This is a sensible precaution to take and is offered by

Avian at special prices in the months of January and February. An additional benefit of the strip down is that the latest upgrades can be fitted, often for free.

General

Careful attention to the rigging and de-rigging sequences will reduce the risk of accidental damage. Repairs should be undertaken by the Avian factory or an approved dealer using genuine Avian spares.

The correct storage of your glider will also greatly influence its life.

The glider should always be stored

WELL PACKED
COMPLETELY DRY
WELL SUPPORTED
IN A DARK, COOL AND DRY PLACE.

N.B. Regular coastal flying will cause increased corrosion of spars and fastenings. More frequent regular inspection is therefore recommended in this case.

Airframe Maintenance

Apart from damage caused by over stressing the glider i.e. crashing etc. the major wear and tear on the glider happens in transit.

Aluminium Tubing

Care and consideration in de-rigging and transportation will pay dividends in airframe life. Damage to any one of the structural members is serious and the only remedy is replacement. Insufficient care during ground handling or transportation can lead to tube abrasion or indentation. The former accelerates fatigue fracture and the latter reduces the strength of a component. Keep a regular watch for tell-tale hair-line cracks, which are most likely to occur in high stress areas such as around bolt holes. If you bend, dent or damage the tubular members in any way, seek immediate professional advice before flying again and have replacement parts fitted.

Fasteners

Any fastener (i.e. nuts bolts etc.) which is bent or shows signs of wear or corrosion should be replaced immediately. Nyloc nuts should only be used ONCE. One clear thread of the bolt should stick out beyond the end of the nyloc. Nuts should be tightened only so that they are snug. In most applications on a hang glider the nut is only there to stop the bolt from falling out. DO NOT OVER-TIGHTEN NUTS AND BOLTS. Over-tightening them can crush the tubes and damage the hang glider.

Anti-luff line wires

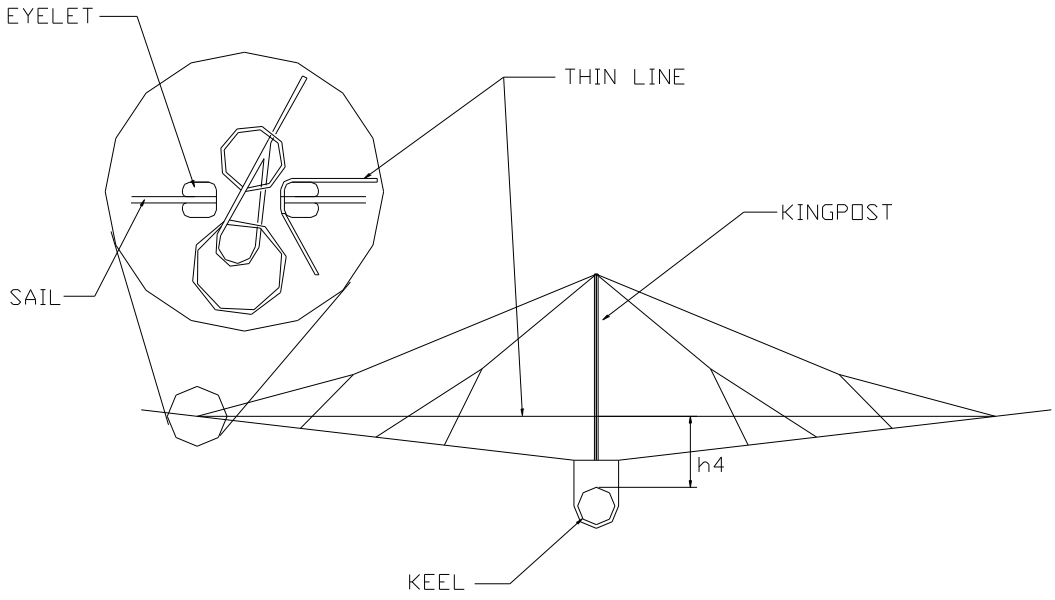
The anti-luff lines on a hang glider are important for the glider's pitch stability. They should be replaced if they are damaged. The 'luff line 'heights' should be checked every 100 hours or after the glider has had a heavy landing. It in not advisable to leave the glider rigged tail into wind in a wind of more than 10 mph. This places needless loads on the sail and 'luff lines and increases the rate at which they wear out.

Checking the ''luff line heights'

This should be carried out with the glider fully rigged and with no wind. This is easiest in a large building. It can done outside but only be in nil wind conditions.
The keel should be supported horizontally at the junction of the rear wires. The keel must be completely straight. If the glider is supported by the end of the keel this will bend the keel and give false readings for the 'luff line heights.
The VB. should be in the fully released position.

A length of thin line is required. (Nylon thread, kite string or fishing line.) This line should be threaded between the 'luff line eyelets and pulled taught. A light strong thread is an advantage as it will not sag too much.

