

# Sundowner 36 ARF

*Assembly Manual*



**HANGAR 9<sup>®</sup>**

*Fly First Class™*

## Notice

All instructions, warranties and other collateral documents are subject to change at the sole discretion of Horizon Hobby, Inc. For up-to-date product literature, visit <http://www.horizonhobby.com> and click on the support tab for this product.

## Meaning of Special Language

The following terms are used throughout the product literature to indicate various levels of potential harm when operating this product:

**NOTICE:** Procedures, which if not properly followed, create a possibility of physical property damage AND a little or no possibility of injury.

**CAUTION:** Procedures, which if not properly followed, create the probability of physical property damage AND a possibility of serious injury.

**WARNING:** Procedures, which if not properly followed, create the probability of property damage, collateral damage, and serious injury OR create a high probability of superficial injury.



**WARNING:** Read the ENTIRE instruction manual to become familiar with the features of the product before operating. Failure to operate the product correctly can result in damage to the product, personal property and cause serious injury.

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. Do not attempt disassembly, use with incompatible components or augment product in any way without the approval of Horizon Hobby, Inc. This 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 serious injury.

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## Intro

The Sundowner 36 is a speedy sport-scale perfect for high-speed aerobatics and club racing. Based on the Sundowner Formula 1, this speedy performer has a scaled-down aggressive racer body design at home equally as a sport flyer or as a serious racer. Designed to be powered by EP or GP power systems, this plane delivers racer styling at a lower cost to you. This spirited speedster is constructed of lightweight balsa and plywood with carbon fiber reinforcements for added strength and durability. The low parts count makes this ARF exceptionally easy to assemble, and with a two piece wing, easy to disassemble for transport. The one-piece fiberglass cowl has hidden cowl screws, adding to its great looks. The internals are easily accessed through the removable canopy, which is held securely in place with tabs and magnets. The Sundowner can be powered for sport utilizing the E-flite Power 32 motor or the Evolution .40NX glow engine. Because of its smooth flight characteristics and precise, sport handling, even intermediate pilots will feel comfortable behind the sticks. Unlike other racers that may be difficult to fly, the Sundowner 36's streamlined design makes this racer smooth, precise and ready-to-roll.

## Product Support

For technical assistance with this product, please contact the appropriate Horizon Product Support office. This information is located in the back of this manual.

## Specifications

Wingspan	51.5 in (131cm)
Length	44.0 in (114cm)
Wing Area	400 sq in (25.8 sq dm)
Weight	4.00–4.50 lb (1.8–2.0 kg)
Engine	.32–.36 2-stroke glow
Motor Size	Power 25 or Power 32 brushless
Radio	4-channel minimum
Servos	5 mini servos (4 with EP setup)

## Included Parts Listing

### PACKAGED INDIVIDUALLY LARGE BAGS

Fuselage with canopy hatch  
 Left wing with aileron  
 Right wing with aileron  
 Tail set  
 Landing gear  
 Wheel pants (right and left)  
 Cowl  
 Carbon wing tube  
 Spinner  
 Landing gear cover plate

### FUSELAGE

Main wheel, 2-inch (51mm)	(2)	
Nylon clevis	(2)	rudder and elevator
Pushrod connector (with 3mm x 4mm machine screw)	(1)	throttle pushrod at servo
1.5mm knurled nut	(1)	throttle pushrod at servo
1.5mm washer	(1)	throttle pushrod at servo
Tail gear wire with wheel collar and setscrew	(1)	
Tail wheel bracket	(1)	
Tail wheel, 1-inch (25mm)	(1)	
Wheel collar with setscrew, 1.5mm	(1)	tail wheel retention
Wheel collar, 4mm with setscrew	(2)	main wheel retention
Axles, 4mm	(2)	main gear axles
Threaded control horn	(2)	rudder and elevator horns
Control horn backplate	(2)	rudder and elevator horns
Control horn fitting	(2)	rudder and elevator horns
2mm x 12mm machine screw	(4)	aileron control horns
2mm x 12mm machine screw	(6)	rudder and elevator control horns
2mm x 8mm self-tapping screw	(2)	tail wheel bracket attachment to fuselage
2mm x 8mm self-tapping screw	(8)	aileron servo hatches
2.5mm x 10mm machine screw	(2)	wheel pant attachment

### HARDWARE

2mm x 8 <sup>3</sup> / <sub>4</sub> -inch (220mm) pushrod tube	(1)	throttle
2mm x 13 <sup>7</sup> / <sub>8</sub> -inch (352mm) throttle pushrod	(1)	throttle
2mm x 20 <sup>1</sup> / <sub>4</sub> -inch (514mm) pushrod	(1)	elevator
2mm x 21 <sup>7</sup> / <sub>8</sub> -inch (555mm) pushrod	(1)	rudder
2-inch (51mm) pushrod (2)	(1)	aileron
3mm blind nut	(4)	engine mount to fuselage
3mm lock washer	(4)	engine mount to fuselage
3mm locknut	(4)	engine to mount, or EP motor to standoffs

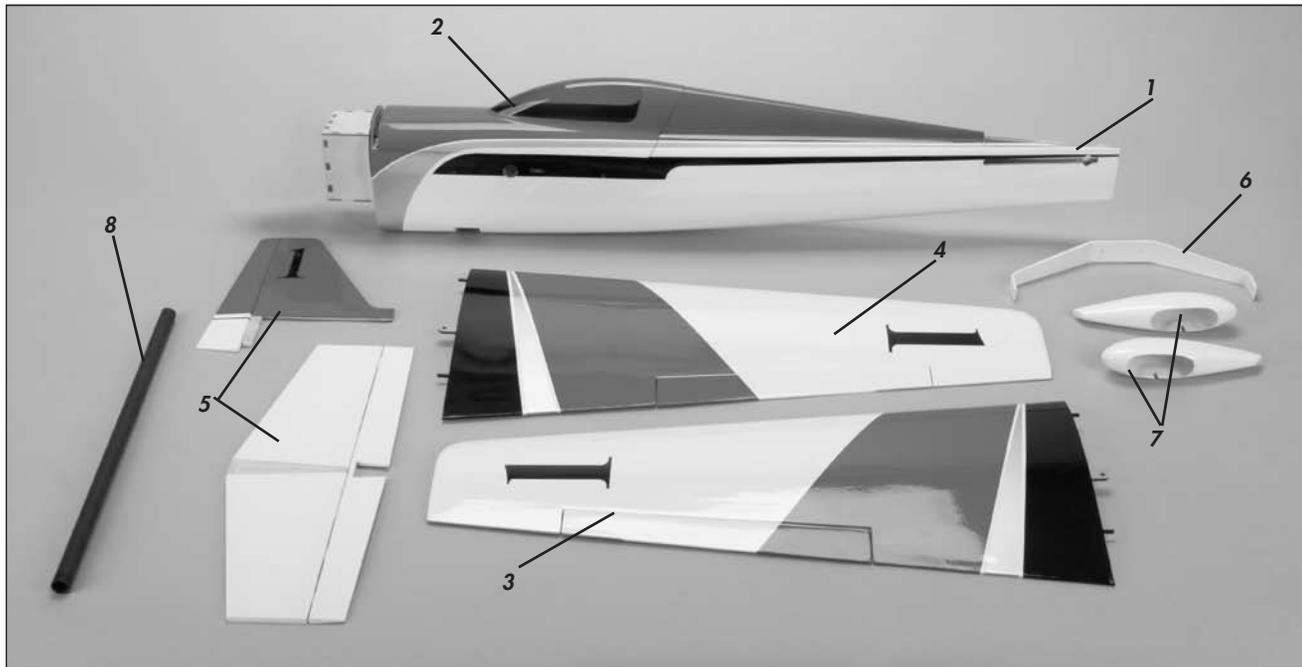
3mm washer	(12)	engine to mount and mount to fuselage, or EP motor to standoffs
3mm washer	(2)	cowl mounting
3mm washer	(2)	wing retention
3mm x 10mm socket head screw	(2)	cowl mount
3mm x 10mm socket head screw	(2)	wing retention
3mm x 20mm socket head screw	(4)	engine mount to fuselage
3mm x 25mm socket head screw	(4)	engine to mount
3mm x 30mm socket head screw	(4)	motor mount (Power 25)
3mm x 35mm socket head screw	(4)	motor mount (Power 32)
3mm x 4mm socket head screw	(1)	throttle pushrod to servo
4mm washer	(2)	landing gear to fuselage
4mm x 12mm socket head bolt	(2)	landing gear to fuselage
Locknut, 4mm	(2)	axle to landing gear
Aileron servo cover	(2)	
Aluminum stand-off, 1 <sup>1</sup> / <sub>16</sub> -inch (27mm)	(4)	power 32 to firewall
Aluminum stand-off, 3/4-inch (22mm)	(4)	power 25 to firewall

### WING

5/16 x 5/16 x 5/8-inch (8mm x 8mm x 15mm) hardwood aileron servo mounting block	(4)	
Nylon clevis	(2)	aileron clevises
Control horn	(2)	aileron horns
Control horn backplate	(2)	aileron horns

### ENGINE

Engine mount (right and left)	(1ea)	
Fuel tubing, 4 <sup>1</sup> / <sub>2</sub> -inch (115mm)	(1)	
Fuel tank	(1)	
3mm aluminum tube 2-inch (51mm)	(2)	fuel tank feed line
3mm aluminum tube 2 <sup>3</sup> / <sub>4</sub> -inch (70mm)	(1)	fuel tank vent line
Clunk	(1)	
Stopper plate, large	(1)	
Stopper plate, small	(1)	
Rubber stopper	(1)	tank stopper
3mm x 30mm self-tapping screw	(1)	tank stopper assembly screw
Plywood engine mount template	(1)	
Plywood throttle servo tray	(1)	
Plywood throttle servo tray support	(2)	



## Contents of Kit and Parts Listing

1.	HAN452001	Fuselage with Hatch	<b>Items not shown</b>	
2.	HAN452002	Fuselage Top Hatch	HAN452006	Cowl
3.	HAN452003	Left Wing Panel	HAN452009	Axles (2)
4.	HAN452004	Right Wing Panel	HAN452011	Fuel Tank, 240cc
5.	HAN452005	Tail Set	HAN452012	Wheels, 2-inch (51mm)
6.	HAN452007	Landing Gear	HAN452013	Engine Standoffs for EP, (22mm and 27mm) with hardware
7.	HAN452008	Wheel Pants (2)	HAN452014	Engine Mount with Hardware
8.	HAN452010	Wing Tube, Carbon	HAN452015	Small Parts
			HAN452016	Pushrods
			HAN452017	Tail Wheel
			HAN452018	Nylon Control Horn

## Safety Precautions and Warnings

Read and follow all instructions and safety precautions before use. Improper use can result in fire, serious injury and damage to property.

Age Recommendation: Not for children under 14 years. This is not a toy.

### COMPONENTS

Use only with compatible components. Should any compatibility questions exist please refer to the product instructions, the component instructions or contact Horizon Hobby, Inc.

### FLIGHT

Fly only in open areas to ensure safety. It is recommended flying be done at AMA (Academy of Model Aeronautics) approved flying sites. Consult local ordinances before choosing a flying location.

### PROPELLER

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 as injury can occur.

### BATTERIES

#### Notes on Lithium Polymer Batteries

When used improperly, lithium polymer batteries are significantly more volatile than alkaline or Ni-Cd/Ni-MH batteries used in RC applications. Always follow the manufacturer's instructions when using and disposing of any batteries. Mishandling of Li-Po batteries can result in fire and rupture causing serious injury and damage.

### SMALL PARTS

This kit includes small parts and should not be left unattended near children as choking and serious injury could result.

## Safe Operating Recommendations

- Inspect your model before every flight to make certain it is airworthy.
- Be aware of any other radio frequency user who may present an interference problem.
- Always be courteous and respectful of other users of your selected flight area.
- Choose an area clear of obstacles and large enough to safely accommodate your flying activity.
- Make certain this area is clear of friends and spectators prior to launching your aircraft.
- Be aware of other activities in the vicinity of your flight path that could cause potential conflict.
- Carefully plan your flight path prior to launch.
- Abide by any and all established AMA National Model Aircraft Safety Code.

## Important Information Regarding Warranty

Please read our Warranty and Liability Limitations in the back of this manual before building this product. 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.

## Using the Manual

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 box (□) are performed once, while steps with two or more boxes (□□) indicate 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.

## UltraCote® Covering Colors

White	HANU870
True Red	HANU866
Black	HANU874
Silver	HANU881

## Recommended Setup—2-Stroke Glow

Evolution® .40NX with Muffler	EVOE0401
APC Propeller, 9 x 7	APC09070

## Recommended Setup— Power 25 (NMPRA)

Power 25 BL Outrunner motor, 1250Kv	EFLM54025B
APC Thin Electric Propeller, 8 x 8	APC08080E
60-Amp Pro Switch-Mode BEC ESC	EFLA1060
2500mAh 4S 14.8V 30C Li-Po, 12AWG	EFLB25004S30

## Recommended Setup— Power 32 (Sport)

Power 32 BL Outrunner motor, 770Kv	EFLM54032A
APC Thin Electric Propeller, 12 x 8E	APC12080E
60-Amp Pro Switch-Mode BEC ESC	EFLA1060
3200mAh 4S 14.8V 30C Li-Po, 12AWG	EFLB32004S30

## Recommended Setup— Power 32 (Speed)

Power 32 BL Outrunner motor, 770Kv	EFLM54032A
APC Thin Electric Propeller, 10 x 10E	APC10010E
60-Amp Pro Switch-Mode BEC ESC	EFLA1060
2700mAh 5S 18.5V Pro Power Li-Po	THP27005SP30

## Transmitter Requirements

This model requires a minimum of a 4-channel radio to operate all the functions of your aircraft. We suggest the following radio systems available through Horizon Hobby or your local hobby distributor.

Spektrum DX6i	SPM6610
Spektrum DX7	SPMR7710
Spektrum DX8	SPM8810
JR® Systems X9503 2.4GHz	JRP2930
JR Systems 12X 2.4GHz	JRP1200

## Radio Equipment Requirements

The following items are recommended when installing the 7-Channel AR7000 (SPMAR7010).

JR Chargeswitch	JRPA004
Receiver Battery, 1100mAh, 4.8V Ni-Cd	JRPB4240
DS388 Digital Micro Servo, MG (2)	JRPS388
MN48 Mini Servo (2–3)	JSP20040
6-inch (152mm) Servo Extension (2)	JRPA095
AR7000 DSM2 7-Channel Receiver	SPMAR7010
3-inch (76mm) Servo Extension (2)	JRPA092
or	
Y-harness, Heavy-Duty	JRPA135

## Servo Placement:

Aileron: DS388 Digital Micro Servo (2)
Rudder: MN48 Mini Servo
Elevator: MN48 Mini Servo
Throttle: MN48 Mini Servo (not required for EP installations)

## Optional Accessories

2-inch (54mm) Aluminum Spinner, EP	EFLSP200
2-Blade Aluminum Spinner, 2-inch (54mm)	HAN99000
1/4-28 Spinner Adapter Kit, GP	HAN99053

## Field Equipment Required

Fuel (15% recommended)	
Long Reach Glow Plug Wrench	HAN2510
Metered Glow Driver with Ni-Cd & Charger	HAN7101
2-Cycle Sport Plug	EVOGP1
Manual Fuel Pump	HAN118

## Optional Field Equipment

### Glow:

PowerPro™ 12V Starter	HAN161
12V 7Ah Sealed Battery	HAN102
Power Panel	HAN106
Blue Block After Run Oil	EVOX1001

### All:

Self-stick weights, 6 oz	HAN3626
Spray cleaner	
Paper towels	

## Required Tools

Ball driver: 2.5mm	Card stock
Drill	Epoxy brush
Felt-tipped pen	Flat file
Hobby scissors	Hobby knife with #11 blade
Low-tack tape	Measuring cup
Medium grit sandpaper	Mixing cup
Mixing stick	Nut driver: 5.5mm, 7mm
Open end wrench: 10mm	Paper towels
Pencil	Phillips screwdriver: #1, #2
Pin vise	Razor saw
Rotary tool	Rubbing alcohol
Ruler	Sanding drum
Side cutter	Square
String	Tapered reamer
T-pins	Hook and loop tape
Hook and loop strap	
Drill bit: 1/16-inch (1.5mm), 5/64-inch (2mm), 7/64-inch (2.5mm), 1/8-inch (3mm), 3/16-inch (5mm)	
Hex wrench: 1.5mm, 2.5mm, 3mm	

## Required Adhesives

5-minute epoxy	PAAPT38
15-minute epoxy	MEUEPX15MIN
Medium CA	PAAPT02
Thin CA	PAAPT08
Threadlock	PAAPT42

## Before Starting Assembly

Before beginning the assembly of your model, remove each part from its bag for inspection. Closely inspect the fuselage, wing panels, rudder and stabilizer for damage. If you find any damaged or missing parts, contact the place of purchase.

If you find any wrinkles in the covering, use a heat gun (HAN100) and covering glove (HAN150) or covering iron (HAN101) with a sealing iron sock (HAN141) to remove them. Use caution while working around areas where the colors overlap to prevent separating the colors.

## Elevator and Stabilizer Installation

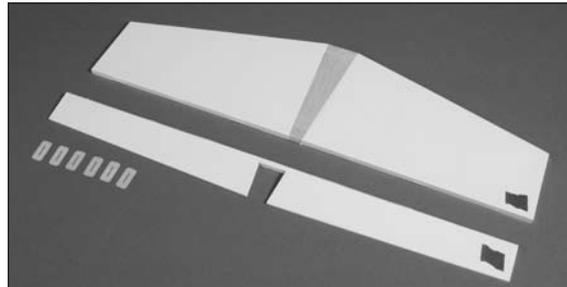
### Required Parts

Fuselage	Wing panel (right and left)
Carbon wing tube	
Stabilizer with elevator and hinges	

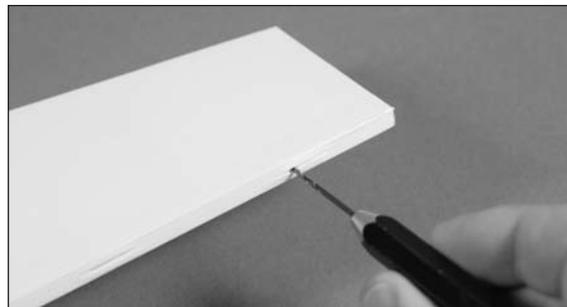
### Required Tools and Adhesives

15-minute epoxy	Paper towel
Rubbing alcohol	Low-tack tape
Pin vise	Drill bit: 1/16-inch (1.5mm)
Felt-tipped pen	Thin CA
Epoxy brush	Measuring cup
Mixing stick	Ruler
T-pins	

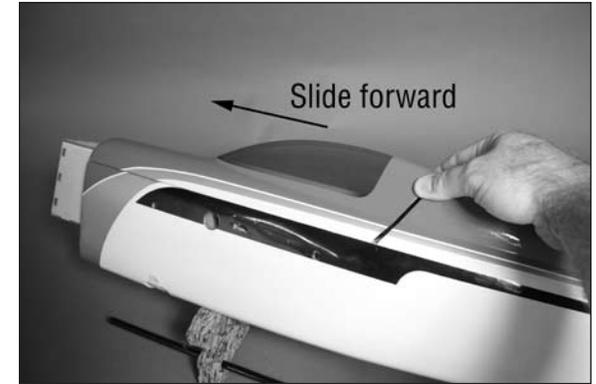
□ 1. Separate the stabilizer and elevator. Use a small piece of low-tack tape to mark one side of the stabilizer and elevator so they can be repositioned easily. Set the six CA hinges aside at this time.



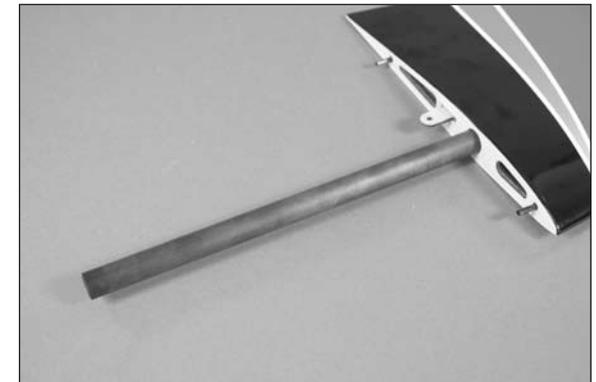
□ 2. Use a pin vise and 1/16-inch (1.5mm) drill bit to drill a hole in the center of each hinge slot. This will provide a tunnel for the CA to wick into, providing a better bond between the wood and hinge when they are glued in position. Prepare both the stabilizer and elevator at this time.



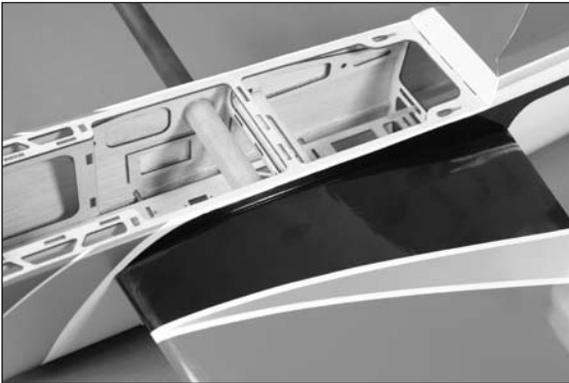
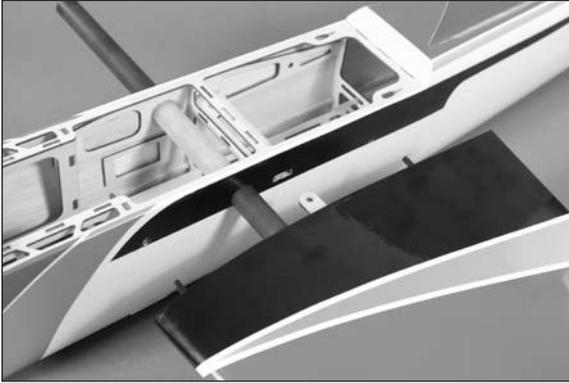
□ 3. Remove the canopy from the fuselage by sliding it forward then lifting up at the rear of the canopy. The rear is held in position using magnets and is also keyed to the fuselage, while the front is held in place using pins that extend into the bulkhead.



□ 4. Locate the carbon wing tube. Slide the tube into one of the wing panels. It will slide in easily, so do not force it further than it will easily slide.



5. Slide the tube and wing panel into position on the fuselage. The wing will fit tight against the fuselage when installed.



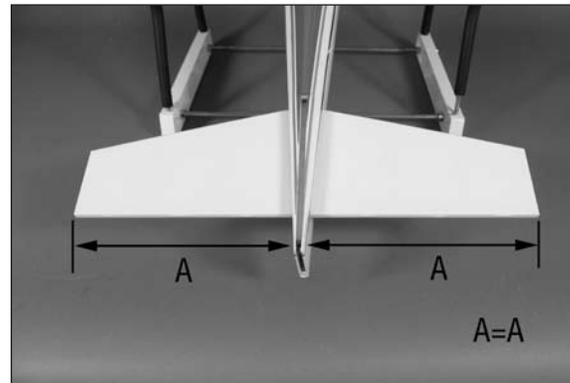
**Note:** The wing does not need to be secured to the fuselage at this time. It is only being installed so the position of the stabilizer can be adjusted.

