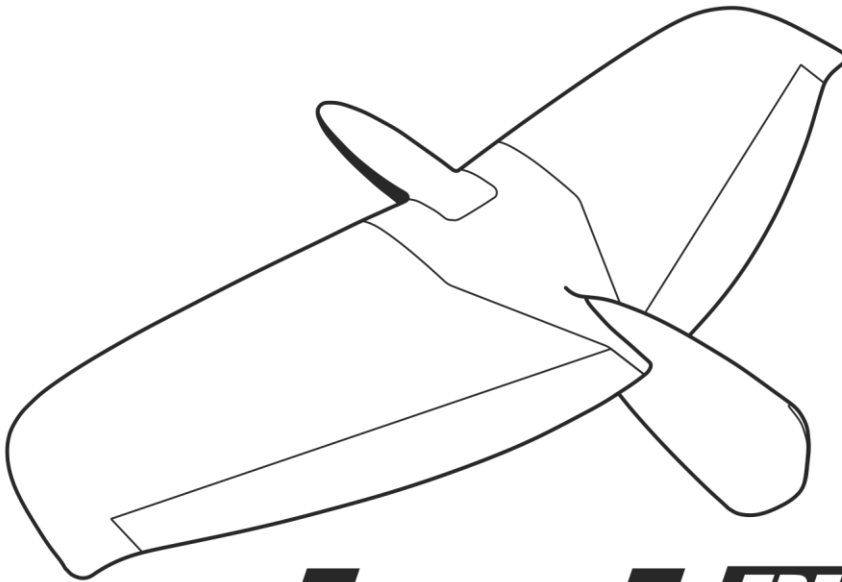


dream-flight®



alula **TREK**™

Flight and Assembly Manual

Designed to go wherever inspiration takes you...

Sometimes where we get to fly is as magical as the flying itself. The Alula-TREK is ready to make the journey wherever the lift takes you. The world's most popular bird-like RC flying wing is back and more refined than ever. Whether you're hiking on a mountain ridge, riding the breeze on a dune at the beach, or searching for thermals at the neighborhood park... the Alula-TREK is ready to go. This modular design is equally at home secured on a backpack or stowed in an overhead bin. Be inspired: fly where you never considered.

Modern RC Glider Design

The Alula-TREK was developed from the ground up to provide pilots of all skill levels a unique RC soaring experience with minimal building skills required. Getting into the air has never been easier with features like a factory-installed skid plate, pre-installed canopy retention magnets, and pre-glued carbon spars and control horns. Previously only available by separate purchase, the Alula-TREK now includes an integrated wing retention system as a standard feature. The most refined Alula yet is ready to get out and glide, when you are.

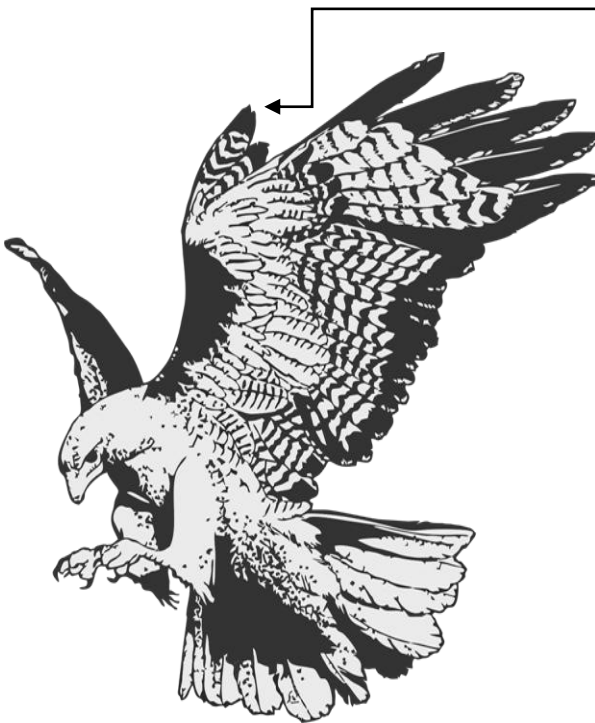


“Alula”- Why the Name?

We love birds! A few years back we stumbled onto the word “alula” while looking for inspiration through a book on bird anatomy. Officially pronounced “al-you-la” in the bird world, we like the sound of “ah-loo-la” when referring to our glider.

Upon researching further, we learned that the “alula” on a bird wing (see figure below) is a set of feathers attached to the bird’s equivalent of a thumb. These “thumb feathers” on a bird serve as a quasi leading edge slotted flap that helps to delay the onset of a stall. It works by maintaining the airflow over the top of the wing at high angles of attack. This serves the bird well during take-off, landing, and perching in difficult locations.

Simply put, we found the name fitting due to the low speed performance of this little glider and its bird-like appearance. Given that many of us use our thumbs to control our RC aircraft, this little glider provides us with some “thumb feathers” of our own.



A Red-tailed Hawk prepares for landing with Alulae (pl.) in full effect.

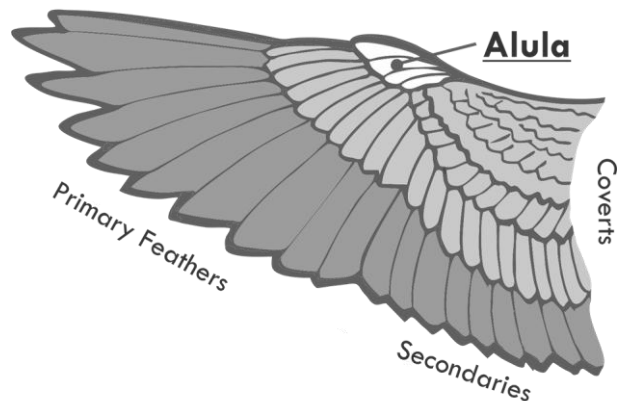
al·u·la

*New Latin origin, meaning **a little wing**.*

The group of three to six small, rather stiff feathers growing on the first digit, or thumb of a bird's wing.

An evolutionary adaptation which delays the onset of stall by reinvigorating wing airflow.

BIRD WING LAYOUT - TOP VIEW



Designer's Notes

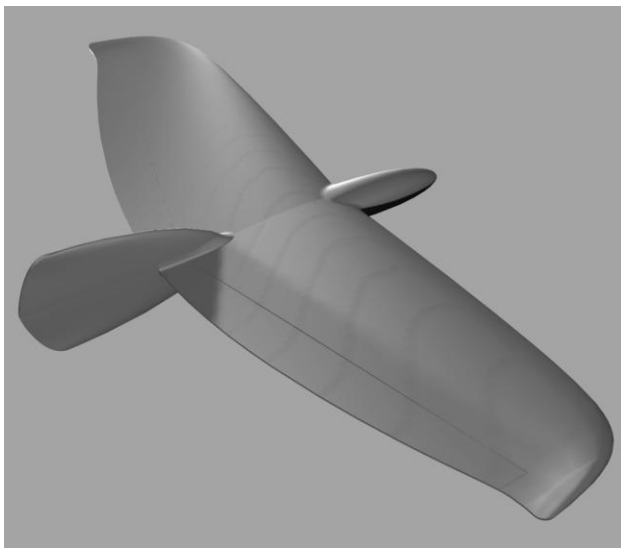
"Originally, I wanted to design a glider with which I could join the Red-tailed Hawks in flight above my parents' home in the Santa Barbara foothills. The design needed to be easily flung to soaring altitude above the oak-studded hillside, and had to be able to negotiate the often light and inconsistent canyon updrafts. Over the years, the Alula design has evolved into a glider that can be taken and flown just about anywhere, without much hassle. The Alula's simplicity and low parts count inspires a sense of freedom, while it's organic form triggers the same sentiment one often experiences while admiring a soaring bird in flight.