The line should pass in a straight line between the two eyelets. If you are measuring number 1 'luff line (the line closest to the keel) the thread will have to pass from the left hand number one 'luff line eyelet, in front of the top rear rigging wire, to the right hand number one ' luff line eyelet. If you are measuring number 4 'luff line (as in the diagram below) the thread will pass behind the top rear rigging wire.



Checking 'luff line 4 height (h4)

The "luff line height' is the perpendicular distance from the top of the keel to the measuring thread or thin line.

Measure each 'luff line independently and write down the results.

Compare with the table below:

'Luff line number	1	2	3	4
Normal 'luff line heights (mm)	135	170	180	160
MINIMUM 'luff line height (mm)	113	129	154	103

If your 'luff line are less than the minimum height (Your 'luff lines are too long) **DO NOT FLY**. Send the 'luff line set to Avian Ltd. with a note of the heights. (Remember a bent keel will give you incorrect figures. Replace the keel and measure the heights again.)

The 'luff lines on a hang glider are very important and should not be altered by the pilot. A glider with 'luff lines that are too long could be dangerous. However this glider might feel the same, in flight, as a glider with the correct length 'luff lines.

A glider with 'luff lines that are shorter than normal might feel difficult to turn and heavy in pitch. This happens if the 'luff lines are so short as to be tight in normal flight. (This can be checked by getting a friend to look at your 'luff lines in flight. e.g. as you take off.) If the 'luff lines are not tight in normal flight, but have a bow in them, they will not adversely effect the glider.

Rigging Cables

The main danger with the rigging lies in kinking the cable. This is usually caused by careless rigging and de-rigging or by over tightening the bolts that attach the tangs to the airframe. (It should be possible to swivel the tangs with light thumb pressure.) Once a cable has a kink the strands are damaged and replacement is the only cure. The side cables are particularly important and should receive a frequent detailed inspection. Check for cable damage along the length but the main failure area lies immediately adjacent to the swaged fitting. Look carefully for signs of strand fracture at this position. Corrosion shows itself as a white powdery deposit. Corrosion cannot be cured and the only answer, again, is replacement.

Cross tube tensioner

The stitching on the cross tube tensioner is easy to see and should be inspected frequently. The rest of the tensioner strop is hidden in the sail and keel pocket so that any damage is more difficult to see. Thus do take time to inspect this thoroughly, particularly around the base of the kingpost and where the strop passes around the

cross tube centre junction shackle. If any damage to the strop is found (fraying, abrasions, cuts or wear to the stitching) the strop should be changed before flying.

Wing fabric maintenance

Any cuts or tears at critical areas such as the trailing edge, sail fixing points or similar high load areas, must be repaired at either the Avian factory or an Avian approved workshop. Small damage to panels, leading edge covers etc., can be repaired with proprietary self adhesive tape. We define small damage as abraded holes no more than 10mm diameter and small cuts no longer than 15mm. Anything larger should be inspected by Avian approved personnel.

Stitching Damage

Thread damage never gets better and eventually runs. If you abrade a seam or damage the stitching in any way, have the damage repaired before it gets worse. Small, non load-bearing areas can often be repaired in situ by the tedious but effective method of hand sewing back through the original stitch holes. Use a needle and only the correct thread: available from Avian or a good sail maker.

Wing fabric cleaning

It is, without doubt, better to keep the wing clean than to try and clean it. Some dirt never comes off completely. If you decide you do need to wash your wing, then select a dry day and have access to a good hose and clean water supply. Never use bleaches, strong soaps or detergents. The soap residue can react with ultra violet light and degrade the fabric. We recommend a very mild liquid soap (washing-up liquid) and a soft sponge. Gently wash the fully rigged wing, frequently hosing clean. Copious amounts of clean water will not harm the wing and can be very beneficial in removing sand and grit which may get trapped inside the sail. (Usually in the nose or wing tip areas.) Ensure that the wing is completely dry before de-rigging and storing.

Battens

Battens form the wing shape and substantially influence the performance of the wing. They need treating with care and, since they are subject to constant stress both during flight and rigging, they may lose their shape. It is essential that they are checked against the template at frequent intervals and re-profiled if necessary. (See Section: Battens and Batten profile.)

RECOMMENDED COMPONENT LIFE

The safe working life of the structural components of the Java is dictated by the environment in which the aircraft is used and the care taken during day to day operations. Inspection, therefore, is an essential tool in deciding the continued use of most components, particularly the sail. Due to the nature of their material, construction and position within the structure, certain components have a critical fatigue life and it is mandatory that these components are replaced within the time stated below.