6. Slide the remaining wing panel into position against the fuselage.

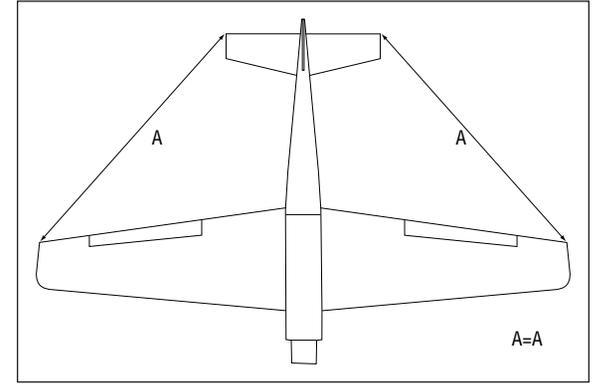


**Important:** The stabilizer must be aligned to the wing as shown in the following steps. Not doing so may require excessive trim to correct for misalignment, which can reduce the performance of the model.

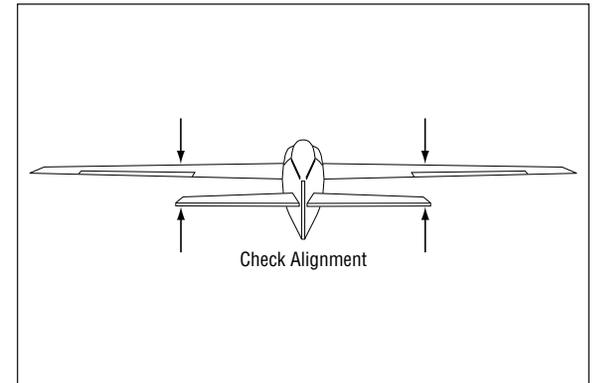
7. Slide the stabilizer in the slot at the rear of the fuselage. Position the stabilizer as far forward in the slot as possible. Check to make sure the stabilizer is centered in the fuselage as shown below.



8. Measure from each wing tip to each stabilizer tip. Position the stabilizer so both measurements are equal as shown.



9. Check the alignment of the stabilizer to the wing by standing back 6–8 feet (2–3 meters). The distance between the wing and stabilizer must be equal as shown. If not, lightly sand the opening in the fuselage for the stabilizer to correct the alignment.



□ 10. Once the alignment has been set, use a felt-tipped pen to mark the outline of the fuselage on the stabilizer. This will allow easy repositioning as it will be removed in the following step.

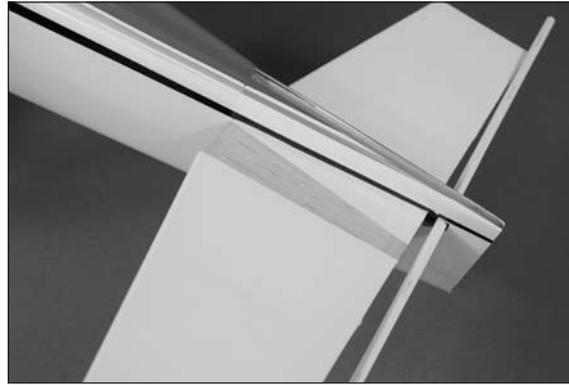


□ 11. Remove the stabilizer from the fuselage. Note the direction of the top and bottom of the stabilizer indicated by the tape placed on it back in step 1. Slide the elevator into the slot, noting the top and bottom to match that of the stabilizer that was just removed.



**Note:** Read steps 12 through 15 before mixing any epoxy. You must be able to complete these steps before the epoxy begins to cure.

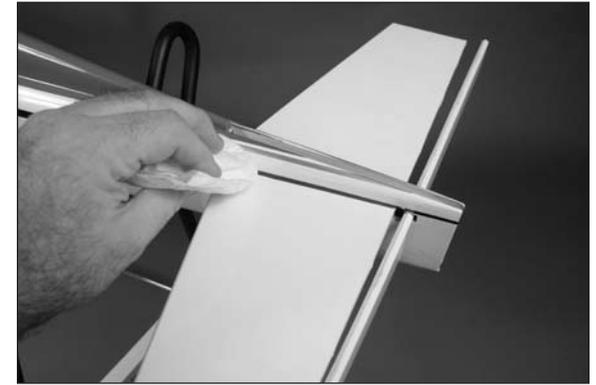
□ 12. Slide the stabilizer back into position in the fuselage. Leave the stabilizer so the exposed wood can be accessed.



□ 13. Mix 1/2 ounce (15mL) of 15-minute epoxy. Use an epoxy brush to apply the epoxy to the exposed wood on both the top and bottom of the stabilizer. Make sure not to get any epoxy on the elevator.

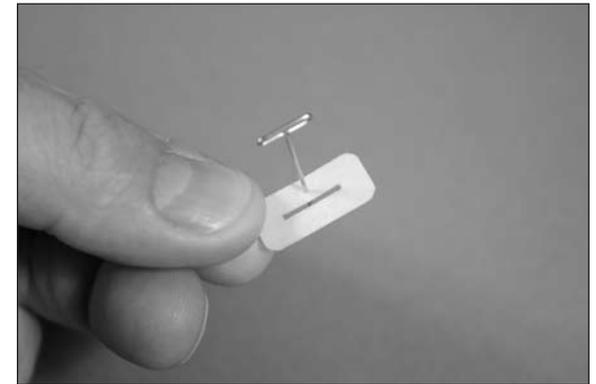


□ 14. Slide the stabilizer in position. Use a paper towel and rubbing alcohol to remove any epoxy that oozes out when the stabilizer is positioned.



□ 15. Before the epoxy can cure, make sure to check the alignment of the stabilizer as described in steps 7 through 9. It is very important the stabilizer is positioned correctly before the epoxy begins to cure, as it will be difficult to readjust its position after the epoxy has cured. Do not proceed until the epoxy has fully cured.

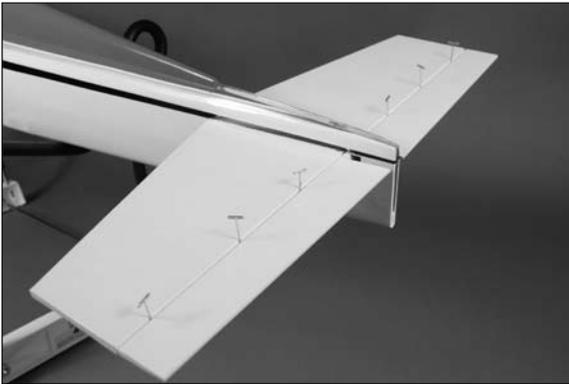
□ 16. Remove the wing panels and wing tube at this time. Place a T-pin in the center of the six hinges removed in step 1. This will center the hinges evenly in the stabilizer and elevator.



- 17. Place the hinges in the elevator.



- 18. Carefully position the elevator so the hinges are inserted into the stabilizer. Make sure that all the hinges get installed, and that none get folded over accidentally. The elevator will fit tightly against the stabilizer as shown. Use the T-pins as handles to help in positioning the hinges.



- 19. Remove the T-pins from the hinges. Make sure the elevator is pressed tightly against the stabilizer to eliminate any hinge gap. Check that the tips of the elevator and stabilizer are aligned.

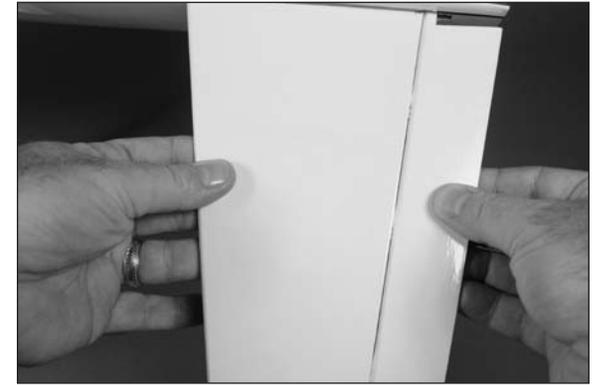


- 20. Saturate each hinge using thin CA on both the top and bottom of the hinge. Allow the CA to fully cure before proceeding.



**Note:** Do not use CA accelerator on the hinges. The CA must be allowed time to soak into the hinge and surrounding wood to provide the best bond for the hinge.

- 21. Once the CA has cured, gently pull on the stabilizer and elevator to make sure the hinges are glued securely. If any hinges are loose, apply more CA and check them again.



- 22. Flex the elevator through its range of motion a number of times to break in the hinges. This will reduce the load on the servo for those first flights.



## Rudder, Fin and Tail Wheel Installation

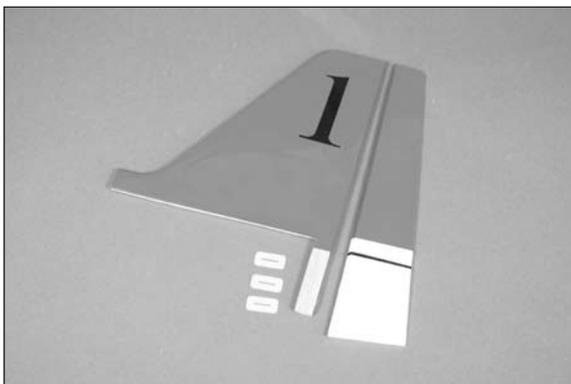
### Required Parts

Fuselage	Aluminum tail wheel bracket
Tail gear wire	Fin with rudder and hinges
Tail wheel, 1-inch (25mm)	
2mm x 8mm self-tapping screw (2)	
Wheel collar with setscrew, 1.5mm	

### Required Tools and Adhesives

Ruler	Hex wrench: 1.5mm
Phillips screwdriver: #1	Hobby knife with #11 blade
Rubbing alcohol	15-minute epoxy
Medium grit sandpaper	Thin CA
Low-tack tape	Mixing cup
Mixing stick	Epoxy brush
Felt-tipped pen	Square
Paper towel	Pin vise
T-pins	Threadlock
Drill bit: 1/16-inch (1.5mm)	

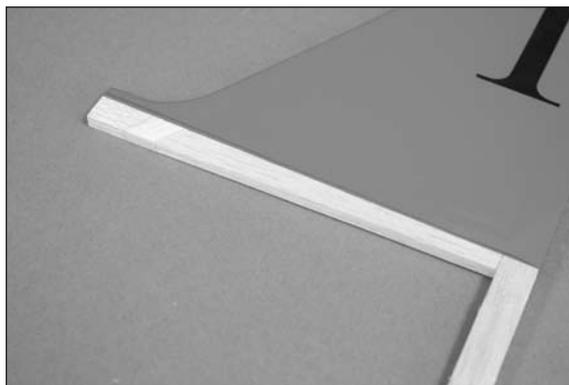
1. Locate the fin and rudder. Separate the fin from the rudder and set the rudder and three hinges aside.



2. Test fit the fin at the rear of the fuselage. Slide the fin as far forward as possible. Use a felt-tipped pen to transfer the outline of the fuselage to the fin.



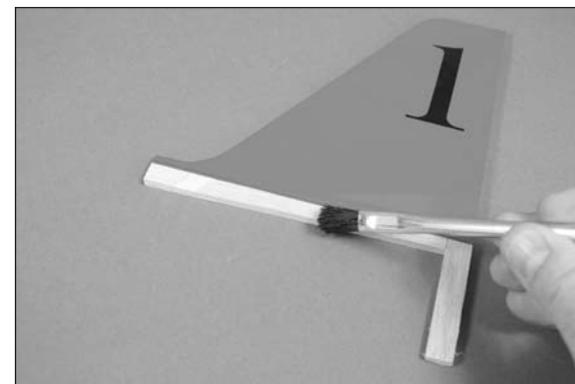
3. Remove the fin from the fuselage. Use a straight edge and hobby knife with a new #11 blade to trim the covering 1/16-inch (1.5mm) below the line on the fin to expose the underlying wood.



**Note:** When cutting through the covering, use very light pressure or a hot knife to trim the covering. If the underlying wood becomes damaged, the fin may fail in flight, causing the loss of your model.

**Note:** Read steps 4 through 7 before mixing any epoxy. You must be able to complete these steps before the epoxy begins to cure.

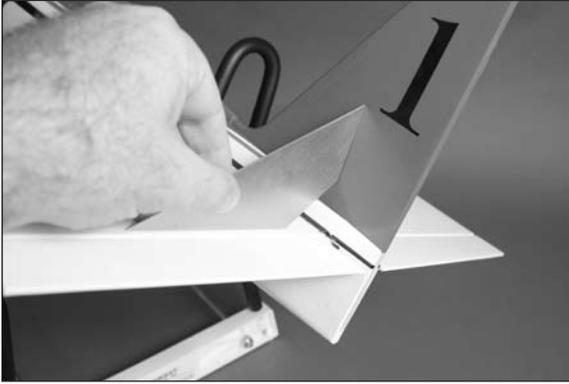
4. Mix 1/4 ounce (15mL) of 15-minute epoxy. Use an epoxy brush to apply the epoxy to the exposed wood on the fin. Also apply a small amount of epoxy in the slot in the fuselage where the fin fits.



5. Fit the fin into the fuselage. Use a paper towel and rubbing alcohol to remove any excess epoxy that oozes out when the fin is installed.



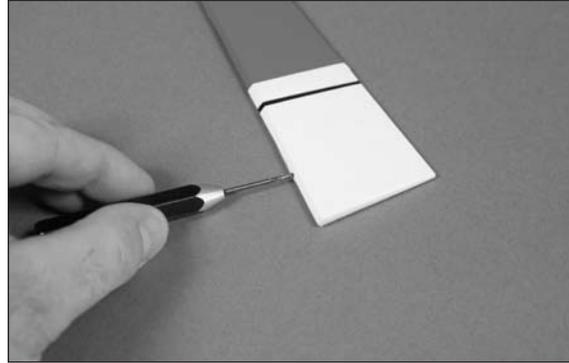
□ 6. Use a square to check that the fin is square to the stabilizer. There will be a slight amount of play to correct for any alignment issues.



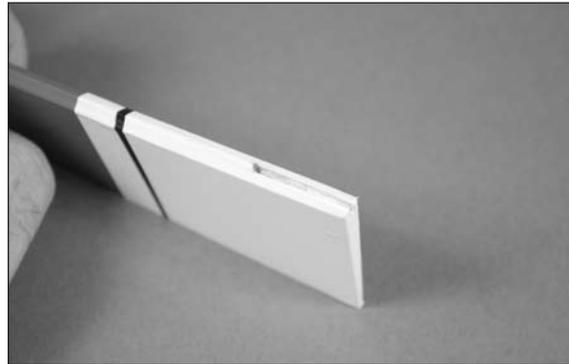
□ 7. Use low-tack tape to hold the fin in position until the epoxy fully cures.



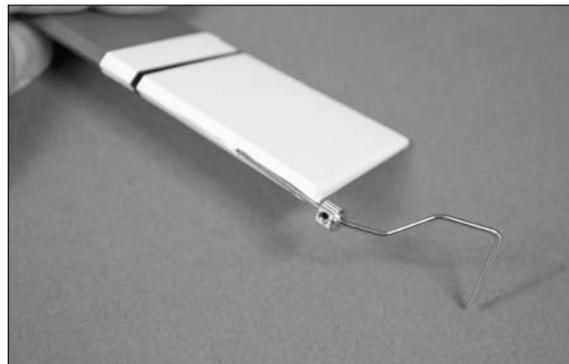
□ 8. Use a pin vise and 1/16-inch (1.5mm) drill bit to drill a hole that is 1/2-inch (13mm) deep 7/8-inch (22mm) from the bottom of the rudder.



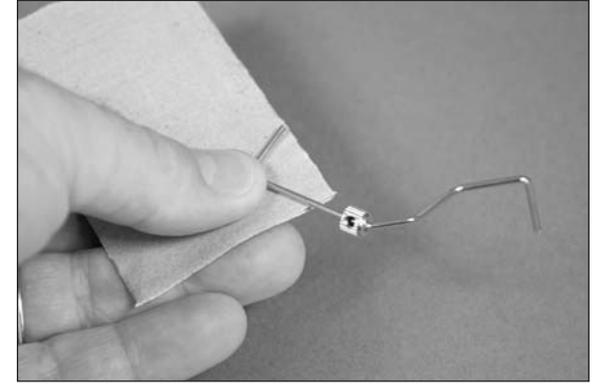
□ 9. Use a hobby knife and #11 blade to cut a groove from the hole drilled in the previous step to the bottom of the rudder for the tail gear.



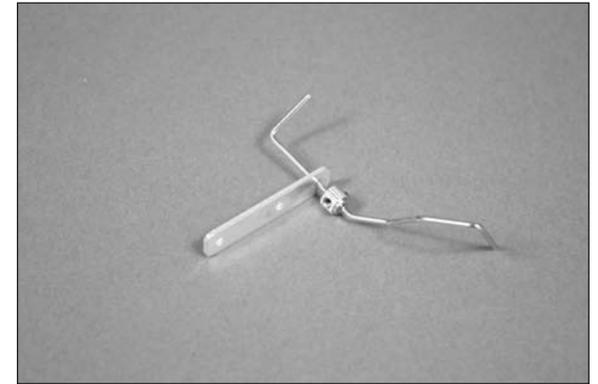
□ 10. Test fit the tail gear wire into the rudder. The wire will rest flush with the hinge line of the rudder as shown. You may need to adjust the groove in the rudder to fit the tail gear wire.



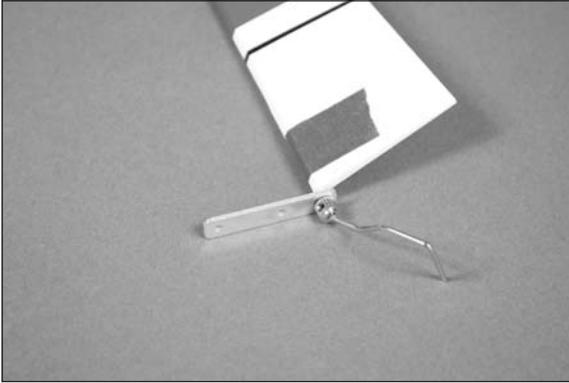
□ 11. Remove the tail gear wire from the rudder. Use medium grit sandpaper to roughen the tail gear wire where it contacts the rudder.



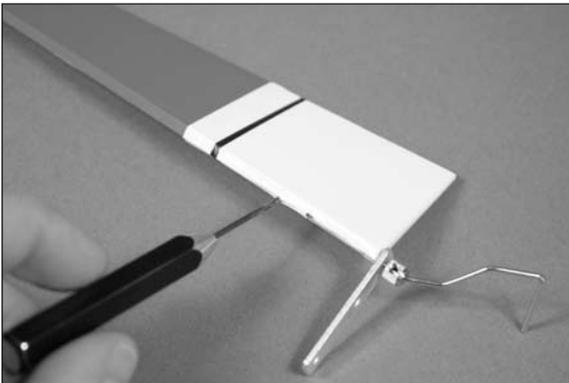
□ 12. Slide the aluminum tail wheel bracket on the tail gear wire. The two larger holes are used for mounting the bracket, while the smaller hole fits over the wire.



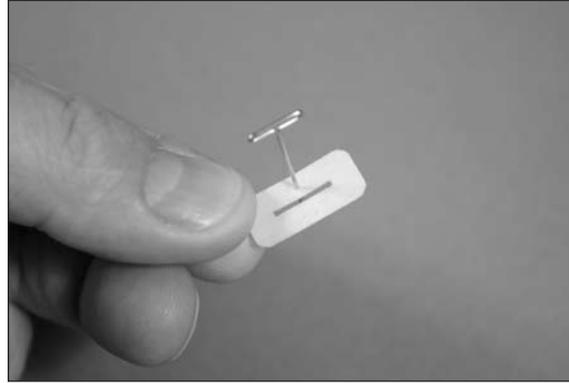
□ 13. Mix a small amount of 15-minute epoxy. Apply the epoxy to the notch in the rudder and the tail gear wire where it fits in the rudder. Insert the wire and use low-tack tape to hold the wire in position until the epoxy cures. Remove any excess epoxy using rubbing alcohol and a paper towel.



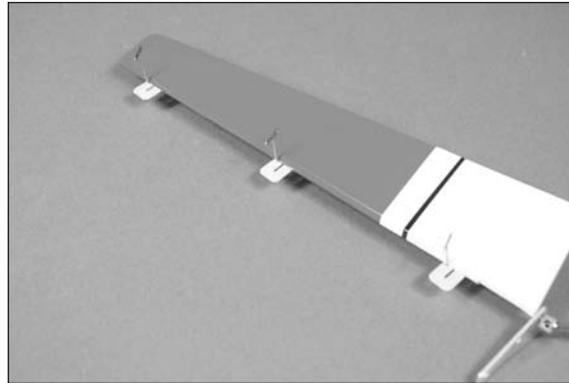
□ 14. Remove the tape from the rudder holding the tail gear wire in position. Use a pin vise and 1/16-inch (1.5mm) drill bit to drill a hole in the center of each hinge slot. This will provide a tunnel for the CA to wick into, providing a better bond between the wood and hinge when they are glued in position. Prepare both the rudder and fin at this time.



□ 15. Place a T-pin in the center of the three hinges removed in step 1. This will center the hinges evenly in the rudder and fin.



□ 16. Place the hinges in the rudder.



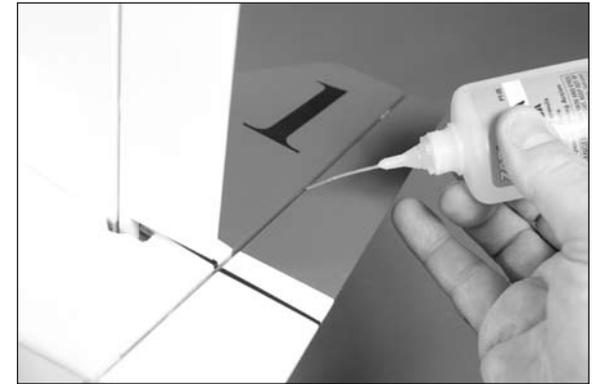
□ 17. Remove the tape placed on the fin and stabilizer in step 7. Slide the hinges into the slots in the rudder.



□ 18. Remove the T-pins from the hinges. Make sure the rudder is pressed tightly against the fin to eliminate any hinge gap. Check that the tips of the rudder and fin are aligned.



□ 19. Saturate each hinge using thin CA on both the top and bottom of the hinge. Allow the CA to fully cure before proceeding.

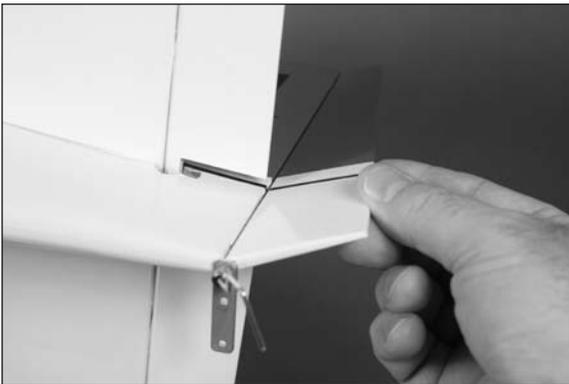
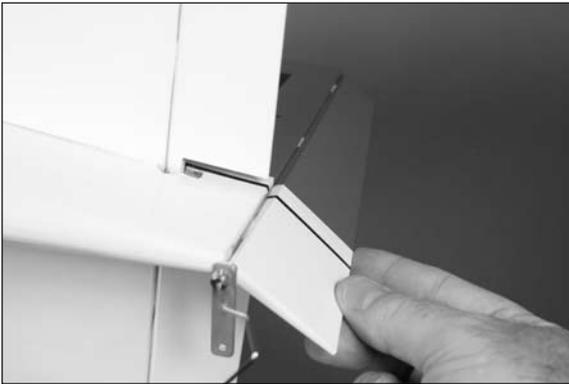


**Note:** Do not use CA accelerator on the hinges. The CA must be allowed time to soak into the hinge and surrounding wood to provide the best bond for the hinge.