The Alula-TREK's wing mimics the gently forward-swept configuration used by the Red-tailed Hawk, and many other soaring birds for that matter. This crucial design element is conducive to low speed circling flight which helps the pilot navigate small, confined sources of lift by eliminating tip stalls and maximizing control surface authority at very low airspeeds. This nature-inspired wing design also has the added benefit of lending itself to the wingtip launch method, contributing to a straighter launch when coupled with the large vertical tail.

Overall, the sleek compact shape, low weight, forward-swept wing, and optimized airfoils and tail, all make for a glider which launches easily to altitude and responds quickly to lift, allowing the pilot to "get on step" quickly within a thermal. The minimalist flying wing configuration also makes for hassle-free flying since it is robust and easy to repair on the spot." -Michael Richter, January 2015.



Michael Richter with an early hand-cut Alula prototype in 2004. The Alula's low weight, easy launching, and tight maneuverability allowed Michael to achieve his dream of joining the Red-tailed Hawks in the light updrafts above his parent's canyon-side home in Santa Barbara, California.

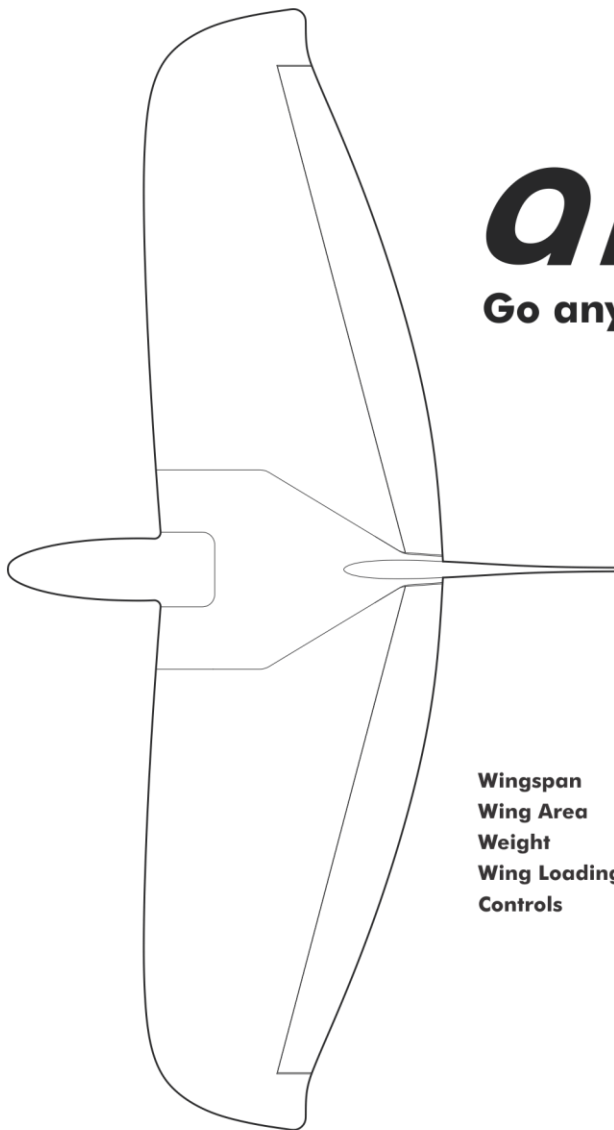
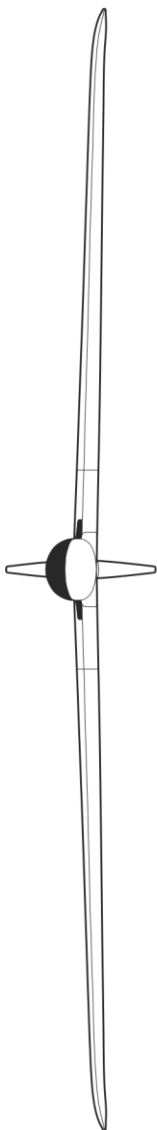


3D CAD rendering shows the evolution of the Alula design that continues in 2015 with the new Alula-TREK. This further refined design features the easiest assembly and setup to date.

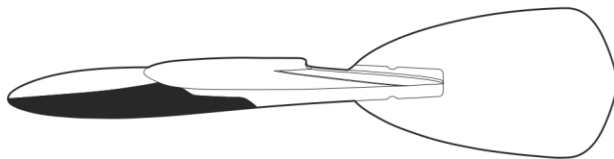
dream-flight®

alula ^{TREK}™

Go anywhere RC glider



Wingspan	900 mm (35.4 in)
Wing Area	16.7 dm ² (259 in ²)
Weight	156-170 gm (5.5-6 oz)
Wing Loading	9.3-10.2 gm/dm ² (3.1-3.3 oz/ft ²)
Controls	Elevons (2 Channels)



M. Richter
signature design

CAUTION! READ BEFORE PROCEEDING:

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

▶ *ALWAYS* fly model aircraft, such as the Alula-TREK, 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 Alula-TREK must be assembled, balanced, and trimmed properly to ensure smooth, efficient flight.** Poor balance and trim WILL lead to poor flight characteristics. This is especially true for small flying wings like the Alula-TREK that usually require a bit of fine-tuning to achieve the best flight characteristics. Don't be discouraged if it takes you a few flights to get it just right. Additionally, make sure to observe proper control surface deflections that suit your skill level.

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

▶ 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.

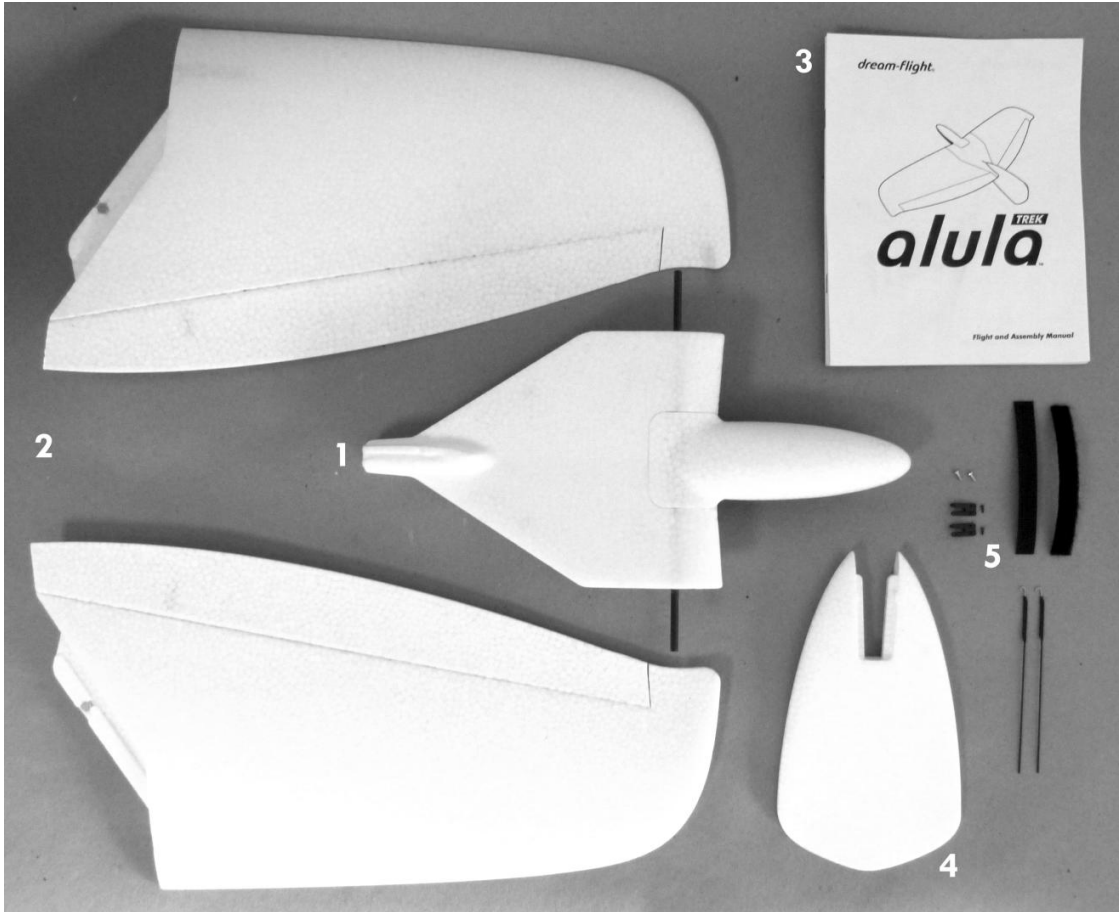
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To familiarize yourself with the assembly process, we recommend reading over this manual before proceeding with final assembly.