Cross Tubes	2000 hours
Leading Edges	1000 hours
Control frame / fittings	1000 hours
Keel	1000 hours
Rigging wires / Tension strop	200 hours
Factory inspection	100 hours or 1 year (See maintenance)

REPAIR

Warning: The Java airframe is deceptively simple, but like all aircraft requires skilled and qualified attention. We do not recommend self repair or re-assembly by other than Avian or Avian nominated repair agents. No replacement parts should be fitted unless they are factory supplied and identified as such.
Repairs should only be undertaken by Avian approved personnel.
Sail repairs are only to be undertaken by the Avian factory.
Repairs of all other parts by replacement only.
Replacement parts must be obtained from Avian Ltd. or an Avian Ltd. appointed agency to ensure that they are genuine.
When ordering spares always quote your glider number (make a note of it if you have to replace your keel).
Bent aluminium tubes must never be straightened, always replaced. Frayed cables and cables with damaged or twisted thimbles must always be replaced.

To help you identify components some of the main assemblies are shown in the appendix of this manual.

TRANSPORTATION AND STORAGE

Storage general

The glider should always be stored:

WELL PACKED
COMPLETELY DRY
WELL SUPPORTED
IN A DARK, COOL AND DRY PLACE.

The glider should always be stored dry. The sail is made from anti-mould treated cloth but extended storage wet might never-the-less encourage mildew. Wet storage will greatly encourage corrosion of the airframe wires and fasteners. Salt water will of course be many times more damaging. After flying on the coast the glider should be washed with fresh water.
Always try and store your glider inside. If it is wet leave the bag open and try and open the glider out to dry properly as soon as possible.
If you must store your glider outside; keep it dry and keep it out of direct sunlight. (UV. light gradually damages the bag and sail inside the bag.)

Transportation general

The wing must always be transported inside its bag, well packed and with all the protective padding in place. We recommend that the glider is placed kingpost down. The zip on the bag can be placed down to prevent entry of rainwater. During transportation, or when stored on slings, the wing must be supported at its centre and at two points not more than one metre from each end. Supports should be padded and relative movement between glider and supports must be avoided at all times. (If travelling abroad pay attention to the legal requirements for both glider overhang and coloured flags etc.)

Breakdown

The Java leading edge has been specially designed in two main sections, the inner (nose to out board of the cross tube - leading edge junction) and the outer (tip section of the leading edge). These can be separated to allow a reduction in total glider packed length. This facility will be found useful for transport overseas or storage. It may also reduce the cost of a damaged leading edge should the damage be confined to either the outer or inner leading edge sections.

Removal of the outer leading edge

The outer leading edge section slides inside the inner leading edge. It locates on a clevis pin which stops it rotating. The outer section can be removed without removing the clevis pin. **(THE CLEVIS PIN SHOULD NOT BE REMOVED ON ANY ACCOUNT**). To take the outer section off, take the glider out of its bag, turn it upside down and remove the sail ties. Release the leading edge tension at the nose by unscrewing the Philips self tapping screws. The sail can then be disconnected from the end plugs. To do so will require the use of two 4mm Allen keys.

The leading edge outer can now be pulled out. The sail can now be folded smaller but take care not to crease the Mylar or damage the sail on the end of the inner leading edge. (We suggest that a padded bag is placed over the end of the inner leading edge. We also suggest that you check the leading edges are marked 'left' and 'right'.

To put the leading edge back together reverse the above procedure making sure that you push the leading edge fully home. (**THIS IS VERY IMPORTANT AND VISUAL CONFIRMATION THAT THE LEADING EDGE OUTER IS FULLY HOME UP TO THE 5" LINE IS ESSENTIAL)**.
To replace the self tapping screws at the nose we recommend rigging the glider first **TAKING GREAT CARE TO PULL THE SAIL TOWARDS THE NOSE WHEN OPENING THE WINGS OUT**.

IMPORTANT: Check that you have your outer leading edges in the correct sides. **(CHECK THE MARKS THAT YOU PUT ON THEM)** When the glider is rigged the location for the tip batten should be on the top front of the leading edge and the Philips self tapping screw should be facing backwards.

TROUBLE SHOOTING

The tension strop gets caught

When rigging the glider and spreading the wings the tension strop should appear through the keel-pocket. If it does not, stop and check to see where it is caught rather than force it. Check for any damage to the tension strop before flying.
To stop this getting caught again, make sure that the elastic attached to the strop is tight enough so that it disappears into the keel when fully rigged. Also check that the strop has no twists in it and that the elastic loop is on the outside of the stainless tang (i.e. not next to the keel) when the tension is released.

The tension strop is difficult to pull on

1. The tension strop might be twisted around the cross tube centre bolt. When freed, inspect the strop for damage and replace if necessary. Try and keep the strop twist free.

