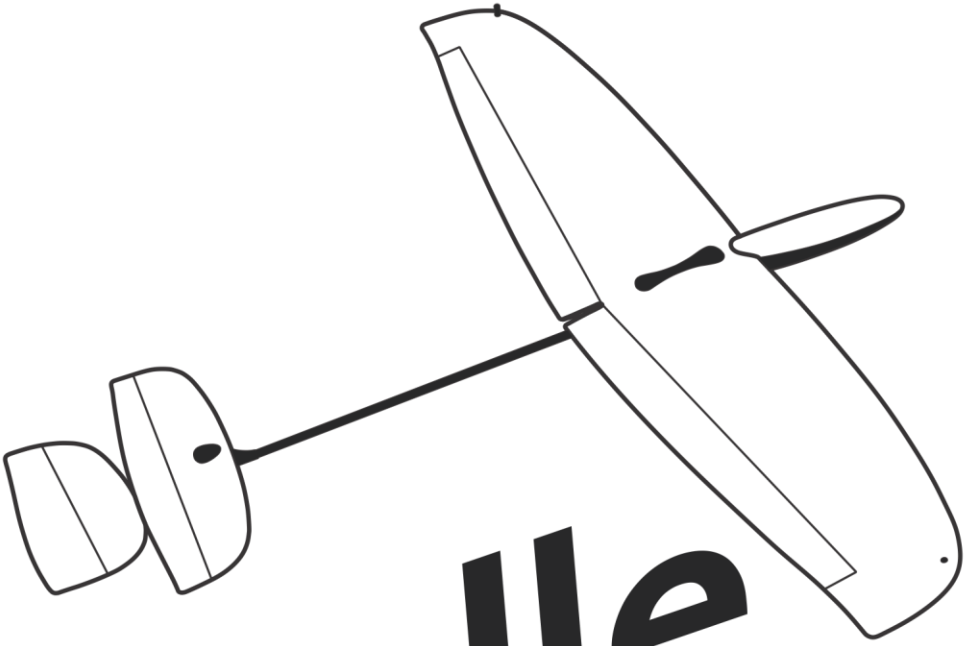
dream-flight®



libelle™

Flight and Assembly Manual

Discus Launch for Everyone!

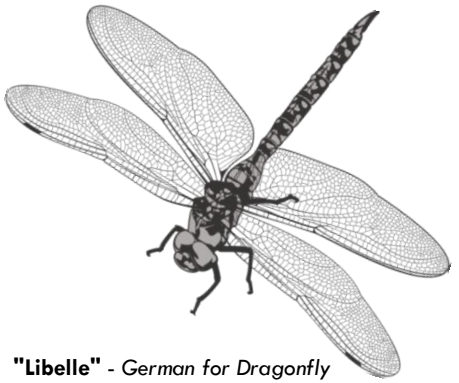
There are few experiences in model aviation more satisfying to the soul than flying an efficient, slow-moving glider that has been launched to soaring altitude by hand. The Libelle takes RC hand-launch glider flying to the next level, building off of the global acceptance of the Alula. Until now, this type of experience had been out of reach for many pilots for a variety of reasons. The Libelle is for everyone; it can be assembled, balanced, and trimmed for flight by pilots of any experience level.

Modern RC Glider Design

ARG - The Libelle is our first ARG design (**A**lmost **R**eady to **G**lide). You'll *get out and glide* faster, as many time-saving tasks have been expertly finished at our factory. Utilizing the most modern materials and foam molding techniques, we have achieved a durable, lightweight, and super smooth airframe that is a huge improvement from the past. The entire model is comprised of proprietary components purpose-designed for the Libelle. For ease of assembly, all essential areas of the model are self-aligning and interlocking.

Launch! Launching the Libelle could not be easier or more accessible. Utilizing clever design by combining injection molded wingtip launch plates and carbon fiber wing spars, the Libelle can be launched "discus style" by both right and left handed pilots. Just slip the included launching peg into whichever wingtip suits your needs.

Designer's Notes - The Libelle's 1.2 meter wingspan is user-friendly and easy to transport (designed to fit across most automobile rear cargo spaces). When compared to the conventional 1.5 meter DLGs, the Libelle's compact wing gives a little more ground clearance for those pilots just developing their discus launch technique. The Libelle packs in a lot of wing area by utilizing a lower aspect ratio wing tuned for slow, turning flight- *perfect for thermalling at low altitude like a bird!* We started from the ground up, fusing in-house airfoil and wing design to provide the Libelle with a wide speed range, great launch performance, and efficient flight behavior. Generous control surfaces provide a nimble control feel that will satisfy even the most experienced pilots.

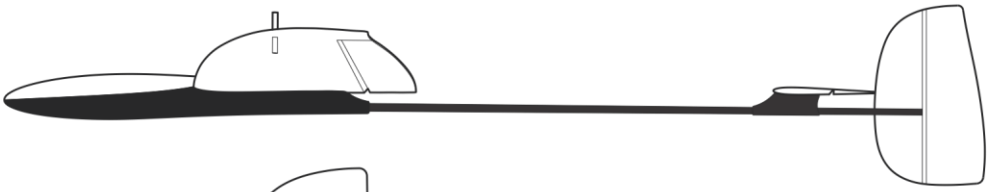


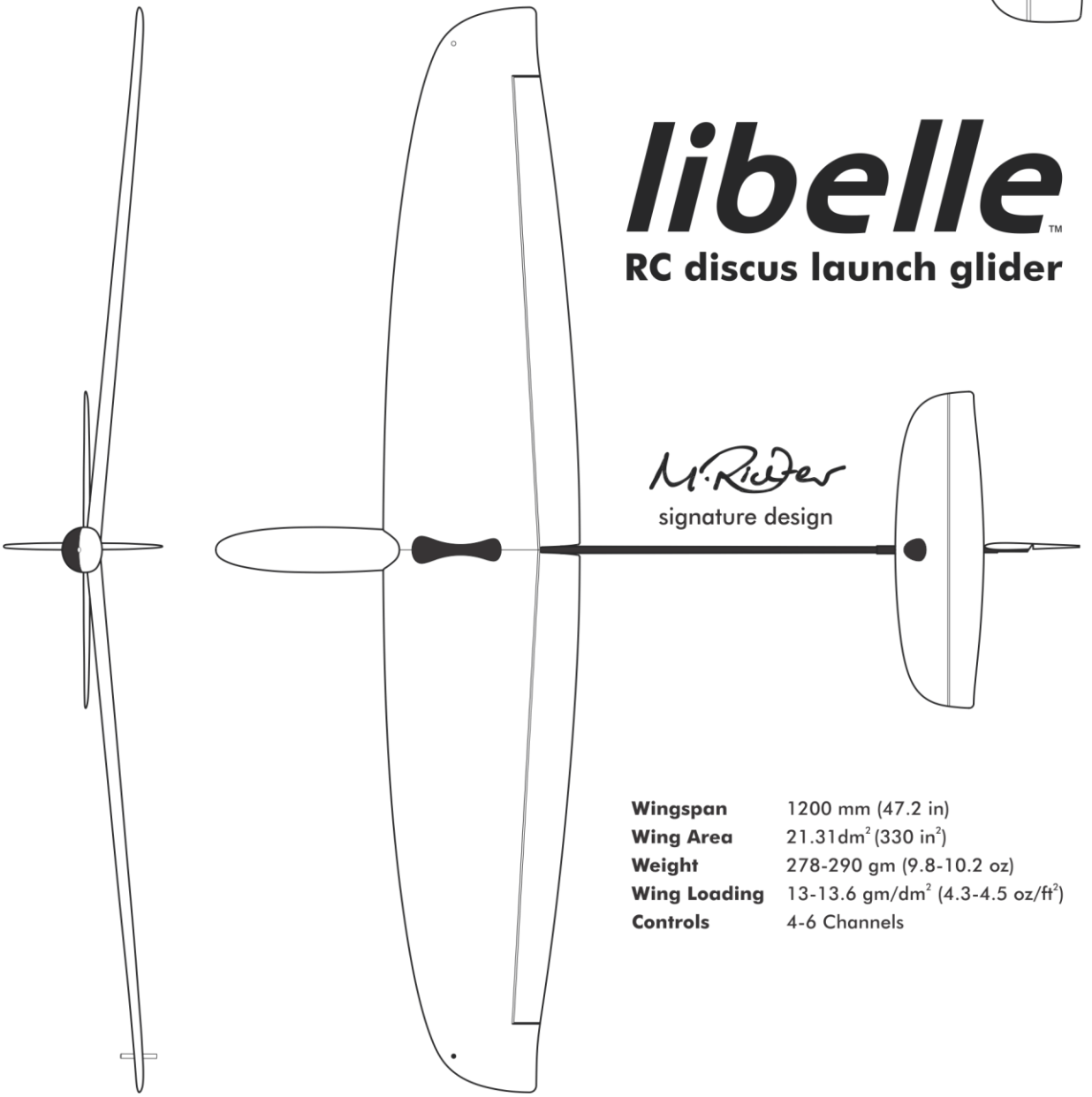
"Libelle" - *German for Dragonfly*

"Libelle"- Why the Name?

Here in the Goleta Valley, we are fortunate to share the air with a very wide variety of flying creatures. One of our favorites, the Green Darner dragonfly, began to appear quite often both physically and symbolically during the development of the Libelle. Watching these dragonflies catch even the slightest bit of air current or lift while not moving their wings was greatly inspiring. The nimble flight characteristics and beautiful shapes resonated deeply with our mindset. It could not have evolved more organically... Libelle- the word for dragonfly in German.

dream-flight®





libelle™

RC discus launch glider

M. Richter
signature design

Wingspan	1200 mm (47.2 in)
Wing Area	21.31dm^2 (330 in^2)
Weight	278-290 gm (9.8-10.2 oz)
Wing Loading	13-13.6 gm/dm^2 (4.3-4.5 oz/ft^2)
Controls	4-6 Channels

CAUTION! READ BEFORE PROCEEDING:

►The Libelle R/C glider is not a toy; a certain amount of experience and practice is required to safely fly this model. We recommend consulting an experienced R/C pilot before attempting to fly this glider. With proper instruction, learning to fly R/C gliders can be a safe and extremely rewarding activity.

►*ALWAYS* fly model aircraft, such as the Libelle, in open areas away from overhead power/telephone lines, groups of people, trees, roads, buildings, and airports.

►*BE CONSIDERATE AND RESPECTFUL!* Always be considerate of passersby, spectators, and other pilots by maintaining a safe distance between them and your aircraft during flight. Choosing a designated safe landing zone is good practice and always give larger, heavier flying models the right of way. Treat flying sites with the utmost of respect and care, as future access to them is by no means guaranteed.

►The discus launch method places a certain amount of physical stress on one's body and glider. Please proceed with caution when attempting this launch method.

►Avoid over-speeding the Libelle by entering "terminal" style vertical dives or applying excessive force during launch, as these actions could result in airframe failure and/or personal injury.

►The Libelle must be assembled, balanced, and trimmed properly to ensure smooth, efficient flight. Poor balance and trim WILL lead to poor flight characteristics.

