Owner's Manual

Before flying your glider please read this Manual completely, check the position of the hang loop (starting position shown in this Manual) and do a thorough pre-flight check.

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INTRODUCTION

Congratulations on your purchase of an Avian Fly 17 Hang Glider. You are now the owner of a versatile, easy to fly hang glider. We hope that you will experience many enjoyable hours of safe flying on your new Fly.

This Manual is designed to help you get the most from your Fly. Please read this Manual completely before flying, check all battens against the batten profile (adjusting them if necessary) and do a thorough pre-flight check.

Please make sure your first flight on your new glider is in perfect conditions from a site with which you're familiar. There are many other things that are important to get right before flight, some of which are listed below:

It is vital to make sure that you are suitably trained before flying this hang glider in all aspects of rigging, pre-flight checking and flying hang gliders.
It is important that the hangloop is in the correct position and can't move (see tuning: Trim speed (pitch trim)).
It is also important that the VG is in the loose (or fully off) position prior to take-off or landing. (See VG Variable geometry.)

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 before you fly. Remember, "It's better to be on the ground wishing you were in the air than in the air wishing you were on the ground."

PLEASE NOTE

Avian Ltd does 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 become the responsibility of the owner or pilot. Any concerns or queries about the glider's subsequent airworthiness MUST be referred back to the local dealer or the Avian factory.

Hang gliders must be:

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

Failure to do any of these courts disaster.

Look after your aircraft!!

What's special about the FLY 17?

The Fly has been specially designed as an easy to use fun hang glider. It is faster to rig and easier to fly than any other hang glider made by Avian. The Fly has several other special features:

- The Fly can be ordered in a configuration for Supine Flight with a paraglider harness or similar. (See the section on Supine Flight.)

- The Fly is designed especially so that it can be upgraded to a Rio 2 17 with the addition of a new sail and rigging should the pilot decide that the extra performance of a sports glider is required.

For a full explanation of all the the innovations on the Fly, check out the website.
www.hanggliding.co.uk

Upgrading to the Rio 2

We think that the ability to upgrade your glider to the next level (or indeed to upgrade your Rio 2 to a Fly for even lighter weight and quicker handling) is a very attractive option for our pilots. If you look after the airframe of your Fly, we can easily fit a new sail and rigging to bring you a very noticeable improvement in performance, both glide angle and sink rate, for much less money than the price of a new glider. You also get the reassurance of having brand new wires, in addition to the outstanding quality of the Avian hardware.

Should you decide to upgrade your glider, the best time to do it would be as part of our winter stripdown service. We will completely strip and reassemble your glider, checking for any signs of wear or damage, before fitting the new sail and all new rigging. If you contact us in advance we can have your sail ready when you bring in the glider, making the whole process very quick (much faster than ordering a new glider).

When should I upgrade?

New pilots are often very eager to upgrade to higher performance gliders. While the extra performance can be useful as you start to explore away from the ridge, there are a few points to bear in mind.

Moving to a higher performance wing will give you improved sink rate and glide - meaning you can fly higher and further than before. However, you will find that the glider is heavier, requires more planning and skill to land accurately and will have less responsive handling.

If you are considering upgrading from the Fly to the Rio, you should be completely comfortable flying your glider in all (sensible) conditions and should not have any difficulties with your landings, either in the top or bottom fields. You should also consider whether the extra performance will be useful to you. For simple ridge soaring, you may have more fun with the very light weight and quick handling of the Fly.

If you want to keep your glider as light as possible but still want to squeeze out some extra performance, we suggest that you learn how to effectively operate the VG (Variable Geometry) system. By pulling your glider's sail tighter you noticeably improve the glide and the sink rate, allowing you to make the most of the conditions. However, practise using the VG at altitude to start with until you are used to the stiffer roll control. (It is more difficult to turn with the VG on.)

OPERATING LIMITS

1. Minimum pilot rating: Club pilot (unsupervised), or Ab-initio (whilst under qualified instruction)

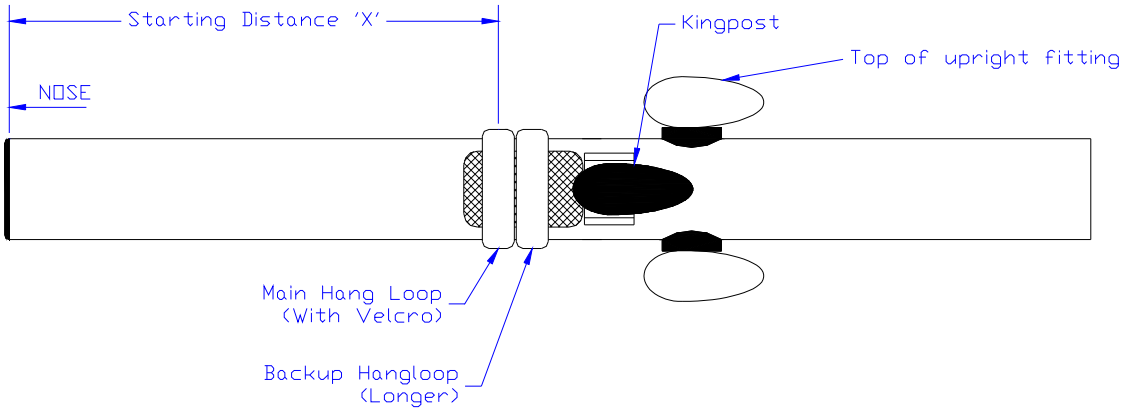
2. Manoeuvres:
   1. Aerobatic manoeuvres are not permitted.
   2. Pitching the nose up or down more than 30 degrees from the horizontal is not allowed.
   3. Do not exceed more than 60 degrees of bank
   4. Do not fly the glider inverted or backwards.
   5. Do not fly with auxiliary power without factory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

3. Hang Glider Payloads:

Pilot clip in weight range (including harness and kit)		
Glider size	**Minimum payload**	**Maximum payload**
Fly 17	14.5 stone	20 stone
Fly 17	203 lb.	280 lb.
Fly 17	92 kg	127 kg
Fly 17 (Pilot and power unit)	100 kg	140 kg

Pilot weight without harness (Estimate only. Calculated as clip-in weight minus assumed 16kg of kit)		
Glider size	**Minimum suggested pilot weight**	**Maximum suggested pilot weight**
Fly 17	12 stone	17.5 stone
Fly 17	168 lb.	245 lb.
Fly 17	76 kg	111 kg

4. Hang Point Position Range (Pitch trim)



The hang loop is attached around the keel and should be within the following range. A recommended starting position is also shown. (For example, if the hang loop has been removed and you are not sure where to replace it.) When you get the best position for yourself, mark the keel with a felt tip pen or record a measurement for future reference. (Do not use pencil or any other sharp implement to mark the glider.) **Note: The starting positions for supine and for prone flight might be slightly different.** Make sure you use the correct one.

Glider	**Max Forward (Fastest)**	**Starting Position (X)**	**Max Aft (Slowest)**
Fly 17 (**Prone**)	1645mm	**1675mm**	1705mm
Fly 17 (**Supine**)	1645mm	**1675mm**	1705mm

RIGGING THE FLY

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

Flat rigging

1. Lay the glider on the ground with the nose pointing into wind. Unzip the glider bag, roll the glider so it is the right way up and remove the bag. Take care to keep the inside of the glider bag clean, as any dirt will be transferred to the glider when the bag is replaced.

2. Remove the glider ties and take the battens out from on top of the sail.

3. Lift the king post into position, making sure that the sail is not caught at the base of the kingpost. Connect the tack hook and ensure that the anti-luff lines (Often called 'luff lines) are not twisted or tangled and are free from any fraying etc.

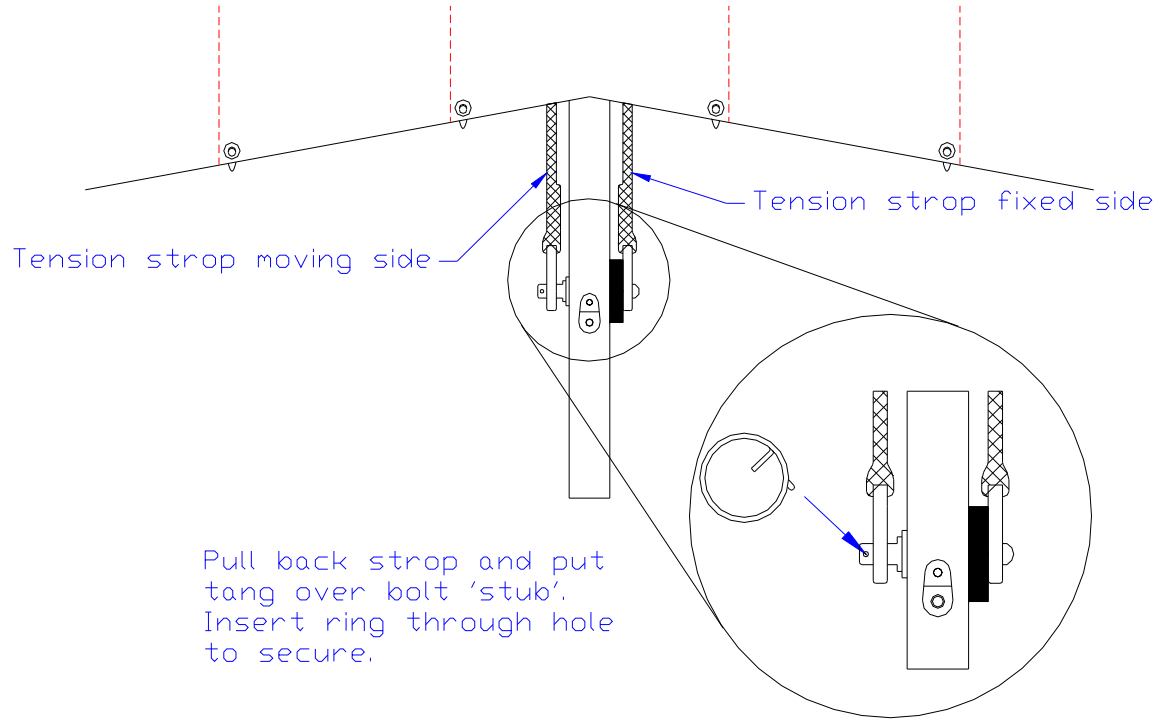
4. Open the wings slightly, then walk them out to about 3/4 of their full extension. If you are rigging alone, move each wing only a short distance in turn. Due to the geometry of the cross-tubes, attempting to move one wing through a large arc when the wings are nearly parallel exerts high loads due to the large leverage. The increased load in certain areas may cause damage to components. Also to prevent damage to the nose plates, ensure that you do not lift either wing tip higher than knee height. If there is any resistance, then check to see what is causing it and free the problem before continuing. **Do not attempt to force the wings apart**.

5. Assemble the 'A' frame flat on the ground. Attach the speed bar below the keel facing downwards, 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 THEM UNTIL LATER.** Thread the VG cord through the cleat in the speed bar and tie a knot in the end. (To prevent the cord from accidentally disappearing into the upright.)

6. Lay the battens on the ground and pair them up, red with green, checking that corresponding batten pairs have the same profile. This is a good habit to get into, as it will reduce the chances of launching on a glider with a turn caused by asymmetrically shaped battens. Periodically the battens should be checked against the batten profile. The battens should all be stored clipped shut to prevent losing the tension settings.

7. Insert the battens smoothly, starting with the first 'normal' curved batten in from the wing tip, working from the tip towards the centre chord. Insert the batten in the pocket inboard of the washout batten. The compression struts (straight rods) and washout battens (which fold out from the leading edge) are rigged later. Keeping the trailing edge low - and slowly easing the battens into their respective pockets - will help increase sail life. (On a new glider, a little silicon spray on the batten ends will help them slide in smoothly.)

8. The glider can now be tensioned. Remove the split ring from the special bolt located through the rear of the keel tube. Pulling first the two cords that come out of the keel, draw the cross-tube webbing back. Check that the cords are not twisted. Locate the stainless tang over the stub of the bolt, and secure by replacing the split ring. If the tension feels too tight, stop and see what is causing the problem. **DO NOT FORCE IT**. (Consult the trouble-shooting area of this Manual for possible causes.)



9. Push the battens fully in the last little bit. (With a new sail the battens may not go fully home unless pushed.) The batten clip ends should be clipped open, inserted in the eyelet and rotated and clipped shut. Work from the keel outboard towards the tip. When you get to the washout batten, rotate it out and clip it in the trailing edge eyelet in the same way as with the other batten ends. Then zip up the under surface at the inboard end of the washout batten. The batten nearest the wing tip can only be inserted when the glider has been tensioned. These battens are referred to throughout this Manual as compression struts. On the Fly, this strut is straight and locates onto a metal hook on the back of the leading-edge tube. The outer end is clipped as before. The small piece of Velcro at the tip of the sail should be closed last.

10. The glider can now be stood up. Check the wind conditions and make sure the glider is pointing into wind. If you have a helper, brief them well but control (hold on to) the nose of your glider yourself. Ensure the wires are not twisted, then stand the glider on its control frame. (Your helper could lift the keel at the same time as you lift the nose.) Hook the swan catch on at the nose rotate to tension the lower rigging, and then insert pip pin through the nose channel, swan catch and safety washer.

11. Insert the nose batten if not already inserted. 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. This is recommended but it should be remembered that the nose batten is more prone to becoming mis-shapen if left in a packed glider. Remember to check its profile against the batten profile when you check the other battens.

12. After checking that the nose catch is correctly attached, with safety washer in place, fit the nose cone. **DO NOT fly without a nose cone.**

13. The glider is now fully rigged, and you should complete a thorough pre-flight check **before** you fly.

If there is a significant wind, we suggest 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 Fly may be left standing on its 'A' frame, tail into wind, but be wary of gusts of wind, thermals and dust devils. Keep a close eye on your glider or make sure it is securely tied down.

Rigging on the 'A' frame

This is useful in confined spaces or where the terrain is likely to cause soiling or damage to the sail, but should only be attempted in light-wind conditions.

1. Lay the glider on the ground. If there is any wind, then the nose should be pointing cross-wind or down-wind. Unzip the bag and remove enough ties to assemble the 'A' frame. Attach the speed bar pointing forwards, 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 THEM UNTIL LATER.** Thread the VG cord through the cleat in the speed bar and tie a knot in the end. (To prevent the cord from accidentally disappearing into the uprights.)

