### AVIAN LTD.

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**ELAN 150** 

Glider serial number ......

Owners Manual

Congratulations on your purchase of an Avian Elan. The Elan is a light-weight easy handling, high performance hang glider, designed specifically for CPC pilots. We hope that you will experience many hours of enjoyable flying on it.

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

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## **OPERATING LIMITS**

- 1. Minimum pilot rating: CPC
- 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.
  - 6. Do not fly with more than one pilot

## 3. Hang Glider Payloads:

Pilot Clip in Elan 150

Weight range Min Max 120lbs 206lbs 9 Stone 14 Stone 58Kg 90Kg

4. Hang Point position range (Measured from the front of the keel.)

Maximum Forwards Rearwards

Imperial 59" 62 1/2" Metric 1500mm 1585mm

Right behind the king post to 3" behind the kingpost.

The normal trim position on this glider is about 1 1/2" behind the kingpost.

### SPECIFICATIONS Elan 150:

Glider weight 50 lbs 22.9 Kg Wing span 29ft 8.8m Wing area 150sq.ft 13.9sq.m. Aspect ratio 5.6 Folded length 17.5 ft. 5.3m Breakdown length 12.5ft 4 m Min sink rate 170ft/min (wing loading = 1.35 lbs/sq.ft) Max L/D ratio 9.5 Speed range 16 - 45 mph.

#### RIGGING THE GLIDER

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

### Rigging the Elan flat;

- 1. Lay the glider on the ground with the nose pointing into wind. Unzip the bag and roll the glider so it is the right way up. Take the bag off. (If you tread on the inside of the bag any dirt that you get on it will be transferred to the glider when you put the bag on later.)
- 2. Take off the glider ties and take the battens out from alongside the kingpost. Raise the aerofoil kingpost checking that sail is not caught by the base of the kingpost. Hook in the top rigging making sure that the anti-luff lines are not tangled.
- 3. Swing the wings out about three quarters of their maximum travel making sure that you do not lift the tips high above the ground. (This ensures that you will not bend the nose plates). If there is any resistance check to see what is causing it. Do not attempt to force the wings apart. (A twisted wire is easily kinked and its strength reduced)
- 4. Locate the tip rods and make sure that they are seated properly.
- 5. Lay the battens on the ground and pair them up, red with green, and check that corresponding batten pairs have the same profile. This is a good habit to get into as it will reduce the chances of taking off on a glider with a turn caused by odd shaped battens. (Periodically the battens should be checked against the batten profile)
- 6. Put the curved battens in their pockets working from the tip towards the centre cord. Keep the trailing edge low and slowly ease the battens into their respective pockets. This makes the job easier and the batten pockets last longer. Then put the nose batten in and locate it on its seat just in front of the nose plate.
- 7. The glider can now be tensioned. Remove the split ring from the special bolt located through the rear of the keel tube. Using the attached elastic cord, pull back the cross tube restraint webbing locate the stainless tang over the stub of the bolt and replace the split ring. DO THIS OPERATION IMMEDIATELY. DO NOT LEAVE IT UNTIL LATER.
- 8. Push the battens further home if they will go and put on the elastics (The batten elastics should be put on double on each batten). Then put in the No 6 battens. They locate OVER THE TIP ROD and onto a plastic cleat on the leading edge. (These battens, sometimes called compression struts, are bent and should be profiled correctly and put in the right way up. Like all the other battens the curve should be up. The top surface of the wing should be convex NOT concave.)
- 9. Put the bottom bar on and insert the two stainless pins and their rings.

- 10. Make sure that the wires will not kink and then stand the glider on its control frame and attach the swan catch, pip pin and safety washer.
- 11. Make sure that the nose catch is correctly attached and then put the nose cone on.
- 12. The glider is now fully rigged and you should now make sure that you do a thorough pre-flight check before you fly.

We suggest if there is any wind that the glider is left flat on the ground into wind and securely weighted or tied down at the nose until you are ready to fly.