2. The side wire is caught:

(i) Check and replace if necessary
(ii) The side wire is caught behind a batten end or wrapped around the control frame: Release the wire, check for damage and replace if necessary.
(iii) The side wire is twisted at the junction with the leading edge. (The wire kinked over the tang): Release the wire, check for damage and replace if necessary. (This kinking is more likely if the tang is very loose. The tang should offer some resistance to movement with light thumb pressure .)

The VB. is difficult to pull on or fails to release

If instruments are attached to the right hand upright it may interfere with the VB. operation. The VB. cord runs down the rubber back of the right hand upright. Crushing the rubber back impedes the movement of the cord. It may then be possible

to pull the VB. on but not to release it. This is easily cured by inserting a length (30cm) of batten material inside the rubber back of the right hand upright. (This stops the rubber back from being crushed.)

Other problems with the VB.

The VB. may also be difficult to pull if mud or stones get into the lower casting. Remove the obstruction.

Other problems are unusual but are most easily cured by following the VB. cord until you find an obstruction.

The wings are difficult to close when de-rigging the glider

When the tension strop is released it should be pushed towards the keel pocket to feed some slack into it. This allows the wings to move together more easily. It is possible for the tension strop to get caught on:

The Kingpost channel,
or with the wings further in, the end of the nose batten.

Release the tension strop and continue to move the wings inboard.

The back of the kingpost gets caught on the sail when rigging

Check the rigging instructions: The kingpost should be raised before the wings are moved out. When the kingpost is raised the kingpost hole should be held back to allow the base of the kingpost through the hole in the sail.

A 'pop' is heard on take off

The lower wing wire goes though a small hole in the sail. During the "pre-flight" this area should be checked. One of the ferrules on the wire can get caught in the sail. If this happens the ferrule will normally "pop" through the hole on take off. (See above: this can also make the tension difficult to pull on when rigging.)

The glider has a turn

Check for crash damage then see tuning instructions.

The glider has become more difficult to turn

1. This can be caused by an incorrect but symmetrical batten profile. (Asymmetrical battens tend to cause turns.) The glider handling does deteriorate significantly if battens are out of profile. Check the battens (don't forget the nose batten) against the profile more regularly.

2. This may also be caused by an incorrect trim position (the position of the king post). The glider might be trimmed too slow "hands off" and be flying in a semi-stalled condition. See tuning instructions.

The glider is heavy or "strange" in pitch

The glider is heavy or handling badly despite the hang point apparently being in the correct position. The backup hang loop might caught in such a way that it interferes with the main loop when moving the bar (in or out depending on the position of the backup loop relative to the main loop.) Free the backup loop so that it is loose at any flying speed. On the Java the main and back up loop are sewn together. On no account should you ever remove the back up loop from the keel. Always fly with a backup loop.

The glider appears to be trimmed too fast despite having the hang loop at its furthest rearward position

1. If you are new to the glider and have previously flown a glider which has a heavier pitch response you may actually be pulling the bar in with out realising. On a smooth day, when you have a safe ground clearance and are clear of all other aircraft, slowly release your grip on the base bar and check the bar position and trim speed without putting any load on the speed bar.

2. As above this might be caused by a backup loop that is caught and interfering with the main loop when flying. Free the loop so that you are sure it is loose in flight.

The short under surface batten has been put in the long under surface batten pocket

You can sometimes do this accidentally if rigging quickly. If you have pushed the batten in a long way, you may have to totally de-rig to remove it.

In future always work in from the tip with the under surface battens i.e. put the shorter battens in first. In this way if you get the wrong batten it will be too long and easy to remove from the pocket.

The nose cone is lost

YOU SHOULD NEVER FLY WITHOUT A NOSE CONE. Check that the nose cone is not down the leading edge pocket of the glider. Hold the leading edge up to the light and look for the silhouette of the nose cone.

The leading edge pocket appears to have black marks or other dirt on the inside

This is usually grass or other debris which has got down the leading edge pocket. Try and get is out as best you can. The problem is usually caused by the storage of the battens in the leading edge pocket which tends to fill the pockets with debris and encourages mildew. **DO NOT STORE YOUR BATTENS IN THE LEADING EDGE POCKET.**

OWNERSHIP

Please notify Avian Ltd. of change of ownership and change of address. Your name and address will be stored on computer. The reason for wanting your address is so that we are able to contact the owners of any of our gliders should we decide to offer upgrades or in the unfortunate case of having to recall components or gliders.

