

# Ascent 450 BL Park Glider PNP

## Assembly Manual



### Specifications

Wingspan:	54 in (1370mm)
Wing Area:	330 sq in (21.4 sq dm)
Length:	32 in (825mm)
Weight w/ Battery:	18-19 oz (510-540 kg)
Weight w/o Battery:	14-15 oz (400-425 kg)



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## Introduction

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Thank you for purchasing the Ascent™ 450 BL Park Glider. E-flite's Ascent offers the modeler a PNP (Plug and Play) electric park glider that is pre-built to a high level of craftsmanship. It is unique in that it comes with the electric motor and folding propeller installed, complete with two sub micro servos and brushless 22 Amp ESC, saving a significant amount of construction time.

The precovered and trimmed Ascent is a high-quality 450 outrunner-powered park glider that can be flight ready in just a few evenings. The world of electric-powered park gliders is extremely challenging and rewarding. It is your skill and knowledge of the surrounding atmosphere, combined with the design capabilities of your model, that will result in your ability to defy the laws of gravity and produce flights of unbelievable distance and duration.

With the electric motor, you can climb 300–500 feet (thermal hunting altitude) many times, resulting in flight times of up to an hour or more as you soar from thermal to thermal. We have included sections on "Thermal Soaring" and "Flight Trimming for Performance and Conditions" to help you achieve the most enjoyment from your Ascent. We believe you will have many enjoyable hours of challenging and rewarding flight. Happy thermal hunting!

## Using the Manual

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This manual is divided into sections to help make assembly easier to understand, and to provide breaks between each major section. In addition, check boxes have been placed next to each step to keep track of each step completed. Steps with a single circle (○) are performed once, while steps with two circles (○ ○) indicate that the step will require repeating, such as for a right or left wing panel, two servos, etc.

Remember to take your time and follow the directions.

## Contents of Kit/Parts Layout

### Replacement Parts

EFL2701	Wing Set
EFL2702	Fuselage
EFL2703	Tail Set
EFL2704	Canopy
EFL2705	Wing Tube



## Battery and Charger Selection

EFLB12503S	1250mAh 3S 11.1V 20C LiPo, 13GA EC3
EFLC3005	Celectra™ 1- to 3-cell Li-Po Charger
EFLC505	1-5S Balancing Li-Po Charger

## Covering Colors

HANU973	Lite White
HANU954	Transparent Blue
HANU964	Lite Clear
HANU881	Silver

## Required Radio Equipment

You will need a minimum 4-channel transmitter and micro receiver. We recommend the crystal-free, interference-free Spektrum™ DX6i 2.4GHz DSM® 6-channel system, which includes a micro receiver.

### Complete Radio System

SPM6600 DX6i DSM 6CH Radio System

### Or

SPM6000 AR6000 DSM 6-Channel Park Flyer Receiver (DX6, DX6i and DX7)

### Or

SPM6100E AR6100E DSM2™ Microlite 6-Channel Receiver, Air (DX6i and DX7 users only)

## Required Tools and Adhesives

### Tools & Equipment

Ball driver: 3/32-inch	Felt-tipped pen
Phillips screwdriver: #1	Painter's tape
Mixing sticks	Mixing cup
Ruler	Square
Hobby knife	#11 blades
Rubbing alcohol	Paper towels
Sandpaper	

### Adhesives

Medium CA	Threadlock
6-Minute Epoxy (HAN8000)	

## Optional Accessories

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EFLA110

Power Meter

### Notes Regarding Servos and ESC

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**WARNING:** Use of servos other than those we recommend may overload the BEC of the recommended Electronic Speed Control (ESC). We suggest the use of only the servos we recommend when utilizing the recommended ESC's BEC, or the use of a separate BEC (like the UBEC) or receiver battery pack when using other servos.

### Note on Lithium Polymer Batteries

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Lithium Polymer batteries are significantly more volatile than alkaline or Ni-Cd/Ni-MH batteries used in RC applications. All manufacturer's instructions and warnings must be followed closely. Mishandling of Li-Po batteries can result in fire. Always follow the manufacturer's instructions when disposing of Lithium Polymer batteries.

### Warning

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An RC aircraft is not a toy! If misused, it can cause serious bodily harm and damage to property. Fly only in open areas, preferably at AMA (Academy of Model Aeronautics) approved flying sites, following all instructions included with your radio.

Keep loose items that can get entangled in the propeller away from the prop, including loose clothing, or other objects such as pencils and screwdrivers. Especially keep your hands away from the propeller.

## Warranty Information

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### Warranty Period

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Horizon Hobby, Inc., (Horizon) warrants that the Products purchased (the "Product") will be free from defects in materials and workmanship at the date of purchase by the Purchaser.

### Limited Warranty

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(a) This warranty is limited to the original Purchaser ("Purchaser") and is not transferable. REPAIR OR REPLACEMENT AS PROVIDED UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY OF THE PURCHASER. This warranty covers only those Products purchased from an authorized Horizon dealer. Third party transactions are not covered by this warranty. Proof of purchase is required for warranty claims. Further, Horizon reserves the right to change or modify this warranty without notice and disclaims all other warranties, express or implied.

(b) Limitations- HORIZON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCT. THE PURCHASER ACKNOWLEDGES THAT THEY ALONE HAVE DETERMINED THAT THE PRODUCT WILL SUITABLY MEET THE REQUIREMENTS OF THE PURCHASER'S INTENDED USE.

(c) Purchaser Remedy- Horizon's sole obligation hereunder shall be that Horizon will, at its option, (i) repair or (ii) replace, any Product determined by Horizon to be defective. In the event of a defect, these are the Purchaser's exclusive remedies. Horizon reserves the right to inspect any and all equipment involved in a warranty claim. Repair or replacement decisions are at the sole discretion of Horizon. This warranty does not cover cosmetic damage or damage due to acts of God, accident, misuse, abuse, negligence, commercial use, or modification of or to any part of the Product. This warranty does not cover damage due to improper installation, operation, maintenance, or attempted repair by anyone other than Horizon. Return of any goods by Purchaser must be approved in writing by Horizon before shipment.

## Damage Limits

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HORIZON SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCT, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY. Further, in no event shall the liability of Horizon exceed the individual price of the Product on which liability is asserted. As Horizon has no control over use, setup, final assembly, modification or misuse, no liability shall be assumed nor accepted for any resulting damage or injury. By the act of use, setup or assembly, the user accepts all resulting liability.

If you as the Purchaser or user are not prepared to accept the liability associated with the use of this Product, you are advised to return this Product immediately in new and unused condition to the place of purchase.

Law: These Terms are governed by Illinois law (without regard to conflict of law principals).

