P-51 Mustang 60 ARF

Assembly Manual

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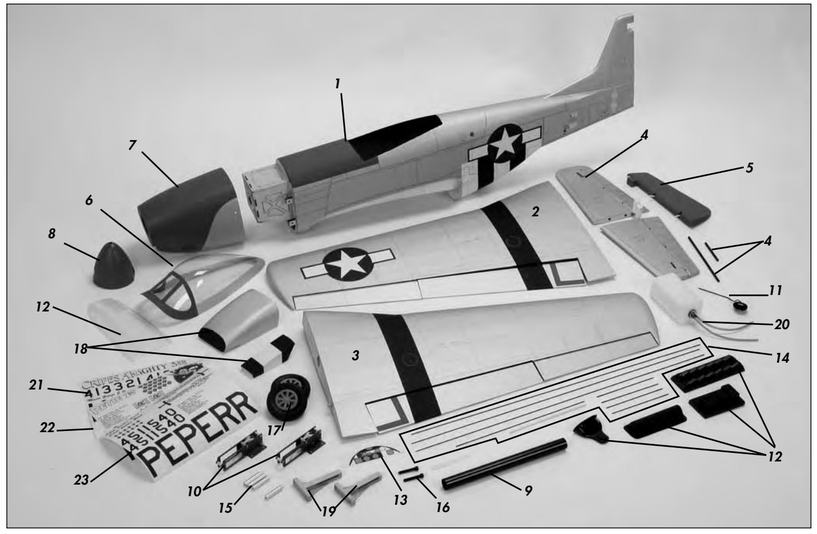
Specifications

Wingspan:	***65 in (1653mm)***
Length:	***57 in (1448mm)***
Wing Area:	***743 sq in (47.9 sq dm)***
Weight:	***9.25–10.0 lb (4.2–4.5 kg)***
Wing Loading:	***29–31 oz per sq ft***
Radio:	***6-channel w/6–7 standard servos, 2 retract servos***
Engine:	***.60–1.20 2-stroke; .91–1.25 4-stroke; E-Power 60–90***

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Contents of Kit and Parts Layout

Replacement Parts

1.	HAN24201	Fuselage with Hatch
2.	HAN24203	Left Wing Panel
3.	HAN24204	Right Wing Panel
4.	HAN24205	Stabilizer with Tubes
5.	HAN24206	Rudder
6.	HAN24207	Canopy
7.	HAN24208	Cowl
8.	HAN24209	Spinner, 4 1/4-inch (107mm)
9.	HAN242010	Wing Tube
10.	HAN242011	Retract Landing Gear with Axle (2)
11.	HAN242013	Tailwheel Assembly
12.	HAN242014	Molded Plastic Parts Bag
13.	HAN242015	Printed Instrument Panel
14.	HAN242017	Pushrods
15.	HAN242019	45mm EP Motor Mount Set
16.	HAN242020	Wing Bolt Set
17.	HAN242022	3 1/2-inch Wheel Set
18.	HAN242023	Belly Scoop and EP Air Exit
19.	HAN242024	Metal Engine Mount
20.	HAN242025	Fuel Tank, 420cc (14 oz)
21.	HAN242026	Decal Sheet, Cripes A'Mighty
22.	HAN242027	Decal Sheet, Petie 2nd (not included, available separately)
23.	HAN242028	Decal Sheet, Excalibur (not included, available separately)

Not Shown:

HAN242012	Retract Strut Assembly (2)
HAN242016	Metal Parts Bag
HAN242018	Small Plastic Parts Bag
HAN242021	Hatch and Cowl Screws
HAN242029	P-51 Mustang Covering Set
HAN242030	20mm EP spacers for Power 90

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Included Parts Listing

Item	Quantity	Use
Fuselage with hatch	1	
Right wing with flap, aileron, servo covers, and gear door	1	
Left wing with flap, aileron, servo covers, and gear door	1	
Right stabilizer with elevator	1	
Left stabilizer with elevator	1	
Rudder	1	
Belly scoop	1	
Canopy	1	
4 1/4-inch (107mm) P-51 spinner	1	
8mm ID x 9.34mm OD bushing	1	Spinner backplate spacer
Adapter nut (5/16-24 thread)	1	Propeller attachment
10-32 x 2 1/2 inch socket head cap screw	1	Spinner attachment
14 ounce (420cc) assembled fuel tank	1	
Aluminum motor mount	2	
Ultratract retracts with strut and aluminum landing gear door bracket	2	
8-32 x 3/4-inch socket head cap screw	8	Retract to wing
#8 silver flat washers	8	Retract to wing
1.5mm hex wrench	1	
3mm hex wrench	1	
Tail wheel assembly with 34mm foam wheel	1	
3 1/2-inch main wheels	2	
ABS exhaust stacks	2	
ABS headrest	1	
ABS gun ports	2	
ABS cockpit detail	1	
Rear cooling vent cut-out template	1	
Rear cooling vent	1	
Instrument panel decal	1	
Nylon control horns with backplate	3	Rudder, and ailerons
Nylon clevis	8	Rudder, elevator, aileron, flap, and throttle
2-inch (52mm) silicone safety tubing	1	
90-degree snap link	8	Rudder, elevator, aileron, flap, and throttle
Tail wheel steering tiller arm	1	
Nylon antenna	1	
Nylon antenna base	1	
19mm x 19mm x 10mm aileron/flap servo mounting blocks	8	Hard point for aileron and flap servos
1 1/4-inch (32mm) wing dowels	2	Wing anti-rotation pins
Tail wheel doors	2	
Plywood wing bolt plates	2	
Plywood throttle pushrod guide	1	
1/4-20 x 1 1/2-inch socket head cap screw	2	Wing attachment
1/4-20 silver flat washer	2	Wing attachment
1/4-20 blind nut	2	Wing attachment
8-32 x 3/4-inch socket head cap screw	8	Engine to mount or EP setup
8-32 x 1 1/4-inch socket head cap screw	4	Engine mount to firewall
8-32 lock nut	4	Engine to mount or EP setup
8-32 blind nut	4	Engine mount to firewall
#8 silver flat washer	8	Engine attachment
2mm x 12mm screw	8	retract servo mounting
Servo mounting wood blocks	8	ailerons/ flaps
2mm x 32mm machine screw	3	rudder control horn
45mm aluminum standoffs	4	Electric motor
2.5mm wheel collars	2	Tail wheel assembly
4mm wheel collars	2	Elevator and rudder connector
EZ link with E-clip	1	Throttle
3mm x 12mm button head	6	Cowl and canopy hatch
3mm x 8mm machine screw	4	Landing gear doors to struts
3mm silver flat washer	10	Cowl, canopy hatch, and landing gear doors to struts
#2 x 3/8-inch self-tapping screw	41	
1 x 11-inch anodized wing tube	1	
1/4 x 7 7/8-inch anodized stabilizer tube	1	
1/4 x 3 1/8-inch anodized stabilizer tube	1	Anti-rotation tube
6 3/8-inch pushrod	4	Ailerons and flaps
13-inch pushrod	1	Throttle
8-inch throttle pushrod guide tube	1	Throttle
30-inch pushrod	3	Elevator and rudder

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 boxes (☐☐) indicate that the step will require repeating, such as for a right or left wing panel, two servos, etc. Remember to take your time and follow the directions.

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 or covering iron to remove them. Use caution while working around areas where the colors overlap to prevent separating the colors.



HAN100 – Heat Gun

HAN150 – Covering Glove



HAN101 – Sealing Iron

HAN141 – Sealing Iron Sock

Your model is covered in a printed version of UltraCote developed specifically for your P-51 Mustang. It has all the same properties as the glossy versions of UltraCote. All the instructions provided with our original UltraCote apply to this new and exciting product.

Important Information Regarding Warranty Information

Please read our Warranty and Liability Limitations section on Page 67 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.

Transmitter Requirements

The P-51 Mustang requires a minimum of a 7-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 DX7	SPM2710
JR Systems X9303 2.4GHz	JRP2915
JR Systems 12X 2.4GHz	JRP1200

Radio Equipment Requirements - 7-Channel Receiver

The following items are recommended when installing the 7-Channel AR7000 receiver (SPM6070) in your aircraft:

DS821 Digital Sport Servo (6) (Note: Only 6 servos required for EP version)	JRPS821
DS821 Digital Sport Servo Reverse (Flap)	JRPS821R
RT88 Retract Servo (2)	JSP20080
3-inch Servo Extension (2)	JSP98100
6-inch Servo Extension (2)	JSP98110
12-inch Servo Extension (2)	JSP98030
Y-Harness (2)	JSP98020
JR Switch, Chargeswitch	JRPA004
Receiver battery, 6-volt, 2700mAh	JRPB5008

Flaps: DS821 Servo and DS821 Servo/Reverse
- Y-harness (plugged into receiver)

Retracts: RT88 Servo (2)
- 3-inch Extension (plugged into receiver) (2)
- 6-inch Extension (connected to servo) (2)

Ailerons: DS821 Servo (2)
- Y-harness (plugged into receiver)
- 12-inch Extension (connected to servo) (2)

Rudder: DS821 Servo
Elevator: DS821 Servo
Throttle: DS821 Servo

Radio Equipment Requirements - 9-Channel Receiver

The following items are recommended when installing the 9-Channel AR9000 receiver (SPM9000) in your aircraft:

DS821 Digital Sport Servo (7) (Note: Only 6 servos required for EP version)	JRPS821
RT88 Retract Servo (2)	JSP20080
3-inch Servo Extension (6)	JSP98100
6-inch Servo Extension (2)	JSP98110
12-inch Servo Extension (2)	JSP98030
JR Switch, Chargeswitch	JRPA004
Receiver battery, 6-volt, 2700mAh	JRPB5008

Flaps: DS821 Servo (2)
- 3-inch Extension (plugged into receiver) (2)

Retracts: RT88 Retract Servo (2)
- 3-inch Extension (plugged into receiver) (2)
- 6-inch Extension (connected to servo) (2)

Ailerons: DS821 Servo (2)
- 3-inch Extension (plugged into receiver) (2)
- 12-inch Extension (connected to servo) (2)

Rudder: DS821 Servo
Elevator: DS821 Servo
Throttle: DS821 Servo

Optional Accessories

- 1/6 US WWII Pilot (HAN8297)
- Decal Sheet, Petie 2nd, P-51 60 Blue Nose ARF HAN24227
- Decal Sheet, Excalibur, P-51 60 Blue Nose ARF HAN24228

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Recommended Setup–2-Stroke Glow

- Evolution® .61NX with Muffler (EVOE0611)
- Evolution Propeller 12 x 6 (EVO12060)
- Fuel Dot (HAN115)

Recommended Setup–4-Stroke Glow

- Saito™ 1.25 AAC w/Muffler (SAIE125A or SAIE125AGK)
- Evolution Propeller 15 x 6 (EVO15060) or 16 x 6 (EVO16060)
- Fuel Dot (HAN115)
- Muffler 90-Degree Adapter (SAI120S140)

Recommended Setup–4-Stroke Gas

- Saito™ FG-20 4-Stroke Gas Engine (SAIEG20)
- Evolution Propeller 15 x 6 (EVO15060) or 16 x 6 (EVO16060)
- Fuel Dot (HAN115)
- Muffler 90-Degree Adapter (SAI120S140)
- JR Switch, Chargeswitch (JRPA004)
- Ignition battery, 6-volt 2300mAh (JRPB5006)

Recommended Setup– Power 60 (EP)

- E-flite® Power 60 BL Outrunner Motor (EFLM4060A)
- 60-Amp Speed Control (EFLA1060)
- APC Propeller 15 x 8E (APC15080E)

or

- APC Propeller 15 x 10 (APC15010E)
- Li-Po Battery, 5000mAh 6-Cell/6S 22.2V (THP50006SP30)

Recommended Setup– Power 90 (EP)

- E-flite® Power 90 BL Outrunner Motor (EFLM4090A)
- 85-Amp Speed Control (CSEPHX85HV)
- 20mm Spacer for Power 90 (HAN242030)
- APC Propeller 16 x 8 (APC16080E)
- Li-Po Battery, 5000mAh 4-Cell/4S 14.8V (2) (THP50004SP30)

Field Equipment Required

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

Optional Field Equipment

- Self-stick weights, 6 oz (HAN3626)
- PowerPro 12V Starter (HAN161)
- 12V 7Ah Sealed Battery (HAN102)
- Power Panel (HAN106)
- Blue Block After Run Oil (EVOX1001)
- Cleaner and towels

Additional Required Tools

Drill	File
Pin drill	Pliers
Ruler	Hobby scissors
Side cutters	Epoxy brushes
Felt-tipped pen	Rotary tool
Cutoff wheel	Sanding drum
String/dental floss	T-pins
Mixing sticks	Mixing cups
Paper towels	Rubbing alcohol
Petroleum jelly	Covering iron
Hobby knife with #11 blade	Small clamps
Medium grit sandpaper	Z-bend Pliers (HAN119)
Phillips screwdriver: #1, #2	Hook and loop tape
Hook and loop strap	Pencil
Water pump pliers	Two-sided tape

Tie wrap, 8-inch (203mm)
Tie wrap, 12-inch (305mm)
Low-Tack Tape (MMM209034)
Box end or open end wrench: 12mm, 11/32-inch
Hex wrench or ball driver: 3/32-inch
Drill bit: 1/16-inch (1.5mm), 5/64-inch (2mm), 5/32-inch (4mm), 7/32-inch (5.5mm), 1/4-inch (6mm)

Additional Required Adhesives

Canopy Glue	(PAAPT56)
Medium CA	(PAAPT02)
Thin CA	(PAAPT08)
Threadlock	(PAAPT42)
30-Minute Epoxy, 8 oz	(PAAPT39)
Hinge Glue	(PAAPT55)

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HANS2008



HANS4010

Hinging the Control Surfaces

Required Parts

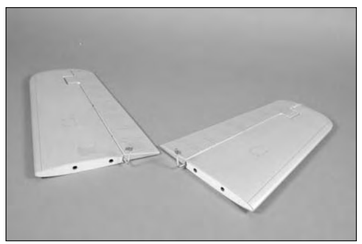
- Fuselage
- Rudder
- Hinge (3)
- Wing panel with aileron and flap (right and left)
- Stabilizer and elevator (right and left)
- Elevator torque rod (right and left)

Tools and Adhesives

- Hinge glue
- 30-minute epoxy
- Sandpaper
- Mixing stick
- Low-tack tape
- Paper towel
- Rubbing alcohol
- Petroleum jelly

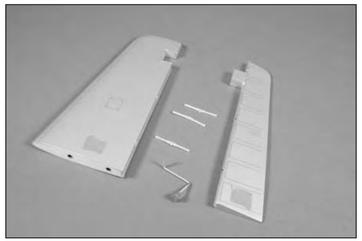
☐☐ Step 1

Locate the stabilizer and elevator assemblies. Note the direction and location of the elevator control horn in relationship to the stabilizer. It is suggested to use a small piece of low-tack tape to mark one of the assemblies so the elevator and stabilizer can be returned to their pairing.



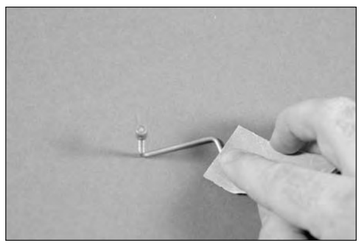
☐☐ Step 2

Separate the elevator and stabilizer. Remove the elevator control horn and three hinges. Set the stabilizer and hinges aside in a safe place.



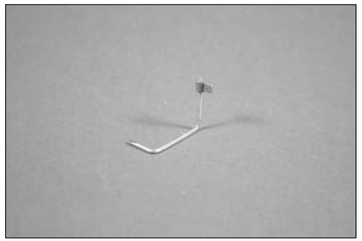
☐☐ Step 3

Use a piece of sandpaper to roughen the wire from the elevator control horn where it contacts the elevator. This provides a better surface for the epoxy to adhere to when glued in position. Use a paper towel and rubbing alcohol to remove any oils or debris from the wire after sanding.



☐☐ Step 4

Thread the nylon horn on the wire so it is flush with the end of the wire and facing the opposite direction of the portion of the wire that will go into the elevator.



Note: You can perform the following steps for both elevator halves with one batch of epoxy. Read through the steps to familiarize yourself with the procedure before mixing any epoxy.

☐☐ Step 5

Mix a small amount of 30-minute epoxy. Apply the epoxy to the notch and into the hole in the elevator, as well as to the portion of the wire that will contact the elevator.



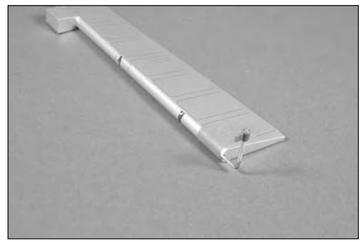
Note: Make sure to use enough epoxy to glue the torque rods. If the epoxy does not ooze out between the torque rod and elevator, you have not used enough epoxy.

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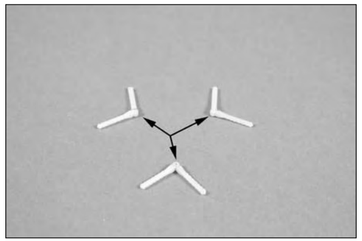
☐☐ Step 6

Insert the wire into the hole in the elevator. Wrap a piece of low-tack tape around the elevator to keep the wire secure until the epoxy fully cures. While the epoxy cures we can continue the hinging process then hinge the elevator last.



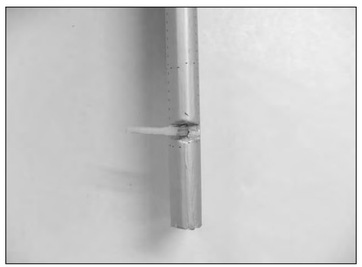
☐☐ Step 7

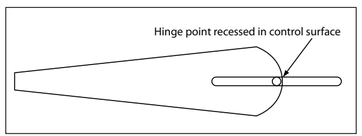
Locate three hinges. Apply a small amount of petroleum jelly to each hinge where it bends to prevent it from accidentally being glued and preventing it from operating correctly.



☐☐ Step 8

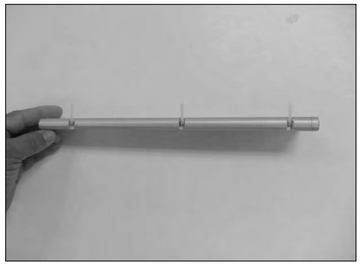
Insert the hinges into the control surface. Moving the hinge over 90 degrees and pressing the hinge into the surface will set the correct depth for the hinge, as the hinge point will be recessed slightly in the control surface so it operates properly.

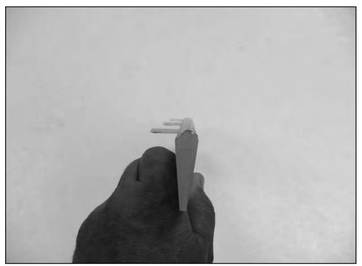




☐☐ Step 9

In addition to setting the correct depth of the hinge, this will guarantee that the hinge has been installed in the correct direction. Rotating the hinge could cause the surface to bind, increasing the load on the servo and draining the receiver battery prematurely.





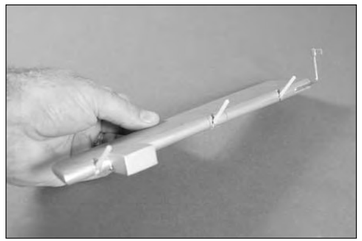
☐☐ Step 10

Apply hinge glue to the holes in the elevator as shown. Make sure to read the instructions on the glue before beginning the hinging process.