When assembling your Alula-TREK, make sure to check out the HOT TIPS found throughout this manual.

KIT CONTENTS



ITEM	DESCRIPTION
1	Fuselage and Canopy
2	L/R Wing Panels
3	Flight and Assembly Manual
4	Vertical Tail Fin
5	Small Hardware Bag Contents: (2) Elevon pushrods (2) Wing clamp screws (2) Clevises with screws Velcro for battery and receiver installation <i>Not shown:</i> Logos, wing decals, and servo decals set

Spare Parts
available at
dream-flight.com

ITEMS REQUIRED FOR COMPLETION (not included)

Radio Gear:

- Programmable 6 channel radio system with Elecon Mixing and Dual Rates (see suggestion below)
- Micro receiver, 4-6 gram weight (see chart below for receiver suggestion)
- (2) Sub-micro servos (Part DFFA005 recommended, or purchase our Alula-TREK flight pack, Part DFFA008)
- Receiver battery: 4.8V 300mAh 1/3AA NiMH (Part DFFA001)
- Battery Extension Wire (Part DFFA013)

Tools and Extras:

- Small Phillips screwdriver
- Small wire or fingernail clippers for trimming servo arms
- Sharp hobby knife or razor blade for relieving foam hinges
- Small needle-nose pliers
- Ruler or measuring tape (for setting control surface deflections)
- Small weights for balancing and Ballast Option: Use our *non-lead* Steel Balance Weights (Part DFFA002)

Adhesives and Tape:

- Blenderm Tape (Part 1525-0) for securing wing panels and making small repairs
- 20-25mm (1") wide painter's masking tape – we like the blue or green stuff by 3M!

Optional:

- 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 Transmitter and Receiver:

	Transmitter	Receiver
Futaba	T6J, *T8J	*R2106GF

**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.*

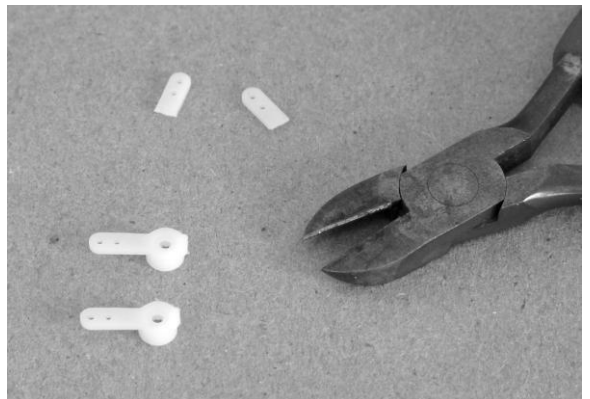
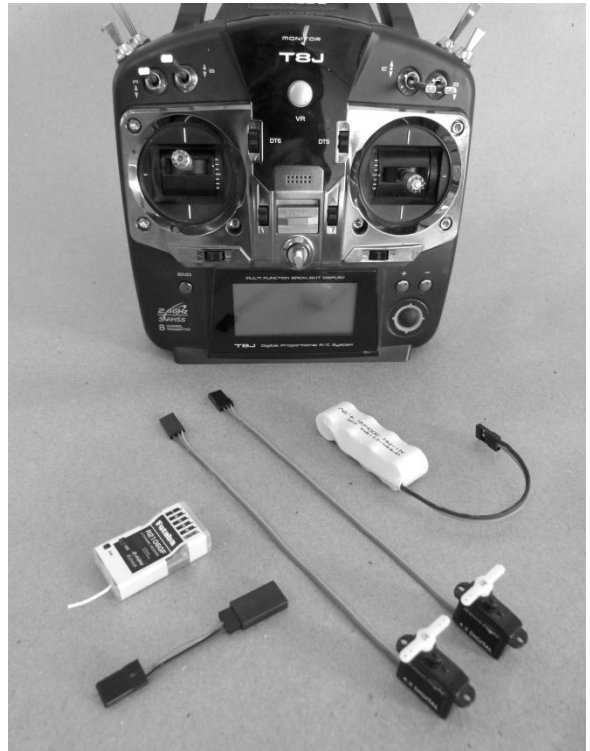
RADIO GEAR SETUP

► The following setup 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 type of servo; however, don't skimp on servos for your Alula-TREK! A good quality digital servo with excellent centering will ensure that your Alula-TREK is a smooth, predictable flyer.

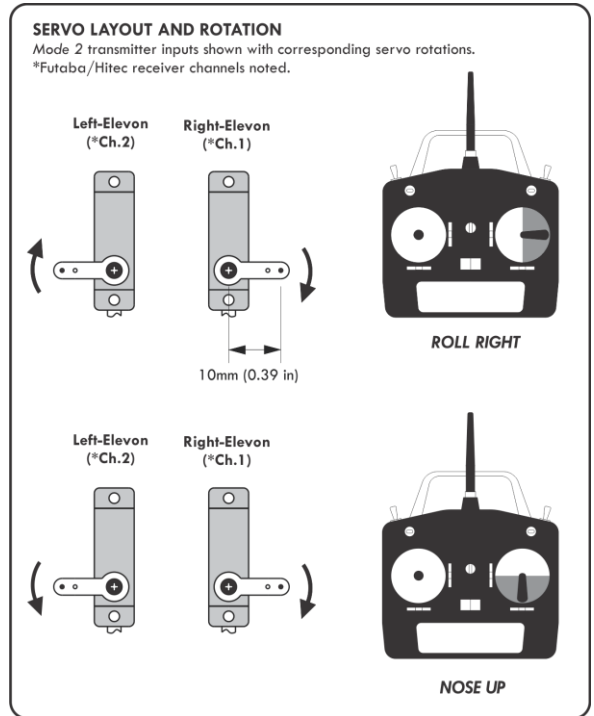
Gather items below:

- Transmitter (battery fully charged)
- Micro receiver
- (2) Servos with servo arms and screws (*Part DFFA005*)
- Battery Extension Wire (*Part DFFA013*)
- 4.8V, 300mAh receiver battery (fully charged)

1. Locate servo arms with two holes on each arm. Place tiny servo screws in a safe place.
2. Using small wire clippers, trim away one side of each servo arm as shown.
3. Plug Battery Extension Wire into receiver (observe proper polarity!). This extension wire replaces a switch and makes it easier to turn on the glider and charge the battery.
4. Turn on transmitter and plug battery into female end of Battery Extension Wire to power up receiver.
5. Activate transmitter's Elevon mixing function (consult your radio manual for details). Elevon mixing may be referred to as "Delta" mixing on some transmitter models.
6. Connect servos to appropriate receiver channels. Confirm system is bound and servos are responding smoothly.
7. Ensure all Trims and Sub-Trims are set to zero, and all End Points and/or Adjustable Throw Volumes (ATV) are set to the default of 100%.



8. Arrange servos on table and attach a servo arm to each servo. **IMPORTANT: Servo arms must be installed in the orientations shown to ensure proper control function.**
9. Referring to graphic to the right, check for correct servo rotation direction. If needed, reverse servo directions using transmitter. If you cannot achieve the correct rotations using servo reversing alone, you may need to swap the servo plugs at the receiver and return to Step 8 above.
10. If necessary, adjust sub-trims to ensure servo arms are at 90 degrees as shown.
11. With a bit of masking tape, label each servo for future reference during installation (i.e. Right, Left).
12. Re-install two tiny screws to secure each servo arm.
13. Power down receiver by unplugging battery from Battery Extension Wire. Now turn off transmitter.