## Safety Precautions

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This is a sophisticated hobby Product and not a toy. It must be operated with caution and common sense and requires some basic mechanical ability. Failure to operate this Product in a safe and responsible manner could result in injury or damage to the Product or other property. This Product is not intended for use by children without direct adult supervision. The Product manual contains instructions for safety, operation and maintenance. It is essential to read and follow all the instructions and warnings in the manual, prior to assembly, setup or use, in order to operate correctly and avoid damage or injury.

## Questions, Assistance, and Repairs

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Your local hobby store and/or place of purchase cannot provide warranty support or repair. Once assembly, setup or use of the Product has been started, you must contact Horizon directly. This will enable Horizon to better answer your questions and service you in the event that you may need any assistance. For questions or assistance, please direct your email to [productsupport@horizonhobby.com](mailto:productsupport@horizonhobby.com), or call 877.504.0233 toll free to speak to a service technician.

## Inspection or Repairs

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If this Product needs to be inspected or repaired, please call for a Return Merchandise Authorization (RMA). Pack the Product securely using a shipping carton. Please note that original boxes may be included, but are not designed to withstand the rigors of shipping without additional protection. Ship via a carrier that provides tracking and insurance for lost or damaged parcels, as **Horizon is not responsible for merchandise until it arrives and is accepted at our facility**. A Service Repair Request is available at [www.horizonhobby.com](http://www.horizonhobby.com) on the "Support" tab. If you do not have internet access, please include a letter with your complete name, street address, email address and phone number where you can be reached during business days, your RMA number, a list of the included items, method of payment for any non-warranty expenses and a brief summary of the problem. Your original sales receipt must also be included for warranty consideration. Be sure your name, address, and RMA number are clearly written on the outside of the shipping carton.

## Warranty Inspection and Repairs

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**To receive warranty service, you must include your original sales receipt** verifying the proof-of-purchase date. Provided warranty conditions have been met, your Product will be repaired or replaced free of charge. Repair or replacement decisions are at the sole discretion of Horizon Hobby.

## Non-Warranty Repairs

**Should your repair not be covered by warranty the repair will be completed and payment will be required without notification or estimate of the expense unless the expense exceeds 50% of the retail purchase cost.** By submitting the item for repair you are agreeing to payment of the repair without notification. Repair estimates are available upon request. You must include this request with your repair. Non-warranty repair estimates will be billed a minimum of ½ hour of labor. In addition you will be billed for return freight. Please advise us of your preferred method of payment. Horizon accepts money orders and cashiers checks, as well as Visa, MasterCard, American Express, and Discover cards. If you choose to pay by credit card, please include your credit card number and expiration date. Any repair left unpaid or unclaimed after 90 days will be considered abandoned and will be disposed of accordingly. **Please note: non-warranty repair is only available on electronics and model engines.**

Electronics and engines requiring inspection or repair should be shipped to the following address:

Horizon Service Center  
4105 Fieldstone Road  
Champaign, Illinois 61822

All other Products requiring warranty inspection or repair should be shipped to the following address:

Horizon Product Support  
4105 Fieldstone Road  
Champaign, Illinois 61822

**Please call 877-504-0233 with any questions or concerns regarding this product or warranty.**

## Safety, Precautions, and Warnings

As the user of this product, you are solely responsible for operating it in a manner that does not endanger yourself and others or result in damage to the product or the property of others.

Carefully follow the directions and warnings for this and any optional support equipment (chargers, rechargeable battery packs, etc.) that you use.

This model is controlled by a radio signal that is subject to interference from many sources outside your control. This interference can cause momentary loss of control so it is necessary to always keep a safe distance in all directions around your model, as this margin will help to avoid collisions or injury.

- Always operate your model in an open area away from cars, traffic, or people.
- Avoid operating your model in the street where injury or damage can occur.
- Never operate the model out into the street or populated areas for any reason.
- Never operate your model with low transmitter batteries.
- Carefully follow the directions and warnings for this and any optional support equipment (chargers, rechargeable battery packs, etc.) that you use.
- Keep all chemicals, small parts and anything electrical out of the reach of children.
- Moisture causes damage to electronics. Avoid water exposure to all equipment not specifically designed and protected for this purpose.

## Wing Assembly

### Required Parts

Fuselage                      Wing panel (right and left)  
Aluminum wing tube        #4 washer (2)  
4-40 x 1/2-inch socket head screw (2)

### Required Tools and Adhesives

Ball driver: 3/32-inch

- 1. Locate the aluminum wing tube and slide it into the hole in the wing root of one of the wing panels. The tube will slide in roughly half of its length.



- 2. Slide the remaining wing panel onto the tube. The two wing panels will fit tightly together.



- 3. Slide the dowels at the leading edge into the holes in the fuselage as shown.



- 4. The wing will fit tight against the fuselage when installed.



- 5. Use two 4-40 x 1/2-inch socket head screws and two #4 washers to secure the wing to the fuselage. Use a 3/32-inch ball driver to tighten the screws.



## Stabilizer/Elevator Installation

### Required Parts

Fuselage w/wing assembly      Stabilizer

### Required Tools and Adhesives

Ruler      Felt-tipped pen  
Sandpaper      Painter's tape  
6-minute epoxy      Mixing stick  
Paper towel      Mixing cup  
Rubbing alcohol  
Hobby knife w/new #11 blade

- 1. Locate the horizontal stabilizer. Use a ruler to determine the center of the stabilizer. Use a felt-tipped pen to mark the center of the stabilizer.





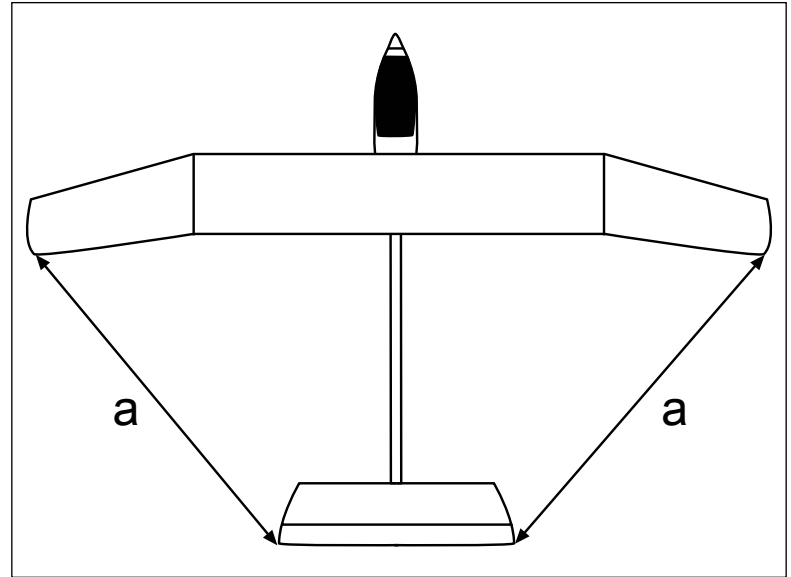
- 2. Mark the center of the tail boom inside the boom using a felt-tipped pen.