□ 20. Once the CA has cured, gently pull on the rudder and fin to make sure the hinges are glued securely. If any hinges are loose, apply more CA and check them again.



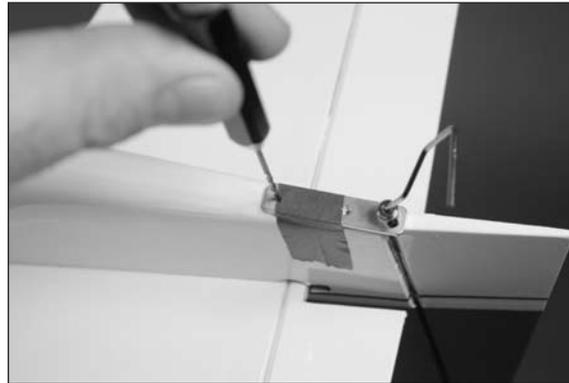
□ 21. Flex the rudder through its range of motion a number of times to break in the hinges. This will reduce the load on the servo for those first flights.



□ 22. Use a piece of low-tack tape to tape the tail wheel bracket to the bottom of the fuselage. Make sure the mounting holes in the bracket are aligned with the fuselage centerline.



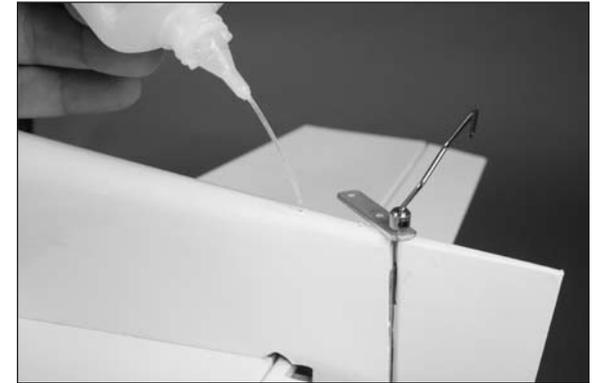
□ 23. Use a pin vise and 1/16-inch (1.5mm) drill bit to drill the two holes in the fuselage for the mounting screws.



□ 24. Remove the tape and swing the bracket to the side. Thread a 2mm x 8mm self-tapping screw into each hole to cut threads in the surrounding wood using a #1 Phillips screwdriver. Remove the screw before proceeding to the next step.



□ 25. Place 2–3 drops of thin CA in each hole to harden the surrounding wood. Doing so will make the screws more secure, preventing them from vibrating loose.



- 26. Secure the tail wheel bracket to the fuselage using two 2mm x 8mm sheet metal screws and a #1 Phillips screwdriver.



**Note:** Always use threadlock on metal-to-metal fasteners to prevent them from vibrating loose.

- 27. Use a 1.5mm hex wrench to loosen the setscrew in the wheel collar. Slide the wheel collar against the tail wheel bracket and tighten the setscrew to secure its location.



**Note:** Always use threadlock on metal-to-metal fasteners to prevent them from vibrating loose.

- 28. Attach the tail wheel to the tail wheel bracket using a 1.5mm wheel collar. Tighten the setscrew using a 1.5mm hex wrench.



## Rudder and Elevator Linkage Installation

### Required Parts

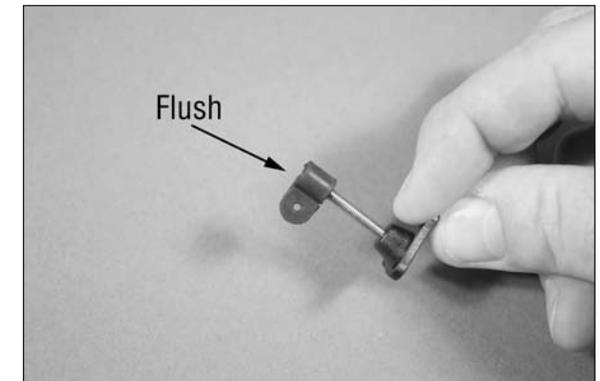
Fuselage assembly	Servo with hardware (2)
Transmitter	Receiver
Receiver battery	Nylon clevis (2)
Control horn fitting (2)	Threaded control horn (2)
Control horn backplate (2)	
2mm x 12mm machine screw (6)	
21 <sup>7</sup> / <sub>8</sub> -inch (555mm) pushrod, rudder	
20 <sup>1</sup> / <sub>4</sub> -inch (514mm) pushrod, elevator	

### Required Tools and Adhesives

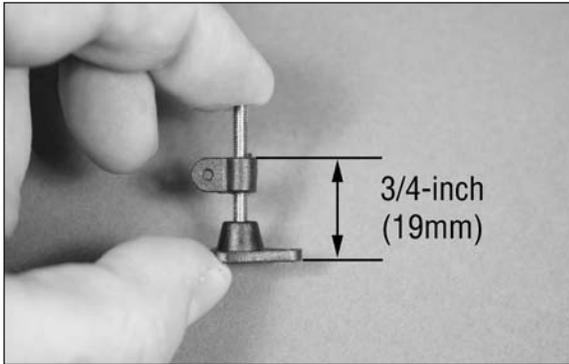
Thin CA	Hobby knife with #11 blade
Phillips screwdriver: #1	Pencil
Felt-tipped pen	Pin vise
Ruler	
Drill bit: 1/16-inch (1.5mm), 5/64-inch (2mm)	

**Note:** Before starting the installation of the servos, we recommend centering the trims and sticks on your transmitter. If using a computer radio, make sure to reset a model memory and name it for this particular model. We also recommend binding the transmitter and receiver at this time following the instructions provided with your radio system.

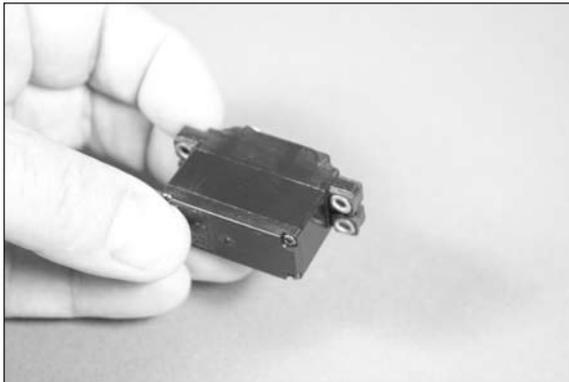
- 1. Prepare the elevator control horn by threading the control horn fitting on the control horn so the top of the fitting is flush with the top of the threads. It may be necessary to hold the screw using a #1 Phillips screwdriver while installing the fitting.



□ 2. Prepare the rudder control horn by threading the control horn fitting on the control horn so the top of the fitting measures 3/4-inch (19mm) from the base of the horn. It may be necessary to hold the screw using a #1 Phillips screwdriver while installing the fitting.



□□ 3. Prepare the servo by installing the rubber grommets and brass eyelets. Remove the servo horn from the servo using a #1 Phillips screwdriver.

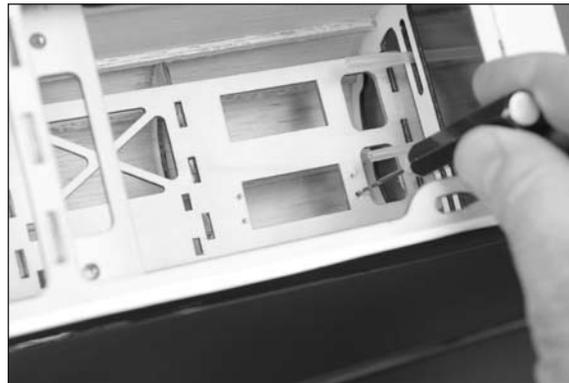


**Note:** The grommets install from the bottom of the servo.

□□ 4. Test fit the elevator servo in the opening in the left-hand side of the fuselage. Make sure the output of the servo faces to the rear of the fuselage. Use a pencil to transfer the locations of the servo mounting screws on the servo tray.



□□ 5. Remove the servo from the fuselage. Use a pin vise and 1/16-inch (1.5mm) drill bit to drill the holes for the servo mounting screws.



□□ 6. Use a #1 Phillips screwdriver to run a servo mounting screw in each of the holes to cut threads in the surrounding wood. Remove the screw before proceeding to the next step.



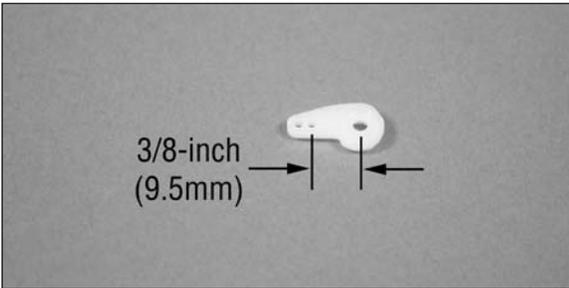
□□ 7. Apply 2–3 drops of thin CA in each hole to harden the surrounding wood. This will help prevent the screws from vibrating loose.



□□ 8. Secure the elevator servo in the fuselage using the screws provided with the servo and a #1 Phillips screwdriver. Make sure the output of the servo faces to the rear when installed in the fuselage. Route the servo lead through the servo tray in the location shown in the photo.



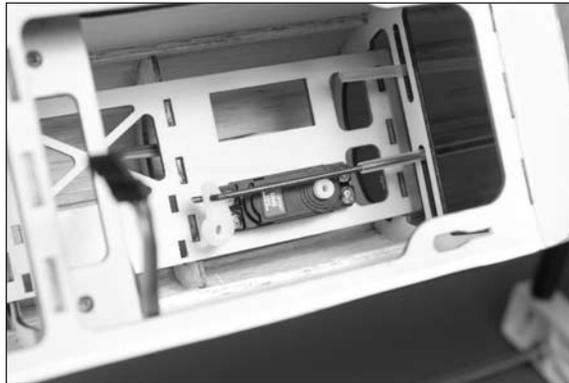
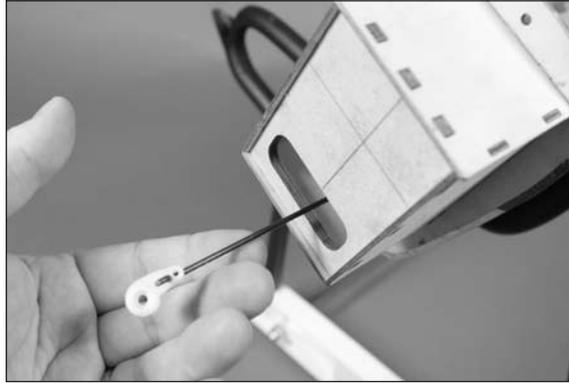
□□ 9. Prepare the servo horn by enlarging the hole in the arm that is 3/8-inch (9.5mm) from the center of the servo horn using a pin vise and 5/64-inch (2mm) drill bit. Use side cutters to remove any other arms from the horn so they don't interfere with the operation of the servo.



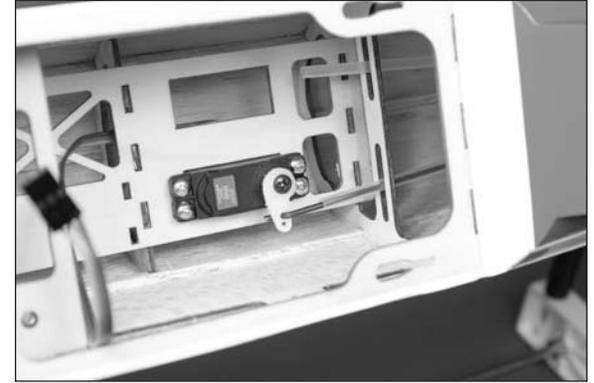
□□ 10. Insert the bend on the 20 1/4-inch (514mm) pushrod into the hole enlarged in the previous step. The wire will be on the top of the horn, while the bend will end underneath the horn.



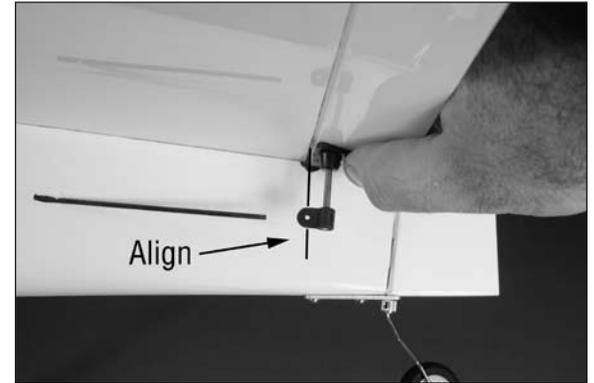
□□ 11. Slide the pushrod into the pushrod tube near the servo. Inserting the pushrod through the oval hole in the firewall will make its installation easier. You will need to use a hobby knife to remove the covering at the rear of the fuselage for the pushrod to exit the left-hand side of the fuselage.



□□ 12. Use the radio system to center the elevator servo. Use a #1 Phillips screwdriver and the screw removed from the servo to attach the servo horn to the servo.



□□ 13. Position the control horn prepared in step 1 on the elevator so the hole in the fitting is aligned with the hinge line, and the fitting is pointing directly at the pushrod. Use a felt-tipped pen to transfer the locations for the three mounting holes onto the elevator.



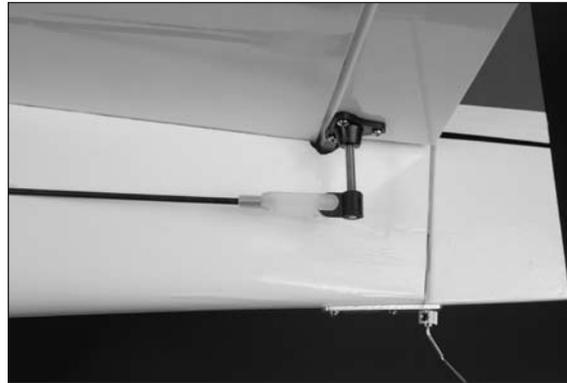
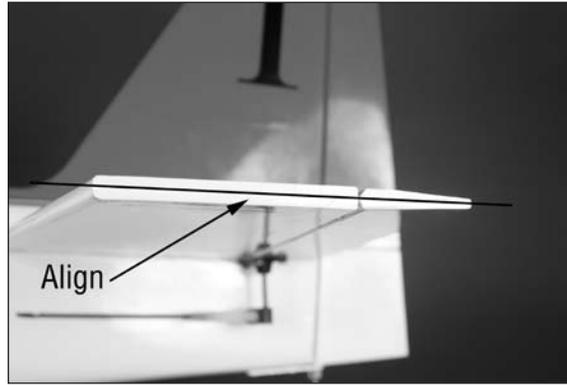
□□ 14. Use a pin vise and 5/64-inch (2mm) drill bit to drill the three holes for the control horn mounting screws. Apply 2–3 drops of thin CA in each hole to harden the surrounding wood.



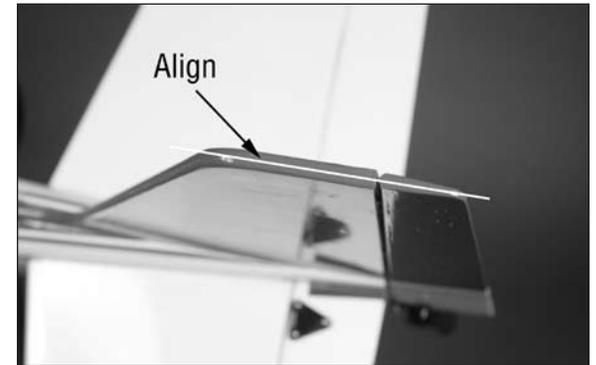
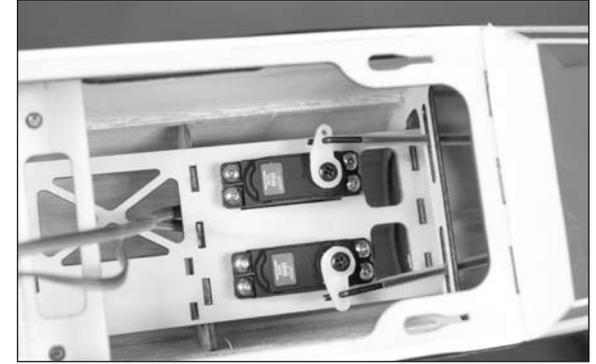
□□ 15. Use a #1 Phillips screwdriver to secure the control horn to the elevator using three 2mm x 12mm machine screws and a control horn backplate.



□□ 16. With the elevator servo centered, thread the nylon clevis on the pushrod wire. When the clevis is attached, the control surface must be centered as shown.



□ 17. Install rudder servo and the 21<sup>7</sup>/<sub>8</sub>-inch (555mm) rudder pushrod following steps 3 through 15. Use the rudder control horn prepared in step 2. The only difference is that the rudder servo mounts on the right-hand side and the pushrod routes out the right side of the fuselage.



□ 18. Remember to turn off the radio system at this time to avoid running the battery down.

## Main Landing Gear Installation

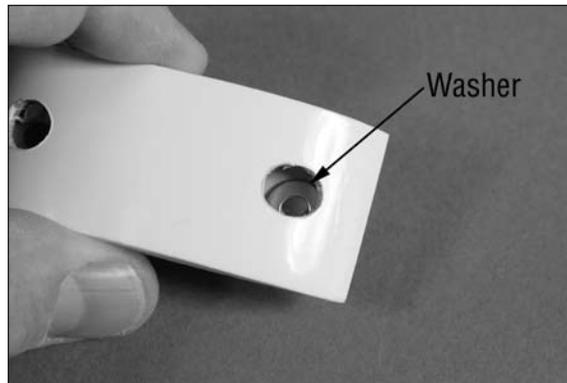
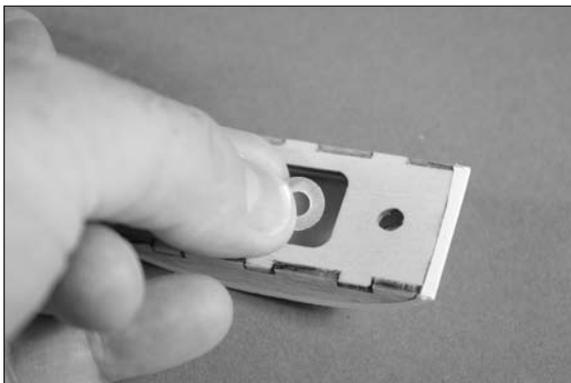
### Required Parts

Fuselage assembly	Main landing gear
Axle, 4mm (2)	Wheel pant (right and left)
Locknut, 4mm (2)	4mm washer (4)
Landing gear cover	
2mm x 8mm self-tapping screw (2)	
4mm x 12mm socket head bolt (2)	
Wheel collar, 4mm with setscrew (2)	
Main wheel, 2-inch (52mm) (2)	

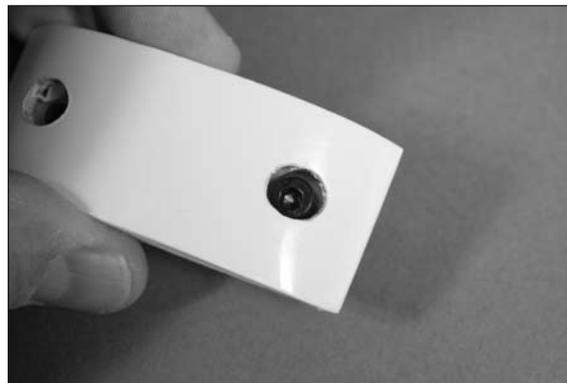
### Required Tools and Adhesives

Nut driver: 7mm	Open-end wrench: 10mm
Ruler	Threadlock
Flat file	Light oil
Ruler	Felt-tipped pen
Hex wrench: 1.5mm, 2mm, 3mm	

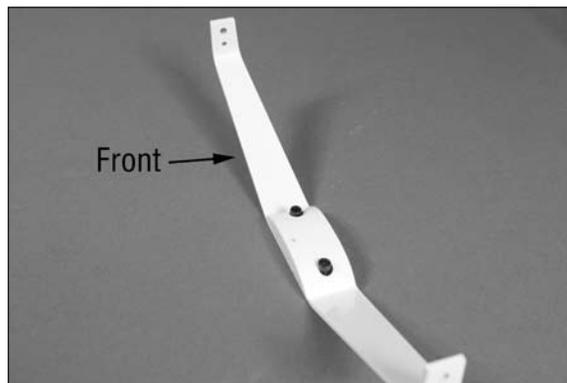
1. Carefully slide two 4mm washers inside the landing gear cover. Turn the cover over and align the washers over the holes in the cover.



2. Insert the 4mm x 12mm socket head screws through the washers and the landing gear cover.



3. Place the landing gear cover assembly on the landing gear. Note that the landing gear will angle forward as shown in the photo. The screws will fit into the mounting holes in the landing gear.

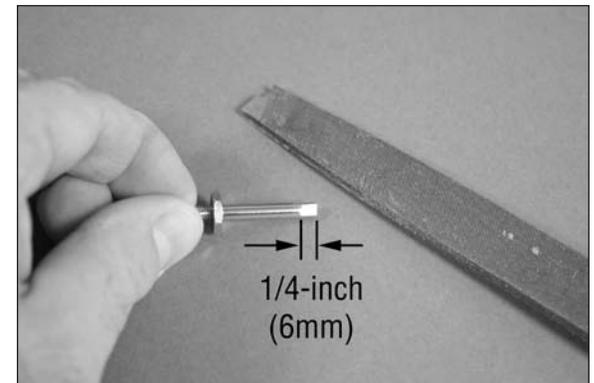


**Note:** Always use threadlock on metal-to-metal fasteners to prevent them from vibrating loose.

4. Attach the landing gear to the fuselage using the screws installed in step 2 and a 3mm hex wrench. Use a paper towel and rubbing alcohol to remove the mark made in step 1.

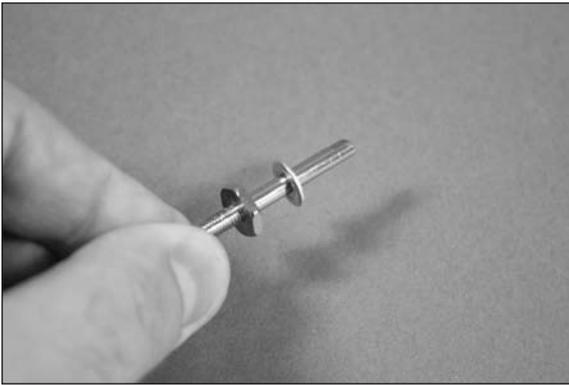


5. Use a flat file to make a flat area on the axle that is 1/4-inch (6mm) wide as shown.



**Note:** Always use threadlock on metal-to-metal fasteners to prevent them from vibrating loose.

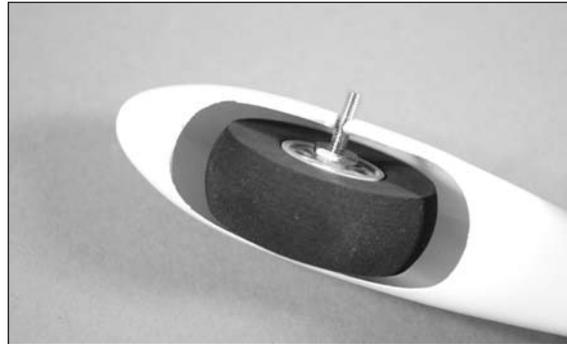
- 6. Slide a 4mm washer on the axle as shown.