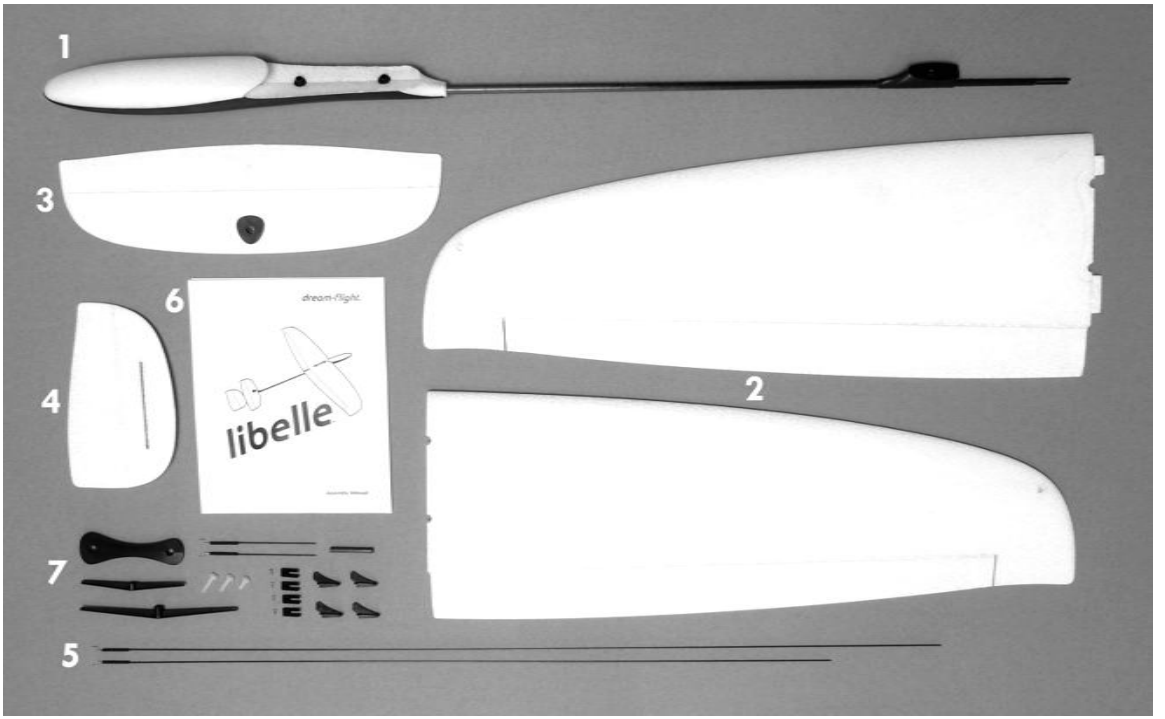
►Do not store glider in areas of excessive heat, as this may cause foam parts to warp/deform, thus adversely affecting the flight characteristics. Additionally, never place objects/weight on glider during storage and transport unless foam parts are properly supported to prevent warping.

TABLE OF CONTENTS

To familiarize yourself with the assembly process, we recommend reading over this manual before proceeding with final assembly.

When assembling your Libelle, make sure to check out the HOT TIPS found throughout this manual!

KIT CONTENTS



ITEM	DESCRIPTION
1	**Fuselage and Canopy**
2	**Wing Panels (Left/Right)**
3	**Horizontal Stabilizer/Elevator**
4	**Vertical Fin/Rudder**
5	**Elevator/Rudder Pushrods**
6	**Manual**
7	**Small Hardware Bag Contents:** (2)Wing Dihedral Braces (Front/Rear) Wing Center Plate (3) Nylon Bolts for Wing and Stabilizer: 20mm, 15mm, 10mm (2) Aileron Pushrods (4) Control Horns (4) Clevises with micro screws Carbon fiber launching peg

Spare Parts
available at
dream-flight.com

ITEMS REQUIRED FOR COMPLETION (not included)

Radio Gear:

- Programmable 6 channel radio system with flaperon mixing *(see chart for transmitter suggestions)*
- Micro receiver, 4-6 gram weight *(see chart below for receiver suggestions)*
- (4) Sub-micro servos *(Part DFFA005 recommended, or purchase our Libelle flight pack, Part DFFA007)*
- (2) Lightweight aileron extensions, 120mm long *(Part DFLB109)*
- Receiver battery: 4.8V 300mAh 1/3AA NiMH *(Part DFFA001)*

Adhesives and Tape:

- Medium instant glue ("CA" or Cyanoacrylate glue)
- Hot glue gun (use only low temperature craft variety)
- 20-25mm (1") wide painters masking tape – *we like the blue or green stuff by 3M!*
- 20mm (3/4") wide clear, non-yellowing office tape

Tools and Extras:

- Small screwdrivers (both Phillips and flathead styles)
- Small wire or nail clippers
- Small needle-nose pliers
- Scissors and sharp hobby knife
- Ruler or measuring tape
- Right angle (90°) square
- Thin permanent marker
- Small balance weights - try our *non-lead* Steel Balance Weights *(Part DFAA002)*
- Paper towels for cleaning glue excess
- A bit of fine grit sandpaper

Optional:

- Wing reinforcement decal *(Part DFLB111)*
- Double-sided tape for servo and radio gear installation (thin variety without foam)
- Packing tape and strapping tape for airframe reinforcement and repair
- Acrylic paints - add your personal style! Remember to clean foam with denatured alcohol first.

Suggested Transmitters and Receivers:

	Transmitters	**Receiver**
Futaba	T6J, ***T8J**	***R2106GF**
Hitec	Optic 6 Sport, Aurora 9	Minima 6L

**We used the Futaba T8J 2.4GHz transmitter and Futaba R2106GF receiver for our own setup. The R2106GF receiver's extremely short antenna makes installation a breeze! The T8J transmitter features a special built-on antenna for durability, and boasts easy to use, yet very comprehensive, programming features.*

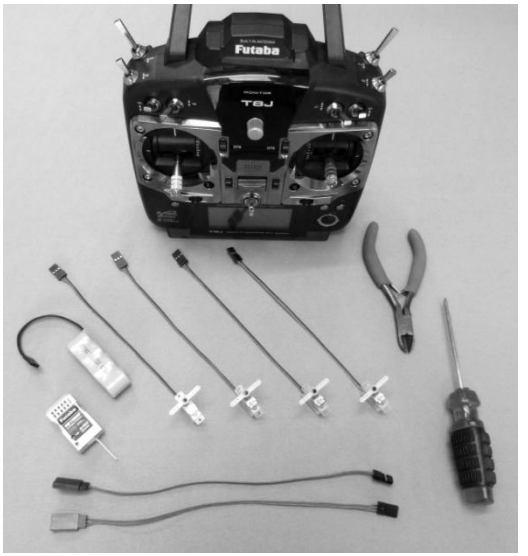
RADIO GEAR SETUP

►Our setup and installation guide is based on the use of our 4.3g digital servos (Part DFFA004). We have included the exact measurements needed to recreate our setup if you choose another brand of servo. Additionally, we highly recommend using a programmable radio with flaperon mixing.

Note: Have tools accessible throughout assembly. Only glider parts, adhesives, etc are listed in the "Gather Items Below" section.

Gather items below:

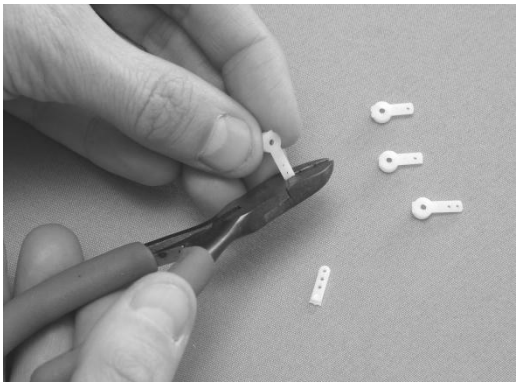
- Transmitter (battery fully charged)
- Micro receiver
- (4) Servos with 4 skinny servo arms *(Part DFFA005)*
- (2) Lightweight aileron extensions, 120mm long (Part *DFLB109)*
- 4.8v, 300mAh receiver battery (fully charged)



1. Gather four skinny servo arms. Place tiny screws in a safe place.

2. Using small wire clippers, trim away one side of all four skinny servo arms as shown.

3. Trim two servo arms to have only one hole remaining, as shown (these will be used for the elevator and rudder servos). For the aileron servos, trim the two remaining servo arms down to two holes as shown. If desired, sand or file down the sharp corners.



4. Attach aileron extensions to two servos.

5. Turn on transmitter and plug battery into receiver (observe proper polarity!).

6. Activate flaperon mixing (consult your radio manual for details).

7. Connect all servos to appropriate receiver channels. Confirm system is bound and servos are responding.

8. Ensure all trims and sub-trims are centered and set to zero.

9. Arrange servos on table and attach shorter servo arms to elevator and rudder servos. Attach longer servo arms to aileron servos. **IMPORTANT: Servo arms must be installed in the orientations shown below to ensure proper function.**

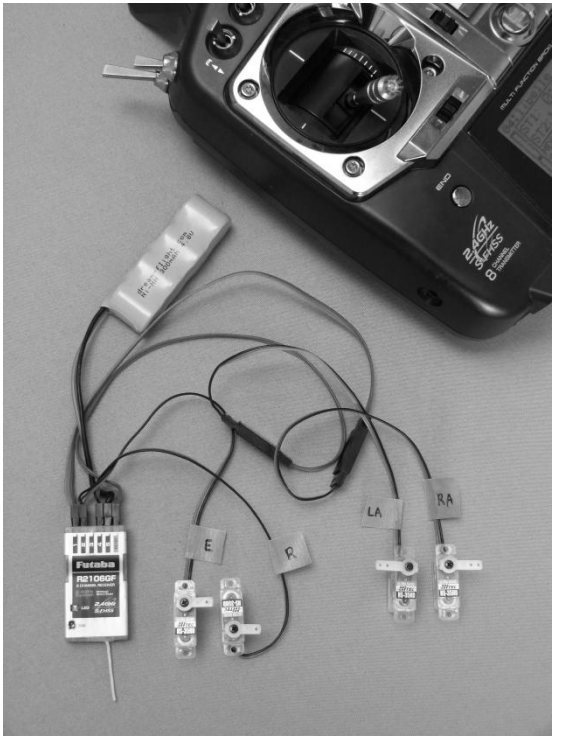
10. Referring to graphic below, check for correct servo rotation direction. If needed, reverse servo directions using transmitter.

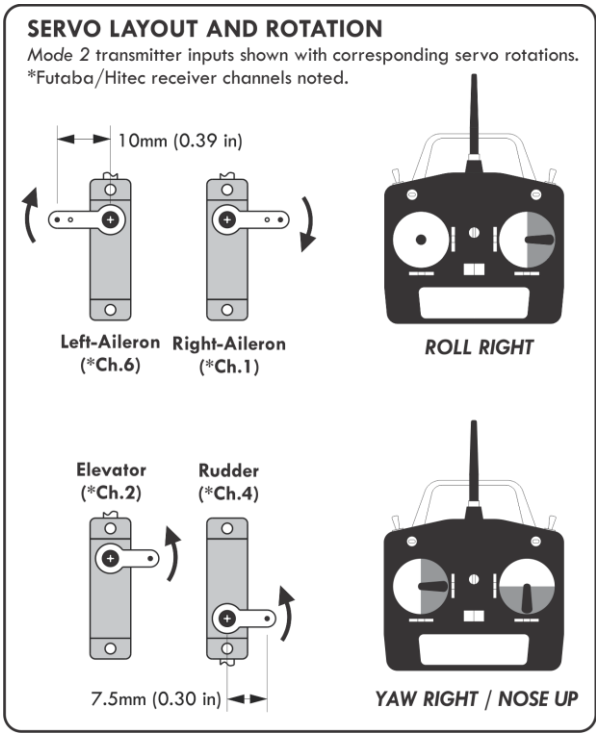
11. If necessary, adjust sub-trims so servo arms are at 90 degrees as shown.