- 3. Use painter's tape to secure the stabilizer to the fuselage.



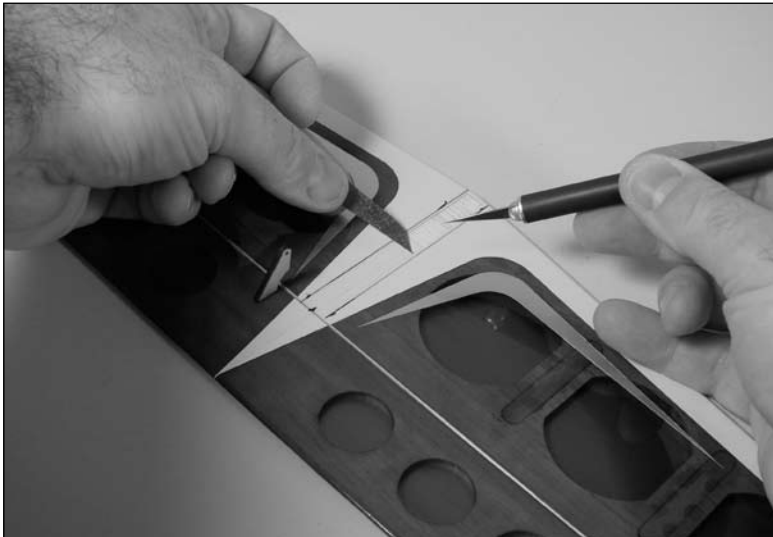
- 4. With the wing mounted to the fuselage, use a long ruler to measure the distance from the wing tip to the stabilizer tip as shown in the drawing. Carefully adjust the stabilizer until both measurements are equal.



- 5. Use a felt-tipped pen to transfer the outline of the fuselage onto the top of the stabilizer.



- 6. Remove the stabilizer from the fuselage. Use a hobby knife with a new #11 blade to remove the covering from inside the lines drawn in the previous step.

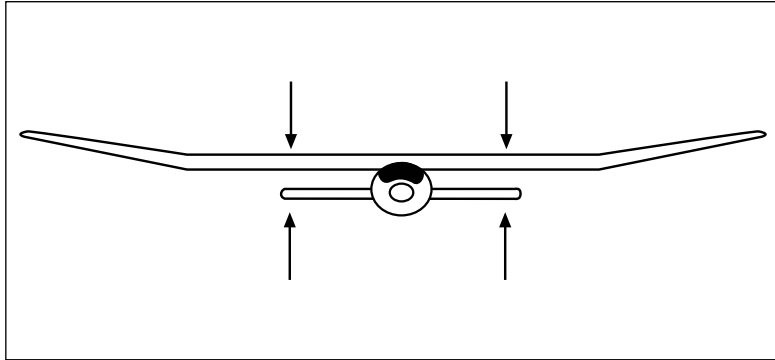


**Important:** Use light pressure when cutting the covering to prevent cutting into the stabilizer. Cutting too deep will weaken the stabilizer and could cause it to fail in flight.

- 7. Reposition the stabilizer and connect the bend from the elevator pushrod to the elevator control horn. The wire will enter the horn from the side closest to the fuselage.



- 8. Step back and view the airframe from roughly 8-10 feet (2-3 meters) to check the alignment of the stabilizer to the wing. If they are not parallel to each other, lightly sand the fuselage where the stabilizer mounts to correct the alignment.



- 9. Use 6-minute epoxy to glue the stabilizer to the fuselage. Use painter's tape to keep the stabilizer tight against the fuselage until the epoxy fully cures. You may use rubbing alcohol and paper towels to clean up any epoxy that has squeezed out during assembly.



## Fin/Rudder Installation

### Required Parts

Fuselage	Fin/rudder
Skid	

### Required Tools and Adhesives

Felt-tipped pen	6-minute epoxy
Painter's tape	Square
Mixing cup	Mixing stick
Hobby knife	Medium CA
Sandpaper	Rubbing alcohol
Paper towels	

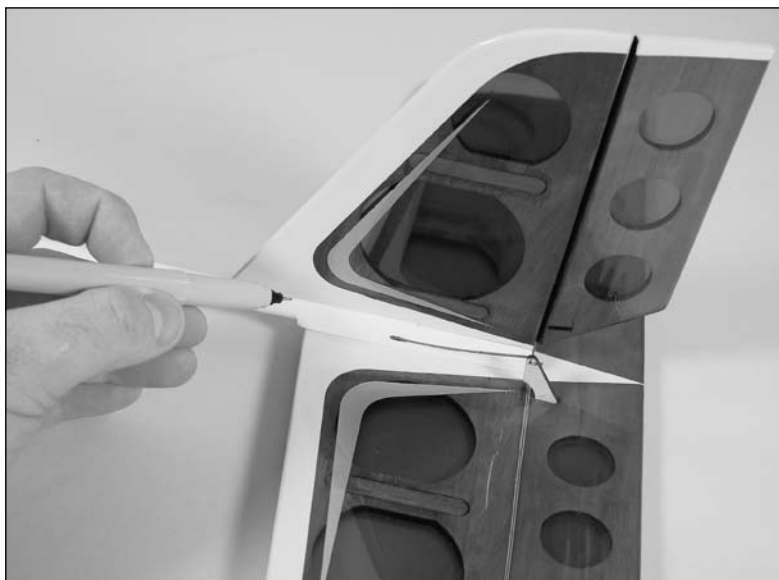
- 1. Check the fit of the fin to the fuselage. It should slide into the fuselage so the hinge line of the fin/rudder aligned with the hinge line from the stabilizer/elevator.



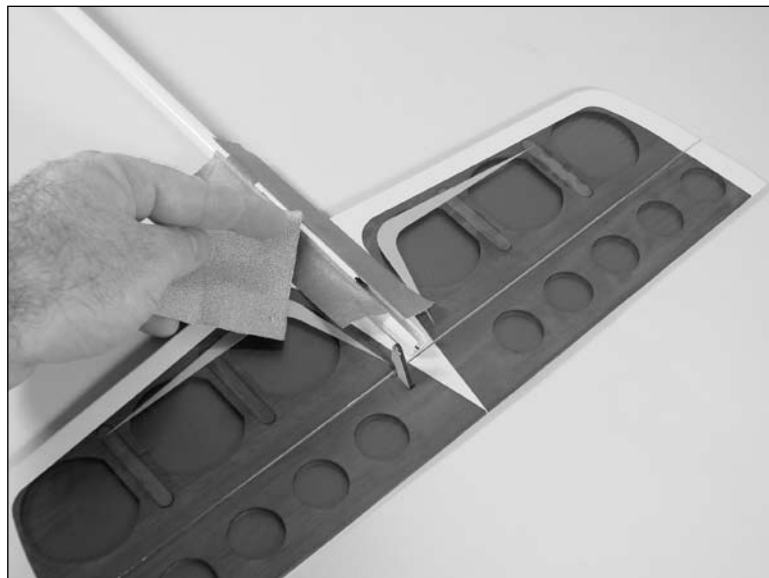
- 2. Use a felt-tipped pen to transfer the edge of the fuselage onto the bottom of the fin.