FUSELAGE PREPARATION

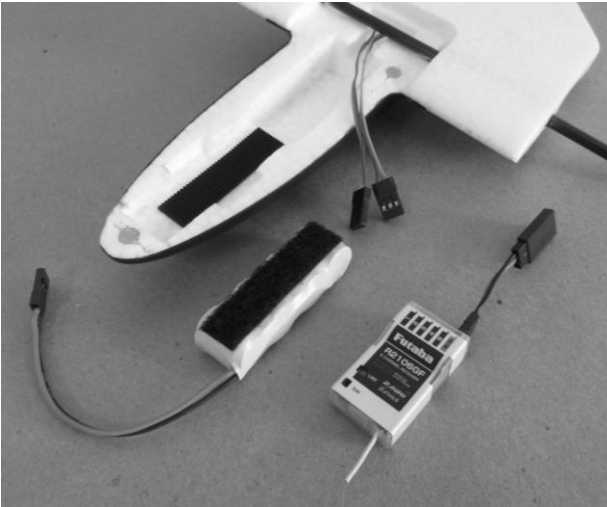
Gather items below:

- Fuselage with canopy
- (2) Elevon servos
- Receiver with Battery Extension Wire (Part DFFA013) attached
- 4.8V, 300mAh receiver battery
- (2) Servo mounting decals (Clear, 37mm square)
- Velcro strips

1. Remove canopy by gripping it near wing and raising the right side as shown. This allows canopy to "hinge" open lengthwise.
2. Insert servos into molded pockets and route wire leads through provided cutouts and into receiver compartment.
3. Apply provided servo mounting decals over each servo as shown. Using a sharp hobby knife, trim away the small area of decal covering the Balance Locators beside the servo wire cutouts. **DO NOT** remove the raised Balance Locator lines, as these will be used for final balancing of the model.



4. Apply 50mm-long x 13mm-wide Velcro strips to battery and inside fuselage battery compartment. Note that each large piece of Velcro is split down the middle to make the 13mm-wide strips. The Velcro allows the battery to be adjusted fore and aft during final balancing. Use the remaining Velcro for mounting receiver or a spare battery.
5. For now, mount battery in the most forward position.
6. Twist the servo wires together for a neater installation and then plug both elevon servo plugs into the proper receiver channel ports (as determined in "Radio Gear Setup").
7. Install receiver as shown. You can use the extra Velcro or a bit of double-sided tape if you like.
8. Replace canopy and check it for proper fit. If necessary, tidy up your wiring so that it does not interfere with fit of canopy.



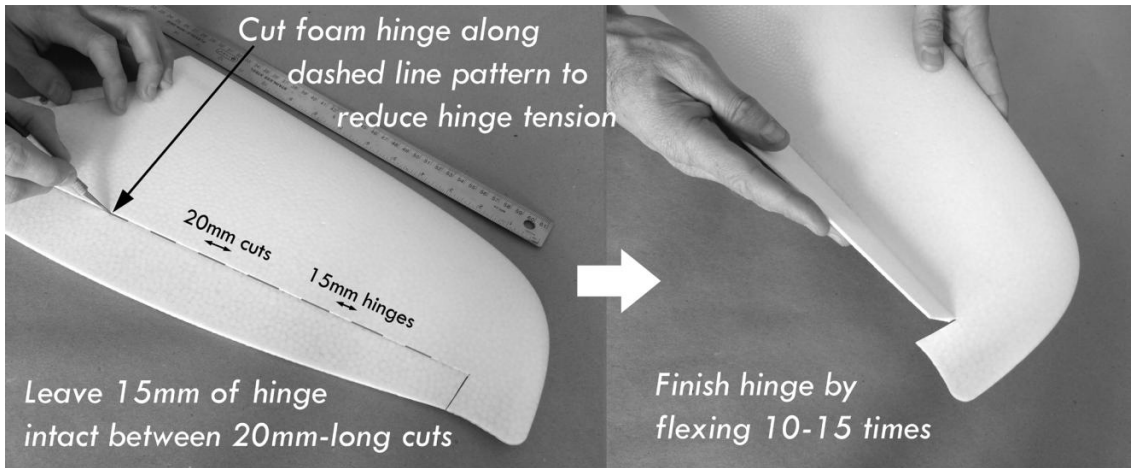
6.

WING AND TAIL INSTALLATION

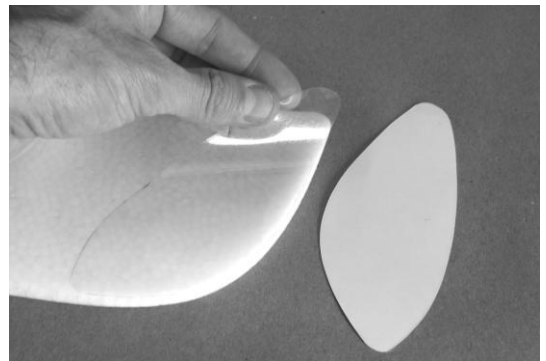
Gather items below:

- Wing Panels (Right/Left)
- Wingtip Reinforcement Decals (apply to launching wingtip only)
- Completed Fuselage (with servos, battery, and receiver installed)
- (2) Elevon pushrods
- (2) Adjustable clevises with black clamping screws
- (2) Wing Clamp Screws (7mm-long x 2mm dia.)
- Tail Fin

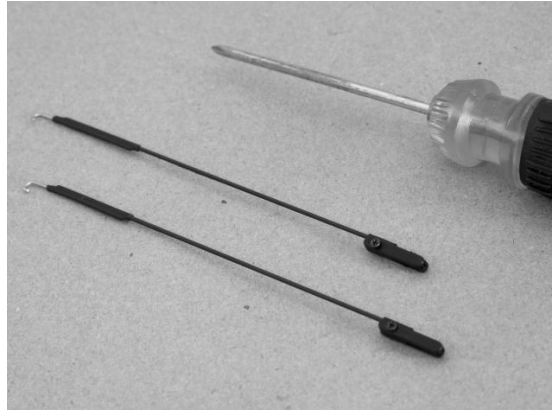
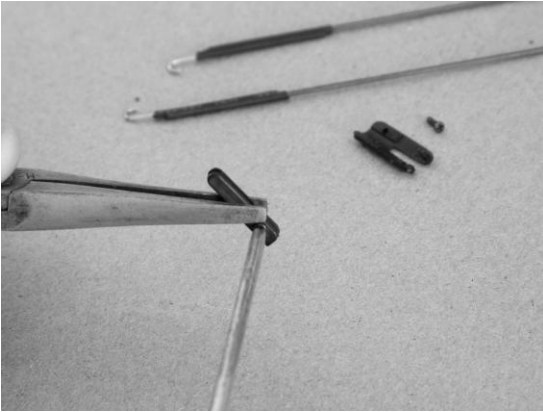
1. Enhance control response and reduce servo load by making 20mm-long incisions along foam hinges using a sharp hobby knife. Alternate, leaving approximately 15mm of intact hinge material between incisions (imagine a dashed line cut pattern as shown below). Make sure to leave 20mm of intact hinge material also at each end of control surface. Flex foam ailerons 45 degrees in each direction a few times to loosen hinge action.