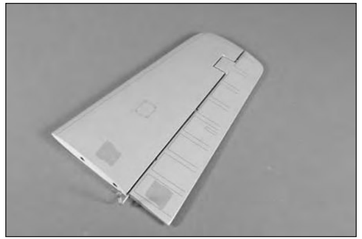
☐☐ Step 11

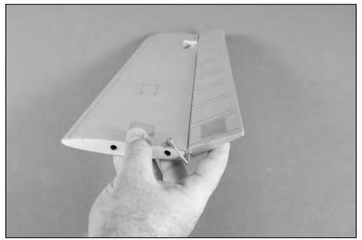
Insert the hinges into the holes in the elevator so the hinge point is set back as described in Steps 8 and 9. Make sure to install the hinges correctly. Allow the hinge glue to fully cure before proceeding to gluing the hinges in the fixed surface. This will prevent them from being moved accidentally. Remove any excess glue using a damp paper towel.

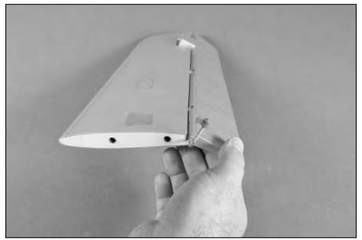


☐☐ Step 12

Apply hinge glue to the holes in the stabilizer. Slide the hinges into the holes and use a damp paper towel to remove any excess glue. Check that the elevator can move up and down freely. Set the assembly aside to allow the glue to fully cure.







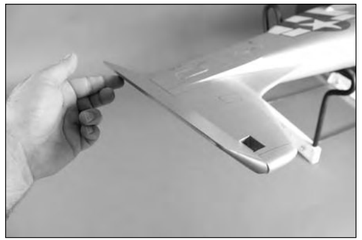
☐ Step 13

Repeat Steps 1 through 12 to prepare the remaining half of the stabilizer and elevator.

☐ Step 12

Hinging the rudder follows the same procedure as the elevators. Again, make sure to prepare the hinges and check the operation of the rudder before the hinge glue begins to cure.

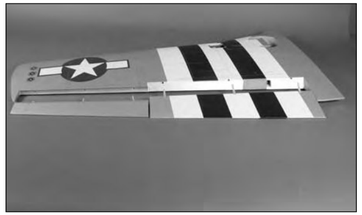




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☐☐ Step 13

Remove the flap and aileron from the wing. Make sure to keep the flap hinges with the flap and the aileron hinges with the aileron as they are different sizes.



Important: Each aileron has a hard point installed in the bottom side of the aileron for mounting the control horn. Make sure to install the aileron so this hard point is located on the bottom of the wing or the control horn could pull away from the aileron and cause the loss of aileron control of your model.

☐☐ Step 14

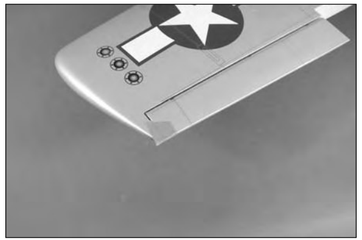
Hinging the aileron is again the same as hinging the elevators and rudder. Make sure the aileron can move freely when the hinges are installed. Remember to double-check that the hard point for mounting the control horn in the aileron is located toward the bottom of the wing.





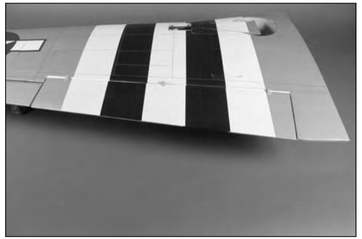
☐☐ Step 15

Apply a small piece of low-tack tape at the tip of the wing to hold the aileron in position. This will help when the flaps are being installed.



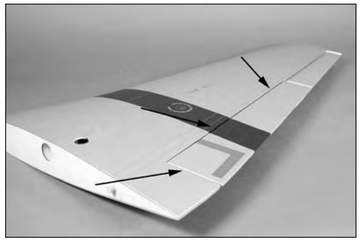
☐☐ Step 16

Hinging the flaps will take a little finesse as the hinges will be exposed and you will need to adjust the flap so it aligns in the correct position. Test fit the flap in position using the hinges. Adjust the flap so it is in alignment with the aileron on one end and the wing at the other. You will need to adjust the position of the flap and hinges to accomplish this.



☐☐ Step 17

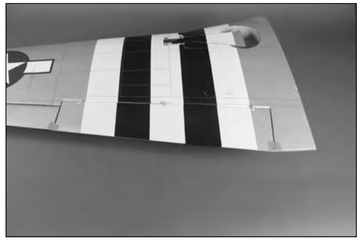
Turn the wing over and check that the flap is flush with the top of the wing as well.



Hint: Tape a piece of balsa flat to the surface to help aid in the alignment of the flap to the surface of the wing skin.

☐☐ **Step 18**

Once you have test fit the flap without glue, you can now remove the flap and use hinge glue to secure the flap to the wing panel. Use small pieces of low-tack tape to hold the flap in position until the hinge glue fully cures.



☐ **Step 19**

Repeat Steps 13 through 18 to hinge the remaining flap and aileron of the opposite wing panel.

Aileron Servo Installation

Required Parts

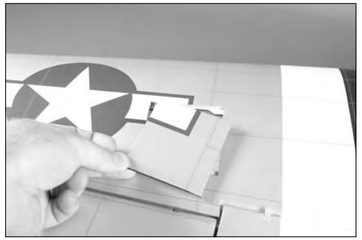
- Wing panel (right and left)
- Servo mounting block (4)
- #2 x 3/8-inch sheet metal screw (16)
- Control horn with backplate (2)
- 2-inch (52mm) safety tubing
- 6-inch (152mm) threaded pushrod (2)
- 12-inch (305mm) servo extension (2)
- Pushrod keeper (2)
- Clevis (2)
- Servo (2)
- Receiver
- Transmitter
- Receiver battery

Tools and Adhesives

- 30-minute epoxy
- Sandpaper
- Mixing stick
- Pliers
- Covering iron
- Pencil
- Clamp (2)
- Medium grit sandpaper
- Drill
- T-pin
- Ruler
- Phillips screwdriver: #1
- Side cutter
- Thin CA
- Felt-tipped pen
- Pliers
- Hobby knife with #11 blade
- Drill bit: 1/16-inch (1.5mm), 5/64-inch (2mm)
- Rotary tool and cutoff wheel

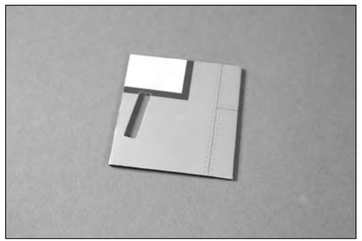
☐☐ **Step 1**

Remove the aileron servo cover from the wing. Make sure to remove all the tape that was holding the cover in position. You may need to use a covering iron to seal the covering back on the wing and cover before proceeding.



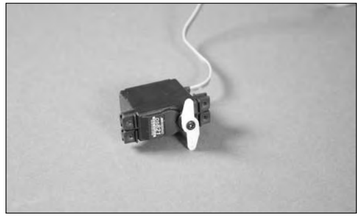
☐☐ **Step 2**

Use a hobby knife with a new #11 blade to remove the covering from the slot in the aileron servo cover.



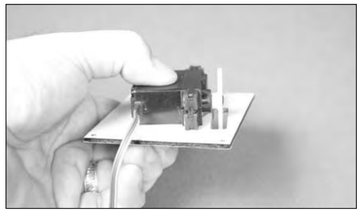
☐☐ **Step 3**

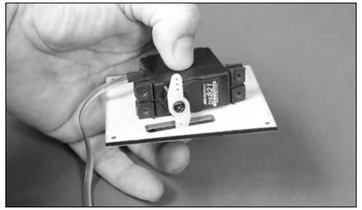
Use the radio system to center the servo for the aileron. Remove the original arm from the aileron servo and install a 180-degree arm so it is perpendicular to the center line of the servo. You will be connecting the linkage to a hole that is 9/16-inch (14mm) from the center of the servo arm, so make sure your servo arm meets these requirements.



☐☐ **Step 4**

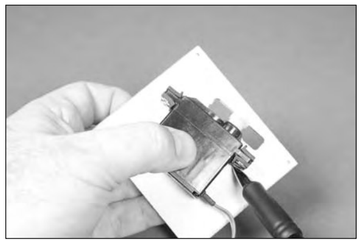
Position the servo on the bottom side of the servo cover so the servo arm is centered in the opening in the cover as shown. The servo must also be parallel to the opening so the arm can move freely through its entire range of movement.





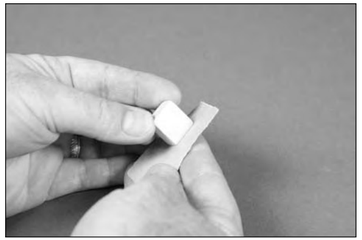
☐☐ **Step 5**

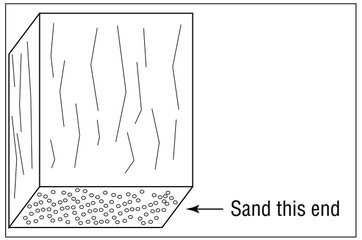
Use a pencil to mark the servo cover for the position of the servo mounting blocks on the aileron servo cover. Make the mark behind the brass eyelets and alongside the servo. Make sure to mark for both blocks without allowing the servo to move on the cover.



☐☐ **Step 6**

Use medium grit sandpaper to scuff the ends of two servo mounting blocks as shown.

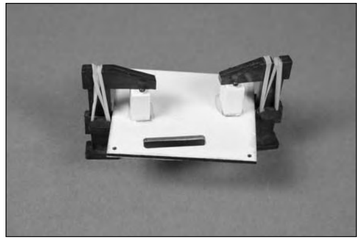




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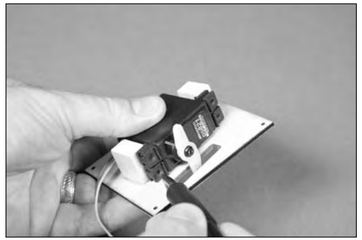
☐☐ **Step 7**

Mix a small amount of 30-minute epoxy. Apply the epoxy to the end of the blocks that were sanded in the previous step. Position the blocks on the servo cover using the marks made previously. Use small clamps to hold the blocks tightly against the servo cover until the epoxy fully cures.



☐☐ **Step 8**

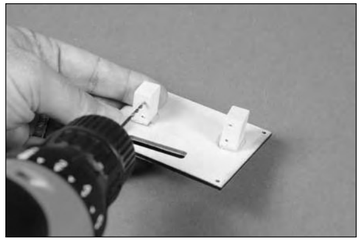
Position the servo between the blocks. Leave a small gap of 1/32-inch (1mm) between the servo cover and servo to prevent vibrations from the airframe from being transferred directly to the servo. Use a pencil to mark the blocks for the four servo mounting screws.



Hint: Place a 1/32-inch (.5mm) spacer between the servo and the servo hatch cover before marking the mounting holes.

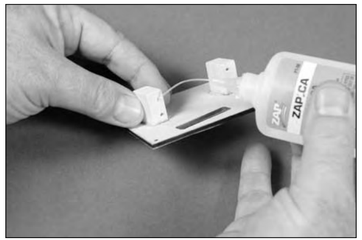
☐☐ **Step 9**

Remove the servo. Use a drill and 1/16-inch (1.5mm) drill bit to drill the four holes for the servo mounting screws.



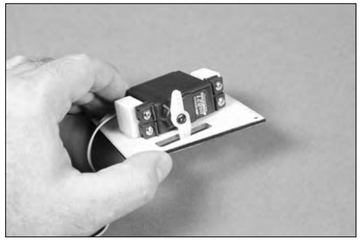
☐☐ **Step 10**

Apply 2–3 drops of thin CA into each hole to harden the surrounding wood. This provides a harder surface for the screws making them more secure when installed.



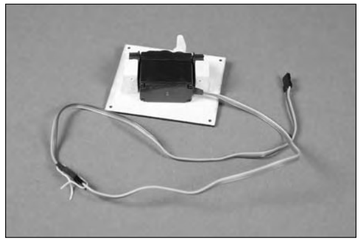
☐☐ **Step 11**

Use the screws provided with the servo to secure it to the servo mounting blocks. Use a #1 Phillips screwdriver to tighten the servo mounting screws.



☐☐ **Step 12**

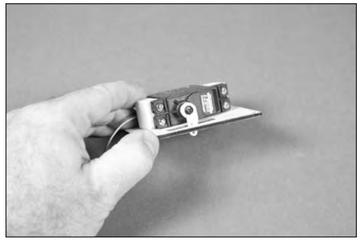
Secure a 12-inch (305mm) servo extension to the aileron servo lead. Use string, dental floss or a commercially available connector to keep the two from unplugging inside the wing.



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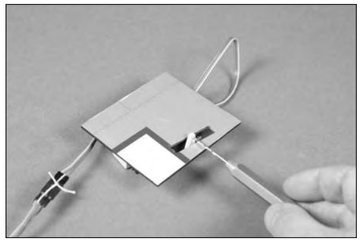
☐☐ **Step 13**

Use side cutters to remove the portion of the servo arm that does not go through the servo cover.



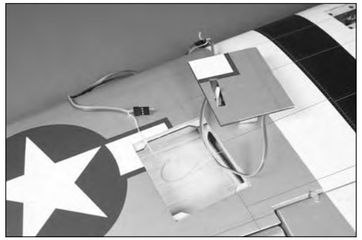
☐☐ **Step 14**

Use a pin drill and 5/64-inch (2mm) drill bit to enlarge the hole that is 9/16-inch (14mm) from the center of the servo horn.



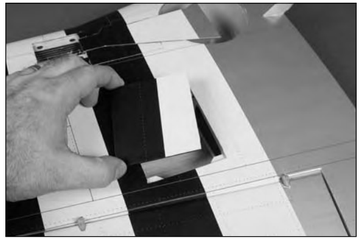
☐☐ **Step 15**

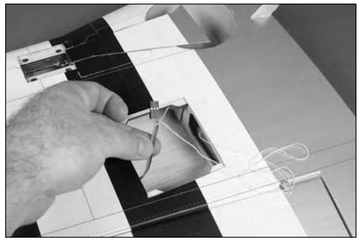
Remove the tape that holds the string in the aileron servo opening. Tie the string to the end of the aileron servo extension. Use care not to accidentally pull the string out of the wing.



☐☐ **Step 16**

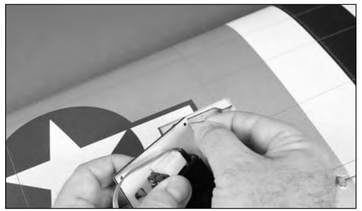
Remove the flap servo cover. Use the string to pull the aileron servo lead to the opening for the flap servo.

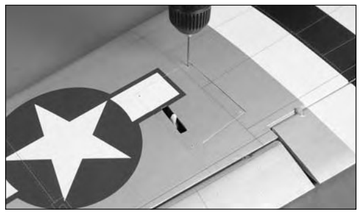




☐☐ **Step 17**

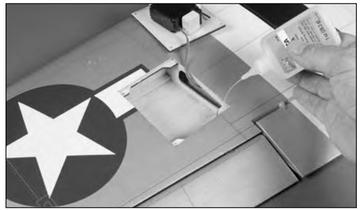
Use a T-pin to poke through the four holes in the covering in the aileron servo cover. Position the servo cover in the wing and use a 1/16-inch (1.5mm) drill bit to drill the four holes for the servo cover mounting holes. Use caution or you could accidentally drill through the top of the wing.





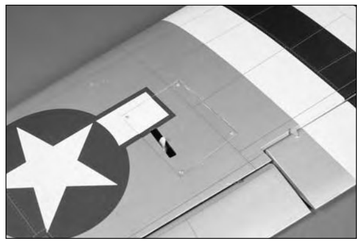
☐☐ **Step 18**

Apply 2–3 drops of thin CA into each hole to harden the surrounding wood. This provides a harder surface for the screws making them more secure when installed.



☐☐ **Step 19**

Use a #1 Phillips screwdriver and four #2 x 3/8-inch sheet metal screws to secure the servo cover to the wing.



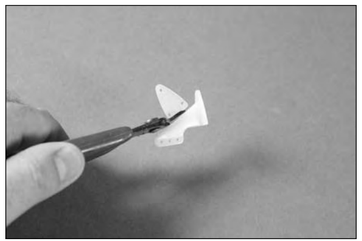
☐☐ **Step 20**

Use a ruler to measure in $2^{15}/_{16}$-inch (75mm) from the inside edge of the aileron. Use a pencil to make a small mark on the aileron.



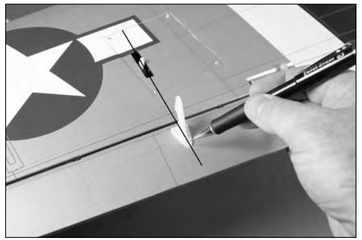
☐☐ **Step 21**

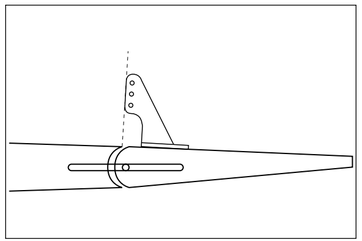
Use side cutters to remove the servo horn backplate from a control horn.



☐☐ **Step 22**

Position the control horn on the aileron so the center of the horn is aligned with the mark made in the previous step. When positioning the control horn, align the front edge of the horn with the edge of the fixed surface as shown to minimize any differential of the control surface. Use a pencil to transfer the location for the three mounting screws on the aileron.

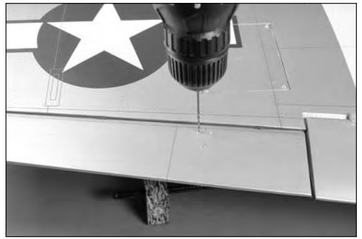




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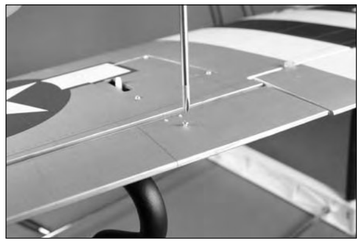
☐☐ **Step 23**

Use a drill and 1/16-inch (1.5mm) drill bit to drill start holes for the aileron control horn. Only drill about 1/4-inch (6mm) into the aileron to avoid drilling through the top of the aileron. There is a hard point in the wing so you will need to be careful when drilling.



☐☐ **Step 24**

Use a #1 Phillips screwdriver to start the three #2 x 3/8-inch sheet metal screws in each hole. Leave about 1/16-inch (1.5mm) of the screw exposed when threading them into the aileron.



☐☐ **Step 25**

After threading the screws into the holes, you will need to apply 2–3 drops of thin CA into each hole to harden the surrounding wood. This provides a harder surface for the screws making them more secure when installed. Skipping this step may not provide a secure mounting of the aileron control horn, which could cause it to fail in flight.

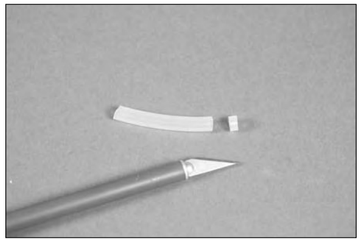


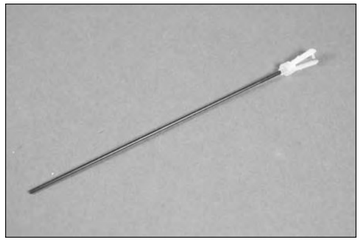
☐☐ **Step 26**

Once the CA has cured, you can attach the control horn to the aileron using three #2 x 3/8-inch sheet metal screws, tightening them with a #1 Phillips screwdriver.

☐☐ **Step 27**

Use a hobby knife with a #11 blade to cut a 1/4-inch (6mm) piece of tubing from the 2-inch (52mm) safety tubing included with the kit. Slide the tubing on a clevis, and then thread the clevis 10-turns on a 6-inch (152mm) threaded pushrod.





☐☐ **Step 28**

Connect the clevis to the center hole of the aileron control horn. Slide the safety tubing onto the clevis so it won't open accidentally in flight.