2. Insert the nose batten or, if it was left in the sail, move it onto its location on the keel. Stand the glider on its 'A' frame. Remove the bag and remaining ties and take the battens from the top of the wing. Lift the kingpost slightly so that it rests on the nose batten.

3. Open the wings slightly, then walk the wings out to about three quarters of their full extension. If you are rigging by yourself, move each wing a short distance in turn. 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 to avoid distortion of the nose plates or any other component. If it is difficult to open the wings - stop and find out what is wrong DO NOT FORCE the wings apart. It is possible to get the kingpost caught behind the cross tubes, wires caught around things etc. Check to find the cause, and rectify the situation before opening the wings any further.

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 for protection. The glider should now be standing on its 'A' frame, wing tips and keel.

5. Lift the king post into position and connect the tack hook securely, ensure that the ‘luff lines aren't twisted or tangled and are free from any fraying etc.

6. Making sure that the wires are not kinked, attach the nose swan catch, pip pin and safety washer.

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

8. Working from the centre chord towards the tip, put all but the last 3 curved battens into their pockets. Keep the trailing edge low, and slowly ease the battens into their respective pockets. Leave the tip socks on.

9. Before tensioning the glider, make sure you have opened the wings as far as possible. Tensioning will be much easier if you can get someone to lift a wing tip slightly, thus opening out the wings still further. Remove the split ring from the special bolt located through the rear of the keel tube. Start by pulling on the attached cords, and then you can draw the cross-tube restraint webbing back. Check that the cords are not twisted. Locate the stainless tang over the stub of the bolt and replace the split ring. If the tension feels too tight, stop and see what is causing the problem. **DO NOT FORCE IT**. (Consult the trouble-shooting area of this Manual for possible causes.)

10. Remove the tip socks and swing out the washout batten. Push all battens fully home. (With a new sail the battens may not go fully home unless pushed.) Clip all the batten ends, working from the keel outboards. When the washout battens are clipped in place, zip up the double-surface zip.

11. Take the compression struts (these are straight) and insert them, ensuring that they locate onto their hook on the leading edge. Clip the end and replace the Velcro.

12. If not already in place, insert the nose batten and locate it on its seat just in front of the nose plate. (It is recommended to only remove the nose batten occasionally to check its profile. Otherwise leave it *in situ* at all times.)

13. Double check that the nose catch is correctly attached with the safety washer in place then fit the nose cone.

14. The glider is now fully rigged, and you should complete a thorough pre-flight check before you fly.

In light winds the Fly may be left standing on its 'A' frame tail into wind; but be wary of gusts of wind, thermals and dust devils. Keep a close eye on your glider or make sure it is securely tied down.

PRE-FLIGHT CHECK-LIST

Always using the same assembly and packing procedure will help to eliminate rigging mistakes. After rigging, always carry out a pre-flight check. Clearly the most obvious thing to do is to take a look at the whole glider. Stand back and have a look at your aircraft. Check that it looks the correct shape from top and bottom. Check that the wing twist looks even from the side and that the glider looks symmetrical. If you notice anything unusual, then investigate this first before continuing with the more detailed pre-flight list below. If you notice something unusual, then clearly you need to sort it out before you fly. Afterwards may be too late. Some of the detailed pre-flight checks should be carried out during assembly, but the following details must all be checked prior to take-off:

1. Check that all tubes are straight and not dented. If you suspect tube damage but cannot see it, then DO NOT FLY. A full factory service is often the only way to see some tube damage.

2. Check that the cross-tube hinge, nose plates and 'A' frame fittings are OK.

3. Check that all sail seams are intact with no frayed stitching, particularly in high-stress areas (*e.g.* wing tips, junction of keel pocket and sail *etc*.)

4. Check that the battens are of the correct shape and undamaged.

5. Check that all wires, nuts and bolts are secure.

6. Check that all quick-release fittings are secure:
   - (i) cross-tube tensioner
   - (ii) nose catch (check the clevis pin and split ring as well)
   - (iii) compression strut battens correctly located on leading-edge hook
   - (iv) quick pins and rings secure on bottom bar
   - (v) outboard leading-edge section fully engaged. Webbing sail attachment at tips in good condition and correctly positioned in their slots. (Be especially vigilant if the leading edge has been short-packed recently.)

7. Check that the cross-tube tensioner strop is free from twists and fraying .

8. Check that the batten tensions are symmetrical on both sides of the glider. The snap ends should be in good condition and should snap closed when rigging.

9. Check that the hang loops are in good condition.

10. Check that the glider is symmetrical when viewed from the front or rear.

11. Unzip the under surface and check the centre junction. Check that the cross-tube hinge bolts are secure and that the webbing loop is in good condition. Sight down the cross-tubes and check that they are undamaged.

12. Check that the four nose plate bolts are secure.

13. Check that the Allen head bolts at the lower upright fitting are secure and that the fronts are flush with the fitting. Check that the top-of-upright bolt through the keel is secure. Check that the double button pins are holding the upright to the fittings.

14. 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.

15. Ensure that the webbing is correctly seated into the groove on the plastic end caps at the wing tips.

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

17. Check that all zips are done up.

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

19. Ensure that the king post is correctly positioned, straight, free from dents and held securely in position via the tack hook.

20. Check that the ‘luff lines are not twisted or frayed and are securely attached. If the outer ‘luff lines become caught under any of the battens, this will cause a significant turn in the glider when flying, so always ensure the ‘luff lines are free before launching.

21. Check that the wires are undamaged. Look for signs of corrosion and fraying. Pay particular attention to inspecting 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 - CONSULT AVIAN FOR ADVICE.**

22. Finally, special attention should be paid to quick-release fasteners, check that all are secure. Pay particular attention to the base bar quick pins as it is possible for the safety rings to become detached from the pin. The most likely cause is forgetting to put them in when rigging. However, moving the glider in long grass and/or touching the safety rings against something can remove a safety ring. The problem is minimised if you put the pins in from the back of the base bar, so that when the glider is sitting on its keel the head of the pin rather than the safety ring is in contact with the ground.

FLYING THE FLY

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. (It is a requirement that, unless under direct instruction, the pilot has completed training to at least BHPA 'Club Pilot' standard and is current. If not, then you will not have the skills required to fly this aircraft.) It is recommended that your first flight on the Fly is from a site you know well, in ideal flying conditions and using your normal flying gear. Remember: only change one thing at a time.

Take-off

Remember that during the first few seconds of flight on a new glider, it is likely to feel different to previous aircraft you have flown. Before take-off, make sure you've 'pre-flighted' the glider, that you are clipped in and that you have performed a hang check. **Have you checked the starting position for the hang loop?** It is given at the front of this Manual. 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 you may allow the angle of attack to increase slightly (relax some pitch pressure) to lift you cleanly from the hill. **DO NOT PUSH OUT PAST TRIM**, or you risk a stall. Fly straight out from the hill for a few seconds. **If you fly too fast and overcontrol, then a series of unintended 'S' turns can result**. R**emember to relax and gently slow down.** Once settled in flight, move your hands - one at a time - to a comfortable position on the base bar. Remember to concentrate on flying and nothing else. This is especially important when near the ground or any other obstacle. **Fly the aircraft**! Getting your feet in your harness, switching on or adjusting instruments can all be done when well clear of everything else. Remember above all: **fly the aircraft**.

In Flight

The control in both pitch and roll is light and precise. Coming from a beginner's glider, the controls might seem very light. Accordingly, the glider should be flown with moderate and precise inputs. The glider should not be flown too slowly or in a semi-stalled condition as the roll response becomes much slower. Likewise it is important not to fly it too fast until you are familiar with the glider's control responses. Once well clear of the ground and of any other obstacles - and while keeping a good look-out – we recommend you experiment with gentle turns at trim and at various slightly increased flying speeds. This idea is to practise until you are able to fly accurately at different airspeeds. Never should you attempt turning towards obstacles such as hills. Always turn away at the ends of beats until you are well above all obstacles.

Stalling

The Fly recovers quickly from stalls but will lose height doing so. A wing close to the stall becomes difficult to control. For both of these reasons, the glider should be flown with sufficient - but not excessive - air speed close to the ground, hill, or any other aircraft or obstacle. Do not take off if it's raining. If you are unfortunate enough to be flying when it is raining, then be careful. The water droplets on the leading edge make the glider far easier to stall. With a wet glider, it's a sensible precaution to apply reduced bank angles and to pull on a little extra airspeed . See below.

Spinning

Hang gliders are generally resistant to spin, and 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. In rain, and with wet leading edges, gliders are more likely to spin. See below.

Flying when wet

DO NOT TEST YOUR NEW GLIDER IF IT IS WET. Wet gliders do not fly nearly as well as dry gliders, because water droplets on the leading edges disturb the airflow over the wing. The result is that the glider does not perform so well and the stall speed is increased, *i.e.* it will not be possible to fly the glider as slowly as if it were dry. A wet glider stalls more easily, takes longer to recover from a stall and is more prone to spinning.

If you get caught in the rain, you will notice the above effects increase as the glider gets wetter. You will have to fly faster to avoid stalling and should be especially careful when turning or landing. WE ADVISE THAT, WITH A WET HANG GLIDER, YOU SHOULD FLY FASTER, ESPECIALLY WHEN DOING ANY MANOEUVRES NEAR THE GROUND OR OTHER AIRCRAFT - and use low bank angles if possible.

Landing the *Fly*

The secret of a good landing is good field selection followed by a precise approach with adequate air speed right up to the point of flare. Don't fly too slowly or slow down until you are 50cm above ground level.

Always plan your landings from high up and make sure you can get your feet out of your harness 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 and be sure of the wind direction. Never choose to land immediately behind other gliders or obstacles, land to one side. You'll make a lot more friends. Flying into wind, try and resist the temptation to push out. Slow down until your feet are close to the ground (50cm). If there is any wind, then you need extra airspeed to fly safely through the wind gradient. After passing through the wind gradient you should aim to have enough airspeed left to round out and fly parallel with the ground for a few metres while gently slowing down (moving the control frame forwards and your weight back) before a final flare. The round-out and flare on this aircraft all happens within a few seconds.

Aerotowing

In recent years, aerotowing has become a popular method for launching gliders in light winds, and as a training method to help new pilots gain airtime without the pressure of avoiding paragliders or getting into an awkward bottom landing field.

Unfortunately, airworthiness restrictions in the UK mean that we are forced to use tug aircraft with quite high stall speeds, sometimes having to tow at 40mph or more. This is a problem for entry-level gliders such as the Fly where the tow speed is close to the glider's top speed. Attempting to aerotow a glider at its top speed, you will experience high pitch pressures and much more difficult handling than when the glider is in its normal range of operation. If you want to aerotow your Fly, we recommend that you **ask your tow instructor to try the glider first**. Ideally the instructor should have a similar body weight to you, since being heavier on the glider will make towing easier. They should be able to advise whether it is safe to fly your glider behind the tug, and should be able to set the tow equipment up correctly.

At Avian, we strongly advise that you use a fin when you aerotow; especially if you are new to towing, have not towed for a while, or are flying a new wing or behind a different tug. A fin will make the glider more stable in yaw and will make it more difficult to get into Dutch Roll, or Pilot Induced Oscillation. The Fly will also require a split tow bridle to help reduce pitch pressure, but this must be set up correctly after test flying by an instructor to match the speed of the tug.

We also recommend you use as slow a tug as possible. 30mph is ideal. A long tow bridle (90m minimum) will also help you to stay in line.

Please note that the glider's behaviour while aerotowing can be very different to hill flying, so you need special training to be able to tow safely.

FLYING SUPINE

Flying supine is something that most paraglider pilots do all the time. Currently, however, it's unusual for hang glider pilots. Because of this, your flying background will influence how supine feels to you. To put it simply: if you have been trained seated or supine, then flying supine will feel very natural but if you come from paragliding, then the hang glider is a very different aircraft. If you are used to hang gliding in the prone position, then flying supine, take-off and landing will feel particularly unfamiliar to start with. This is why Avian recommends that you seek training when converting to supine flight on the Fly for the first time.

How the glider is changed

The Fly has a Supine Control Frame option for flying supine (or seated) with the pilot's legs under the control frame. This is completely different to the prone flying control frame set-up. With the supine set-up, the uprights are shorter and at a very different angle. The speed bar is a different shape. It is vital to note that the two set-ups are very different and can only be flown in the appropriate way. It is not anticipated that the pilot would change between the two set-ups and it is not recommended. If, for example, one were to try and fly the supine set-up with a prone harness, firstly the hang loop would be wrong. However, even if that were corrected, when flying at trim, the speed bar would be much too far back in flight. The pilot would be very likely to stall accidentally as the result of having pushed the bar forwards to a more familiar position.

Moving from Paragliding

The flying position will feel very familiar, except that one's arms will be holding the special speed bar rather than 'brake handles' as on a PG. It is important to check that the harness height is correct before flying. That way, your legs can pass comfortably under the speed bar.

Because a hang glider is generally a faster aircraft, take-off on a hang glider requires a faster run than would be required on a PG in the same conditions. That said, ground handling is much easier on a hang glider and take-off generally requires far less skill than a PG. However, the implications of a failed take-off are usually more serious and costly with a hang glider owing to the higher speeds etc. So it is important that the supine harness is set up so that the pilot can run well.

The differences in take-off and landing technique mean that a paraglider pilot **must get training** from a qualified hang-gliding instructor before flying solo.

Take-off

Choice of take-off site and conditions is important, as always, and perfect conditions should be sought for first flights. It is recommended that the hang glider is held with the uprights on the pilot's shoulders and arms outside the risers with the hands on the uprights. A hard run is recommended, while leaning forwards and maintaining a constant angle of attack. When full running speed is achieved, the uprights should be allowed to move forwards slightly letting the nose up for take-off. It is important to try and maintain a running position until clear of the ground. Seated harnesses often try to tip the pilot back into seated early, and if the glider hits sink just after liftoff, then you must be ready to run again until you are well clear of the hill.

Once flying, you can rotate back into seated and move your hands to the back of the special speed bar.

