

# Soaring Star

## Almost Ready To Fly 2M Electric Powered R/C Sailplane



### **No.4313 Soaring Star**

\*Wing Span: 78.75"(2000mm) \*Length: 41.25" (1047mm) \*Wing Area: 532.5 sq.in.(34.36dm<sup>2</sup>) \*Weight: 50~52oz.(1400~1500g)  
\*Wing Loading: 13.8oz./sq.ft.(42g/dm<sup>2</sup>) \*Motor: 540 Motor included \*Prop: 8 x 4.5 Folding Prop included \*ESC-50 req'd  
\*Radio: 4 channel, 4 mini servo req'd \*Battery: 7.2V req'd

**Warranty:** This kit is guaranteed to be free from defects in material and workmanship at the date of purchase. It does not cover any damage caused by use or modification. The warranty does not extend beyond the product itself and is limited only to the original cost of the kit. By the act of building this user-assembled kit, the user accepts all resulting liability for damage caused by the final product. If the buyer is not prepared to accept this liability, it can be returned new and unused to the place of purchase for a refund.

**Notice: Adult Supervision Required:** This is not a toy. Assembly and flying of this product requires adult supervision. Read through this book completely and become familiar with the assembly and flight of this airplane. Inspect all parts for completeness and damage. Customers in North America please call 1-949-833-7498 for help if you encounter any problems.

## **INTRODUCTION**

All of us at Thunder Tiger want to thank you for choosing the Soaring Star. This Kit has been engineered to go together quickly and easily while still providing you with great looks and exceptional flying performance. The world of electric powered sailplanes can be an extremely challenging and rewarding experience. Your skill along with the design capabilities of your model will combine to defy the laws of gravity and produce flights of unbelievable distance or duration. Under proper conditions your Soaring Star can stay aloft for hours from a single battery charge! As you gain experience with your model you will be able to “feel” the wing and lift conditions that affect it enabling you to greatly extend your flight times.

The Soaring Star is an electric powered 2-meter sailplane which is intended for use in light to medium wind and lift conditions. Its airfoil, motor package and design platform are intended to maximize performance under those flying conditions and will provide great results for pilots of all skill levels.

We suggest that before beginning to assemble this kit you thoroughly read this assembly instruction manual to familiarize yourself with the complete assembly procedure. This will insure that your assembly process will be as smooth and uneventful as possible.

We are confident that you will enjoy flying your Soaring Star and that it will provide many hours of challenging and rewarding flight.

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## PRE-ASSEMBLY NOTES

1. If you are not an experienced R/C pilot plan to have a fully competent pilot help you to learn to fly your Soaring Star. This will help you to be successful much faster and also avoid potential damage to your model.

2. Please assemble your model exactly according to these instructions. Do not attempt to modify or change the Soaring Star in any way as doing so may adversely change its flying characteristics.

3. Before you begin please check the entire contents of this kit against the parts list and part drawings to be sure that no parts are missing or damaged. This will also help you to become familiar with each component of your Soaring Star. If you find that any of the parts are either missing or damaged please contact your dealer immediately for replacement. Note: Your dealer cannot accept kits for return if construction has begun.

For customers in the US and Canada please call or write to ACE Hobby Distributors, Inc. for replacement of missing or damaged parts.

**ACE Hobby Distributors, Inc.**  
**2055 Main Street, Irvine, CA 92614**  
**Tel: 949.833.0088**  
**Fax: 949.833.0003**  
**E-Mail: [service@acehobby.com](mailto:service@acehobby.com)**

**Remember.** We have worked very hard to make this model as easy to assemble as possible while still maintaining our high standards of quality. Your assembly of this model is very important and will determine the final flight capabilities of your Soaring Star, so use extra care and follow the assembly procedure exactly.

## OTHER ITEMS REQUIRED

**Radio:** You will need at least a 3 channel radio control system with 4 mini servos on an aircraft frequency for use in your Soaring Star. However, if you are really looking for every bit of extra performance then you should consider using one of the miniature radio systems available which would lower the weight and increase the performance of your Soaring Star.



**Electronic motor controller:** We recommend the ACE8014 ESC-50 with BEC for controlling the power of your Soaring Star as well as eliminating the need for a separate radio battery. The BEC (Battery Eliminator Circuitry) in this controller will automatically turn off the power to the motor when the battery reaches a factory present discharge level leaving about 20-25 minutes of flight time for the radio system. Note: Some radio manufacturers offer a lightweight radio system with a built-in motor controller with BEC especially for this type of model.

**Flight Battery:** We recommend the use of a 6 cell 7.2V 2000 mAh battery pack for maximum performance.

**Charger:** You will need a quick charger to charge your power battery. We recommend our ACE2529 EDC-01 simple charge or TTR2685 7.2V DC Quick Charger for 6-cell battery pack.



Note: When charging your flight battery be sure to very carefully follow the instructions provided with the charger.

**Extension Wire:** 2 servo extensions plus Y harness are required. If you are going to use Flaperon then it will require 2 servo extensions which are 15" in length minimum.

## TOOLS AND SUPPLIES NEEDED

1. 5 Minute Epoxy
2. Thin CA Glue
3. Thick CA Glue
4. 1/2" Masking Tape
5. Mixing Stick for Epoxy
6. Medium Grit Sandpaper
7. Rubbing Alcohol
8. Paper Towels
9. Hobby Knife
10. 1/16" Drill
11. 5/64" Drill
12. 1/8" Drill
13. 3/16" Drill
14. Ruler
15. Pen, Pencil or Marker
16. Small Screw Drivers

**AS6317 FRP Fuselage**

Zip Tie (1)

FRP Fuselage (1)

Blind Nut (4)

CA Hinge (2)

**AS6318 Main Wing**

Main Wing (L/1, R/1)

Hatch Cover (L/1, R/1)

Carbon Wing Joiner (2)

Wing Protector (L/1, R/1)

Two-Sided Tape (2)

Plastics Servo Bed (2)

Wing Bolt (L/2, S/2)

2 x 5mm Wood Screw (8)

**AS6319 Horizontal Tail**

Horizontal Tail / Elevator (1)

Plastic Sink Washer (2)

3 x 20mm Sink Wood Screw (2)

**AS6189 Motor**

3x8mm Sink Screw (2)

540 Motor (1)

**AS6321 Pushrod Set**

Long Threaded End (1)

Z-Bend Pushrod (2)

Aileron Pushrod (2)

Clevis (4)

Short Threaded End (1)

**AS6320 Canopy**

Simulated Carbon Canopy (1)

2 x 5 mm Wood Screw (5)

**AS6322 Decal**

Decal (1)

**PE0565 Folding Prop Set**

Spinner (1)

Blade (2)

Drive Shaft (1)

Backplate (1)

2 x 12mm Screw (2)