- 7. Place a drop of light machine oil on the axle so the wheel can rotate easily. Slide the wheel on the axle, then secure it with a 4mm wheel collar. Install the collar so it is flush with the end of the axle. Tighten the setscrew on the flat made in the previous step using a 1.5mm hex wrench.



- 8. Insert the wheel assembly into one of the wheel pants. The threaded portion of the axle will fit into the notch of the wheel pant.

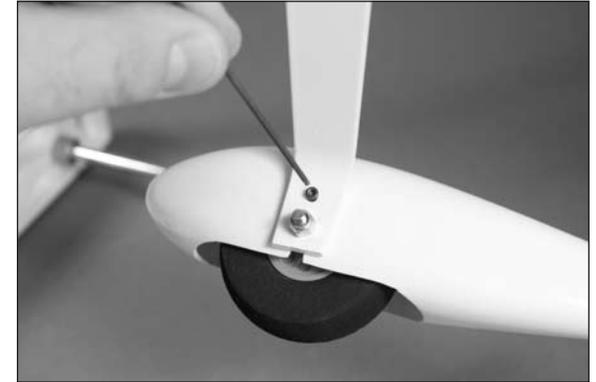


- 9. Insert the threaded portion of the axle through the larger hole of the landing gear. Use a 10mm open-end wrench and 7mm nut driver to tighten the 4mm nut that secures the axle. Leave the nut a little loose so the wheel pant can be moved easily for adjustment.



**Note:** Always use threadlock on metal-to-metal fasteners to prevent them from vibrating loose.

- 10. Use a 2mm hex wrench to reinstall the 2.5mm x 10mm socket head machine screw. Use a 10mm open-end wrench and a 7mm nut driver to fully tighten the nut on the axle.



- 11. Repeat steps 5 through 10 to install the remaining wheel and wheel pant.



## Hinging the Aileron

### Required Parts

Wing panel with aileron and hinges (right and left)

### Required Tools and Adhesives

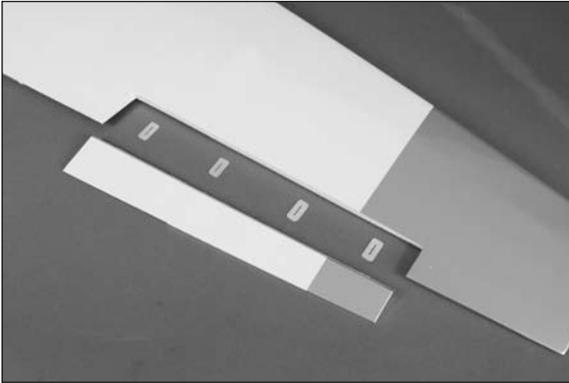
Pin vise

Thin CA

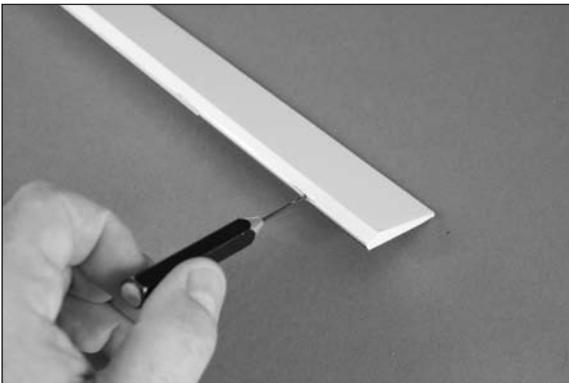
T-pins

Drill bit: 1/16-inch (1.5mm)

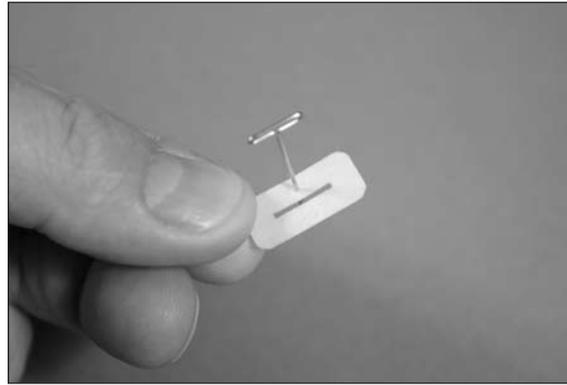
1. Separate the aileron from the wing panel and set the four hinges aside.



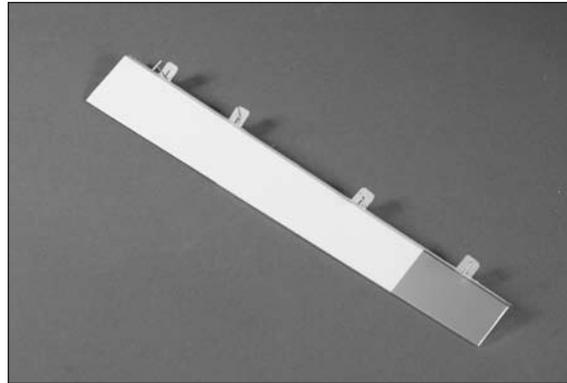
2. Use a pin vise and 1/16-inch (1.5mm) drill bit to drill a hole in the center of each hinge slot. This will provide a tunnel for the CA to wick into, providing a better bond between the wood and hinge when they are glued in position. Prepare both the aileron and wing panel at this time.



3. Place a T-pin in the center of the four hinges removed in step 6. This will center the hinges evenly in the rudder and fin.



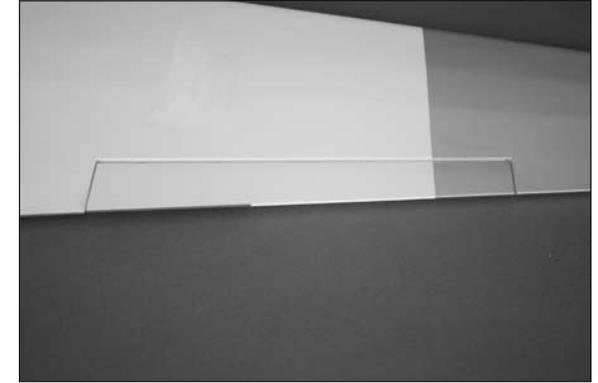
4. Place the hinges in the aileron.



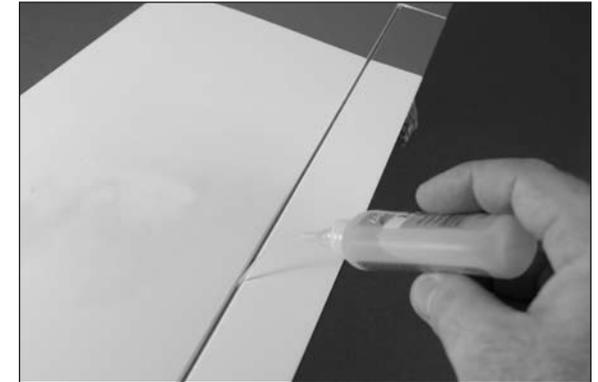
5. Slide the hinges into the slots in the wing panel.



6. Remove the T-pins from the hinges. Make sure the aileron is pressed tightly against the wing panel to eliminate any hinge gap. Check that the ends of the aileron have an equal gap and are centered in the opening for the aileron in the wing panel.

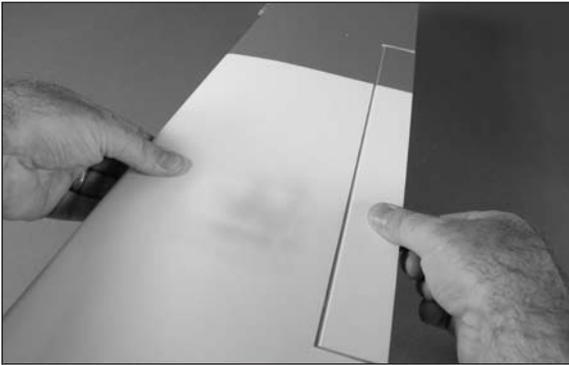


7. Saturate each hinge using thin CA on both the top and bottom of the hinge. Allow the CA to fully cure before proceeding.

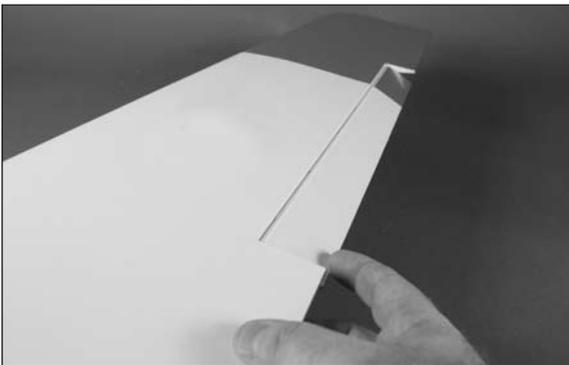
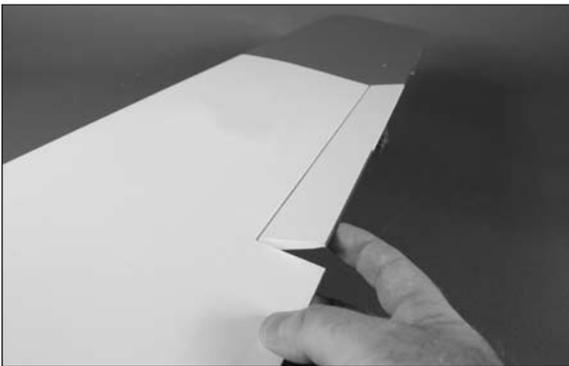


**Note:** Do not use CA accelerator on the hinges. The CA must be allowed time to soak into the hinge and surrounding wood to provide the best bond for the hinge.

□□ 8. Once the CA has cured, gently pull on the wing and aileron to make sure the hinges are glued securely. If any hinges are loose, apply more CA and check them again.



□□ 9. Flex the aileron through its range of motion a number of times to break in the hinges. This will reduce the load on the servo for those first flights.



□□ 10. Repeat steps 1 through 9 to hinge the remaining aileron.

## Aileron Servo Installation

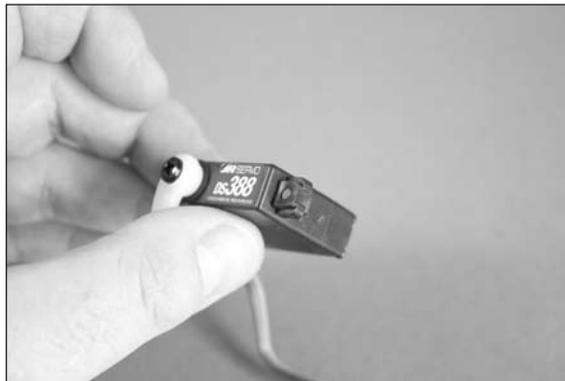
### Required Parts

Servo with hardware (2)    Aileron servo cover (2)  
 Transmitter                      Receiver  
 Receiver battery  
 2mm x 8mm self-tapping screw (8)  
 6-inch (152mm) servo extension (2)  
 Wing panel with aileron (right and left)  
 5/16 x 5/16 x 5/8-inch (8mm x 8mm x 15mm)  
 hardwood block (4)

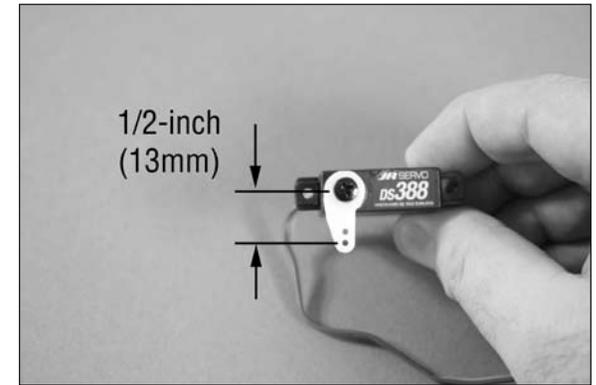
### Required Tools and Adhesives

Drill                                      Pin vise  
 Pencil                                    Trim seal tool  
 Phillips screwdriver: #1            Thin CA  
 Ruler                                      Hobby knife with #11 blade  
 Side cutter                              String/music wire  
 Hobby scissors                        Medium grit sandpaper  
 Rotary tool                              Sanding drum  
 5-minute epoxy                        Mixing stick  
 Mixing cup  
 Drill bit: 1/16-inch (1.5mm), 5/64-inch (2mm)

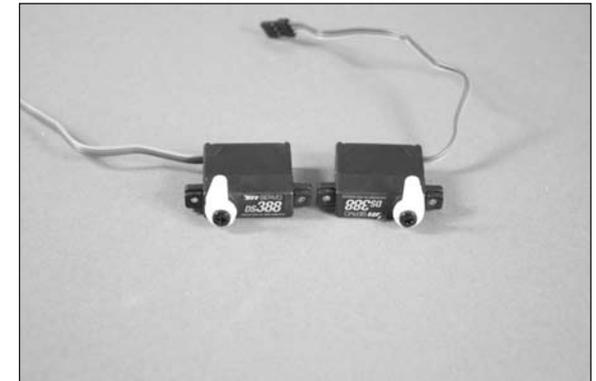
□□ 1. Prepare the aileron servo by installing the rubber grommets and brass eyelets. Center the servo using the radio system. Use side cutters to remove any arms from the horn that may interfere with the operation of the servo. Use a #1 Phillips screwdriver to attach the servo horn to the servo using the hardware provided with the servo.



□□ 2. Use a pin vise and 5/64-inch drill bit to enlarge the hole in the servo arm that is 1/2-inch (13mm) from the center of the horn as shown.



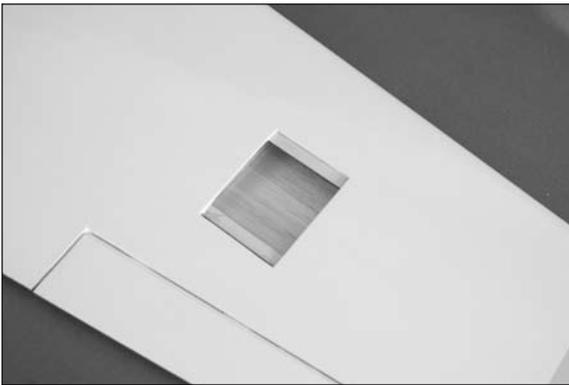
□□ 3. Repeat step 1 to prepare a second aileron servo. Note the servos will be mirror images of each other.



□□ 4. Use a hobby knife and #11 blade to remove the covering to expose the slot for the servo horn and mounting screw locations in the servo cover.

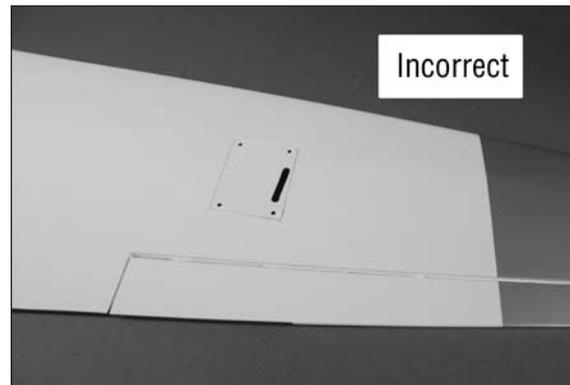
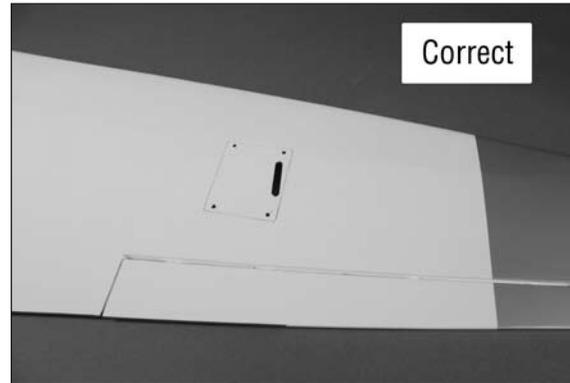


□□ 5. Use a hobby knife with a #11 blade to trim the covering 1/16-inch (1.5mm) inside the opening for the aileron servo in the wing. Use a trim seal tool to iron the covering down around the edges for a finished opening.

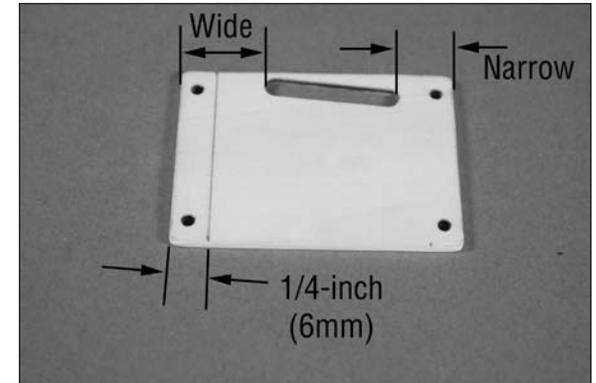


□□ 6. Repeat steps 4 and 5 to prepare the remaining aileron servo cover and hinge the remaining aileron.

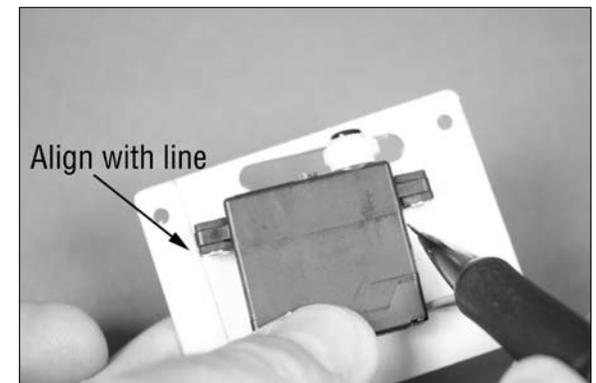
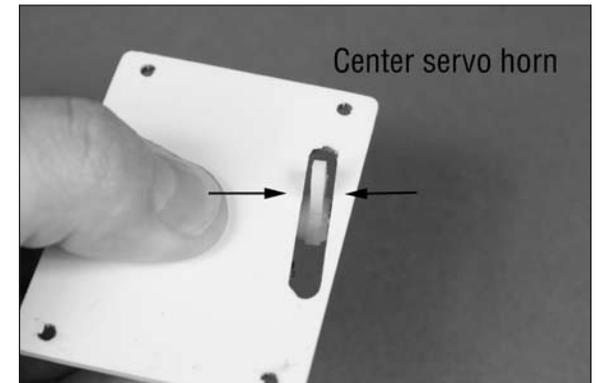
□□ 7. Check the fit of the aileron servo cover to the wing. Note that there is a left and right cover as shown in the following photos. Make sure to select the correct cover for the wing panel.



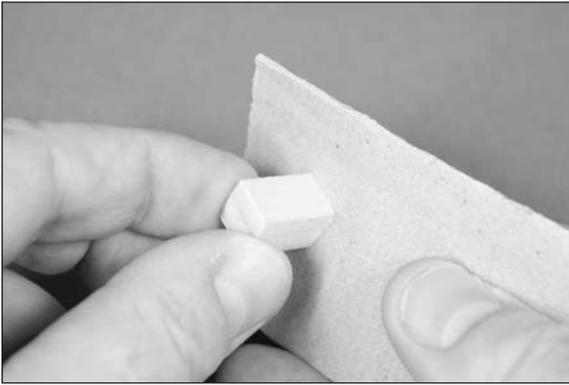
□□ 8. Use a pencil and ruler to draw a line on the cover 1/4-inch (6mm) from the edge of the cover. The line is located on the end of the cover that has the wider area between the slot and edge of the cover.



□□ 9. Position the servo on the cover so the horn is centered in the width of the slot. Align the edge of the servo with the line drawn in the previous step. Use a pencil to mark the location of the servo mounting tabs.



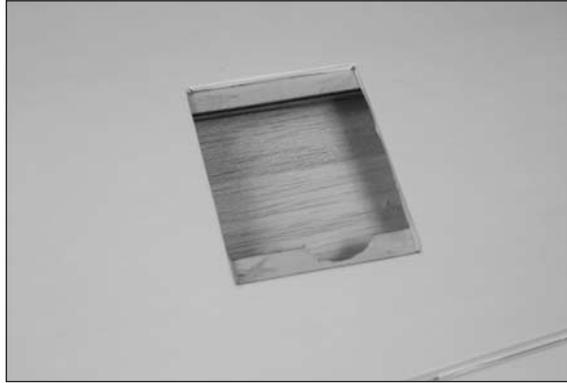
□□ 10. Sand the 5/16 x 5/16 (8mm x 8mm) end of the hardwood block. This will be the end glued to the plate in the following step. Prepare two blocks at this time.



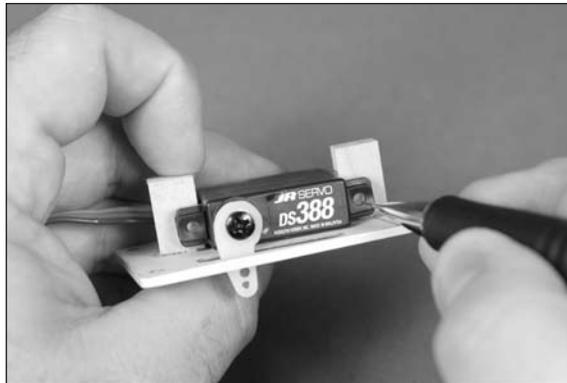
□□ 11. Use 5-minute epoxy to glue the square end of the hardwood block to the servo cover using the marks made in step 18. Allow the epoxy to fully cure before proceeding.



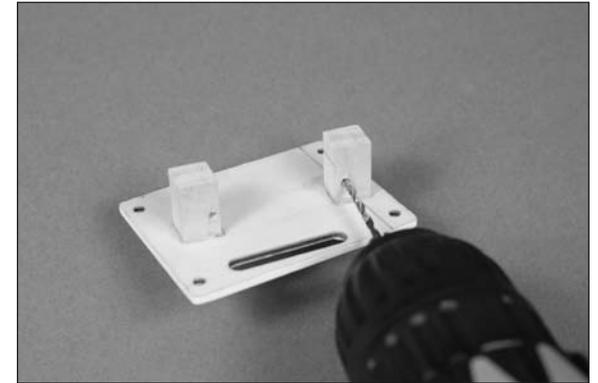
□□ 12. Test fit the servo cover in the opening in the wing. It may be necessary to notch the cover support rail to clear the hardwood block. Use a rotary tool and sanding drum to carefully notch the rail, being careful not to sand the wing sheeting or remove too much material from the rail.