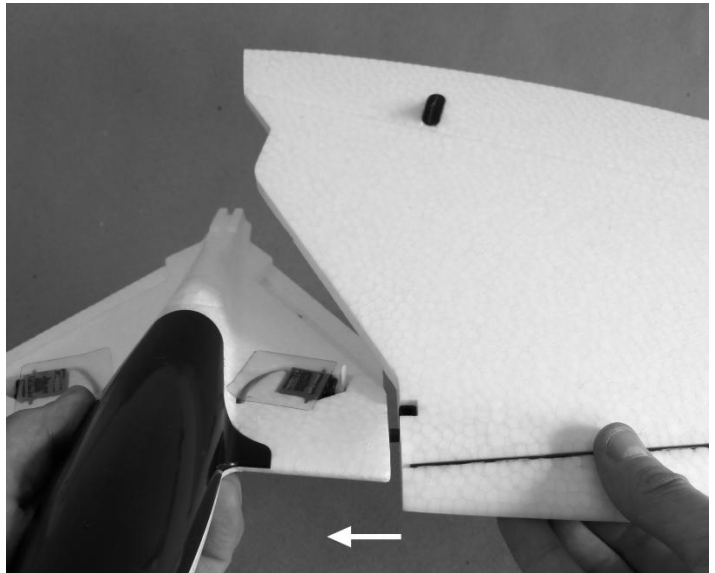
2. Apply provided reinforcement decals to desired launching wingtip. If you are right-handed, apply decals to left wing tip and vice versa for left-handers. Apply decals to both top and bottom of desired wingtip, making sure to note proper orientation as shown to the right.



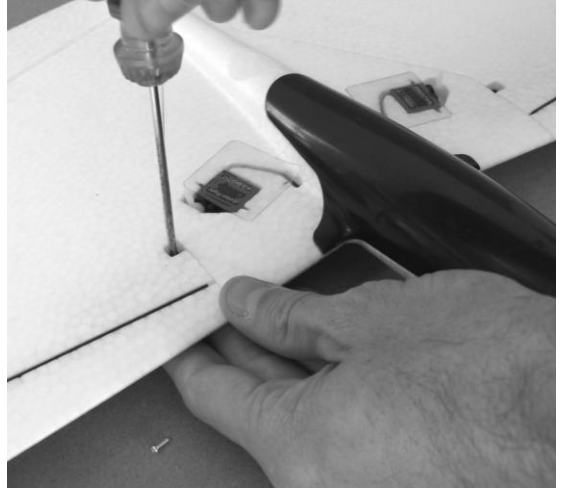
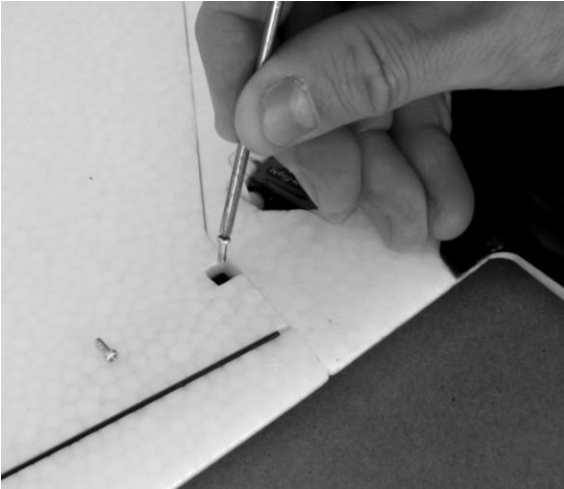
3. Prepare two clevises by folding sides together, creating a slot where pushrod will be clamped. With clevis folded, install small clamping screw through each clevis. Do not tighten screw at this point.
4. Slide a clevis onto end of each elevon pushrod. You may have to loosen clamping screw slightly to allow clevis to slide onto pushrod end.



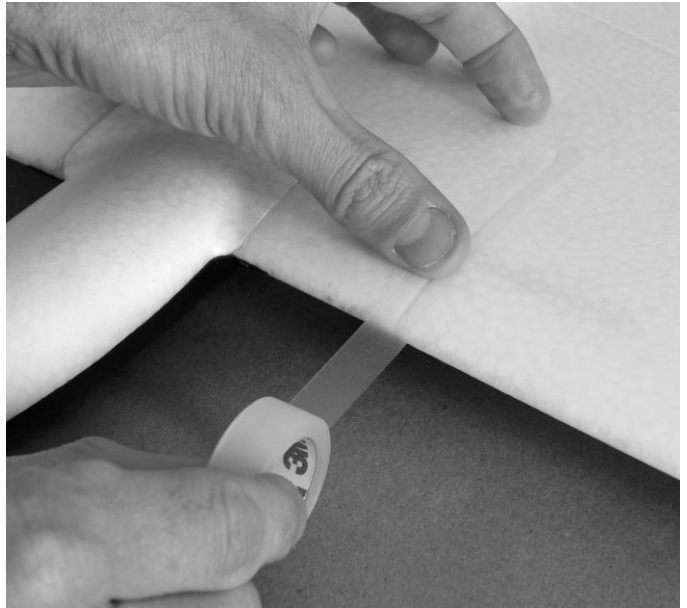
5. While holding fuselage in hand, slide one wing panel at a time onto carbon-fiber joiner, with leading edge of wing angled downward as shown. Once wing panel contacts fuselage, rotate wing panel allowing magnets to snap into contact.



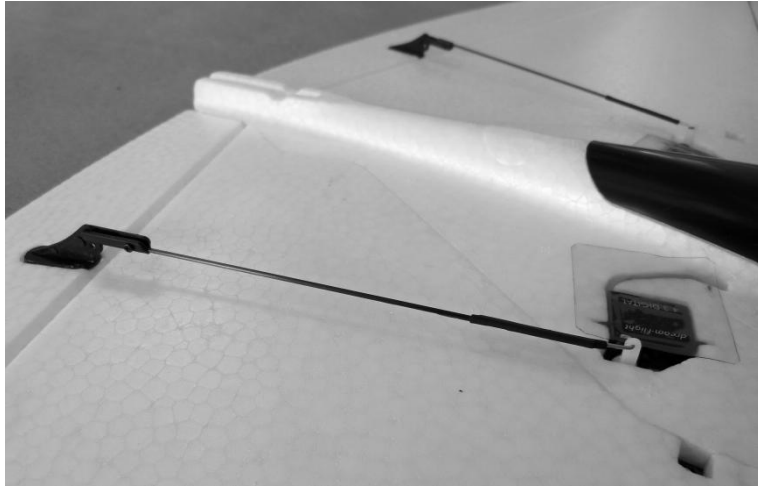
6. Locate and install two wing clamp screws into wing clamps as shown below. Firmly tighten the wing clamp screw in each panel. The wing clamp screws can be loosened at any point to remove wing panels for travel and storage.



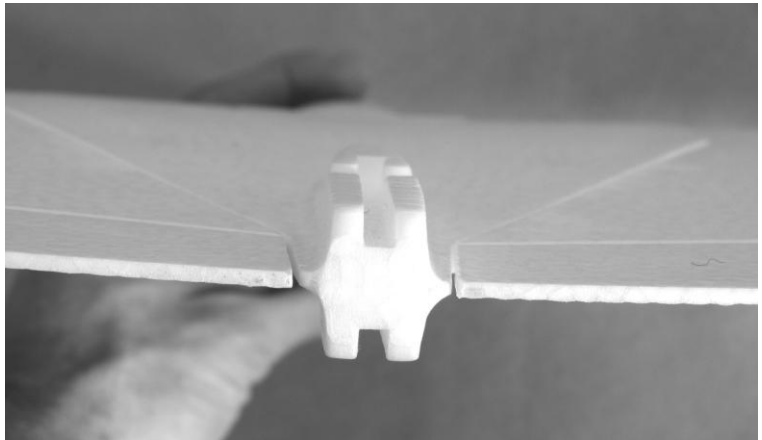
7. **IMPORTANT:** For added security during aggressive side-arm launches, please wrap a strip of tape (*Blenderm 1525-0*) around each wing joint at the leading edge as shown. It is possible for the wing clamp to loosen after a hard landing or a few "aggressive" launches. This can result in the wing separating from the fuselage during a sidearm launch. Between flights, make sure to inspect your wing joints for any signs of loosening or separation.