2 x 8mm Sink Screw (1)

5mm Nut (1)

Washer (1)

Drive Nut (1)

**AS6324 Plywood Parts**

Plywood Parts (1)

**AS6243 Control Horn (Sold in Pair)**

Backplate (3)

Control Horn Base (3)

2 x 22mm Screw (3)

Nylon Horn Link (3)

**AS6049 Control Horn (typical) (Sold in Pair)**

2 x 12mm Screw (2)

Backplate (1)

Control Horn (1)

**Wing Assembly 主翼的安裝步驟：**



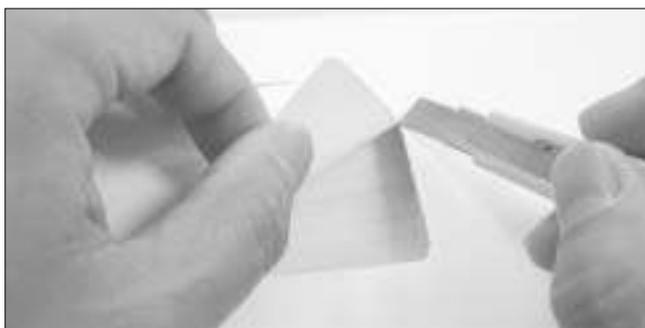
1. Before you install the aileron servo you have to decide your Soaring Star have Flaperon (FLPN) or regular Aileron control surface.

If Flaperon function is applied, then it will require 2 Servo Extensions which are 16" long minimum.

If Aileron control surface is your choice, then 2 Servo Extensions(8") plus a Y harness are required.

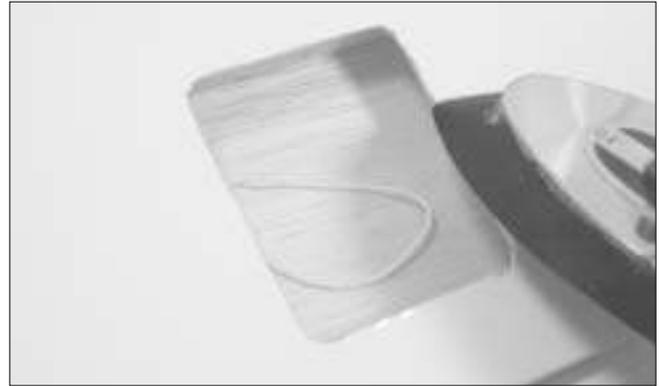
在安裝副翼伺服機前、請先確認遙控器是否有支援 FLPN (副翼、襟翼混控功能)，若有請準備兩條 40cm 以上的伺服機延長線、分別控制單邊的副翼、並以遙控器執行襟副翼混控操作的功能。

若您使用簡單的4動遙控器、您必須準備兩條20cm 以上伺服機延長線及一條Y型的延長線以將兩個伺服機作連結控制。



2. Cut away the covering at servo hatch, the hole near the wing root where extension wire to go through and mounting holes.

將覆蓋在伺服機座及翼根處圓孔上面的包覆紙小心剝除。



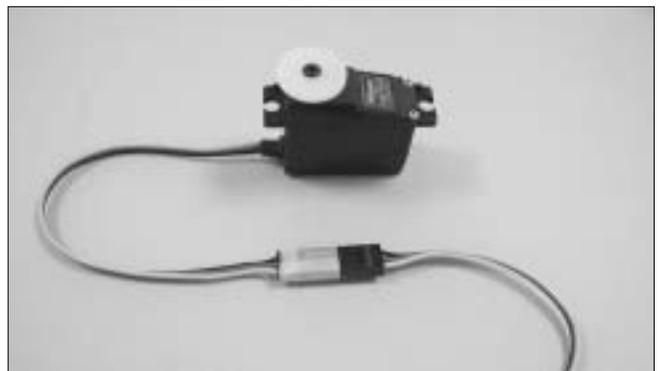
3. Use heat iron to tack down the covering at the opening. Do't move the leading string away until step 6.

伺服機座的周圍使用包覆紙專用的電熨斗、將周圍的包覆紙均勻的燙平。伺服機座中的細繩必須保留、以牽引伺服機電線穿過。



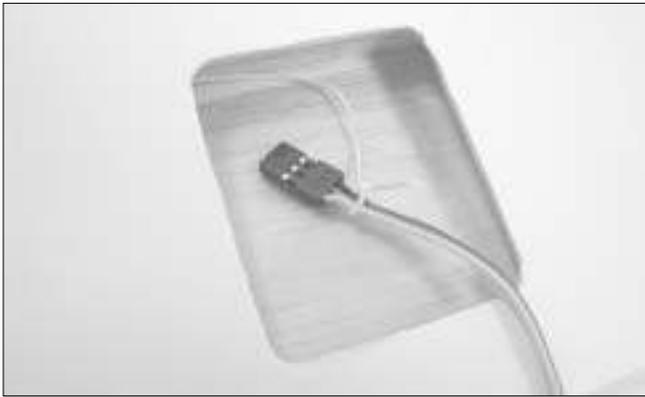
4. Sand the glue area of the plastic square piece (servo bed) then CA it on the wing planking.

砂磨該塑膠片並用瞬間膠固定其於主翼蓋板上。



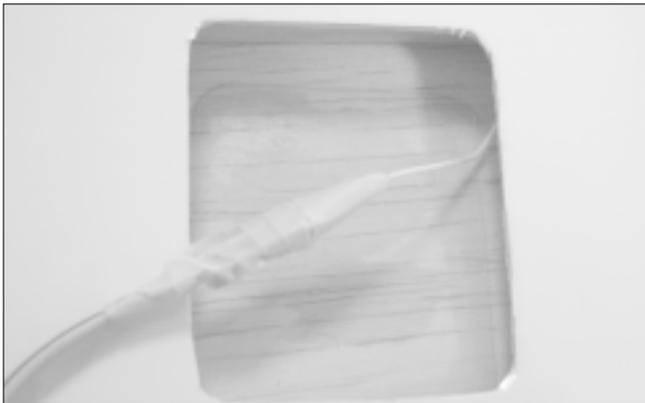
5. Connect the extension wire and tape the connector to prevent from disconnecting during flight.

將伺服機延長線與伺服機電線連接，建議使用膠帶確實包捆、預防脫落。



6. Use the leading string to make a knot on the servo extension.

將細繩與伺服機延長線頭打結。



7. As the holes in the ribs are very small, it will be easier to pull the string if you tape the extension cord end to the leading string in a tapered fashion as shown.

