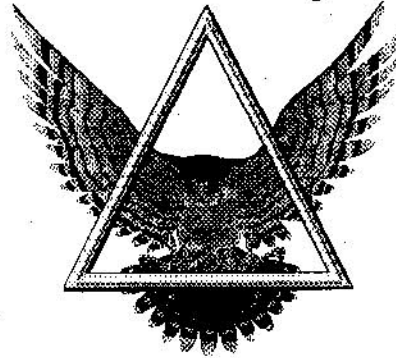


Discovery



Operators Manual

Discovery 160, 195 & 195S

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1.0 Introduction

Offpiste Limited is a new company that has been created by pilots that like flying for enjoyment and fun. The Discovery Skyfloater range of wings have been design with this in mind. The low speeds and light handling make the Discovery an ideal recreational wing for both ridge soaring and cross country flying.

1.1 General Description

The Discovery Skyfloater is a light weight hang glider that can float around the sky at very low airspeeds. It can be piloted in a prone, seated or supine flying position, all flown within the control frame, i.e., suspended above the bottom control bar. It can be flown in any standard hang gliding or paragliding harness and can be transported at a break-down length ranging from 2.4 to 3.2 mtrs.

1.2 Wing Identification

The wings serial number is engraved on the nose plate plus a BHPA approval sticker attached to the keel tube giving the flight limitations. A visual check of the wing will confirm size and specification, i.e.; Discovery 160 only has 3 luff lines. Discovery 195 has 4 luff lines. Discovery 195 S has 4 luff lines and 2 inch leading edges, it should be noted that the 195 S should not be flown with a pilot clip in weight of less than 13.5st - 85kg. A red ribbon should normally be attached to the wickard hook of the cross boom tension cable stating maximum and minimum clip in weights.

1.3 Sail

The sail cloth is top quality Polypreg, renowned for its strength and durability with an aerofoil section that has been achieved through cord-wise cutting methods. The fully cambered sail is supported by three preformed and three composite battens per side plus one preform nose batten and one centre section under surface composite batten. All webbing's and material fastenings are of proven quality.

1.4 Airframe

Built with anodised 60% 2-T6 aluminium drawn tube (the industry standard) and braced with plastic coated 2.5mm galvanised rigging wires. Fittings are made from hard wearing and long lasting stainless steel. All aluminium channels and plates are secured with HT bolts and Nyloc nuts.

2.0 Wing Specifications

	160	195
Wing span	9.14mtr/30ft	10.36m/34ft
Sail Area	14.8mtr/160ft	18.1sqm/195ft
Aspec Ratio	5.6	5.6
Weight with bag	23kg/50lbs	25kg/55lbs
Full length packed	5.3mtr/17ft 4	85.8mtr/19ft
Length break down	2.9mtr/9ft 6	3.1mtr/10ft

2.1 Luff Line Lengths	160	195
Line one (shortest)	2080cm	1850cm
Line two	2740cm	2419cm
Line three	3494cm	3170cm
Line four		3932cm

2.2 Luff Line Check

Line one	36cm	32/33cm
Line two	48cm	41/42cm
Line three	56cm	48/50cm
Line four	* 41cm	52/54cm

These measurements should be taken by attaching a thin line/cord (6lbs breaking strain nylon fishing line would do) to each pair of luff line ends and measuring the heights of the line/cord above the keel tube. All measurements should be made with the king post positioned in the centre trim hole. * Take measurement from end of tip barters.

A 6cm long plastic tube covers the luff line to king post securing cord. The plastic tube should butt up against the king post and the luff line retainer thimble (see diagram), giving a measurement of 8cm from the king post to luff line ends.

3.0 Operating Limitations

3.1 Pilot Rating

The minimum pilot rating for flying the Discovery is F.P.C.

3.2 Manoeuvres

Aerobatics manoeuvres including whipstalls, stalled spiral descents, spins and negative Gs are prohibited.

3.3 Pitching

In flight do not pitch nose up or down more than 30 degrees from the horizontal.