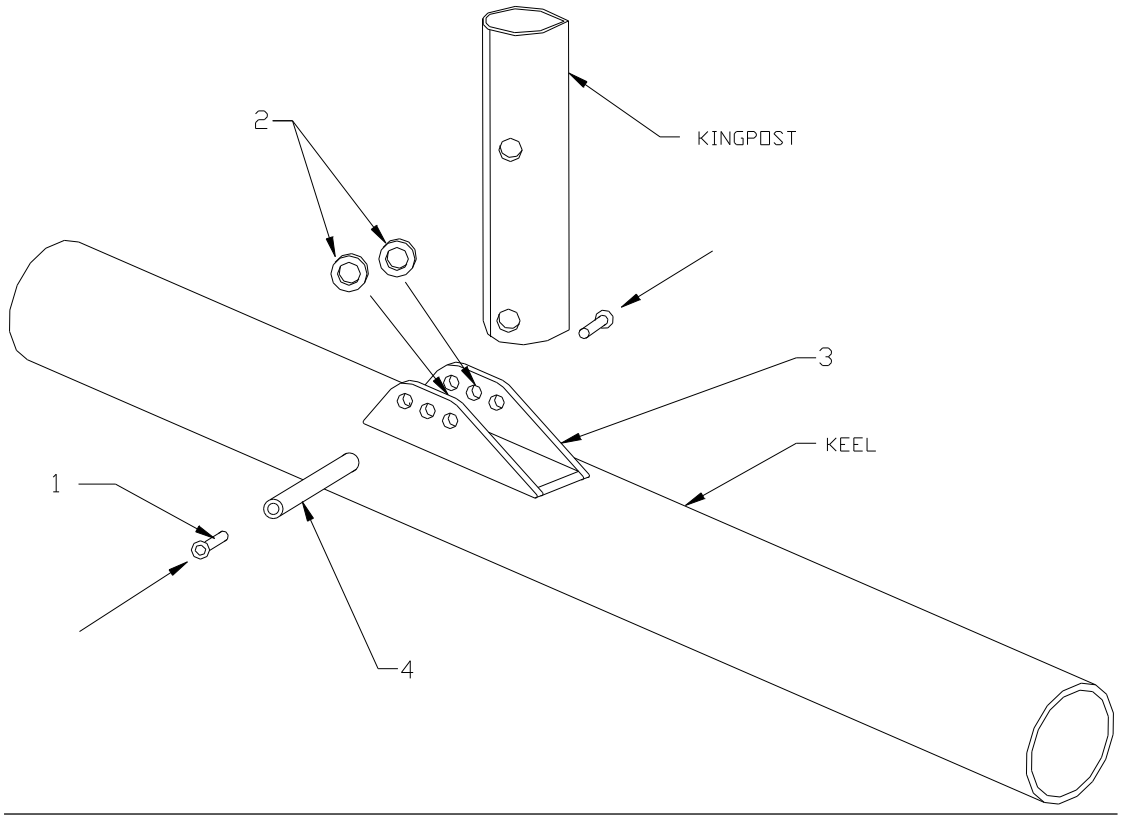
Please keep a record of all work done on your hang glider.

Please let us know of any ideas for changes that you think would improve our hand book, hang gliders or company. We are interested and would also like to hear if you have any complaints about the gliders or our service.

We would be most grateful to receive any interesting photographs of our gliders. Finally we hope that you have many hours of safe and very enjoyable flying.