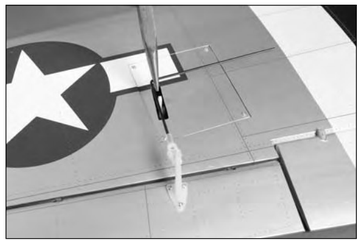
☐☐ **Step 29**

With the aileron aligned with the wing tip and aileron servo centered, use a felt-tipped pen to mark the pushrod wire where it crosses the hole in the servo arm that was enlarged back in Step 14.



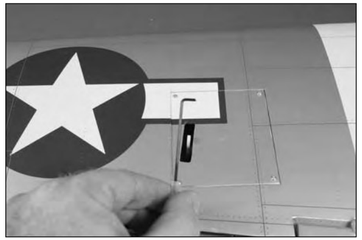
☐☐ **Step 30**

Use pliers to bend the pushrod wire 90 degrees at the mark made in the previous step.



☐☐ **Step 31**

Use side cutters or a rotary tool and cutoff wheel to trim the wire 3/8-inch (10mm) past the bend as shown. Use a flat file to remove any sharp edges after cutting the wire.

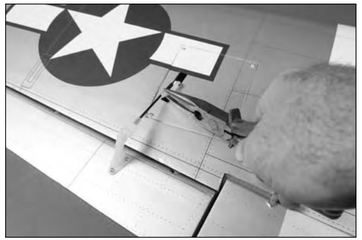


☐☐ **Step 32**

Insert the wire into the hole in the servo horn. Slide the pushrod keeper on the wire, and then use pliers to snap it on the wire to secure the pushrod wire to the servo arm.



Note: You may need to adjust the clevis slightly to align the aileron with the wing tip. Make sure the radio is on and the aileron servo centered during this process.



☐ **Step 33**

Repeat Steps 1 through 32 to install the remaining aileron servo and linkage in the opposite wing panel.

Note: The retracts are installed next and prior to installing the flap servos so that you have access through the flap servo hatch to route the retract extensions.

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Retract Installation

Required Parts

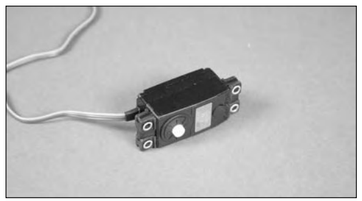
Wing panel (right and left)	Retract assembly (2)
Retract strut (right and left)	#8 washer (8)
Retract servo (2)	Receiver
Transmitter	Receiver battery
2mm x 12mm retract screw (8)	
2mm washer (8)	
6-inch servo extension (2)	
#2 x 3/8 screw (4)	3mm washer (4)
8-32 x 3/4-inch socket head screw (8)	
3 1/2-inch (90mm) wheel (2)	
3mm x 8mm machine screw (4)	

Tools and Adhesives

Side cutters	
Threadlock	String or dental floss
T-pin	Medium CA
Pencil	Ruler
Drill	Pin drill
String or dental floss	Thin CA
Phillips screwdriver: #1, #2	
Drill bit: 1/16-inch (1.5mm), 5/64-inch (2mm), 1/8-inch (3mm)	
Hex wrench or ball driver: 1.5mm, 9/64-inch, 3mm	

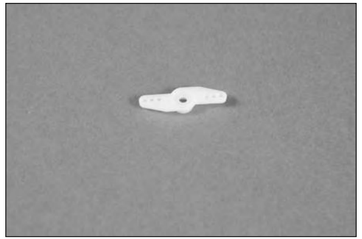
☐☐ **Step 1**

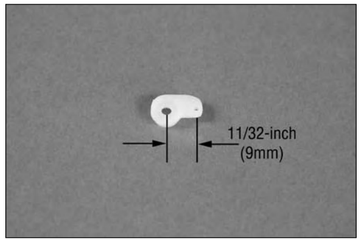
Prepare the retract servo by installing the grommets and brass eyelets. Note the eyelets are on the top-side of the servo as shown. Remove the servo horn from the servo at this time as well.



☐☐ **Step 2**

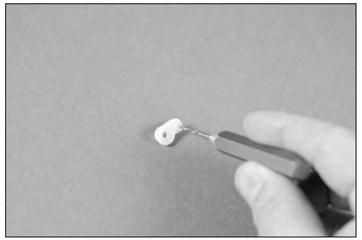
Select a servo arm that has a hole located 11/32-inch (9mm) from the center of the horn. Remove any arms that will not be used using side cutters, leaving only the arm with the hole as described. It is best to trim the arm down as small as possible to fit into the retract mechanism without binding.





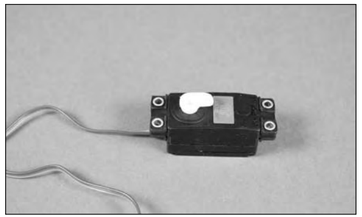
☐☐ **Step 3**

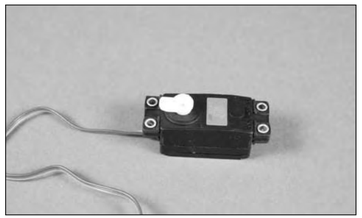
Enlarge the hole in the servo horn using a 5/64-inch (2mm) drill bit and pin drill.



☐☐ **Step 4**

Place the servo horn on the retract servo so it moves equally from the center position. You will need to use the radio system to cycle the retract servo for this procedure.





☐☐ **Step 5**

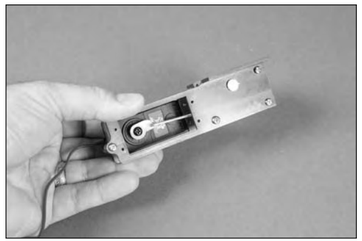
Check to make sure you are installing the servo on the correct side of the retract mechanism. The servo will face to the trailing edge when installed.

Note: The next steps will check the operation of the retract mechanism. Do not secure the servo as poor positioning of the linkage or servo could cause the servo to bind causing stress on the radio battery or even damage the servo gears.



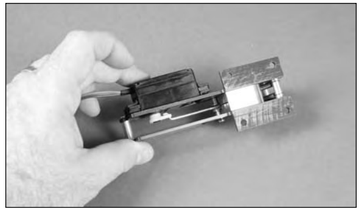
☐☐ **Step 6**

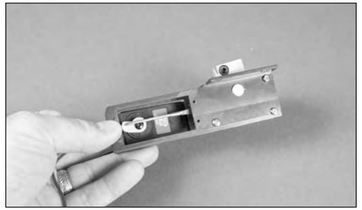
With the retract mechanism and servo in the "up" position, check the fit of the servo in the retract frame. The mounting holes of the servo must align with the holes in the frame for mounting the servo. It may be necessary to adjust the length of the linkage to get the mounting holes to align.

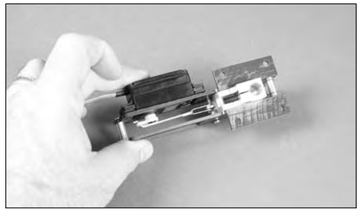


☐☐ **Step 7**

Hold the servo in position against the retract frame. Check the operation of the retract using the radio system. When the retract mechanism is in the "down" position the mounting holes should still be aligned. If not, the linkage may need some more minor adjustments in length.



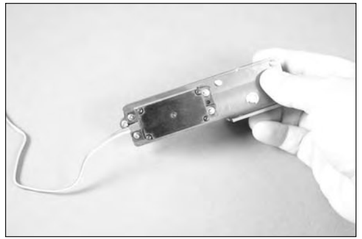




Important: Also make sure the retract mechanism is locking in both the "up" and "down" positions. If not, it may be necessary to prepare a new servo horn with the hole in a slightly different position.

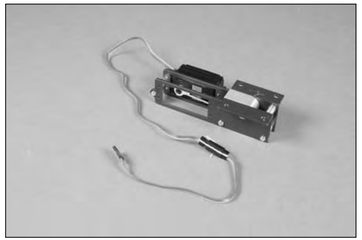
☐☐ **Step 8**

Once the retract is operating without binding and locking in both the "up" and "down" positions, use four 2mm x 12mm machine screws and four 2mm washers to secure the retract to the retract frame. Use a 1.5mm hex wrench to tighten these screws.



☐☐ **Step 9**

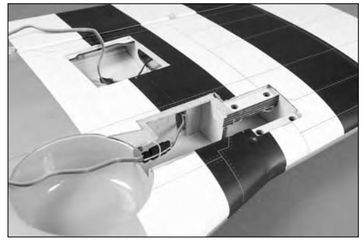
Secure a 6-inch (152mm) servo extension to the retract servo using string, dental floss or a commercially available fastener.



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☐☐ **Step 10**

Pass the extension through the hole in the wing behind the opening for the retract mechanism.



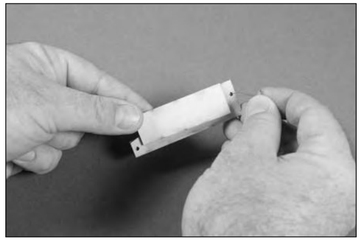
☐☐ **Step 11**

Position the retract mechanism into the wing. Use four 8-32 x 3/4-inch socket head screws and four #8 washers to secure the retract mechanism in the wing. Tighten the screws using a 9/64-inch hex wrench or ball driver. Make sure to use threadlock on all four screws so they do not vibrate loose in flight.



☐☐ **Step 12**

Use a T-pin to poke through the covering of the retract servo cover so the holes can be located from the top-side of the cover.



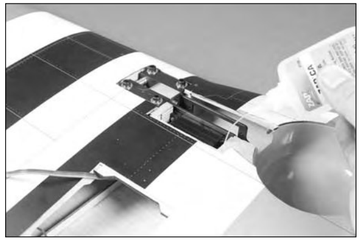
☐☐ **Step 13**

Position the retract servo cover over the retract servo. Slide the cover back snug against the wing. Use a drill and 1/16-inch (1.5mm) drill bit to drill the two holes for the cover mounting screws. Use care not to drill through the top of the wing when drilling these holes.



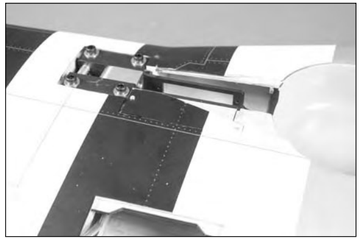
☐☐ **Step 14**

Apply 2–3 drops of thin CA into each hole to harden the surrounding wood. This provides a harder surface for the screws making them more secure when installed.



☐☐ **Step 15**

Secure the cover to the wing using two #2 x 3/8-inch sheet metal screws. Tighten the screws using a #1 Phillips screwdriver.



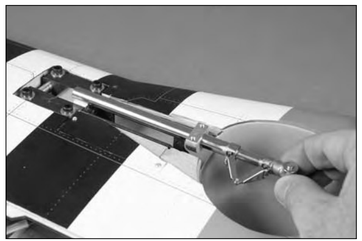
☐☐ **Step 16**

Remove the wheel cover from one of the main wheels.



☐☐ **Step 17**

Check to make sure you have selected the correct strut for your particular wing panel. The scissor mechanism will face to the rear of the aircraft and the flat area on the gear door mount faces out away from the wheel well.



☐☐ **Step 18**

Use a 1.5mm hex wrench or ball driver to loosen the setscrew that secures the axle to the retract strut. Remove the axle from the strut assembly.



☐☐ **Step 19**

Slide the wheel collar from the axle. The axle will now fit into the hole in the wheel. Make sure to install the axle into the side of the wheel with the deeper recess that does not have the screws that hold the wheel assembly together.



Hint: Apply a small drop of machine oil on the axle to allow the wheel to rotate smoothly.

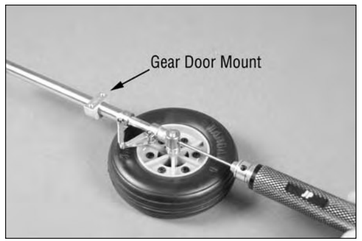
☐☐ **Step 20**

Slide the wheel collar on the axle. Secure the collar using a 2mm setscrew. Make sure to use threadlock on the setscrew to prevent it from vibrating loose.



☐☐ **Step 21**

Slide the axle back in the retract strut. Note that the wheel will face opposite the flat area on the gear door mount. Use a 1.5mm hex wrench or ball driver to secure the axle in position. Make sure to use threadlock on the setscrew to prevent it from vibrating loose in flight.



☐☐ **Step 22**

Snap the wheel cover back on the wheel at this time.

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☐☐ **Step 23**

Use the radio system to move the gear to the “down” position. Insert the strut into the retract mechanism and secure it by tightening the screw using a 3mm hex wrench or ball driver. There is a flat area the screw secures to. This will align the strut so the aircraft tracks straight on the runway without excessive wandering.



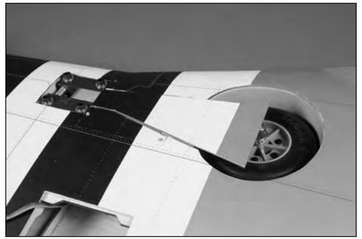
☐☐ **Step 24**

Use the radio system to move the retract mechanism to the “up” position. Check that the wheel is centered in the wheel well. It may be necessary to adjust the position of the strut in the retract mechanism slightly so the wheel is centered.



☐☐ **Step 25**

Position the gear door as shown in the photo. Use a small drop of medium CA to temporarily tack glue the gear door to the gear door mount. Make sure not to get any CA into the threads of the gear door mount. The CA only needs to hold the gear door in position so it can be marked to drill the two holes for the gear door mounting screws.



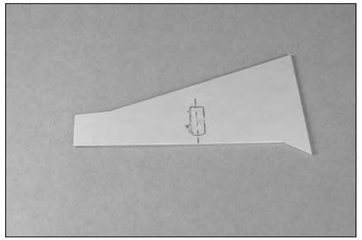
☐☐ **Step 26**

Use a pencil to trace the outline of the gear door mount on the gear door.



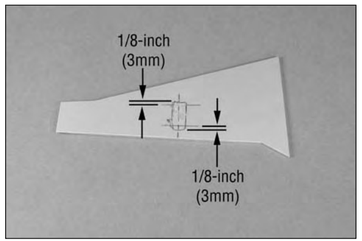
☐☐ **Step 27**

Carefully remove the gear door from the gear door mount. Use a pencil to draw a center line through the tracing of the mount as shown.



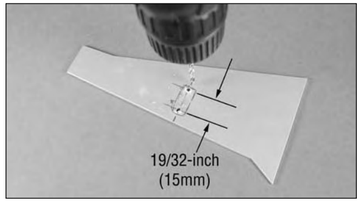
☐☐ **Step 28**

Measure in 1/8-inch (3mm) from each edge of the gear door mount outline and draw a line as shown. The distance between the two lines will be 19/32-inch (15mm) if done correctly.



☐☐ **Step 29**

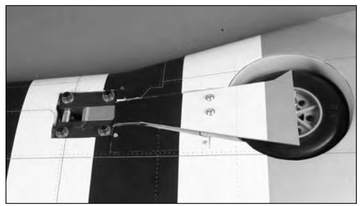
Use a drill and 1/8-inch (3mm) drill bit to drill two holes through the gear door as shown. Use care not to tear the covering when drilling through the gear door.



Hint: Placing the gear door on a piece of wood while drilling will minimize any possibility of damaging the covering.

☐☐ **Step 30**

With the gear in the "up" position, attach the gear door to the gear door mount using two 3mm x 8mm machine screws and two 3mm washers. Use a #2 Phillips screwdriver and threadlock to install the screws.



Hint: If the gear door does not align, loosen the screws to reposition the gear door or loosen the setscrew on the gear door mount to align the trim scheme. If that does not work, the holes can be enlarged slightly to make minor adjustment to the alignment.

☐ **Step 31**

Repeat Steps 1 through 30 to install the retract mechanism in the remaining wing panel.

Flap Servo Installation

Required Parts

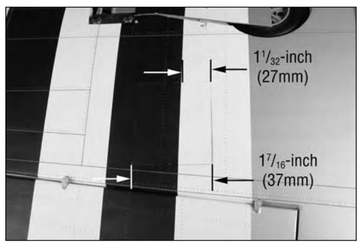
Wing panel (right and left)	Servo mounting block (4)
2-inch (52mm) safety tubing	
6-inch (152mm) threaded pushrod (2)	
#2 x 3/8-inch sheet metal screw (8)	
Servo (2)	Receiver
Transmitter	Receiver battery
Pushrod keeper (2)	Clevis (2)

Tools and Adhesives

30-minute epoxy	Sandpaper
Mixing stick	Pencil
Clamp (2)	Medium grit sandpaper
Ruler	Phillips screwdriver: #1
Side cutter	Thin CA
Hobby knife with #11 blade	Pliers
T-pin	Drill
Drill bit: 1/16-inch (1.5mm), 5/64-inch (2mm)	
Rotary tool and cutoff wheel	

☐☐ **Step 1**

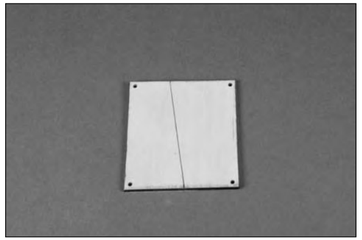
Place the flap servo cover in position on the wing. Use a ruler and pencil to make a mark that is $1^{1}/_{32}$-inch (27mm) in from the edge of the cover near the retract. Make a second mark that is $1^{7}/_{16}$-inch (37mm) in from the edge of the cover near the root of the wing.



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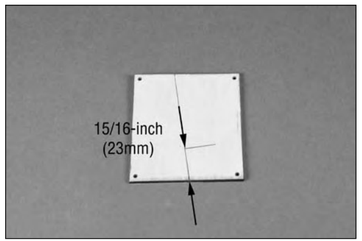
☐☐ **Step 2**

Remove the cover and transfer the marks to the bottom side of the cover. Draw a line that connects the two marks. This will be used in aligning the position of the servo.



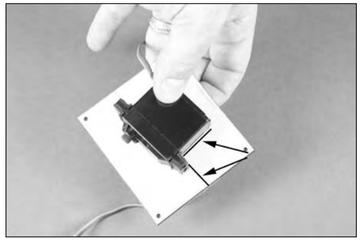
☐☐ **Step 3**

Measure 15/16-inch (23mm) from the edge that was toward the trailing edge of the cover. Draw a line that is perpendicular to the first as shown.



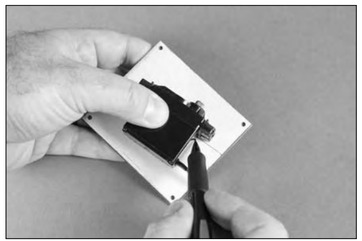
☐☐ **Step 4**

Use a #1 Phillips screwdriver to remove the servo horn from the servo. Position the servo on the cover. Use the lines for aligning the servo on the cover.



☐☐ **Step 5**

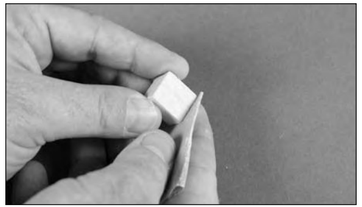
Use a pencil to mark the position for the second servo mounting block on the servo cover.

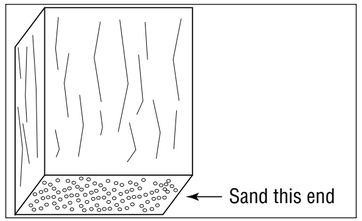


Hint: Use a 1/32-inch (.5mm) spacer between the servo and flap servo cover before marking for the servo mounting screws to set the correct spacing.

☐☐ **Step 6**

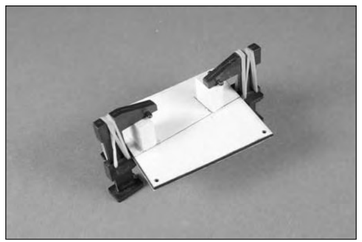
Use medium grit sandpaper to scuff the ends of two servo mounting blocks as shown.