12. With a bit of tape, label each servo for future reference during installation (i.e. LA, RA, E, R).

13. Re-install four tiny screws to secure each servo arm.

14. Unplug servos from receiver and power down transmitter and receiver.





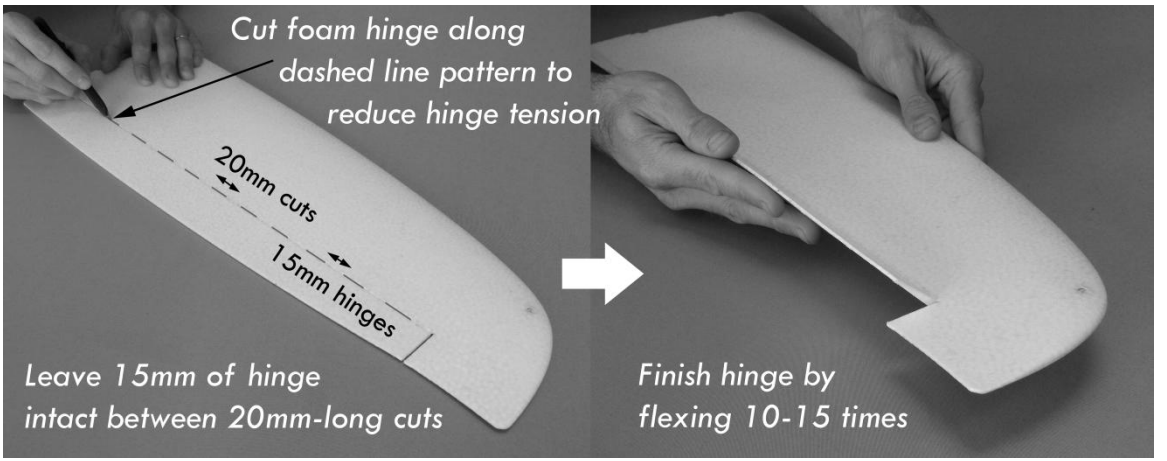
WING ASSEMBLY

►***IMPORTANT!*** Joining the right and left wing panels is the most critical and difficult part of assembly. We strongly encourage you to practice the steps below first WITHOUT glue. Once you are comfortable with the steps, proceed with glue.

Gather items below:

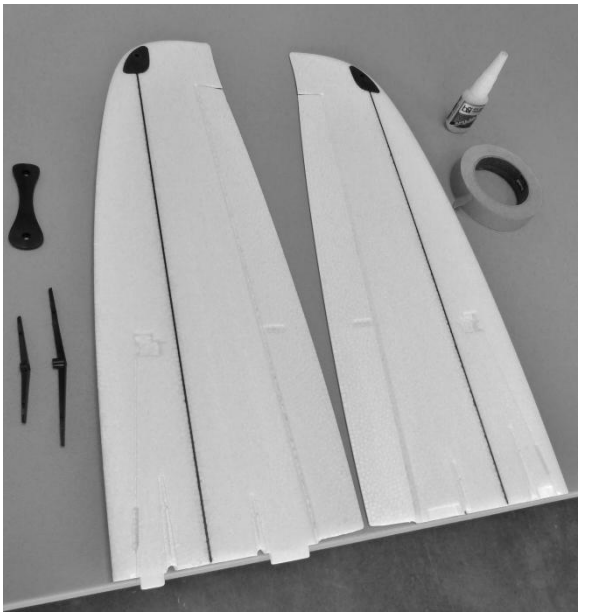
- Wing Panels (Right/Left)
- Dihedral Braces (Front/Rear)
- Wing Center Plate
- (2) Control horns
- (2) Aileron servos
- (2) Aileron servo extensions
- (2) Aileron pushrods
- (2) Adjustable clevises with clamping screws
- Masking tape
- 20mm (3/4") wide clear, non-yellowing office tape
- Medium instant glue
- Paper towel

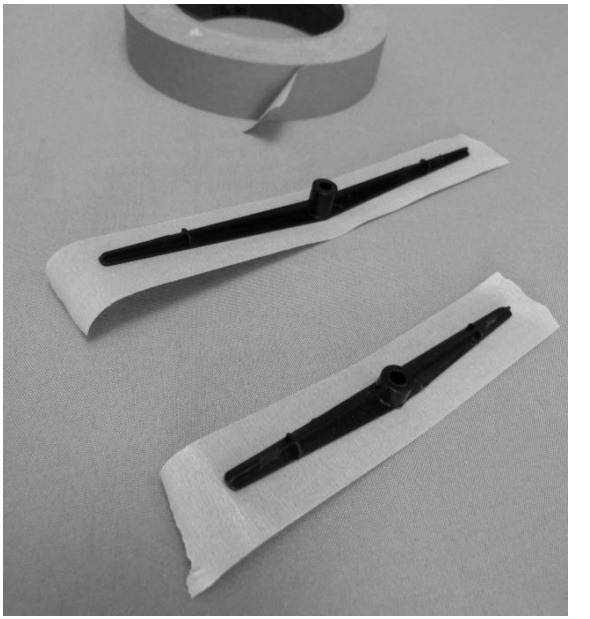
1. Enhance control response and reduce servo load by making 20mm-long incisions along foam hinges using a sharp hobby knife. Alternate, leaving approximately 15mm of intact hinge material between incisions (imagine a dashed line cut pattern as shown below). Make sure to leave 20mm of intact hinge material also at each end of control surface. Flex foam ailerons 45 degrees in each direction 10-15 times to loosen hinge action. Feel free to prepare the hinges on Horizontal Stabilizer and Vertical Fin in same manner (set these aside for later).



2. Place right and left wing panels on table as shown below, upside down with wing roots (centers) aligned with edge of table.

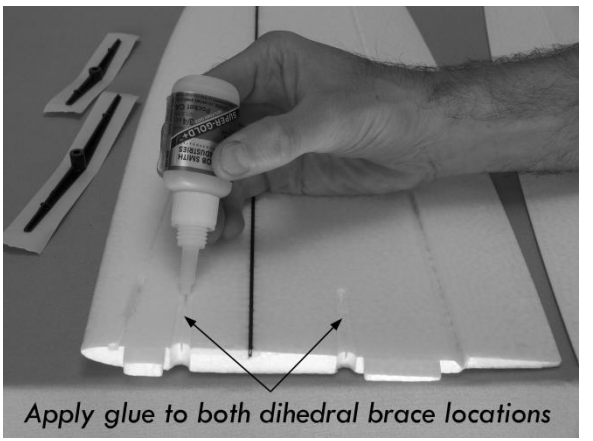
3. Apply masking tape to flat side of each dihedral brace as shown. Tape should be slightly longer than each brace.



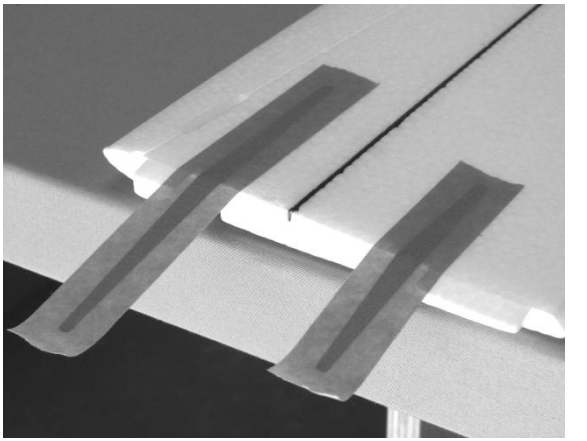


4. Apply a small bead of medium instant glue to front and rear dihedral brace recesses on bottom of **left** foam wing panel as shown.

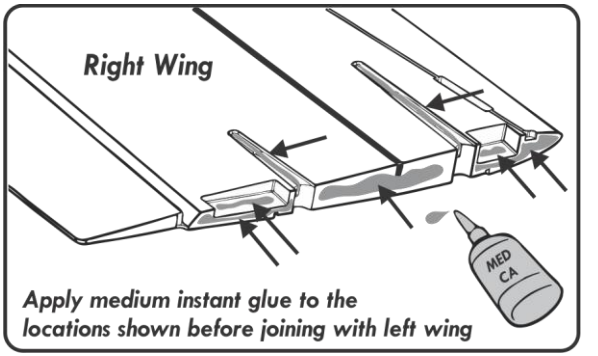
5. Insert longer Front Dihedral Brace into molded dihedral slot in **left** foam wing and press firmly in place. Using your finger, secure masking tape over glue joint, ensuring brace is flush in wing. Install shorter Rear Dihedral Brace in same manner as shown below.



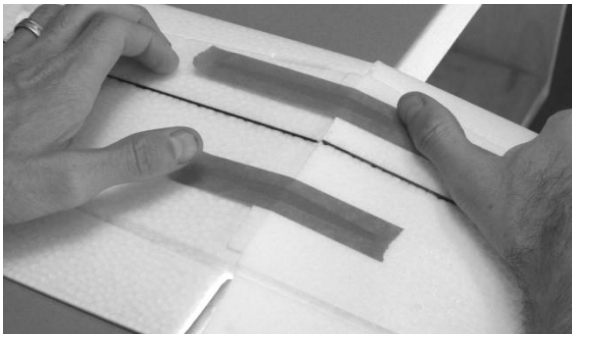
Apply glue to both dihedral brace locations



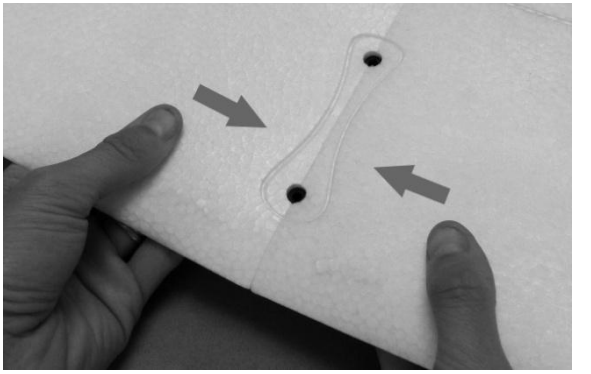
6. Apply medium instant glue to areas of **right** foam wing shown in graphic to the right. Glue is applied to the following locations on **right** wing only: molded recesses for dihedral braces, alignment tab recesses, and adjoining wing root face areas. Avoid applying glue excessively.



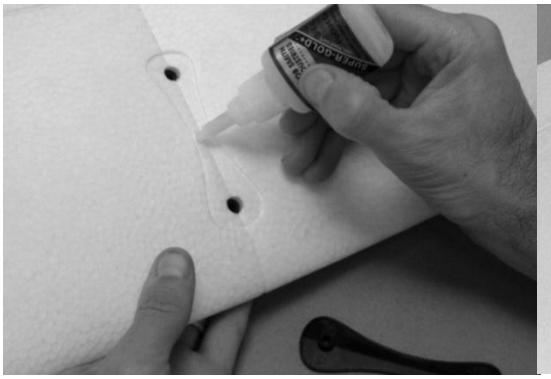
7. Pick up **left** wing with pre-installed dihedral braces and join with **right** wing by lowering it into position, allowing dihedral braces and foam alignment tabs to locate and align. Press wing joint together. Using your finger, smooth over pre-applied masking tape to lock wing panels and dihedral braces in position and contain excess glue.