Rigging the Elan standing on its A-frame;

This is essentially very similar to rigging the glider flat:

- 1. Lay the glider on the ground. If there is any wind the nose should be pointing cross or down wind. Unzip the bag and take off enough ties to assemble the A frame. Assemble the A frame.
- 2. Stand the glider on its A-frame and then take off the bag, the remaining ties and remove the battens from alongside the kingpost.
- 3. Walk the wings out about three quarters of full extension. NB: Whilst spreading the wings, particularly when the glider is standing on its A frame, it is essential that the leading edges and keel are kept in the same plane. (This is to avoid distortion to the nose plates or any other component.)
- 4. Take care to place the tips on a piece of ground that is not likely to cause them damage. The glider should now be standing on its A frame, wing tips and keel.
- 5. Raise the aerofoil kingpost checking that sail is not caught by the base of the kingpost. Hook in the top rigging making sure that the anti-luff lines are not tangled.
- 6. Lay the battens on the ground and pair them up, red with green, and check that corresponding batten pairs have the same profile. This is a good habit to get into as it will reduce the chances of taking off on a glider with a turn caused by odd shaped battens. (Periodically the battens should be checked against the batten profile)
- 7. Put the curved battens in their pockets working from the tip towards the centre cord. Keep the trailing edge low and slowly ease the battens into their respective pockets. This makes the job easier and the batten pockets last longer.
- 8. The glider can now be tensioned. Remove the split ring from the special bolt located through the rear of the keel tube. Using the attached elastic cord, pull back the cross tube restraint webbing locate the stainless tang over the stub of the bolt and replace the split ring. DO THIS OPERATION IMMEDIATELY. DO NOT LEAVE IT UNTIL LATER.

This operation is much easier if you get a friend to lift a wing while tensioning.

9. Push the battens further home if they will go and put on the elastics (The batten

elastics should be put on double on each batten). Then put in the No 6 battens. They locate OVER THE TIP ROD and onto a plastic cleat on the leading edge. (These battens, sometimes called compression struts, are bent and should be profiled correctly and put in the right way up. Like all the other battens the curve should be up. The top surface of the wing should be convex NOT concave.)

- 10. Put the nose batten in and locate it on its seat just in front of the nose plate.
- 11. Make sure that the nose catch is correctly attached and then put the nose cone on.
- 12. The glider is now fully rigged and you should now make sure that you do a thorough pre-flight check before you fly.

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

### PRE-FLIGHT CHECK-LIST

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

- 1. All tubes are straight and not dented.
- 2. Cross-tube hinge, nose plates and A frame fittings are not damaged.
- 3. All cables unkinked, unfrayed and correctly terminated.
- 4. All sail seams intact with no frayed stitching, particularly in high stress areas (eg. wing tips, rear of keel etc.)
- 5. Battens correct shape and undamaged with no cracks or splits in the fibreglass section.
- 6. All nuts and bolts secure.

- 7. All quick release fittings secure.
- (i) cross tube tensioner
- (ii) nose catch
- (iii)tip rods fully engaged
- (iv) quick pins and rings on bottom bar secure.
- (v) outboard leading edge section fully engaged. (Be especially vigilant if the leading edges have been broken down recently.)
- 8. Cross tube tensioner unfrayed and twist free.
- 9. Sail zips done up and centre velcro correctly attached.
- 10. Batten elastics unfrayed and engaged over the batten ends.
- 11. Hang loops in good condition and in the correct position.
- 12. The glider is symmetrical when viewed from the front.
- 13. The king post is straight and joint at its base is secure.
- 14. The four nose plate bolts are secure.
- 16. Walking along the length of the leading edges feel with your fingers to check that they are free from dents. Check that there is a similar leading edge curvature when looking down the inside of the wing from the nose to each wing tip.
- 17. Check through the sail inspection zip to ensure that the wing wire and cross tube leading edge bolts are secure.
- 18. Check that the keel is straight and then check that the tensioning strap is secure, correctly fitted and that the split ring is in place.
- 19. Inspect the cross tube hinge through the centre zip, ensuring that the nuts are secure and the tubes ends are meeting correctly. Also check that the cross-tubes are straight and undented.
- 20. Check that the A frame nuts are secure and that the quick pin split rings are fitted correctly.
- 21. Finally check that the wires are undamaged. Look out for corrosion and fraying. Pay particular attention to the wing wires as, in normal flight, these are the most heavily loaded.