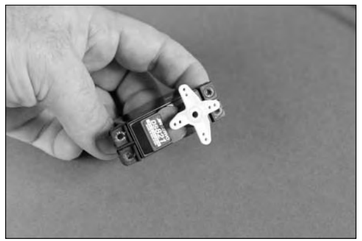
☐☐ **Step 7**

Mix a small amount of 30-minute epoxy. Apply the epoxy to the end of the blocks that were sanded in the previous step. Position the blocks on the servo cover using the marks made previously. Use small clamps to hold the blocks tightly against the servo cover until the epoxy fully cures.



☐☐ **Step 8**

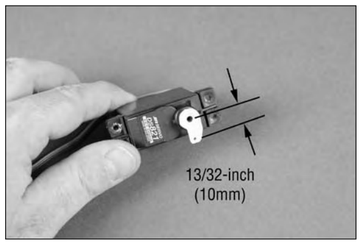
Use the radio system to center the flap servo. If your radio uses a three-position switch, set the switch in the center position. If you have a two-position switch, setting the throws to 0% for both positions will also center the flap servo. Install a servo horn on the flap servo that has a hole 13/32-inch (10mm) from the center of the horn. Install the horn on the flap servo as shown.



Hint: Most servos have an odd number of splines. If the horn is not aligned correctly as shown, you can rotate it 180 degrees to bring it into alignment.

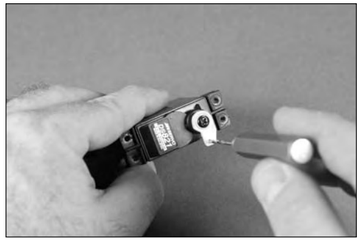
☐☐ **Step 9**

Use side cutters to remove any arms that will not be used from the servo horn. Trim the horn down leaving only the hole that was 13/32-inch (10mm) from the center of the horn.



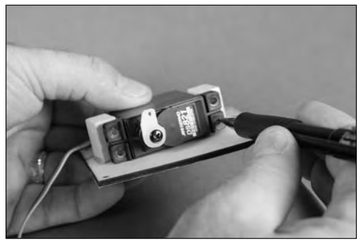
☐☐ **Step 10**

Use a 5/64-inch (2mm) drill bit and pin drill to enlarge the hole in the flap servo horn.



☐☐ **Step 11**

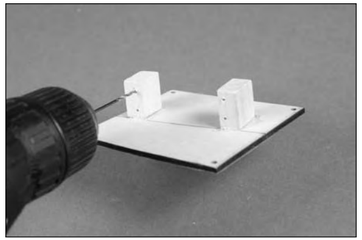
Position the servo between the blocks. Leave a small gap of 1/32-inch (1mm) between the servo cover and servo to prevent vibrations from the airframe from being transferred directly to the servo. Use a pencil to mark the blocks for the four servo mounting screws.



Hint: Place a 1/32-inch (.5mm) spacer between the servo and the servo hatch cover before marking the mounting holes.

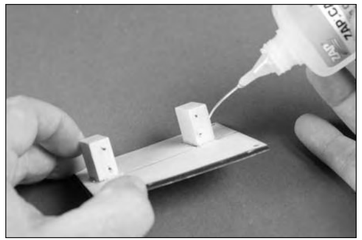
☐☐ **Step 12**

Remove the servo. Use a drill and 1/16-inch (1.5mm) drill bit to drill the four holes for the servo mounting screws.



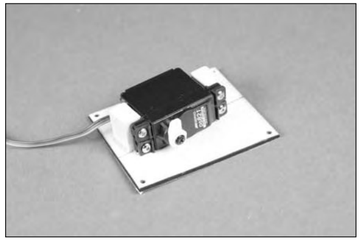
☐☐ **Step 13**

Apply 2–3 drops of thin CA into each hole to harden the surrounding wood. This provides a harder surface for the screws making them more secure when installed.



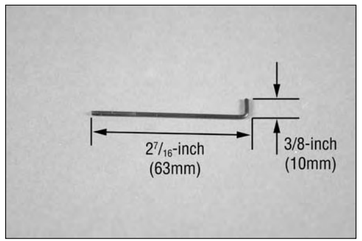
☐☐ **Step 14**

Use the screws provided with the servo to secure it to the servo mounting blocks. Use a #1 Phillips screwdriver to tighten the servo mounting screws.



☐☐ **Step 15**

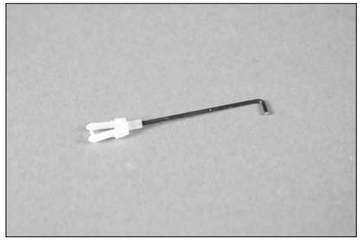
Prepare the flap pushrod by making a 90-degree bend that is $2^{7}/_{16}$-inch (63mm) from the threaded end of the pushrod. Measure 3/8-inch (10mm) from the bend and use side cutters to trim the pushrod wire.



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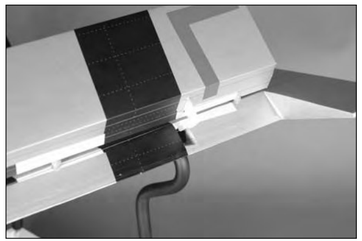
☐☐ **Step 16**

Use a hobby knife with a #11 blade to cut a 1/4-inch (6mm) piece of tubing from the 2-inch (52mm) safety tubing included with the kit. Slide the tubing on a clevis, and then thread the clevis 10 turns on the flap pushrod.



☐☐ **Step 17**

Slide the flap pushrod into the wing, bent end first. Connect the clevis to the outer hole of the flap control horn. Slide the safety tubing on the clevis so it won't accidentally open in flight.



☐☐ **Step 18**

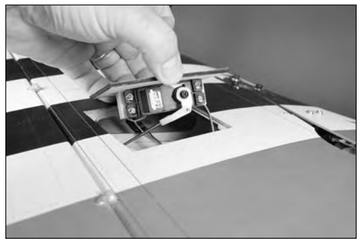
At this time you will want to mark the leads for the aileron, retract and flap servos so each can be identified as they are going to be hidden inside the wing. Tie the string around all three leads and carefully pull them through the wing and out through the hole.



Hint: If you have a short extension or Y-harness handy, you may want to attach it temporarily to the flap servo lead as it will make it easier to connect the flap servo to the receiver while the servo installation is being finalized.

☐☐ **Step 19**

Use a pushrod keeper to connect the flap pushrod to the flap servo horn.

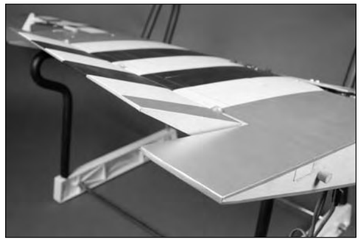


☐☐ **Step 20**

If you have a three-position flap switch, it is recommended to set the endpoint to 0%. This will make installing the flap much easier.

☐☐ **Step 21**

Place the flap servo into position and check the measurement for the mid flap setting. You may need to adjust the length of the pushrod to achieve the correct measurement.

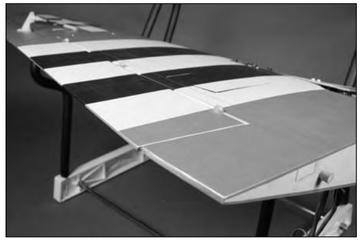


Note: If you have a two-position switch, you will not need to make this measurement. You will only be setting the 'up' and "down" flap positions.

Important: Do not operate the flap using the radio system at this time. If the throws are too great, it could damage the servo if the servo moves more than the flap can. Setting the throws to 0% at your radio as a starting point is the best method for installing the flap servo. If you have not set the throws to 0%, simply lift the flap servo cover from the wing BEFORE operating the flap servo from the radio system to make sure the servo does not bind when operated.

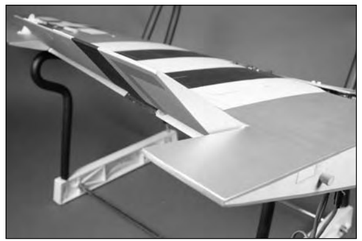
☐☐ **Step 22**

After setting the throws to 0%, move the switch on the radio to the "up" position. Adjust the throw at the radio until the flap is aligned with the trailing edge of the wing.



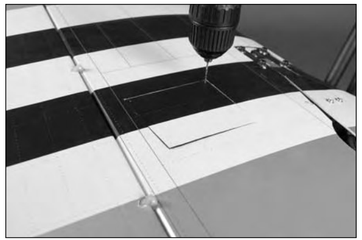
☐☐ **Step 23**

Move the switch on the radio to the "down" position. Adjust the throw at the radio until the flap is set at the measurement listed under "Control Throws" for down flap.



☐☐ **Step 24**

Use a T-pin to poke through the four holes in the covering in the flap servo cover. Position the servo cover in the wing and use a 1/16-inch (1.5mm) drill bit to drill the four holes for the servo cover mounting holes. Use caution or you could accidentally drill through the top of the wing.



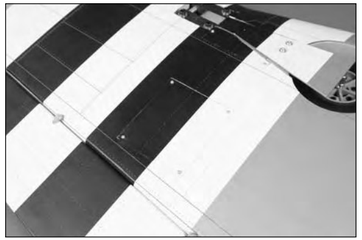
☐☐ **Step 25**

Apply 2–3 drops of thin CA into each hole to harden the surrounding wood. This provides a harder surface for the screws making them more secure when installed.



☐☐ **Step 26**

Use a #1 Phillips screwdriver and four #2 x 3/8-inch sheet metal screws to secure the servo cover to the wing.



☐ **Step 27**

Repeat Steps 1 through 26 for the remaining flap servo installation.

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Receiver, Rudder Servo and Tail Wheel Installation

Required Parts

- Fuselage
- Tail gear steering arm
- 1.5mm washer
- 2.5mm wheel collar (2)
- Clevis
- Servo
- Transmitter
- Pushrod keeper
- Control horn with backplate
- 2mm x 32mm machine screw (3)
- #2 x 3/8-inch sheet metal screw (4)
- Pushrod wire, 30 1/2-inch (775mm)
- Tail gear wire with wheel
- Pushrod connector
- C-clip
- 3mm setscrew (3)
- Clevis safety tubing
- Receiver
- Receiver battery
- Switch harness

Tools and Adhesives

- Hook and loop strap
- Felt-tipped pen
- Pliers
- Rubbing alcohol
- Pencil
- Phillips screwdriver: #1
- Rotary tool with cutoff wheel
- Hobby knife with #11 blade
- Hex wrench: 1.5mm (included)
- 6-inch (152mm) servo extension (4)
- Drill bit: 1/16-inch (1.5mm), 5/64-inch (2mm)
- Pin drill
- 1/4-inch (6mm) foam
- Side cutter
- Paper towel
- Thin CA
- Threadlock
- T-pin

Extensions for 7-Channel Receiver Installation

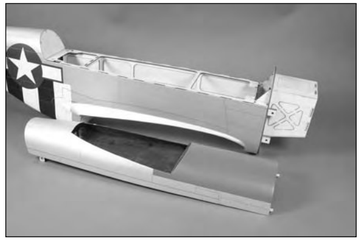
- 3-inch (76mm) servo extension (2)
- Y-harness (2)

Extensions for 9-Channel Receiver Installation

- 3-inch (76mm) servo extension (6)

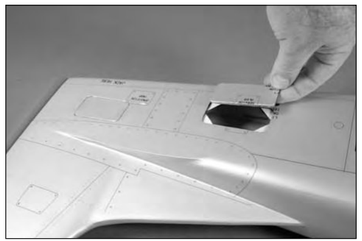
☐ **Step 1**

Remove the fuselage hatch from the fuselage by lifting it up at the rear to release the magnets. Slide the hatch to the rear of the fuselage to release the pegs at the front and set it aside.



☐ **Step 2**

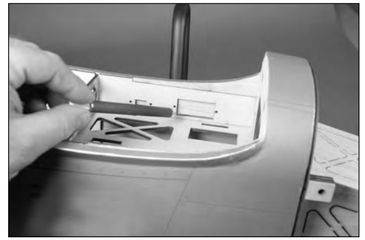
Remove the access cover for the tail wheel from the fuselage. Set it aside with the fuselage hatch.



Note: Steps 3 through 6 are for mounting the switch harness and receiver battery for glow-powered models. If you are preparing your model for electric power, you can skip to Step 7 and mount the receiver.

☐ **Step 3**

Use a hobby knife to remove the balsa from the side of the fuselage for mounting your particular switch. The plywood will have the correct cutout for the most common switches available.



☐ **Step 4**

Place your switch harness into the appropriate hole. Use a pin drill and 1/16-inch (1.5mm) drill bit to drill the two holes necessary to mount the switch to the fuselage.



☐ **Step 5**

If you will be using sheet metal screws to mount your switch, place 2–3 drops of thin CA in each hole to harden the surrounding wood.

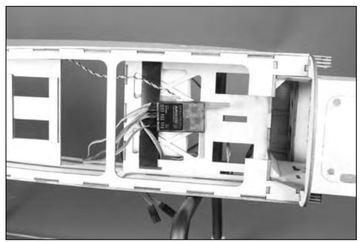


☐ **Step 6**

Wrap the receiver battery in 1/4-inch (6mm) foam. Use a hook and loop strap (not included) to secure the receiver battery to the bottom of the forward radio tray. Plug the receiver battery into the switch harness at this time.

☐ **Step 7A**

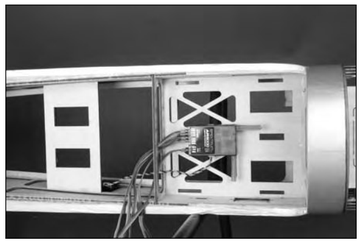
Glow Power Receiver: Use hook and loop tape to mount the receiver on the top side of the forward servo tray. The remote receiver is then mounted on the inside of the fuselage with hook and loop tape as far as possible from the main receiver as shown. Plug in any necessary extensions into the receiver for the flaps, retracts and ailerons at this time as well.

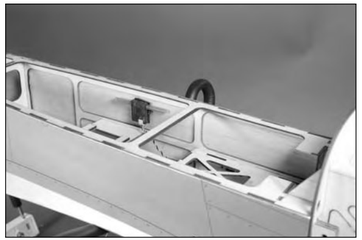




☐ **Step 7B**

Electric Power Receiver: Use hook and loop tape to mount the receiver on the bottom side of the forward servo tray. The remote receiver is then mounted on the inside of the fuselage with hook and loop tape as far as possible from the main receiver as shown. Plug in any necessary extensions for the flaps, retracts and ailerons at this time as well. The receiver is mounted to the bottom of the forward servo tray to allow room for the motor battery on the top side of the forward radio tray.





Note: We used two 3-inch (76mm) extensions for ailerons and two 3-inch (76mm) extensions for retracts. These channels were mixed using a computer radio.

☐ **Step 8**

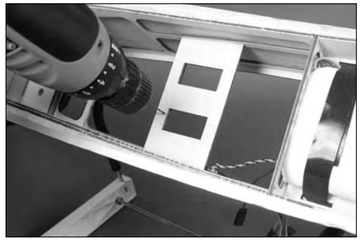
Place the rudder servo in the rear servo tray. The servo is installed from the bottom of the tray with the output shaft facing to the front of the fuselage. Use a pencil to mark the locations for the servo mounting screws through the grommets and on the servo tray.



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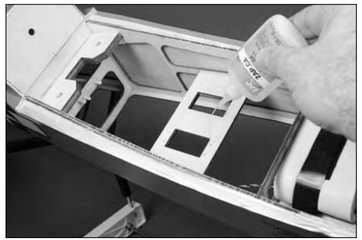
☐ **Step 9**

Remove the servo. Use a drill and 1/16-inch (1.5mm) drill bit to drill the four holes for the servo mounting screws.



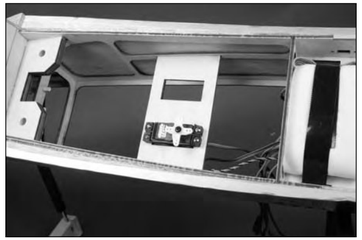
☐ **Step 10**

Apply 2–3 drops of thin CA into each hole to harden the surrounding wood. This provides a harder surface for the screws making them more secure when installed.



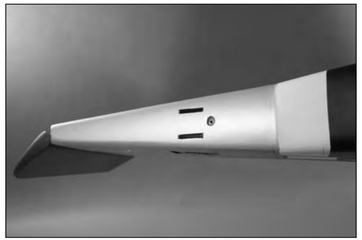
☐ **Step 11**

Use the screws provided with the servo to secure it to the servo mounting blocks. Use a #1 Phillips screwdriver to tighten the servo mounting screws. Plug the rudder servo into the receiver at this time.



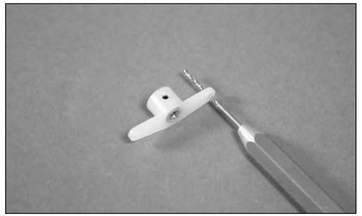
☐ **Step 12**

Use a hobby knife with a #11 blade to remove the covering for the tail gear doors and tail gear wire from the bottom of the fuselage.



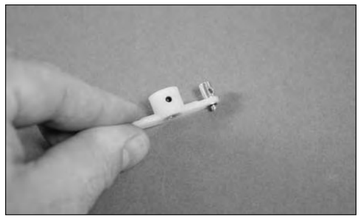
☐ **Step 13**

Use a pin drill and 5/64-inch (2mm) drill bit to enlarge the hole in the tail gear steering arm. Note the position of the arm and location of the setscrew when enlarging the hole.



☐ **Step 14**

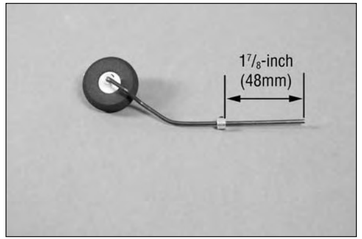
Insert the pushrod connector in the hole as shown. Use a C-clip and 1.5mm washer to secure the connector to the steering arm.





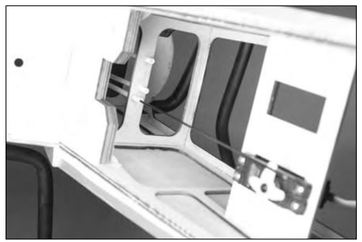
☐ **Step 15**

Slide a 2.5mm wheel collar on the tail gear wire. Position the collar 1 7/8-inch (48mm) from the end of the wire as shown. Use a 3mm setscrew and 1.5mm hex wrench to tighten the setscrew. Use threadlock to prevent the setscrew from vibrating loose.



☐ **Step 16**

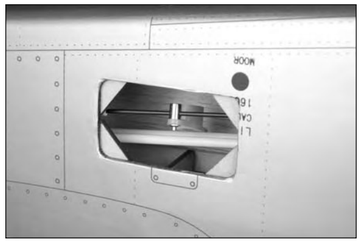
Slide the 30 1/2-inch (775mm) pushrod wire into the rudder pushrod tube threaded end first. You will need to guide the wire through the aft rudder pushrod tube and remove the covering from the pushrod exit to allow the pushrod to exit the fuselage.





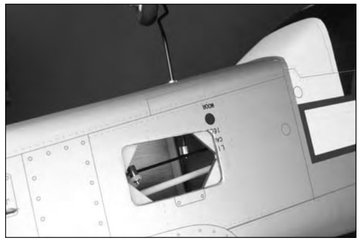
☐ **Step 17**

Pull the wire back slightly so the connector on the steering arm can be slid on the wire. Note the direction of the arm with the connector facing to the bottom of the fuselage.



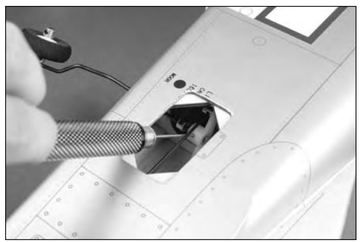
☐ **Step 18**

Slide the tail wheel wire into the bracket in the rear of the fuselage. Slide a second 2.5mm wheel collar on the wire from inside the fuselage. Use a 3mm setscrew to keep the collar from falling off the wire. The collar shown should be roughly 1-inch (25mm) from the end of the wire so the steering arm can be installed. The position of this collar will be finalized once the steering arm is secured.