Weight shift control is easy once you get used to it, you simply move your weight in the direction you would like to turn. Moving your weight further towards the direction of turn will increase the rate of roll. The hang glider will not roll level again without pilot input, so unless an opposite weight shift input is made the glider will continue turning.

Towing

We are looking into the possibility of winch towing the Fly in its supine configuration, and we have heard of pilots successfully winch towing like this in other countries, but we have not as yet been able to perform extensive testing. As such, we recommend that supine pilots do not attempt to winch tow their Fly gliders until we have verified that the glider performs well.

Aerotowing presents a particular challenge as UK restrictions on our tug aircraft mean that the gliders must be towed at very high speed, which is on the limit for a glider such as the Fly. For the time being we must stipulate that you **DO NOT AEROTOW THE FLY SUPINE.**

Landing

Unlike take-off, landing a hang glider is usually considered more difficult than landing a PG. The main reason is - once again - the higher safe flying speed. It is strongly recommened that first flights and landings are made with some wind. It is important to take off and land into wind. This will give the maximum reduction in ground speed. A hang gliding approach will be faster, and final approach should be in an upright position (no longer sitting but ready to run) with hands comfortably on the uprights again outside the risers.

This is one of the areas of flight where the pilot is likely to need most instruction. Good control of airspeed while keeping wings level, rounding out and flaring is a simple enough concept, but easy to get wrong. Good training and practice here are key. The Fly can be landed in nil wind in a supine harness with arms behind the risers, but a flare is required. It is unlikely that you will be able to run fast enough for a successful nil-wind landing without flaring.

VG: VARIABLE GEOMETRY (If in doubt LOOSE!)

How does VG work?

Variable geometry allows the pilot to adjust the sweep of the leading edges in flight. Pulling the VG cord pulls the cross tube centre junction aft, which results in the leading-edge tubes being forced further apart. As the wing tips are ‘opened further’, the sweep is reduced. This tightens the sail between the wing leading edge and keel pocket. The range of the VG is limited.

What is the effect of VG?

The VG has two main effects.

1. Improved performance: reduced sink rate and increased maximum glide angle (max L/D). (The tighter sail has less washout, which is where the improved performance comes from.) But there is a price to pay:

2. Reduced handling. The tighter sail makes the weight shift turning of the glider more difficult. More effort is required and gets a slower response from the glider. The pitch control is altered only slightly on the Fly; it becomes slightly lighter.

How to use VG

Having the VG off (or loose) allows the glider to be easy to turn, ideal for take-off and landing or anytime when quick handling might be required.

The VG on (or tight) gives best sink rate and glide. This might be used when well clear of the ground and of all obstacles when conditions are smooth. Classic examples might include when climbing high in wave lift or perhaps gliding fast between clouds. The VG allows infinite variability between the two settings above so the pilot can choose the best blend of performance and handling.

Tips from Top Pilots on VG use

Top pilots often use the VG a lot in a single flight. They take off and land with it loose but when high pull it on a bit for the extra performance. They sometimes fly with the VG slightly on when thermalling in smooth thermals….Completely off for thermalling in rough conditions and maybe changing between the two in one climb.
Near the ground or near a hill, the VG should be loose. Fast handling is far more important than any small gain in sink rate or glide. To fly with VG on near obstacles is potentially very dangerous.

One useful tip for when flying with the VG on tight, especially if approaching traffic or anticipating an imminent loosening of the VG is to have the VG cord held in the right hand while holding the speed bar. This way the rope can be held already un-cleated. Thus in an emergency the VG can be released very quickly to allow maximum handling, just by loosening your grip on the rope. Allowing the VG to run gently through your fingers until fully off is best. Try and avoid just letting the rope go, as you will give the airframe and mechanism an unwelcome shock or bang as the VG reaches the end of its travel.

POST FLIGHT INSPECTION

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

DE-RIGGING

De-rigging is largely the reverse of the assembly sequence:

De-rigging the glider flat

1. Lay the glider flat on the ground and into wind, and remove the compression struts. If you intend to remove the nose batten from the sail, do so before releasing the cross-tube tension or remove it when you are about to put the glider in the bag with the wings together.

2. To unclip the battens: unclip the white clip batten fitting by rotating it around the eyelet. Remove it from the eyelet and then clip it back parallel with the batten. Clipping shut prevents the tension adjustment from being lost (accidentally rotating the white fitting).

3. Release the cross-tube tension and swing the wings in a few feet.

4. Remove all the battens from the sail. Slide the battens out slowly rather than as fast as possible: to prevent wear. If you want to de-rig quicker, then pull two battens out slowly - one with each hand. Unzip and then rotate the washout batten towards the wing tip.

5. Bring the leading edges in further so they are near the side of the 'A' frame. Slide the keel padding onto the keel and up around the tension bolt and Velcro it in place. Dismantle the 'A' frame and attach the 'A' frame padding around the bottom of the uprights. You may need to lift the keel slightly to get the uprights to pack neatly alongside one another. When packed, the side wires should emerge from the top of this packing and should not be kinked.

6. Bring the wing tips completely together. Now is a good time to unhook the top rear wires: put the small sock on the kingpost and fold it forwards between the leading edges of the sail.

7. The sail should be carefully arranged alongside the glider and then rolled and tucked inside the leading edge. One side can be rolled and retained with a tie and tip sock while the other wing is being packed.

8. The battens can be stowed at the front of the glider between the leading edges with the curves over the nose section. Place the ties around the glider, holding the leading edges neatly together. Place the glider bag over the glider and then turn the glider on its back.

9. Now check that the uprights are arranged neatly between the sail alongside the keel and that the wires are neat with no kinks or twists. When the ties have been neatly arranged, they can be moved or placed at the top and bottom of the uprights.

10. Put the speed bar in the sail with one end in a tip sock. Any remaining ties should be put around the glider. Tuck the nose cone under the tie nearest the nose of the glider.

11. Zip up the bag and store the glider in a cool, dry and dark place. Always ensure that your glider is dry before storing. If it's damp, then store with the bag open and endeavour to get the glider out to dry fully as soon as possible.

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 the reverse of rigging the glider on the keel:

1. Put the glider on the ground, keel down and tail into wind. Unclip the top surface battens: unclip the white batten end fitting by rotating it around the eyelet. Remove the batten fitting from the sail eyelet and then clip it back parallel with the batten. This prevents the tension adjustment from being lost and makes the battens easier to pack neatly. Unclip all the batten ends including the compression struts.

2. With the glider still tensioned, unzip and swing the washout batten towards the tip. Remove a couple of outer battens, say 1 or 2 per side. Roll the wing tips and put on the tip socks. (This keeps the tips covered and protects them before they are lowered when the tension is released.)

3. Release the cross-tube tension and move the wings in slightly. Attach the keel packing around the tension bolt and pass the Velcro in front of the lower rear wires. The keel remains on the ground.

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

5. Remove all remaining battens except the nose batten.

6. Release the king post, lay it down onto the sail and put the sock on.

7. Bring the wings closer together, pulling the sail between the leading edge and keel so that it is all above the leading edge. Roll the sail carefully and tuck inside the leading edge. One side can be rolled and retained with a tie and tip sock while rolling the other.

8. If you intend to remove the nose batten, do so now. Put all the battens into their batten bag.

9. 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. Remove the ties holding the sail in place, and put them around the whole glider in the normal way.

10. Place the glider bag over the glider, turn the glider on its back and lay it on the ground.

11. Dismantle the 'A' frame. Attach the 'A' frame padding around the bottom of the uprights. When packed, the side wires should emerge smoothly from the top of the packing.

12. 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 nearest the nose of the glider.

13. Zip up the bag and store the glider dry in a cool, dry, dark place. Always ensure your glider is dry before storing.

TUNING INSTRUCTIONS

Trim speed (Pitch trim)

Adjusting trim speed is one of the most important basic adjustments to get right on any hang glider. Experienced pilots often overlook it. Always make sure that you get the trim speed right before any other changes are contemplated. Also having made any other changes always fly and re-adjust the trim speed, if necessary, before evaluating and making further changes.

What is trim speed?

The trim speed (or pitch trim) is the speed at which the glider flies with no pitch input from the pilot. It is not necessary to let go of the speed bar to establish trim. In fact a more realistic trim occurs when you're holding the speed bar gently with no forward or aft input. (This might be slightly faster than handsoff due to the weight of hands and arms on the speed bar.)

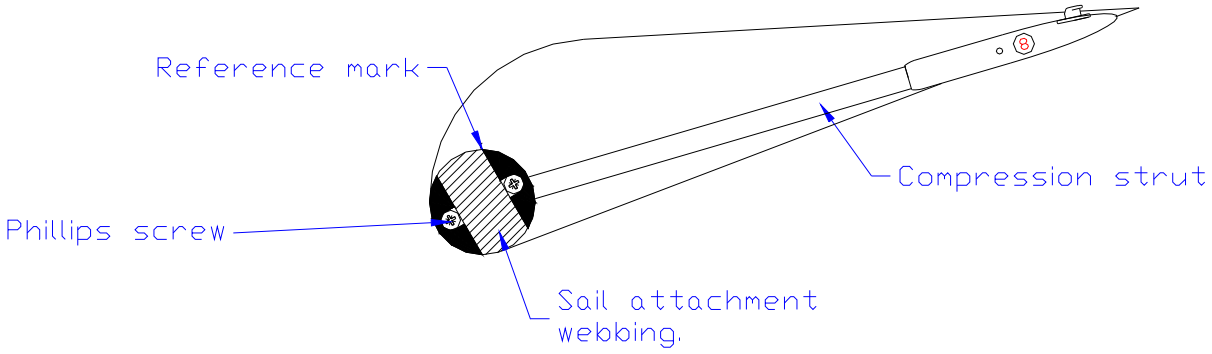
The glider should be trimmed (in pitch) to fly comfortably with no nodding tendency (too slow). It should turn comfortably in either direction. If you have an ASI (Air Speed Indicator) it will probably show low 20s mph or mid 30s kmh when trimmed correctly. Different payloads will alter the trim speed. (Different ASIs may give different readings with the same payload as well.)

The trim speed is adjustable by moving the hang loop forwards or backwards along the keel. Forward movement will increase the trim speed of the glider (make it fly faster), whilst rearward movement will lower the trim speed. Only move the hang loops in small increments. (**5 mm maximum** between flights). You should not need to move the hang loop very far from the suggested starting position for comfortable flying. (Certainly not beyond the limits stated in Operating limits (Page 6). If in doubt contact Avian.)

Turns

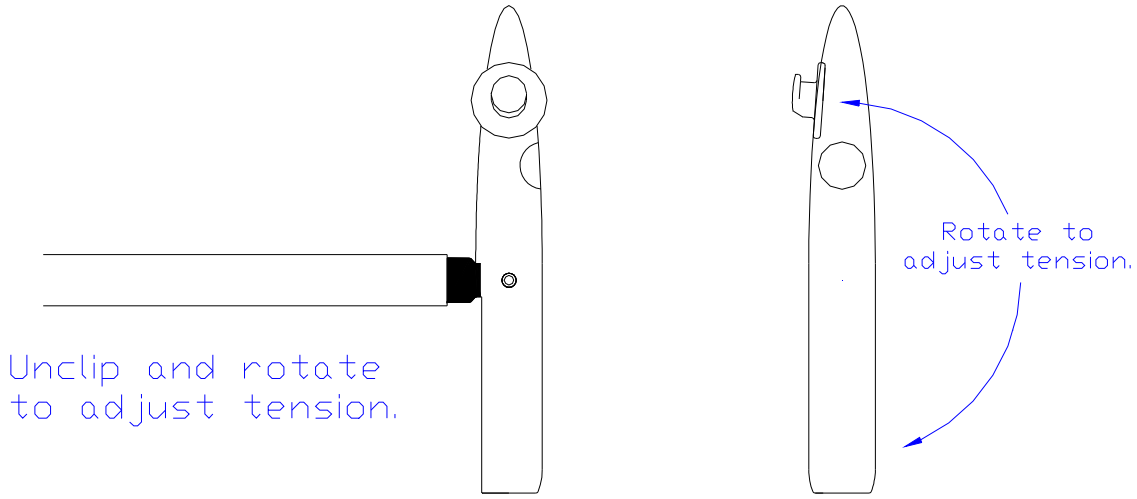
It's unusual for a Fly to suffer from a turn. If your glider previously flew straight, then the most likely explanation for a turn is that you have mis-rigged or damaged your glider. If a turn is detected, check the

glider immediately after landing. Check that it was rigged correctly. Next, 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 tension is the same on both sides of the glider. Check that the webbing is correctly seated in the tip caps and that the caps are tight and will not rotate by hand twisting. If they do rotate, re-set correctly and tighten the screws to lock the caps in position. If there is still a turn, then check that the leading edges are straight and undamaged.



A slight turn may be tuned out by adjusting the tip cap. Before any adjustment is made, locate the reference mark on the outer leading edge and note its position relative to the black plastic end-cap. If there is no reference mark on the leading edge, then ensure that you mark the starting position of the end-cap before any alterations are made.
To make an adjustment, loosen the 2 self-tapping screws no more than 3 turns and then rotate the black plastic cap slightly. It is possible that the screws may stand 'proud' of the end-cap when they have been unscrewed and you will need to exert sufficient pressure to push them inwards and loosen the cap (A tap on the end of the screwdriver is normally enough.) You should then be able to rotate the end cap and adjust the washout. 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).
ONLY ALTER THE WASHOUT AT THE TIP IN SMALL INCREMENTS. (MAXIMUM 5mm at a time.) Making a large adjustment all in one go may give unexpected results, so take it slow to make sure that things are improving each time. The total movement should **NOT** exceed 15mm each side of the factory setting. **REMEMBER TO TIGHTEN THE SELF-TAPPING SCREWS AFTER ADJUSTMENT** to lock the cap in the new position.

Batten Tensions



The Fly battens are the same as those used in the high performance Cheetah and Evo competition gliders from Avian. The snap fitting allows neat robust fitting, easy rigging and easy precise adjustment of batten tension. The batten tension does make a difference to how the glider flies and is therefore important. The tension can be adjusted by rotating the clip end when open. One turn alters the tension by 1mm.

