



# Evolution 2.5M

## Evolution-EV 2.5M

### Assembly Manual

#### Kit Contents

- ☐ - Fiberglass fuselage pod with canopy
- ☐ - Tapered tail boom - carbon/glass-composite
- ☐ - 4-segment Wing - pre-sheated and sanded
- ☐ - V-tail halves - laminated w/hinged elevators
- ☐ - Wing Tip Joiners rods - carbon (4)
- ☐ - Wing Bolt M4 (1-stainless, 1 nylon)
- ☐ - V-tail Mount (1)
- ☐ - Triangle top V-tail joiner (1)
- ☐ - V-tail nutplate w/nylon retainers and M3 screw (1)
- ☐ - V-tail Control horns Set (2)
- ☐ - Control Horns for the Ailerons and the Flaps (4)
- ☐ - Pushrod wire for Aileron and Flap (2)
- ☐ - Light weight Pushrod set for elevators (2)
- ☐ - Fiberglass cloth.
- ☐ - Glider Drawing

*If this is your first model, please seek the advice of other experienced modelers prior to assembly and flight. An internationally recognized nonprofit sanctioning organization for modeling is the Academy of Model Aeronautics. They can provide club, field, and liability insurance information. Contact them*

*for information at:*

**AMA**  
5151 East Memorial Drive  
Muncie, IN 47302-9252  
(800) 435-9262  
Fax: (765) 289-4248  
Internet:  
[www.modelaircraft.org](http://www.modelaircraft.org)

*Check the Items Needed, Tools and Supplies, and Contents sections. Verify the contents of the kit and your supplies before continuing. If you have any other problems or questions, please contact customer service in the U.S.A. at:*

**Customer Service**  
1122 Ginger Ave.  
Billings, MT 59105  
(406) 545-4118  
Email:  
[gliders@arthobby.com](mailto:gliders@arthobby.com)  
Visit us at  
[www.arthobby.com](http://www.arthobby.com)

#### Notes about the finishing wing surfaces:

*We recommend using a clear lacquer to finish wood surfaces of the wing. Please remember that the wing is a foam core and some paints may attack the foam internally.*

**Note: Please test fit all parts before beginning assembly. The glider has a complete 3 view assembly drawing separate to this manual.**

**Please refer to this drawing during assembly. The drawing is the latest information about the glider and should be the primary source for measurement and placement questions.**

#### Recommended Radio & Drive Components

##### Glider & Electro-glider:

- ☐ 6-ch.+ Radio system Hitec Optic-6; Eclipse-7 or similar
- ☐ 6 ch.+ Receiver  
Electron-6 Hitec (#H25272) or similar
- ☐ Servos:  
HS-65MG; HS-82MG (#H32065, H32082) - ailerons/spoilerons  
HS-85MG (#H31085) - flaps (optional)  
HS-65HB (#H33065) - tail
- ☐ Servo wire extensions:  
2x 36" (#H00X36) - ailerons  
2x 24" (#H00X24) - flaps  
or 100 Inches of Servo Wire to make your own extensions
- ☐ Universal wing servo covers x2 (#A0031)

##### Electro-glider:

- ☐ - PJS-1400ART outrunner motor or similar
- ☐ - 36-55Amp ESC  
(#M70360, M997256)
- ☐ - 31mm "LowDrag" spinner  
(#A031S4)
- ☐ - 12.5 x 6 carbon FP poppeler blade set  
(#A01256)
- ☐ 1600 - 2500mAh, 3-cells LiPo  
(#M157121; B25003S)

#### Tools & Supplies

- ☐ - Drill Bits: 2mm, 4mm, 6mm
- ☐ - 2 x 24" and 2 x 36" servo wire extensions  
(#H00X24 & H00X36)  
or 100 Inches of Servo Wire to make your own extensions
- ☐ - Universal wing servo covers (#A0031)
- ☐ - Hobby Knife (blade #11)
- ☐ - 5 Minute Epoxy (#A0201).  
(use for joining the wing panels and tail)
- ☐ - 20 Minute Finishing Epoxy (#A0209)  
(use for fiberglassing the joints)
- ☐ - CA adhesive (#A0101).
- ☐ - Masking tape
- ☐ - Pliers
- ☐ - Drill
- ☐ - Drill Bits: 2mm, 4mm, 6mm
- ☐ - Soldering Iron
- ☐ - 1 meter ruler
- ☐ - Flexible metal ruler (Approximately 250mm long will be easiest to use)
- ☐ - Clear lacquer (DEFT) or similar.

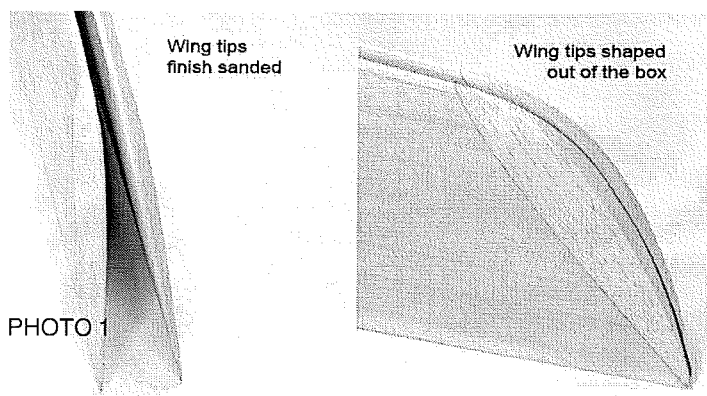
## Finishing the Wood Surfaces

To prevent the wood from pre-mature aging and moisture damage, we recommend sealing the wood using lacquer manufactured by DEFT (available from The Home Depot and Lowe's stores). The best would be a "Satin" or "Semi gloss" type of finish. **(Prior to using lacquer, any white foam surface should be sealed by applying a film like coat of epoxy).** The black poplar veneer wing skeens (~0.4mm thick) are doped under surface then laminated with epoxy to the wing foam cores. This is making a barrier preventing harsh lacquer thinner penetration inside. We recommend to apply lacquer in a few very light coats, this way lacquer thinner evaporates very fast and does not have time to cause any harm to the wing foam cores. After applying the first and second light coats, sand the surface using 400 grid sand paper, then apply a very light 3-rd, 4-th and more coat if desired. Use as little as possible to keep the weight down.

**Color Option:** After wing is completely finished with lacquer then you can mask it and spray some color stripes especially to the bottom side of the wing that will give the glider some accent and provide you with better visibility during flight.