3.4 Banking

Do not exceed more than 60 degrees of bank

3.5 Hang Point Loads

	160	195	195 s
Minimum pilot clip in weight	8st 8lbs/55kg	10st 5lbs/66kg	14st/85kg
Maximum pilot clip in weight	14st/89kg	16st/102kg	21st/135kg

3.6 Hang Point Range

(Measured from front end of keel)

Maximum forward position	1472/58inch	1562/61.5 inch	1562/61.5 inch
Maximum rearward position	1510/59.5inch	160cm/63 inch	160/63inch

3.7 Cross Spar Pivot Point

(Measured from front end of keel)

1030/40.5inch	1448/57inch	1448/57inch
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3.8 Airspeed

V.N.E.	50Mph/80kms	50Mph/80kms	50 Mph/80 kms
Vs Max weight	12 Mph/18kms	11 Mph/17 kms	16 Mph/25kms

4.0 Rigging the Discovery

- a. Get into the habit of doing a thorough inspection of all components on your wing each time you rig. Take every opportunity to check nuts, bolts, tubes, rigging, luff lines, sail, webbing and stitching. Try and find a quiet spot where you cannot get distracted from a systematic check as you ready your wing for flight.
- b. Lay your Discovery nose into wind on flat and even ground if possible, un-zip bag and rotate if necessary so that the wing is laying king post up.
- c. Remove padding from the bottom of the control frame and open out both wings including the control frame sides approximately 1 mtr. Take hold of the king post and locate the pin that is attached to the bottom into one of the predrilled trim holes in the keel (ref. to 7.1 trimming). Make sure the cross boom tension wires are not twisted and running neatly each side of the king post.
- d. Connect top rigging and luff lines to the top of the erected king post, ensuring both rigging and luff lines are free from links, twists and tangles.
- e. Open out both wings half at a time until fully open. Connect the wash out rods.
- f. Connect the bottom bar ensuring all bottom rigging wires are clearly routed to their wing attachment points and not tangled and twisted.

4.1 Battens

There is a total of 14 battens arranged in the following order;

- No 1 batten Performed (the longest) closest to the keel
- No 2 batten "
- No 3 batten "
- No 4 batten (longest straight composite)
- No 5 batten "
- No 6 batten "
- Nose batten
- Under surface (root) large diameter straight composite

- a. Before inserting battens always check that the Port (red) are identical in shape and size to the Starboard (green) and that they are cambered to match the batten plane supplied with the glider.
- b. Insert battens starting at the root (keel) and working out wards towards the tip (green starboard right side), straight composite battens should be inserted thin end first (note that the last inch or so requires extra force to fully insert, this is best done with the wing fully tensioned) ensure that the battens are securely and neatly fastened and that they are be fully inserted (flush with the trailing edge).
- c. Insert the nose batten into the batten pocket situated above the nose plates. Once fully inserted the batten front end should rest on the inside lower edge of the keel tube front. Do not try and fasten the nose Velcro at this point, this operation can only be done with the wing fully tensioned.
This batten can remain permanently inserted.
- d. Insert the large diameter composite under surface root batten (thin end first) into the batten pocket (entrance located just forward of the control frame apex), ensuring that it passes through the smallest hole of the white webbing that is attached to the keel.
This batten can remain permanently inserted.

4.2 Tensioning the Wing

- a. Ensure each wing have been opened out to its maximum and that the leading edges are not laying on or near any sharp rocks.
- b. Reach inside the rear of the keel pocket and pull back the cross boom tension wire. Connect the Wickard hook to the restraint wire that sits on top of the keel tube, always checking that the cross boom wires are clearly routed each side of the king post and that there are no twists and tangles
- c. Walk round to the nose and neatly fasten the nose Velcro, position yourself along side the left leading edge, using the palms of both hands position the fluffy Velcro onto the nose batten holding it in place while at the same time pulling the right hand leading edge hook Velcro (with your fingers) over and on top of the positioned fluffy Velcro. With a little practice the nose Velcro can be neatly joined together.
- d. Checking that the nose is pointing directly into wind, carefully lift the nose (keep a firm grip) ensuring that the tip battens are not snagged on the ground. Take care not to raise the nose to high in moderate or strong winds. Take hold of the lower front rigging wires and connect the Wickard hook onto the tang that is connected to the lower nose plate, check that the D shackle is securely connected to the Wickard hook and rigging wires. **Make sure that the rigging wires attached to the bottom corners of the control frame are not twisted or kinked during this operation.**