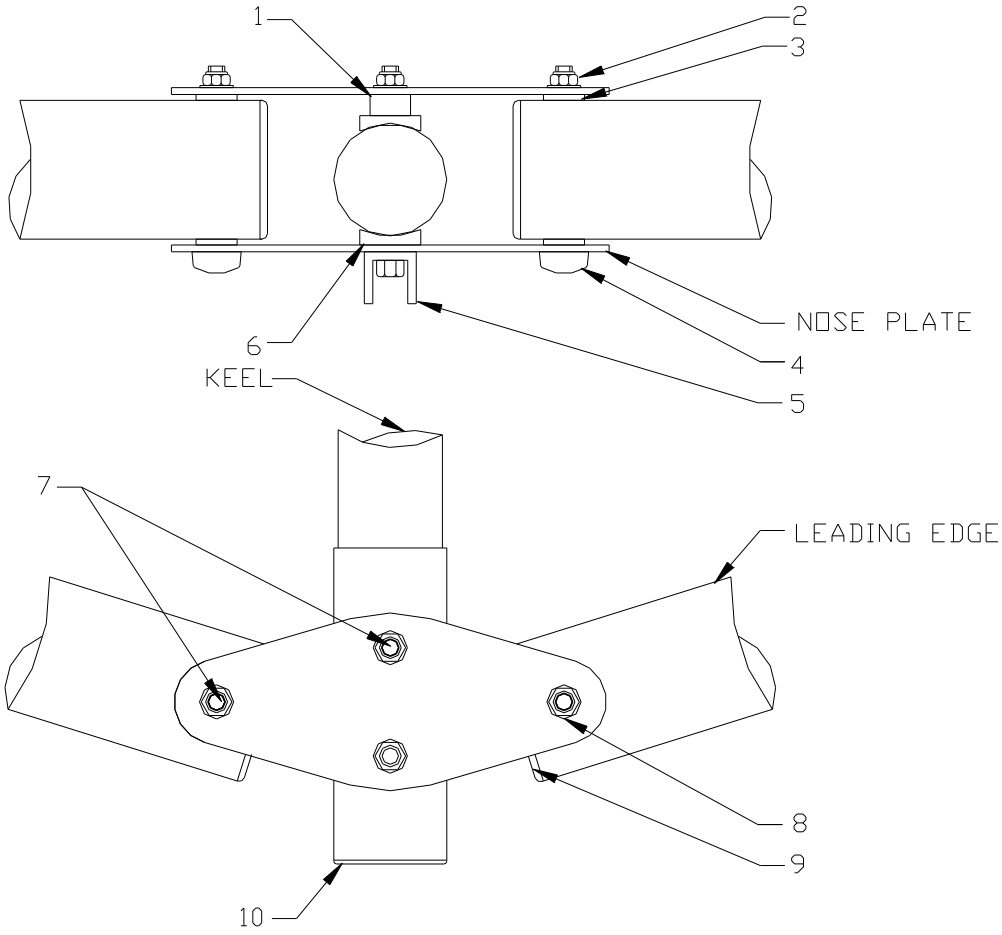
APPENDIX: ASSEMBLY DRAWINGS

KINGPOST / KEEL JUNCTION



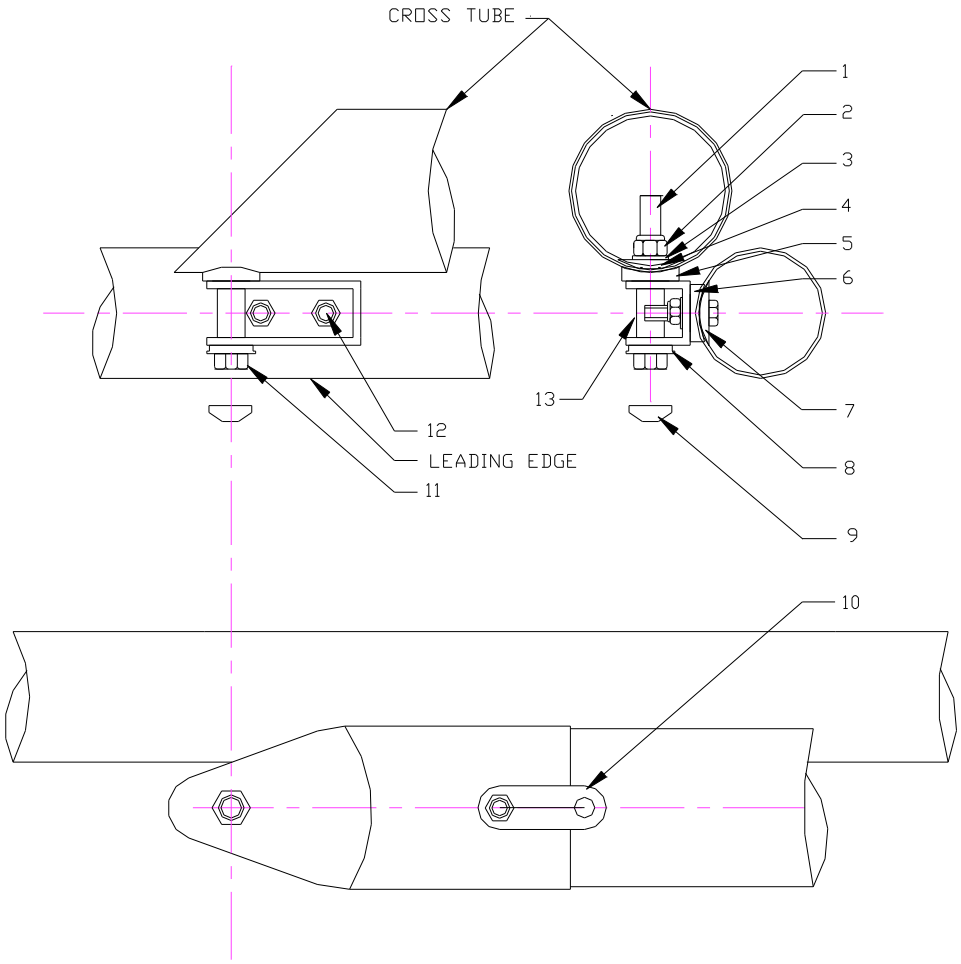
1.....M6 *10mm button head Allen screw
2.....M8 nylon washer
3.....Kingpost channel
4.....1 1/4" * 8mm stainless 'barrel'