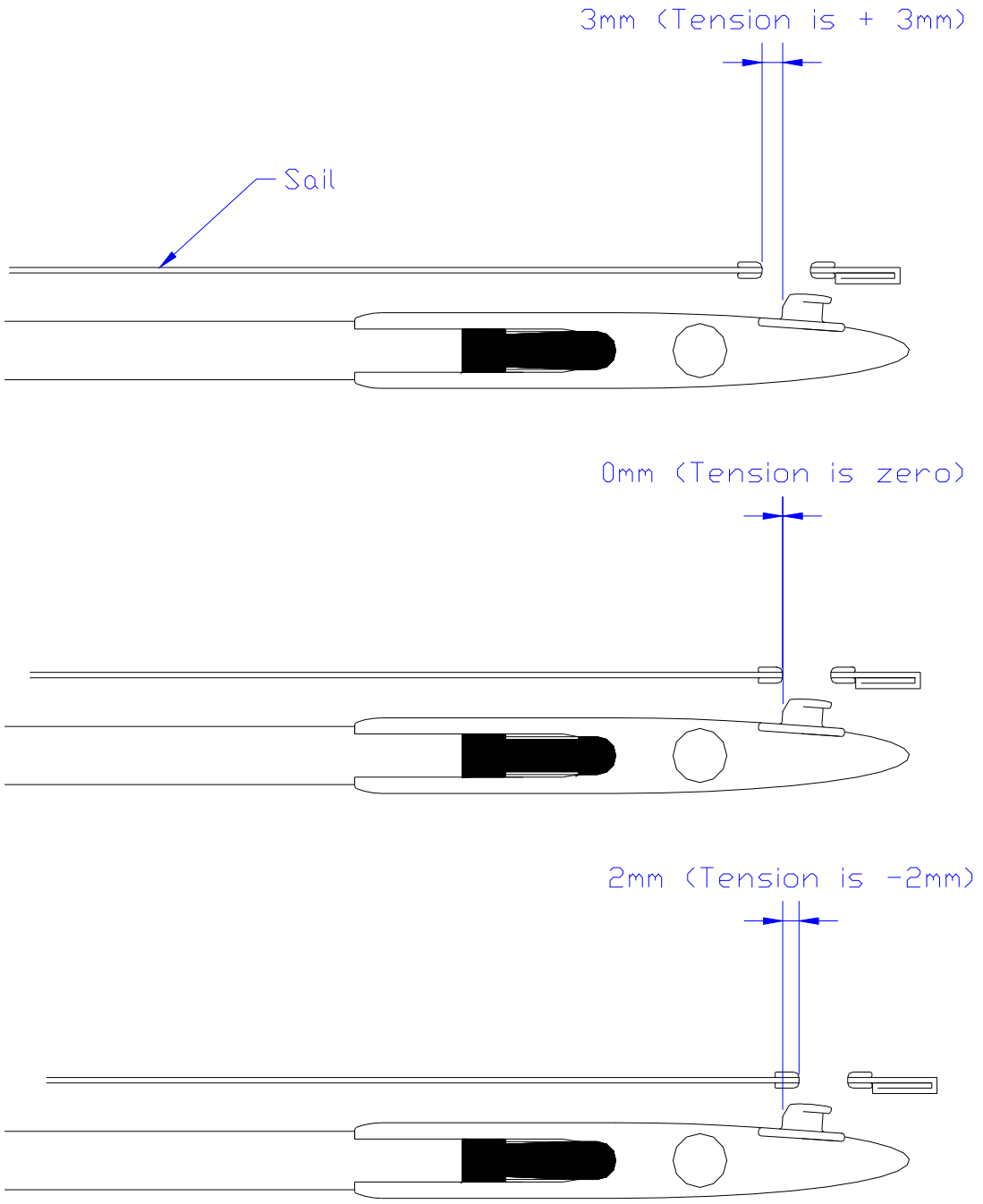
Checking Batten Tension

Batten tension should be checked with the glider fully rigged in nil-wind conditions. **The batten tensions are checked with the glider tensioned but the VG fully off.** All battens should be clipped into their eyelets.

The batten tension is measured and adjusted by noting the gap, in millimetres, between the front of the mounting lug on the batten end and the front edge of the sail eyelet.

To check the batten tension of Batten 1 for example, unclip the batten from the sail and then clip it shut below the sail. Hold the batten end in one hand and pull the trailing edge of the sail taught with the other. Look down through the eyelet and note the gap between the front of the eyelet and the front of the lug. A diagram and a table of our factory settings are shown below.

Note that when adjusting the tension, rotating the batten end (screwing it in or out) will adjust the tension by **1mm for every rotation.**



Recommended factory set-up:

The battens are numbered from the root outboard. The batten closest to the keel is number 1.

Batten number 1 should be relatively tight.
Moving outboard battens 2 to 6 should be light tension. Too much tension makes the glider harder to turn.
Batten 7, the washout batten, should be far tighter. This batten loosens in flight as the sail lifts, so it needs to be quite tight on the ground. The compression strut should be tight, like number 1 batten. Again, too much tension makes the glider harder to turn.

Recommended Batten Tension Starting Set Up								
Batten Number	1	2	3	4	5	6	WO (7)	8 Comp
Factory Tension (mm)	3	0	0	0	0	0	5	3

Note: The battens are numbered from 1 at the keel to 7 near the tip. The outermost batten or compression strut is number 8.

Some boxes have been left blank in the above table – so you can record alternative tuning that you might prefer.

Washout Batten tension at the tips

The washout batten tension at the tips can be altered symmetrically. The tension on this batten appears to be far greater than the other battens when the glider is on the ground. (In flight, the sail lifts at the tip and the tension is reduced.) Only small changes are needed, and large changes are counterproductive. If you reduce the tension too much, then the sail will flutter in flight.

Asymmetrical tuning will also have an effect on turning.

You may also notice that there is another adjustment facility at the front of the washout batten where it meets the leading edge. This is to adjust the minimum washout height, which is set at the factory to ensure the glider's stability. DO NOT ADJUST THE WASHOUT SETTING. Changing the minimum washout setting may make the glider dangerously unstable in pitch.
This settingshould only be adjusted by qualified staff.

It is worth noting that adjusting the min. washout height will not provide any benefit to the glider's handling or performance. In normal flight, the washout battens sit loosely inside the sail, and are used only to provide stability in dangerous turbulence or other negatively loaded situations. Thus, some pilots who lower their washout setting may feel like everything is fine when they fly the glider, but are incredibly vulnerable to 'tumbling' if they encounter turbulence.

BATTENS AND BATTEN PROFILE

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

Batten Material

The nose batten is made from ½-inch OD 6082 T6 aluminium alloy tubing. This is relatively soft and easier to bend than the other battens. All other battens are made from 10.6mm OD 7075 T6 aluminiumalloy tubing. 7075 is a harder stronger alloy than 6082, more difficult to bend and more brittle. However, it holds its shape much better and therefore usually requires little correction if undamaged.

How often should your battens be checked?

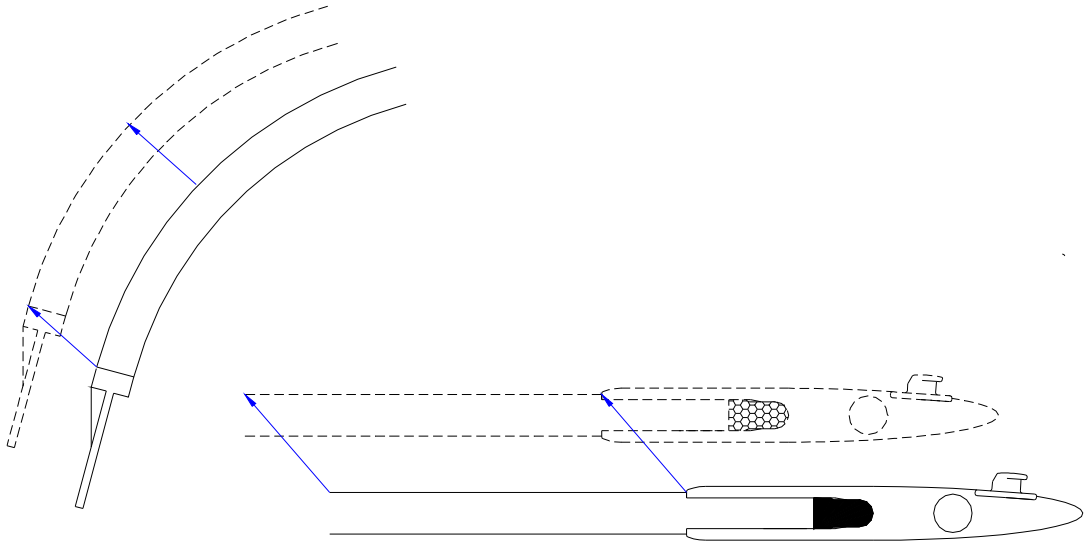
Initially check your battens regularly, this will give you some idea of how fast they are changing profile and will bring to light any damage you might be doing to your battens in storage. Battens made from 7075

aluminium alloy tend to hold their shape well. The nose batten is made from a softer alloy, 6082. It will tend to harden and hold its shape better once it has been re-profiled a few times. On the Fly, the batten most likely to require re-profiling is the nose batten.

Remember: 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.

Batten Profile

The batten profile is printed with the profile or shape of the battens. The length of the battens may not exactly match the profile due to inaccuracies in the printing process.



Move the batten over the profile as shown above

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 by laying them on the profile and viewing from above:

Place Green (Right) Number 1 batten against Number 1 on the profile. Place the front end of the batten against the profile and check that it matches the profile along its entire length. If it does not match the profile, then see where it deviates and adjust the batten accordingly in that area (see below.) Continue this process until the batten matches the profile. Repeat the procedure for Red Number 1 batten and 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.

Repeat for batten Number 2 and so on until you have checked all the battens. Remember tocheck that the compression struts are straight.

Nose batten

The nose batten profile should not be under-cambered (too flat) but can be a little over-cambered 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 aim is to get a smoothly curved batten, but it is not quite as easy as it sounds. 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 do need profiling, then practise with the softer 6082 nose batten first as it is much easier to bend.

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. (Extra care should be taken when re-profiling any battens made from the harder 7075 aluminium alloy 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, then try and remove it.

MAINTENANCE

Annual strip-down and factory inspection

Avian recommend that the Fly has a factory inspection every year or 100 flying hours - whichever is the sooner. We also recommend an inspection after any serious crash, even if there is no obvious damage. This is a sensible precaution, as some tube damage just cannot be seen with the sail on. An additional benefit of the strip-down is that the latest upgrades can be fitted, sometimes free of charge.

General

Careful attention to the rigging and de-rigging sequence will reduce the risk of accidental damage. Repairs should only be undertaken by the Avian factory or by 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**

Airframe Maintenance

Apart from damage caused by over-stressing the glider *i.e.* crashing *etc*., most of the wear & tear on your glider occurs 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 telltale hairline 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 fasteners (*i.e.* nuts, bolts *etc*.) which are bent or show 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 can crush the tubes and damage the hang 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, paying special attention to the area immediately adjacent to the swaged fitting, as this is the main failure area. Look carefully for signs of strand fracture at this position. Corrosion shows itself initially as a white powdery deposit, and very serious corrosion of wires is brown rust coloured. Corrosion cannot be cured and the only answer is replacement. Even apparently undamaged rigging wires should be replaced every 100 hours.

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. Take time to inspect this area thoroughly, particularly the cross-tube centre junction, also ensure the shackle bolt is tight. If the strop is damaged (*e.g*. fraying, abrasions, cuts or wear to the stitching) replace it 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 either at the Avian factory or at an Avian approved workshop. Small damage to panels, leading-edge covers *etc*., can be repaired with proprietary self-adhesive tape. 'Small damage' is defined 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 polyester 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. If a sail becomes dirty, some stains will never come off. With a new glider, avoid getting it dirty in the first place by careful rigging and de-rigging. 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 ultraviolet 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.) Removing stains from stitching is difficult; resist the

temptation to scrub with a stiff brush as it may do more harm than good. 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, and they need to be treated with care. As they are subject to constant stress both during flight and rigging, they may lose their shape, and it is therefore essential to check them against the template at frequent intervals and to re-profile them if necessary. (See Section: Battens and Batten profile.)

PITCH STABILITY

What is pitch stability?

Pitch stability is the tendency for the glider to maintain a steady angle of attack if disturbed. It is unusual to fly in perfectly smooth air. In fact, glider pilots often seek out rough air in the form of thermal lift. When the glider flies through rough air or turbulence, the glider will try and return to normal flight if the pilot keeps the same position. Of course, often the pilot might help and pull in if the turbulence lifts the nose of the glider. (Pulling in turbulence is a good idea as an aircraft is more stable with its centre of gravity moved forwards.)

Pitch stability is very important for most aircraft as it makes them easier to fly. Pitch stability is especially important for hang gliders as the aircraft is controlled via weight shift. If the glider encounters turbulence that makes the pilot weightless, then the pilot is temporarily unable to influence the glider. In these situations, the pitch stability of the glider is vital as the aircraft essentially flies itself for a moment. If there is not sufficient pitch stability, then the glider mayt not recover, with the possible result of a tumble.

Violent turbulence is quite rare, as hang gliders are not generally flown in very bad weather.

What gives pitch stability?

The Fly has two main pitch stability devices:

- The anti'luff lines (Reflex)
- The washout battens (Washout)

The 'luff lines work by holding up the rear of the sail in weightless situations or when the angle of attack is said to be very low or negative. This gives the part of the sail to which the 'luff lines are attached a curved up rear or 'reflexed' section. Reflexed sections are stable and tend to bring the nose of the glider up. 'luff lines work very well especially at high speeds.

The 'washout battens' or washout limiting rods (sometimes called sprogs) set the lower limit of the washout of the hang glider. Washout is the twist up of the trailing edge of the wing at the tip. Washout happens in normal flight of a flexwing hang glider even without washout rods. What the washout rod does is to set the lower limit for washout. If the glider is subjected to turbulence that tries to twist the trailing edge of the wing tips down, then the washout rod resists downwards twisting beyond a certain limit.

Washout when combined with the sweep of the hang glider causes the wing tip to act in a very similar manner to the tailplane of a conventional aircraft. That is, if the nose is too high and the centre section of the wing is stalled, then the wing tips continue to fly due to their lower angle of attack. This will end up with the nose dropping and normal flight resumed. A similar but opposite effect happens at low (for centre section) or negative (for the tip) angles of attack. This time, the resultant moment is nose up.