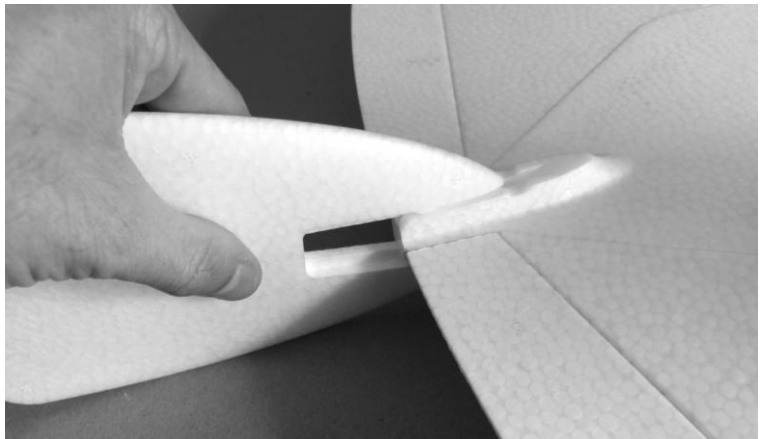
8. Insert wire "U-Bend" side of each pushrod into outermost (second) hole of servo arms.
9. Ensure that both clevises slide freely on each pushrod for the next adjustments. Loosen clevis screw if necessary.
10. Turn on transmitter and plug battery into the Extension Wire to power up servos. Double check that your servo arms are centered.



11. Connect clevises to elevon control horns at outermost hole as shown.
12. Align elevons with fuselage and wingtips as shown to the right. Adjust clevis as necessary and tighten clevis screws with elevons in their correct neutral position. Do not over-tighten clevis screws; when properly tightened, tip of screw should protrude slightly from side of clevis. Check by hand to make sure clevis is now locked onto pushrod. It is possible to add a drop of instant glue to rear of clevis (pushrod side) for added security; however, do not get any glue near the clevis pin and control horn.



13. Slide Tail Fin onto glider from rear until it locks in position. The tail is held in place by a friction fit. If it loosens over time, use a piece of tape to secure it.



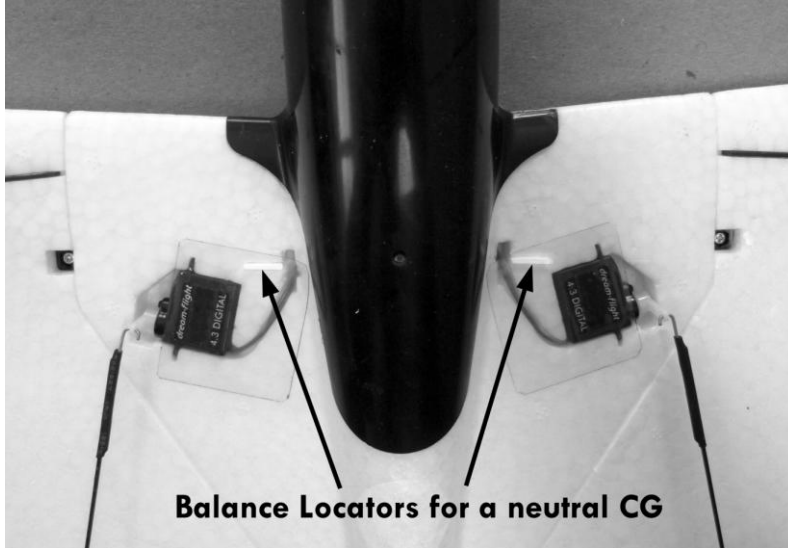
BALANCING THE ALULA-TREK

► **IMPORTANT:** The Alula-TREK must be assembled, balanced, and trimmed properly to ensure smooth, efficient flight. Poor balance and trim WILL lead to poor flight characteristics. This is especially true for small flying wings like the Alula-TREK which almost always require a bit of fine-tuning to achieve best flight characteristics. Don't be discouraged if it takes you a few flights to get the balance and trim just right.

Gather items below:

- Fully assembled Alula-TREK
- Small balance weights (not always necessary). You may only need small paperclips or coins to get the balance correct. If you need more weight, try our *non-lead Steel Balance Weights (Part DFAA002)*.

- 1) Ensure all components of glider are attached and installed. Replace canopy if not already installed.
- 2) Find the Balance Locators on underside of wing, just ahead of servos. This Center of Gravity (CG) position provides the Alula-TREK with a very neutral flight and launch behavior. It may be a bit too neutral for some pilots who appreciate a little more hands-off stability, but it is a good place to start nonetheless. If the Balance Locators are partially covered with the servo mounting decals, expose them by trimming away a small amount of the plastic decal material using a sharp hobby knife (this will allow you to better feel the balance locators with your fingertips).



- 3) Center your fingertips on the Locators to balance the glider and see how it reacts. If the nose drops quickly, move battery rearward until glider balances level on fingertips. If the tail drops quickly, slide battery forward if possible, or add a small amount of balance weight in the provided recesses alongside battery (you may only need a small paperclip or two). The Alula-TREK's short length makes balancing a bit tricky, so take your time and make sure glider balances level on your fingertips for at least a moment or two before it starts to fall out of balance. **Proper balance is crucial! If you don't trust your fingertips, use the Hot Tip below for a more precise way to balance your Alula-TREK.**



► **HOT TIP:** If you don't trust your fingertips to balance the glider, make a simple balancing jig out of a block of wood and two dowels or pencils. The tips of the dowels should be wedge-shaped to provide a fairly sharp balancing tip. Space the dowels 65 mm apart, so the tips align with the middle of the Balance Locators.



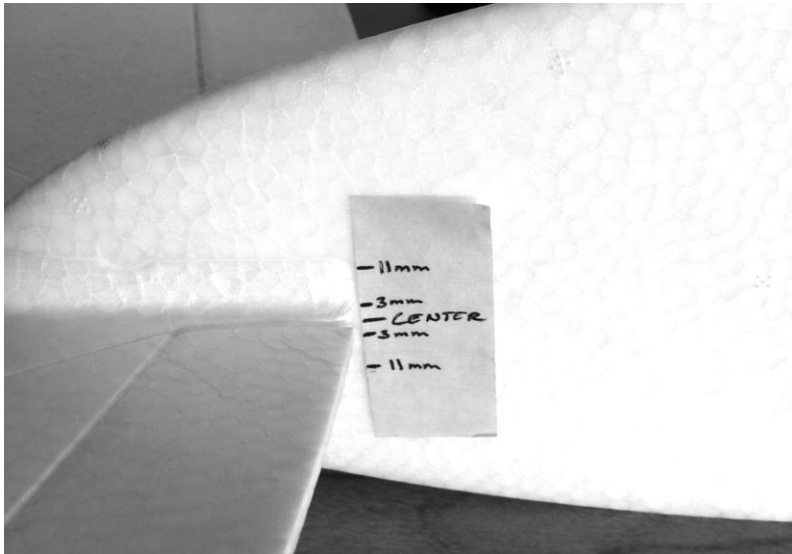
CONTROL SURFACE DEFLECTIONS

The control surface deflections in the table below provide the Alula-TREK 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 transmitter. Before proceeding, make sure all End Points and/or Adjustable Throw Volumes (ATV) are set to the default of 100%. **IMPORTANT:** Elevon deflections can be adjusted to suit one's own flying style, but make sure to pay particular attention to your elevator deflections (a little goes a long way for a flying wing!). Too much elevator deflection will result in inefficient over-controlling, stalling, and poor flight behavior.

► **HOT TIP:** As shown below, apply a piece of painter's tape to the tail, just behind elevon control surface for setting deflections. Mark desired deflections on tape and adjust transmitter Dual Rates until proper deflections are achieved.