由於翼肋上的電線孔很小、建議使用膠帶將細繩與延長線網綁（建議使用膠帶將伺服機線頭與細繩連接處捆成一個錐形），以方便延長線穿過。



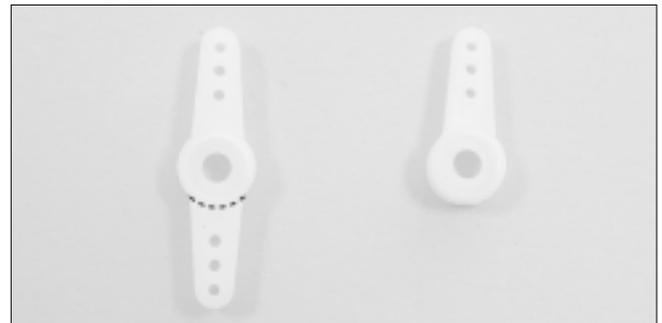
8. Pull the string out from the hole slowly, using needle-nose pliers or tweezers.

利用尖嘴鉗或鑷子小心地將細繩及延長線拉出。



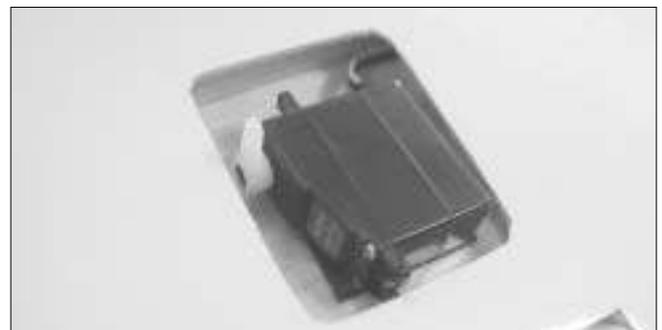
9. Locate the Hatch Cover and trim it along the molded line. Cut a hole as an exit for pushrod and drill holes at each corner with 1/16"(1.5mm) drill bit.

先將整流罩按模線剪下然後再將連接桿出口處切除，使用約1.5mm鑽頭在四端鑽孔。



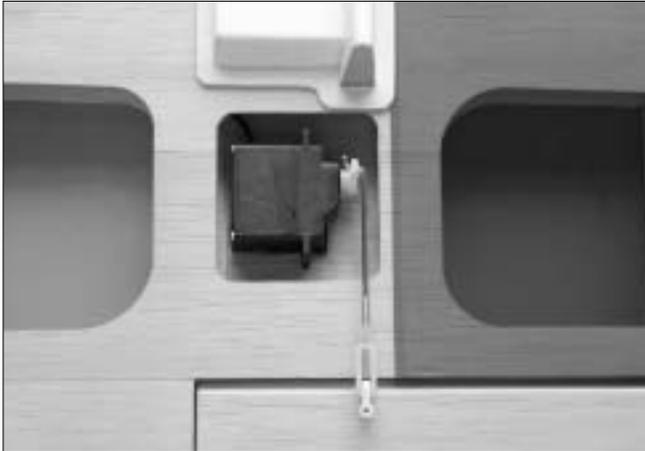
10. Cut the servo horn as shown. Connect the servo to your receiver and set up your radio to make sure the direction is correct. Do not secure the servo at this moment.

將伺服機擺臂切修至適當長度，確認伺服機與接收機之連接方式以及伺服機動作方向正確之後再將控制擺臂與伺服機確實的安裝至固定位置。



11. Locate the clevis and the pushrod. Thread the clevis onto the pushrod at least 1/4" (6mm). Cut small piece of silicone tube about 1/8" (3mm) and slide it onto the clevis.

先將連桿頭與連接桿相互鎖合、必須至少保留6mm以上長度的螺牙。截取一段油管（約3mm）、穿入連接桿頭以防止連桿頭於動作中脫開。

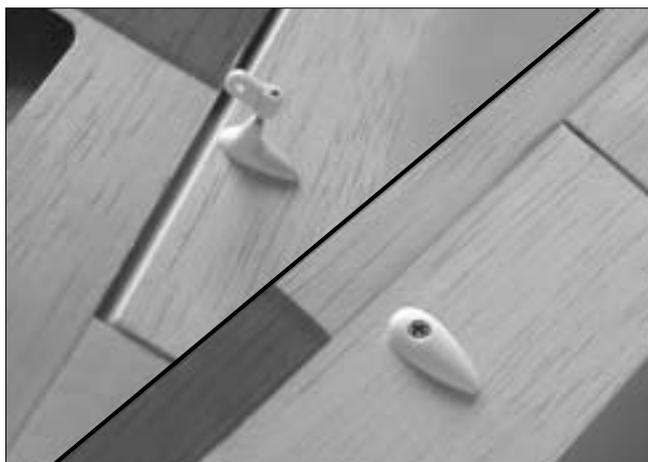


12. Install the pushrod on servo horn when servo is at neutral position. Next snap the clevis onto the control horn link. Before using two-sided tape to secure the servo in place, use the hatch cover as a guide to position the servo. Make sure the servo horn does not contact the fairing when attached.

Also make mark for the control horn hole.

於伺服機中立點時將z字連桿端安裝至伺服機擺臂上，再將舵角片連接頭與連桿頭裝置在一起。

利用伺服機整流罩做為伺服機裝置位置的參考點，再使用雙面膠帶將伺服機固定。注意固定後轉動伺服機控制臂不能與整流罩干涉。定位出舵角控制器之螺絲孔位。



13. Drill 5/64" (2mm) hole at the mark then install the control horn and link with 2x22mm machine screw. Make sure the control horn base does not go over the leading edge of aileron.

在記號處鑽2mm孔並安裝舵角控制器。注意舵角控制器座不超過副翼前緣。



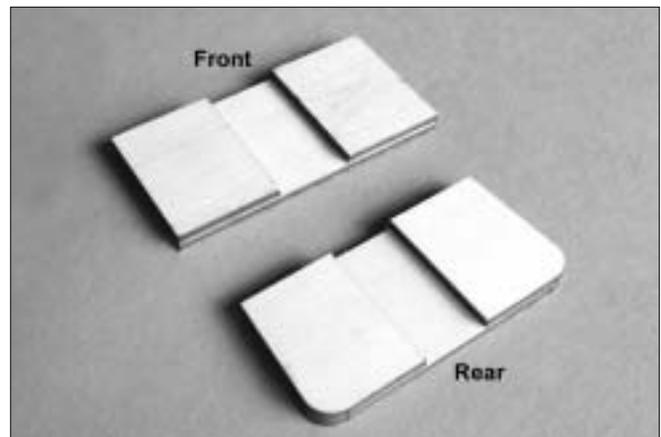
14. Next secure the Hatch Cover in place with furnished 2x5 mm wood screws. Snap on the clevis on control horn. Thread a small piece of silicone tube and slide it on the clevis to prevent it from loose.

Do the same procedure on the other wing half.