Washout rods work especially well at low speeds.

The combination of these two pitch stability devices makes the Fly perform very well in pitch stability.

Checking pitch stability set-up.

It can be seen that the pitch stability of a hang glider is very important. What makes it perhaps more important to keep it set correctly is the fact that in normal flight it is often impossible to tell if the pitch stability of the glider is set correctly. In fact, quite a few competition pilots have sadly died due to changing their gliders. They reduced or eliminated the pitch stability of their gliders in the belief that they would gain a small performance advantage. In normal flight their glider probably felt similar and flew in a similar manner. It was only when they encountered a bit of turbulence that tipped the glider too far that the lack of pitch stability became apparent - with violent consequences.

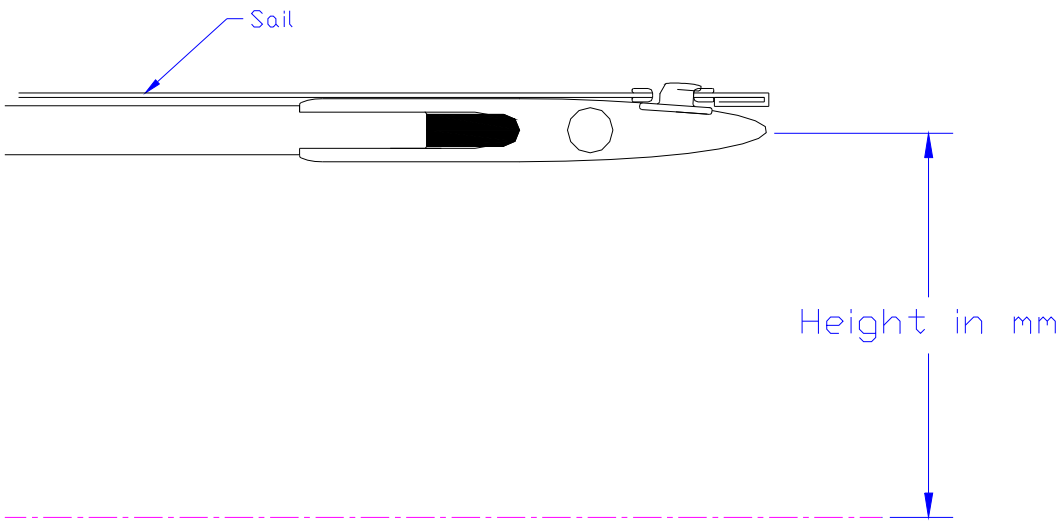
The problem for these pilots is that (with a competition glider) changing these settings can initially give a small performance advantage but can massively reduce safety. Pilots can't detect the increased danger until it's too late.

On the Fly there is no performance advantage that can be gained through changing pitch stability settings, so make sure they are within the specified limits and don't move outside those limits.

Clearly if any components related to washout are replaced, (for example an outer leading edge) it is vital to set up the washout to factory settings before flight. In addition, as a hang glider is used, most wear results in a reduction in pitch stability settings. It is for this reason that checking the pitch stability settings is a good idea every 100 hours of flight. (See annual inspection below.)

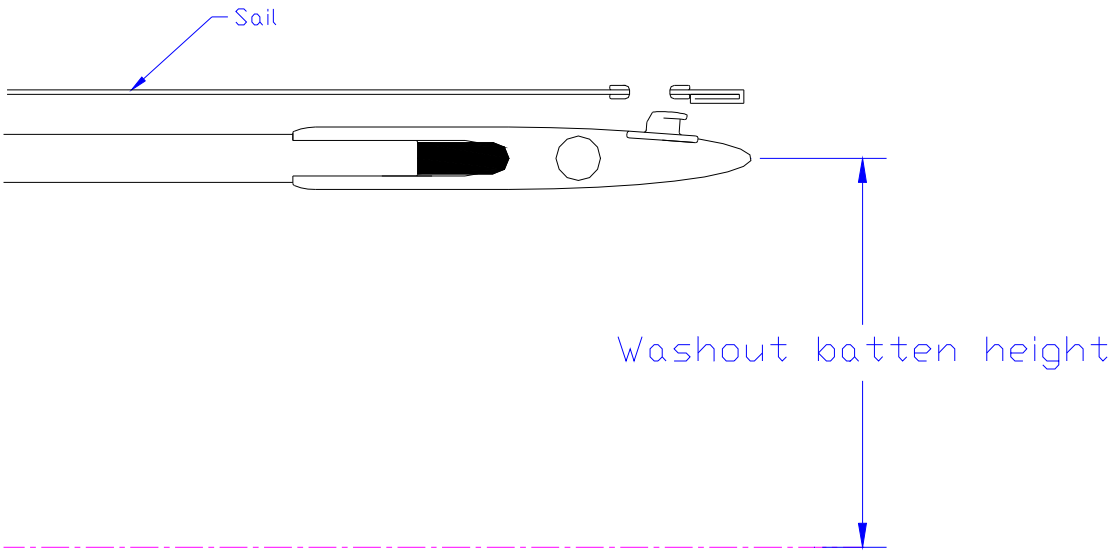
How to check.

The easiest and quickest way to check both pitch stability systems is to rig the glider inside on a flat surface. The battens should be checked against the profile before rigging the glider. Lay the glider flat on the floor with speed bar attached but nothing else under the keel or leading edges. Use a ruler to measure the heights above the ground to the centre of the batten ends.

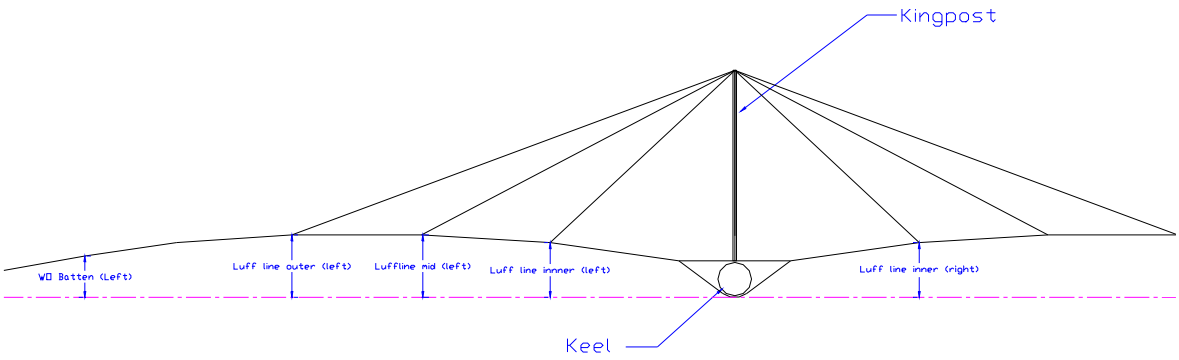


How to measure washout batten heights.

The washout battens must be measured in a special way. Prior to measuring, the batten end must be unclipped from the sail but left below the eyelet. This is important as the tension in the sail causes the washout battens to appear higher than they do when supported by their support wires alone. It is the height with the support wires tight that is to be measured.



By walking behind the glider, all the measurements can be recorded and written down (make sure the keel is central):



	Left hand wing.				Right Hand Wing			
	WO Batten (mm)	'Luff Outer (mm)	'Luff Middle (mm)	'Luff Inner (mm)	'Luff Inner (mm)	'Luff Middle (mm)	'Luff Outer (mm)	WO Batten (mm)
Max	270	300	290	230	230	290	300	270
Nominal	**265**	**290**	**280**	**220**	**220**	**280**	**290**	**265**
Min (BHPA)	250	280	270	210	210	270	280	290

As well as being simple, the above method has the advantage of enabling the symmetry of the glider to be checked. This is especially useful with the washout rods. It is possible to set different heights on each side. They should of course be set symmetrically. (Note the 'luff line heights may appear slightly asymmetric, if the kingpost is not perfectly vertical.)

The Tight Line Method

If you do not have access to a flat floor large enough to rig your glider, an alternative method is presented here which will require a light line such as fishing line or sewing thread that can be stretched tight. In our opinion it is not as good as the flat floor method - for several reasons:

- It shows the mean value between sides and thus does not show any asymmetry in the set-up.
- It does not give such good reproducibiity and relies on similar line types and tensions.
- It may require two or more people to do the job well.
- It is more time-consuming.

First you must rig your glider in a windless area, standing it on its A-frame with the keel held level to the horizon (the nose tied down). The VG should be off.

We will measure the height of the trailing edge of the sail, specifically at the batten eyelets corresponding to the ‘luff line attachment points and washout battens, above the glider’s keel.

To measure the inner ‘luff line height, take a thin, strong thread (fishing line is ideal) and - with the batten unclipped from the eyelet on one side - put the end of the string down through the eyelet of Number 2 batten and tie the string around the batten end. Then put the batten back in the eyelet and close it. You should now have a string securely tied to the batten, running out of the top of the batten eyelet.

On Number 2 batten on the other side, put a loop of the string down through the batten eyelet and around underneath the batten end. Then put the batten end back in the eyelet and close it. You should now have a free length of string that goes down into the batten eyelet, around underneath the batten, then up out of the eyelet and across to the matching eyelet on the opposite side where the string is tied off. Using the free end, you should be able to pull the string tight, so that it does not sag down in the middle between the two batten eyelets.

With the string stretched tight between the two batten eyelets, use a ruler to measure the height of the string above the keel. Be sure to measure with the ruler perpendicular to the keel, not slanted, so that you record the shortest possible length.

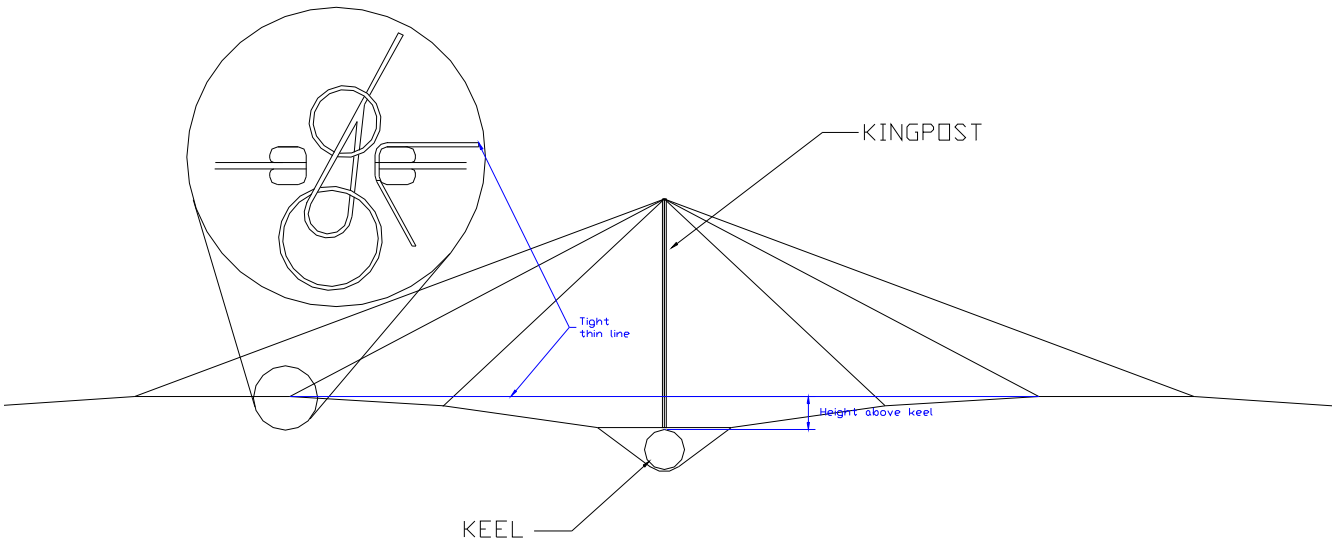
Repeat this measurement at all the battens that are supported by ‘luff lines (batten Numbers 2 and 3).

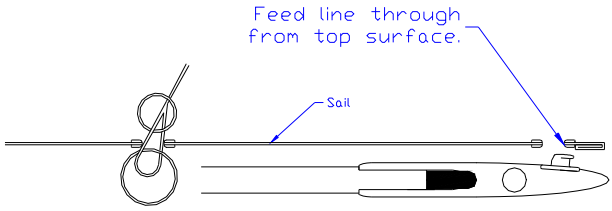
The washout rods are more difficult to measure. For accuracy of measurement, the washout battens cannot be clipped into the sail, as the sail tension will lift the rod and give a false reading. On the other hand, though, we cannot tie the string directly to the ends of the washout battens, as pulling the string tight will just draw the washout battens in towards the keel. So, the washout battens must be restrained.

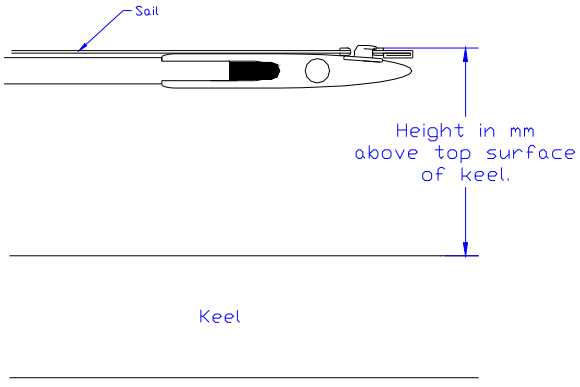
To do this, measure in a similar way to the ‘luff lines. Put the string down through the sail eyelet at the washout batten, and tie it around the batten end but **leave the batten end unclipped**. Then look down inside the leading-edge pocket from the wingtip to make sure that the batten is being supported by its wires (wires are not slack). Repeat the process on the other side, making sure that you tie the string securely but also with a good tension in the line to keep it as level as possible, and take the measurement.

Measuring the height of the washout batten using this method is very difficult and the results can vary a lot depending on how you set up the string. It can be helpful to rely on an assistant to aid holding the string tight at one end, but if the assistant pulls the string slightly up or down it can cause a large change in the reading.

If you are at all unsure about your pitch stability settings, then please contact us and we can check your glider properly at the factory.