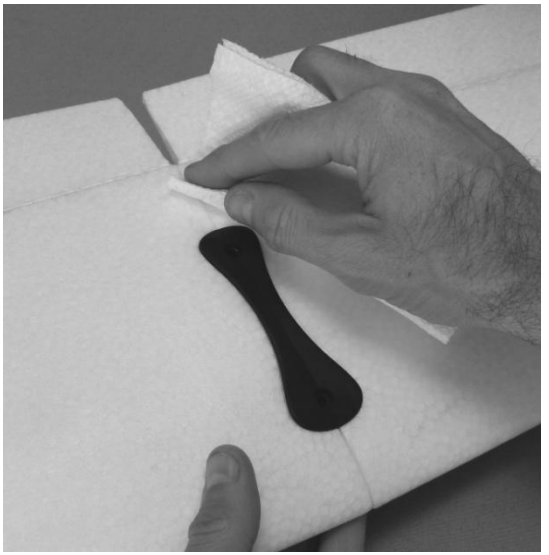
8. Flip wing over and press center joint together as shown. Ensure wing panels are in proper alignment and hold for 15-20 seconds. While supporting wing carefully, inspect entire center wing joint. Continue to apply pressure to center wing joint ensuring a tight joint and good adhesion.

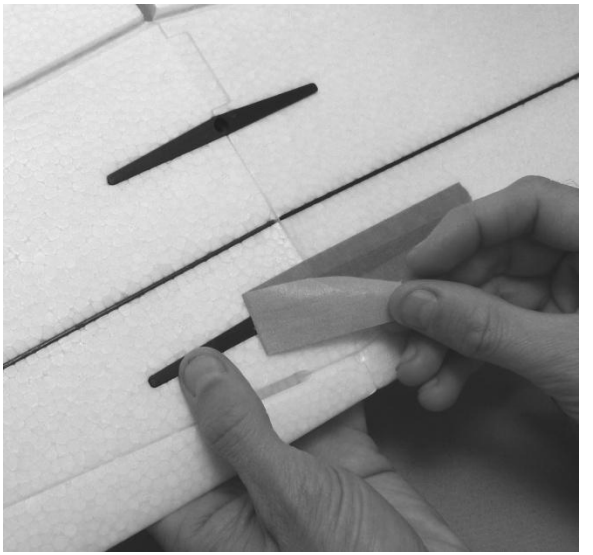


9. As shown in the sequence below, apply medium instant glue to molded recess for Wing Center Plate. Apply glue to flat area of recess as well as deeper perimeter channel. Lay one wing half flat against table while supporting the raised wing with one hand to maintain dihedral. Now firmly press Wing Center Plate in place, applying pressure for 15-20 seconds as shown.

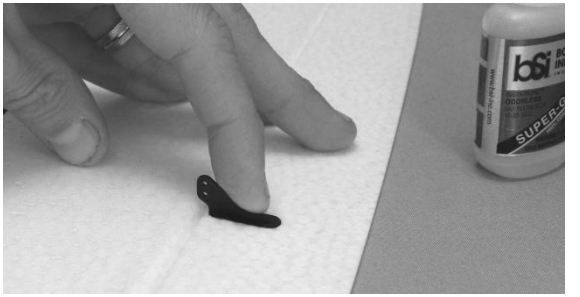


10. Wipe away excess glue along entire wing joint and around Center Wing Plate. Turn wing over and carefully remove masking tape covering dihedral braces.





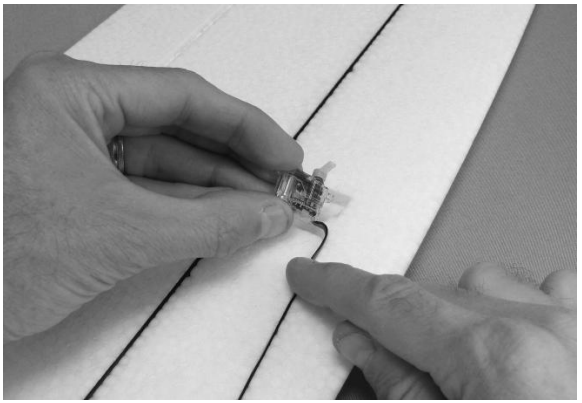
11. Locate control horn recess on underside of each aileron. **NOTE:** the two holes on each control horn should face forward towards the molded servo pockets. As shown below, apply medium instant glue to recess and press control horn in place, applying pressure for a few seconds until glue has set. Wipe away excess glue.

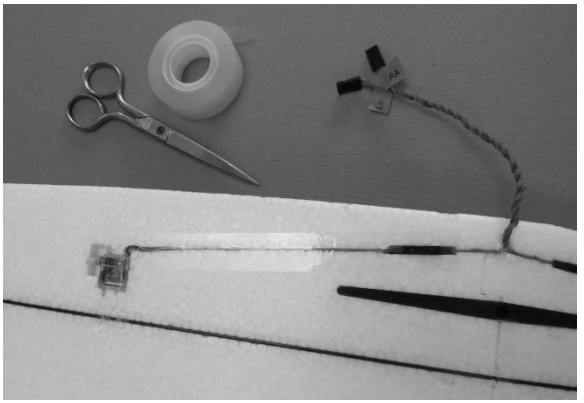


12. Before proceeding, ensure aileron servos are centered, labeled, and extensions are installed. Test fit aileron servos in their appropriate molded pockets, with the servo arm oriented vertically and centered.

13. Remove servos and securely re-install using a drop or two of medium instant glue, thin double-sided tape, or low-temperature hot glue.

14. Press the servo wires and extensions neatly into the provided channels. If you have chosen the Wing Reinforcement Decal option (Part DFLB111), apply this now. Otherwise, apply a piece of clear packing or office tape over each servo and extension wires. ***Wing Decal Tip:*** For easier application of Wing Reinforcement Decal, mist the foam wing surface with a spray bottle to allow decal to "float" into position. Use a spray solution of 4 drops of dish soap per quart, or liter, of water. Once decal is in position, use a combination of your fingers, cloth, or a very soft squeegee to apply pressure from the middle to the edges (this will remove the solution and allow adhesive to come into contact with foam).





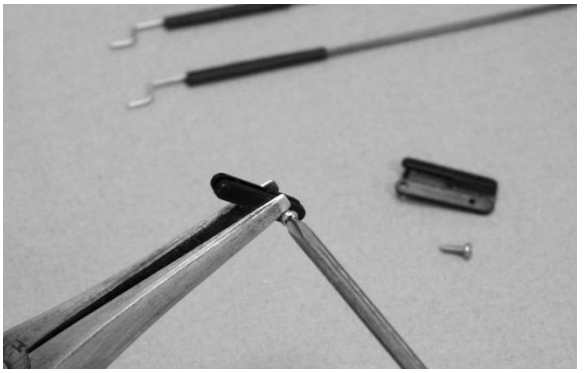
15. Prepare two clevises by folding sides together, creating a slot where the pushrod will be clamped. With clevis folded, install small clamping screw through each clevis. Do not tighten screw at this point.

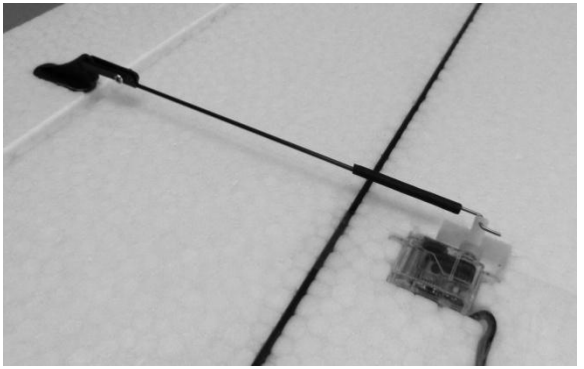
16. Slide clevis onto end of each aileron pushrod. You may have to loosen clamping screw slightly to allow clevis to slide onto pushrod end.

17. Insert wire "Z-Bend" side of each aileron pushrod into outermost (second) hole of servo arms.

18. Adjust and install clevises to align with outermost hole of aileron control horns.

19. With aileron servo arm centered, center and align aileron flight surface with wingtip. Adjust clevises as necessary and tighten clamping screws until pushrod is secure. Do not over-tighten clamping screw; when properly tightened, tip of screw should only protrude slightly from side of clevis.

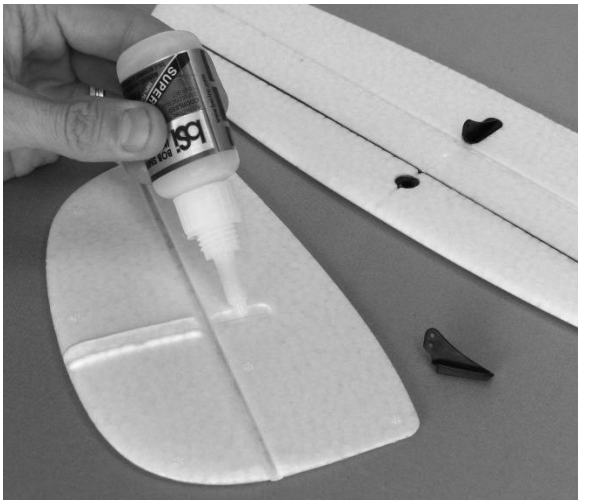


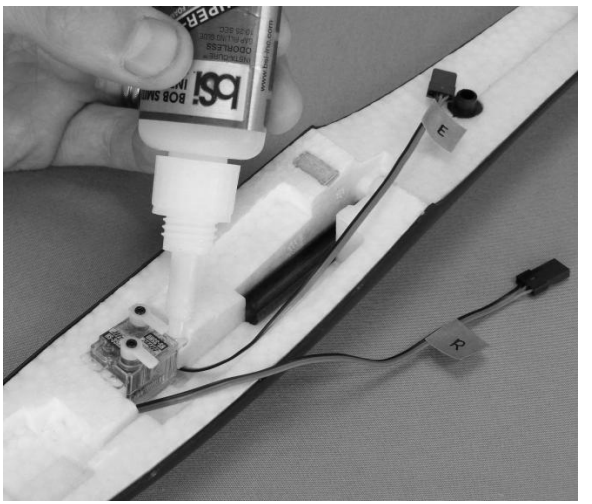


FUSELAGE AND TAIL ASSEMBLY

Gather items below:

- Fuselage
- Horizontal stabilizer/elevator
- Vertical fin/rudder
- Elevator pushrod
- Rudder pushrod (longest)
- Elevator and rudder servos
- (2) Control horns
- (2) Adjustable clevises and clamping screws
- Nylon elevator bolt (10mm long)
- Medium instant glue
- Paper towel
- *Optional* double-sided tape for battery and receiver mounting





1. If you haven't done so already, prepare rudder and elevator hinges using the same procedure described in Step 1of Wing Assembly (Page 5). This will help enhance control response and reduce servo load.

2. Install control horns in elevator and rudder as shown, with holes facing hinge. Apply medium instant glue to recess and press control horn in place, applying pressure for a few seconds until glue has set. Wipe away excess glue.