- 3. Use a felt-tipped pen to trace the outline of the fin on the top of the fuselage.



- 4. Use sandpaper to remove the paint from the top of the fuselage. This is necessary to provide a bonding surface between the fin and fuselage.



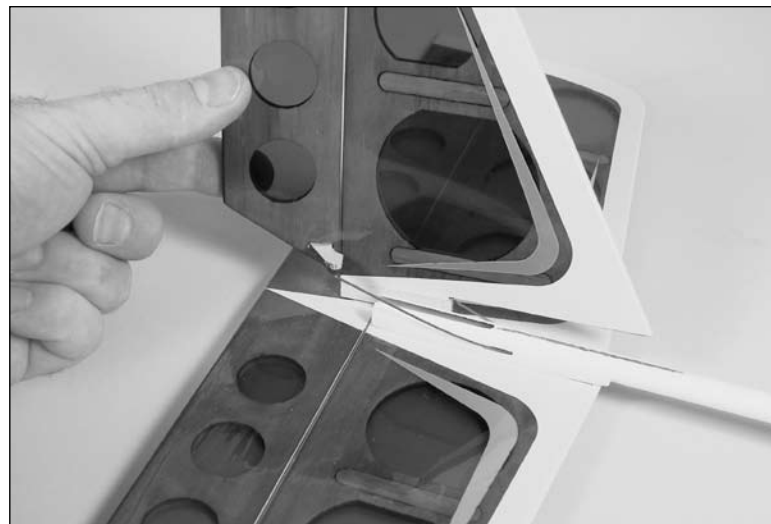
**Hint:** Use tape to outline the area to sand to prevent removing paint from the surrounding area.

- 5. Use a hobby knife with a new #11 blade to remove the covering from the bottom of the fin.

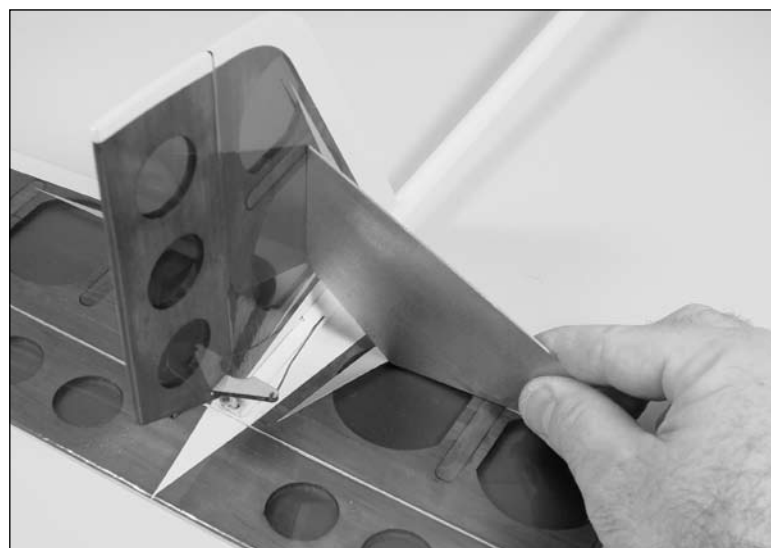


**Important:** Use light pressure when cutting the covering to prevent cutting into the fin. Cutting too deep will weaken the fin and could cause it to fail in flight.

- 6. Reposition the fin and connect the rudder pushrod to the rudder control horn. The bend will enter the horn from the side of the horn closest to the stabilizer. You will need to put a small bend in the pushrod wire to connect it to the rudder.



- 7. Use a square to check the alignment between the stabilizer and fin.



- 8. Use 6-minute epoxy to glue the fin to the fuselage.



- 9. Use painter's tape to keep the fin in position and square to the stabilizer while the epoxy cures. You may use rubbing alcohol and paper towels to clean up any squeeze out during this procedure.



- 10. Use a felt-tipped pen to trace the outline of the skid on the bottom of the stabilizer.



- 11. Use a hobby knife with a new #11 blade to remove the covering from inside the lines drawn in the previous step.



- 12. Use medium CA to glue the skid to the bottom of the stabilizer.



## Receiver Installation

### Required Parts

Receiver	Hook and loop tape
Motor battery	Fuselage assembly

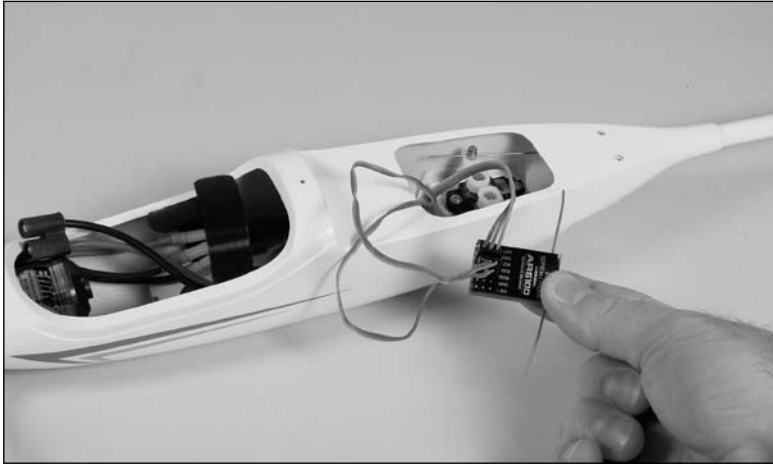
### Required Tools and Adhesives

Phillips screwdriver: #1

- 1. Use a #1 Phillips screwdriver to remove the two screws that secure the canopy to the fuselage.



- 2. Plug the elevator servo, rudder servo and speed control leads into the appropriate ports of the receiver. On a model that uses rudder and elevator control, it is common to plug the rudder servo into the aileron port.



- 3. Use the supplied hook and loop tape to attach the receiver inside the fuselage.



- 4. Install the motor battery inside the fuselage. Place the hook and loop tape on the battery and battery tray to keep the battery from moving forward or backward in the fuselage. The battery installation is completed by securing the battery with the hook and loop strap that is pre-installed in the fuselage.