利用零件包中所提供的2x5 mm 自攻螺絲固定伺服機整流罩。連桿頭穿過整流罩後安裝一小段油管於連桿頭上再安裝至舵角片控制器。

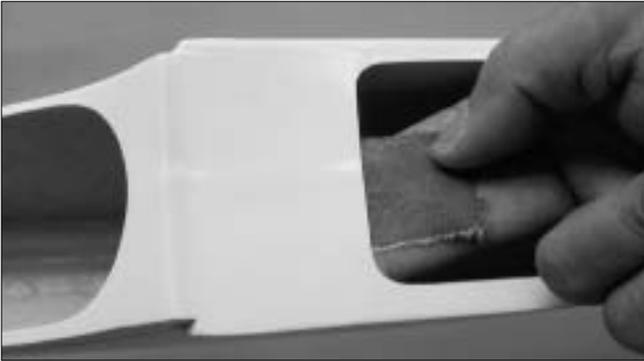
同法完成另一半主翼。

## Fuselage 機身的組裝步驟



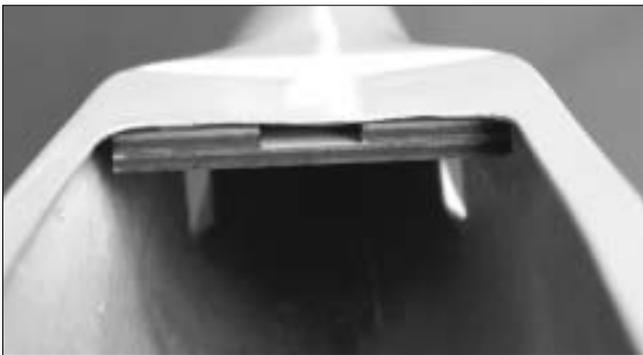
15. Locate the front and rear wing mounts as well as the doublers. Glue the doublers as shown.

使用瞬間膠或環氧樹脂膠合三夾板以形成主翼前後固定座。



16. Trial fit the wing mount in the fuselage, sand the contact area with 200 grit sandpaper. This will provide a better glue bond.

試安裝主翼固定座在機身上並使用砂紙砂磨機身的機翼固定座部位膠合時可增加表面接著力。



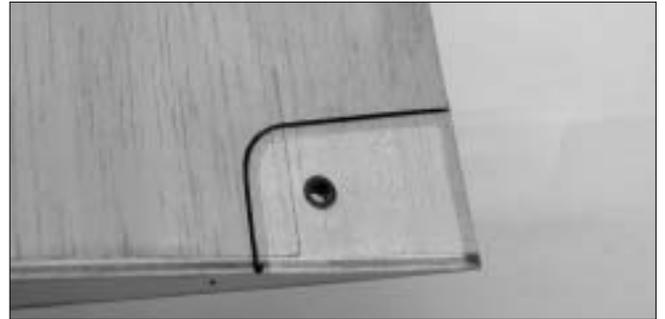
17. Glue the front and rear wing mount in place either by thick instant glue or epoxy. The wing mounts are flush with the opening of fuselage.

請使用高黏度瞬間膠或是環氧樹脂粘前後機翼固定座，黏合時與機身翼鞍開口處切齊。



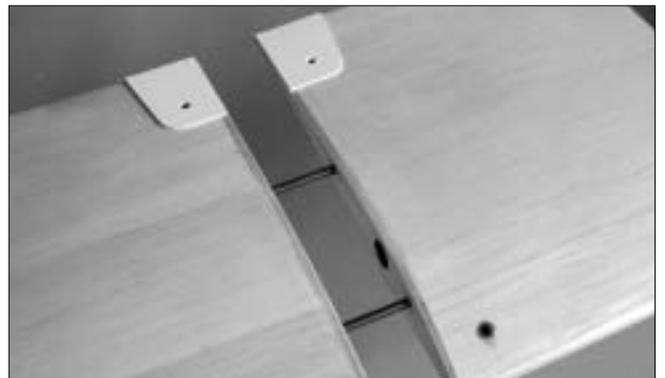
18. Locate the wing protectors, place the wing protector where is even with the edges. Make marks along the wing protector on the wing.

將主翼後緣補強片切齊後緣及翼根，以奇異筆沿補強片在機翼上做記號。



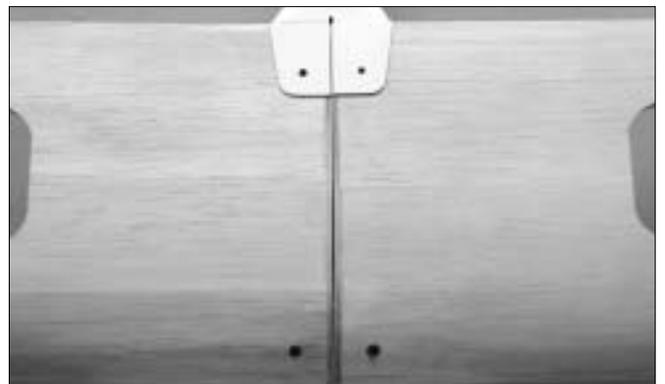
19. Remove the covering inside the mark about 1/8" (3mm) by using hobby knife.

使用銳利的美工刀沿線內側約3mm割除包覆紙。



20. Do the same procedure on the other wing halves, next locate the carbon rod and join the two wing halves.

同法完成另一補強片，並用原來已有的孔位為導引由機翼下側往上側鑽出鑽1/8" (3mm)的孔。使用碳纖維棒將兩主翼接合。



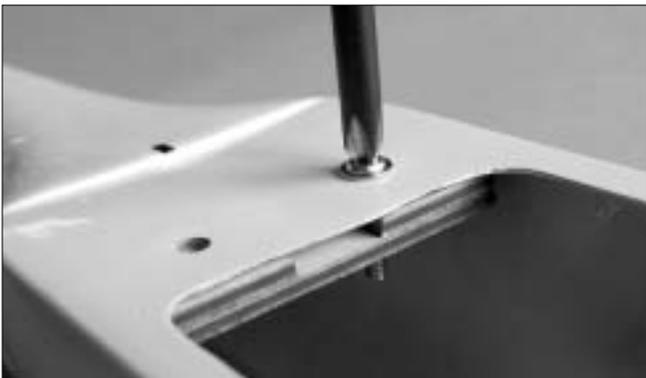
21. Draw a center line on fuselage then place the main wing on the fuselage. You may use masking tape to tape two wing halves to hold them together. Use four mounting holes as the guide to make drill mark on the fuselage.