## Wing Assembly

1. Remove the wing segments from their protective foam.
2. Sand the balsa wing tips to shape. Only round the top. Leave the bottom of the tip the shape of the wing foil. Try to make the tips match as closely as possible. PHOTO 1



Find the light fiberglass cloth and cut four ~35 - 40mm wide strips from it. PHOTO 2

3. Lightly sand the meeting surfaces of the wing center panels and outboard panels.

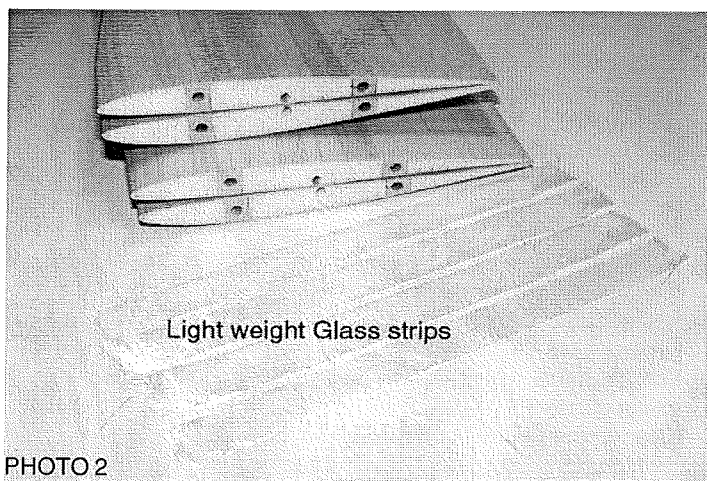


PHOTO 2

## Recommended building steps.

1. Do all wing joining and fiberglassing.
2. Finish (lacquer) the wing and tail surfaces.
3. Cut ailerons and servo bays.
4. Hinge control surfaces.
5. Install radio gear (drive) components.

4. Apply the 40mm wide gloss cloth strip to each panel face. Use 20 Minute Finishing Epoxy to adhere the glass cloth strips to the panel face. PHOTO 3

**Do NOT use polyester resin as the resin will attack the foam core.**

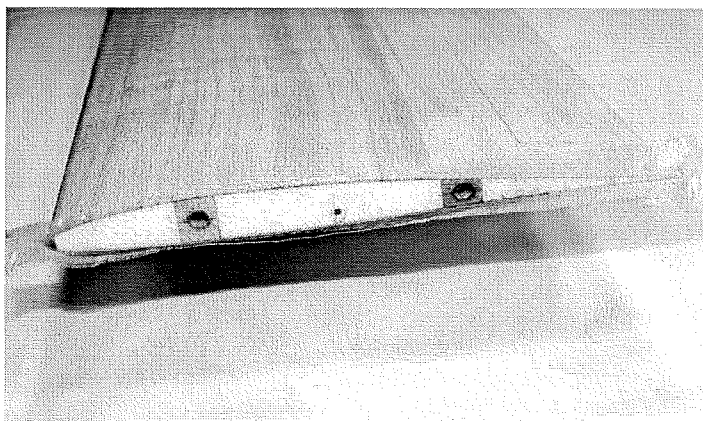


PHOTO 3

5. After epoxy has cured cut off excess cloth and sand finish using 400-grid sandpaper, then cut through it to expose the holes for the Carbon fiber rods and the cable canals.

6. Glue the four (100mm) carbon fiber rods in the outboard wing panels, with the exposed ends projecting out 50mm. PHOTO 4

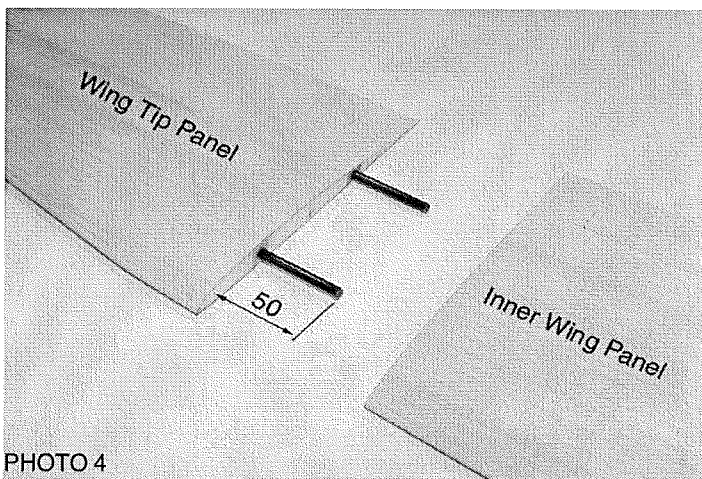


PHOTO 4

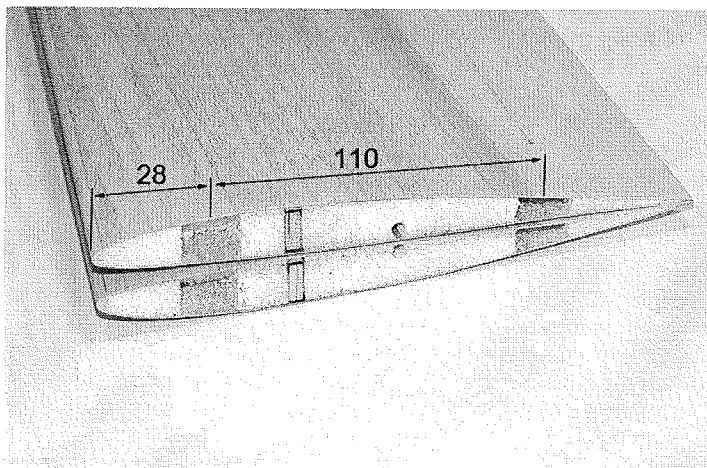
## Joining the Wing Center Panels

1. Hold the wing center panels together with masking tape. Mark the bottom side root of the wing 40mm and 160mm back from the leading edge.

Also mark the position of the wing servo wire cannals on the bottom side of the wing root.

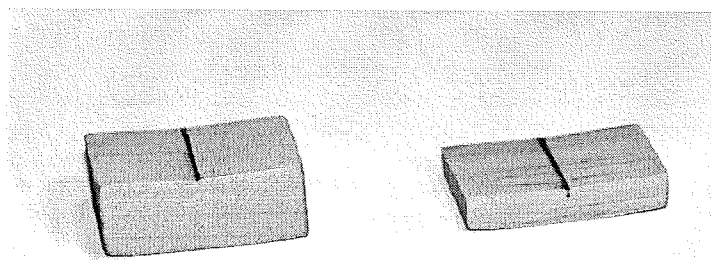
2. Find the two hardwood blocks. Place the blocks on the wing root foam surface. Center each block on the mark you made. Mark the block width on the wing root foam and draw the wing contour line on the block.