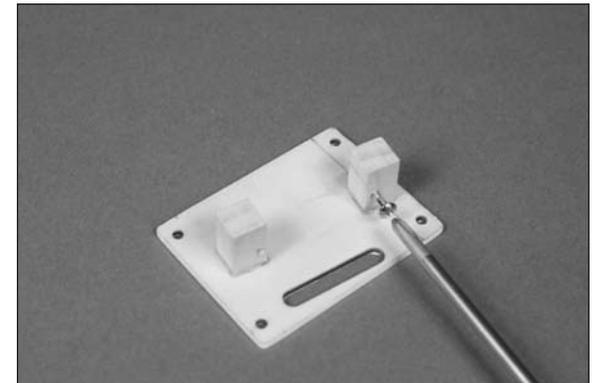
□□ 13. Position the servo between the two blocks. Leave a small gap between the servo and servo cover so vibrations from the airframe are not transferred directly to the servo. Use a pencil to mark the locations for the two servo mounting screws on the blocks.



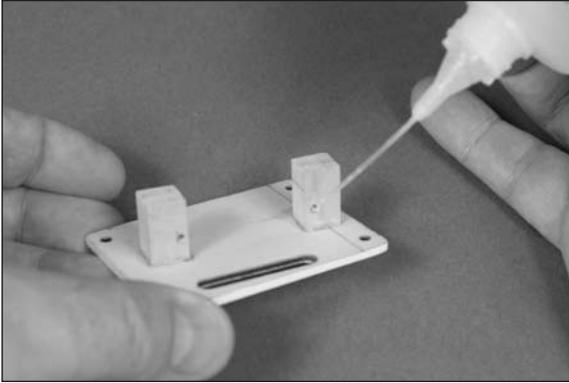
□□ 14. Use a drill and 5/64-inch (2mm) drill bit to drill the holes for the mounting screws. Use care not to enlarge the holes any larger than the drill bit.



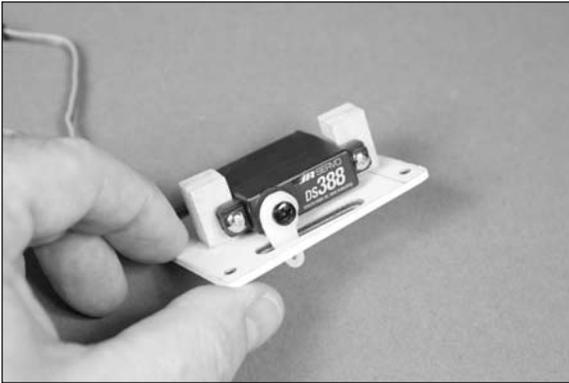
□□ 15. Use a #1 Phillips screwdriver to run a servo mounting screw in each of the holes to cut threads in the surrounding wood. Remove the screw before proceeding to the next step.



□□ 16. Apply 2–3 drops of thin CA in each hole drilled. Also saturate the front and rear of the block using thin CA to harden the block. This will help keep the block from splitting when the servo mounting screws are installed.



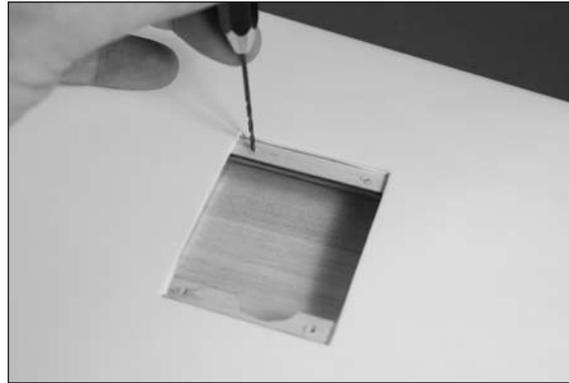
□□ 17. Use the screws included with the servo and a #1 Phillips screwdriver to attach the servo to the mounting blocks.



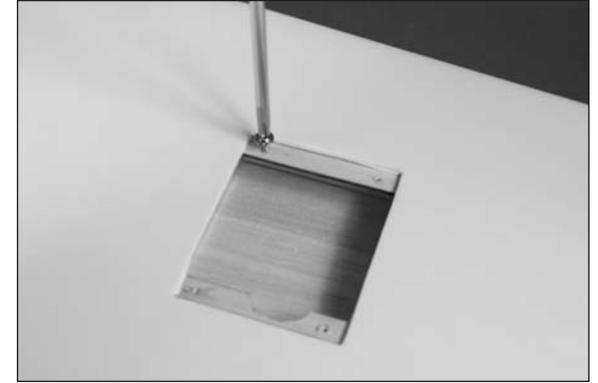
□□ 18. Fit the aileron servo and cover to the wing. Use a pencil to transfer the four positions for the servo cover mounting screws onto the cover rails.



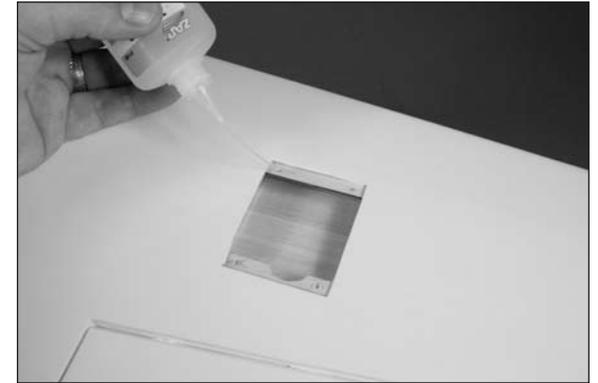
□□ 19. Remove the cover and servo from the wing. Use a pin vise and 1/16-inch (1.5mm) drill bit to drill the four holes for the cover mounting screws. Make sure not to accidentally drill through the top of the wing.



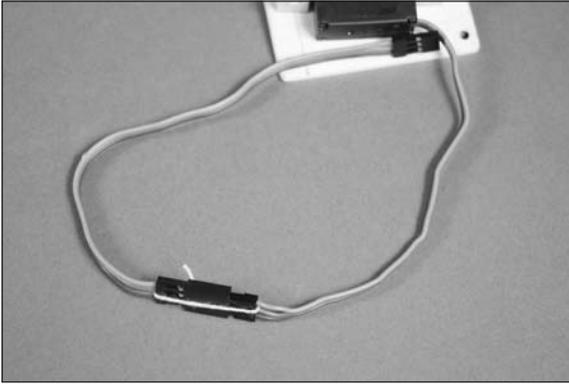
□□ 20. Use a #1 Phillips screwdriver to run a 2mm x 8mm self-tapping screw in each of the holes to cut threads in the surrounding wood. Remove the screw before proceeding to the next step.



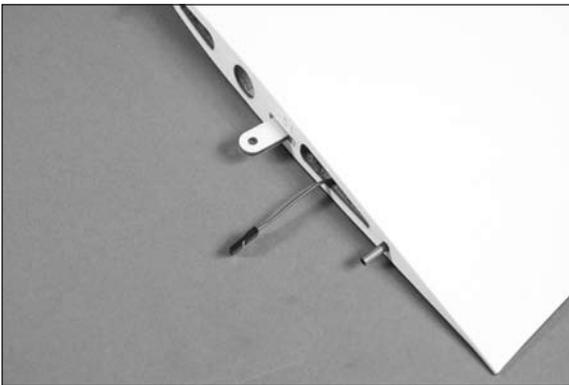
□□ 21. Apply 2–3 drops of thin CA in each hole to harden the surrounding wood. This will help prevent the screws from vibrating loose.



22. Secure a 6-inch (152mm) servo extension to the servo lead using string or a commercially available connector.



23. Use music wire or string to pull the servo extension through the wing.



24. Secure the servo cover and servo to the wing using a #1 Phillips screwdriver and four 2mm x 8mm self-tapping screws.



23. Repeat steps 8 through 24 to install the remaining aileron and aileron servo.

24. Remember to turn off the radio system at this time to avoid running the battery down.

## Aileron Linkage Installation

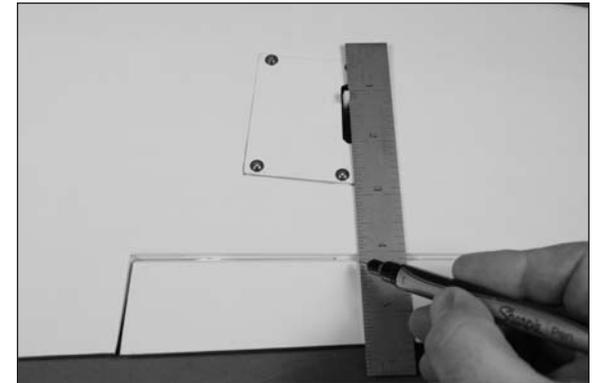
### Required Parts

Nylon clevis (2)	Receiver battery
Transmitter	Receiver
2-inch (52mm) pushrod (2)	
2mm x 12mm machine screw (4)	
Nylon control horn with backplate (2)	
Wing panel with aileron (right and left)	

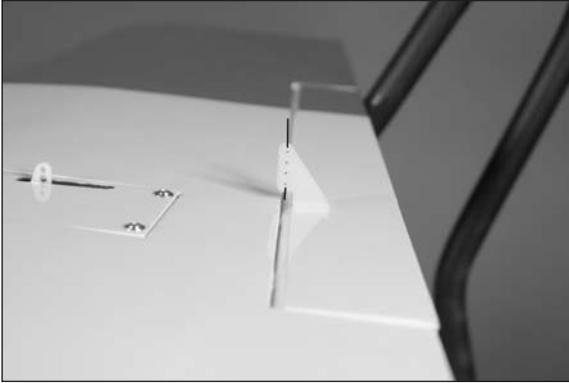
### Required Tools and Adhesives

Phillips screwdriver: #1	Felt-tipped pen
Pin vise	Drill bit: 5/64-inch (2mm)
Ruler	

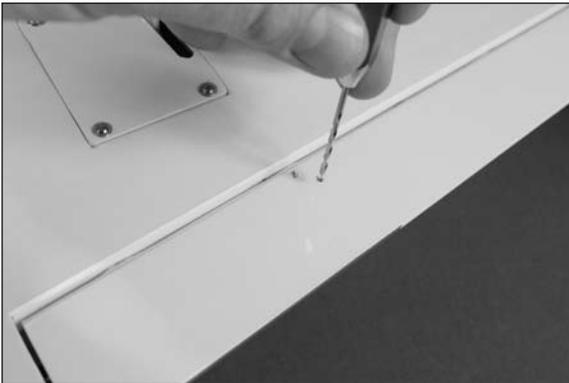
1. Use a ruler and a felt-tipped pen to make a small mark on the aileron used for positioning the aileron control horn. Align the ruler so it is resting against the outside edge of the servo horn and is perpendicular to the aileron hinge line.



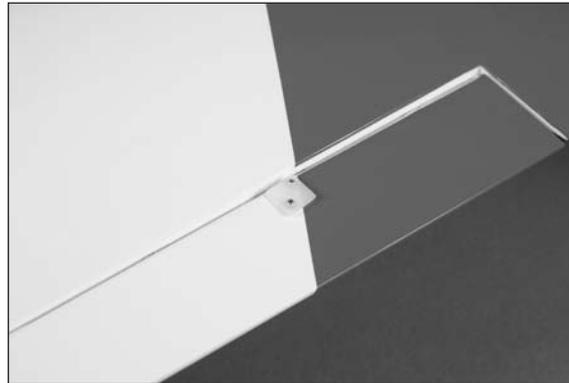
□□ 2. Center the control horn on the mark made in the previous step. The holes in the control horn will align with the hinge line. Use a felt-tipped pen to mark the locations for the two mounting screws on the aileron.



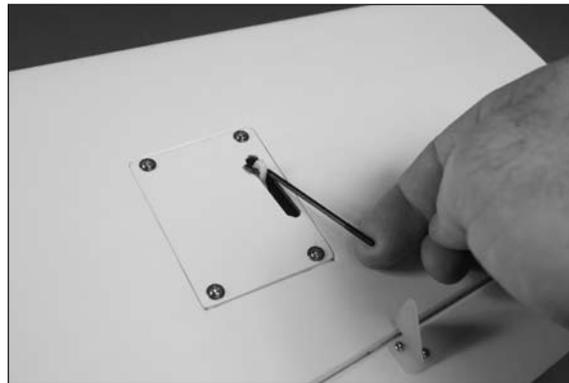
□□ 3. Use a pin vise and a 5/64-inch (2mm) drill bit to drill the holes for the control horn mounting screws.



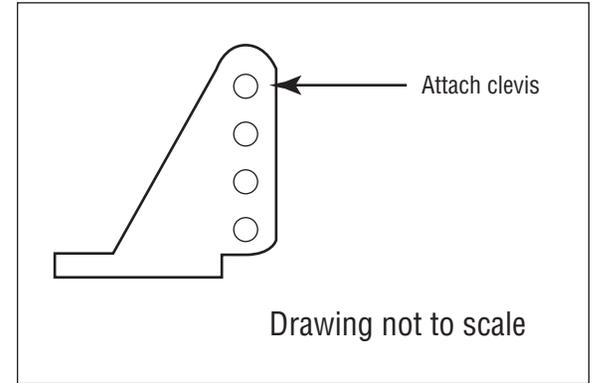
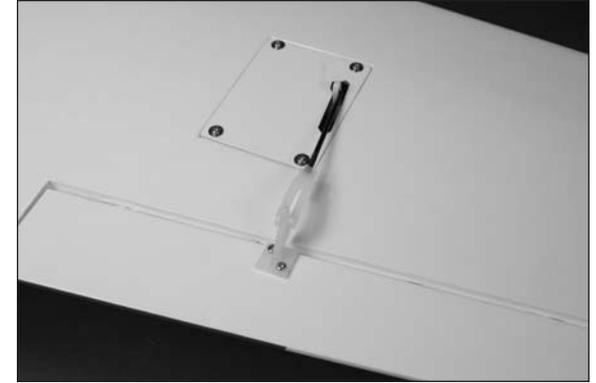
□□ 4. Use two 2mm x 12mm machine screws and the control horn backplate to secure the control horn to the aileron. Use a #1 Phillips screwdriver to tighten the screws. Be careful not to crush the underlying wood when installing the control horn.



□□ 5. Insert the Z-bend of the 2-inch (52mm) linkage in the hole of the servo arm that was enlarged in the previous section of this manual.



□□ 6. With the radio on and the aileron servo centered, thread the nylon clevis on the pushrod. Thread the clevis on enough so the aileron is centered when the clevis is connected to the outer hole of the control horn shown below.



□□ 7. Check the operation of the aileron using the radio system. If you find the pushrod or servo horn binding on the servo cover, use a hobby knife with a #11 blade to slightly trim the cover to eliminate this binding.

□□ 8. Repeat steps 1 through 7 to install the remaining aileron control horn and linkage.

□□ 9. Remember to turn off the radio system at this time to avoid running the batteries down.

## Engine Installation

### Required Parts

Fuselage assembly	Engine mount (right and left)
3mm blind nut (4)	3mm locknut (4)
3mm lock washer (4)	3mm washer (12)
Engine	
Plywood engine mount template	
3mm x 20mm socket head screw (4)	
3mm x 25mm socket head screw (4)	

### Required Tools and Adhesives

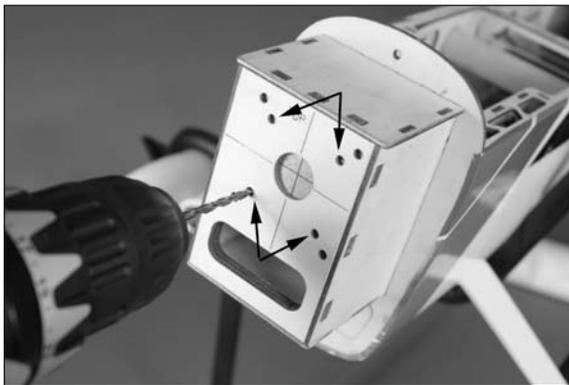
Drill	Hobby knife with #11 blade
Pencil	Tapered reamer
Side cutter	Thin CA
Hex wrench: 2.5mm	Nut driver: 5.5mm
Ruler	Medium CA
Drill bit: 1/8-inch (3mm), 3/16-inch (5mm)	

**Note:** If you are preparing your model for EP flight, skip to page 36 and begin with the section "Motor Installation."

- 1. Locate the plywood engine mount template. The template will fit into the recess of the firewall. If not, lightly sand the edges of the template so it fits into position.



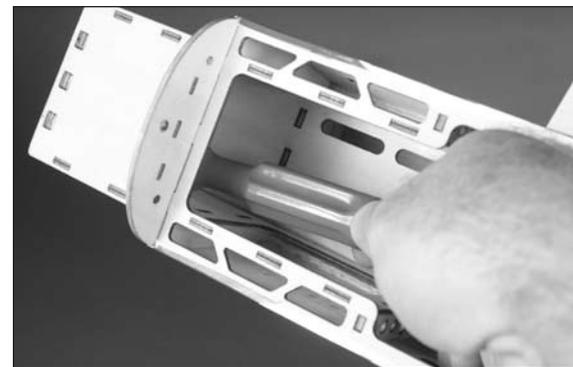
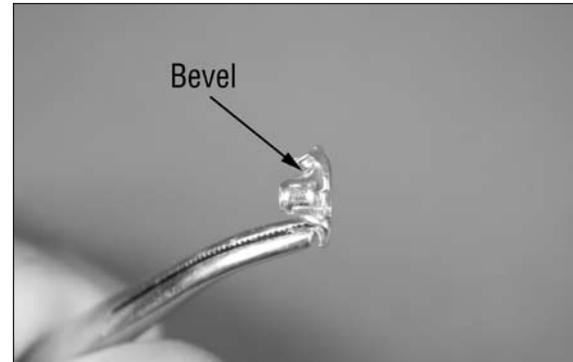
- 2. Use a drill and 1/8-inch (3mm) drill bit to drill the four holes for mounting the engine. Use the inner set of holes as shown below.



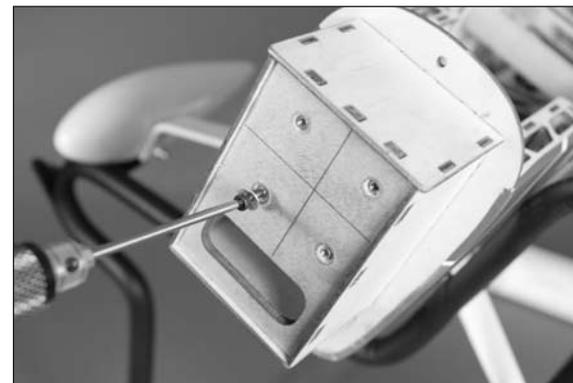
- 3. Use a drill and 3/16-inch (5mm) drill bit to enlarge the holes in the firewall.



- 4. Note there is a slight bevel where the blind nut contacts the back side of the firewall. Use a hobby knife or tapered reamer to bevel the inside of the holes to fit the bevel of the blind nut.



- 5. Install the blind nuts into the back side of the firewall. Use a 3mm x 20mm socket head bolt and 3mm washer to draw the prongs of the blind nut into the firewall, fully seating them. Use a 2.5mm hex wrench when tightening the socket head bolts.

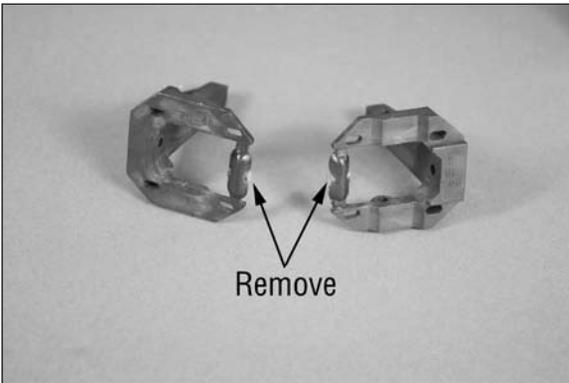


**Hint:** Use a drop of medium CA to attach the blind nut to your finger so it can be installed easily. Make sure it is not glued too well as it may become difficult to break free.

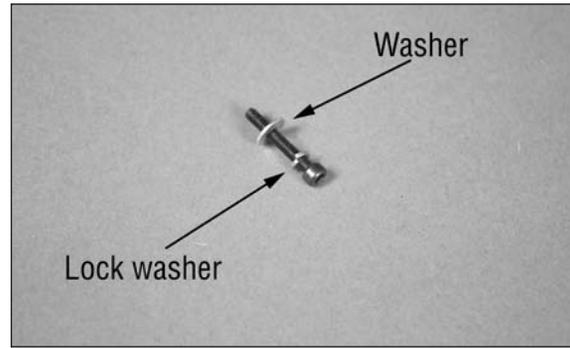
- 6. Apply 2–3 drops of thin CA to each of the prongs of the blind nuts to secure their locations. Be careful not to get CA in the threads of the blind nut as it will make installing the screws difficult.



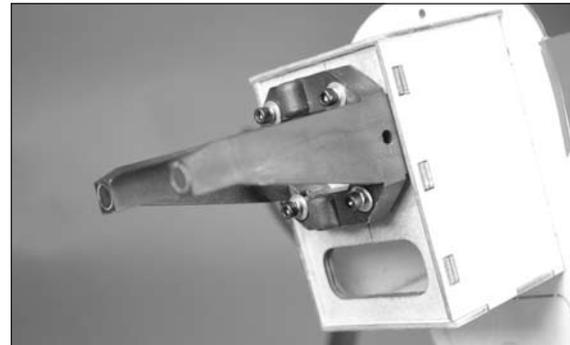
- 7. Use side cutters to remove the portion of the engine mount as shown in the photo.



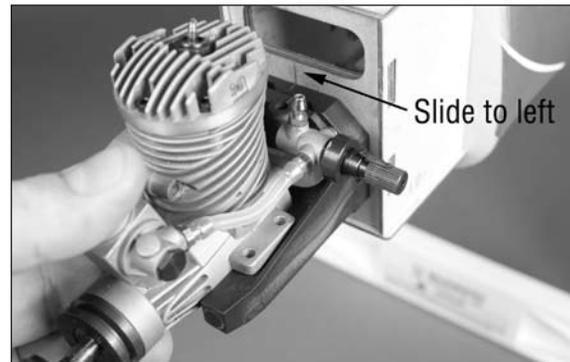
- 8. Prepare four 3mm x 20mm socket head screws by sliding a 3mm lock washer and 3mm washer on each screw.



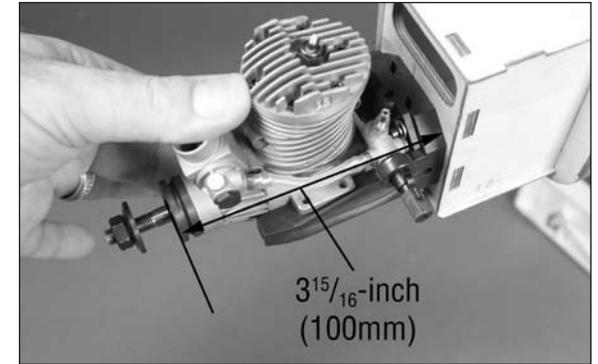
- 9. Place the engine mount rails on the firewall as shown. Use the four 3mm x 20mm machine screws to hold the mount in position. Do not tighten the screws, as the mount will need to be adjusted for your particular engine.



- 10. Place the engine between the mount and slide the nylon mounting beams tight against the engine case. Slide the engine and mount as far to the left as possible, as this will center the propeller shaft with the cowling when it is installed.