☐ **Step 19**

The steering arm can now be slid on the tail gear wire. Slide the tail gear wire so the wheel collar on the outside of the fuselage is resting against the tail gear bracket. The position of the steering arm will self-adjust in height on the tail gear wire. With the arm perpendicular to the tail wheel, tighten the 3mm setscrew with a 1.5mm hex wrench to secure it to the tail gear wire.



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☐ **Step 20**

Loosen the setscrew on the wheel collar installed in Step 18. Slide it down so it is resting against the tail gear bracket and tighten the 3mm setscrew. You may need to use a ball driver to tighten this particular setscrew since you will be at an angle accessing it through the slots for the tail gear doors from the outside of the fuselage to do so. Make sure the pushrod operates smoothly without any binding.

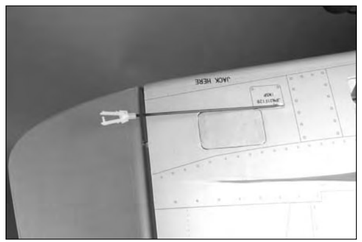
☐ **Step 21**

Use a pencil to mark the rudder where the pushrod crosses. This will be used to center the horn vertically on the rudder.



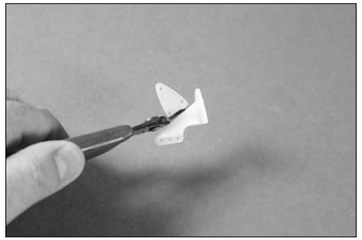
☐ **Step 22**

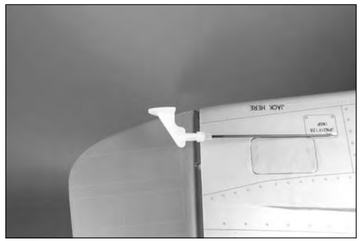
Use a hobby knife with a #11 blade to cut a 1/4-inch (6mm) piece of tubing from the 2-inch (52mm) safety tubing included with the kit. Slide the tubing on a clevis, and then thread the clevis 10 turns on the rudder pushrod.



☐ **Step 23**

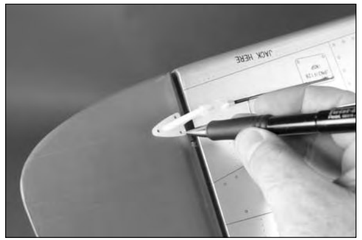
Use side cutters to remove the backplate from a control horn. Connect the clevis to the center hole of the control horn. Set the backplate aside as it will be used later.

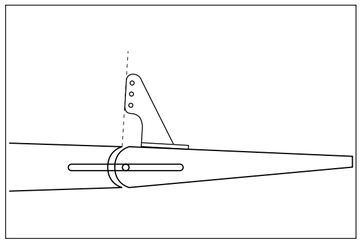




☐ **Step 24**

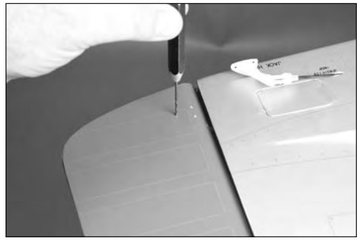
Center the rudder so it is in alignment with the fuselage. When positioning the control horn, align the front edge of the horn with the edge of the fixed surface as shown to minimize any differential of the control surface. Locate the centerline of the control horn vertically on the mark made in Step 21. Use a pencil to transfer the locations for the three control horn mounting screws onto the rudder.





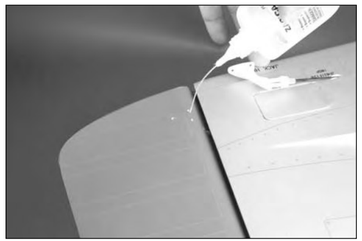
☐ **Step 25**

Use a pin drill and 5/64-inch (2mm) drill bit to drill the three holes through the rudder to mount the control horn. Use care to drill the holes parallel in the rudder so the backplate can be installed on the opposite side of the rudder.



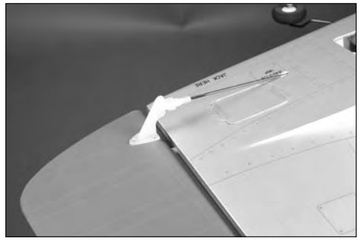
☐ **Step 26**

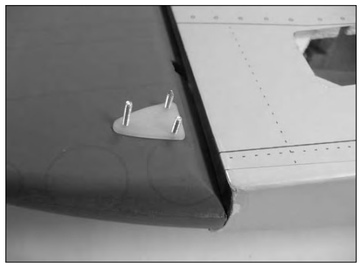
Apply 2–3 drops of thin CA into each hole to harden the surrounding wood. This provides a harder surface for the screws making them more secure when installed.



☐ **Step 27**

Once the CA has cured, you can attach the control horn to the rudder using three 2mm x 32mm machine screws and the control horn backplate. Use a #1 Phillips screwdriver to tighten the screws.





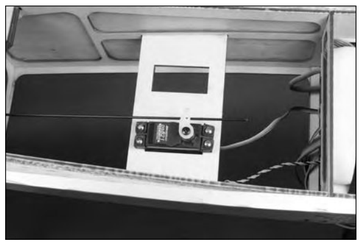
☐ **Step 28**

Use side cutters to trim the length of the screws down. Use a flat file to remove any sharp edges from the screws so they don't accidentally damage anything during the transport of your aircraft.



☐ **Step 29**

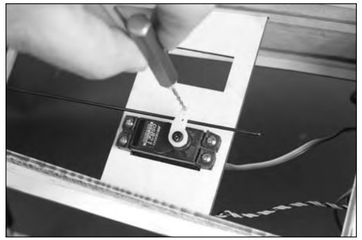
Use the radio system to center the servo for the rudder. Remove the original arm from the rudder servo and install a 180-degree arm so it is perpendicular to the center line of the servo. You will be connecting the linkage to a hole that is 9/16-inch (14mm) from the center of the servo horn, so make sure your servo horn meets these requirements. Use side cutters to remove any unused arms from the servo horn that may interfere with the operation of the servo.



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☐ **Step 30**

Use a 5/64-inch (2mm) drill and pin drill to enlarge the hole that is 9/16-inch (15mm) from the center of the servo arm.



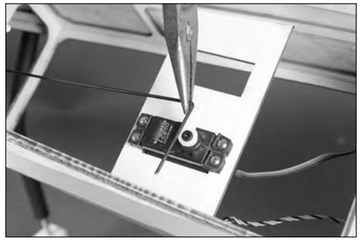
☐ **Step 31**

Make sure the rudder and rudder servo are centered. Use a felt-tipped pen to mark the pushrod where it crosses the hole in the servo arm enlarged in the previous step.



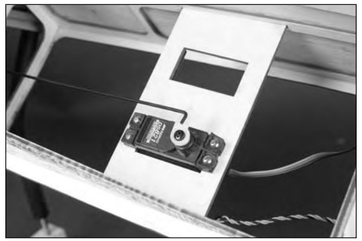
☐ **Step 32**

Use pliers to bend the pushrod wire 90-degrees at the mark made in the previous step.



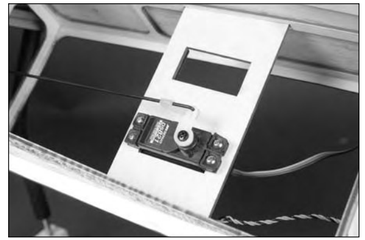
☐ **Step 33**

Use side cutters to trim the pushrod wire so only 3/8-inch (10mm) of the wire remains beyond the bend.



☐ **Step 34**

Use a pushrod keeper to secure the pushrod wire to the servo horn.



☐ **Step 35**

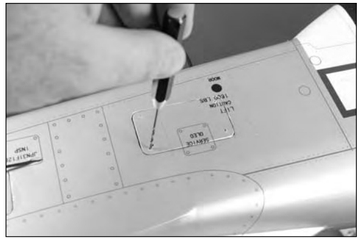
It is now time to secure the connector at the tail gear wire to the pushrod. You will need to deflect the rudder slightly so the setscrew can be accessed. Use a 1.5mm hex wrench to tighten the setscrew that secures the connector to the pushrod wire. Make sure that when the rudder is centered, the tail wheel is centered as well. It may take a try or two to get it correct. You will want to make sure to use threadlock on this setscrew as accessing in the future will be difficult.



Hint: Use a file to make a flat spot on the pushrod wire for the setscrew. This will make the connection between the wire and setscrew more secure and less likely to slip.

☐ **Step 36**

Place the access cover back in place on the fuselage. Use a pin drill and 1/16-inch (1.5mm) drill bit to drill four holes through the cover and into the fuselage. Make sure to position the holes so they are roughly 3/32-inch (2mm) from the edges of the cover.



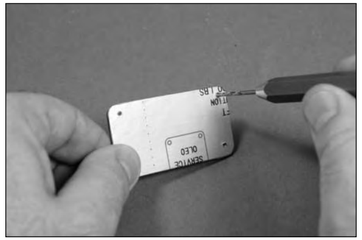
☐ **Step 37**

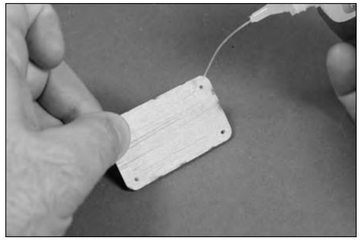
Apply 2–3 drops of thin CA into each hole to harden the surrounding wood. This provides a harder surface for the screws making them more secure when installed.



☐ **Step 38**

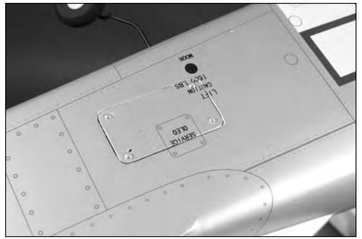
Use a 5/64-inch (2mm) drill bit to enlarge the holes in the cover. Apply 2–3 drops of thin CA into each hole to harden the surrounding wood. This will harden the wood and help it hold up to the pressure of the screws over time.





☐ **Step 39**

Secure the cover to the fuselage using four #2 x 3/8-inch sheet metal screws. Use a #1 Phillips screwdriver to tighten the four screws. The screws only need to be tight enough to secure the cover: don't tighten them too much and crush the wood of the cover.



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Elevator/Stabilizer Installation

Required Parts

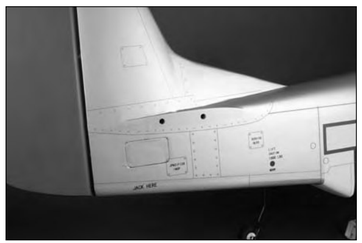
- Fuselage
- Stabilizer tube (long)
- Clevis (2)
- Wheel collar, 4mm (2)
- 3mm x 3mm setscrew (2)
- Stabilizer assembly (right and left)
- #2 x 3/8-inch sheet metal screw (8)
- Pushrod wire, 30 1/2-inch (775mm) (2)
- Stabilizer tube (short)
- Clevis safety tubing
- Transmitter
- Pushrod keeper
- Servo with hardware

Tools and Adhesives

- Hobby knife with #11 blade
- Rubbing alcohol
- 30-minute epoxy
- Mixing stick
- Epoxy brush
- Phillips screwdriver: #1, #2
- Rotary tool with cutoff wheel
- Drill bit: 1/16-inch (1.5mm), 5/64-inch (3mm)
- Threadlock
- Thin CA
- Felt-tipped pen
- Paper towel
- Mixing cup
- Low-tack tape
- Pin drill
- Side cutters
- Pliers
- Hex wrench: 1.5mm

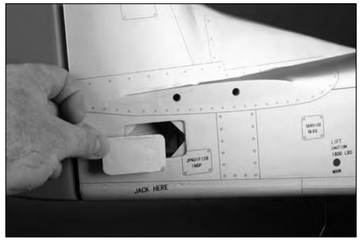
☐☐ **Step 1**

Use a hobby knife and #11 blade to remove the covering for the two stabilizer tubes in the fuselage.



☐☐ **Step 2**

Remove the access cover from the side of the fuselage. Set it aside for the time being.



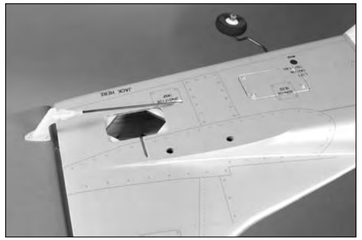
☐☐ **Step 3**

Use a hobby knife with a #11 blade to remove the covering from the linkage slot above the access hole on the side of fuselage.



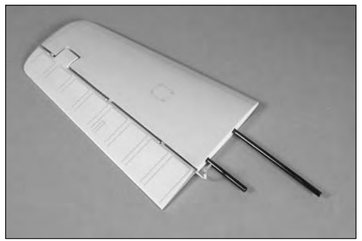
☐ **Step 4**

Repeat Steps 1 though 3 for the opposite side of the fuselage.



☐☐ **Step 5**

Slide the long and short stabilizer tubes into the stabilizer half. Note the longer tube is in the hole toward the leading edge of the stabilizer (front) and the shorter tube toward the elevator (rear).



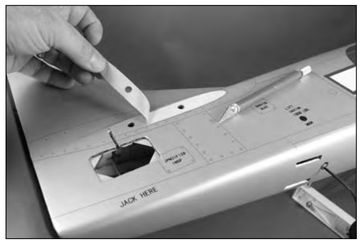
☐☐ **Step 6**

Slide the tubes into the fuselage. Use a felt-tipped pen to trace the outline of the stabilizer on the side of the fuselage.



☐☐ **Step 7**

Use a hobby knife with a #11 blade to remove the covering from the fuselage. Trim 3/32-inch (2mm) inside the lines drawn when cutting the covering.



☐ **Step 8**

Repeat Steps 5 through 7 to prepare the opposite side of the fuselage for the stabilizer.





Hint: Use rubbing alcohol and a paper towel to remove the lines drawn on the fuselage.

Important: Read through the next few steps before mixing any epoxy. You must be able to perform these steps before the epoxy begins to cure.

☐☐ **Step 9**

Mix a small amount of 30-minute epoxy. Brush a thin coat of epoxy on the exposed wood of the fuselage as well as to the bare wood of the stabilizer.

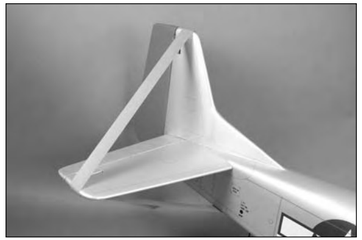




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☐☐ **Step 10**

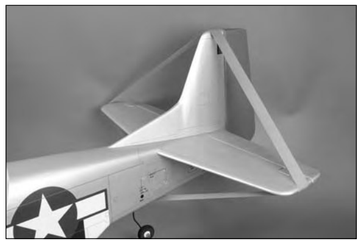
Slide the stabilizer into position. Use low-tack tape to keep the stabilizer tight against the fuselage.



Caution: Make sure to keep the hinge line of the stabilizer perpendicular to the hinge line of the vertical fin when applying the tape. It is possible to have too much tension on the top or bottom and pull the stabilizer out of alignment.

☐ **Step 11**

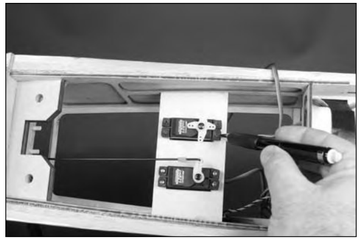
Repeat Steps 9 and 10 to install the remaining stabilizer half before the epoxy begins to cure.



Hint: Use rubbing alcohol and a paper towel to remove any excess epoxy from the stabilizer and fuselage before it begins to cure.

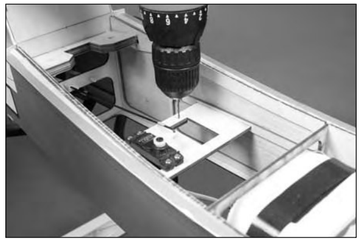
☐ **Step 12**

Place the elevator servo in the rear servo tray. The servo is installed from the bottom of the tray with the output shaft facing to the front of the fuselage. Use a pencil to mark the locations for the servo mounting screws through the grommets and on the servo tray.



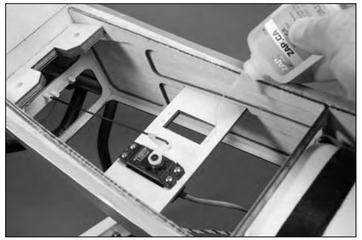
☐ **Step 13**

Remove the servo. Use a drill and 1/16-inch (1.5mm) drill bit to drill the four holes for the servo mounting screws.



☐ **Step 14**

Apply 2–3 drops of thin CA into each hole to harden the surrounding wood. This provides a harder surface for the screws making them more secure when installed.



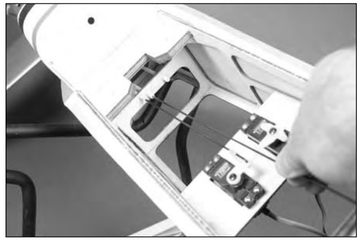
☐ **Step 15**

Use the screws provided with the servo to secure it to the servo mounting blocks. Use a #1 Phillips screwdriver to tighten the servo mounting screws. Plug the elevator servo into the elevator port of the receiver.



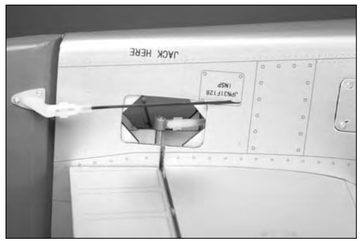
☐☐ **Step 16**

Slide one of the 30 1/2-inch (775mm) pushrods, threaded end first, into the elevator pushrod tube closest to the center line of the fuselage inside of the fuselage.



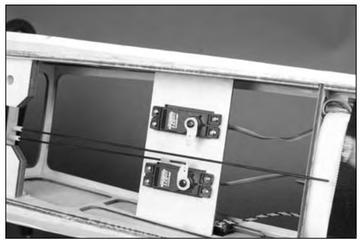
☐☐ **Step 17**

Cut a 1/4-inch (6mm) piece from the clevis safety tubing and slide it over the clevis. Thread the clevis 10 turns on the pushrod wire. Connect the clevis to the elevator control horn. Slide the tubing over the clevis so it will not accidentally open in flight.



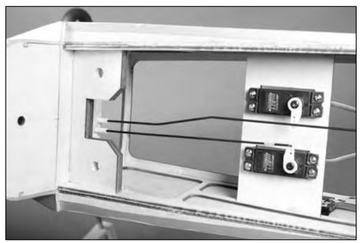
☐ **Step 18**

Use the radio system to center the servo for the elevator. Remove the original arm from the elevator servo and install a 180-degree arm so it is perpendicular to the center line of the servo. You will be connecting the linkage to a hole that is 9/16-inch (14mm) from the center of the servo horn, so make sure your servo horn meets these requirements. Use side cutters to remove any unused arms from the servo horn that may interfere with the operation of the servo.



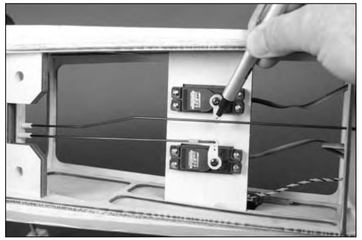
☐ **Step 19**

You will need to make two slight bends in one elevator pushrod to align it with the elevator servo horn as shown. Make sure the bend is at least 1-inch (25mm) forward of the pushrod tube so the bend does not bind in the tube when operating the elevator.



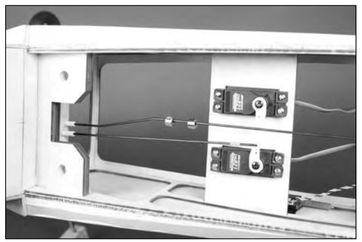
☐ **Step 20**

With the radio system on and the elevator centered, use a felt-tipped pen to mark the pushrod wire where it crosses the hole of the servo horn previously enlarged.