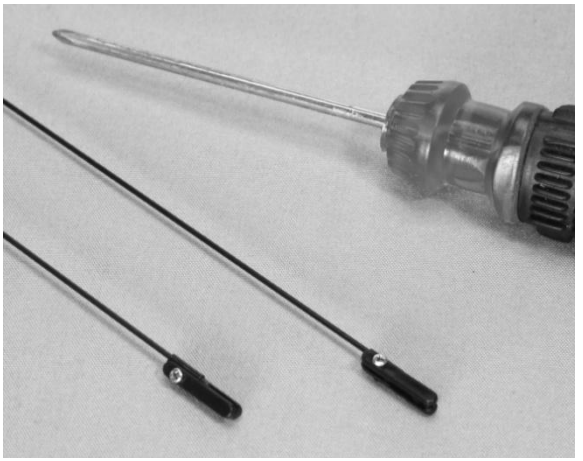
3. Test fit elevator and rudder servos in fuselage by sliding into position sideways. Before proceeding, confirm servo fit, orientation, and servo arm positions as shown. **IMPORTANT: Elevator servo is slid into place before rudder servo, with servo arm towards rear as shown.**

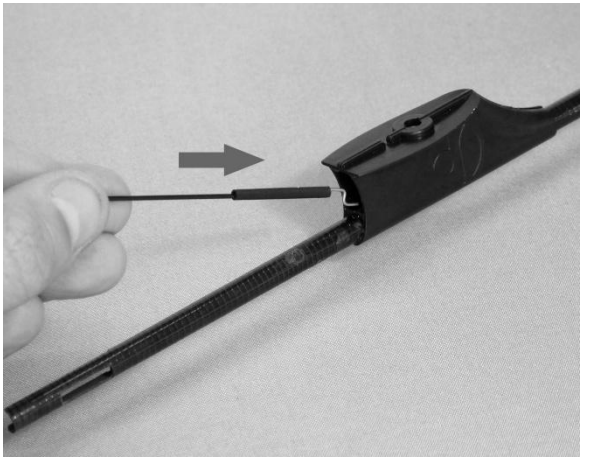
4. Securely install elevator and rudder servos by applying hot glue or a drop or two of medium instant glue beneath all four servo mounting tabs. Ensure glue penetrates underneath tabs and servos fit tight against each other and surrounding foam. Apply a little pressure to servos for several seconds as glue sets.

5. Prepare two clevises for elevator and rudder pushrods.

6. Attach a clevis to each pushrod as shown below.

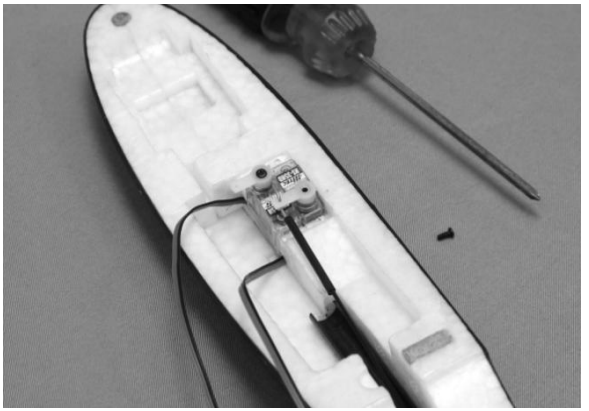
7. Feed Z-Bend end of shorter pushrod through rear of elevator mount at angle as shown below. Slide pushrod all the way forward through tail boom for connection with elevator servo arm.

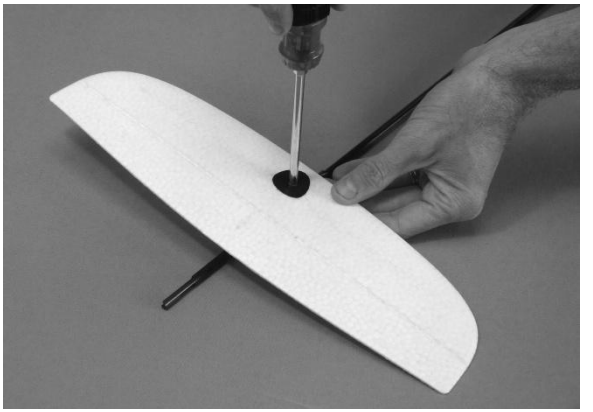




8. Remove elevator servo arm and attach to pushrod Z-Bend as shown below. You may need to use small needle nose pliers to grab the pushrod. Reinstall servo arm and replace screw. **IMPORTANT: Elevator and rudder pushrods must hang BELOW servo arms for proper clearance.**

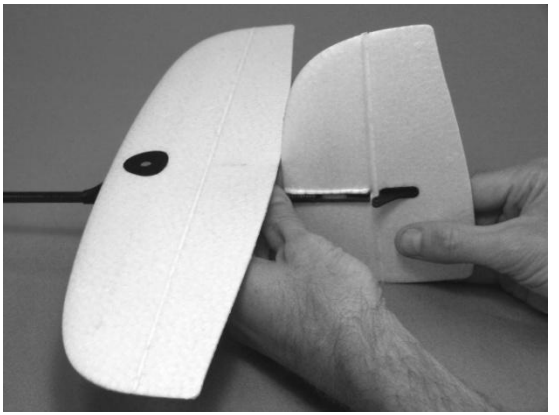
9. Make note of alignment tab on top of elevator mount. Align horizontal stabilizer on mount and secure with nylon elevator bolt (10mm-long). Do not over-tighten nylon bolt. If bolt thread feels tight, de-burr tip of bolt using sandpaper.



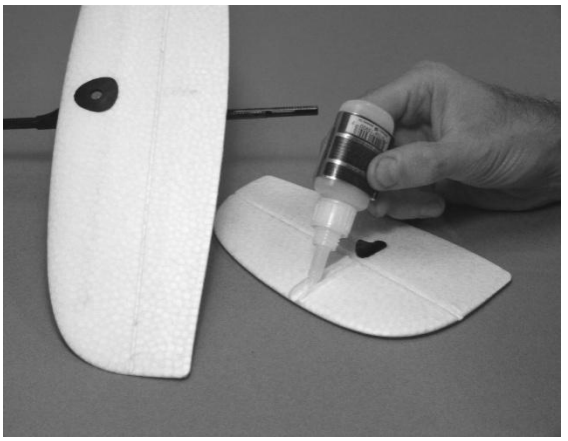


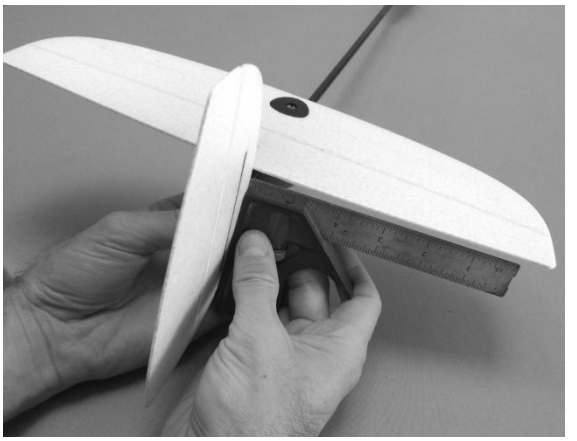
10. As shown below, attach clevis to elevator control horn at outermost hole. If necessary, use a small flat-bladed screwdriver to spread clevis apart. If you are having difficulty, try removing stabilizer to make clevis connection easier (re-install stabilizer after connection has been made). **IMPORTANT: Clevis must be installed with correct orientation (screw head on right side of tail boom) for sufficient pushrod clearance**. You may need to loosen clevis clamping screw to allow pushrod to slide freely in clevis for adjustment. Do not tighten clamping screw yet.

11. As shown below, test fit vertical fin onto tail boom. Note foam index tab on fin which aligns with tail boom, providing correct positioning.



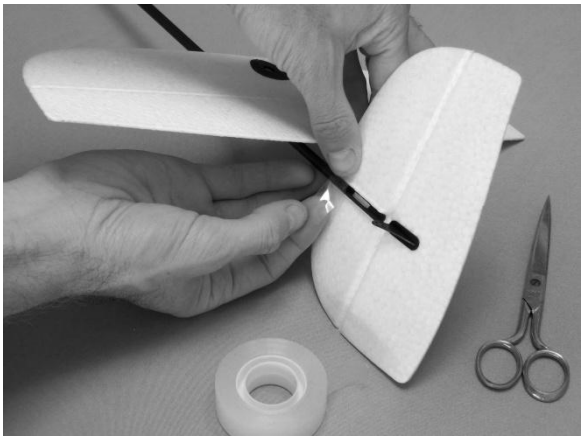
12. When gluing fin onto tail boom, ensure fin is mounted at 90 degrees to horizontal stabilizer. Apply medium instant glue to cutout in vertical fin as shown below. You can substitute 5-minute epoxy for more working time and a stronger joint. Lightly press vertical fin onto tail boom while aligning index tab with tail boom cutout. Looking from rear of glider as shown below, ensure fin is mounted 90 degrees to horizontal stabilizer using a 90° square - ***adjust fin as needed before glue sets!*** When fin is perfectly vertical, apply pressure to glue joint for several seconds or use painter's tape to hold fin in place while glue cures. Wipe away any excess and allow glue to cure for several minutes before proceeding.

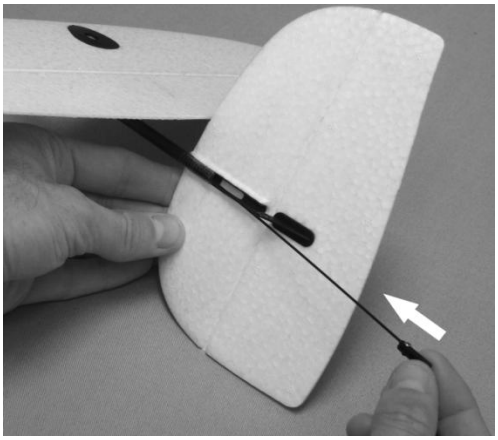




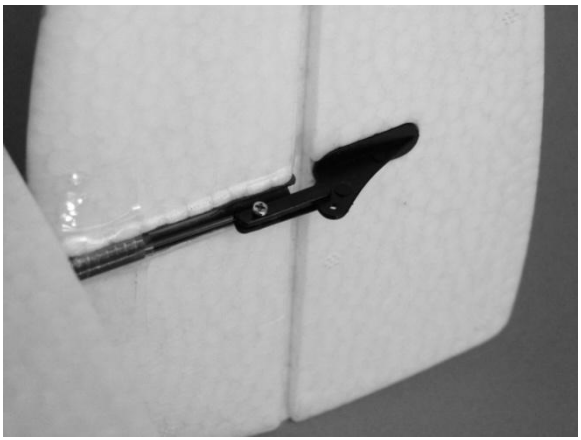
13. For added strength, apply a small strip of clear tape over tail boom and overlapping onto fin (see below). The tape should not cover pushrod cutout in carbon tail boom.

14. Feed Z-Bend end of longer rudder pushrod into rear opening of carbon tail boom as shown below. Slide pushrod all the way forward through tail boom for connection with rudder servo arm.





15. Attach clevis to rudder control horn at innermost hole. **IMPORTANT: Clevis must be installed with correct orientation (screw head on top) for sufficient pushrod clearance.** You may need to loosen clevis clamping screw to allow pushrod to slide freely in clevis for adjustment and connection with rudder servo arm. Do not tighten clamping screw yet.