- 5. Turn on the radio and check the operation of the servos. Center the rudder stick and trim. After centering the rudder, use a #1 Phillips screwdriver to tighten the screw that secures the rudder pushrod wire. Once complete with the rudder, check the elevator centering as well.





## Control Throws

- 1. Turn on the transmitter and receiver of your Ascent 450 BL Park Glider PNP®. Check the movement of the rudder using the transmitter. When the stick is moved right, the rudder should also move right. Reverse the direction of the servo at the transmitter if necessary.
- 2. Check the movement of the elevator with the radio system. Moving the elevator stick down will make the airplane elevator move up.
- 3. Use a ruler to adjust the throw of the elevator and rudder. Adjust the position of the pushrod at the control horn to achieve the following measurements when moving the sticks to their endpoints.

**Note:** Measurements are taken at the widest point on the surface.

### **Elevator**

Low Rate: 5/8-inch (16mm) (Up/Down)  
High Rate: 1-inch (25mm) (Up/Down)

### **Rudder**

1 1/2-inch (38mm) (Right/Left)

These are general guidelines measured from our own flight tests. You can experiment with higher rates to match your preferred style of flying.

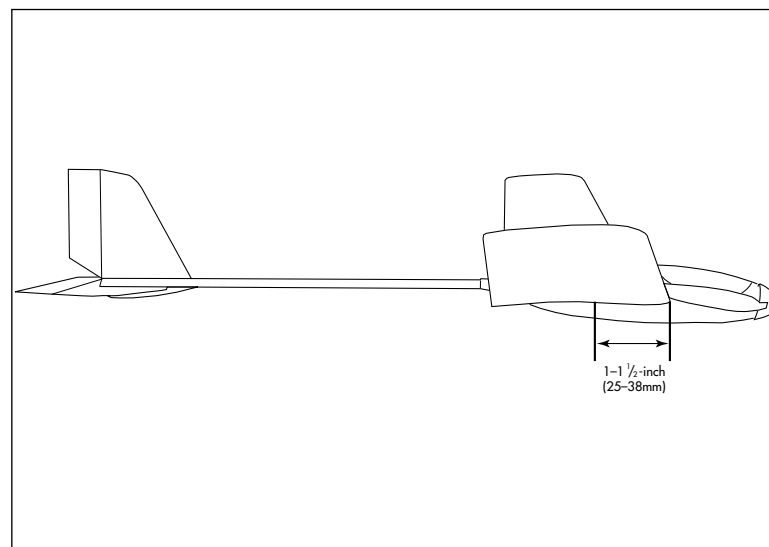
## Center of Gravity

An important part of preparing the aircraft for flight is properly balancing the model.

**Caution: Do not inadvertently skip this step!**

The recommended Center of Gravity (CG) location for the Ascent 450 BL Park Glider PNP is 1–1 1/2-inch (25–38mm) back from the leading edge of the wing. Mark the location of the CG on the bottom of the wing.

Please balance your model while it is upright with the battery installed. With the model upright, lift the model at the marks using your fingertips, or use a commercially available balancing stand. The model will rest level or slightly nose down when balanced correctly. Adjust the position of the motor battery, or add weight to the nose or tail if necessary to achieve the correct CG. Please understand that if you use a different Li-Po battery than the one included, you need to rebalance the model to verify the Center of Gravity.



After the first flights, the CG position can be adjusted for your personal preference.

## Range Test Your Radio

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- 1. Please consult your radio instructions for complete range testing instructions.
- 2. Double-check that all controls (aileron, elevator, rudder and throttle) move in the correct direction.
- 3. Be sure that your transmitter batteries are fully charged, per the instructions included with your radio.

## Instructions for Disposal of WEEE by Users in the European Union

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This product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or where you purchased the product.



## Preflight

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### Check Your Radio

Before going to the field, be sure that your batteries are fully charged per the instructions included with your radio. Charge both the transmitter and receiver pack for your airplane. Use the recommended charger supplied with your particular radio system, following the instructions provided with the radio. In most cases, the radio should be charged the night before going out flying.

Before each flying session, be sure to range check your radio. See your radio manual for the recommended range and instructions for your radio system. Each radio manufacturer specifies different procedures for their radio systems. Next, start the motor. With the model securely anchored, check the range again. The range test should not be significantly affected. If it is, don't attempt to fly! Have your radio equipment checked out by the manufacturer.

**Note:** Keep loose items that can get entangled in the propeller away from the prop. These include loose clothing, or other objects such as pencils and screwdrivers. Especially keep your hands away from the propeller.

Double-check that all controls (aileron, elevator, rudder and throttle) move in the correct direction.

Check the radio installation and make sure all the control surfaces are moving correctly (i.e. the correct direction and with the recommended throws). Test run the motor and make sure it transitions smoothly from off to full throttle and back. Also ensure the engine is installed according to the manufacturer's instructions, and it will operate consistently.

Check all the control horns, servo horns, and clevises to make sure they are secure and in good condition. Replace any items that would be considered questionable. Failure of any of these components in flight would mean the loss of your aircraft.

## Glide Testing Your Ascent PNP

We strongly recommend that before you fly your new Ascent, you first perform a test glide. Pick a flat spot that has soft, tall grass and is free from obstructions. You first want to check out the Ascent's performance but also check your performance as a pilot. It also allows you to make corrections to any building or control defects that may have been overlooked. The test glide should be done with an assistant on a calm day.

**Hint:** A good time during the day is very early in the morning or at dusk when the wind is calm. You want to be able to concentrate on what the model is doing, and have time to think about what you're doing. We will assume you have an assistant during the following steps.

- 1. Range check your radio system and check the control throws. Make sure the control surfaces move in the proper direction.
- 2. Have the assistant hold the Ascent under the wing near the CG and run forward until they can sense the wing developing lift. Don't release the glider yet. See if the model wants to lift. If not, add a bit of up elevator trim and try again.
- 3. This step may take some practice on the part of your assistant. What you want them to do now is run forward, but a bit faster, with the nose of the plane pointed at the horizon with the wings level (not nose down or nose up). Then thrust the Ascent forward in a line straight toward the horizon and release it.
- 4. When the assistant releases the model, watch it carefully. A properly trimmed aircraft will fly straight, gliding to a smooth landing about 50 feet away. If the Ascent pitches nose down, the CG is too far back and you have a nose-heavy condition. Remove some weight from the nose. If the Ascent pitches nose up sharply, and

stalls, you have a tail-heavy condition (the CG is too far forward), and you need to remove weight from the tail or move the battery and receiver further forward.