Suitable heights for the battens are presented in this table:

Mean height of supported battens above keel (Tight Line Method)				
	‘Luff line Inner (mm)	‘Luff line Middle(mm)	‘Luff line Outer (mm)	Washout Batten (mm)
Max	190	255	260	100
Nominal	**180**	**245**	**250**	**95**
Minimum (BHPA Specification)	170	235	240	80

REPAIR

The Fly airframe is deceptively simple, but - like all aircraft - requires skilled and qualified attention. We do not recommend self repair or re-assembly by anyone other than Avian or Avian nominated repair agents. No replacement parts should be fitted unless they are factory supplied and identified as such. When ordering spares, always quote your glider serial number (make a note of it if you have to replace your keel. It should be recorded on the front of this Manual). Bent aluminium tubes must never be straightened, always replaced. Frayed cables and cables with damaged or twisted thimbles must always be replaced. If you feel you ***must*** take your glider to pieces, then take many detail photographs prior to disassembly, and order new nyloc nuts and locking compound for reassembly.

To help you identify components, some of the main assemblies are shown in the Appendix of this Manual.

RECOMMENDED COMPONENT LIFE

The safe working life of the structural components of the Fly 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 on the continued use of most components, particularly the sail. UV exposure shortens the life of the sail, so it should not be left needlessly exposed to sunlight or to any other source of UV radiation. Certain components - due to the nature of their material, construction & position within the structure - have a critical fatigue life; and it is mandatory that these components be replaced within the times stated below.

Cross-tubes	1000 hours
Leading Edges	1000 hours
Control frame / fittings	1000 hours
Keel	1000 hours
Tension strop	500 hours
Rigging wires	100 hours
Factory inspection	100 hours or 1 year (see Maintenance)

TRANSPORTATION BY CAR

The wing must always be transported inside its bag, well packed and with all the protective padding in place. The zip on the bag can be placed underneath to reduce 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 any relative movement between glider and supports must be avoided at all times. (If travelling abroad, take note of the legal requirements for both glider overhang and coloured flags *etc*.)

SHORT PACKING

It is sometimes useful to short pack your glider especially for transportation by air. It is unusual to be able to take the glider full length on an aeroplane, and it's always best to short pack it.

Tools:

You should require no tools to short pack a Fly. However, depending upon the leading edge tension and your experience, you might require a large Phillips screwdriver.

The Fly leading edge has been specially designed in two main sections, the inner (nose to outboard of the cross-tube/leading edge junction) and the outer (tip section of the leading edge). These sections can be separated for short packing - useful for transport overseas or storage.

Removal of outer leading edge

The outer leading edge section slides inside the inner leading edge and locates on a clevis pin, which stops it rotating. The outer section can be removed without removing the clevis pin. Do not remove this 'locator' clevis pin. (The outers **MUST** be replaced in the correct sides of the glider. See: **Assembly Drawings** at the back of this book.)

If you have a Fly 17 with a detachable keel and want to reduce the packed length to the absolute minimum, then you may reduce the length of the inner leading edge by removing the clevis pins on the leading-edge tubes near the nose. With these removed it is possible to telescope the inner leading edges (we recommend that you **do not** undertake this procedure unless you need to short pack less than 12'. Re-assembly is more difficult.)

To remove the outer section of leading edge:

1. Unzip the glider bag and remove the sail ties. Sit down at the wing tips and (holding the leading edge inside the sail with one hand) pull the webbing loop at the end of the leading edge. The sail can be disconnected from the wing tips by pulling and slipping off the webbing straps from around the end caps. (Do **not** loosen the screws in the tip caps.) This procedure requires no tools but is quite difficult to do, especially for the first time on a new glider. New gliders have tight sail tension along the leading edge. Once you have mastered the technique it becomes far easier.
   If you are unable to pull enough tension to release the webbing, then the job can be made easier by releasing the leading edge tension at the nose by unscrewing the cross-headed, self-tapping screws at the **NOSE**. This reduces all the tension in the leading edge such that the webbing now falls off. Once the webbing is removed, put the nose screws back in their holes through the sail, taking care not to cross the threads.

2. **Before moving the outer leading edges, mark them 'left' and 'right' with a felt pen.** The leading-edge outer can now be pulled out of the sail carefully. The washout battens will need to be carefully rotated to pass through the zip hole in the sail as the outers are removed.

3. Remove the leading edges and place a padded bag over the end of the inner leading edge to prevent it damaging the sail.

4. Place a cylindrical object (cardboard roll 4" diameter, roll of bubble wrap or plastic bottle *etc*.) alongside the sail and bend the tips round. (Take care not to crease the Mylar or damage the sail on the end of the inner leading edge or by bending it round too sharply.)

5. Wrap and pack the leading-edge outers so that they will not damage your sail or each other.

Re-assembly of glider

This is basically the reverse of removal of the leading edges:

1. Open the sail out and remove padding from the end of the inner leading edge.

2. 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 washout rod support should be sticking upwards and the washout batten should be towards the trailing edge. (See: **Assembly Drawings** at the back of this book.)

3. Rotate the washout batten towards the inner end of the outer leading edge and **s**lide the outer into the sail from the tip. Thread the washout batten through the zip hole in the sail and rotate it towards the trailing edge and then towards the wing tip as you feed the leading edge into the sail. The outer leading edge should be inserted in the open end of the inner. This is easier if a small object like a bag is placed under the inner to lift it slightly off the ground. When almost home the leading edge should be twisted slightly until the slot engages with the clevis pin. Then it should be pushed fully in. You should hear a 'clonk' when you push it fully home. You should no longer be able to rotate the outer leading edge if correctly assembled.

4. Look into the sail from the tip. Check that the leading-edge outer is in the correct side and that the washout batten is correctly threaded through the zip hole.

5. Sit at the end of the leading edge and (while holding the leading edge with one hand) pull the webbing tight and slip over the end of the tube so that it locates in the slot of the end cap. This is easier if all ties are removed from the glider and if somebody lifts the leading edge of the sail so that the fabric is able to lie tight along the aluminium leading edge. Ensure that the sail webbing is correctly seated into the end-cap groove at the wing tips. If you are unable to pull the tension on, then this can be made easier by removing the screws at the nose end of the sail. However the glider will then need to be fully rigged to replace the screws.

6. Rig the glider as per this Manual. If the nose screws have been removed, **TAKE GREAT CARE TO PULL THE SAIL TOWARDS THE NOSE WHEN OPENING THE WINGS OUT. THIS IS ESSENTIAL! FAILURE TO DO SO WILL RESULT IN VERY SERIOUS SAIL DAMAGE.** Move the wings out a little, then go to the nose and pull the sail forwards. Move the wings out a little further and pull the sail forwards at the nose again. Repeat until the wings are fully opened.

7. When fully rigged, the self-tapping screws at the nose can be replaced. The holes should line up. If not, thread a thin cord through the holes, pull the sail into position, replace the screws and remove the cord.

8. In your pre-flight check, check all the fasteners especially those that have been removed; and make sure that the webbing at the tip is correctly seated in the slot in the tube cap. Make sure that the outer leading edges are inserted in the correct sides. The washout rod supports on the leading edge should stick upwards towards the top surface of the sail.

TRANSPORTATION BY AIR

Remember, your glider has to be loaded on and off the plane and get past the baggage handlers at both airports. It also has to make the return journey.

The object is to:

- Make the glider as short as possible.
- Protect the glider so that it will not get damaged in transit.
- Make the package as light as possible, with handles so it is easy for the baggage handlers to move. (If they can't lift it they'll probably use a forklift truck.)
- Minimise the damage to the sail caused by packing the glider.
- Make the whole operation simple, so that you can easily repeat the procedure for your trip home.

The type of damage you are trying to protect against:

- Damage caused by dragging one end of the glider across the floor. Protect the ends with thick cardboard or something that will not wear through too quickly.
- Damage to the glider from being dropped onto an edge such as a railing or the edge of a container truck. (If the whole package has some padding this helps prevent damage. Bubble wrap seems to help but is difficult to unpack and re-pack. You will need lots of sticky tape including some for the return journey.)
- Dirt: Airports and aeroplane-holds seem to be dirty places. Your glider bag may be nice and clean now, but it won't be after a trip on the plane, so if possible use an old glider bag or some other suitable covering.
- Finally, a cover that will give telltale signs of any damage is useful i.e. if you pack your glider in a cardboard box and somebody drives a 747 over it, then at least you'll be able to see the tyre marks on the box and look out for damage inside!

If you are lucky, you may have a purpose made box or bag. (Avian make and recommend an armoured short-pack glider bag.) This will speed up the process of short packing and also provides good protection for your glider.

STORAGE

The correct storage of your glider will greatly influence its life. The glider should always be stored:

- **well packed**
- **completely dry**
- **well supported**
- **in a dark, cool and dry place.**

Ensuring that your glider is stored dry is important. The sail is made from anti-mould treated cloth but extended storage whilst wet might nevertheless encourage mildew. Wet storage will also 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. If the glider is wet, leave the bag open and try and open out the glider to dry properly as soon as possible. It is important to keep the glider out of the sun when not in use, as exposure to UV radiation damages the sail. Always try and store your glider inside. Use the thick bag supplied and - if at all possible - store in the dark.

TROUBLE-SHOOTING

It is difficult to open the wings when rigging

When rigging the glider, especially on the uprights and without the nose batten in place, it is possible to get the kingpost caught behind the cross tubes. This is an additional reason to leave the nose batten in when de-rigging. When flat rigging, you can raise the kingpost as one of the first jobs you do – so this problem will be avoided.

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, then 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 the cord disappears into the keel when fully rigged. Also check that the strop has no twists in it and that the cord loop is on the outside of the stainless tang (*i.e.* not next to the keel) when the tension is released.

Tension strop is difficult to pull on

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

2. Are you flat rigging in a depression in the ground with the wing tips higher than the keel? Either lift the keel while pulling the tension on or move to a flatter area.

3. The side wire is caught:

a) 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.
b) The side wire is twisted at the junction with the leading edge, (the wire is 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. Check that the nut has not come loose (**DEADLY**). The wing wire nuts should always be new and for double protection locked with a thread locking compound. The nut should be tight enough for the tang to offer some resistance to movement with light thumb pressure, but it should not be very tight.)

Wings are difficult to close when de-rigging the glider

1. When de-rigging on the keel, the weight of the wings is transferred to the keel. This stops the cross-tube junction from sliding so easily on the keel when the tension is released (see above.) The easy remedy is to unzip the under surface and pull the cross-tube junction forwards. The wings can then easily be moved inwards.

2. 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. If this happens, find the obstruction and release the tension strop. Then continue to move the wings inboard.

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's handling will deteriorate significantly if the battens are out of profile. Check the battens (always remembering the nose batten) against the profile more regularly.

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

3. This can also be caused by foreign bodies in the cross-tube junction area. Check, and if present remove.

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

2. As above, this might also 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 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.

OWNERSHIP

Please notify Avian Ltd. of any change of ownership and change of address. This is important so we can let you know about upgrades or in the unlikely event, 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 handbook, hang gliders or service. 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.

SPECIFICATIONS

Glider	**Fly 17** (Imperial)	**Fly 17** (Metric)
Wing span (VG On)	33foot 1.5inch	10.1m
Wing area	180 Square feet	17 m^2
% Double Surface	30%	
Aspect ratio	6: 1	
Normal packed length	19ft 11inch	6.1m
Quick short pack length	13ft 2inch	4.0m
Extra short pack length*	12ft	3.66m
Glider weight rigged	58.3lb	26.5kg
Glider weight in bag + packing	61.6lb	28kg
Maximum Clip in Weight	280lb	110kg
Minimum Clip in Weight	203lb	92kg
Maximum Clip in Weight with Power unit	308lb	140kg
Min sink rate**	190 ft/min	1 m/s
Max. L/D ratio	10	
Speed range***	18-40 mph	29 - 64 km/h
Max. speed (VNE)	50 mph	80 kmh

* Extra short pack is an optional extra at time of purchase.

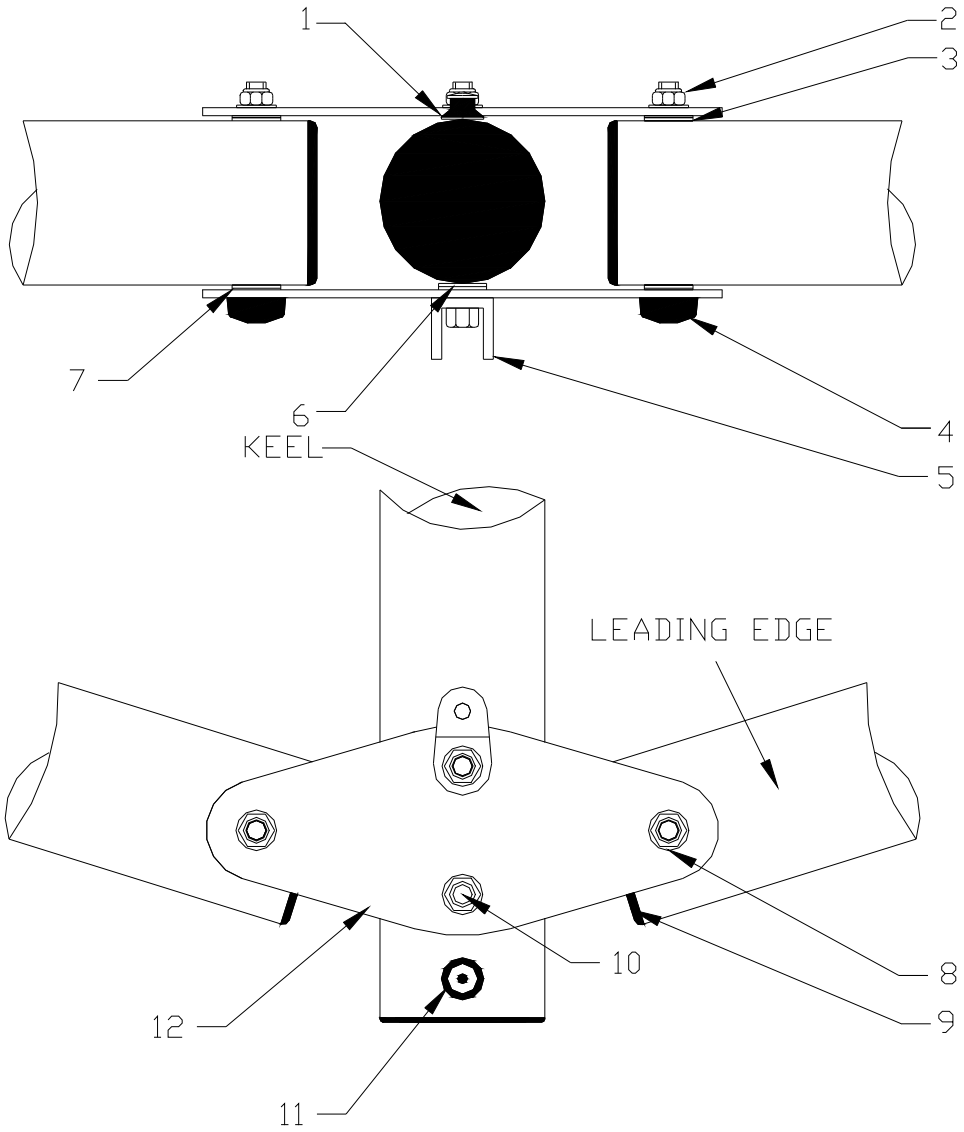
** At a wing loading of 7kg/m^2 (1.4lbs/ft^2)