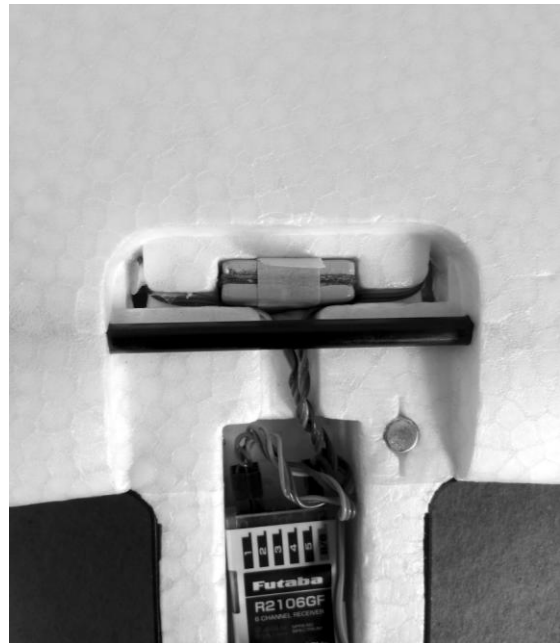
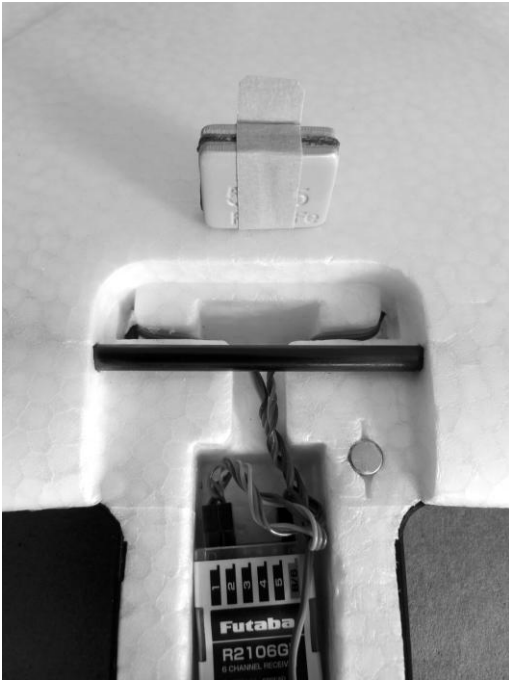
	LOW RATES	HIGH RATES
Elevator (Pitch Control)	3mm UP 3mm DOWN *D/R: 20%	5mm UP 5mm DOWN *D/R: 35%
Aileron (Roll Control)	10mm UP 10mm DOWN *D/R: 75%	13mm UP 13mm DOWN *D/R: 100%

* Provides the approximate Dual Rate (D/R) settings in percent. These settings will get you close to the listed deflections, but make sure to confirm through physical measurement.



BALLAST OPTION

For breezy conditions on the slope, you may want to add some ballast weight for better penetration. The Alula-TREK features a new compartment for easy ballast addition. This compartment is located just behind the carbon spar, beneath the canopy. It fits exactly four pieces of our steel balance weights (Part DFAA002).



Stick four 5 gram pieces together as shown to create a 20g ballast weight. Add a piece of tape to create a small tab for easy removal. Ballast weight is simply press-fit into place. Make sure tape tab does not interfere with canopy fit.

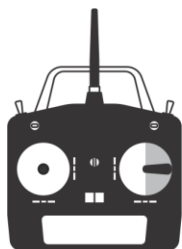
PRE-FLIGHT CHECK

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 session if possible.
3. Turn on transmitter, then glider.
4. Refer to table and graphic below 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!

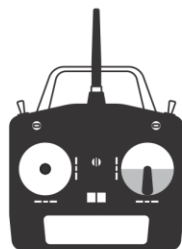
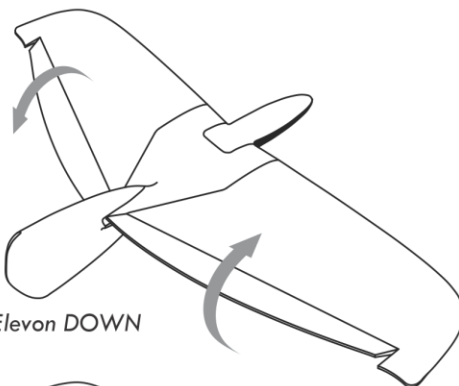
Roll	Roll Right: Right elevon up, Left elevon down Roll Left: Left elevon up, Right elevon down
Pitch	Nose Up: Elevons both deflected up Nose Down: Elevons both deflected down

CONTROL SURFACE MOVEMENTS

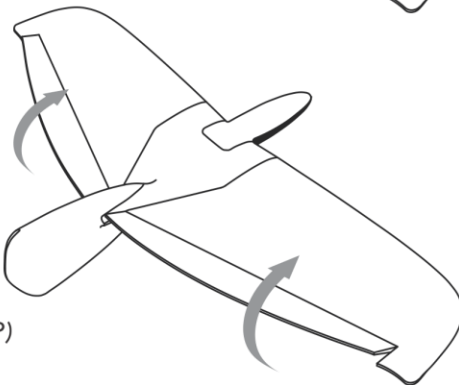
Corresponding "Mode 2" transmitter inputs shown.



Glider Rolls Right
(Right Elevon UP, Left Elevon DOWN)



Glider Noses Up
(Both Elevons move UP)



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. Check controls and flight surfaces for proper operation. If you are unsure, start with "Low Rate" elevon deflections listed on page 13.
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 Alula-TREK 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 and level glide, you can progressively try harder launches and eventually side-arm launches by utilizing the method described on Pages 17-18.



► **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 your liking, we suggest adding a drop of instant glue (CA) to the clevis/pushrod to lock the pushrod in place. **DO NOT** get any glue on the clevis pin and control horn connection.

SIDE-ARM LAUNCH TECHNIQUE

► You will be surprised by how little force is required to sidearm launch your Alula-TREK 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. For frequent, aggressive side-arm launching, make sure to secure the launching wing with tape as shown in Step 7 on Page 9. **CAUTION:** Exerting too much force during launch can result in injury and/or glider airframe failure.

Typical Side-arm Launching Sequence (see following page for time-lapse photos of a typical launch)

1. **CAUTION!** When holding the Alula-TREK prior to launch, allow the glider to hang vertical as shown. **DO NOT** raise the Alula's wing horizontally while supporting only the wingtip, as this can damage the wingtip by creating too much bending stress.
2. As shown in the image to the right, grip desired wingtip of the Alula-TREK with four fingers on top and thumb supporting from below, aligned with carbon wingspar. Orient your transmitter-supporting arm into the wind.
3. While keeping your throwing arm fully extended, begin launch rotation allowing your arm and glider to swing into launch trajectory (30-45 degrees above horizon).
4. Release glider directly into wind, above horizon. Allow the glider to climb without control input (a properly balanced and trimmed Alula-TREK should launch in a straight line without control input).
5. Smoothly push the glider's nose over 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.



Practicing your Side-arm launches on a flat field is a lot of fun.

We like playing "launch and catch" with our Alula-TREKs... It's like flying an RC boomerang!

Bottom line, have fun and enjoy the sun, wind, and your surroundings.



Side-arm Launch Sequence

One complete side-arm rotation shown in intervals, from start to release.

The launching rotation is about 180 degrees from start to release. This is about half the amount of rotation as a standard Discus-style launch, which involves a full rotation and usually several steps into the wind. Comparably, the side-arm launch method is a very easy and quick way to get a small lightweight glider like the Alula-TREK to soaring altitude.

Remember, always release into wind and keep arm and wrist as straight as possible. Avoid snapping your wrist upon release, as this results in excessive yawing motion, reducing launch height.