在機身上畫出中心線然後將主翼置於機身上對準中心線，建議使用紙膠帶緊密的接合主翼再置於機身



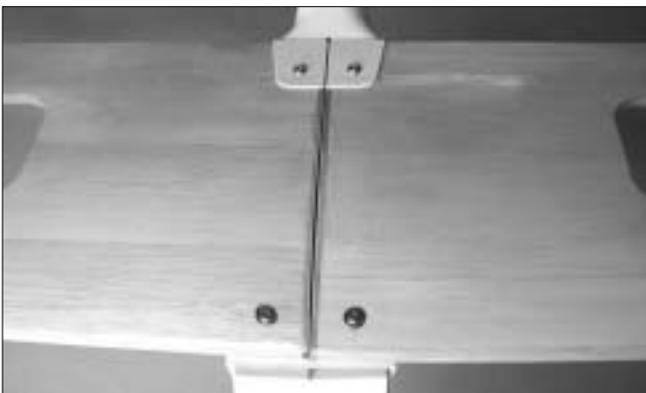
22. Next drill 3/16" (5mm) holes where you marked.  
Hint: It will be easier if you drill 1/8" (3mm) hole first then use the 3/16" (5mm) bit to drill the hole again.

請在記號上鑽出5mm的孔。可先使用3mm鑽頭鑽穿固定孔然後再鑽出5mm孔位，這樣比較容易而且精準。



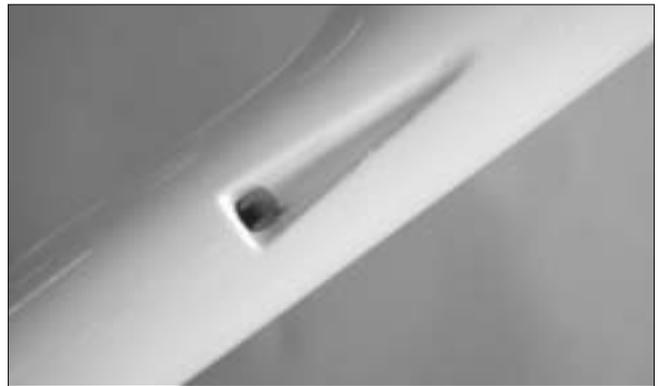
23. Install the blind nut in place. Secure the wing bolt all the way in with the blind nut underneath the wing mount.

機身內側主翼固定座孔內壓入盲孔螺帽，使用機翼固定螺絲鎖入並將盲孔腳螺帽深入固定在機翼固定座內側。



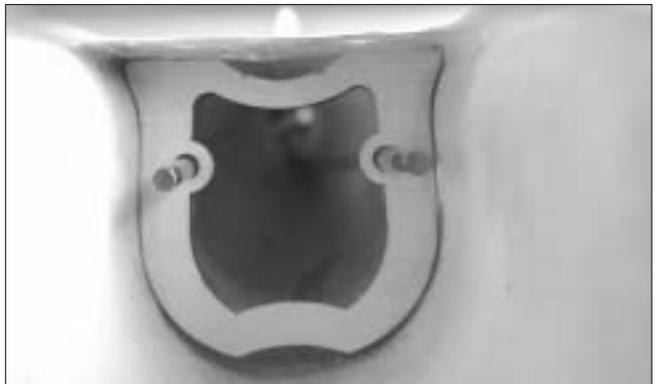
24. Install the main wing on fuselage as shown, it should be secured perfectly.

如圖示將主翼安裝於機身。



25. Remove the wing, insert the guide tube from the fuselage tail. Apply a drop of CA to glue the guide tube in place.

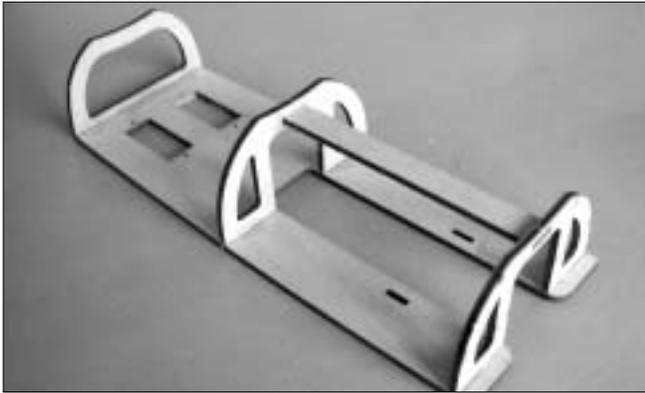
將機翼卸下，從機身後方穿入方向舵推桿導管並以瞬間膠將其固定。



26. Locate the guide tube bulkhead then insert the guide tube through the bulkhead.

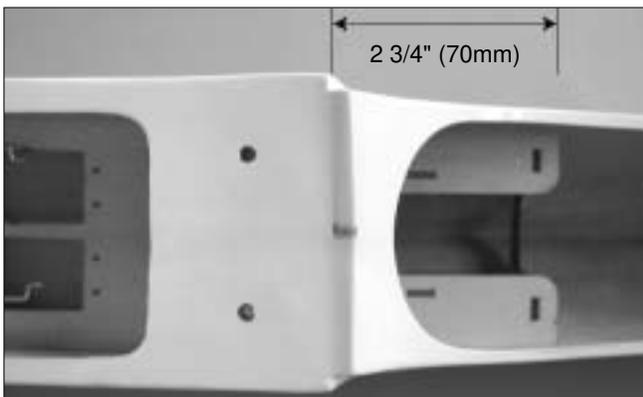
Push bulkhead into the fuselage just tight then apply CA to secure bulkhead and guide tube in place. Never push it in too hard or it may hurt the fuselage.

將導管穿過隔板後將隔板往機身尾部方向推入直到隔板與機身卡住為止。使用瞬間膠將隔板及導管固定，注意切勿推入過深或施力過當以免造成玻璃纖維機身變形。



27. Locate the plywood servo tray and supports. Glue those supports in place with thick CA or Epoxy.

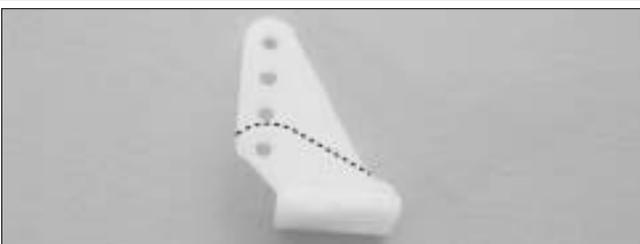
使用瞬間膠或環氧樹脂膠合伺服機固定座。



28. After it cured, slightly sand the inside of fuselage at glue area with 200 grit sandpaper. Next slide the servo tray in the fuselage from the front opening, it might need to rotate the servo tray to get in. Set the servo tray in level and make sure its front end is 2 3/4\" (70mm) away the leading edge. Apply thick CA to glue it in place.