*** Speeds measured using upright mounted vario-ASI system not calibrated.

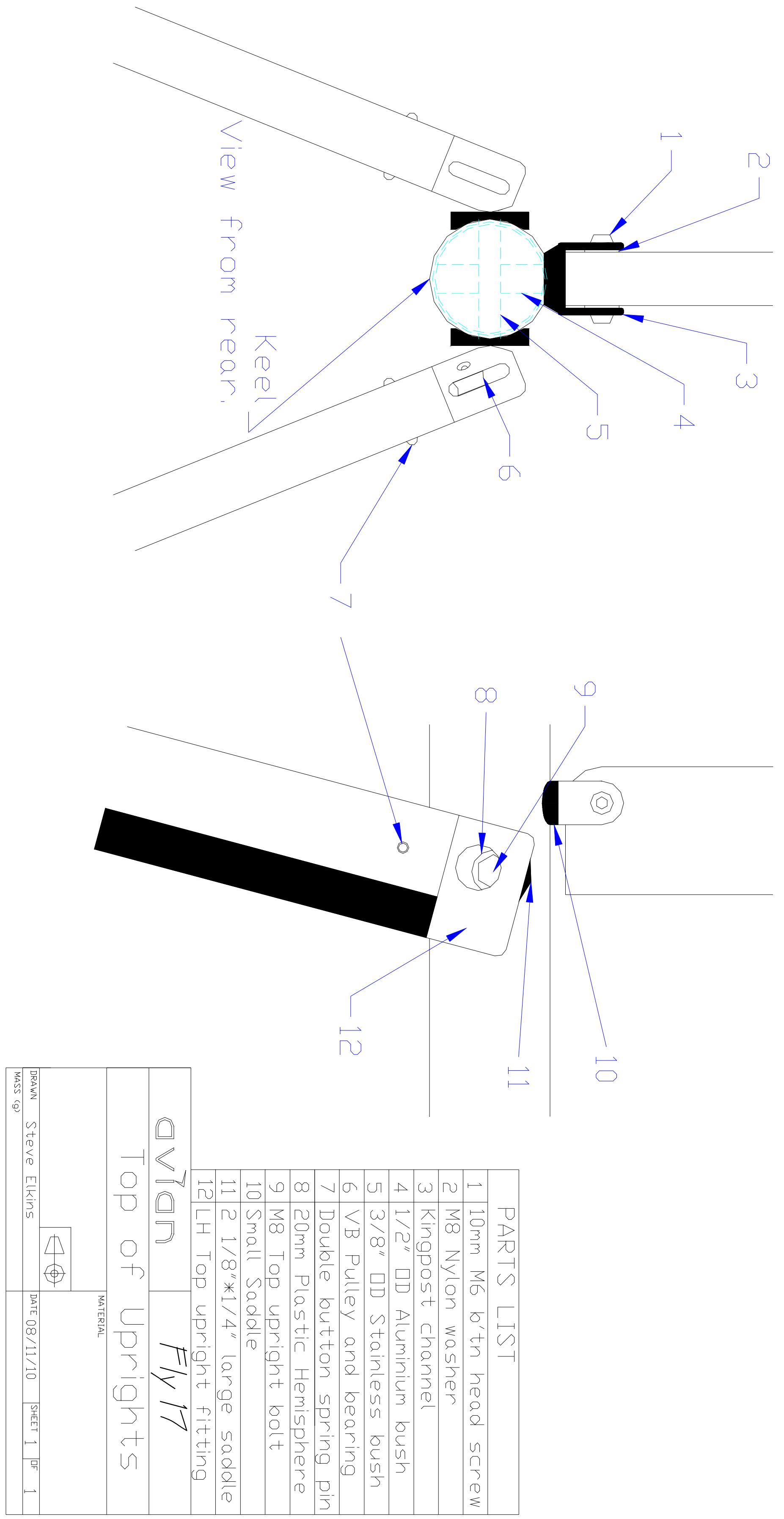
VNE: Velocity Never to Exceed.

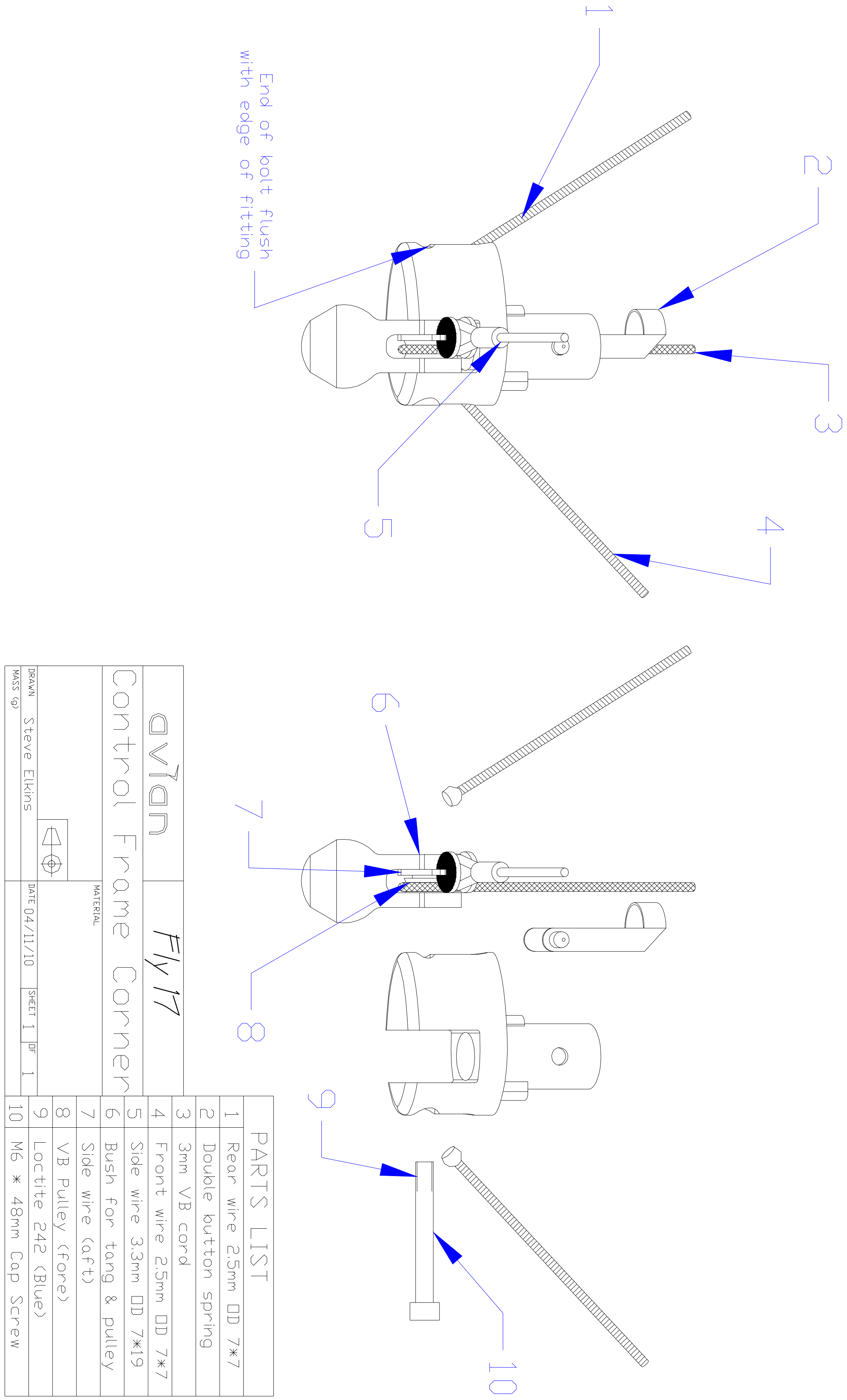
Lowest speed estimated for lightest pilot, highest speed for heaviest pilot loading.

At maximum loading glider will fly, and stall, approximately 3mph (5kph) faster than at minimum loading.

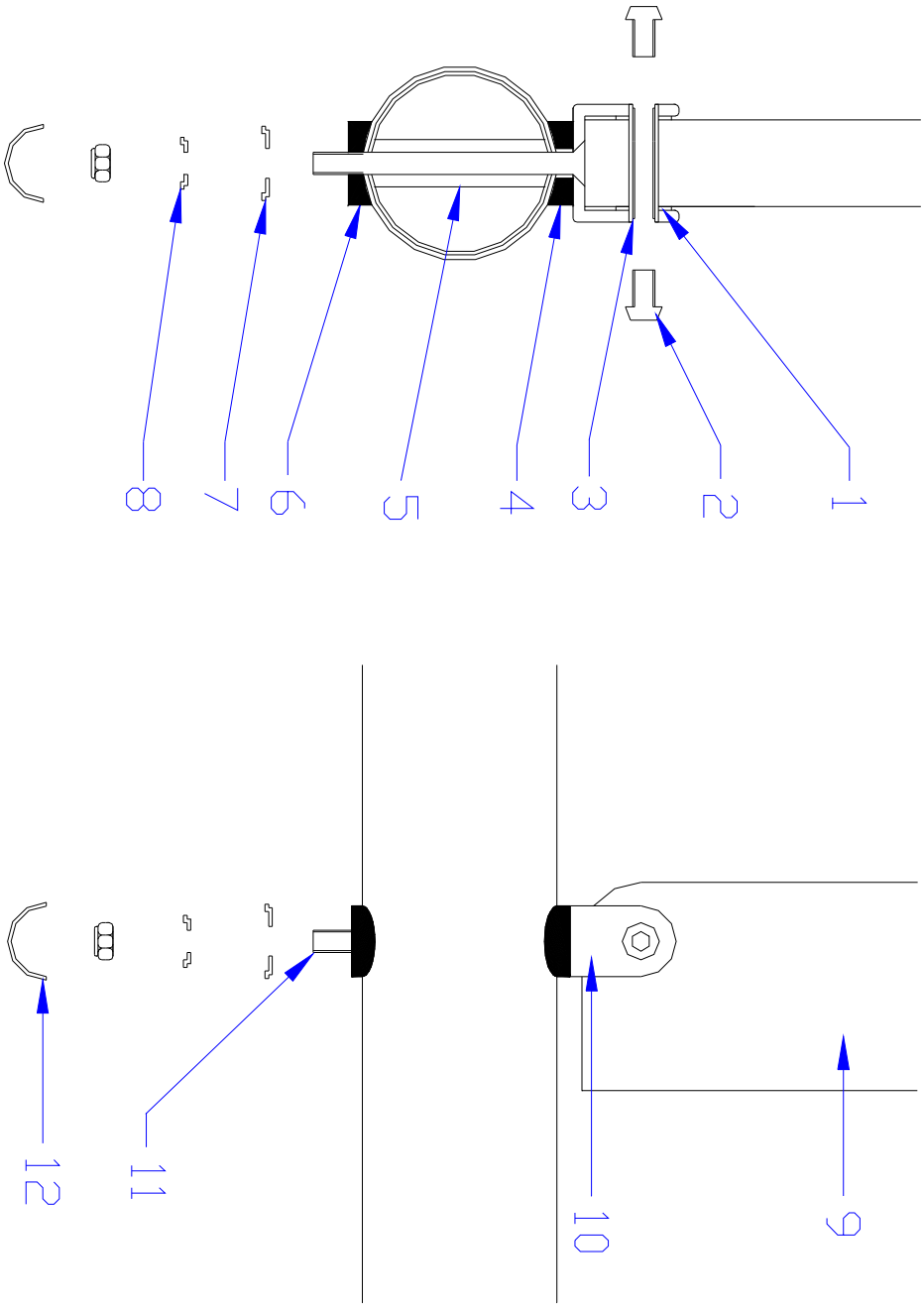


PARTS LIST		
1	Single nylon washer	6
2	M6 Nylock nut	4
3	Aluminium insert.	4
4	6mm Nut cap	2
5	Nose channel	1
6	Double nylon washer	
7	0.3mm Mylar washer	4
8	6mm Stainless washer	4
9	50mm Tube bung	3
10	6mm Diameter bolt	4
11	Batten location	1
12	Nose plate	2


View from rear.
Keel
1
2
3
4
5
6
7
8
9
10
11
12
PARTS LIST
1 10mm M6 b'tn head screw
2 M8 Nylon washer
3 Kingpost channel
4 1/2" OD Aluminium bush
5 3/8" OD Stainless bush
6 VB Pulley and bearing
7 Double button spring pin
8 20mm Plastic Hemisphere
9 M8 Top upright bolt
10 Small Saddle
11 2 1/8"*1/4" large saddle
12 LH Top upright fitting
avian
Fly 17
Top of Uprights
MATERIAL
DRAWN Steve Elkins
DATE 08/11/10
SHEET 1 OF 1
MASS (g)



End of bolt flush with edge of fitting
1
2
3
4
5
6
7
8
9
10
avian
Fly 17
Control Frame Corner
MATERIAL
DRAWN Steve Elkins
DATE 04/11/10
SHEET 1 OF 1
MASS (g)
PARTS LIST
1 Rear wire 2.5mm OD 7*7
2 Double button spring
3 3mm VB cord
4 Front wire 2.5mm OD 7*7
5 Side wire 3.3mm OD 7*19
6 Bush for tang & pulley
7 Side wire (aft)
8 VB Pulley (fore)
9 Loctite 242 (Blue)
10 M6 * 48mm Cap Screw