NOSE ASSEMBLY



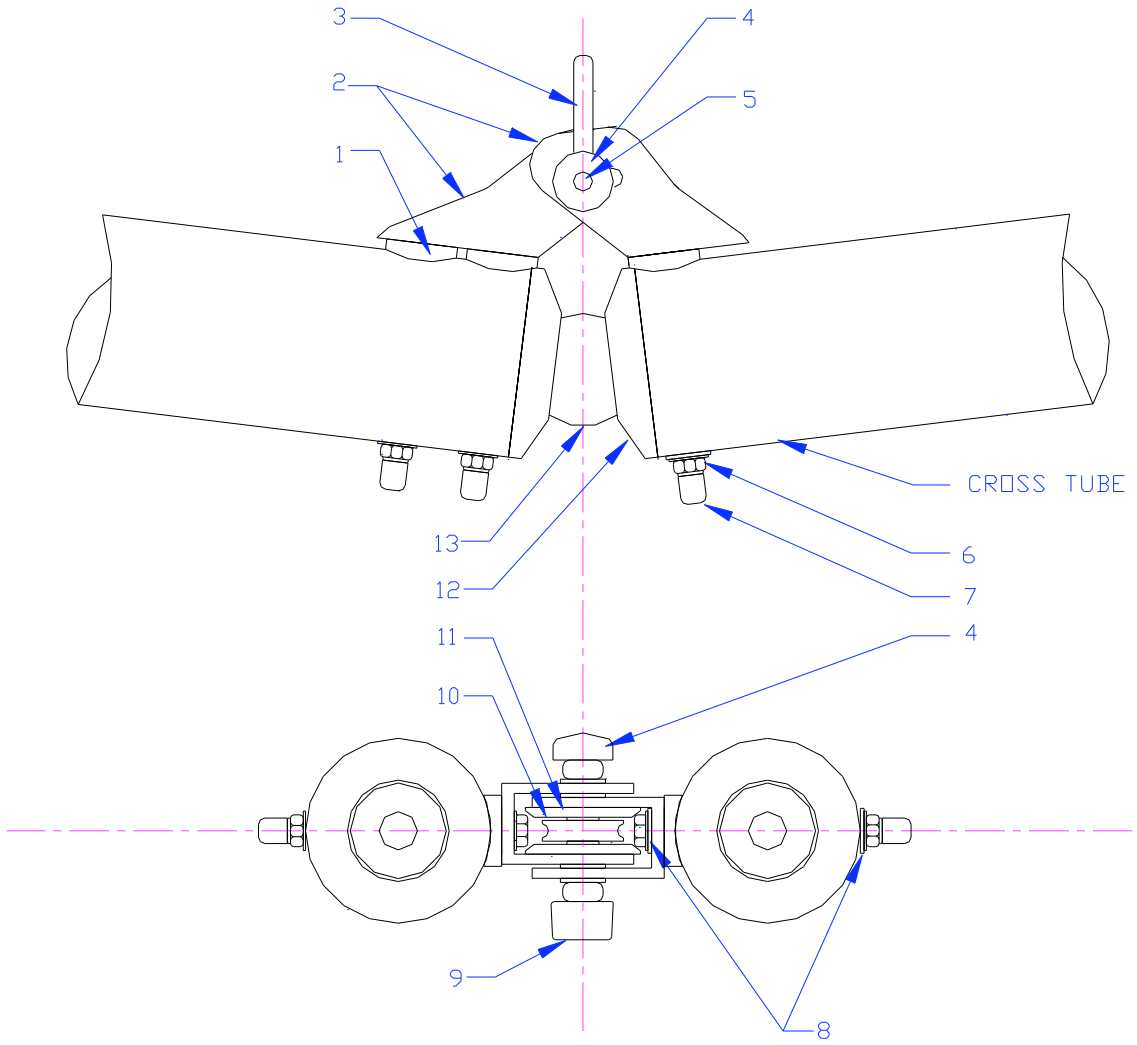
1.....Nylon spacer bush (7.5mm)
2.....M6 nyloc nut
3.....Nylon leading edge bush
4.....M6 nut cap
5.....Nose channel
6.....Keel saddle M6 hole
7.....M6 Bolts
8.....Stainless M6 washer
9.....Leading edge bung
10.....Keel nose bung