☐ **Step 21**

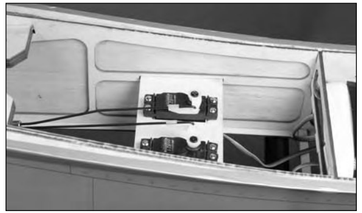
Slide two 4mm wheel collars on the pushrod wire.



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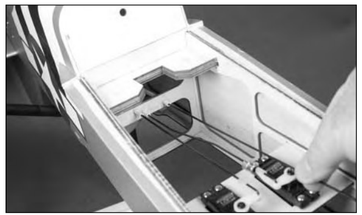
☐ **Step 22**

Use pliers to bend the pushrod wire 90 degrees at the mark made in the previous step. Trim the wire 3/8-inch (10mm) above the bend using side cutters or a rotary tool. Insert the wire into the hole in the servo arm. Slide the pushrod keeper onto the wire, then rotate it and snap it on the wire to secure the pushrod wire to the servo horn.



☐ **Step 23**

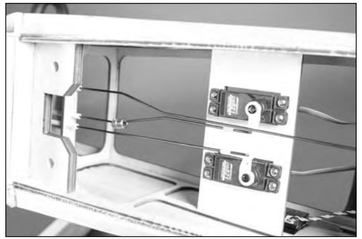
Repeat Steps 16 and 17 to install the remaining 30 1/2-inch (775mm) pushrod wire.





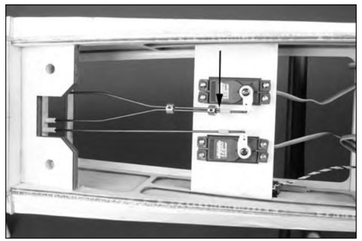
☐ **Step 24**

You will need to make two slight bends in the elevator pushrod to align it with the first elevator pushrod wire as shown. Make sure the bend is at least 1-inch (25mm) forward of the pushrod tube so the bend does not bind in the tube when operating the elevator.



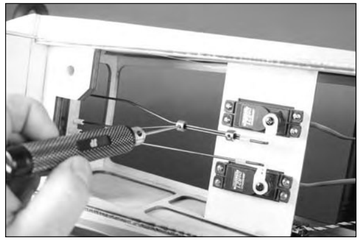
☐ **Step 25**

Use a rotary tool and cut off wheel or side cutters to trim the pushrod wire so it almost touches the pushrod keeper. Slide the wheel collars forward. Slide the bent pushrod wire into the wheel collars.



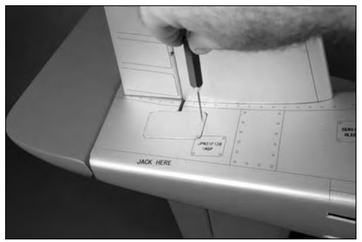
☐ **Step 26**

Use two 3mm x 3mm setscrews and a 1.5mm hex wrench to secure the collars that link the two pushrods together. Make absolute sure to use threadlock on these screws so they don't vibrate loose.



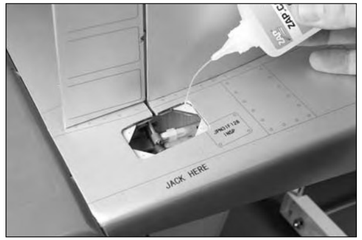
☐☐ **Step 27**

Place the access cover back in place on the fuselage. Check to make sure the trim scheme matches and that you are not installing the cover on the wrong side of the aircraft. Use a pin drill and 1/16-inch (1.5mm) drill bit to drill four holes through the cover and into the fuselage. Make sure to position the holes so they are roughly 3/32-inch (2mm) from the edges of the cover.



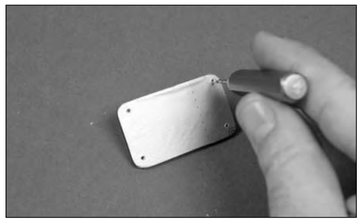
☐☐ **Step 28**

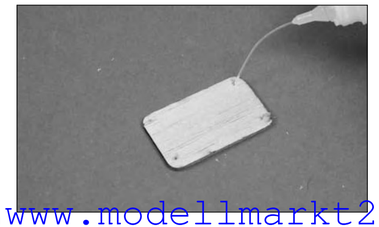
Apply 2–3 drops of thin CA into each hole to harden the surrounding wood. This provides a harder surface for the screws making them more secure when installed.



☐☐ **Step 29**

Use a 5/64-inch (2mm) drill bit to enlarge the holes in the cover. Apply 2–3 drops of thin CA into each hole to harden the surrounding wood. This will harden the wood and help it hold up to the pressure of the screws over time.





☐☐ **Step 30**

Secure the cover to the fuselage using four #2 x 3/8-inch sheet metal screws. Use a #1 Phillips screwdriver to tighten the four screws. The screws only need to be tight enough to secure the cover; don't tighten them too much and crush the wood of the cover.



☐ **Step 31**

Repeat Steps 27 through 30 to install the remaining elevator access cover.



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Engine Installation: 4-Stroke

Required Parts

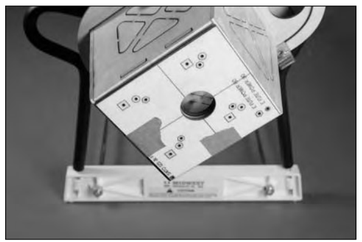
- Fuselage assembly
- 8-32 blind nut (4)
- #8 washer (8)
- Safety tubing
- Throttle servo with hardware
- 8-32 x 3/4-inch socket head bolt (4)
- 8-32 x $1^1/_4$-inch socket head bolt (4)
- Pushrod tube, $8^1/_8$-inch (206mm)
- Pushrod wire, $13^1/_4$-inch (335mm)
- Firewall template
- Engine mount rail (2)
- Clevis
- Plywood pushrod support
- 8-32 lock nut (4)

Tools and Adhesives

- Low-tack tape
- Side cutters
- Hobby knife with #11 blade
- Phillips screwdriver: #1, #2
- Pencil
- Pliers or Z-bend pliers
- Hex wrench or ball driver: 9/64-inch
- Nut driver or socket: 11/32-inch
- Drill bit: 1/16-inch (1.5mm), 5/32-inch (4mm), 7/32-inch (5.5mm)
- Drill
- Felt-tipped pen
- Medium grit sandpaper
- Medium CA
- Thin CA

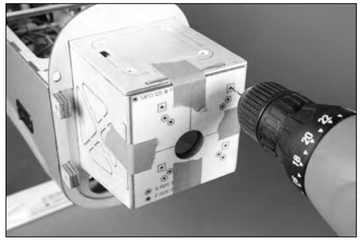
☐ **Step 1**

Locate the firewall template. Use low-tack tape to secure it to the engine box. A paper copy of the engine template is located on Page 71 of this manual.



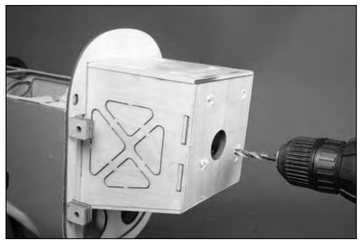
☐ **Step 2**

Using a drill and 1/16-inch (1.5mm) drill bit, drill through the template and through the firewall for the mount that fits your particular engine.



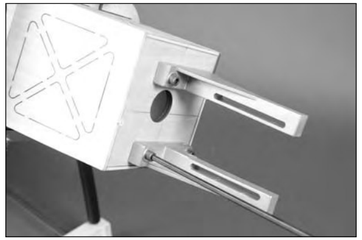
☐ **Step 3**

Remove the template from the firewall. Use a drill and 7/32-inch (5.5mm) drill bit to enlarge the holes in the firewall.



☐ **Step 4**

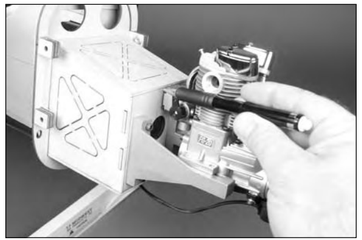
Use four 8-32 x 3/4-inch socket head bolts, four #8 washers and four 8-32 blind nuts to secure the mount rails to the firewall. Tighten the screws using a 9/64-inch hex wrench or ball driver.



Important: Make sure to use threadlock on all metal-to-metal fasteners.

☐ **Step 5**

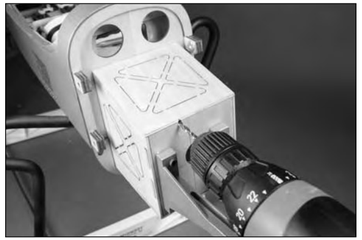
Slide the engine into position between the engine mount rails. Use a pencil to mark the location for the throttle pushrod wire on the firewall.



Note: If you are using a regular four-stroke, make sure the carburetor arm is facing the same direction as shown in the photo above.

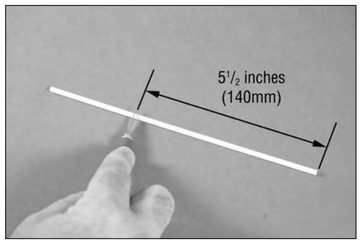
☐ **Step 6**

Remove the engine from the rails. Use a drill and 5/32-inch (4mm) drill bit to drill a hole through the firewall for the throttle pushrod tube.



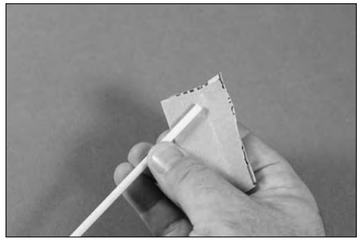
☐ **Step 7**

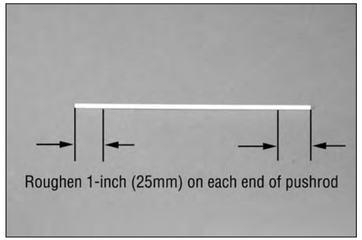
Use a hobby knife with a #11 blade to cut the throttle pushrod to a length of $5^1/_2$ inches (140mm).



☐ **Step 8**

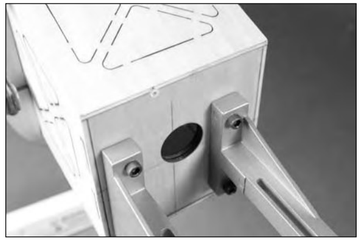
Use medium grit sandpaper to roughen the first 1-inch (25mm) of the tube on each end.





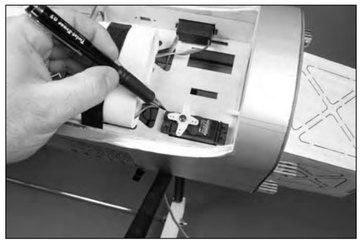
☐ **Step 9**

Slide the pushrod tube in the hole in the firewall. Use medium CA to glue the tube to the firewall so it is flush with the front of the firewall.



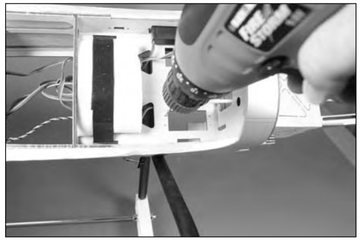
☐ **Step 10**

Position the throttle servo on the same side of the fuselage as the pushrod tube with the output facing to the rear of the fuselage. Use a pencil to mark the locations for the four servo mounting screws.



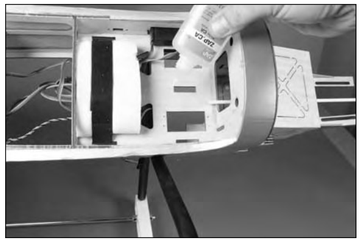
☐ **Step 11**

Remove the servo and use a drill with a 1/16-inch (1.5mm) drill bit to drill the holes necessary for the servo mounting screws.



☐ **Step 12**

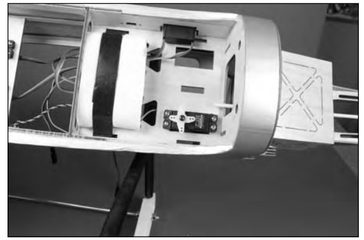
Place 2–3 drops of thin CA in each hole to harden the surrounding wood.



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☐ **Step 13**

Use the screws provided with the servo and a #1 Phillips screwdriver to secure the throttle servo in the fuselage. Make sure to plug the throttle servo into the throttle channel of the receiver at this time.

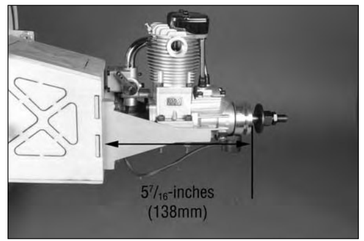


☐ **Step 14**

Use the radio system to center the throttle servo. With the throttle stick and trim centered, the arm should be positioned as shown in the previous photo. This will provide an equal amount of travel to both full and closed throttle.

☐ **Step 15**

Use four 8-32 x $1^{1}/_{4}$-inch socket head bolts, four #8 washers and four 8-32 lock nuts to secure the engine. Make sure the engine is positioned so the driver washer is $5^{7}/_{16}$-inches (138mm) forward of the firewall. A 9/64-inch hex wrench or ball driver and a 11/32-inch nut driver or socket will make tightening the bolts quick work.

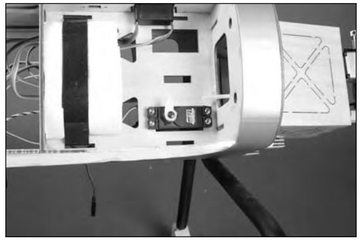




Hint: You can loosen the mounts on the firewall to make it easier to install the engine. Just make sure the mounts are tight before tightening the engine mounting bolts.

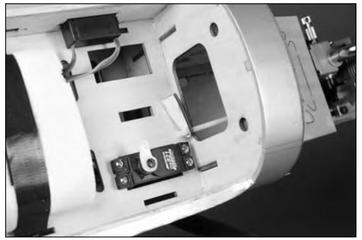
☐ **Step 16**

Remove the arms from the throttle servo that will not be used so they don't interfere with the operation of the servo. Use an arm that has a hole that is 1/2-inch (13mm) from the center of the servo horn.



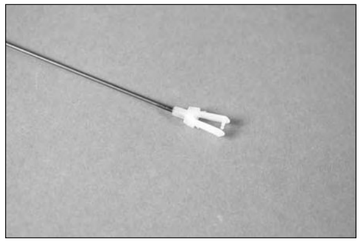
☐ **Step 17**

Slide the plywood pushrod support on the pushrod at this time. Do not glue the support until instructed to do so.



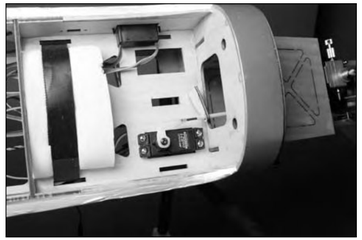
☐ **Step 18**

Thread a clevis on the $13^{1}/_{4}$-inch (335mm) pushrod wire. Make sure to slide a piece of safety tubing on the clevis.



☐ **Step 19**

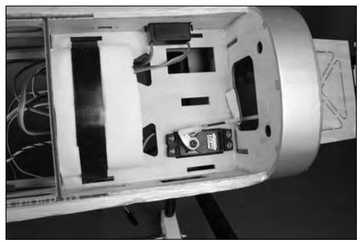
Insert the pushrod into the pushrod tube from the inside of the fuselage. Attach the clevis to the servo arm.

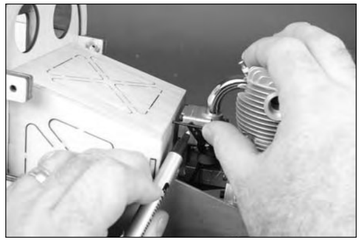


Hint: It may be necessary to use side cutters to trim the length of the pushrod so it doesn't interfere with the engine. Make sure to leave the pushrod wire long enough so a bend can be placed in the wire to attach it to the carburetor arm.

☐ **Step 20**

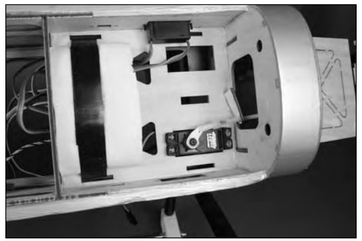
Use the radio system to move the throttle servo to the closed position. Physically close the carburetor on the engine. Make sure the direction of the servo and carburetor arm are working in unison. Use a felt-tipped pen to mark the pushrod where it crosses the outside hole of the carburetor arm.

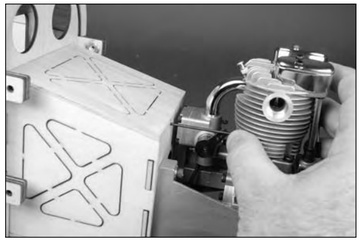




☐ **Step 21**

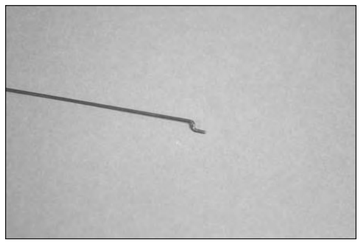
Use the radio system to move the throttle servo to the full throttle position. Move the carburetor to the full throttle position. Check that the mark on the pushrod wire aligns with the outer hole of the carburetor arm. If it is off only a slight amount, you can use the ATV function of your radio to correct. If the line is too far forward, attach the clevis to a hole on the servo arm that is closer to the center of the servo. If it doesn't move far enough, use a servo arm that allows you to position the clevis farther from the center of the servo. Repeat the previous steps if necessary to achieve the correct amount of throw to operate the throttle on your engine.





☐ **Step 22**

Remove the pushrod and take the clevis off the wire. Use Z-bend pliers to make a Z-bend in the pushrod wire where the mark was made in the previous steps. You can use regular pliers, but Z-bend pliers will provide the best results.



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☐ **Step 23**

Slide the wire into the pushrod tube from the front of the fuselage. Connect the Z-bend to the carburetor arm.



Hint: You may need to remove the carburetor arm from the carburetor. If so, make sure it is installed to provide equal throw from open to closed.

☐ **Step 24**

Thread the clevis back on the wire and connect it to the servo arm in the hole that worked best for your throttle operation. Slide the safety tubing over the clevis to prevent it from opening accidentally. Use medium CA to glue the plywood pushrod support to the fuselage in a position that will provide smooth movement of the throttle pushrod.



Note: If you are installing a glow-powered 4-stroke you can skip to the section on installing the cowling.

Saito FG-20 Ignition Component Installation

Required Parts

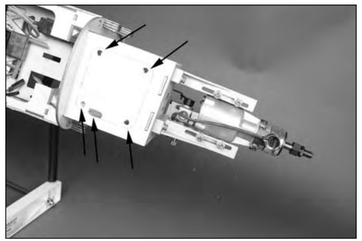
- Fuselage assembly
- Ignition battery
- Ignition module
- Switch harness
- Tie wrap, 12-inch (305mm) (4) (not included)
- 1/4-inch (6mm) foam (not included)

Tools and Adhesives

- Drill
- Hobby knife with #11 blade
- Drill bit: 1/4-inch (6mm)

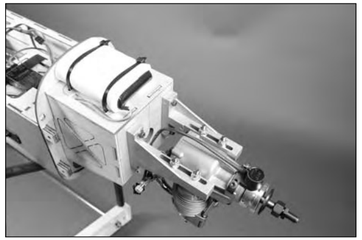
☐ **Step 1**

Prepare the top of the radio box by using your battery as a guide and drilling four holes in the box using a drill and 1/4-inch (6mm) drill bit. You will also need to make a slot to pass the lead from the battery through as well.



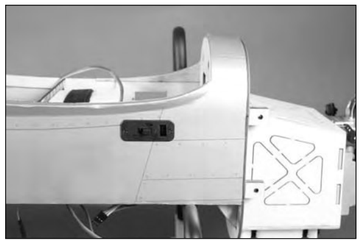
☐ **Step 2**

Wrap the ignition battery in 1/4-inch (6mm) foam. Secure the battery to the top of the radio box using two 12-inch (305mm) tie wraps.