### FLYING THE ELAN

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. Your instructor should be an invaluable source of information and there are also a number of good books available full of useful tips. (A recommended book is "Starting Soaring" by Noel Whittal)

### Take off

Before take-off ensure that you have pre-flight checked the glider, are clipped in and that you have performed an adequate hang check.

On take-off the wings should be held level with the nose slightly raised. A strong and committed take off run is always recommended, with the angle of attack being kept low. Once sufficient air speed has been achieved increase the angle of attack slowly to take off. Once settled in flight move your hands to a comfortable position on the base bar.

### In Flight

The control in both pitch and roll is light and precise. Accordingly the glider should be flown with moderate and precise inputs.

#### Stall

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

## Spin.

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

#### LANDING THE ELAN

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

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

#### **DE-RIGGING**

This is the reverse of the assembly sequence. Lay the glider flat and remove the nose batten. Release the cross tube tension and swing the wings in a few feet. The remaining battens can now be removed.

The wings can then be closed and the king post lowered. The luff lines can be clipped to the edge of the king post hole. The sail can now be rolled and tucked inside the mylar of the leading edge. The tipsticks then need to be disengaged and a tie placed around the tail end. The battens can be stowed at the front of the glider between the leading edges with the curves over the nose section. A tie can then be placed round the nose section. Place the glider bag over the glider and then turn the glider on its back. Take off the bottom bar and stow the control bar in the rear of the folded sail. Place the supplied packing around the top of the uprights, the rear of the keel over the tensioning bolt and over the upright ends. The remaining ties should be put around the glider and finally tuck the nose cone under one of these.

#### POST FLIGHT INSPECTION

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

#### **TUNING INSTRUCTIONS**

Trim speed - The trim speed is adjustable by moving the hang point. Forward movement will speed up the glider, whilst rearward movement will slow it down. Do not move the hang point further forward than tight behind the kingpost or backwards further than the dimensions given at the front of the manual (3 inches behind the kingpost.)

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

A slight turn may be tuned out using the tip adjusters:

The self-tapping screw should be removed and the black plastic cap turned slightly. The wing that is lifting should have the washout increased while the wing dropping should have the washout reduced. ONLY ALTER THE WASHOUT IN THIS WAY IN SMALL INCREMENTS. (MAXIMUM 5mm.) The total movement should NOT exceed 10mm each side. DON'T FORGET TO REPLACE THE SELF-TAPPING SCREW.

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

### **MAINTENANCE**

#### General

Careful attention to the rigging and de-rigging sequences will protect the wing from the risk of unnecessary damage. Avian recommend that the glider has a factory inspection every year or fifty flying hours which ever is the sooner. Repairs should be undertaken by the Avian factory or an approved dealer using genuine Avian spares.

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

#### Airframe Maintenance

Apart from damage caused by over stressing the glider i.e crashing etc the major wear and tear on the glider is done 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 part. Keep a regular watch for tell-tale hair -line cracks, which are most likely to occur in high stress areas such as around bolt holes. If you bend, dent or damage the tubular members in any way, seek immediate professional advice before flying again and have replacement parts fitted.

#### **Fasteners**

Any fastener (ie nuts bolts etc) which is bent or shows signs of wear or corrosion should be immediately replaced. Nylock nuts should only be used ONCE.

#### **Rigging Cables**

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

### Cross tube tensioner

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

before flying if any damage is found. (fraying, abrasions cuts or wear to the stitching or strop)

### Wing fabric maintenance

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

### Stitching Damage

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

### Wing fabric cleaning

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

#### **Battens**

Battens form the wing shape and substantially influence the performance of the wing. They need treating with care and, since they are subject to constant stress both during flight and rigging, they may lose their shape. It is essential that they are checked against the template at frequent intervals and re-profiled if necessary. The correct way to re-form is to hold the batten against your knee and, whilst applying pressure to bow the batten, slide it side to side across your knee over the area that you want to re-shape. Direct point bending will usually result in either a poor shape or a broken batten.