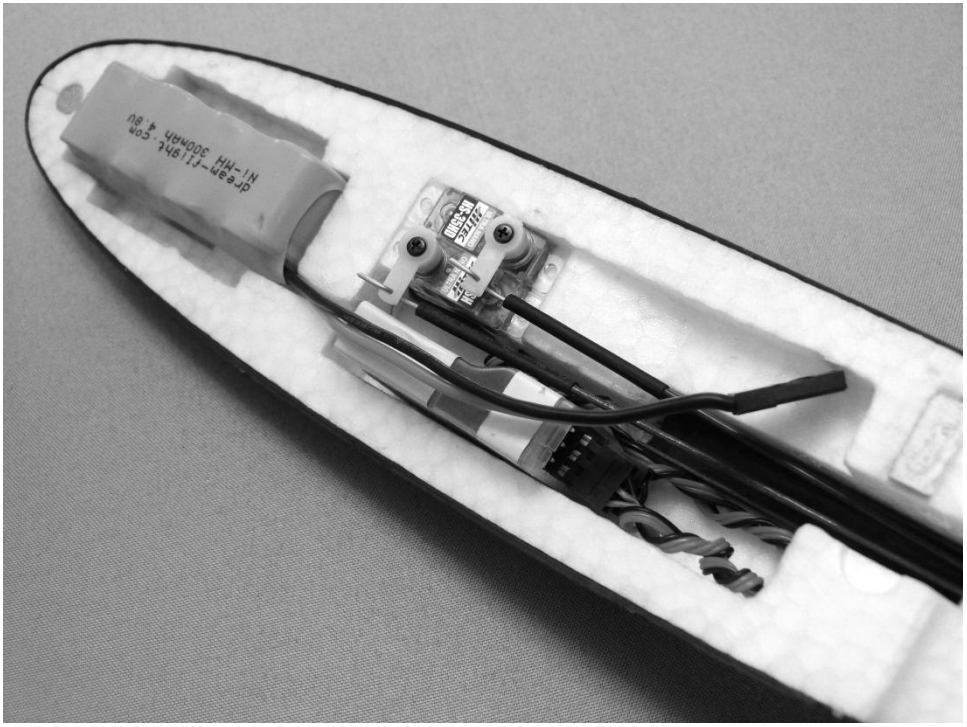


16. Remove rudder servo arm and attach to pushrod Z-Bend. Re-install servo arm and replace screw as shown below. **IMPORTANT: Elevator and rudder pushrods must hang BELOW servo arms for proper clearance.**

17. Ensure elevator and rudder servo arms are centered on servos as shown below.

18. Loosen clevis clamping screws to allow pushrods to slide freely in clevises. Center foam elevator and rudder control surfaces by eye and tighten clevis clamping screw to lock pushrod in centered position.

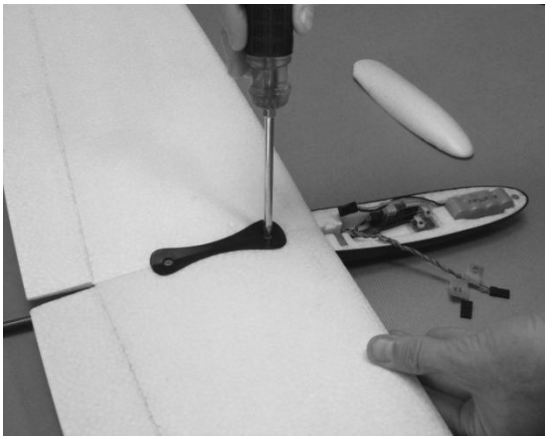
19. As shown below, set battery and receiver temporarily in position and plug elevator and rudder servos into appropriate receiver ports. Twist elevator and rudder servo wires together for a neater installation. **IMPORTANT: Keep your servo and battery wires tidy so as not to obstruct movement of servos and pushrods.**



WING INSTALLATION

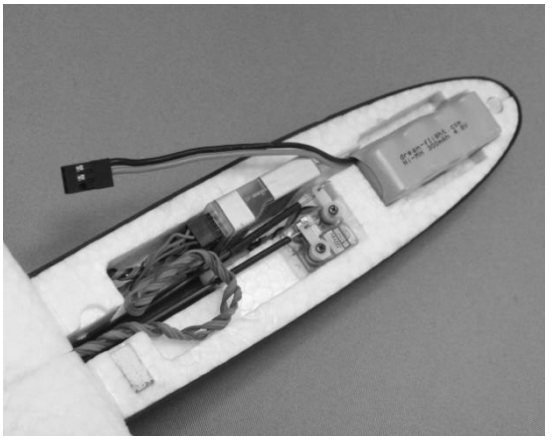
Gather items below:

- Completed wing
- Completed fuselage with tail group installed
- Canopy
- (2) Wing bolts (20mm front, 15mm rear)
- Carbon fiber launching peg



1. Press wing onto fuselage by aligning wing with anti-rotation pins on fuselage wing saddle.

2. Aileron extension leads should pass through molded foam channel underneath the wing's leading edge. Ensure no wires are pinched between the wing and fuselage. Twist aileron leads together for a tidier installation.



3. Install two nylon wing bolts. Insert longer 20mm-long bolt in forward hole. Do not over-tighten nylon bolts; only slight pressure is needed to hold wing onto fuselage, since the anti-rotation pins absorb the stress of discus launching. De-burr ends of nylon bolts with sandpaper if they feel tight initially.

4. Plug aileron servo leads into appropriate ports on receiver.

5. **IMPORTANT: Install all servo and battery wires in a neat manner so that they allow canopy to seat properly and do not obstruct movement of pushrods.** Refer to picture at right for example of a tidy radio gear installation.

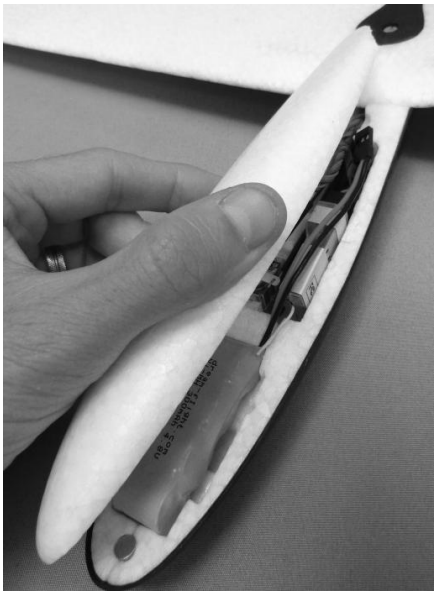
6. Install carbon fiber launching peg in desired wingtip. **Do not force!** If peg fit is too tight, sand peg diameter until it slides in place. If fit is loose, follow the "Hot Tip" at the bottom of page 21. Most right-handers prefer a launching peg in the left wingtip; however, there are those who prefer to launch from the right wingtip (left hand launch) to keep their right hand on the elevator/aileron joystick (for Mode 2 transmitters).

BALANCING THE LIBELLE: CG POSITION

Gather items below:

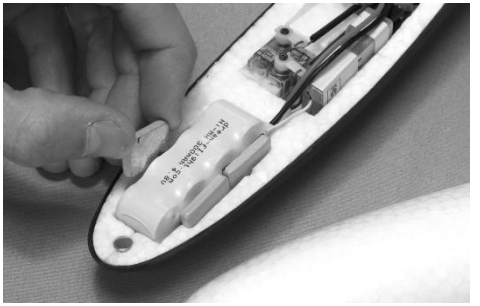
- Assembled Libelle (assembled wing and fuselage)
- Canopy
- Small balance weights - try our *non-lead* Steel Balance Weights (Part DFAA002)

1. **The Libelle's neutral balance position is located 5mm behind the carbon wing spar**. Using a ruler, mark this position underneath the wing on each side of fuselage as shown to right. This Center of Gravity (CG) position provides the Libelle with an efficient flight and launch behavior. For a more "hands-off" flight stability, move CG as far forward as the carbon fiber wing spar; however, keep in mind that a more forward CG will require more nose weight and elevator up-trim, thus reducing the glider's efficiency. It is best to start at the 5mm mark and move forward in small increments, 1mm at a time, until the Libelle's flight feels right to you. ***We do not recommend moving the CG position more than 6mm behind the carbon wing spar.***



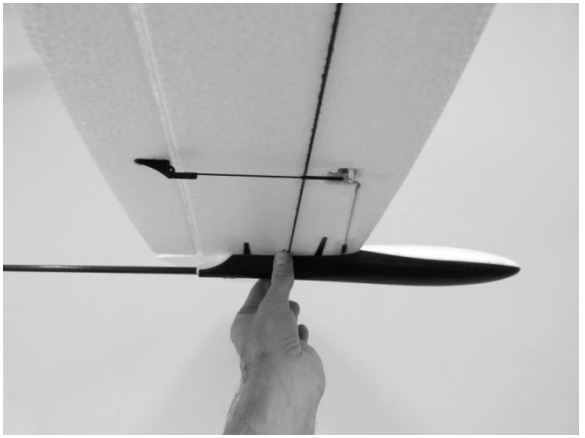
2. Fit balance weight in provided recesses and remove battery if necessary to fit more weight underneath. Use our *non-lead* Steel Balance Weights (Part DFAA002) and expect to add anywhere from 3-5 pieces (15-30 grams). Don't worry, adding balance weight to sailplanes is normal... your finished Libelle will be extremely lightweight even after adding balancing weight.

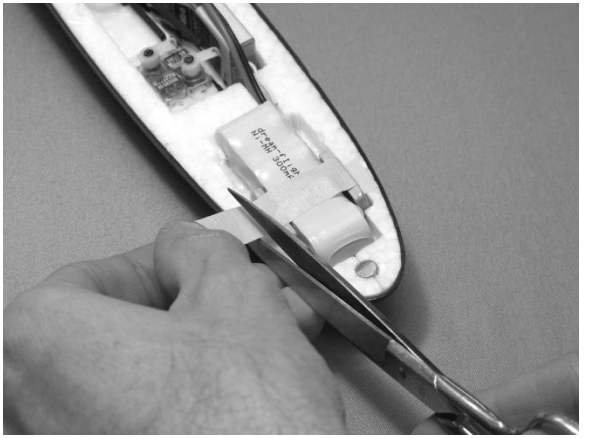
3. Install battery and attach canopy. *Final balancing should always occur with the canopy mounted!* To remove canopy later, simply grip canopy near wing and raise left side allowing canopy to "hinge" open lengthwise. If fit of canopy is hindered by balance weights, feel free to remove the foam adhesive backing for better clearance.



4. As shown below, balance glider on fingertips or balancing stand at CG location marks under wing. Add or remove balance weight until glider balances in level position. You may need a few smaller pieces of weight to get the balance just right.

5. **Secure battery with hot glue** and attach required weight using a bit of painter's tape (this can be removed during fine-tuning of CG position). If desired, secure receiver in position with a bit of double-sided tape.

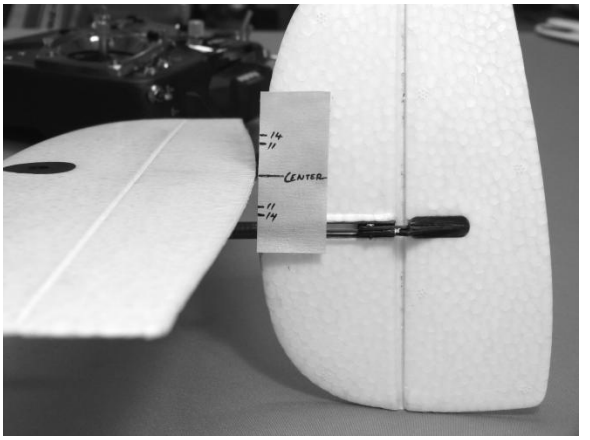




CONTROL SURFACE DEFLECTIONS

The control surface deflections in the table below provide the Libelle with active response to control inputs. You can set separate Low and High rates using the "Dual Rate" menu and toggle switches on your programmable radio. Note: Deflections can be adjusted to suit one's own flying style.