3. Remove the masking tape. Cut out cavities 20mm deep in the wing foam cores to accommodate the blocks. PHOTO 5



**The blocks will carry the wing mounting screws.**

4. Shape the blocks before installation and test fit. PHOTO 6 & 7  
Use sandpaper and/or a knife and/or a rotary tool to completely fit the blocks to the wing's contour.



Wing Blocks shaped to fit

PHOTO 6

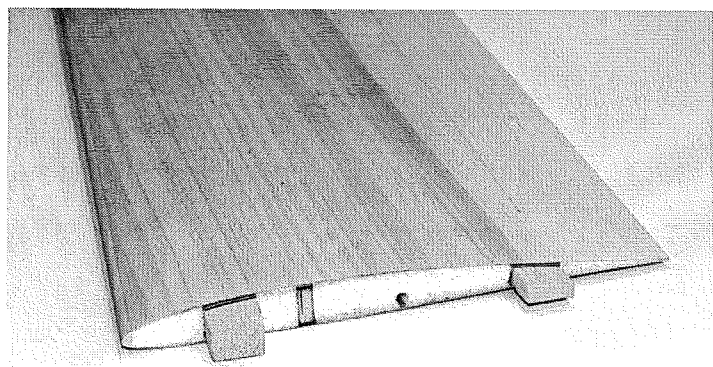
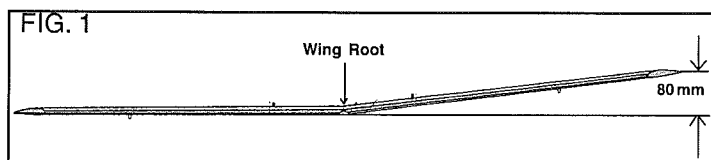


PHOTO 7

5. Lay the wing right center panel flat on the table. Take the left wing center panel and join with its wing tip panel. Hold down both center panels together at the roots and raise the left wing tip 80mm from the table surface. FIG 1



Evolution-E v.02

**To achieve a proper fit, the root of each wing half must be sanded at a slight angle to fit.**

6. After sanding the wing root surfaces trial fit the blocks once again. It may be necessary to make adjustments to the wing blocks.

7. Lay down wax paper to protect your work bench.

8. Once satisfied with the fit, glue the blocks in place and wing center panels together. Use 5 Minute Epoxy and hold the wing panel in place.

Wipe away any excess epoxy.

**Make a wood support or use books to hold the tip at its proper height.**

9. Allow the epoxy to cure (at least 30 minutes) then clean the joint.

10. Cut two strips 35mm wide from heavy weight glass cloth, and two strips 50mm wide from medium weight glass cloth (supplied in the kit). PHOTO 8

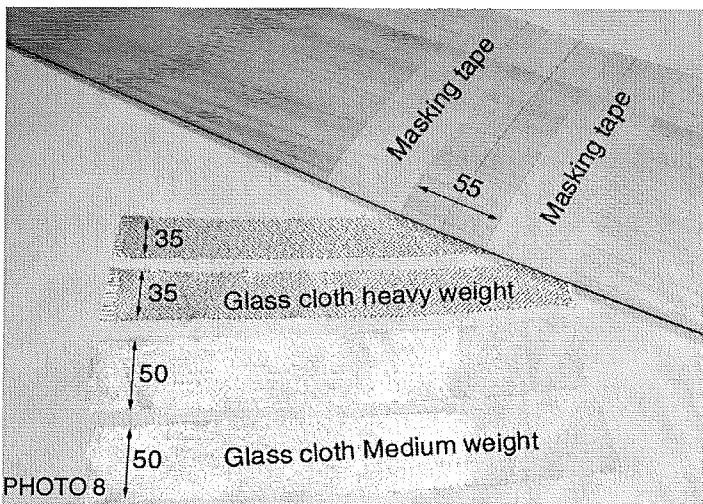


PHOTO 8

**The cloth will reinforce the wing, top and bottom, around the wing joint at the root.**

To help hold the glass in place while the epoxy resin is applied, first apply C/A glue to the glass at the leading edge. Then pull the glass smooth and apply C/A glue to the glass at the trailing edge.

11. To keep the resin from spreading too far, apply masking tape to the wing ~2mm away from the cloth's edge. PHOTO 8.

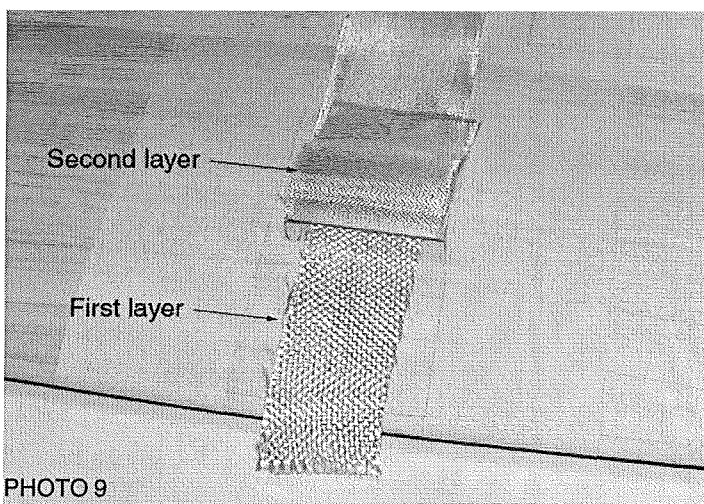


PHOTO 9

12. Mix a moderate portion of 20min.epoxy and using a small paint brush or spreader stick apply the epoxy to the bottom of the joint.

13. Lay prepared strips of glass cloth over the joint. First lay the heavy cloth then the medium wider strip over PHOTO 9.

14. Use small piece of paper towel, fold a few times together and dab the glass cloth.

15. Dabbing will allow the epoxy to completely saturate the cloth and adhere to the wood wing surface, it will also remove excess epoxy and smooth the joint.

(change new piece of the towel if needed)

16. Repeat steps 12-15 and apply reinforcing cloth to the top of the joint.

17. Once the epoxy has set, remove the masking tape. Apply fresh masking tape 2mm past the end of epoxy.

18. Use 400 grid sand paper and sand the joint smooth if needed. **Do NOT sand away the wingsheeting where the glass ends. This will weaken the wing and could cause failure.**

## Wing Servo and Control Surface Installation

Refer to glider drawing and check the marking of the aileron and flap location on each wing.