先以砂紙砂磨機身內部接合處，再將伺服機座從座艙開口處置入。稍加旋轉伺服機座即可推入，如圖示在距離伺服機座前端約70mm處保持機座水平後以高黏度瞬間膠水固定。

## Tail Installation 尾翼的安裝步驟



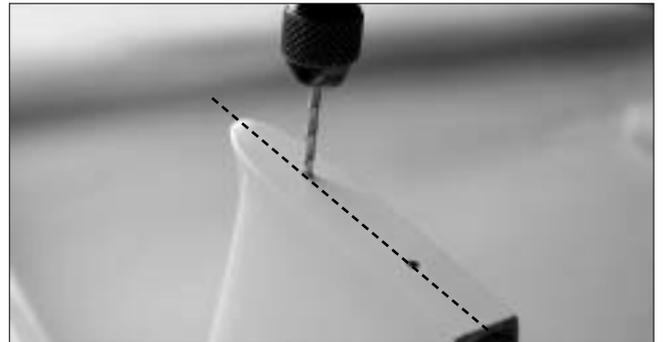
29. Locate the control horn and cut the control horn as indicated.

將舵角片按虛線位置剪下，並用砂紙打磨。



30. Drill 2mm holes and install the control horn on the tail, note it has to be in line with the tail mounting holes and the control horn is even with the elevator leading edge.

安裝舵角片控制器於升降舵上，注意與尾翼定位孔成一直線。

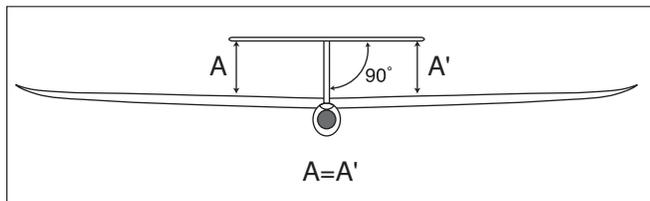


31. Place horizontal tail on the T-tail mount, use two holes as the guide and make drill marks. Make sure the drill marks are on the center line of the Tail mount. Drill 3/32\" (2mm) hole at the marks vertically.

將水平尾翼置於T型尾座上，以固定孔為導引在T型尾座上做出鑽孔記號。注意該記號必須在T型尾座中心線上。在記號上垂直鑽出2mm孔。



32. Locate the plastic washer and 3x20mm Wood Screw then secure the tail on the T-tail mount. Make sure the horizontal tail is perpendicular to the vertical tail and has same angle to the main wing if you see from the nose.



以3x20mm木螺絲及塑膠墊片固定水平尾翼於T型尾座上。如果不考慮搬運因素，建議您將水平尾翼膠合固定以提高飛行穩定度。



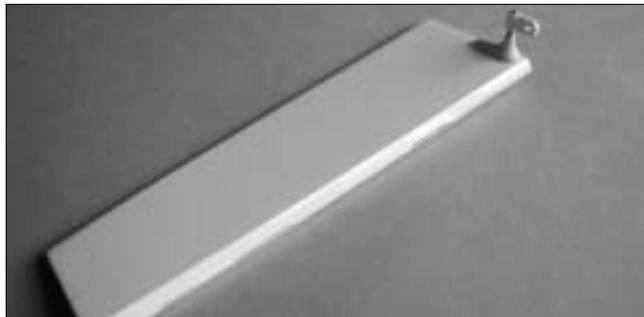
33. Locate the short/ long threaded end, clevis and plastic tube. Thread the long threaded end to plastic tube first about 1/4" (6mm) in length then insert the plastic tube through the guide tube from the bulkhead end. Get the plastic tube at the rear of T-Tail mount then install the short threaded end and clevis.

安裝長型金屬推桿於塑膠管並至少保持有6mm的長度，然後將塑膠管端從機身前端穿入，並於尾部開口處穿出。再將短螺桿及連桿頭安裝如圖示。



34. Snap the clevis onto the control horn as shown. It may need to file the T-Tail portion to make sure the movement is free.

試將連桿頭裝置於舵角控制片上並推動升降舵觀察是否有干涉。請以小銼刀將干涉部位修掉。



35. Locate the control horn base, backplate, link and 2x 22mm screw then install the control horn on the rudder.

安裝水滴型舵角控制器於方向舵上。



36. Locate the CA hinges then insert the CA hinges in the slots of the vertical tail then glue the rudder and CA hinge in place with thin CA.

Do the same procedure of elevator pushrod on the rudder pushrod.

安裝活頁片於垂尾及方向舵上並以瞬間膠固定。同法安裝推桿並連接至方向舵上。

## Motor / Prop Installation

### 馬達以及螺旋槳的安裝步驟



37. Locate the motor, and 3x8mm countersunk screws. Secure the motor in the fuselage.

使用3x8mm沉孔螺絲固定馬達。



38. Locate the prop, spinner and screws as shown. Assemble the folding prop first. Make sure the two blades move freely. Insert the drive nut to the backplate then the drive shaft. The hole of drive nut is tapered to accommodate the drive shaft. Secure the whole set onto motor shaft with the nut. Do not over-tighten the nut as it might break the aluminum drive shaft but make sure it will not spin out when it in high rotation.

先組合可摺疊螺旋槳、需確認螺旋槳可以順暢運作，驅動螺帽因驅動軸的關係、因而設計為漸縮孔，將馬達輸出軸經由驅動螺帽與驅動軸連結、將螺帽鎖至適當緊度即可否則會傷及鋁製傳動軸但注意高速不能打滑或脫離以免造成危險。



39. Make sure there is about 2~3mm(5/64"~1/8") gap between spinner backplate and fuselage.

螺旋槳座與機身間需保留2~3mm的間隙。

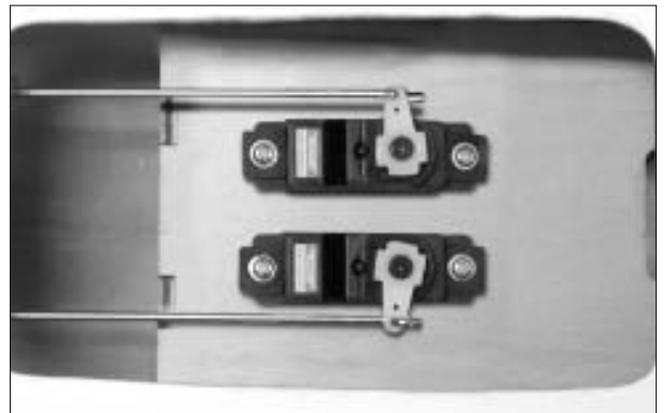
## Servo Installation

### 伺服機的安裝步驟



40. What we used here are mini servos. You may use standard servo but need to enlarge the servo tray. The upper one is elevator servo and lower one is rudder servo.