►HOT TIP: Stick a piece of painter's tape to the tail boom, just behind the control surface for setting deflections. As shown, mark desired deflections on tape and adjust transmitter rates accordingly until proper deflection is achieved.



	LOW RATES	*HIGH RATES*
Elevator	11mm *UP* 11mm *DOWN*	14mm *UP* 14mm *DOWN*
Rudder	20mm *RIGHT* 20mm *LEFT*	25mm *RIGHT* 25mm *LEFT*
Ailerons	12mm *UP* 12mm *DOWN*	18mm *UP* 18mm *DOWN*

PRE-FLIGHT CHECK

1. Ensure transmitter and receiver batteries are fully charged.

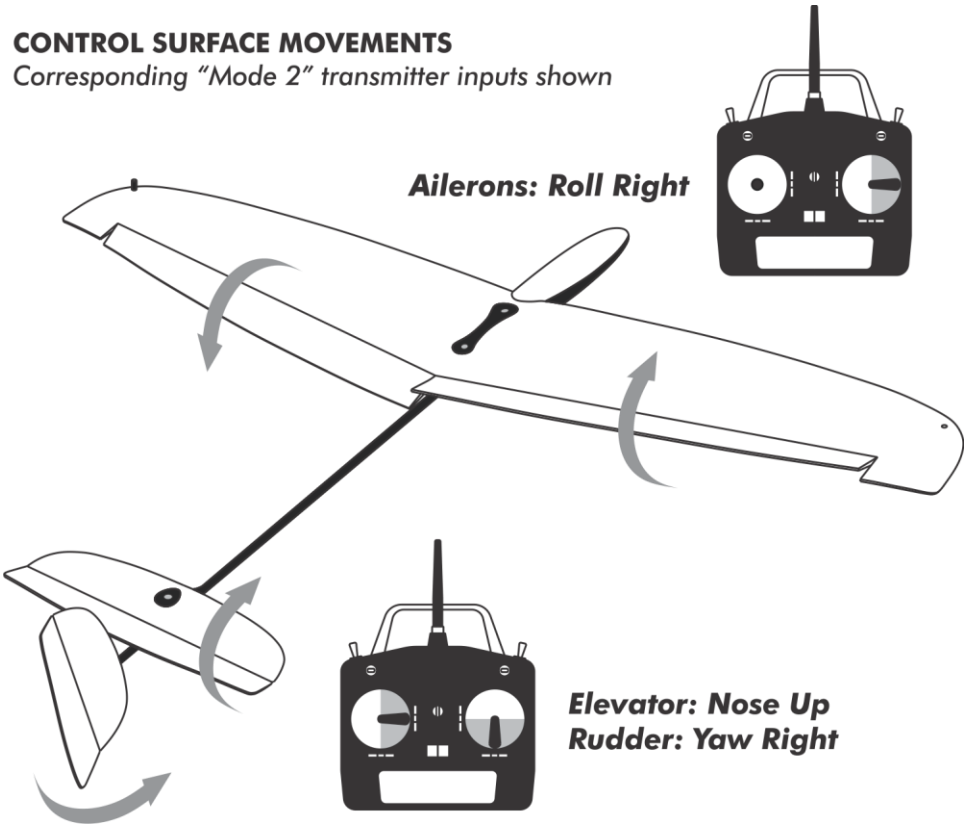
2. Check balance of glider and control surface deflections one last time. Make adjustments if necessary. It is always important to do this check before each flight.

3. Turn on transmitter, then glider, by plugging battery lead into receiver - *observe proper polarity!*

4. Refer to table and graphic to verify proper control surface movements. Hold glider with nose facing away from you and verify that control stick inputs result in correct control surface movements.

5. Check for any binding or interference between moving parts and do a range test according to your transmitter's instructions. You are now ready for the maiden flight!

Ailerons	***Roll Right:*** Right aileron up, Left aileron down ***Roll Left:*** Left aileron up, Right aileron down
Elevator	***Nose Up:*** Elevator deflected up ***Nose Down:*** Elevator deflected down
Rudder	***Yaw Right:*** Rudder deflected right ***Yaw Left:*** Rudder deflected left



TEST FLIGHTS: TRIMMING FOR STRAIGHT AND LEVEL FLIGHT

1. Locate a flat, open, grassy field for initial test flights. Choose a nice day with a light breeze (no more than 5 mph).

2. Turn on transmitter, then glider by plugging receiver battery directly into receiver - *observe proper polarity!* Check controls and flight surfaces for proper operation.

3. As shown, use simple, overhand javelin-style launches until you achieve proper trim. Pinch sides of fuselage in front of wing with middle finger and thumb, supporting rear of glider with index finger.

4. ALWAYS launch and land your glider into wind to minimize ground speed. Throw the Libelle firmly but not excessively, like a javelin, without twisting your wrist. Make sure to point nose towards horizon (not up or down). Make trim adjustments via trim levers on your transmitter until glider flies straight and level.

5. Once you have achieved a straight, level glide, you can progressively try harder launches and eventually side-arm launches by utilizing the discus launch method described on Pages 21-22.

►HOT TIP: *PREVENT LOOSE CLEVISES*

It is possible for the clamping action of the clevises on the pushrod to loosen after numerous flights and several hard landings. Once the glider has been flown and trimmed to you liking, we suggest adding a drop of CA to the clevis/pushrod to lock the pushrod in place. DO NOT get any glue on the clevis pin and control horn connection.

PROGRAMMING MIXES: FROM LAUNCH TO THERMAL

►The Libelle launches and flies great without any use of flaps to adjust wing camber and reflex. However, just as a bird adjusts its wing shape to suit varying flight conditions, you may want to as well in order to broaden your soaring experience and technique. Below are a few useful radio mixes and flight condition settings that we've found useful.

Using Flaps via Flaperon Mix:
Two ailerons acting as flaps in addition to ailerons are called "flaperons". This requires two aileron servos and a transmitter with "Flaperon" mixing. You may program separate flap settings for launch, cruise, thermal, and possibly landing. You can instantly toggle between the different flap modes via the programmed switch(es) to suit the given flight scenario.

***Launch*:** The Libelle's wing is designed to launch very well with flaperons in neutral position. A little reflex is OK.

***Cruise*:** In this mode, we allow the wing to glide efficiently with flaperons set at neutral. This is good for covering ground while hunting for thermals.

***Thermal*:** 2-3mm of camber is sufficient (both flaperons move down this amount to generate more lift). Too much camber makes the glider draggy.

FLAP DEFLECTIONS USING FLAPERON MIX
(measured from neutral position of control surfaces near tail boom)

LAUNCH	**0-1mm UP**	**"Reflex"**
CRUISE	**0mm (centered)**	**"Neutral"**
THERMAL	**2-3mm DOWN**	**"Camber"**
****LAND***	**15mm DOWN**	**"Brake"**

**Mix 1-2mm of DOWN elevator into the "LAND" flap condition to keep the glider's nose from ballooning.*

***Land*:** This setting will help slow the Libelle for landing and hand-catching, or to keep from overshooting your landing spot. Keep in mind that landing with your flaperons extended this far can make the servos more susceptible to damage. Use a little DOWN elevator mix for this flap setting to keep the nose from ballooning.

Active Camber Control via Elevator-Flap Mixing:
When thermalling, the elevator acts as your "accelerator and brake pedal." We like to use the Elevator-Flap mix on our radios to slightly camber the airfoil when up elevator is applied. When you apply UP elevator to hold level attitude while centering within a thermal, the wing proportionally adds camber to climb more efficiently. This mix also makes for a more active elevator response when flying, which is useful for aerobatics and tight maneuvering. For aerobatics, an Elevator-Flap mix which adds some “reflex” for DOWN elevator inputs will enhance outside (inverted) maneuvers.

For Elevator-Flap mix setup on your programmable transmitter, consult your radio manual for details. Essentially, the elevator must be designated as the MASTER channel, and the flap as SLAVE. The amount of Elevator-Flap mix is a matter of preference, but we like to start with a 35% flap mix (flap movement is 35% of elevator input). This equals about 4-6mm of DOWN flap (camber) for FULL UP elevator deflection.

DISCUS LAUNCH TECHNIQUE

►You will be surprised by how little force is required to discus launch your Libelle to good flying altitude. Always release your glider into the wind; your launches will be higher and less effort will be required. Like all techniques... practice makes perfect. Take it easy in the beginning and work on your form.
CAUTION: Exerting too much force during launch can result in injury and/or glider airframe failure.

Typical Discus Launch Sequence (see following page for time-lapse photos of a discus launch)

1. Install included carbon fiber launching peg into desired wingtip (whichever feels more natural or suits your particular technique). Some right-handed pilots discus launch left-handed, as this allows them to keep their hand on the control stick.

2. ***CAUTION!*** When holding the Libelle prior to launch, allow the glider to hang freely from the Launching Peg, supported by your index and middle finger as shown to the right. ***DO NOT*** raise the Libelle's wing horizontally while supporting only the wingtip, as this can damage the wing by creating too much bending stress.

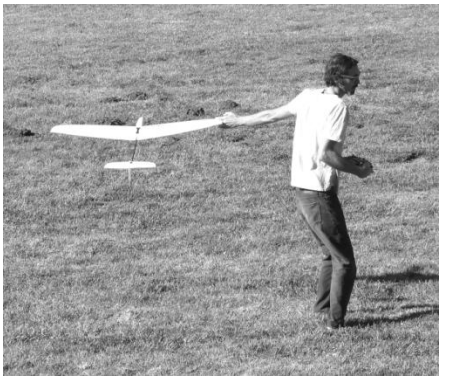
3. Fully extend your launching arm horizontally, with the glider hanging freely from the launching peg. For best launches, and to minimize chance of shoulder and arm strain, ALWAYS keep your launching arm fully extended during entire launch sequence.

4. Facing into the wind, begin one complete rotation allowing the centrifugal force to transition the glider to horizontal flight. You may take a few steps into the wind while rotating.

5. At the end of one complete rotation, release glider into wind, above horizon. Allow the glider to climb using a bit of up-elevator (ideally using a launch pre-set switch).

6. Smoothly push the glider's nose down to level flight when it has just about reached maximum height and still has sufficient airspeed. If you wait too long to nose the glider over, it will stall and altitude will be quickly lost.

►HOT TIP: *GOT A LOOSE LAUNCHING PEG?*
If launching peg becomes loose in wing from use, rub a thin layer of instant glue around middle of peg using a paper towel. Wipe away excess glue, leaving only thin coating of glue. When glue has completely cured after 5 minutes, test fit in wing. If too tight, simply sand away glue residue until fit is snug.



Discus Launch Sequence

One complete rotation shown at 90 degree intervals, from start to launch. It is OK to take a few steps into the wind while completing one revolution.

Always release into wind and keep arm as straight as possible!