1. Cut the aileron and flap from the wing.

First cut both ends of each aileron and flap. We recommend using a fine balsa saw to make those cuts. PHOTO10

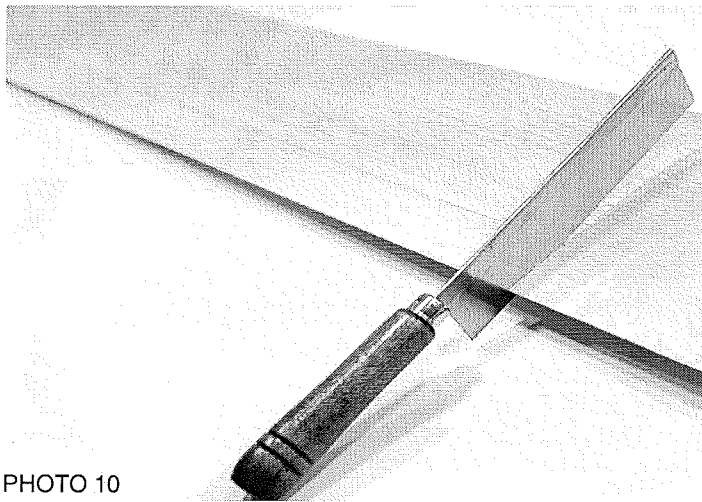


PHOTO 10

2. Use hobby knife with #11 blade and metal ruler as a cutting guide to cut the ailerons and flaps from the wing. It is very important to make perfectly straight cuts. PHOTO 11

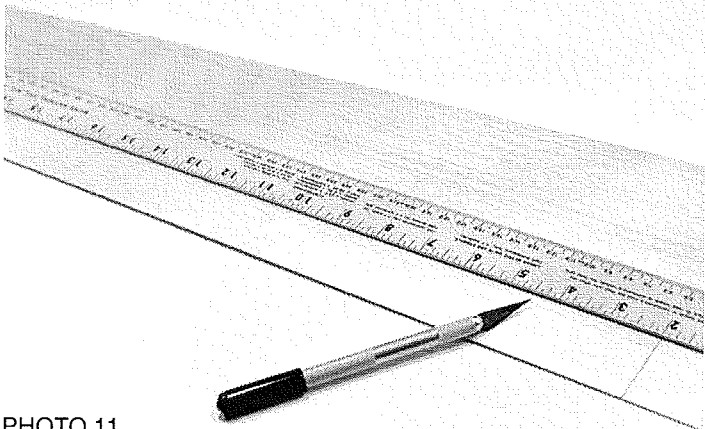


PHOTO 11

Because the ailerons will be hinged on the upper wing surface, the leading edge of each aileron will need to be sanded at an angle to allow the aileron to deflect down. The flaps will be hinged on the lower wing surface.

3. Use hinge tape (or silicone hing) to attach the ailerons and flaps to the wing.

4. The wing flap servo bays 40mm x 35mm are located 320mm from the wing root, and 100mm from the trailing edge.

5. The wing aileron servo bays 40mm x 35mm are located 775mm in from the wing root, and 90mm from the trailing edge. Please use Hitec HS-85 / HS-125 servos for the ailerons, and HS-85MG / HS-125 servos for the flaps or similar wing servos.

Make an exact cut in the bottom of the wing for the servos. Align the servo so that the output arm is aligned with the aileron or flap.

6. Run servo wire through the wing (music wire can be used to help pull the wire through) Hardwire the servo wire extension to the servo. There is simply no room for the servo plug. Be very careful to keep the polarity correct and each wire insulated.

7. Connect the servos to the receiver. Turn on the radio and center the servos. Check for proper servo movement. Use your servo reversing switches on the transmitter if the servo moves in the wrong direction.

8. Install control horns on the ailerons and flaps directly back from the servo arm. The horns should be positioned with the holes forward and aligned over the hinge line. Use a small dab of epoxy or CA to permanently secure the horns in position.

9. Place the servos in the center of servo bays, lock the ailerons and flaps in a neutral position securing both ends of each control surface to the wing's trailing edge with a piece of tape. Now measure distances between servo control arms and aileron, and also the flap control horns, according to these measurements make two sets of short pushrods from the supplied wire (we suggest making "Z" bend on both ends).

10. Connect the pushrods first to the aileron and flap horns, then to the servo arms, after that install the servos in servo bays with a small amount of silicone sealer.

11. To cover the servos you can use Art Hobby's universal wing servo covers (#A0031). PHOTO 12

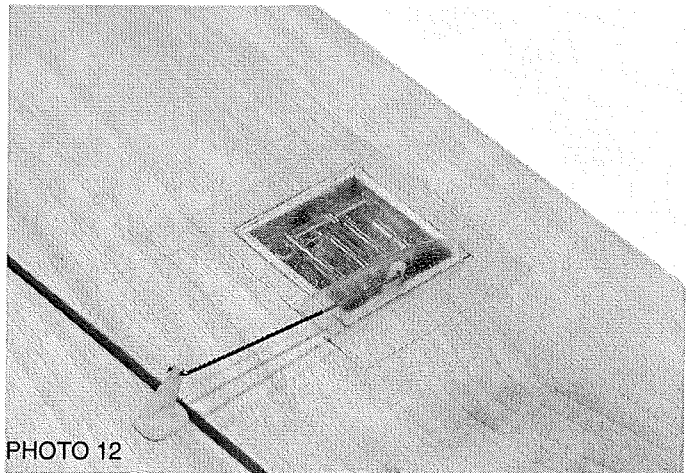


PHOTO 12



## Mounting the Wing

1. Place the wing properly on the fuselage wing saddle, then use a sharp pointed pencil to mark the wing's trailing edge on the fuselage.
  2. Remove the wing, then measure the distance between the marked line and the center of the two threaded holes in the wing saddle.
  3. Place the wing upside down and transfer both measured distances onto the center of the wing joint.
  4. Using 4mm drill bit, drill the hole in the marked position.  
**Remember that the hole has to be drilled in an angle to match the angle of the wing bolt screwed into the fuselage.**
  5. Find the M4 stainless wing bolt.
  6. From the top side of the wing open the holes properly to fit in the nylon seats for the wing bolts. Trial fit the the seats, insert the wing bolts, and screw the wing to the fuselage.
- If satisfied with the fit, remove the wing and permanently glue wing bolt seats in place. Use 5 Minute Epoxy

V-tail mounting plate and triangle - Shaped

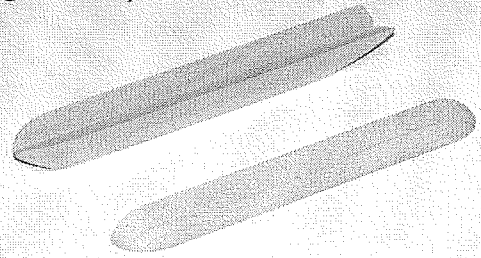


PHOTO 14

4. The bottom part of the V-tail mounting plate has a round shape to fit the boom. But to make a perfect fit to the boom we recommend wrapping the tail part of the boom with sand paper, and making a few strokes with the plate to achieve perfectly fitted saddle for the taper tail boom. PHOTO 15