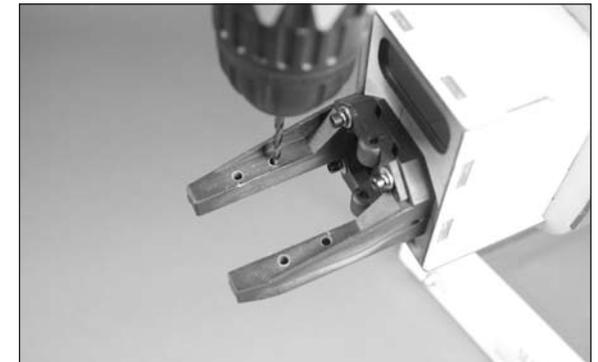
- 11. Position the engine so the face of the drive washer is  $3^{15}/_{16}$ -inch (100mm) forward of the firewall. Make sure to measure from the firewall where the mount is located, not the edges of the engine box.



- 12. Use a pencil to mark the locations for the four engine mounting screws on the engine mount.

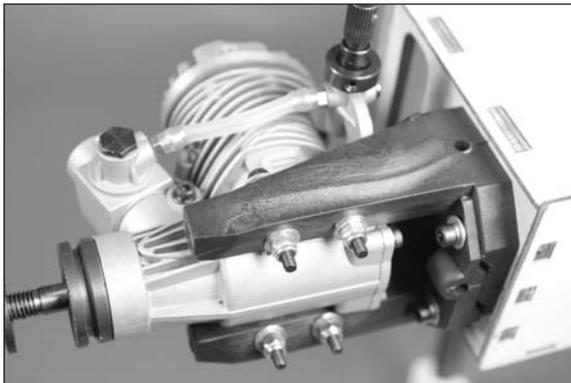
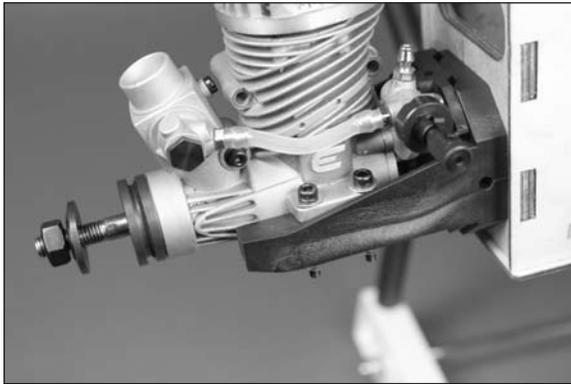


- 13. Use a drill and 1/8-inch (3mm) drill bit to drill the holes for the engine mounting screws.



**Hint:** Use a drill press to drill the holes for the engine mounting bolts so they are nice and straight in the mount.

- 14. Use four 3mm x 25mm socket head bolts, eight 3mm washers and the four 3mm lock nuts to secure the engine to the mounting rails. Use a 2.5mm hex wrench and 5.5mm nut driver to tighten the hardware. Also remember to tighten the screws that secure the mount to the firewall using a 2.5mm hex wrench.



## Throttle Servo and Linkage Installation

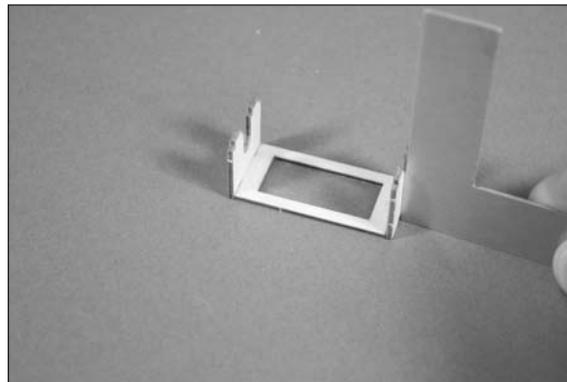
### Required Parts

Fuselage assembly	Servo with hardware
Plywood servo tray	Pushrod connector
1.5mm knurled nut	1.5mm washer
Transmitter	Receiver
Receiver battery	
3mm x 4mm socket head screw	
13 <sup>7</sup> / <sub>8</sub> -inch (352mm) throttle pushrod	
8 <sup>3</sup> / <sub>4</sub> -inch (220mm) pushrod tube	
Plywood servo tray support (2)	

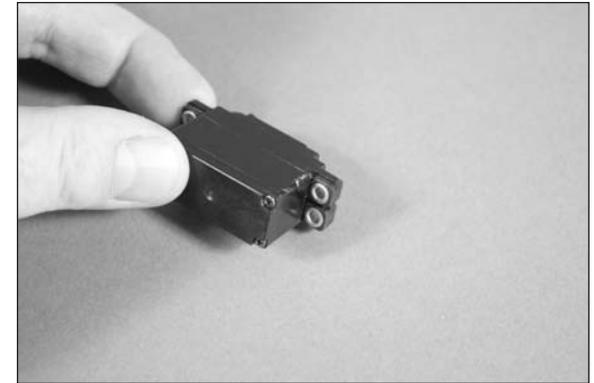
### Required Tools and Adhesives

Pin vise	Square
Medium CA	Thin CA
Threadlock	Pencil
Medium grit sandpaper	Phillips screwdriver: #1
Ruler	Side cutters
Pin vise	Hex wrench: 2.5mm
Drill bit: 1/16-inch (1.5mm), 7/64-inch (2.5mm)	

- 1. Use medium CA glue to assemble the throttle servo tray using the plywood servo tray and two servo tray supports. Make sure the supports are square to the tray before the CA cures.



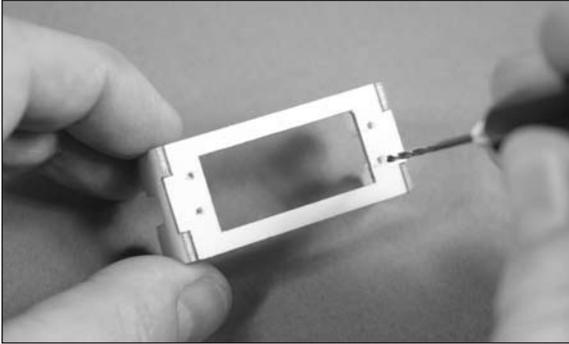
- 2. Prepare the throttle servo by installing the rubber grommets and brass eyelets that were included with the servo. Use a #1 Phillips screwdriver to remove the servo horn from the servo.



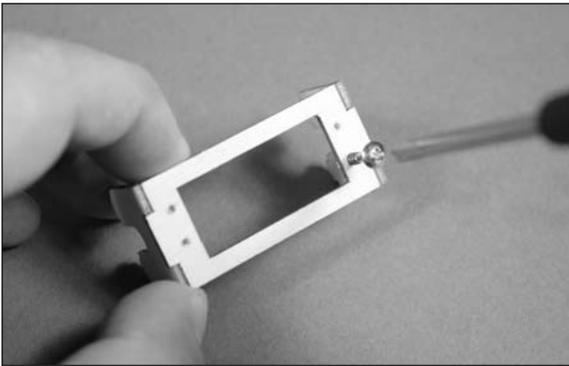
- 3. Test fit the servo in the throttle servo tray. Use a pencil to transfer the locations of the servo mounting screws on the servo tray.



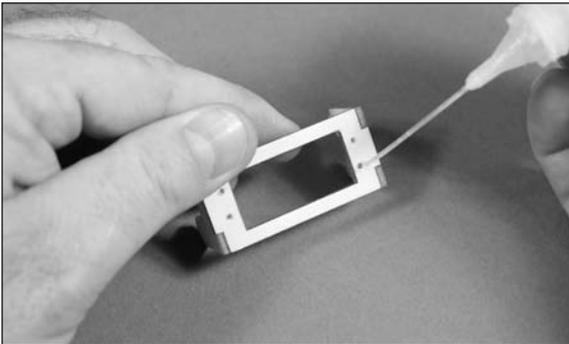
- 4. Remove the servo from the servo tray. Use a pin vise and 1/16-inch (1.5mm) drill bit to drill the holes for the servo mounting screws.



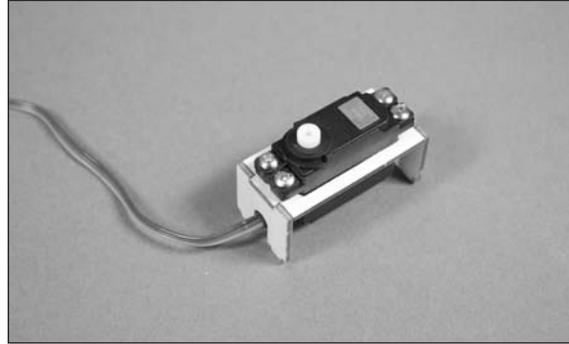
- 5. Use a #1 Phillips screwdriver to run a servo mounting screw in each of the holes to cut threads in the surrounding wood. Remove the screw before proceeding to the next step.



- 6. Apply 2–3 drops of thin CA in each hole to harden the surrounding wood. This will help prevent the screws from vibrating loose.

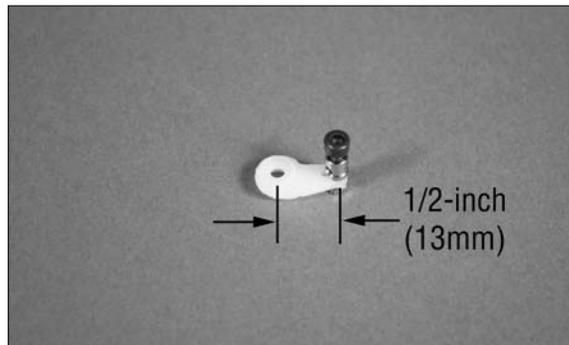


- 7. Secure the servo in the servo tray using the screws provided with the servo and a #1 Phillips screwdriver. Route the servo lead through the notch in the servo tray support.

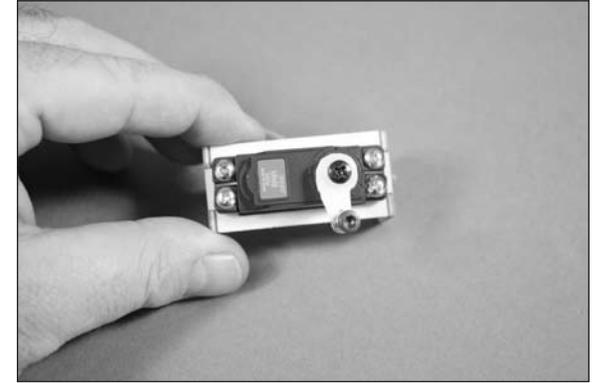


**Note:** Always use threadlock on metal-to-metal fasteners to prevent them from vibrating loose.

- 8. Attach the pushrod connector to the servo horn using a 1.5mm knurled nut, 3mm x 4mm socket head machine screw and 1.5mm washer. Position the connector so it is 1/2-inch (13mm) from the center of the horn. Use side cutters to remove any unused arms from the horn so they don't interfere with the operation of the throttle servo.



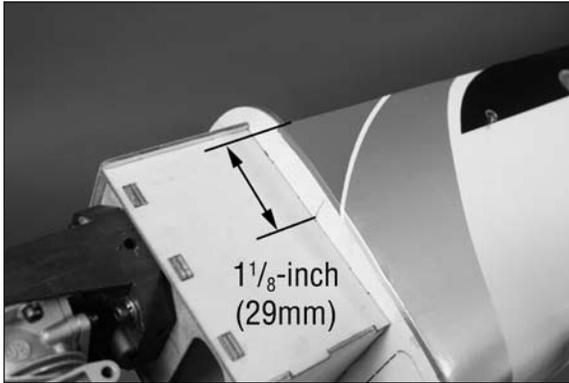
- 9. Use the transmitter to center the throttle servo. Center the throttle stick and trim, then install the servo horn as shown. This will provide equal throw for both full- and closed-throttle. Use a #1 Phillips screwdriver and the screw removed from the servo to secure the horn on the servo.



- 10. Use medium CA to glue the throttle servo tray in the fuselage. Use care not to glue the servo lead in case the servo must be removed later. Note that the output of the servo faces to the rear of the fuselage.



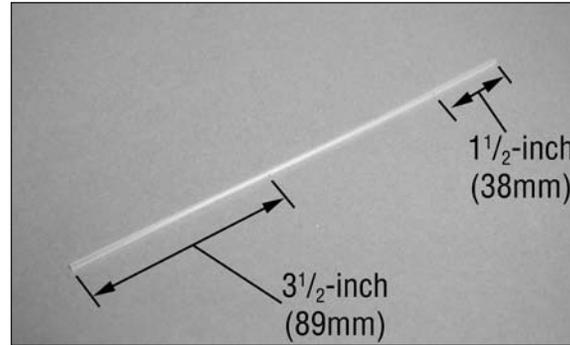
- 11. Use a ruler to measure down  $1\frac{1}{8}$ -inch (29mm). Mark the front edge of the fuselage in the location shown.



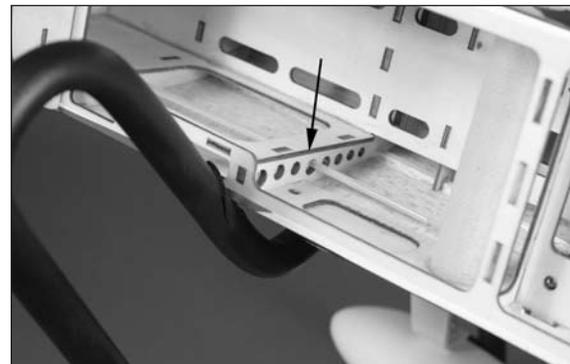
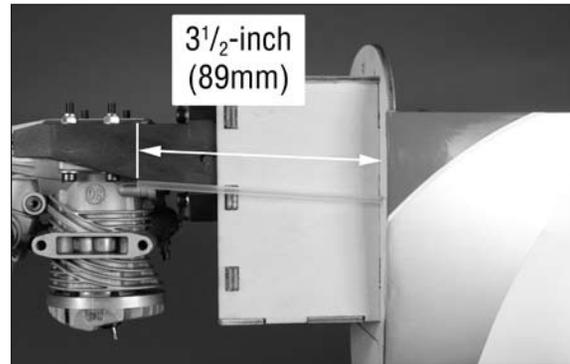
- 12. Use a pin vise and  $7/64$ -inch (2.5mm) drill bit to drill a hole as close to the engine box as possible for the throttle pushrod tube.



- 13. Use medium grit sandpaper to sand a  $1/2$ -inch (13mm) wide area on the pushrod tube that is  $1\frac{1}{2}$ -inch (38mm) and  $3\frac{1}{2}$ -inch (89mm) from the ends of the tube. This provides an area for the CA to adhere to when the tube is glued in place.



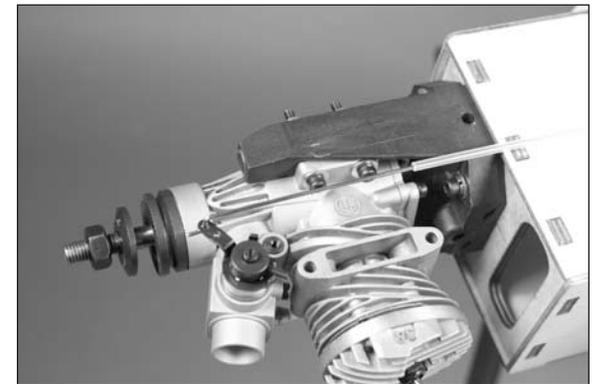
- 14. Slide the tube into the fuselage with the  $1\frac{1}{2}$ -inch (38mm) first. Note the position of the tube inside the fuselage as it passes through the formers. Position the tube so  $3\frac{1}{2}$ -inch (89mm) of the tube is exposed forward of the fuselage as shown.



- 15. Apply 2–3 drops of medium CA where the pushrod tube passes through the formers to secure its location.



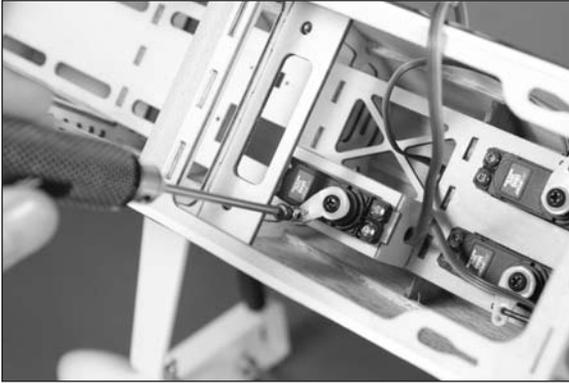
- 16. Attach the Z-bend in the pushrod to the outer hole of the carburetor arm. The wire will pass through the tube and into the fuselage.



**Hint:** Remove the carburetor to make the installation of the pushrod wire easier.

**Note:** Always use threadlock on metal-to-metal fasteners to prevent them from vibrating loose.

- 17. Move the carburetor to the open position. Use the radio system to move the throttle servo to the open position. Insert the wire through the pushrod connector and secure it with the 3mm x 4mm socket head machine screw. Use a 2.5mm hex wrench to tighten the screw.



- 18. Check the operation of the throttle to make sure the carburetor moves from open to closed. You may need to make adjustments at the radio so the servo does not bind at either extreme.

- 19. Remember to turn off the radio system at this time to avoid running the batteries down.

## Fuel Tank Installation

### Required Parts

Fuselage assembly	Fuel tank
Rubber stopper	Stopper plate, small
Stopper plate, large	Clunk
Mixing stick (not included)	
Fuel tubing (not included)	
Aluminum tube, 2-inch (51mm)	
Aluminum tube, 2 <sup>3</sup> / <sub>4</sub> -inch (70mm)	
Fuel tubing, 4 <sup>1</sup> / <sub>2</sub> -inch (115mm)	
3mm x 30mm self-tapping screw	

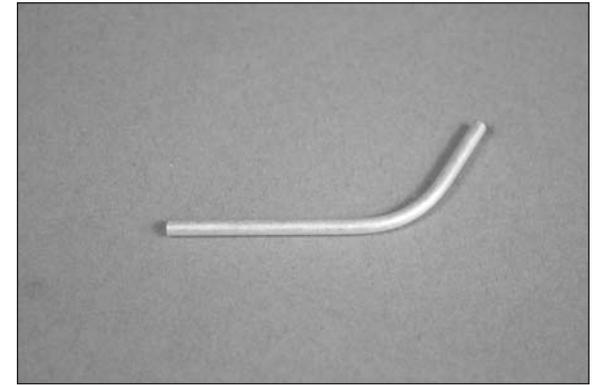
### Tools and Adhesives

Ruler	Phillips screwdriver: #1
Razor saw	Medium CA
Hobby knife with #11 blade	

- 1. Remove the material so two of the three holes in the stopper pass completely through, as well as the center hole for the screw that will secure the stopper. Use a hobby knife and #11 blade for this procedure.



- 2. Carefully bend the 2<sup>3</sup>/<sub>4</sub>-inch (70mm) aluminum tube at a 45-degree angle. This will place it close to the top of the tank when installed.

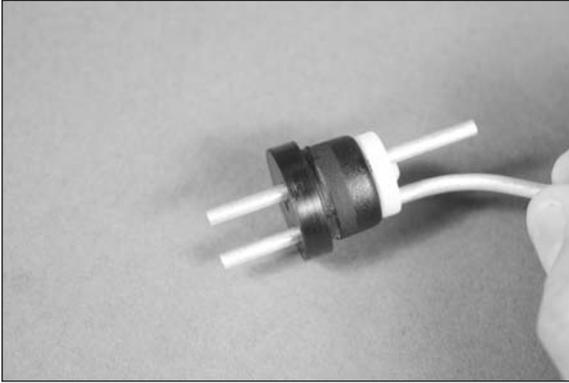


**Hint:** Use a solid round object such as a paint can to bend the tube around to help reduce the chance of kinking the tubing.

- 3. Slide the aluminum tube from the previous step through the smaller stopper plate. Note that the boss for the screw will face toward the bend in the tube. The tube is then inserted in the stopper from the smaller or back of the stopper. Leave 5/8-inch (16mm) of the tube forward of the stopper.



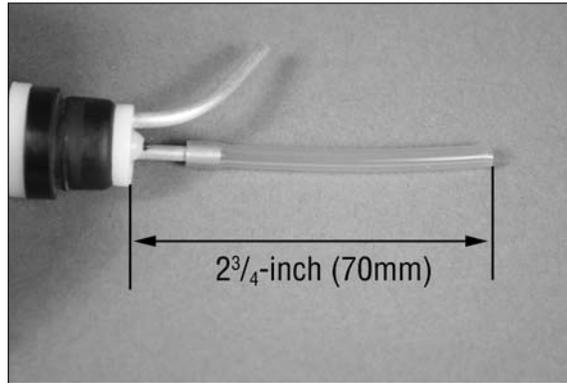
- 4. Slide the 1<sup>7</sup>/<sub>8</sub>-inch (48mm) aluminum tube through the stopper. Position the front of the tube even with the bent tube as shown.



- 5. Slide the larger stopper plate over the tubing at the front. Start the 3mm x 30mm self-tapping screw using a #1 Phillips screwdriver. The screw only needs to be in far enough to keep the large stopper plate from falling off.



- 6. Attach the 4<sup>1</sup>/<sub>2</sub>-inch (115mm) piece of fuel tubing to the straight tube. Use a hobby knife to trim the length of the tube to a length of 2<sup>3</sup>/<sub>4</sub>-inch (70mm) as shown in the photo below.

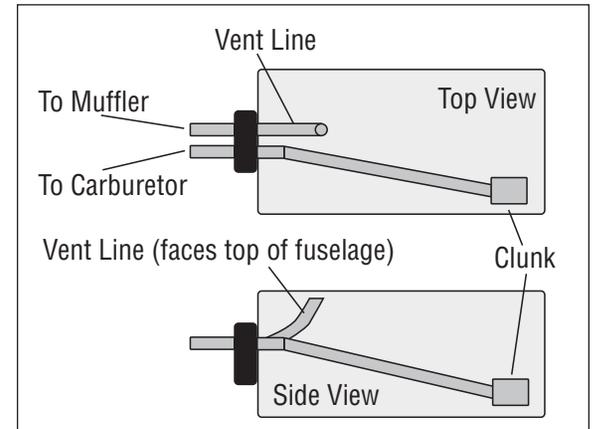


**Note:** Check the ends of the aluminum tubes for sharp edges. If any sharp edges are found, remove them before installing the fuel tubing

- 7. Attach the clunk to the end of the tubing as shown.



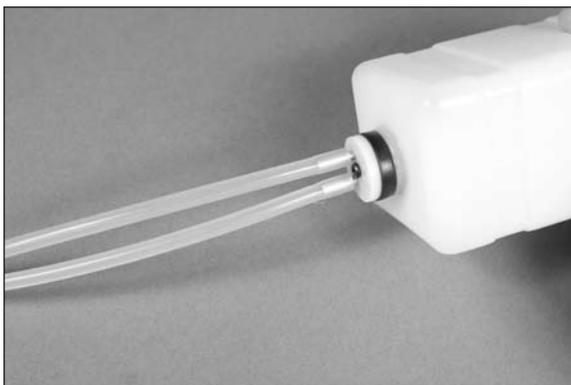
- 8. Insert the stopper assembly into the fuel tank. Make sure the vent line faces to the top of the tank as shown. Note that the hole in the tank is off-center. The hole for the stopper will be closer to the bottom of the tank.