FINE-TUNING BALANCE POSITION (i.e. Center of Gravity)

► It is well worth spending a little time verifying the proper balance and trim of your glider. Doing so will ensure the Alula-TREK 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 glider:

- 1. Correct CG Position:** If properly balanced and trimmed for level flight, the Alula-TREK 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. A tail-heavy glider will be a chore to fly, constantly requiring elevator input to maintain a smooth flight trajectory. **Solution:** Add nose-weight and UP elevator trim until the first scenario above is achieved.

IMPORTANT NOTES:

Make sure your transmitter's trim steps are set to the absolute minimum, since small flying wings like the Alula-TREK are very sensitive to trim adjustments. Note that not all transmitters have adjustable trim steps.

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.



CONFIRMING CG LOCATION

You can confirm the CG location via the **inverted flight test** below:

Inverted Flight Test: A well balanced Alula-TREK should fly inverted with a little forward stick (down elevator), assuming good lift and moderate airspeed. If it takes NO forward stick, then the glider is slightly tail-heavy, and if it takes more than 1/3 forward stick the glider is a bit nose-heavy. How much this bothers you should be dictated by the previous CG tests, and how much you like to fly inverted. Some prefer their gliders to be a bit more nose-heavy, as they tend to be more stable and predictable. We like ours quite neutral, as this gives the glider a smooth and precise feel and makes for the straightest launches to altitude, although it will require a little more concentration to fly.

ADJUSTING ELEVATOR RATES

At the same time you are working on the CG, you'll probably find that your elevator rates need adjusting. For a flying wing, having too much elevator movement is as bad as having poor balance. This is especially so if you move the CG back a bit, as this will make your plane more sensitive to pitch, i.e. elevator inputs. The easiest way to test elevator rates is the **Loop Test**:

1. In decent lift, an Alula-TREK with proper CG and elevator rates should be able to do a nice, reasonably tight loop after building airspeed in a dive. If the plane has too much elevator throw, when attempting a loop the glider will nose up quickly and then hesitate, perhaps not finishing the top of the loop. This is a sign of excessive elevator throw, and the hesitation is a type of stall caused by too much control surface movement. If you see this, you need to reduce your elevator rates.
2. Likewise, if the loop is huge and it seems like the glider could be looping tighter, you can increase the elevator rates. If the CG is close to right on, you won't need to do much. We recommend increasing the rates a little at a time until you get a nice loop from a reasonable entry speed. We like our elevators relatively insensitive, so we don't usually set our elevator rates as high as other people (We find it makes the elevator too sensitive and thus makes the glider harder to fly smoothly and efficiently). Play with it until you get it "dialed in" exactly the way you like. The elevator response should be nice and smooth.
3. **A final note:** If, when flying, you pull back and the glider's nose bobs up and down very rapidly in a "hyper-stall," then you've got way too much elevator deflection. If you have your control surface rates set to the recommended amounts and you have your CG correct, YOU WILL NOT SEE THIS. However, if you are seeing it, it's a sure sign your elevator rates are too high.

“URBAN SOARING” TECHNIQUE

Background:

RC soaring is quiet, clean, challenging, and fun! Through mastering the soaring techniques listed on the following pages, one develops a unique appreciation and understanding of the environment and weather patterns. Fortunately, successfully flying an RC sailplane no longer requires a far journey in search of large open spaces. The Alula-TREK'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 Alula-TREK'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).

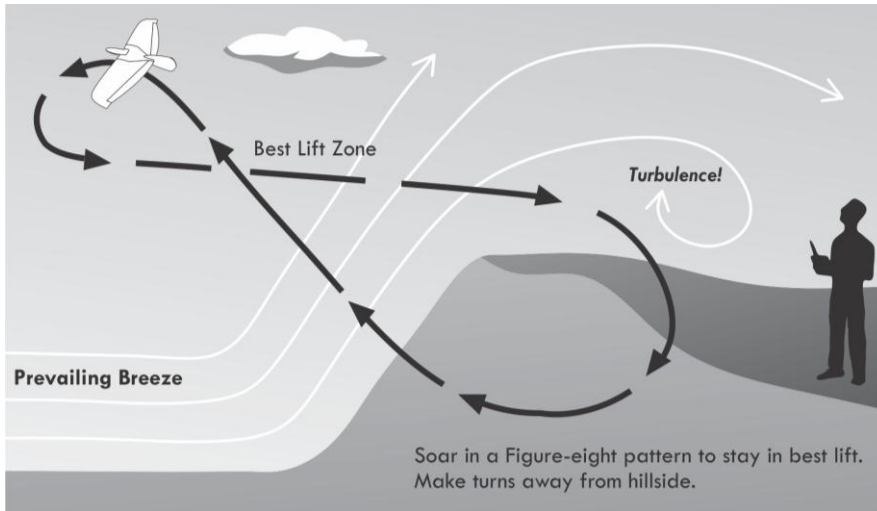
Important guidelines to follow when flying the Alula-TREK:

- ▶ **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 RC 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).

Below is a graphic which illustrates basic slope soaring technique.



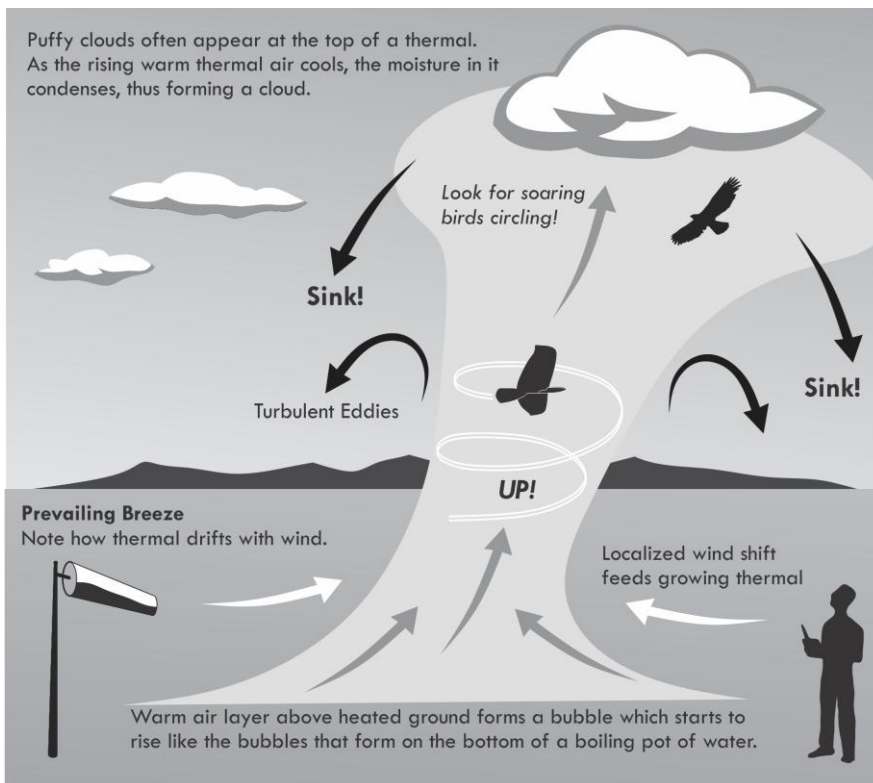
Flatland Soaring:

Flatland soaring with the Alula-TREK 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 that 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 launch to altitude, a nose over of the glider to level flight, and then off to search for a thermal. The majority of flights tend 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. 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 a 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. If one of your wings should rise noticeably, the common technique is to turn towards that wing and into what is hopefully rising air (this is not always true since turbulence can also cause the glider to alter course). 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. Typically, a glider will speed up slightly in lift and slow down and wallow in sink (downward moving air). If the glider speeds up a bit in level flight and doesn't seem to be losing altitude, start circling and use your elevator to slow the glider down and gain altitude.

► **Location and 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 too much. As the wind increases in the afternoon, it becomes more difficult to navigate thermal lift as conditions get "blown out." 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.



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 RC aircraft that get more people outdoors to enjoy the wind and sun.





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