V-tail mounting plate sanded to fit the boom

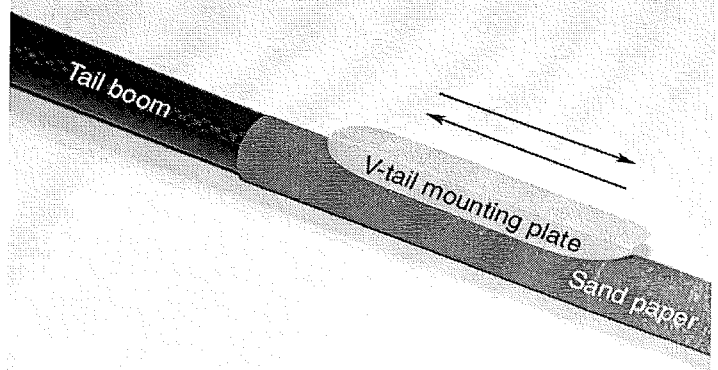


PHOTO 15

5. Trial fit the plate to the boom and mark its position on the boom. Clean the marked surface of the boom with sand paper.

PHOTO 16

Tail boom sanded down in preparation for the V-tail mounting plate

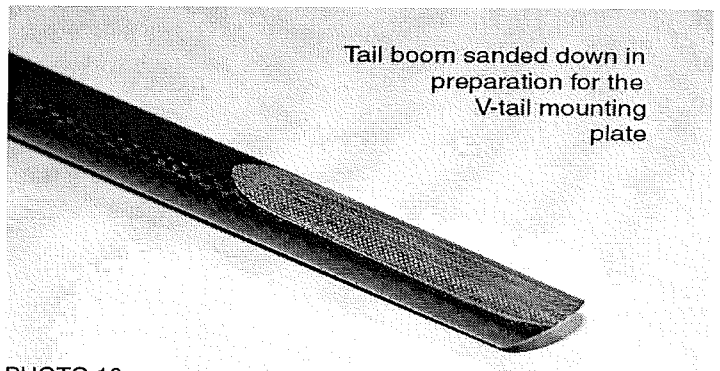


PHOTO 16

6. Use 5 min. epoxy and glue the plate to the boom. PHOTO 17

V-tail mounting plate glued to the boom

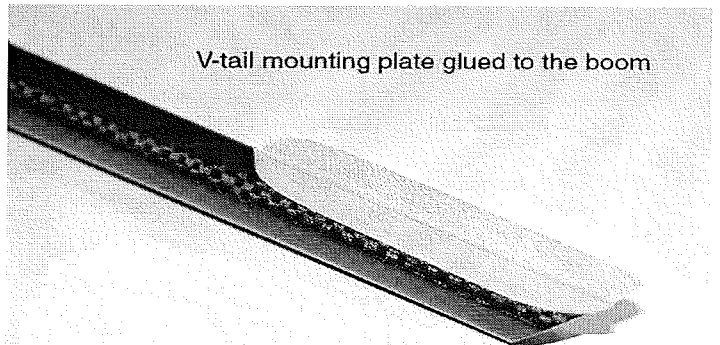


PHOTO 17

## V-tail Assembly

**The V-tail can be glued permanently to the boom with use of the mounting plate or it can be made removable.**

1. Find the V-tail stabilizer halves and the mounting plate set.

PHOTO 13

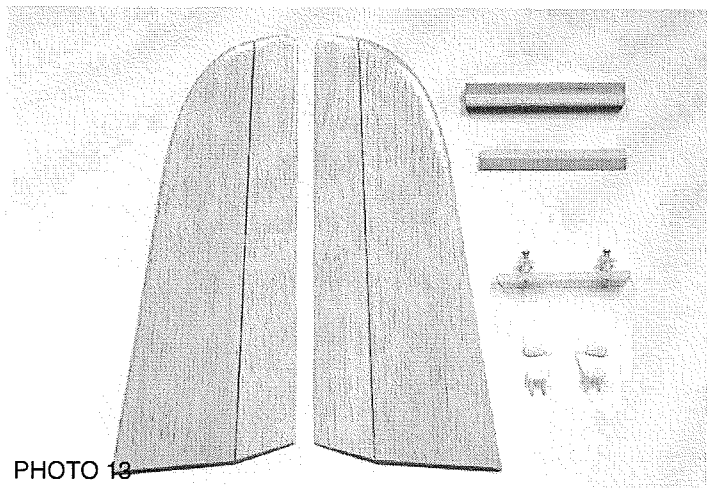


PHOTO 13

The plate and triangle are pre-cut to the correct angle of 105 degrees. All tail pieces: the mounting plate, two V-tail halves, and triangle interlock together.

2. The mounting plate and triangle are a little bit longer, so both pieces have to be cut to fit. At the back it should be aligned with the hinge line. The front should match the stabilizer.
3. After cutting the front and the back of the mounting plate and triangle, they should be sanded to shape. PHOTO 14

7. Find V-tail stabilizers and trial fit together. Check the V-Tail angle, it should be 105 degrees.
8. Glue both of the V-tail stabilizers together. You may wish to block the stabilizers to hold the correct angle.
- Do not allow the parts to be twisted.
- Once satisfied with the fit, join the stabilizers with CA adhesive.
9. Glue the triangle joiner between stabilizers. PHOTO 18

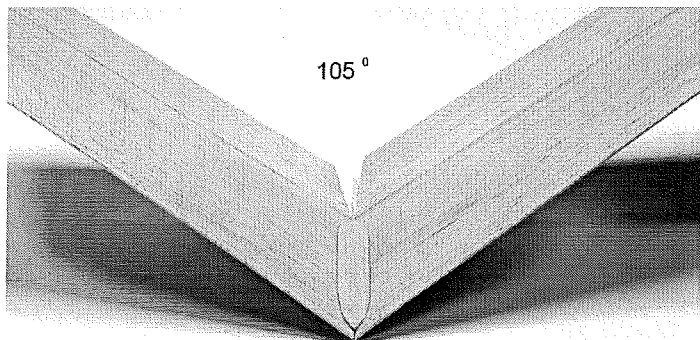


PHOTO 18

10. Now mask the V-tail and **reinforce top and bottom of the joints with a strip of lightweight glass cloth** using the 20 Minute Finishing Epoxy. PHOTO19
- After epoxy cures smooth the joint with fine sand paper to ensure good fit to the V-shape saddle of mounting plate.