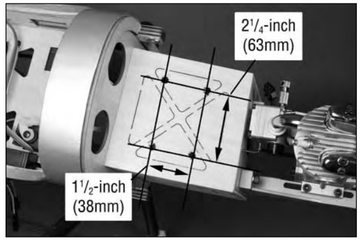
☐ **Step 3**

Mount the switch for the ignition on the side of the fuselage opposite that of the radio switch. Mounting the switch follows the same procedure as the radio switch.



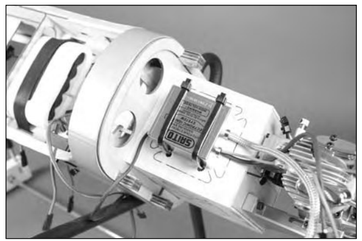
☐ **Step 4**

Use a drill and 1/4-inch (6mm) drill bit to drill four holes in the bottom of the engine mounting box so the ignition module can be secured to the fuselage.



☐ **Step 5**

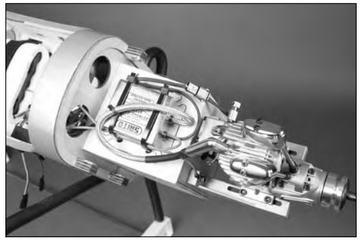
Place a piece of 1/4-inch (6mm) foam between the ignition module and fuselage. Use two 12-inch (305mm) tie wraps to secure the module to the fuselage.



Important: Make sure not to install the tie wraps over the throttle pushrod tube. This could cause the pushrod to bind and cause the throttle servo to run the receiver battery down prematurely.

☐ **Step 6**

Make all the connections between the ignition battery, switch and module according to the instructions provided with the engine. Make sure to secure any loose wires so they do not interfere with the operation of the engine or radio system.



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Engine Installation: 2-Stroke

Required Parts

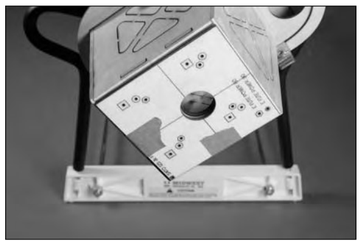
- Fuselage assembly
- 8-32 blind nut (4)
- #8 washer (8)
- Safety tubing
- Throttle servo with hardware
- 8-32 lock nut (4)
- 8-32 x 3/4-inch socket head bolt (4)
- 8-32 x 1¼-inch socket head bolt (4)
- Pushrod tube, 8⅛-inch (206mm)
- Pushrod wire, 13¾-inch (335mm)
- Firewall template
- Engine mount rail (2)
- Clevis
- Plywood pushrod support
- 90-degree keeper

Tools and Adhesives

- Low-tack tape
- Side cutters
- Hobby knife with #11 blade
- Phillips screwdriver: #1, #2
- Pencil
- Hex wrench or ball driver: 9/64-inch
- Nut driver or socket: 11/32-inch
- Drill bit: 1/16-inch (1.5mm),5/64-inch (2mm), 5/32-inch (4mm), 7/32-inch (5.5mm)
- Drill
- Felt-tipped pen
- Medium grit sandpaper
- Medium CA
- Thin CA

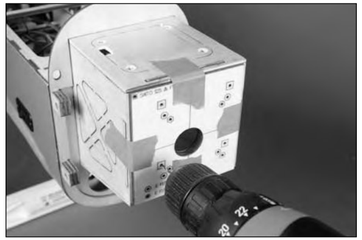
☐ **Step 1**

Locate the firewall template. Use low-tack tape to secure it to the engine box. A paper copy of the engine template is located on Page 71 of this manual.



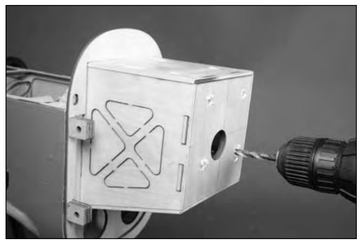
☐ **Step 2**

Using a drill and 1/16-inch (1.5mm) drill bit, drill through the template and through the firewall for the mount that fits your particular engine.



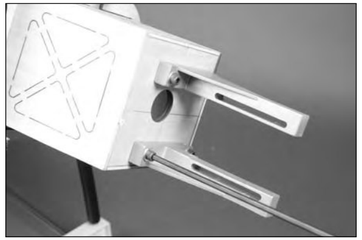
☐ **Step 3**

Remove the template from the firewall. Use a drill and 7/32-inch (5.5mm) drill bit to enlarge the holes in the firewall.



☐ **Step 4**

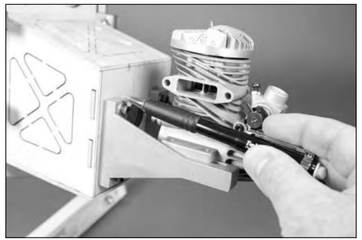
Use four 8-32 x 3/4-inch socket head bolts, four #8 washers and four 8-32 blind nuts to secure the mount rails to the firewall. Tighten the screws using a 9/64-inch hex wrench or ball driver.



Important: Make sure to use threadlock on all metal-to-metal fasteners.

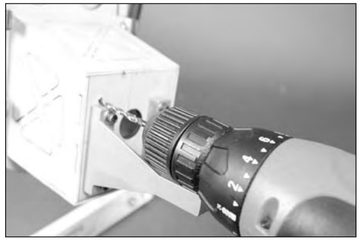
☐ **Step 5**

Slide the engine into position between the engine mount rails. Use a pencil to mark the location for the throttle pushrod wire on the firewall.



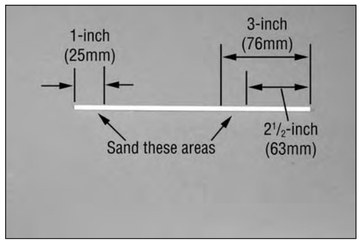
☐ **Step 6**

Remove the engine from the rails. Use a drill and 5/32-inch (4mm) drill bit to drill a hole through the firewall for the throttle pushrod tube.



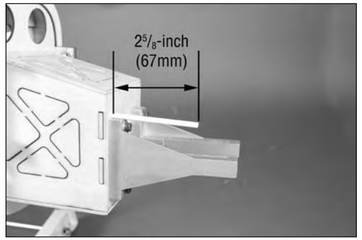
☐ **Step 7**

Use medium grit sandpaper to roughen an area that is 2½- to 3 inches (63 to 76mm) from one end, as well as the last 1-inch (25mm) of the pushrod tube as shown.



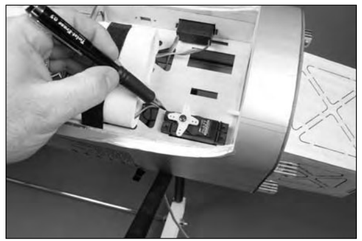
☐ **Step 8**

Slide the pushrod tube in the hole in the firewall. Position the tube so $2^5/_8$-inch (67mm) is exposed forward of the firewall. Use medium CA to glue the tube to the firewall.



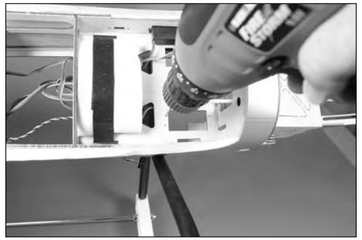
☐ **Step 9**

Position the throttle servo on the same side of the fuselage as the pushrod tube and the output of the servo facing the rear of the fuselage. Use a pencil to mark the locations for the four servo mounting screws.



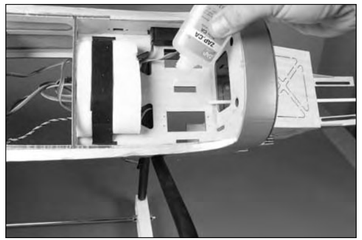
☐ **Step 10**

Remove the servo and use a drill with a 1/16-inch (1.5mm) drill bit to drill the holes necessary for the servo mounting screws.



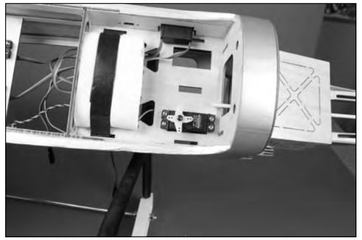
☐ **Step 11**

Place 2–3 drops of thin CA in each hole to harden the surrounding wood.



☐ **Step 12**

Use the screws provided with the servo and a #1 Phillips screwdriver to secure the throttle servo in the fuselage. Make sure to plug the throttle servo into the throttle channel of the receiver at this time.

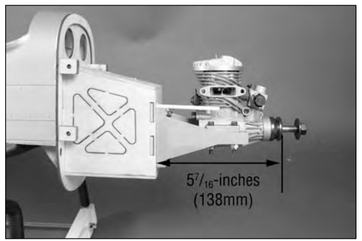


☐ **Step 13**

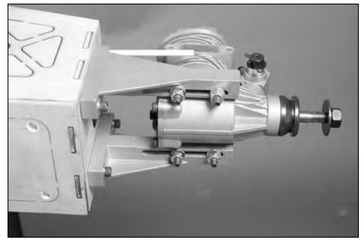
Use the radio system to center the throttle servo. With the throttle stick and trim centered, the arm should be positioned as shown in the previous photo. This will provide an equal amount of travel to both full and closed throttle.

☐ **Step 14**

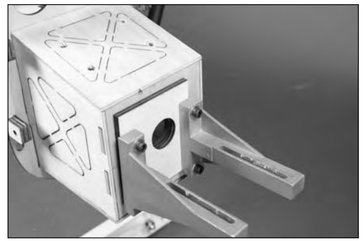
Use four 8-32 x $1^1/_4$-inch socket head bolts, four #8 washers and four 8-32 lock nuts to secure the engine. Make sure the engine is positioned so the driver washer is $5^7/_{16}$-inches (138mm) forward of the firewall. A 9/64-inch hex wrench or ball driver and a 11/32-inch nut driver or socket will make tightening the bolts quick work.



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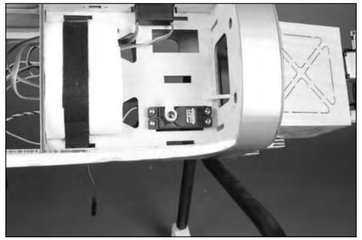
Important: A plywood spacer has been included if your engine is too short to achieve the correct distance between the drive washer and firewall. The spacer must be secured to the firewall with epoxy and placed between the mount and firewall. You will also need to purchase four 8-32 x $1^1/_4$-inch bolts to attach the mount to the firewall spacer.



Hint: You can loosen the mounts on the firewall to make it easier to install the engine. Just make sure the mounts are tight before tightening the engine mounting bolts.

☐ **Step 15**

Remove the arms from the throttle servo that will not be used so they don't interfere with the operation of the servo. Use an arm that has a hole that is 1/2-inch (13mm) from the center of the servo horn.



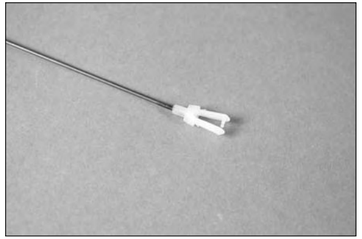
☐ **Step 16**

Slide the plywood pushrod support on the pushrod at this time. Do not glue the support until instructed to do so.



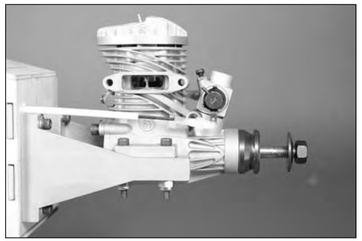
☐ **Step 17**

Thread a clevis on the $13^1/_4$-inch (335mm) pushrod wire. Make sure to slide a piece of safety tubing on the clevis.



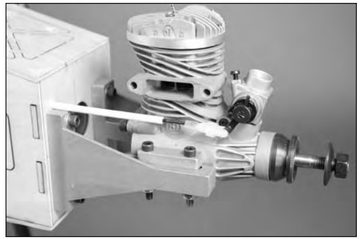
☐ **Step 18**

Insert the pushrod into the pushrod tube from the outside of the fuselage. Attach the clevis to the carburetor arm.



☐ **Step 19**

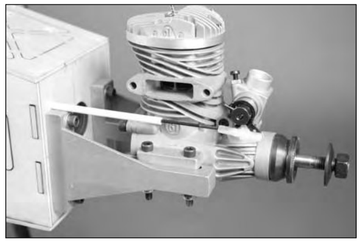
Use the radio system to move the throttle servo to the closed position. Physically close the carburetor on the engine. Make sure the direction of the servo and carburetor arm are working in unison. Use a felt-tipped pen to mark the pushrod where it crosses the outside hole of the servo arm.





☐ **Step 20**

Use the radio system to move the throttle servo to the full throttle position. Move the carburetor to the full throttle position. Check that the mark on the pushrod wire aligns with the outer hole of the carburetor arm. If it is off only a slight amount, you can use the ATV function of your radio to correct. If the line is too far forward, attach the clevis to a hole on the servo arm that is closer to the center of the servo. If it doesn't move far enough, use a servo arm that allows you to position the clevis farther from the center of the servo. Repeat the previous steps if necessary to achieve the correct amount of throw to operate the throttle on your engine.



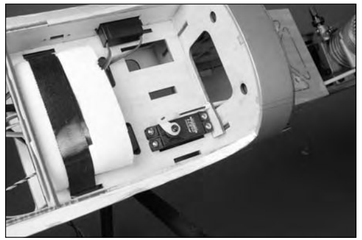


☐ **Step 21**

Use pliers to make a 90 degree bend in the pushrod wire where the mark was made in the previous steps.

☐ **Step 22**

Enlarge the hole in the servo arm that works properly for the operation of your throttle with a pin drill and 5/64-inch (2mm) drill bit. Secure the throttle pushrod to the servo horn using a pushrod keeper. Use medium CA to glue the plywood pushrod support to the fuselage in a position that will provide smooth movement of the throttle pushrod.



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Fuel Tank Installation

Required Parts

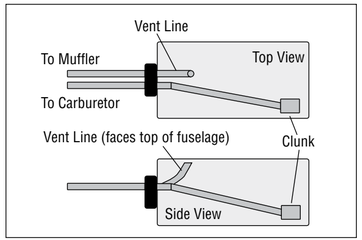
Fuselage assembly	Fuel tank
Hardwood tank support	1/4-inch (6mm) foam

Tools and Adhesives

Medium CA

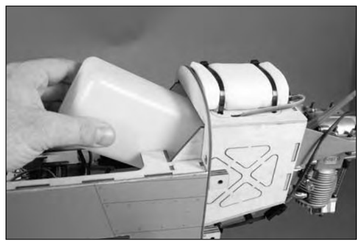
☐ **Step 1**

Inspect the fuel tank so the lines inside the tank can be identified. Note that the vent line in the tank will face to the top of the fuselage when the fuel tank is installed.



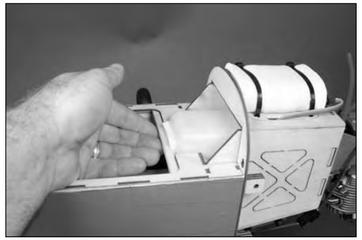
☐ **Step 2**

Slide the fuel tank in the fuselage. Make sure to guide the tubes through the hole in the firewall.



☐ **Step 3**

Cut the brace to length so it fits in the fuselage behind the tank. Place a small piece of 1/4-inch (6mm) foam between the brace and tank. Use medium CA to glue the brace in position.



Electric Motor Installation

Required Parts

Fuselage assembly	Firewall template
#8 washer (8)	Motor with hardware
Electronic speed control	
Aluminum motor standoff, 1$^{3}/_{4}$-inch (44.5mm) (4)	
Tie wrap, 8-inch (205mm) (2)	
8-32 x 3/4-inch socket head bolt (8)	

Tools and Adhesives

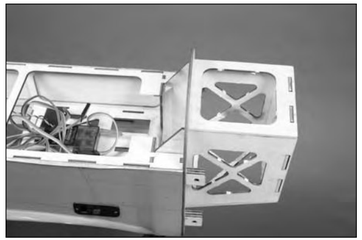
Low-tack tape	Drill
Two-sided tape	Threadlock
Hex wrench or ball driver: 9/64-inch	
Hobby knife with #11 blade	
Hex wrench or ball driver: 2.5mm, 9/64-inch	
Drill bit: 1/16-inch (1.5mm), 5/32-inch (4mm)	

Note: The motor shown installed in this section is the Power 60. Installation of the Power 90 follows the same procedure, but requires drilling the template in the correct locations and the use of the 20mm Power 90 adapter placed between the firewall and the aluminum standoffs.

☐ **Step 1**

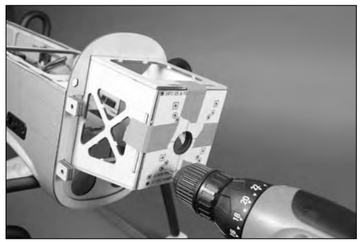
Use a hobby knife with a #11 blade to remove the plywood filler pieces from the sides, top and bottom of the engine box. This will allow air to flow into the fuselage to cool the batteries.





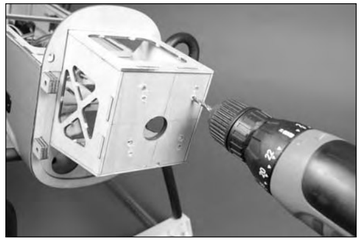
☐ **Step 2**

Locate the firewall template. Use low-tack tape to secure it to the engine box. Use a drill and 1/16-inch (1.5mm) drill bit, drill through the template and through the firewall for the mount that fits your particular motor. A paper copy of the engine template is located on Page 71 of this manual.



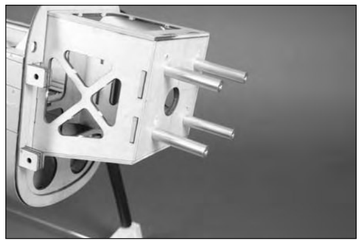
☐ **Step 3**

Remove the template from the firewall. Use a drill and 5/32-inch (4mm) drill bit to enlarge the holes in the firewall.



☐ **Step 4**

Use four 8-32 x 3/4-inch socket head bolts and four #8 washers to secure the aluminum motor standoffs to the firewall. Use a 9/64-inch hex wrench or ball driver to tighten the bolts.



Important: Make sure to use threadlock on all metal-to-metal fasteners to prevent them from vibrating loose.

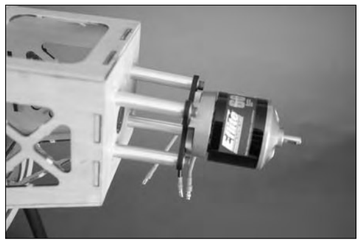
☐ **Step 5**

Use a 2.5mm hex wrench or ball driver to attach the X-mount to the motor using the screws provided with the motor. Make sure to use threadlock on these screws as well.



☐ **Step 6**

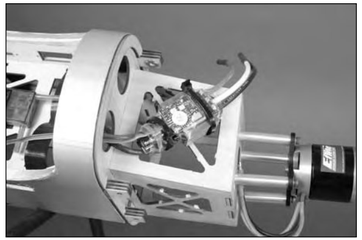
Use four 8-32 x 3/4-inch socket head bolts and four #8 washers to secure the motor to the aluminum standoffs. Use threadlock on the screws before tightening them with a 9/64-inch hex wrench or ball driver.



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☐ **Step 7**

Secure the electronic speed control to the bottom of the motor box using two-sided tape and tie wraps.



☐ **Step 8**

Connect the leads between the speed control and motor. Use tie wraps to secure the wiring so it will not get entangled in the moving parts of the motor.