PARTS LIST	
1	8mm nylon washer
2	10mm M6 screw
3	1 1/4" Barrel
4	1 1/2" M8 saddle
5	1/2" Alu Bush
6	2 1/8"*1/4"saddle
7	8mm cap washer
8	6mm cap washer
9	Kingpost
10	Kingpost channel
11	M6*60 c/s screw
12	M8 Nut cap

avian

Fly 17

Kingpost base

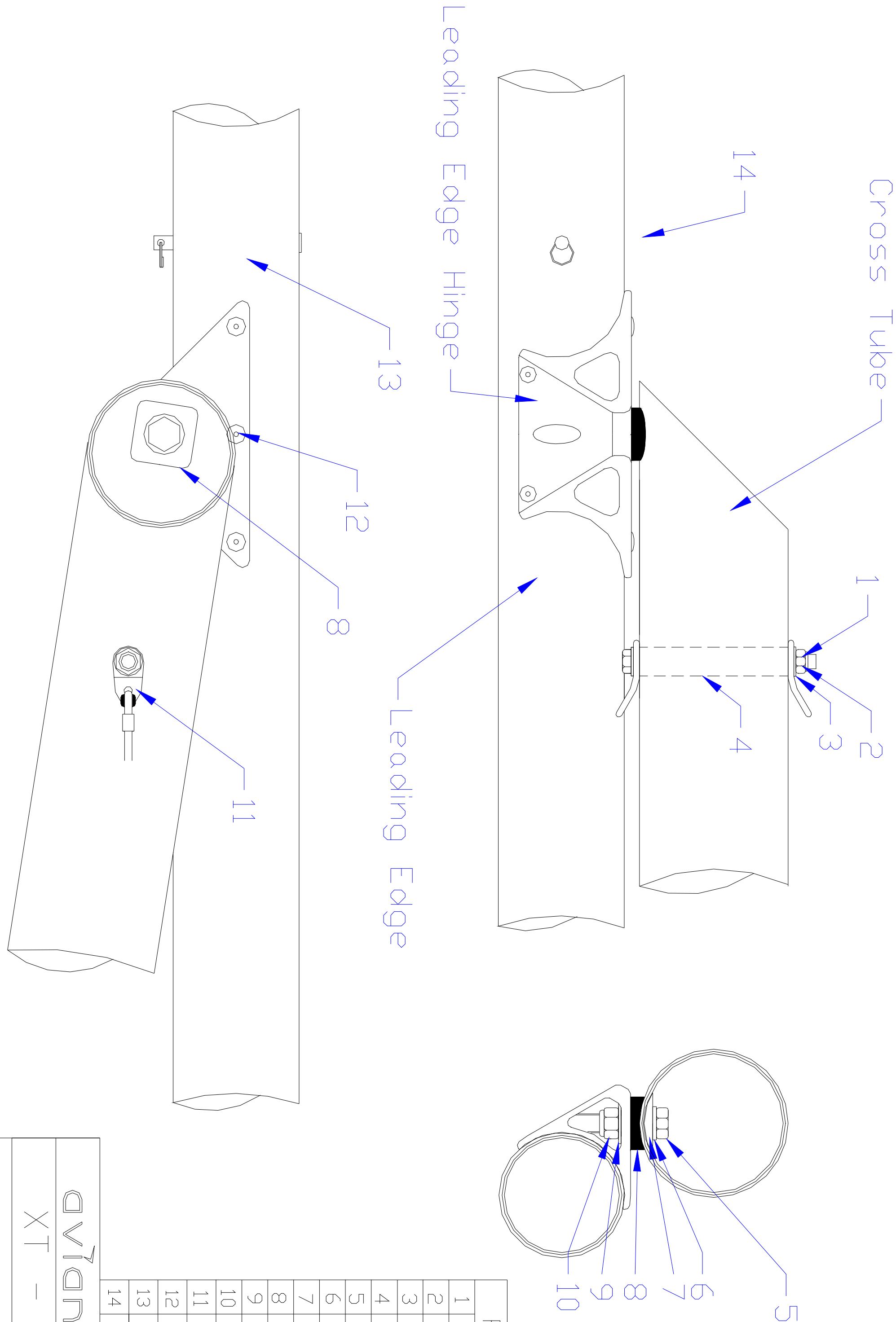
MATERIAL

DRAWN Steve Elkins

DATE 8/11/10

SHEET 1 OF 1

MASS (g)



PARTS LIST

1	M6 Nyloc nut
2	M6 Locking compound
3	6mm Stainless washer
4	Aluminium bush 1/2" OD
5	M8 * 40mm Bolt
6	8mm Nylon Washer
7	Half round section
8	Small Saddle 2 1/8" * 8mm
9	8mm Stainless washer
10	M8 Nyloc nut
11	Side wire tang
12	3/16" * 13mm Monel rivet
13	10mm Dia Split Ring
14	6mm * 55mm Clevis pin

avian

Fly17

XT - LE Junction

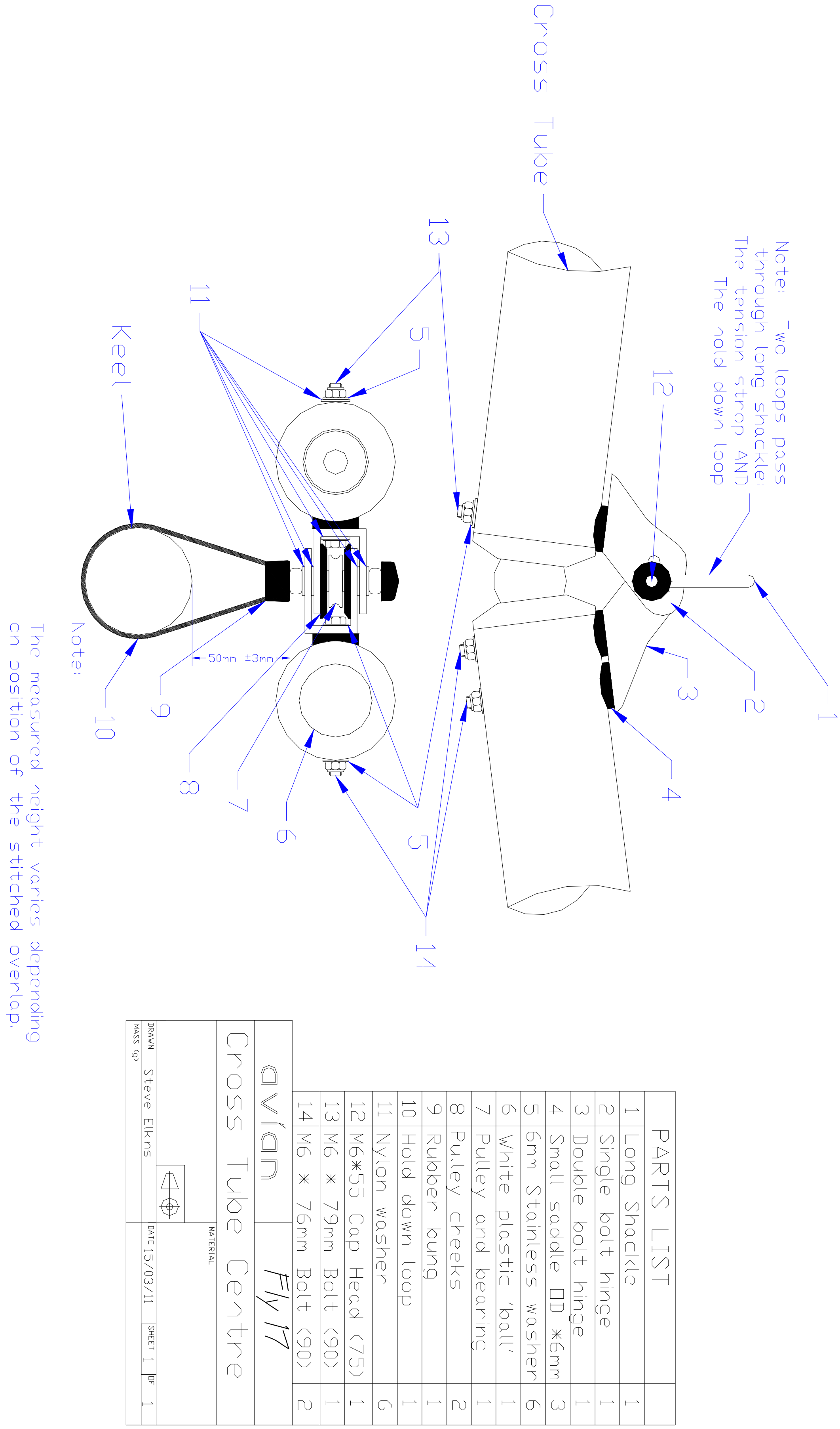
MATERIAL

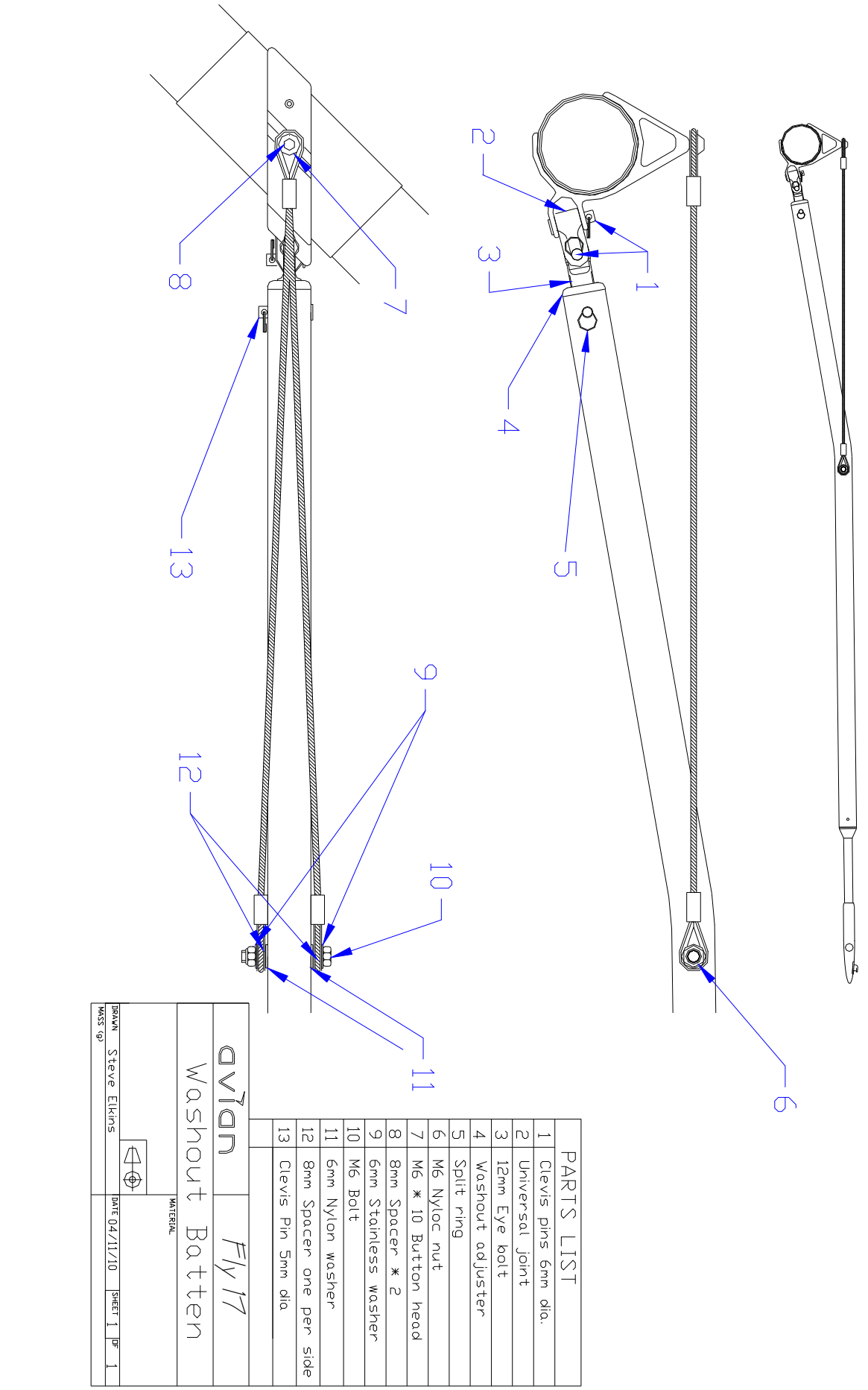
DRAWN Steve Elkins

DATE 04/11/10

SHEET 1 OF 1

MASS (g)


Cross Tube
Keel
Note: Two loops pass through long shackle: The tension strop AND The hold down loop
Note: The measured height varies depending on position of the stitched overlap.
50mm ±3mm
1
2
3
4
5
6
7
8
9
10
11
12
13
14
PARTS LIST
1 Long Shackle 1
2 Single bolt hinge 1
3 Double bolt hinge 1
4 Small saddle OD *6mm 3
5 6mm Stainless washer 6
6 White plastic 'ball' 1
7 Pulley and bearing 1
8 Pulley cheeks 2
9 Rubber bung 1
10 Hold down loop 1
11 Nylon washer 6
12 M6*55 Cap Head (75) 1
13 M6 * 79mm Bolt (90) 1
14 M6 * 76mm Bolt (90) 2
avian
Fly 17
Cross Tube Centre
MATERIAL
DRAWN Steve Elkins
MASS (g)
DATE 15/03/11
SHEET 1 OF 1



PARTS LIST	
1	Clevis pins 6mm dia.
2	Universal joint
3	12mm Eye bolt
4	Washout adjuster
5	Split ring
6	M6 Nyloc nut
7	M6 * 10 Button head
8	8mm Spacer * 2
9	6mm Stainless washer
10	M6 Bolt
11	6mm Nylon washer
12	8mm Spacer one per side
13	Clevis Pin 5mm dia.

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Washout Batten

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SHEET 1 OF 1

MASS (g)