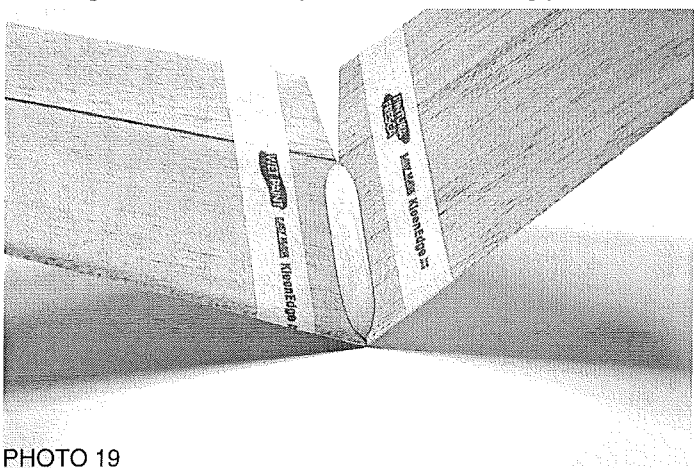


PHOTO 19

11. Mark position for the V-tail mounting screws. PHOTO 20

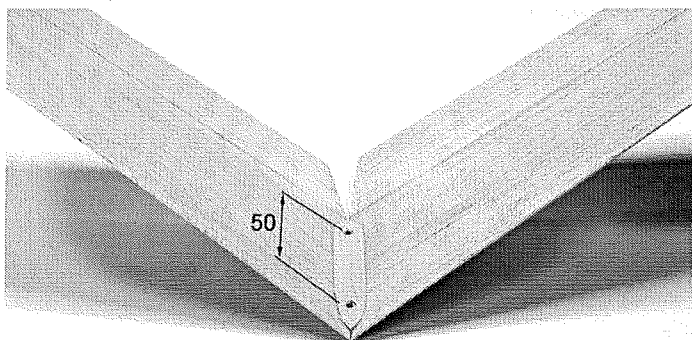


PHOTO 20

12. Place the V-tail in its position on the mounting plate and drill two holes through the V-tail and plate with the boom.
13. Now the composite mount, insert it in the boom and trial mount the V-tail with two M3 screws. PHOTO 21

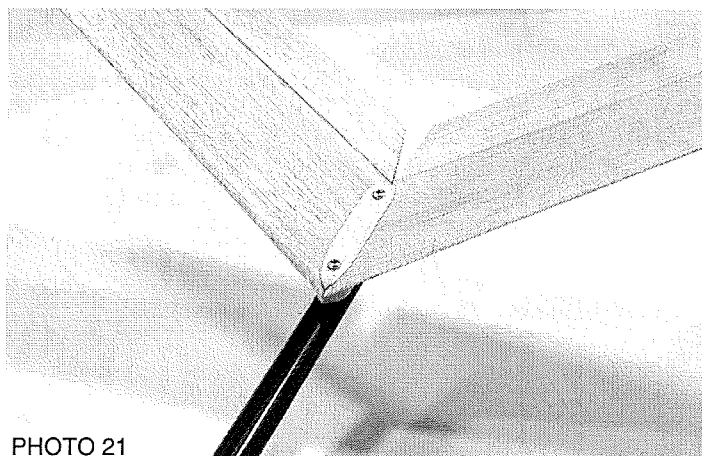


PHOTO 21

14. If everything fits, remove the V-tail and enlarge the two holes and place in the two nylon retainers. Use a small dab of epoxy or CA to permanently secure the retainers in their positions.

## V-tail control horns

1. Find the control horns. Cut the backplate from the horns, use them as templates to mark placement of the holes.
2. Drill holes for the horn locating pins.
3. Mount the horns securing them with the backplates. Use a small dab of epoxy or CA to permanently secure the horns in their positions. PHOTO 22

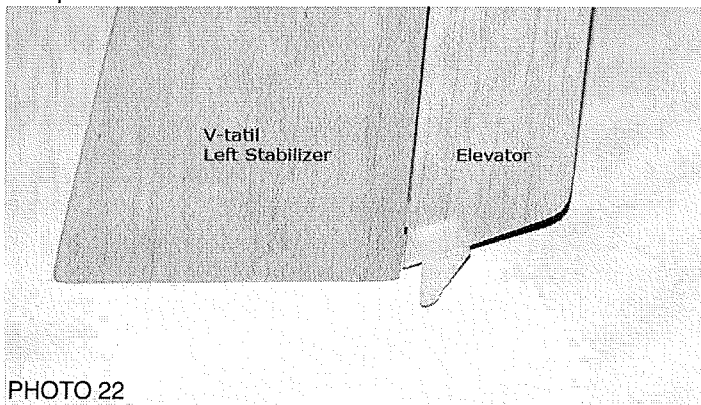


PHOTO 22

## Tail boom, Pushrods & Radio installation (glider)

**Note: To prevent excess weight we suggest using "Z" bends at both ends of the pushrod wire.**

1. Clean the joiner tip of the fuselage pod with sand paper.
- PHOTO 23 Trial fit the boom with the pod and check the alignment.

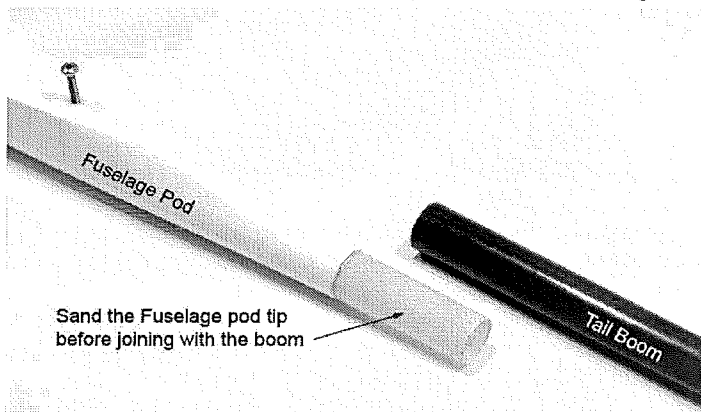


PHOTO 23

2. Install the elevator and rudder pushrod housings and pushrods. Once the pushrod placement is finalized, glue the housing tubes with epoxy inside the boom to prevent flexing. PHOTO 24