使用迷你伺服機來控制升降舵及方向舵面，如果您要使用標準尺寸伺服機則須將伺服機座擴孔。上方為升降舵伺服機、下方為方向舵伺服機。

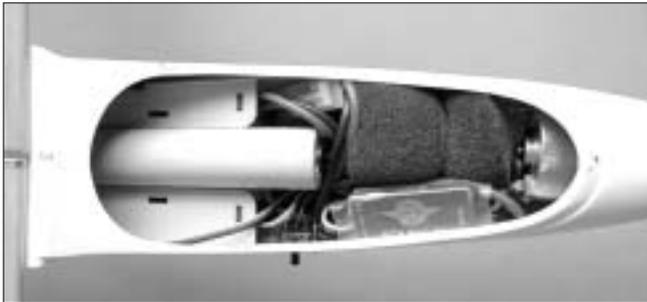


41. Insert the Z-Bend end to the servo control horn then secure the servo horn onto the servo. It may need to adjust the threaded rod and plastic tube to get rudder and elevator at the neutral position.

將Z字連桿裝置於伺服機搖臂上，來回調整塑膠管及金屬推桿於伺服機中立點位置並確認升降舵及方向舵面亦為中立位置。再將伺服機控制搖臂固定在伺服機上。

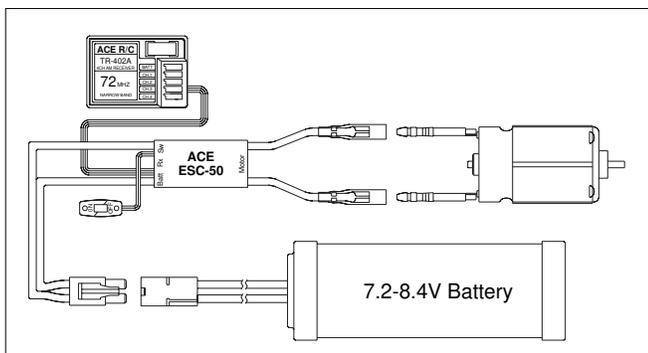
## RX, ESC & Battery Installation

### 其他安裝步驟



42. Refer to the manual of Electronic Speed Control Unit (ESC-50 Shown P/N:ACE8014), link to motor, battery and receiver. You may wrap the receiver with sponge or thin foam pad. It will protect the receiver and reduce the vibration from motor.

如圖示之安裝位置連結速控器、馬達、電池、與接收器。將發泡海綿包覆接收機以減少因馬達運作所發生的震動。



43. The attached picture is the example for using ESC-50.

這張圖例是使用速控器連接的示範。



44. Apply furnished foam tap on battery mount, it will help retaining the battery pack in place.

Use furnished zip-tie to fix the battery pack in place. Insert zip-tie through the laser cut slot and go around the plywood bar then come out from the other slot.

使用泡棉膠帶黏貼於電池座以增加固定效果。利用提供的束帶將電池固定並修剪至適當尺寸。



45. Use switch plate as a template, drill holes then install the switch as shown.

以速控器電源開關面板作為模板，開孔後並固定之。

## Canopy Installation

### 座艙罩的安裝步驟



46. Locate the canopy. Cut 1/16" (1.5mm) outside the molded line with curved scissors. Trial fit and trim it until it fits on the fuselage.

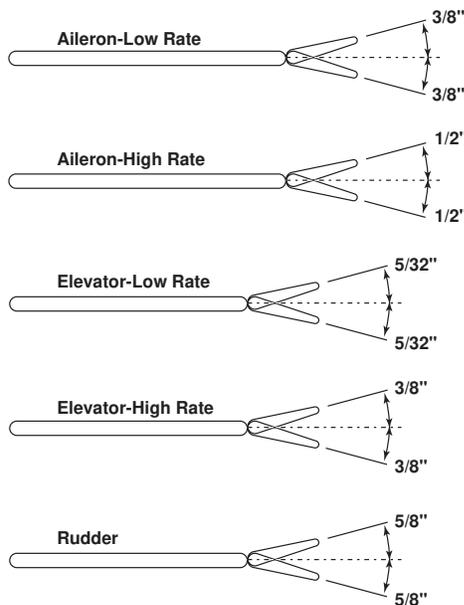
利用曲線剪刀沿著裁修線保留1.5mm距離將座艙罩剪下，然後再將它罩至機身上並慢慢的修剪至可合適的安裝在機身上為止。



47. With the canopy in place on the fuselage, drill 5 holes with 1/16" (1.5mm) bit. One in the front of canopy, two at both sides of the canopy. Next secure the canopy with 2x5mm wood screws.

在座艙罩前端與兩側各鑽1.5mm的孔洞以固定座艙罩。然後用2x5mm木螺絲固定。

## Control Throws



These control throws are merely a starting point for your radio setup and can be tailored to fit your flying style.

## Balance 平衡步驟

48. Balancing your model is very important and must not be overlooked. The center of gravity (CG) is 2 3/8" behind the leading edge of the wing near the wing root, parallel with the fuselage. You can adjust the battery pack forward or backward to reach the right CG.

機體的重心平衡是非常重要的一件事，本產品的重心位置自翼根處沿著機身距主翼前緣約2 3/8" (約60mm) 的位置，您可以藉著調整電池位置來找出正確的重心

## FIRST FLIGHTS

### Checks You Should Make

Before you attempt to fly your model you should perform some final checks:

1. Fully charge your radio and flight batteries following the manufacturers instructions.
2. Check the direction of travel of your control surfaces and the operation of the motor controller per the manufacturers instructions.
3. Range check your radio system per the manufacturers instructions.
4. Double check that you have installed the screws in the servo control arms and that the clevis are snapped tightly on the control horns.

We strongly recommend that you get help from an experienced R/C pilot to learn to fly if you are just beginning. You should be able to find help at your local dealer or club field.

## Flying Your Soaring Star

First of all, if you are flying with other flyers, check to make sure they are not operating on the same frequency as you. If they are, do not turn on your radio until they have safely landed and have turned their radios off.

Secondly, even though the Soaring Star is very easy to fly, if you are a novice modeler/pilot, we highly recommend that you seek the help of an experienced modeler for your first few flights. He can save you a lot time and possible disappointment by helping you get your model in the air safely and getting it trimmed out for you.

Important: The radio control system is set up to operate the control surfaces just like a real airplanes as if the pilot (you) are sitting in cockpit controlling the airplane. When you want the plane to dive, you push the elevator stick forward (up), to climb you pull the stick back (down), to turn right, you move the aileron stick to right with elevator up and visa versa. When you want to turn the motor on you push the throttle

stick forward and when you want to turn the motor off you pull the stick back. It is the turning that causes the most problems with novice pilots because when the plane is flying towards you a right turn command on the transmitter cause the plane to turn to your left (which is the planes right). Get the picture? Fortunately the up and down commands do not change. The easiest way to conquer this problem is to try and always face your body near the direction the planes is flying. This means that you will have to look over your shoulder at times, but many modelers find this an easy way to learn.