□ 9. Use a #1 Phillips screwdriver to tighten the 3mm x 30mm self-tapping screw that secures the stopper in the tank. Don't over-tighten the screw as you could damage the fuel tank. It needs to be tight enough to create a seal between the tank and stopper.

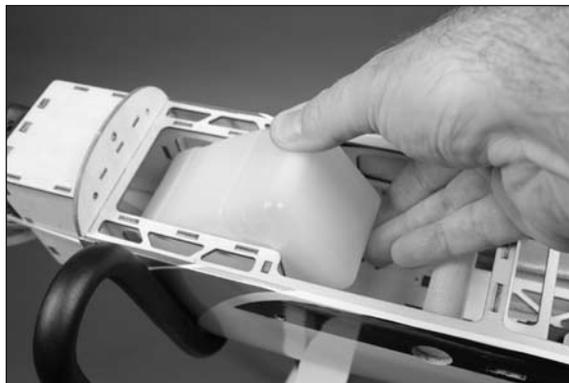


□ 10. Slide the fuel tubing (not included) on the aluminum tubes outside the tank.



**Important:** We recommend using two colors of tubing on the tank: red on the vent line and the green on the line from the clunk. If a single color is used, make sure to mark them so they can be identified when the tank is inside the fuselage.

□ 11. Slide the fuel tank into the fuselage. Guide the lines from the tank through the hole in the firewall. Slide the tank in only as far as it will easily slide. Do not force the fuel tank forward and damage the fuel lines.



□ 12. Use a razor saw to cut two mixing sticks to a length of 3 inches (76mm). Use these and medium CA to secure the tank in the fuselage.



## Cowling and Muffler Installation - Glow Option

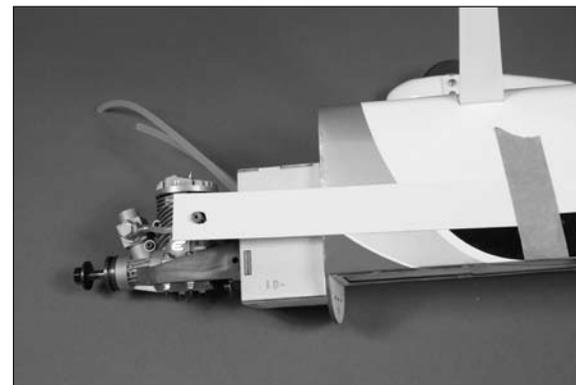
### Required Parts

Fuselage assembly	Muffler with hardware
Cowling	3mm washer (2)
Propeller (not included)	Spinner assembly
3mm x 10mm socket head screw (2)	

### Tools and Adhesives

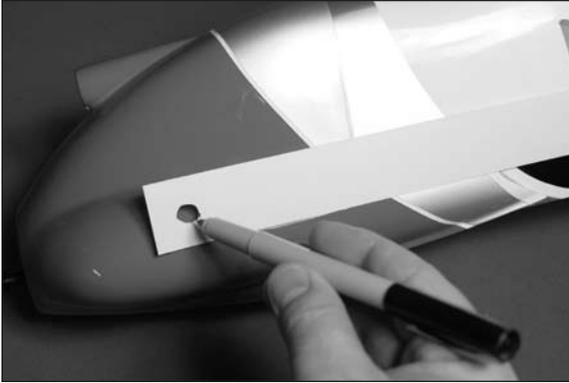
Low-tack tape	Rotary tool
Sanding drum	Hobby scissors
Hex wrench: 2.5mm	Felt-tipped pen
Card stock	

□ 1. Use hobby scissors to cut pieces of card stock to locate the needle valve and any other items that may protrude through the cowling. Use low-tack tape to secure the card stock to the fuselage.



**Note:** Because of the shape of the cowl you may not be able to easily locate all the items using card stock.

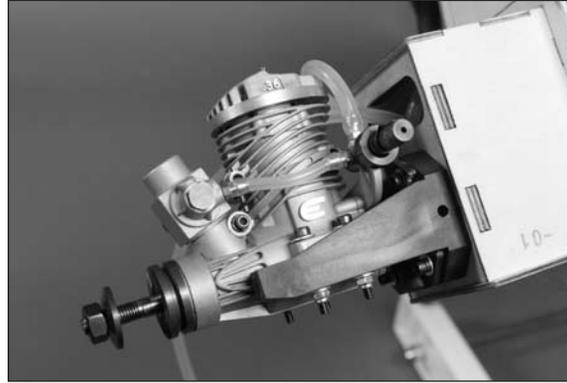
- 2. Slide the cowling on the fuselage until the inner support of the cowling contacts the fuselage. Use a felt-tipped pen to transfer the locations from the card stock to the cowling.



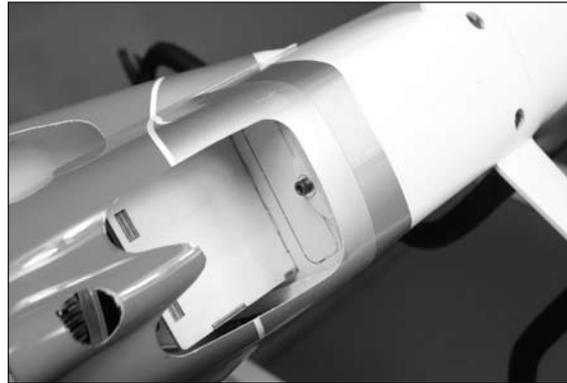
- 3. Use hobby scissors and a rotary tool with a sanding drum to remove the material necessary to fit the cowling over the engine. Work slowly, removing only small amounts from the cowling at a time. Test fit the cowling periodically to make sure it is fitting properly. Create a small opening for the muffler at this time as well.



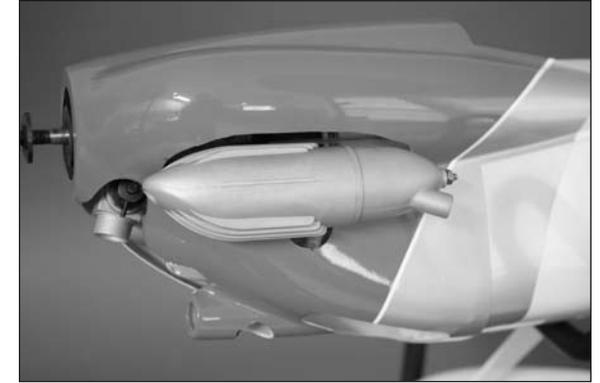
- 4. Connect the line from the clunk to the carburetor. Leave the line long so it can be removed through the cowl using hemostats.



- 5. Attach the cowl to the fuselage using two 3mm x 10mm socket head machine screws and two 3mm washers. The lower screw is installed from the inside of the cowl, while the upper screw is installed inside the fuselage. Use a 2.5mm hex wrench to tighten the screws.



- 6. Attach the muffler to the engine using the hardware provided with the engine. Make sure there is clearance around the muffler so it does not damage the cowl when it gets hot. Connect the line from the vent on the fuel tank to the muffler.



- 7. Attach the propeller and spinner to the engine. Follow the instructions provided with the engine to make sure the propeller is secure.

## Receiver, Receiver Battery and Switch Harness Installation - Glow Option

### Required Parts

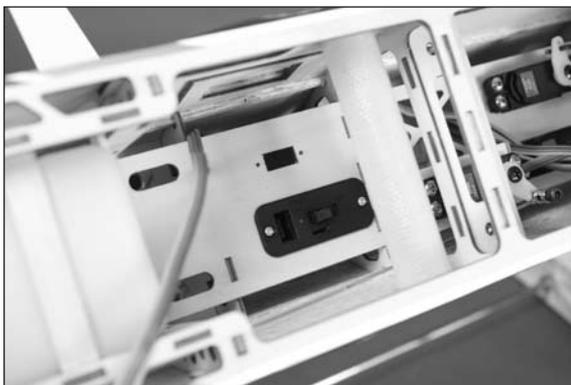
Fuselage assembly	Receiver battery
Receiver	Switch harness with hardware
Hook and loop tape (not included)	
Hook and loop strap (not included)	
Foam rubber (not included)	
Y-harness (1-channel ailerons)	
3-inch (76mm) servo extension (2) (2-channel ailerons)	

### Required Tools and Adhesives

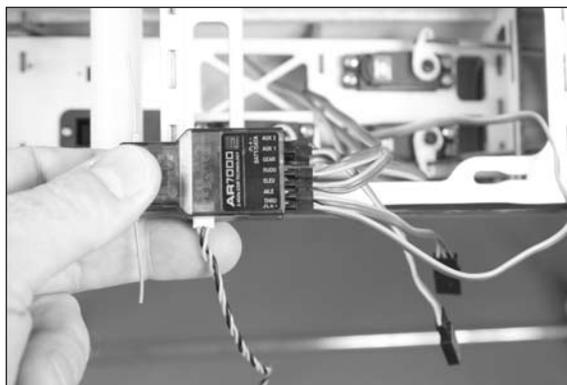
Phillips screwdriver: #1

**Note:** The ailerons can be connected to the receiver using a Y-harness, utilizing the single aileron channel. They can also be connected to the aileron and an auxiliary channel, but you will require the use of a computer radio to mix the auxiliary channel to the aileron channel.

□ 1. Mount the switch in the fuselage using the hardware provided with the switch and a #1 Phillips screwdriver. Note there are multiple locations available, depending on your switch selection. Make sure to route the leads from the switch where they can be accessed for the connections to the receiver and receiver battery.



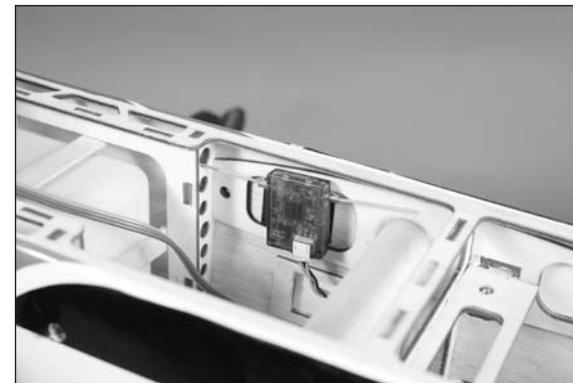
□ 2. Connect the leads from the rudder, elevator and throttle servos to the receiver. Also connect the switch harness and extensions for the ailerons at this time.



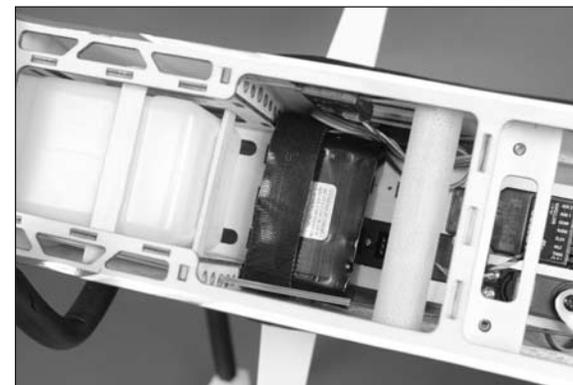
□ 3. Use hook and loop tape to secure the receiver in the fuselage. Make sure to route the leads so they don't interfere with the operation of the servos.



□ 4. Mount the remote receiver in the fuselage away from the main receiver using hook and loop tape. Make sure to orient the antenna on the remote receiver in a different direction than those on the main receiver for the best reception from your radio system.



□ 5. Use a hook and loop strap to secure the receiver battery in the fuselage. Make sure to place a piece of foam rubber between the receiver battery and radio tray to isolate the battery from vibrations. Secure the receiver battery lead to the switch harness lead so it does not disconnect accidentally.



## Motor Installation

### Required Parts

Fuselage assembly  
3mm lock nut (4)      3mm washer (8)  
Electronic speed control  
Motor with hardware and X-mount  
Aluminum stand-off, 3/4-inch (22mm) (4) (Power 25)  
Aluminum stand-off, 1<sup>1</sup>/<sub>16</sub>-inch (27mm) (4) (Power 32)  
Plywood engine mount template  
3mm x 30mm socket head screw (4) (Power 25)  
3mm x 35mm socket head screw (4) (Power 32)  
Hook and loop tape (not included)

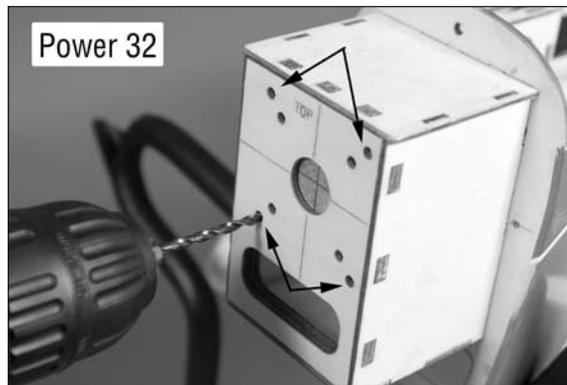
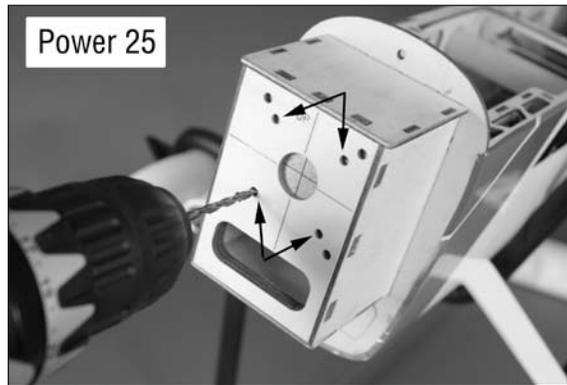
### Required Tools and Adhesives

Drill      Needle nose pliers  
Hemostats      Threadlock  
Ball driver: 2.5mm      Nut driver: 5.5mm  
Hobby knife with #11 blade  
Drill bit: 1/8-inch (3mm)  
Phillips screwdriver: #2

□ 1. Locate the plywood engine mount template. The template will fit into the recess of the firewall. If not, lightly sand the edges of the template so it fits into position.



□ 2. Use a drill and 1/8-inch (3mm) drill bit to drill the four holes for mounting the engine. Use the inner set of holes for the Power 25, the outer set of holes for the Power 32.



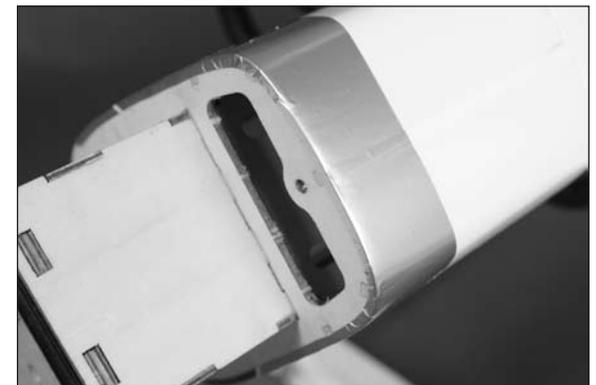
**Note:** The following steps will show the recommended Power 32 motor installation. The Power 25 follows the same procedure, but will mount in the holes drilled in step 2 for the Power 25.

**Note:** Always use threadlock on metal-to-metal fasteners to prevent them from vibrating loose.

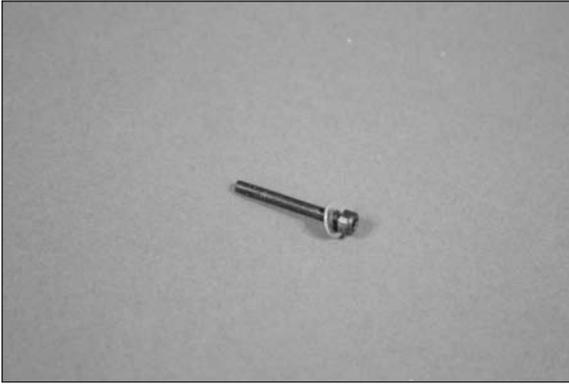
□ 3. Use the hardware provided with the motor to attach the X-mount. Use a #2 Phillips screwdriver to tighten the screws.



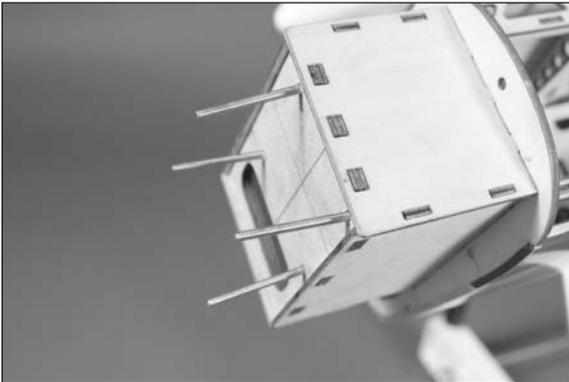
□ 4. Use a hobby knife and a #11 blade to remove the plywood to access the fuselage for the speed control installation.



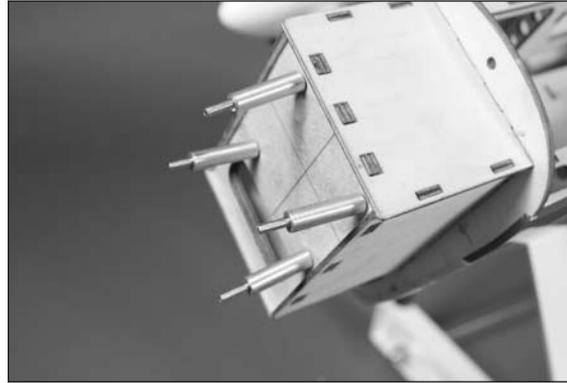
- 5. Prepare four 3mm x 35mm socket head screws by sliding a 3mm washer on each screw.



- 6. Slide the screws through the firewall from inside the fuselage. You may need to use needle nose pliers or hemostats to hold the screws while inserting them in the fuselage.



- 7. Slide an aluminum stand-off on each of the screws.

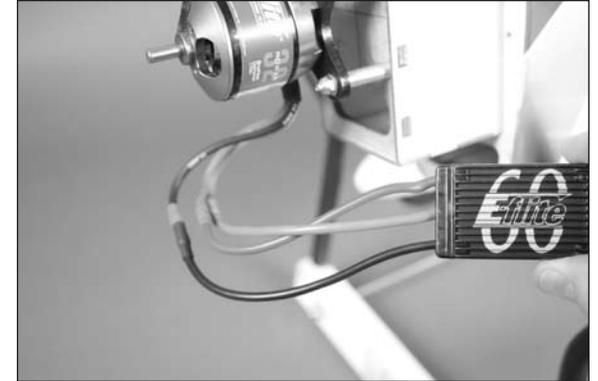


**Note:** The Power 32 will require four 1<sup>1</sup>/<sub>16</sub>-inch (27mm) aluminum standoffs. Use four 3/4-inch (22mm) aluminum standoffs for the Power 25 installation.

- 8. Attach the motor to the firewall using four 3mm washers and four 3mm lock nuts. Use a 2.5mm ball driver to hold the screws from the inside of the fuselage while tightening the nuts with a 5.5mm nut driver.



- 9. Connect the leads from the motor to the speed control. If you are using the recommended equipment, matching the colored wires between the speed control and motor will result in the motor rotating in the correct direction.

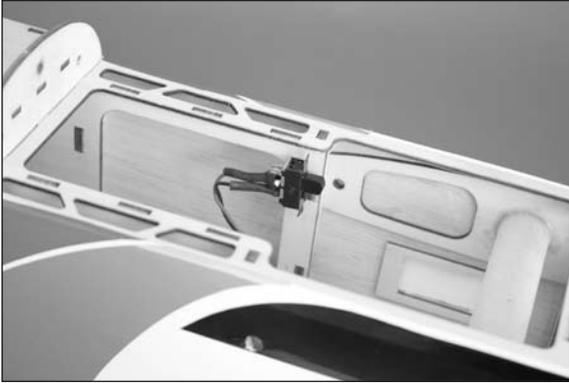


- 10. Use hook and loop tape (not included) to secure the speed control inside the fuselage. Make sure to guide the leads for the battery, switch and connection to the receiver into the fuselage where they can be accessed later. The speed control will attach to the inside of the fuselage, not to the underside of the battery tray.



**Note:** Drill a 1/8-inch (3mm) hole in the bottom of the motor box and use a tie wrap (not included) to secure the wires so they don't interfere with the operation of the motor.

□ 11. Secure the switch in the fuselage using a small amount of silicone adhesive or two-sided tape. Position the switch so it does not interfere with the installation of the motor battery.



## **Cowling, Propeller and Spinner Installation - EP Option**

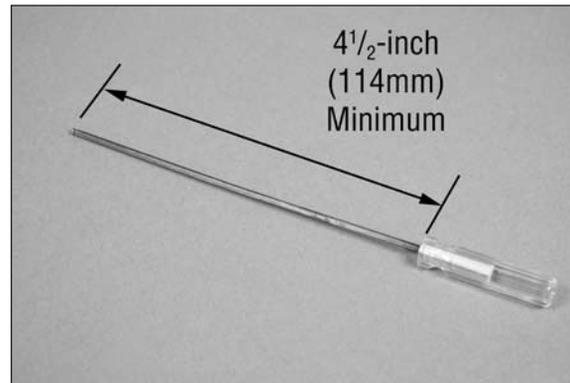
### **Required Parts**

Fuselage assembly	Cowling
3mm washer	Fuel tubing (not included)
Propeller (not included)	
Spinner assembly (not included)	
3mm x 10mm socket head screw (2)	

### **Required Tools and Adhesives**

Ruler	Ball driver: 2.5mm
Ball driver: 2.5mm	Hobby scissors
Rotary tool	Sanding drum
Open end wrench: 10mm	Hobby knife with #11 blade

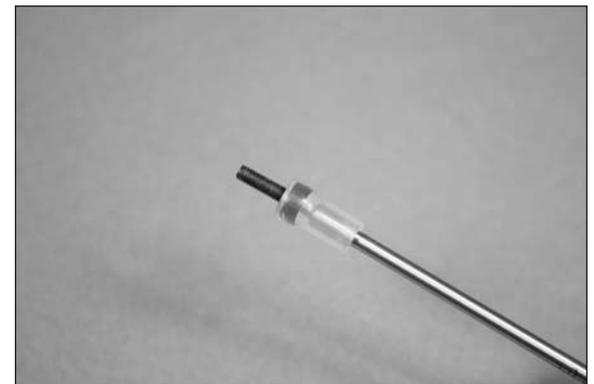
□ 1. Check the length of your 2.5mm ball driver. If it is not at least 4½ inches (114mm), you will need to make a small access opening in the cowl as shown in the next step.



□ 2. (Optional) Use hobby scissors and a rotary tool to make a 3/8-inch x 3/4-inch (9mm x 19mm) slot in the bottom of the cowl to access the lower mounting screw if your ball driver is less than 4½ inches (114mm) in length.



□ 3. To make the installation of the lower cowl mounting screw easier, use a 1/2-inch (13mm) piece of fuel tubing to keep the screw attached to the ball driver as shown.



4. Slide the fuselage into position on the front of the fuselage. Use two 3mm x 10mm socket head screws and two 3mm washers to secure the cowl to the fuselage.