4.3 Checks

- a. Now that your Discovery is fully rigged it is ready for a pre-flight inspection. First ensure that it cannot get blown away by the wind if the nose is unattended, if in doubt get someone to firmly hold the nose rigging wires.
- b. Starting at the nose and moving around the wing make the following checks,
 - Nose wires attached correctly
 - Nose plate nuts and bolts secure
 - Nose batten inserted correctly (see 4.1c)
 - Battens correctly located along the leading edge
 - Leading edge nose Velcro neatly attached together
 - Leading edge at cross boom junction, nuts and bolts.
 - Leading edge tip webbing correctly located
 - Batten ends secure and flush with the trailing edge
 - Luff lines secure
 - Cross boom tension wire nut and bolt secure
 - Top and bottom rear rigging nut and bolt secure
 - King post and hang strap secure
 - Trim position located correctly (king post & cross boom strop)
 - Under surface root batten correctly located (see 4.1d)
 - Cross boom nuts and bolts secure
 - Control frame nuts and bolts (top and bottom) secure
 - Lower rigging wires snag free
 - Bottom bar connection pins secure with safety rings
- c. Finally check the symmetry of the wing, stand a few paces back, does it look right? Wash out rods, battens, luff lines, king post and control frame angle, rigging wires. If in any doubt now is the time to re-check. Do not do it after you have taken off, by then it is too late and could leave you in a potentially dangerous situation.

Never take off without a pre-flight check.

5.0 De-rigging

- a. Whenever possible de-rig on flat clean ground with the nose pointing into wind
- b. Disconnect the Wickard hook from the nose plate tang and carefully lower the wing. Unfasten the nose Velcro. If the wind is strong secure the nose so that the wind cannot lift the wing.
- c. Go to the rear of the wing and de-tension the cross boom by disconnecting the Wickard hook.
- d. All top surface battens can now be removed. Bring the leading edges in a meter or 2 (this will decrease wear of the batten pockets). The nose batten can be left at this stage. Neatly gather the battens and put them to one side where they cannot get stepped on.
- e. Remove the bottom bar and move the control frame sides in as far as possible taking care not to trap the hang strap spreader bar between the control frame top and keel tube. Reconnect the pins and safety rings to the steel bottom bar connections.
- f. Standing legs astride the keel, take hold of the sail cloth trailing edge half way along the wing and lift. This will allow you to swing the wings in.
- g. Unplug the top rigging from the king post and neatly stow on top of the sail. Pull the king post up so that the bottom location pin has been removed from the keel tube and lay forward onto the sail. The control frame padding can now be attached to the bottom of the control frame and the wings moved together making sure that the hang strap spreader bar hasn't been trapped between the keel and control frame sides.
- h. Lift the nose batten off the keel tube and pull out 5 or 6cm so that it runs along the outside of the keel tube end (you do not need to totally remove this batten). Stow the remainder of the battens along the top of the nose batten so that the curves are running neatly together. The straight composite battens should be stowed rearward of any curves.
- i. The sail can now be rolled up to run parallel with the keel, taking care that the luff lines and top rigging wires are neatly enclosed and not tangled and twisted. The glider ties can now be secured by attaching them evenly along the length of the wing.
- j. Lay the glider bag along side the wing and carefully roll the wing onto it so that the control frame sides are on top. Neatly arrange the padding and leading edges so that there are no unnecessary folds and twists, stow the bottom bar between the leading edges and zip up the bag.
- k. Now check the surrounding area to insure that you have not left anything lying around.
- l. Always transport your Discovery with the zip and control frame facing upwards, this will reduce wear and prevent the zip from being damaged by the roof rack.

5.1 Breakdown Method

- a. De-rig your glider in the normal way (see 5.0) to the point of securing the glider ties (Ref. 5.0 h).
- b. Depress the double button push pin to the rear of the keel pocket and remove the keel extension. Stow inside keel pocket.
- c. Take hold of the leading edge tube at the tip with one hand and pull the outer leading edge webbing with the other. This will disengage the inner tip webbing from the plastic groove on the end of the leading edge tube. Repeat on the opposite wing.

d. Slide hand inside the sail at the cross boom/leading edge junction and feel for the double button push pins on the cross boom sleeve, press in both buttons and slide the main cross boom spar forwards a few centimeters. Repeat this action on the opposite wing. You can now slide the main cross boom spars forward until they disengage with the cross boom sleeves.

e. Slide hand along the leading edge tube half a metre in front of the cross boom/leading edge junction and feel for the double button push pin. Press in both buttons and at the same time rotate the leading edge sleeve a few degrees, the outer leading edge including the sleeve can now be removed from the leading edge front tube. Withdraw the leading edge tubes approximately 30cm so that so that the sail (complete with the internal tube) can be folded over towards the nose of the glider and laid on top of the sail.

f. Stow the battens and bottom bar between the two folded leading edges so that the cambered ends are pointing and flush with the leading edge ends. The glider ties can now be positioned and secured, taking care to re-adjust any creases and twists in the sail. Now place the glider tail end first into the wide end of the glider bag and fold the remainder of the bag neatly on top of the sail. The bag can now be zipped up ready for transportation.