CROSS TUBE / LEADING EDGE JUNCTION



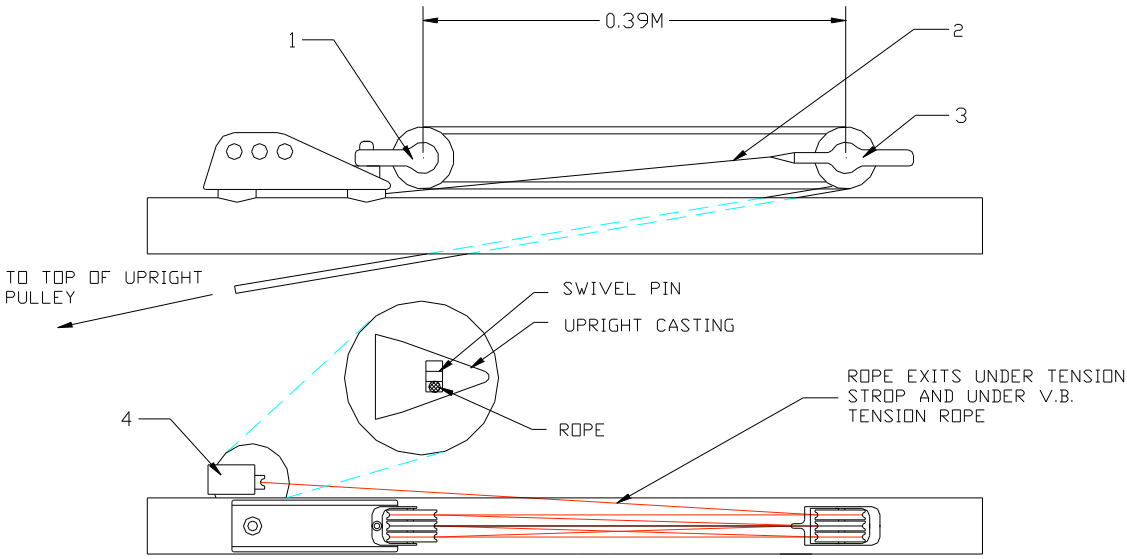
1.....M8 rubber thread cap
2.....M8 nyloc nut
3.....M8 nylon washer
4.....HRS single 8mm hole
5.....Cross tube saddle 8mm hole
6.....Leading edge saddle 6mm hole
7.....HRS double 6mm hole
8.....M8 nut cap retaining washer
9.....M8 nut cap
10.....30º tang for rigging wire
11.....M8 * 60mm bolt
12.....M6 leading / hinge bolt
13.....Aluminium hinge spacer

CROSS TUBE CENTRE JUNCTION

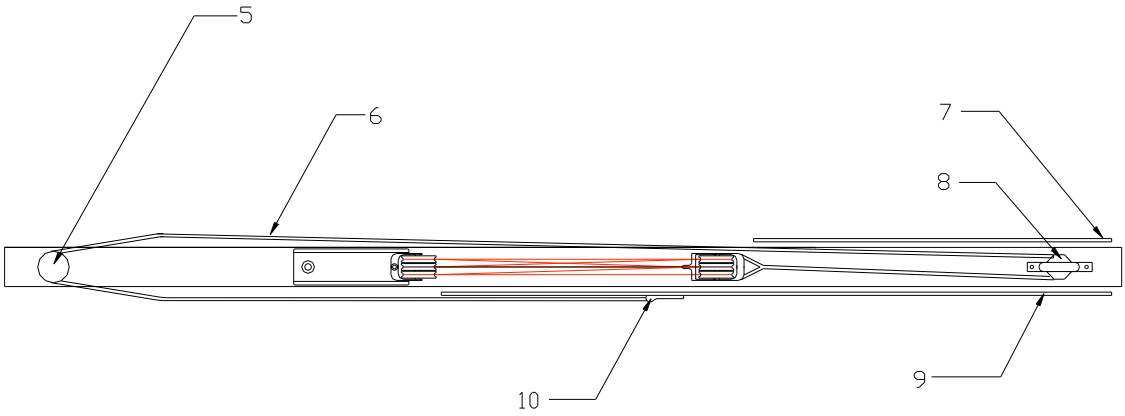


1.....Cross tube saddle M6 hole
2.....Cross tube hinge (set of)
3.....Cross tube shackle
4.....Cross tube centre nut cap
5.....Cross tube hinge centre bolt M6 Allen head
6.....M6 nyloc nut
7.....M6 rubber cap
8.....M6 nylon washer
9.....Cross tube centre rubber foot
10.....Cross tube centre sealed bearing pulley
11.....Nylon cheeks for cross tube centre pulley
12.....Cross tube ball socket
13.....Cross tube centre ball

VARIABLE BILLOW VB. (OR VARIABLE GEOMETRY VG.)



ROPE LENGTH 5.2M



CROSS TUBE V.B. ROPE LENGTH = 3.5M

1.....Triple block pulley (no becket)
2.....White retaining cord
3.....Triple block pulley (with becket)
4.....Top of upright pulley block
5.....Cross tube centre sealed bearing pulley
6.....Cross tube VB. rope
7.....Tension strop static side (only part shown)
8.....Rear of keel single block
9.....Tension strop moving side (only part shown)
10.....Cross tube VB. rope attachment to tension strop