**Do not attach the housings inside the fuselage pod yet.**

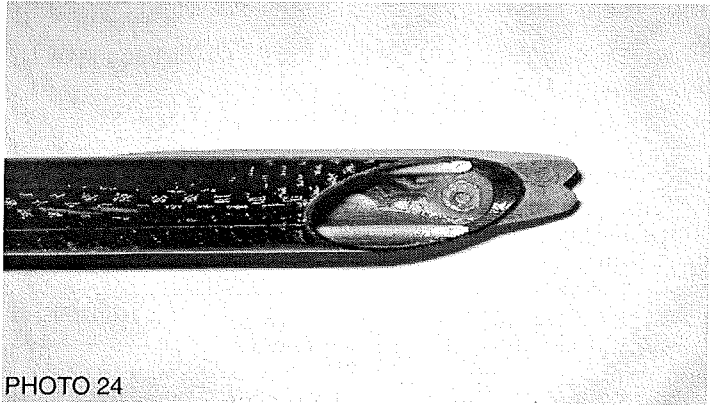


PHOTO 24

3. Attache the wing, the V-tail and trial connect the boom to the pod, then fit your radio gear in the pod to find the best placement. Try to position your radio components far forward to achieve proper balance and to minimize use of nose weight. Use glider drawing as a starting point. PHOTO 25

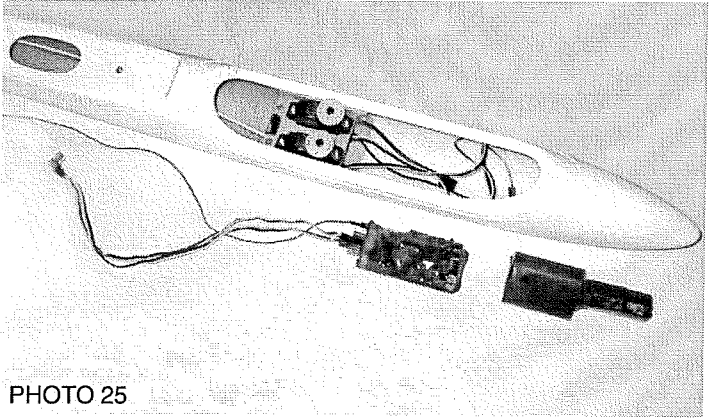


PHOTO 25

4. Once proper radio position has been find, glue the boom in place using 5 Minute Epoxy. Look along the fuselage from the nose while the glue is still soft, and rotating tail boom align tail with the wing very carefully before epoxy cures.

5. Glue the pushrod housings to the inside of the fuselage pod in one or two spots.

6. Place the control surfaces and radio gear in neutral. Make "Z" bends in the pushrod wires ends, then connect the pushrods to the servo arms. Now mount the servos (HS-65MG) inside the pod.

7. Before flight, double check balance and control throw direction for free and proper movement.

## Motor mount / Bulkhead installation

1. Cut the nose of the fuselage appropriate to the size of the spinner you are going to use for the glider (measurements are shown on the drawing).

2. Cut circular bulkhead plate from the plywood or other desired material in diameter to fit **4-5mm** deep into the nose opening.

Drill the appropriate holes in the bulkhead plate to accomadate the drive unit. PHOTO 26

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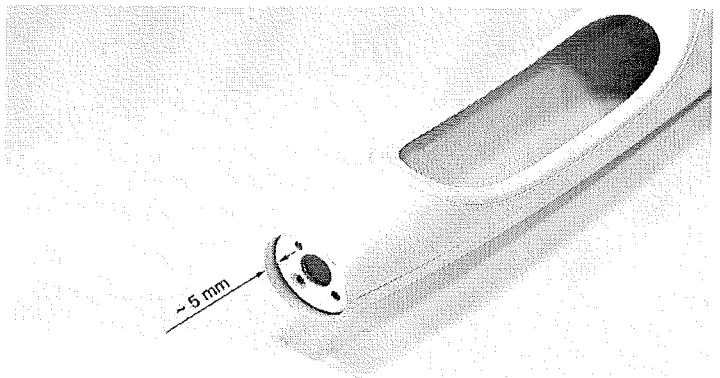


PHOTO 26

3. Generously spread epoxy where the motor mount/bulkhead will go into the fuselage, and on the edge of the circular mount.

4. Insert the bulkhead approximately **4-5mm from the edge** into the nose opening.

The epoxy inside the fuselage where the bulkhead is installed will be pushed behind plate as it's inserted, forming a reinforcing bead of epoxy around the edge of the plate.

Spread a bit of extra epoxy, if necessary (from the outside) around the junction of the bulkhead and fuselage to seal and strengthen the joint.

5. When the epoxy hardens cut four ventilation holes (similar way as shown on the photo): two on both sides of the nose and two on both back sides of the canopy, this will not abstract aerodynamics of the pod and allow the cooling air to pass through PHOTO 27.

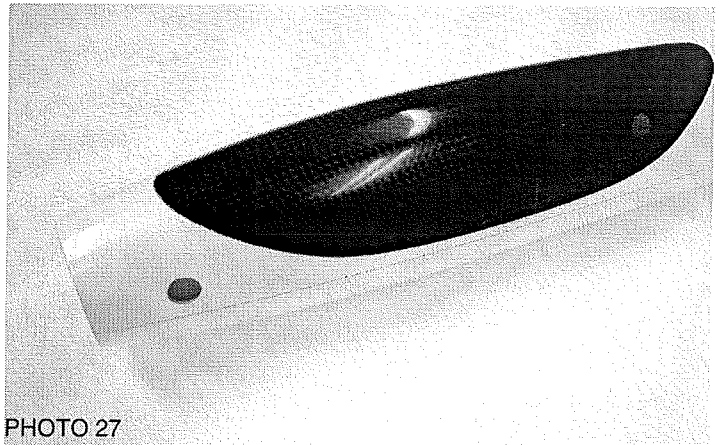


PHOTO 27

5. Attach the drive unit (with speed controller connected) to the motor mount/bulkhead, then temporarily attach spinner with mounted propeller blades and check if all fits well. PHOTO 28

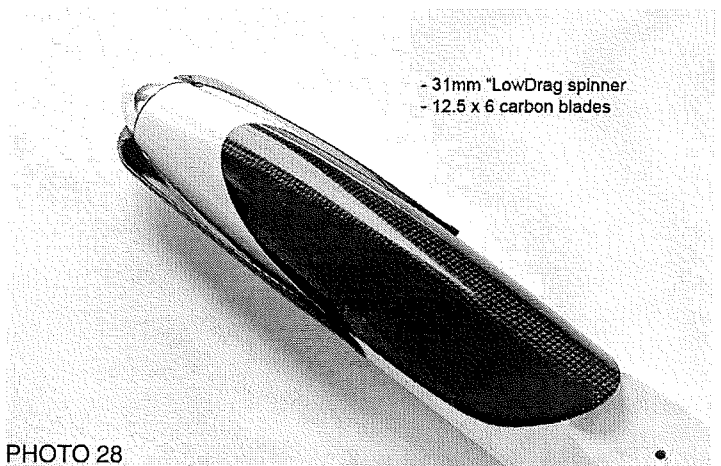


PHOTO 28

## Pushrods & Servo installation (electro-glider)

1. Clean the joiner tip of the fuselage pod with sand paper.
- PHOTO 23 Trial fit the boom with the pod and check the alignment.
1. Check the length of the boom, and trim if necessary referring to the drawing.
2. Cut opening in wing saddle. PHOTO 29