#### RECOMMENDED COMPONENT LIFE

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

Cross Tubes 2000hours Leading Edges 1000hours

Control frame / fittings 1000hours

Keel 1000hours

Rigging wires / Tension Strop 200hours

#### **REPAIR**

Warning: The Elan airframe is deceptively simple, but like all aircraft requires skilled and qualified attention. We do not recommend self repair or re-assembly by other than Avian or Avian nominated repair agents. No replacement parts should be fitted unless they are factory supplied and identified as such.

Repairs shall only be undertaken by Avian approved personnel.

Sail repairs are only to be undertaken by the Avian factory.

Repairs of all other parts by replacement only.

Replacement parts must be obtained from Avian Ltd. or an Avian Ltd. appointed agency to ensure that they are genuine. When ordering spares always quote your glider number (make a note of it if you have to replace your keel).

Bent aluminium tubes must never be straightened, always replaced.

Frayed cables and cables with damaged or twisted thimbles must always be replaced.

#### TRANSPORTING AND STORAGE OF YOUR HANG GLIDER

## Storage general

The glider should always be stored dry. The sail is made from anti-mould treated cloth but extended storage wet might never-the-less encourage mildew. Wet storage will also encourage corrosion of the airframe wires and fasteners. Salt water will of course be many times more damaging. After flying on the coast the glider should be washed with fresh water.

Always try and store your glider inside. If it is wet leave the bag open and try and open the glider out to dry properly as soon as possible.

If you must store your glider outside again keep it dry and keep it out of direct sunlight. (U.V.light gradually damages the bag and sail)

#### Transportation general

The wing must always be transported inside its bag well packed and with all the protective padding in place. We recommend that the glider is placed kingpost down.

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

#### Breakdown

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

#### Removal of the outer leading edge

The outer section is kept in position by a clevis pin and slot. The outer section can be taken off without removing the clevis pin. To take the outer section off, take the glider out of its bag roll it upside down and remove the sail ties. Release the leading edge tension at the nose by unscrewing the phillips self tapping screws. The tip plug can usually be removed by taking out the self tapping screw. It is not necessary to remove the plug from the sail. To do so will require the use of two 4mm allen keys.

The leading edge can now be pulled out and the tip rod fed through its hole in the sail. The sail can now be folded smaller but take care not to crease the mylar or damage the sail on the end of the inner leading edge. (We suggest that a padded bag is placed over the end of the inner leading edge.)

To put the leading edge back together reverse the above procedure threading the tip rod through the hole in the sail and making sure that you push the leading edge fully home.

To replace the self tapping screws at the nose we recommend rigging the glider first.

IMPORTANT: Check that you have your outer leading edges in the correct sides. When the glider is the right way up the tip rods should stick UP not down.

#### TROUBLE SHOOTING

### The tension strop gets caught

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

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

When the tension strop is released it should be pushed towards the keel pocket to feed some slack into it. This allows the wings to move together more easily.

The kingpost base gets caught on the sail when rigging

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

A 'pop' on take off is heard

The lower wing wire goes though a small hole in the sail. During the "pre-flight" this area should be checked. One of the ferrules on the wire can get caught in the sail. If this happens the ferrule will normally "pop" through the hole on take off.

The glider has a turn see tuning instructions.

The glider has become more difficult to turn

- 1. This can be caused by an incorrect but symmetrical batten profile. (Asymmetrical battens tend to cause turns.) The glider handling does deteriorate significantly if battens are out of profile. The centre section (nose batten and battens with G.R.P. ends) seems to make the largest difference. Check the battens against the profile more regularly.
- 2. This may also be caused by an incorrect trim position (position of the hang loop on the keel). The glider might now be trimmed too slow "hands off" and be flying in a semi-stalled condition. See tuning instructions. When the trim you prefer is found the keel position should be marked and the hang loop fixed in place.

#### **OWNERSHIP**

Please Notify Avian Ltd. of change of ownership and change of address. Your name and Address will go onto a computer file but we hope that you won't worry about that. The reason for wanting your address is so that we are able to contact the owners of any of our gliders should we decide to offer upgrades or in the unfortunate case of having to recall components or gliders.

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

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

We would be most grateful to receive any interesting photographs of our gliders.

Finally we hope that you have many hours of safe, interesting and most enjoyable flying.1