5.2 Quick Breakdown Method

a. De-rig your glider in the normal way (see 5.0) to the point of securing the glider ties (Ref. 5.0 h).

b. Take hold of the leading tube at the tip with one hand and pull the outer leading edge webbing with the other. This will disengage the inner tip webbing from the plastic groove on the end of the leading edge tube. Repeat on the opposite wing.

c. Slide hand along the leading edge tube just behind the cross boom/leading edge junction and feel for the double button push pin. Press in both buttons and at the same time rotate the leading edge a few degrees, the outer leading edge can now be removed from the leading edge sleeve. Withdraw the leading edge tubes approximately 30cm so that so that the sail (complete with the internal tube) can be folded over towards the nose of the glider and laid on top of the sail.

d. Stow the battens and bottom bar between the two folded leading edges so that the cambered ends are pointing and flush with the leading edge ends. The glider ties can now be positioned and secured, taking care to re-adjust any creases and twists in the sail. Now place the glider tail end first into the wide end of the glider bag and fold the remainder of the bag neatly on top of the sail. The bag can now be zipped up ready for transportation.

5.3 Breakdown Rebuild

To return your glider to its normal length reverse the above procedures. Take care to check that the rear leading edge tubes have been installed correctly. With the leading edges together check that both tip adjuster screws are facing each other and that the right leading edge is in the right side. Look for an R (right) and an L (left) sign pinned onto the inside of the tip tube.

Always make sure that double button push pins are fully engaged

6.0 Post Flight Inspection

Get into the habit of checking each component as you disassemble it, checking for wear and abnormalities. Always do a thorough inspection of your wing after heavy or awkward landings especially if any part of the wing has come into contact with the ground. Avoid leaving these checks until later, you may need a spare part

7.0 Tuning

Your Discovery requires very little tuning and only then if a noticeable difference in performance and co-ordination is felt whilst flying (normally brought about through old age, a hard life or a few hundred hours airtime resulting in a stretch or bagged out sail). The Discovery has five separate adjustment points that will make a difference to the sail tension:

- a. Bungee elastic securing leading edge cloth to nose plates.
- b. Plastic tip insert moved outwards to the next predrilled hole.
- c. Leading edge tip tube extended outwards using predrilled holes.
- d. Under surface bungee elastics.
- e. Cross boom tension stop shortened (contact Offpiste first).

In any event, only make one small adjustment at a time

7.1 Trimming

Be sure to fix your trim position correctly. It is best to do your initial test flight trimmed in the middle hole. Depending on your clip in weight the following is a guide and should be cross referenced with the section headed hang point loads (ref. 3.5 page 5). Light weight pilots should be attached to the most rearward position (closest to the keel pocket) and heavy weight pilots the most forward position (closest to the nose).

7.2 Pitch and Roll Dampening

The Discovery has a Velcro fastening (dampening adjuster) that goes around the king post and hang strap. If you require light bar pressure then secure the Velcro at the top of the hang strap where it attaches to the king post. If you require more positive bar pressure then move the Velcro lower, the lower you go the more bar pressure.

7.3 Turns

If your Discovery develops a turn or a bias in one direction, either one or more adjustments may be necessary. There are four adjustments that will affect turns;

- a. Increase or decrease under surface bungee elastic tensions.
- b. Rotating the leading edge rear tip adjusters.
- c. Increase or decrease batten camber.
- d. Increase or decrease leading edge tension.

7.4 Left Turns

First you should check that the wing has been set up correctly. Check batten profiles, tip adjusters and under surface bungee elastics for equal tension.

Method 1.

To rectify the dropping of the left wing increase the tension of the left under surface bungee elastic (port) or decrease the tension of the right under surface bungee elastic (starboard). If the turn still exists after maximum adjustment to both elastics try methods 2 and/or 3 and 4.

Method 2.

Remove the small self tapping screw on the end of the left leading edge and rotate the plastic end fitting anti clockwise (standing at the tip and looking along the leading edge towards the nose) approximately 5mm to the predrilled hole, then replace the self tapping screw. Repeat this action on the right wing, again rotating the plastic tip anti clockwise by the same amount as the left wing.

Method 3.

If the turn still exists after rotating the plastic tip adjusters, remove the plastic tip adjuster from the left wing and re-attach using the first pre-drilled hole. This will increase the tension of the left leading edge.

Method 4.

Increase the camber of the left (port) No 3 batten by approximately 3 cm or/and decrease the camber of the right (starboard) batten by the same amount.