- 5. Turns to the left or right after launch can be adjusted through the use of right or left rudder trim.  
**Important:** Make any trim adjustments in small increments. Large changes can result in abrupt turns, causing tip stalls and loss of control.
- 6. If you have to make large trim adjustments on your transmitter, you may have other problems, such as warps. Check the wings, elevator, and rudder to make sure there are no warps in the airframe. Make sure the wings are aligned and mounted properly on the fuselage. When you have the Ascent trimmed and the CG adjusted so it glides properly in a "hands off" manner, return your transmitter trim switches to their neutral position, then make the appropriate mechanical linkage corrections to return the control surfaces to their test glide positions.
- 7. After you have made the necessary corrections, glide test the model again to make sure it is trimmed properly with the transmitter trims in neutral.
- 8. You are now ready to launch under power. Hold the fuselage under the wing with the model powered up. Apply half throttle and gently toss the model into the wind at a slight nose up attitude. The model will fly out strongly and you will be able to climb to altitude in a very short time. Moving the throttle stick to idle (or cutoff) you will find the prop will stop spinning and fold against the fuselage. You are now ready to hunt for thermals and enjoy the calm air.

## Thermal Soaring

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A key component to soaring is the air mass the park glider flies in. Also, there is an energy source producing lift, either a warm air thermal (thermal lift), or the wind rising as it meets an obstacle such as a hill or a line of mountains (ridge lift). We will limit our discussion to describing thermal soaring.

We will be using the electric motor to launch our park glider to altitude. Once at altitude we shut down the motor and the park glider will soar, eventually to return to earth until we use the motor to climb again. How then does a park glider stay aloft for long periods of time and travel long distances? Some force has to provide sufficient lift to overcome gravity when the motor is not used.

One such force is the thermal. The thermal is simply a column of rising warm air. Warm air is lighter (less dense) than cooler air and thus rises. The term "differential heating" is used to describe the generation of thermals. Descending cool air is known as "sink."

Balloonists, to launch and fly their hot air balloons, use the principle of warm vs. cool air. They create and trap warm air inside the balloon envelope, and the warm air displaces the cool air, causing the balloon to inflate and rise until air begins to cool inside the envelope. The balloonist simply uses a propane heater to warm the air again, causing the balloon rises again or maintains its altitude.

Nature generates thermals by the sun heating darker ground or objects more than lighter colored surfaces. The dark object absorbs the sun's heat becoming warm and thus warming the air above it.

For a thermal to be formed, the sun (or a heat source such as a hot metal roof, factory, etc.) will heat the ground or surrounding air in one location faster or warmer than the surrounding air. The warm ground will warm the air above it and cause the air to begin to rise. Rising warm air can take on the form of a column or a funnel. Usually the part of the thermal near the ground is small and expands outward as it rises in altitude.

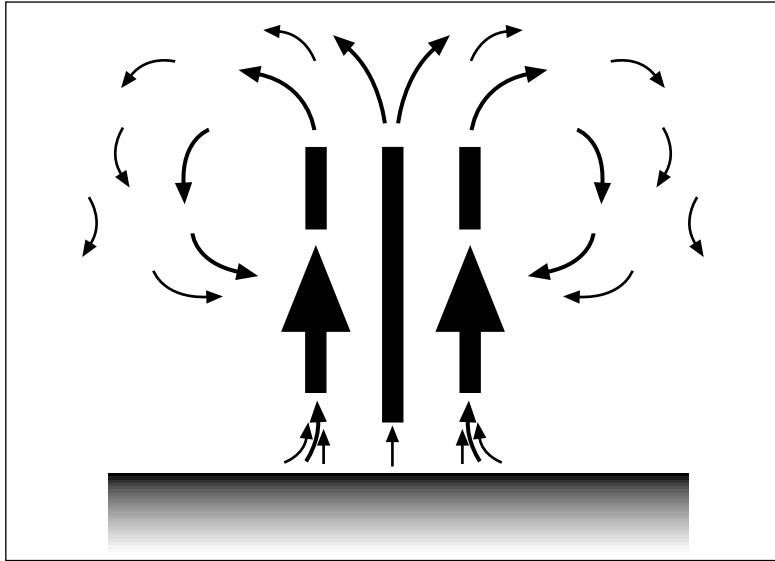
Since the warming of air is usually a much smaller area than the total area, the thermal updraft will be faster than the cooler downdraft motion of air. This cooler downdraft of air is referred to as "sink" and causes glider flights to be of a much shorter duration as the lift generated by the wing is overcome by the downward motion of the air.

To stay aloft one's task is to move from one thermal to another, utilizing the lift created by rising warm air. In level flight, a glider continuously descends in relation to the surrounding air. The only way to sustain flight in a glider beyond the sink time in still air (without a motor) is to fly in an air mass that is rising at a rate greater than the sink rate of the glider.

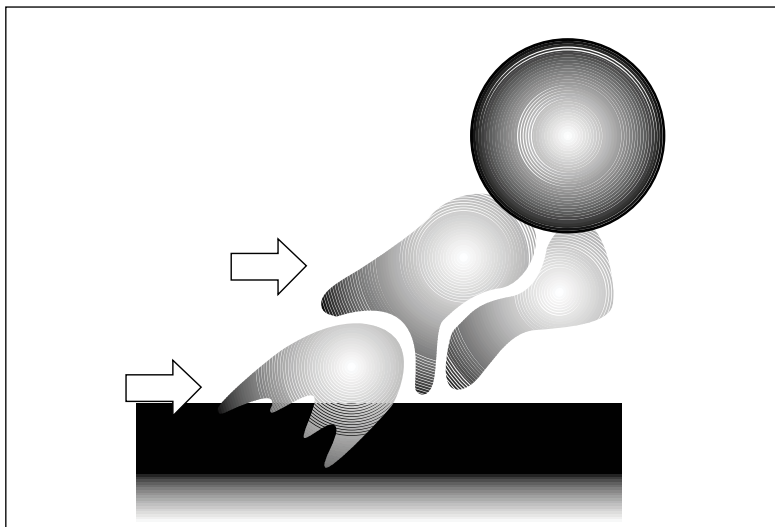
Thermals usually cannot be seen. (An exception is a "dust devil"—a small thermal that has picked up dust making it visible.) One can sometimes "feel" the presence of a thermal. A breath of air in an otherwise calm spot indicates the presence of a thermal. A shift in the wind (in a light breeze) probably indicates airflow into a thermal. And one can watch for the graceful soaring of birds, such as hawks and eagles to locate the presence of thermals.

Sometimes the wind will cause the thermal to bend or break, causing a warm air bubble that slowly travels downwind as it rises. Thermals can vary in strength, rising at speeds of a few hundred to over a thousand feet per minute.