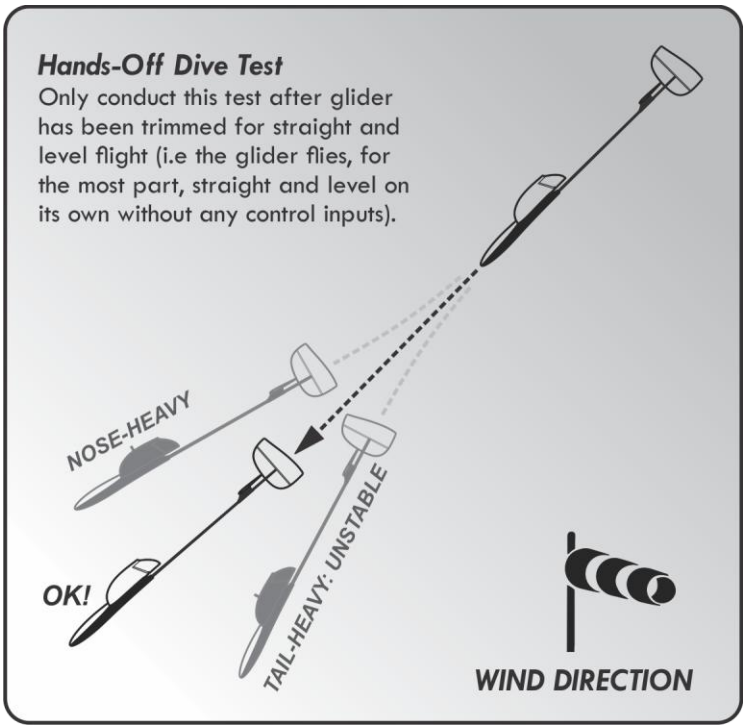
FINE-TUNING CG POSITION

►It is well worth spending a little time verifying the proper balance and trim of your glider. Doing so will ensure the Libelle is a pure joy to fly and reacts predictably to the varying air currents experienced while soaring. We find it easiest to fine-tune the CG position on the slope in light to moderate lift. This will make it easy to climb quickly to altitude for the "dive test" described below.

To fine-tune the CG position for optimum performance, first climb to safe altitude, and verify glider is trimmed for straight and level flight. Proceed to put glider into 45° dive. Allow glider to dive "hands-off" and see which of the three scenarios holds true for your Libelle:

1. **Correct CG Position:** If properly balanced and trimmed for level flight, the Libelle will remain in a straight 45° hands-off dive. Additionally, a well-balanced and trimmed aircraft will fly hands-off in a straight and level glide for a good while. If instead your glider noses up or down as speed increases, this is a sign that your CG position is off; read on if this is the case.
2. **Nose-Heavy (too forward CG):** If the glider noses up as speed increases without any elevator input, the aircraft is most likely nose-heavy. ***Solution:*** Remove a bit of nose-weight and add DOWN elevator trim until the first scenario above is achieved.
3. **Tail-Heavy (too rearward CG):** If the glider increases steepness of dive at higher speed (i.e. "tucks under"), then it is tail-heavy. Oftentimes a tail-heavy glider will be a chore to fly, constantly requiring pilot input to maintain a smooth flight trajectory. ***Solution:*** Add nose-weight and UP elevator trim until the first scenario above is achieved.

NOTE: In order to achieve trimmed flight, you will have to adjust elevator trim slightly each time you add or remove balance weight to the nose of the glider.



"URBAN SOARING" TECHNIQUE

Background:
Successfully flying an R/C sailplane doesn't require a far journey in search of large open spaces. The Libelle's ability to be flung to considerable height with the simple swing of an arm makes for convenient soaring, both on the slope and over flatland. The Libelle's low weight, compact size, and maneuverability, allow you to participate in what we call "urban soaring;" a small schoolyard, an empty parking lot, a row of dense trees, a sea-wall, or perhaps the side of a large building, now all become potential soaring locations. Of course, know that there are some guidelines to follow when looking for viable soaring locations and we always encourage safe and conscientious flying habits (see the important guidelines listed in the beginning of the manual). RC soaring is quiet, clean, challenging, and fun. While mastering the soaring techniques listed on the following pages, one develops a unique appreciation and understanding of the environment and weather patterns.

Important guidelines to follow when flying the Libelle:

►When learning how to fly, always seek advice and training from experienced local pilots.

►Choose a flying location with a nice grassy area and free of large obstacles.

►When slope soaring, use a figure-eight shaped flight pattern to remain in best lift zone.

►When slope soaring, always make turns away from slope whenever possible and give right of way to larger, heavier aircraft.

►Launch and land glider into wind and away from obstacles, people, and turbulence.

►Treat the land and its occupants with the utmost of respect.

►Fly glider a safe distance away from any individuals present.

►**Have fun and enjoy the sun, wind, and your surroundings!**

Slope Soaring:
Also known as ridge soaring, slope soaring may be one of the easiest and most rewarding ways to experience the thrills of R/C soaring flight. The glider sustains flight by utilizing updrafts created when wind is deflected upward by any sizeable land feature (hill, mountain, cliff, large building, row of trees, etc).

Flatland Soaring:
Flatland soaring with the Libelle can be extremely rewarding; however, a certain amount of skill is required to sustain flight at low altitudes using rising bubbles of warm air known as thermals (caused by the sun's heating of the earth's surface). Navigating thermals, which tend to be inconsistent and turbulent near the ground, makes for a good challenge. A good way to think of hand-launched thermalling is "sky fishing," since a typical flight consists of a quick discus launch to altitude, a nose over of the glider to level flight, and then off to search for a thermal. The majority of flights will to be short (15-30 seconds), but if you persist, you will eventually hook a nice thermal and gain altitude for an extended flight several minutes in duration. Next are a few tips that make mastering the art of near-ground thermalling a bit easier:

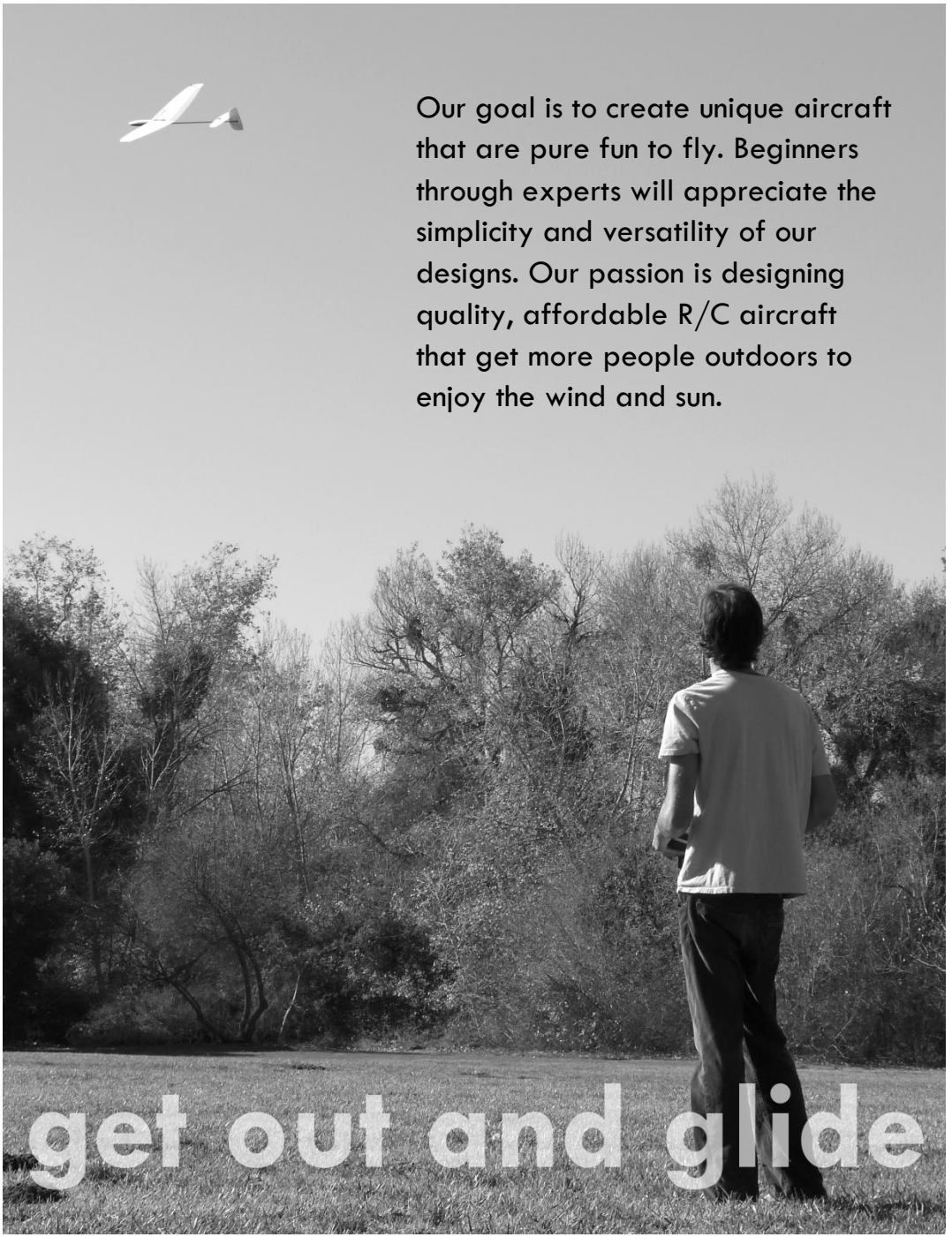
►***Tune into your surroundings…*** Watch for birds and insects! Listen to and feel for sudden yet subtle changes in the wind and air temperature. Soaring birds often appear miraculously when a thermal is present. Look for groups of swallows or sparrows picking rising insects out of the air as a thermal passes by. Oftentimes the wind will change suddenly and the temperature will rise a few degrees as a thermal passes through. A thermal is like a large vacuum and will suck surrounding air towards it, so a sudden change in wind direction usually indicates that a thermal is near and probably downwind of your location.

►***A thermal*** generally tries to push a soaring aircraft or bird away from its core where the lift is best. Thus, the pilot has to work constantly to keep the glider centered within the thermal for the best chance of gaining altitude. Note that the lower the altitude, generally the harder it is to "core" a thermal, so you'll have to concentrate and pay close attention to the signals your glider is giving you as it responds to the quickly changing dynamics of the growing thermal. A sign that a thermal might be very close is if you notice your glider suddenly being pushed or turned away from its current path. The common technique is to immediately steer against and turn towards the invisible force that is pushing you away from the rising air. So, you'll most likely have to make constant control corrections to force your way into the thermal's core, since the thermal will do its best to spit you out into the surrounding sinking air that feeds the thermal.

►***Time of Day*** is very important when it comes to flatland soaring with small, lightweight, hand-launched gliders. Usually, the best time is middle to late morning before the wind starts to pick up. As the wind increases in the afternoon, it becomes more difficult to navigate thermal lift as conditions get "blown out."

►***Location*** is crucial when it comes to thermal soaring. Our best suggestion is to keep your eyes peeled for soaring birds. They will always find the best lift! Just because a location looks good does not mean you will find good updrafts there. Local wind patterns and topography have a large influence on the "soarability" of locations and may cause a great-looking field to have turbulent and/or sinking air currents. If you see birds soaring, not constantly flapping their wings, chances are you've found a viable soaring location.

We wish you good luck, good lift, and happy soaring!


Our goal is to create unique aircraft that are pure fun to fly. Beginners through experts will appreciate the simplicity and versatility of our designs. Our passion is designing quality, affordable R/C aircraft that get more people outdoors to enjoy the wind and sun.
get out and glide

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