## THE FIRST FLIGHTS

You should always use the first few flights to get accustomed to your new airplane and its flying characteristics. Keep the model upwind and climb to a good comfortable altitude to cut off the motor and trim your Soaring Star for a glide. At altitude cut the motor and start your glide. Have an experienced modeler adjust the trims of the transmitter for you until the plane will glide straight and level without any other control input. Once the trims are set practice making smooth turns in both directions while losing as little altitude as possible. When the Soaring Star starts to get too low for comfort turn the motor back on and climb back up to altitude. Practice this climbing and gliding until you are comfortable with the airplane.

Depending on the battery you use the Soaring Star will make 2 to 3 good climbs up to a nice thermal searching altitude from single battery charge. Once the ESC shuts off the power to the motor you will need to set up for your landing. Continue to make smooth gently turns while lining up the Soaring Star with your landing strip. Once you are set up to land keep the wings level and let the model settle in for an nice gentle landing while adding up elevator to keep the nose up slightly as the plane slows down. Make several flights like this to really familiarize yourself with the characteristics of your model and to learn the glide and distance covering abilities of the Soaring Star. Once you have mastered a good "comfort level" you are ready to start searching for thermals which will really increase your flight times.

## THERMALS

Thermal soaring is one of the most interesting and challenging types of flying there is. Believe it or not, your Soaring Star is capable of flights thousands of feet high, lasting for several hours, and covering dozens of miles. The following paragraphs will help

explain how to take advantage of nature's energy sources called thermals.

"Thermal" is the term applied to columns of rising air. This air is rising because it is warmer than the surrounding air. A dust devil is simply a thermal which has picked up some dust. Even a tornado is very similar to a thermal, but of course much stronger.

Thermals occur when the sun, or other heat source, heat the air in one location faster and/or warmer than the surrounding air. Darker surfaces (plowed fields, asphalt parking lots, etc.) absorb the sun's energy faster than lighter colored and are generally good thermal generators. This warmer air is lighter (less dense) than the cooler air and thus rises. The rising air naturally starts to rotate, much like water going down a drain, and forms an inverted funnel shaped column that usually gets larger with altitude. This warmer air often contains water vapor which condenses as it reaches the cooler air high above the earth forming big puffy Cumulus clouds that experienced sailplane flyers will watch to determine where the thermals are forming. Thermals vary in strength, but often contain air that is rising at speeds over 1200 feet per minute. Some thermals are so strong they can even rip a sailplane apart, especially if the plane is flying fast when it passes through the thermal.

## THERMAL SOARING

It takes lots of practice and concentration to thermal soar like the Hawks and Eagles. Since the pilot is not sitting inside an model sailplane, he cannot feel the thermal, he can only see his sailplane's reaction to the thermal. Therefore, the majority of the time, unless the pilot is paying careful attention to the plane, he may not even realize that plane is near a thermal. Since most thermals are relatively small, less than a hundred feet in diameter near the ground, the sailplane will rarely fly directly into the thermal and start rising. More likely, it will fly near a thermal and the wing closest to the thermal will rise turning the plane away from the thermal. So as you can see, an inexperienced pilot may bounce around between the thermals with never knowing that he is encountering rising air.

In order to take advantage of thermals, you need to fly smoothly with as few control inputs as possible. Watch the sailplane carefully and it will tell you what the air around it is doing.

When a sailplane does fly directly into a thermal it will

either start rising or stop sinking at its normal rate. Either case is reason enough to explore further. Continue flying straight ahead until you have obviously passed through the area of strongest lift. Now start circling in fairly tight, but smooth circles. Because of the thermals inverted funnel shape, the lower the planes altitude, the tighter the circles need to be. As the plane gains altitude, the diameter of the circles can be increased. If you see the plane falling off on one side of the turn, move the circle over into the stronger lift. Thermals are swept along by the wind so allow your circle to drift downwind with the thermal. Be careful when following a thermal downwind though as you still have to be able to make it back to the field!

If the sailplane is flying along and all of a sudden turns by itself, it has probably flown near a thermal. Keep in mind that thermal will have tendency to turn the plane away, so make a 180 degree turn and fly back towards the thermal. If you don't quickly encounter lift start searching around that area. If you find the thermal, follow the procedure outlined above to take advantage of it.

Thermals can be generated at any time of the day, but the strangest thermals are usually produced when the sun is directly overhead 10:00am to 2:00pm seems to be the best time to find the strongest thermals.

If you find yourself getting too high or you're having trouble getting out of a strong thermal. DO NOT dive the plane to lose altitude. This will very quickly over-stress the airframe and blow the wings off the plane. The easiest and safest way to quickly lose altitude is to apply full rudder (either right or left) and full up elevator. This will put the plane into a tight spin that will normally not over-stress the airframe. This is especially useful if the sailplane gets sucked into a cloud or gets too high to see. The spinning action will give the sun a better chance of reflecting off of the wing and catching your attention.

As you might expect, with all this rising air, there must also be some sinking air. This sinking air is the sailplane pilots enemy and one of the factors that really make soaring challenging. "Sink" as it is referred to, is usually not as strong as the nearby thermals, but it can quickly put a sailplane on the ground. Sink in one of the reasons, you have to be very careful when chasing a thermal downwind. If you encounter sink, immediately turn and fly 90 degrees to the direction of the wind. Apply a little down elevator to pick up some speed and get out of the bad air as

## Safety Precautions

You as the pilot of this radio controlled model are responsible for any accidents that may occur during its use. We recommend that you fly your model at a model club field which is specially set up for model flying. But always be sure that you operate the model in a safe and careful manner and observe the

### Following Suggestions:

1. Do not fly your model close to buildings, power lines, roads, or other obstacles.
2. Do not fly in congested areas such as parks or occupied playing fields. Select wide, flat and open area to fly with no obstructions and plenty of room for learning to fly.
3. Do not fly without help from an experienced model pilot until you have learned how to fly. Your local model club or hobby shop can recommend an instructor if you do not already know one.
4. Always check for other modelers in the area and be sure that your frequency is not in use by someone else which might cause you model to crash. Always observe frequency control systems at flying fields and wait your turn to fly.
5. Never fly your model directly toward spectators, autos, other modelers or their models.
6. Always abide by the rules for model flying provided by your club and the governing agency for model aircraft in your country.

## Congratulations

Now that you have completed the assembly of your Soaring Star model we feel that have a very capable and good looking 2-meter electric sailplane. We hope that you will enjoy this model and get many hours of flying pleasure from its use. Thank you for purchasing this Soaring Star from Thunder Tiger and we look forward to providing you with other great R/C products in the future.