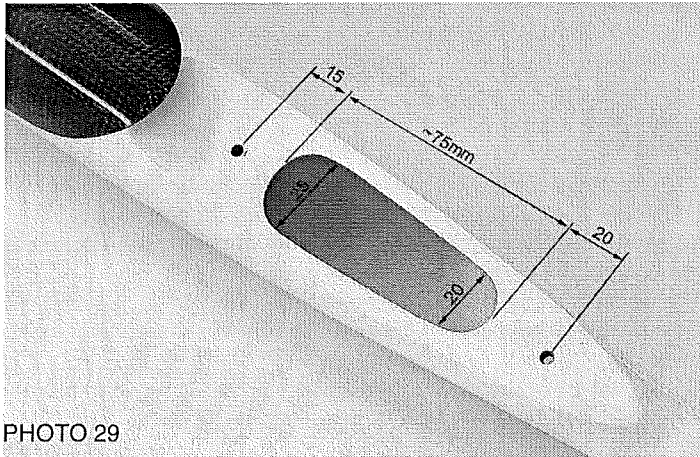


PHOTO 29

4. Install the elevator pushrod housings and pushrods. Connect the pushrod wires to the elevator control horns.
5. Once the pushrod placement is finalized, glue the housing tubes with a dab of epoxy inside the end of the boom.
6. To secure the pushrod housing inside the boom you can make a plug approx. 19mm in diameter from **soft balsa** and in the center of it drill two holes for the pushrod tubes.
- Plug size should allow to be FREELY pushed inside the thicker side of the boom approx. 75mm in. (~65mm is the pod tip length)**
- Now place the plug over the pushrod tubes and slide it inside the boom 75mm deep, then put 2-3 drops of CA to adhere the tubes to the plug and plug to the boom inner wall.
7. Trial connect the boom to the pod.
8. Place the elevator servos (recommend HS-65HB) temporarily inside the pod. Use glider drawing as a reference point. Once proper servos position has been finalized, mark it precisely and remove the tail boom.
9. Install the servos in the marked position inside the pod. **(We recommend installing the servos with use of plywood tray epoxy inside the pod).** PHOTO 30

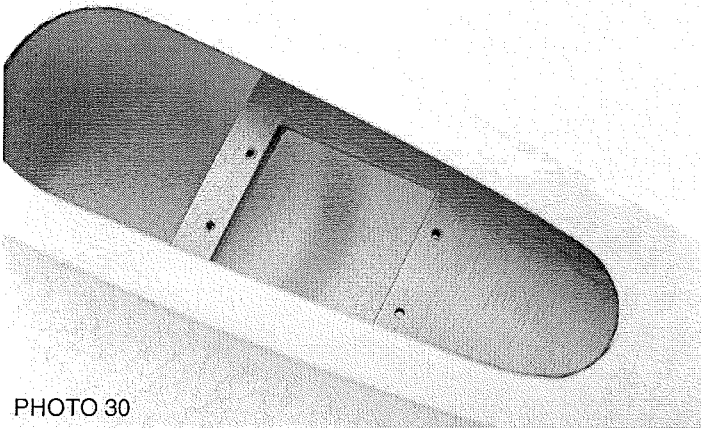


PHOTO 30

(The servos also may be attached to the bottom of the pod using silicone adhesive)

10. Now In preparation to connect elevators pushrod wires to the servo arms:

- Use masking tape and tape both elevators in neutral position
- Trial connect the elevator servos to the receiver, turn the radio ON and find servos neutral position.
- 11. Connect the boom to the pod and mark the pushrod housing tubes approx. 30mm away from the servo arms.
- 12. Remove tail boom and carefully cut the pushrod tubes on the mark (use hobby knife).
- 13. Reconnect the boom to the pod and mark each pushrod wire over the servo arm hole for the "Z" bends to be made.
- 14. Remove tail boom and cut the pushrod wires appropriately then make the "Z" bends.

15. Remove the servo arms from the servos and connect to the "Z" bended pushrod wires.

Now connect the boom to the pod and trial connect the servo arms to the servos.

16. If satisfied with the fit, remove the servo arms from the servos and disconnect the boom from the pod.

17. Mount the wing to the pod and glue the boom to pod with 5 min. epoxy.

Look along the fuselage from the nose while the glue is still soft, and rotating tail boom align the tail with the wing very carefully before epoxy cures.

18. After epoxy cures, remove the wing, connect the servo arms to the pushrod wire then connect it to the servo and secure with the servo arm screw.

19. Glue the pushrod housings to the inside of the fuselage pod in one or two spots.

20. Finalize all radio and drive gear installation.

21. Before flight, double check balance and control throw direction for free and proper movement.

### Starting control throws:

**AILERONS:** 15mm UP, 10mm DOWN, 17 - 26mm CROW

**SPOILERON:** 26mm UP (break)

**FLAPS:** 7mm TOWING, 20 - 26mm CROW

**ELEVATORS :** 8 degrees in each direction

**RUDDER:** 7 - 12 degrees

### BALANCE POINT (C.G.):

*The completely assembled glider must balance level when raised at the marked "C.G." point under the wing roots, a tolerance of 5mm back and forward of marked position is permissible.*

*Balance the Evolution ~70mm back from the leading edge of the wing at the center section.*

22. Try some hand launches and straight glides over a grass field before high launching the glider. This will be a good time to adjust control throws and final balance.

### NOTE:

*Control throws and glider C.G. are quite subjective according to the flying conditions and pilot's preferences. These throws are simply a starting point. Experimentation is recommended to achieve a smooth flying plane you are comfortable flying.*

## Attaching Canopy

We recommend attaching canopy with two pieces of clear scotch tape adhered to both sides of canopy. To access the interior, simply peel off tape on one side (other side will act as a hinge). This is good for opening the canopy a few times, then tape has to be replaced. This is a simple and very dependable method. There is no danger for the canopy to be blown off during flight- because canopies of all our gliders are perfectly fitted to their fuselage pods.