7.5 Right Turns

First you should check that the wing has been set up correctly. Check batten profiles, tip adjusters and under surface bungee elastics for equal tension.

Method 1.

To rectify the dropping of the right wing increase the tension of the right under surface bungee elastic or decrease the tension of the left under surface bungee elastic. If the turn still exists after maximum adjustment to both elastics try methods 2 and/or 3 & 4.

Method 2.

Remove the small self tapping screw on the end of the right leading edge and rotate the plastic end fitting clockwise (standing at the tip and looking along the leading edge towards the nose) approximately 5mm to the predrilled hole, then replace the self tapping screw. Repeat this action on the left wing, again rotating the plastic tip clockwise by the same amount as the right wing.

Method 3.

If the turn still exists after rotating the plastic tip adjusters, remove the plastic tip adjuster from the right wing and re-attach using the first pre-drilled hole. This will increase the tension of the right leading edge.

Method 4.

Increase the camber of the right No 3 batten by approximately 3 cm or/and decrease the camber of the left batten by the same amount.

If the above methods fail to cure the turn contact your dealer or notify Offpiste.

If your glider has had heavy contact with the ground then the leading edges should be removed and checked for bends and cracks.

7.6 Glide

Should the glide performance show signs of deterioration through heavy use or old age, slide the leading edge tip adjusters out a short way and secure with the self tapping screw in the first hole, make sure that the nose bungee tension elastic has not worn out and that it is doing its job. This will increase the tension on the leading edges.

7.7 Handling

Should the handling become slow or sluggish check the sail tensions on the leading edges (the leading edge inner tip webbing should be under load and not slack when fully tensioned). Check bungee elastic that secures the leading edge sail cloth to the nose plates, this should be under tension and not weak and tired. Also check the lower side wires for length, stretched lower side wires will reduce roll response.

Always check the batten profiles first if any difference is noticed in performance

8.0 Maintenance

Always rig and de-rig you wing neatly and carefully, this will extend its life and keep maintenance costs to a minimum. Be sure to stow rigging wires carefully to avoid kinks and tangles. Ensure the rigging tangs and swaged wire ends are neatly packed and not bent or forced to one side. The sail should be neatly rolled and supported with glider ties at regular intervals.

8.1 Airframe

The airframe should be checked every 50 Hrs/year or after a heavy landing, check for the following:

- Bends
- Cracks
- Dents
- Stress marks
- Elongated bolt holes
- Corrosion

Never re-straighten bent tubes or use extra sleeves to repair damaged parts, always seek advice from the manufacturer

8.2 Fittings

Check all channels and plates for the following.

- Bends
- Cracks
- Dents
- Stress marks
- Elongated bolt holes
- Corrosion

Never fly with bent or straighten channels or plates

8.3 Nut and Bolts

Bolts should be straight, corrosion free, with undamaged thread and not worn unevenly. Nuts (Nyloc) should never be re-used, always replace with new and never over tighten. The correct way is to tighten the nut to a snug fit with at least one and a half bolt threads showing above the nut.

8.4 Rigging

All rigging wires should be free from kinks and twists. Thimbles should be straight and not buckled or elongated. Look carefully around the swages for broken wire strands and corrosion. At least 3mm of wire should be visible and protruding from crimped swages.

8.5 Battens

Take care of your battens and check them regularly against the profile supplied with the glider. Only store them where they cannot get damaged or bent out of shape. Special care should be given to the composite battens, they crush easily.

8.6 Sail Care

Always roll the sail up neatly and never store whilst damp. All mud and other matter should be cleaned off as soon as possible using a mild soap with warm water. Be sure to rinse well as traces of soap can soon turn to mildew.

8.7 Stitching

Make regular checks for any damage especially around high load areas (Centre join, keel pocket, trailing edge and tip attachments). Any damage should be reported to the manufacturer, who will advise what steps to take.

8.8 Rips and Tears

Rips, tears and holes no greater than 15mm can be repaired with high bondage self adhesive tape, providing they are not in or to near high load areas. Rips, tears and holes greater than 15mm should be referred to the manufacturer for advice.

8.9 Recommended Replacement Schedule

Luff lines	200hrs/3 years
Lower side rigging wires	100hrs/2 years
Lower front and rear rigging wires	200hrs/3 years
Top rigging wires	200hrs/3 years
Nuts and bolts	200hrs/3 years
Webbing's	500hrs
Leading edges, keel and cross booms	1000hrs
Control frame sides and bottom bar	1000hrs
Channels and plates	1000hrs

We recommend a factory inspection of your Discovery after every 50hrs airtime or one year, whichever comes first