### Thermal Form (Column)



### Thermal Form (Bubble)

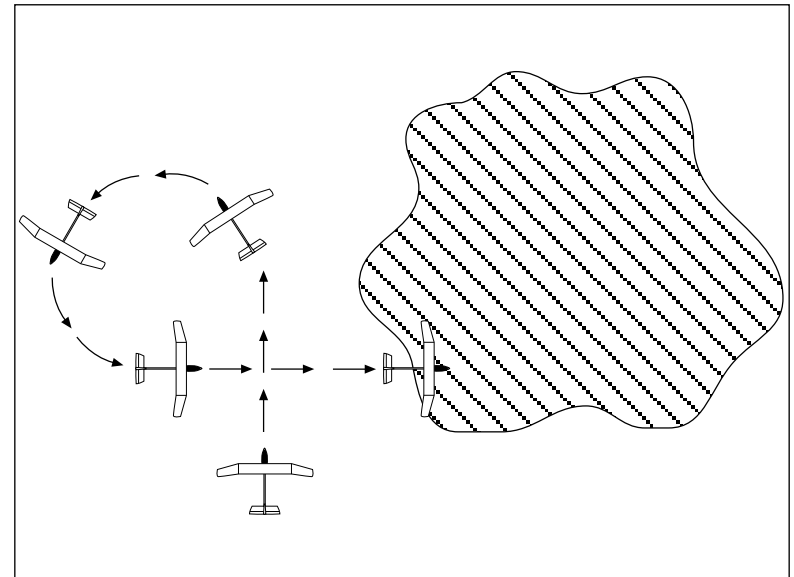


As you are flying your Ascent, watch it carefully. If you were in a full-size glider, you would be able to feel the "bump" of entering a thermal. Now you must depend on signs the glider gives as it approaches or enters a thermal.

When the Ascent flies near a thermal that is rising, the wing closest to the thermal will also try to rise, causing the aircraft to "rock" slightly. The nearness of a thermal will cause the glider to "turn away" without any control input from the pilot.

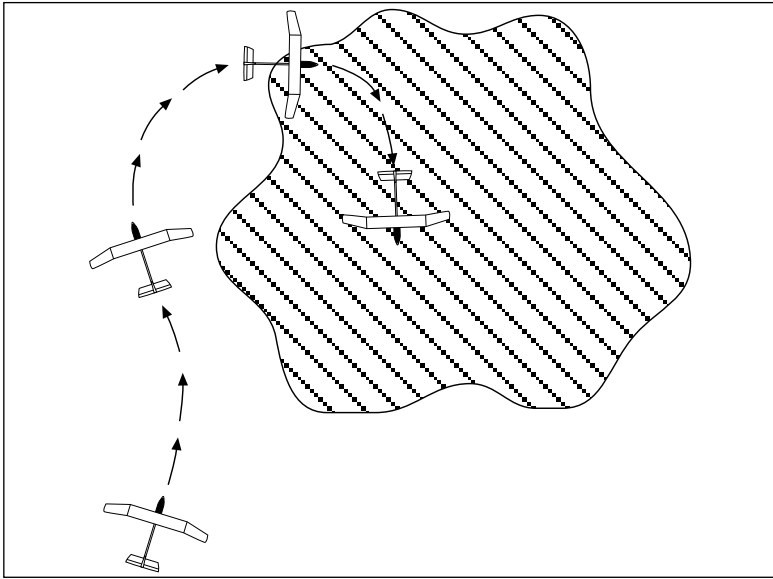
### Executing a 270-degree turn

There are several ways of entering a thermal. One is to continue the thermal-induced turn for 270 degrees. If the thermal is on your right, turn left for 270 degrees and enter at a right angle to the original flight path.



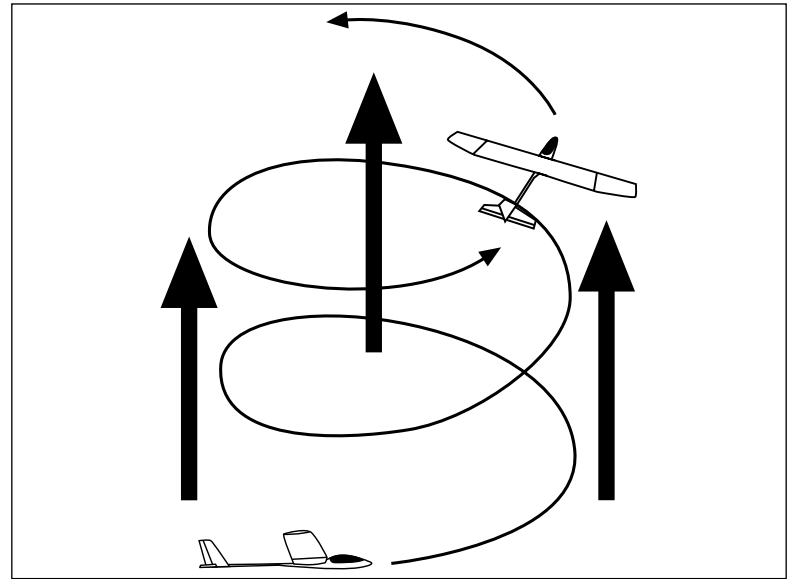
## Executing a 180-degree turn

The second method is to make a wide 180-degree turn back into the thermal.



## Flying the Core of a Thermal

Once in the thermal, you will need to try to stay in the center of the lift. Slow down by increasing the up elevator "trim" until the park glider is just above stall (minimum sink) speed. Make easy banking turns to find the area of highest lift (thermal core). When you have found the core of lift, tighten the turns to stay within the core of highest lift.



As you gain experience, you will find it easier to locate thermals and track their progress.

## In-Flight Adjustments for Performance and Conditions

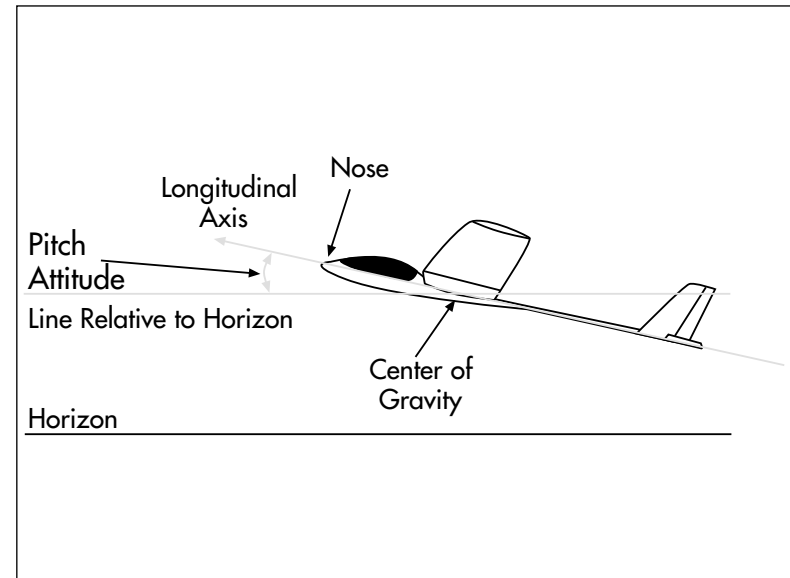
- Pitch Attitude
- Minimum Sink Speed
- Maximum Lift/Drag (L/D) Speed
- Best Penetration Speed

Once the fundamentals of launch, trim, and control of the Ascent are learned, it's time to consider getting the most out of its ability to perform. To do that, you must learn how to trim your Ascent for maximum performance, whatever the current conditions are at the time. The key to trimming for maximum performance is to become knowledgeable of three key speeds: minimum sink, maximum lift/drag (L/D), and best penetration.