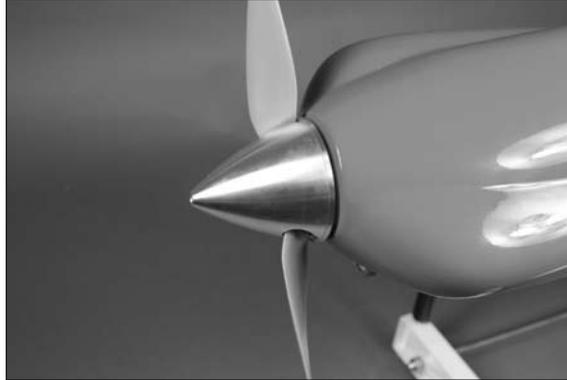


5. Fit the propeller and spinner backplate together. Slide the assembly on the motor shaft so there is a slight gap between the backplate and cowling. Use a 10mm open-end wrench to tighten the nut that secures the propeller to the spinner.



**Important:** Always balance the propeller before securing it to the motor. An unbalanced propeller can transmit vibrations into the motor or airframe, causing damage or even failure of these components.

6. Use a 3/32-inch hex wrench to tighten the screw securing the spinner cone to the backplate assembly.



## Receiver and Motor Battery Installation - EP Option

### Required Parts

Fuselage assembly	Receiver battery
Receiver	Switch harness with hardware
Hook and loop tape (not included)	
Hook and loop strap (not included)	
Foam rubber (not included)	
Y-harness (1-channel ailerons)	
3-inch (76mm) servo extension (2) (2-channel ailerons)	

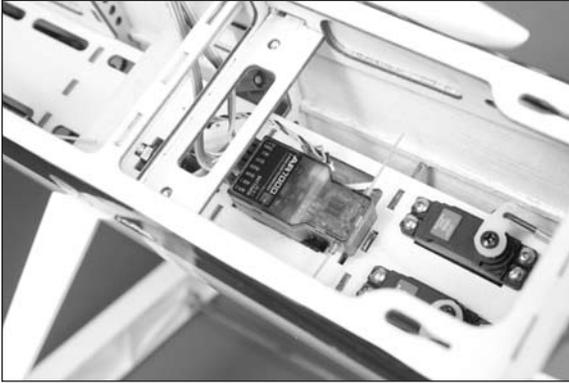
### Required Tools and Adhesives

Hobby scissors

1. Connect the leads from the rudder and elevator servos to the receiver. Also connect the speed controller lead and extensions for the ailerons at this time.



2. Use hook and loop tape to secure the receiver in the fuselage. Make sure to route the leads so they don't interfere with the operation of the servos.



3. Mount the remote receiver in the fuselage away from the main receiver using hook and loop tape. Make sure to orient the antenna on the remote receiver in a different direction than those on the main receiver for the best reception from your radio system.



4. Secure the battery in the fuselage using hook and loop straps. Use a piece of hook and loop tape along the bottom of the battery to keep it from sliding on the battery tray.



## Final Assembly

### Required Parts

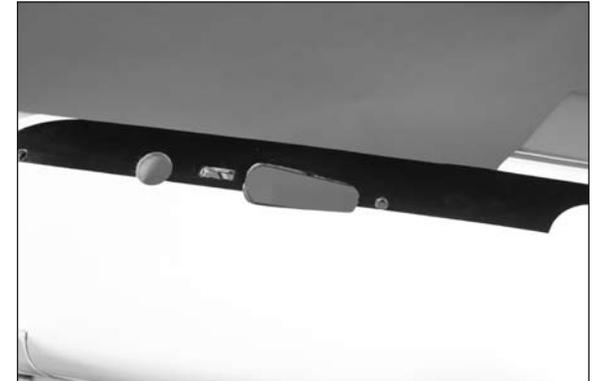
Fuselage assembly	Wing panels (right and left)
Canopy	3mm washer (2)
Carbon wing tube	
3mm x 10mm socket head screw (2)	

### Required Tools and Adhesives

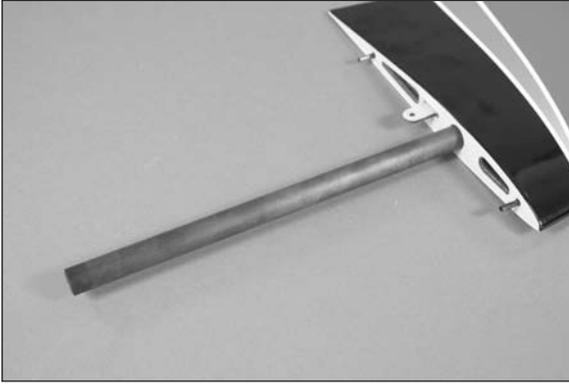
Ball driver: 2.5mm	Hobby knife with #11 blade
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**Note:** The ailerons can be connected to the receiver using a Y-harness, utilizing the single aileron channel. They can also be connected to the aileron and an auxiliary channel, but you will require the use of a computer radio to mix the auxiliary channel to the aileron channel.

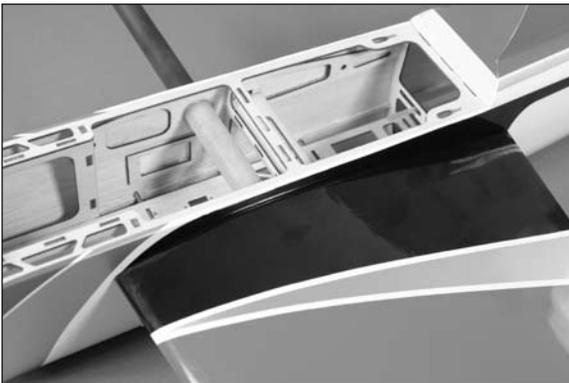
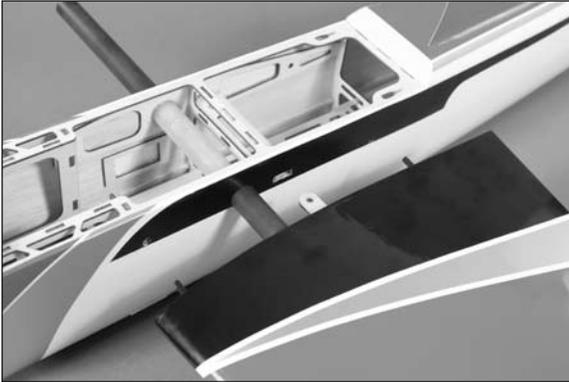
1. Use a hobby knife with a #11 blade to remove the covering from the right and left side of the fuselage so the aileron servo leads can pass into the fuselage.



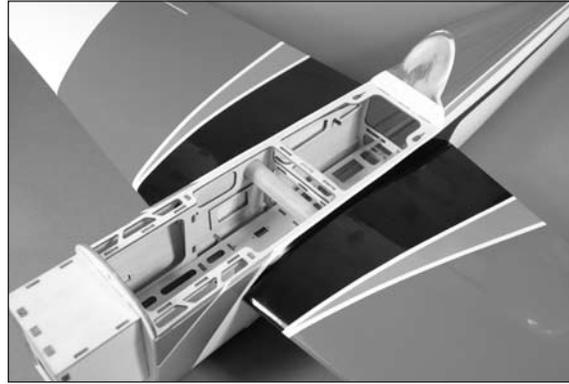
□ 2. Locate the carbon wing tube. Slide the tube into one of the wing panels. It will slide in easily, so do not force it further than it will easily slide.



□ 3. Slide the tube and wing panel into position on the fuselage. The wing will fit tight against the fuselage when installed.



□ 4. Slide the remaining wing panel into position against the fuselage.



□ 5. Connect the leads from the aileron servos to the lead (or Y-harness) from the aileron ports of the receiver.



□ 6. Use two 3mm x 10mm socket head screws and two 3mm washers to secure the wings to the fuselage. Use a 2.5mm hex wrench to tighten the bolts securing the wing.



□ 7. Complete the airframe by placing the canopy back on the fuselage.



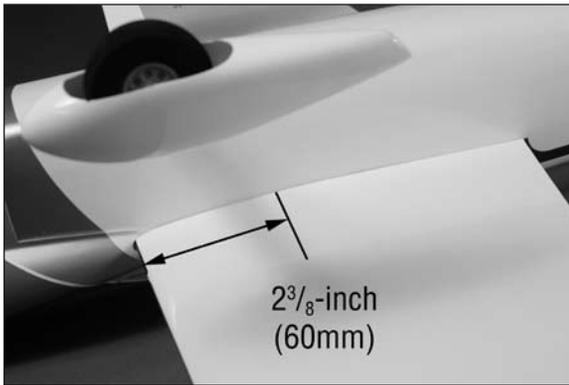
## Center of Gravity

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

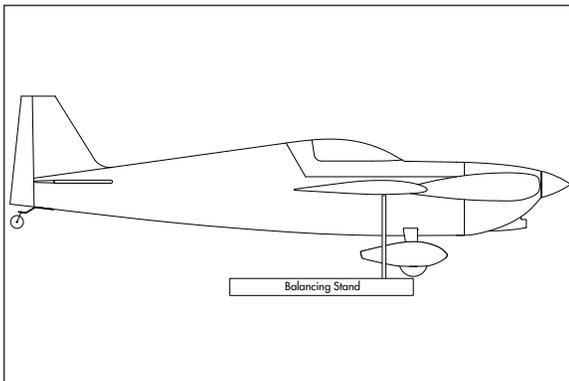


**CAUTION: Do not inadvertently skip this step!**

1. The recommended Center of Gravity (CG) location for your model is  $2\frac{3}{8}$ -inch to  $2\frac{3}{4}$ -inch (60mm–70mm) back from the leading edge of the wing as shown. We recommend starting at the forward CG and making changes to suit your preferred flying style. Mark the location of the CG on the bottom of the wing with a felt-tipped pen.



2. When balancing your model, make sure it is assembled and ready for flight. Support the plane upright at the marks made on the wing with your fingers or a commercially available balancing stand. This is the correct balance point for your model.



3. You should find the CG to be very close with the components installed as shown in this manual. If the nose of your aircraft hangs low, add weight to the rear of the aircraft. If the tail hangs low, add weight to the nose of the aircraft. Stick-on weights are available at your local hobby store and work well for this purpose.

**Note:** When using an EP power system, you can move the motor battery to correct the Center of Gravity if it is off. Mark the location of the battery on the battery tray using a felt-tipped pen so it can be returned to this position if it is removed from your model.

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

## Control Throws

1. Turn on the transmitter and receiver of your model. 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 toward the bottom of the transmitter will make the airplane elevator move up.

3. Check the movement of the ailerons with the radio system. Moving the aileron stick right will make the right aileron move up and the left aileron move down.

4. Use a ruler to adjust the throw of the elevator, ailerons and rudder.

### Aileron:

#### High Rate:

Up:	7/16-inches	11mm	30% Expo
Down:	11/32-inches	9mm	30% Expo

#### Low Rate:

Up:	9/32-inches	7mm	15% Expo
Down:	5/32-inches	4mm	15% Expo

**Note:** Measure the aileron throw from the inboard edge of the aileron.

### Elevator:

#### High Rate:

Up:	11/32-inches	9mm	25% Expo
Down:	11/32-inches	9mm	25% Expo

#### Low Rate:

Up:	3/16-inches	5mm	20% Expo
Down:	3/16-inches	5mm	20% Expo

**Note:** Measure the elevator throw from the inboard edge of the elevator.

## Rudder:

### High/Low Rate:

Right:	5/8-inches	16mm	15% Expo
Left:	5/8-inches	16mm	15% Expo

**Note:** Measure the rudder throw from the bottom edge of the rudder at its widest point.

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

**Note:** Travel Adjust, Sub-Trim and Dual Rates are not listed and should be adjusted according to each individual model and preference.

**Note:** We highly recommend re-binding the radio system once all the control throws are set. This will keep the servos from moving to their endpoints until the transmitter and receiver connect.

## Preflight

### Check Your Radio

Before going to the field, be sure your batteries are fully charged per your radio's instructions. Charge the transmitter and motor battery 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, run 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.

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).

Check all the control horns, servo horns, and clevises to make sure they are secure and in good condition.

### Range Test Your Radio

Before each flying session, and especially with a new model, it is important to perform a range check. It is helpful to have another person available to assist during the range check. If you are using a Spektrum transmitter, please refer to your transmitter's manual for detailed instructions on the range check process.

## Flight Hints and Tips

The takeoff and landing characteristics of this airplane are actually very benign and any intermediate to advanced pilot will be successful with the Sundowner 36. You can slow the airplane nicely for landing (on your test flight take some time before you have to land to slow the airplane at 2-3 mistakes high to get the feel of the airplane as it approaches the stall).

The Sundowner 36 is designed to provide you with an exhilarating flight envelope; from slow to high speed. This airplane is designed to be an all-around aerobatic (but not 3D) airplane as well as allowing you to explore flight at upwards of 110 mph. We have included a carbon fiber wing tube for extra strength and fully sheeted the wing panels to allow the higher G-loadings that normally occur in the racing environment. On the Sundowner 36 we changed the airfoil section to a SD6061. This differs from the airfoil on our previous Sundowners and allows a broader flight envelope and speed range.

The CG shown in the manual works very well and we suggest you start at the forward (60mm) CG for your first flights. After this you can experiment with moving the CG to rear, which does tend to make the airplane a little faster but you will need to reduce the elevator throws (the further back you move the CG, the further the elevator throws should be reduced).

For knife-edge pylon racing turns you should set your airplane up so you just have enough elevator throw to complete the desired turn radius when you move the transmitter stick to its full extreme. Anything more than this and you will tend to have an airplane that hunts in the straight-aways, making smooth corrections almost impossible. Remember, the key to high-speed flight and being faster than your competition is to fly smooth and very small control deflections (each control deflection causes drag). During the knife edge turns you should not need to use any rudder to maintain your altitude. Experiment by moving the CG slightly rearward until you can go through the entire turn with any loss of altitude and without the use of rudder.

You may need to experiment with small amounts (a penny, dime or nickel) of tip weight on one or the other wingtip in order to laterally balance the airplane in a high G-turn. Example, if your airplane tends to roll left with application of elevator in a high G-turn place a small amount of tip weight on the right panel until you can pull through the entire turn radius without your wing rolling to one side or the other.

For further information about Electric Formula One Racing (EF1) and all other Pylon racing events visit the NMPRA (National Miniature Pylon Racing Association) website at: [www.NMPRA.org](http://www.NMPRA.org).

## ***Safety Do's and Don'ts for Pilots***

- Consult local laws and ordinances before choosing a location to fly your aircraft.
- Check all control surfaces prior to each takeoff.
- Do not fly your model near spectators, parking areas or any other area that could result in injury to people or damage of property.
- Do not fly during adverse weather conditions. Poor visibility can cause disorientation and loss of control of your aircraft. Strong winds can cause similar problems.
- Do not take chances. If at any time during flight you observe any erratic or abnormal operation, land immediately and do not resume flight until the cause of the problem has been ascertained and corrected. Safety can never be taken lightly.
- Do not fly near power lines.

## ***Daily Flight Checks***

- 1. Check the battery voltage of the transmitter battery. Do not fly below the manufacturer's recommended voltage. To do so can crash your aircraft.

**When you check these batteries, ensure you have the polarities correct on your expanded scale voltmeter.**

- 2. Check all hardware (linkages, screws, nuts, and bolts) prior to each day's flight. Be sure that binding does not occur and that all parts are properly secured.
- 3. Ensure all surfaces are moving in the proper manner.
- 4. Perform a ground range check before each day's flying session.
- 5. Prior to starting your aircraft, turn off your transmitter, then turn it back on. Do this each time you start your aircraft. If any critical switches are on without your knowledge, the transmitter alarm will sound a warning at this time.
- 6. Check that all trim levers are in the proper location.
- 7. All servo pigtails and switch harness plugs should be secured in the receiver. Make sure the switch harness moves freely in both directions.

## ***Warranty and Repair Policy***

### ***WARRANTY PERIOD***

Exclusive Warranty- Horizon Hobby, Inc., (Horizon) warranties 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***

***Horizon reserves the right to change or modify this warranty without notice and disclaims all other warranties, express or implied.***

(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 all warranty claims.

(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 Product by Purchaser must be approved in writing by Horizon before shipment.

## ***DAMAGE LIMITS***

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).

## Warranty Services

### QUESTIONS, ASSISTANCE, AND REPAIRS

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 Product Support representative. You may also find information on our website at [www.horizonhobby.com](http://www.horizonhobby.com).

### INSPECTION OR REPAIRS

If this Product needs to be inspected or repaired, please use the Horizon Online Repair Request submission process found on our website or call Horizon to obtain a Return Merchandise Authorization (RMA) number. 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. An Online Repair Request is available at [www.horizonhobby.com](http://www.horizonhobby.com) or <http://www.horizonhobby.com> under the Repairs tab. If you do not have internet access, please contact Horizon Product Support to obtain a RMA number along with instructions for submitting your product for repair. When calling Horizon, you will be asked to provide your complete name, street address, email address and phone number where you can be reached during business hours. When sending product into Horizon, please include your RMA number, a list of the included items, and a brief summary of the problem. A copy of your original sales receipt must be included for warranty consideration. Be sure your name, address, and RMA number are clearly written on the outside of the shipping carton.

**Notice: Do not ship batteries to Horizon. If you have any issue with a battery, please contact the appropriate Horizon Product Support office.**

### WARRANTY INSPECTION AND REPAIRS

**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.

### 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. Horizon accepts money orders and cashiers checks, as well as Visa, MasterCard, American Express, and Discover cards. By submitting any item to Horizon for inspection or repair, you are agreeing to Horizon's Terms and Conditions found on our website under the Repairs tab.

### UNITED STATES

*(Electronics and engines)*  
Horizon Service Center  
4105 Fieldstone Rd  
Champaign, Illinois  
61822 USA  
[productsupport@horizonhobby.com](mailto:productsupport@horizonhobby.com)  
877-504-0233  
Online Repair Request visit:  
[www.horizonhobby.com/repairs](http://www.horizonhobby.com/repairs)

*(All other products)*  
Horizon Product Support  
4105 Fieldstone Rd  
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[productsupport@horizonhobby.com](mailto:productsupport@horizonhobby.com)  
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### Compliance Information for the European Union



### INSTRUCTIONS FOR DISPOSAL OF WEEE BY USERS IN THE EUROPEAN UNION

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.

# Academy of Model Aeronautics National Model Aircraft Safety Code

Effective January 1, 2011

## A. GENERAL

A model aircraft is a non-human-carrying aircraft capable of sustained flight in the atmosphere. It may not exceed limitations of this code and is intended exclusively for sport, recreation and/or competition. All model flights must be conducted in accordance with this safety code and any additional rules specific to the flying site.

### 1. Model aircraft will not be flown:

- (a) In a careless or reckless manner.
- (b) At a location where model aircraft activities are prohibited.

### 2. Model aircraft pilots will:

- (a) Yield the right of way to all man carrying aircraft.
- b) See and avoid all aircraft and a spotter must be used when appropriate. (AMA Document #540-D-See and Avoid Guidance.)
- (c) Not fly higher than approximately 400 feet above ground level within three (3) miles of an airport, without notifying the airport operator.
- (d) Not interfere with operations and traffic patterns at any airport, heliport or seaplane base except where there is a mixed use agreement.
- (e) Not exceed a takeoff weight, including fuel, of 55 pounds unless in compliance with the AMA Large Model Aircraft program. (AMA Document 520-A)
- (f) Ensure the aircraft is identified with the name and address or AMA number of the owner on the inside or affixed to the outside of the model aircraft. (This does not apply to model aircraft flown indoors).
- (g) Not operate aircraft with metal-blade propellers or with gaseous boosts except for helicopters operated under the provisions of AMA Document #555.
- (h) Not operate model aircraft while under the influence of alcohol or while using any drug which could adversely affect the pilot's ability to safely control the model.
- (i) Not operate model aircraft carrying pyrotechnic devices which explode or burn, or any device which propels a projectile or drops any object that creates a hazard to persons or property.

Exceptions:

- Free Flight fuses or devices that burn producing smoke and are securely attached to the model aircraft during flight.

- Rocket motors (using solid propellant) up to a G-series size may be used provided they remain attached to the model during flight. Model rockets may be flown in accordance with the National Model Rocketry Safety Code but may not be launched from model aircraft.
- Officially designated AMA Air Show Teams (AST) are authorized to use devices and practices as defined within the Team AMA Program Document (AMA Document #718).
  - (j) Not operate a turbine-powered aircraft, unless in compliance with the AMA turbine regulations. (AMA Document #510-A).
- 3. Model aircraft will not be flown in AMA sanctioned events, air shows or model demonstrations unless:
  - (a) The aircraft, control system and pilot skills have successfully demonstrated all maneuvers intended or anticipated prior to the specific event.
  - (b) An inexperienced pilot is assisted by an experienced pilot.
- 4. When and where required by rule, helmets must be properly worn and fastened. They must be OSHA, DOT, ANSI, SNELL or NOCSAE approved or comply with comparable standards.

## B. RADIO CONTROL (RC)

1. All pilots shall avoid flying directly over unprotected people, vessels, vehicles or structures and shall avoid endangerment of life and property of others.
2. A successful radio equipment ground-range check in accordance with manufacturer's recommendations will be completed before the first flight of a new or repaired model aircraft.
3. At all flying sites a safety line(s) must be established in front of which all flying takes place (AMA Document #706-Recommended Field Layout):
  - (a) Only personnel associated with flying the model aircraft are allowed at or in front of the safety line.
  - (b) At air shows or demonstrations, a straight safety line must be established.
  - (c) An area away from the safety line must be maintained for spectators.
  - (d) Intentional flying behind the safety line is prohibited.
4. RC model aircraft must use the radio-control frequencies currently allowed by the Federal Communications Commission (FCC). Only individuals properly licensed by the FCC are authorized to operate equipment on Amateur Band frequencies.
5. RC model aircraft will not operate within three (3) miles of any pre-existing flying site without a frequency-management agreement (AMA Documents #922- Testing for RF Interference; #923- Frequency Management Agreement)

6. With the exception of events flown under official AMA Competition Regulations, excluding takeoff and landing, no powered model may be flown outdoors closer than 25 feet to any individual, except for the pilot and the pilot's helper(s) located at the flight line.
7. Under no circumstances may a pilot or other person touch a model aircraft in flight while it is still under power, except to divert it from striking an individual. This does not apply to model aircraft flown indoors.
8. RC night flying requires a lighting system providing the pilot with a clear view of the model's attitude and orientation at all times.
9. The pilot of a RC model aircraft shall:
  - (a) Maintain control during the entire flight, maintaining visual contact without enhancement other than by corrective lenses prescribed for the pilot.
  - (b) Fly using the assistance of a camera or First-Person View (FPV) only in accordance with the procedures outlined in AMA Document #550.

## C. FREE FLIGHT

1. Must be at least 100 feet downwind of spectators and automobile parking when the model aircraft is launched.
2. Launch area must be clear of all individuals except mechanics, officials, and other fliers.
3. An effective device will be used to extinguish any fuse on the model aircraft after the fuse has completed its function.

## D. CONTROL LINE

1. The complete control system (including the safety thong where applicable) must have an inspection and pull test prior to flying.
2. The pull test will be in accordance with the current Competition Regulations for the applicable model aircraft category.
3. Model aircraft not fitting a specific category shall use those pull-test requirements as indicated for Control Line Precision Aerobatics.
4. The flying area must be clear of all utility wires or poles and a model aircraft will not be flown closer than 50 feet to any above-ground electric utility lines.
5. The flying area must be clear of all nonessential participants and spectators before the engine is started.



*Fly First Class™*



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