These three speeds are what we call airspeeds, not ground speeds (the aircraft's speed across the ground). Thus the airspeed of the plane is relative to the air mass surrounding it.

### Pitch Attitude

To determine the Ascent's airspeed, you will have to watch carefully for its pitch attitude. Pitch attitude can best be described as the amount (degree) the nose of the aircraft is above or below a line relative to the horizon. The angle of attack term is used to describe the angle between the chord (width) of the wing and the direction the wing moves through the air.



## Minimum Sink Speed

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In our discussion of thermals, we know sink is the cooler air moving downward to replace the warm air that is rising. Minimum sink speed is the speed at which a park glider loses altitude most slowly. As the term then implies, minimum sink speed gives the glider the maximum amount of time aloft from a given altitude. This is the speed to fly at when you are circling in thermals, or whenever you need the maximum lift the glider can produce. The pitch attitude will appear to be more nose-up.

To determine what this speed is for your Ascent, fly it at a slow speed, slowing down until it just stalls, then trim it to fly at a speed just above where it begins to stall. Observe the pitch attitude at this speed. You will need to practice flying at this speed without stalling so you can come back to it whenever you want to when you are in a thermal or trying to maintain maximum lift.

## Maximum Lift/Drag (L/D) Speed

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This is the speed at which you can fly the maximum distance for a given altitude. It's used when you move from one thermal to another, or when you need to cover the maximum distance over ground. This will be a moderately faster airspeed than the minimum sink speed. You will have to experiment by starting from the minimum sink speed and add small amounts of down trim to increase speed slightly. This is the speed the Ascent performs the best for duration, and the speed at which you will do most of your flying. It will take practice until you are familiar with the Ascent's attitude at this speed. Remember you will be flying slightly faster, at a lower pitch attitude as compared to minimum sink speed.

## Best Penetration Speed

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This is the speed at which the Ascent will travel forward against the wind or a thermal, as far and as quickly as possible. This speed will vary with the conditions, such as windy situations or very strong thermals. You will want to use this speed to escape from very strong lift (or sink). This speed has a more pronounced nose down appearance, which will vary with the conditions encountered. It will also not be a consistent attitude, but vary with the strength and direction of the lift/sink or wind.

Once you have learned to launch and control your Ascent in a consistent manner, you will want to then proceed with practicing these three speeds. Remember these are trim speeds, so you will be using your trim lever to obtain them. For maximum performance, remember to use trim sparingly, don't depend on the stick, as you will only impart small movements that result in drag and battery drain.

Practice Smooth Control Inputs and Use the Trim lever. (Remember you trimmed the Ascent in the first flights, and then set the mechanical linkages to reflect the trim imparted. You then set your trim levers back to neutral. Now you know why we performed that procedure, to allow you to use the trim lever for in-flight trim to better control flight performance.)

There are other things that can be done to bring the performance level of your Ascent to its absolute best. However, they should not be attempted until you have become proficient in the launch, control, and trim of your model.

The more you learn how to trim your Ascent for optimum performance, the more fun you can have chasing thermals!



# 2008 Official AMA National Model Aircraft Safety Code

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## GENERAL

- 1) I will not fly my model aircraft in sanctioned events, air shows or model flying demonstrations until it has been proven to be airworthy by having been previously, successfully flight tested.
- 2) I will not fly my model higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator. I will give right-of-way and avoid flying in the proximity of full-scale aircraft. Where necessary, an observer shall be utilized to supervise flying to avoid having models fly in the proximity of full-scale aircraft.
- 3) Where established, I will abide by the safety rules for the flying site I use, and I will not willfully or deliberately fly my models in a careless, reckless and/or dangerous manner.
- 4) The maximum takeoff weight of a model is 55 pounds, except models flown under Experimental Aircraft rules.
- 5) I will not fly my model unless it is identified with my name and address or AMA number on or in the model. (This does not apply to models while being flown indoors.)
- 6) I will not operate models with metal-bladed propellers or with gaseous boosts, in which gases other than air enter their internal combustion engine(s); nor will I operate models with extremely hazardous fuels such as those containing tetranitromethane or hydrazine.

## RADIO CONTROL

- 1) I will have completed a successful radio equipment ground range check before the first flight of a new or repaired model.
- 2) I will not fly my model aircraft in the presence of spectators until I become a qualified flier, unless assisted by an experienced helper.
- 3) At all flying sites a straight or curved line(s) must be established in front of which all flying takes place with the other side for spectators. Only personnel involved with flying the aircraft are allowed at or in front of the flight line. Intentional flying behind the flight line is prohibited.

- 4) I will operate my model using only radio control frequencies currently allowed by the Federal Communications Commission. (Only properly licensed Amateurs are authorized to operate equipment on Amateur Band frequencies.)
- 5) Flying sites separated by three miles or more are considered safe from site-to-site interference, even when both sites use the same frequencies. Any circumstances under three miles separation require a frequency management arrangement, which may be either an allocation of specific frequencies for each site or testing to determine that freedom from interference exists. Allocation plans or interference test reports shall be signed by the parties involved and provided to AMA Headquarters.

Documents of agreement and reports may exist between (1) two or more AMA Chartered Clubs, (2) AMA clubs and individual AMA members not associated with AMA Clubs, or (3) two or more individual AMA members.

- 6) For Combat, distance between combat engagement line and spectator line will be 500 feet per cubic inch of engine displacement. (Example: .40 engine = 200 feet.); electric motors will be based on equivalent combustion engine size. Additional safety requirements will be per the RC Combat section of the current Competition Regulations.
- 7) At air shows or model flying demonstrations, a single straight line must be established, one side of which is for flying, with the other side for spectators.
- 8) With the exception of events flown under AMA Competition rules, after launch, except for pilots or helpers being used, no powered model may be flown closer than 25 feet to any person.
- 9) Under no circumstances may a pilot or other person touch a powered model in flight.







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