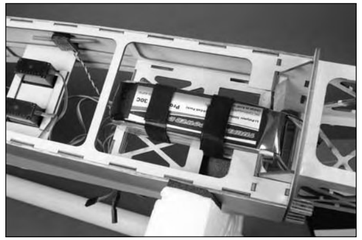
Hint: Drill a 5/32-inch (4mm) hole through the firewall so a tie wrap can be used to secure the wiring to the firewall as shown.

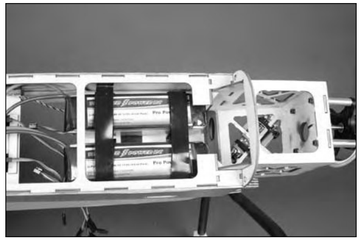
☐ **Step 9**

Plug the lead from the speed control into the throttle channel of the receiver at this time.

☐ **Step 10**

The batteries are mounted in the fuselage from the top side. Use hook and loop straps to secure them in the fuselage. It may be necessary to use hook and loop tape to keep the batteries from sliding on the battery tray in the fuselage.





Note: The second photo shows the dual battery configuration for the Power 90.

☐ **Step 11**

At this time check the operation of the motor using the radio system. It should rotate counterclockwise when viewed from the front of the fuselage. If it does not, refer to the instructions included with the speed control to correct the direction of rotation.

Cowling and Spinner Installation - Electric Version

Required Parts

Fuselage assembly	Cowling
Spinner assembly	Propeller adapter
Propeller	Propeller nut
Spinner backplate spacer	

3mm x 15mm socket head machine screw (4)

Tools and Adhesives

Rotary tool with sanding drum
Hobby knife with #11 blade
Hobby scissors
Box or open end wrench: 12mm
Hex wrench or ball driver: 2.5mm, 5/32-inch

☐ **Step 1**

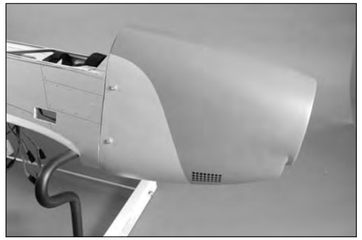
Carefully cut the opening in the front of the cowling to allow cooling air to pass through the cowling. Use a rotary tool with a sanding drum to clean up any rough edges left from the hobby scissors.



Note: Both motor options (Power 60 and Power 90) have been tested and only require the opening in the front of the cowling to allow cooling air to pass into the fuselage.

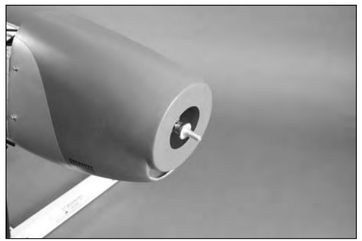
☐ **Step 2**

Slide the cowling on the front of the fuselage. Use four 3mm x 15mm socket head machine screws to secure the cowl to the front of the fuselage. A 2.5mm hex wrench or ball driver will be required to tighten the screws.



☐ **Step 3**

Slide the propeller adapter included with your particular motor on the motor shaft.



☐ **Step 4**

Position the spinner backplate on the propeller shaft. The hole may be larger than the adapter shaft, so a spacer has been included to take up any space if the shaft and hole in the backplate are different sizes.



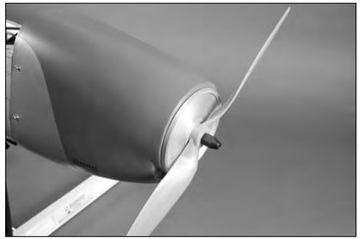
☐ **Step 5**

Slide the propeller on the propeller shaft. Make sure it is facing the correct direction to operate properly.



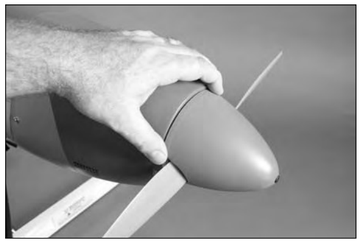
☐ **Step 6**

Use the propeller nut included with your P-51 Mustang to secure the propeller and spinner backplate to the motor. Tighten the propeller nut using a 12mm box or open end wrench. It may be necessary to use the spinner backplate spacer to take up any extra space between the hole in the backplate and propeller adapter.



☐ **Step 7**

Use the included spinner bolt to secure the spinner cone in position, Use a 5/32-inch hex wrench or ball driver to tighten the bolt to secure the spinner cone.



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Cowling and Spinner Installation - Glow Version

Required Parts

Fuselage assembly	Cowling
Spinner assembly	Propeller
Propeller nut	Backplate

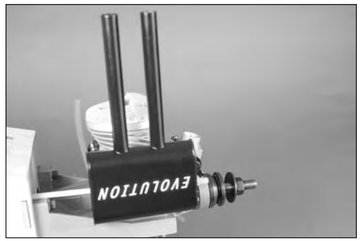
2-stroke in-cowl muffler (not included)
Fuel filler dot (not included)
3mm x 15mm socket head bolt (4)

Tools and Adhesives

Rotary tool with sanding drum
Hobby knife with #11 blade
Hobby scissors
Hex wrench or ball driver: 2.5mm, 5/32-inch

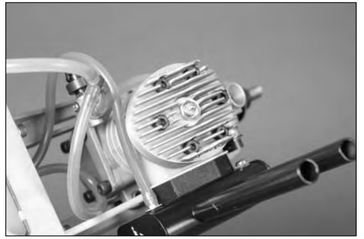
☐ **Step 1**

Attach the muffler to the engine using the hardware provided with the muffler.



☐ **Step 2**

Connect the lines from the fuel tank to the engine and muffler. Make sure the vent line goes to the muffler, and the line from the clunk to the carburetor.



Note: We used a fuel filler dot to allow for fueling the engine from the outside of the cowling. This makes fueling the engine much easier than removing the cowling before each flight.

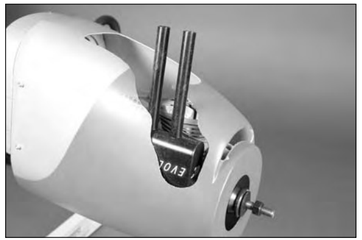
☐ **Step 3**

Carefully cut the opening in the front of the cowling to allow cooling air to pass through the cowling.



☐ **Step 4**

Use hobby scissors and a hobby knife with a #11 blade to trim the cowling to fit your particular engine and muffler combination. Make sure to leave enough gap between the cowl and engine components so they do not chafe or cause cracking to the cowling. Use a rotary tool with a sanding drum to smooth any rough edges left from the trimming process.



☐ **Step 5**

Position the spinner backplate on the propeller adapter. The hole may be larger than the adapter shaft, so a spacer has been included to take up any space if the shaft and hole in the backplate are different sizes.



☐ **Step 6**

Slide the propeller on the engine crankshaft. Make sure it is facing the correct direction to operate properly.



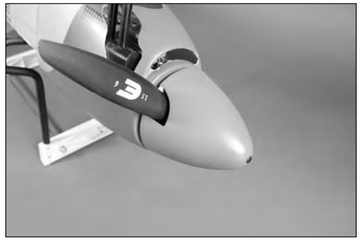
☐ **Step 7**

Use the propeller nut included with your P-51 Mustang to secure the propeller and spinner backplate to the motor. Make sure to leave a slight gap of 3/32-inch (2mm) between the backplate and front of the cowl so the backplate does not rub the cowling. Tighten the propeller nut using a 12mm box or open end wrench.

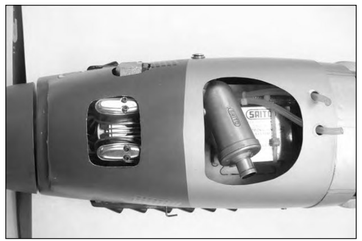


☐ **Step 8**

Use the included spinner screw to secure the spinner cone in position. Use a 5/32-inch hex wrench or ball driver to tighten the bolt to secure the spinner cone.

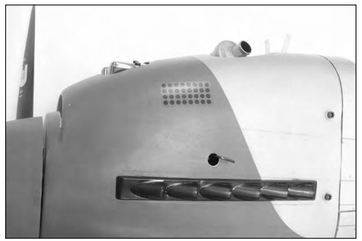


The following images show the installation of the four-stroke engine option. Make sure to cut clearance for the muffler, rocker covers and 90 degree exhaust manifold.









Note: You will need to use an L-bent piece of wire to make an extension so the high-speed needle can be adjusted from outside the cowling.

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Scale Accessory Installation

Required Parts

- Fuselage assembly
- Exhaust stack (right and left)
- Antenna mast
- Radiator exhaust
- #2 x 3/8-inch sheet metal screw (3)
- Wing assembly (right and left))
- Tail gear door (2)
- Gun fairing (2)
- Antenna mast mount
- Radiator exhaust template

Tools and Adhesives

- Low-tack tape
- Hobby scissors
- Hobby knife with #11 blade
- Felt-tipped pen
- Medium CA
- Phillips screwdriver: #1
- Canopy glue

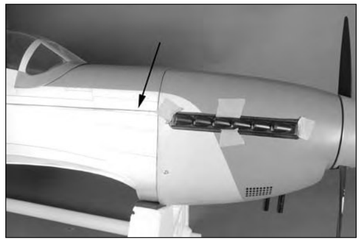
☐ **Step 1**

Use hobby scissors and a hobby knife with a #11 blade to trim the excess material from the exhaust stacks.



☐ **Step 2**

Use canopy glue to secure the exhaust stacks to the sides of the cowling. Use the photo below and those on the box to aid in correctly positioning the exhaust stacks, aligning the top of the exhaust stack with the seam between the hatch and fuselage. Use low-tack tape to keep the exhaust stacks in position until the glue fully cures.



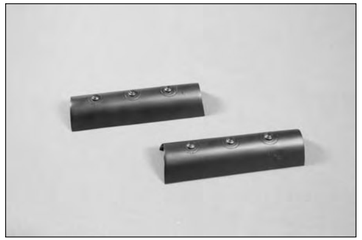
☐ **Step 3**

Use medium CA to glue the tail gear doors to the bottom of the fuselage.



☐ **Step 4**

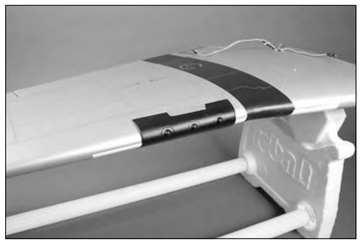
Use hobby scissors and a hobby knife with a #11 blade to trim the excess material from the gun fairings.



Hint: The guns can be individually cut out for a more scale look.

☐ **Step 5**

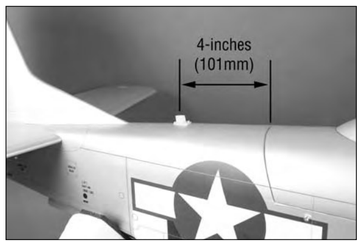
Use canopy glue to secure the gun fairings to the leading edge of the wing. Use the photo below and those on the box to aid in correctly positioning the gun fairings. Use low-tack tape to keep the gun fairings in position until the glue fully cures.





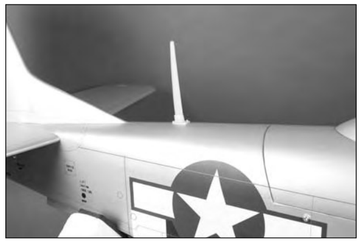
☐ **Step 6**

Use three #2 x 3/8-inch sheet metal screws and a #1 Phillips screwdriver to attach the antenna mast mount to the top of the fuselage. Position the mount so it is centered 4-inches (101mm) behind the edge of the canopy hatch as shown. Make sure to harden the holes with CA when installing the mount.



☐ **Step 7**

Insert the antenna mast into the mount. The antenna can be easily removed to prevent it from becoming damaged while transporting your aircraft.

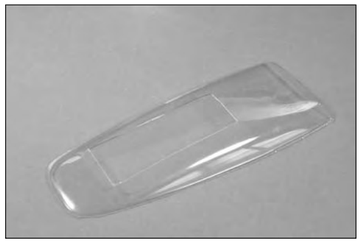


COOLING EXHAUST FOR ELECTRIC VERSION

Note: The following steps are required to install the radiator exhaust for the electric version of your aircraft. This will allow air to pass through the fuselage to provide cooling for the batteries. You can still install the exhaust for a glow-powered aircraft, but it is not necessary to do so.

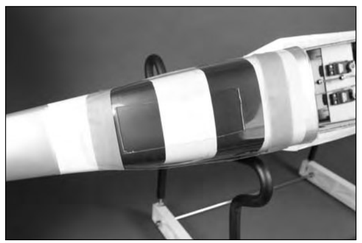
☐ **Step 8**

Use hobby scissors and a hobby knife with a #11 blade to remove the center from the radiator scoop template.



☐ **Step 9**

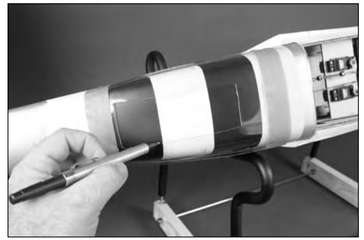
Place the radiator exhaust template on the bottom of the fuselage. It is shaped to fit snugly on the fuselage. Use low-tack tape to secure the template to the bottom of the fuselage.



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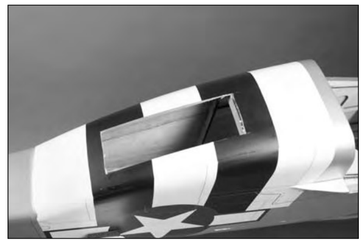
☐ **Step 10**

Use a felt-tipped pen to trace the outline of the cutout of the template on the bottom of the fuselage.



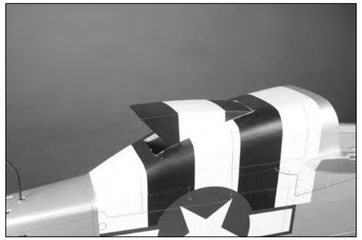
☐ **Step 11**

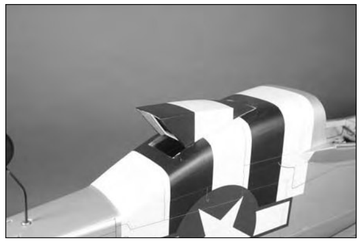
Remove the template from the fuselage. Using a hobby knife with a new #11 blade, carefully cut along the lines drawn in the previous step. It is better to trim inside the lines and fit the exhaust, rather than to cut too large and not have the exhaust fit into the opening.



☐ **Step 12**

Test fit the radiator exhaust into the opening made in the previous step. You may need to trim the opening to fit the scoop perfectly. Once fit, use medium CA to glue the scoop to the fuselage.





Wing and Belly Pan Installation

Required Parts

- Fuselage assembly
- 1/4-20 blind nut (2)
- 1/4-inch washer (2)
- Radiator scoop
- #6 x $2^{1}/_{4}$-inch wood screw (2)
- Wing assembly (right and left)
- 1/4-20 x $1^{1}/_{2}$-inch socket head machine bolt (2)
- Wing dowel (2)
- Wing tube
- Wing bolt plate (2)

Tools and Adhesives

- Hobby knife with #11 blade
- Channel lock pliers
- Phillips screwdriver: #2
- Pencil
- Hex wrench or ball driver: 3/16-inch
- Medium CA
- Thin CA
- Ruler

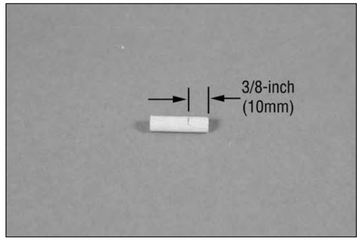
☐☐ **Step 1**

Use a hobby knife with a #11 blade to remove the covering at the leading edge of the wing for the wing dowel.



☐☐ **Step 2**

Use a ruler and pencil to mark the wing dowel 3/8-inch (10mm) from one end as shown. This is the amount the wing dowel will protrude from the leading edge of the wing.



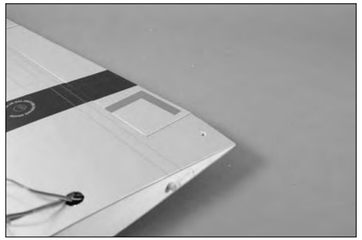
☐☐ **Step 3**

Use medium CA to glue the wing dowel in the leading edge of the wing. Make sure to use the reference line made in the previous step so the dowel extends 3/8-inch (10mm) from the leading edge of the wing.



☐☐ **Step 4**

Use a hobby knife with a #11 blade to remove the covering to expose the hole for the wing mounting bolts.



☐ **Step 5**

Repeat Steps 1 though 4 for the remaining wing panel.

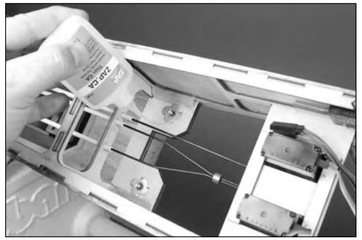
☐ **Step 6**

Use channel lock pliers to install the two 1/4-20 bland nuts in the fuselage. Make sure the nut is installed from the inside of the fuselage as shown in this step and the following step.



☐ **Step 7**

Place 2–3 drops of thin CA on each of the bards of the blind nut to keep it from coming loose inside the fuselage. Make sure not to get any CA in the threads or it will be difficult to install the wing bolts.



☐ **Step 8**

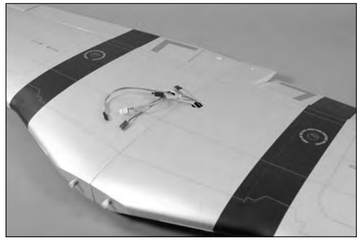
Slide the wing tube into one of the wing panels. It will only go in so far, so don't force it farther than it will easily slide.



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☐ **Step 9**

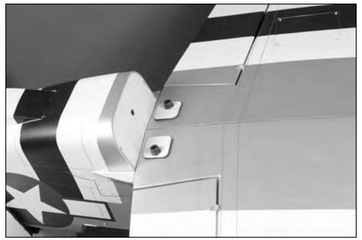
Slide the remaining wing panel on the tube and tightly against the opposite wing panel. Make sure not to get any of the servo wiring between the panels or they will not fit together.



☐ **Step 10**

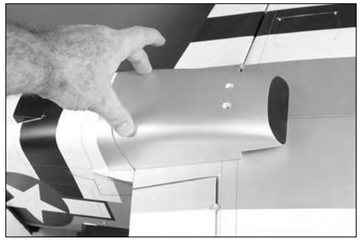
Mount the wing to the fuselage by sliding the wing dowels into the holes in the fuselage at the front of the wing. The wing is held securely to the fuselage using two wing bolt plates, two 1/4-inch washers and two 1/4-20 x $1^1/_2$-inch socket head machine bolts. Before using a 3/16-inch hex wrench or ball driver to tighten the bolts, note the orientation of the wing bolt plates in relationship to the wing in the second photo.





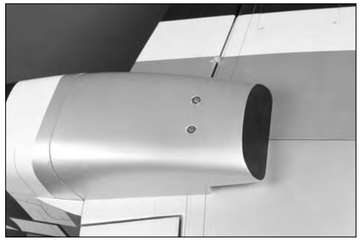
☐ **Step 11**

Position the radiator scoop on the bottom of the wing. If the wing bolts' plates are not oriented correctly the scoop will not fit tightly to the fuselage.



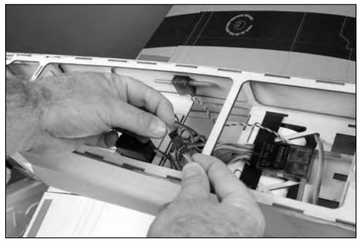
☐ **Step 12**

The radiator scoop is held in position by two #6 x $2^1/_4$-inch wood screws. The screws will self-thread into the bottom of the wing. Use a #2 Phillips screwdriver to tighten the screws.



☐ **Step 13**

Turn the airframe upright and connect the leads from the wing to the extensions from the receiver.



Cockpit Details and Installation

Required Parts

- Cockpit hatch
- Instrument panel decal
- Scale radio
- Scale backrest
- Scale pilot (optional)
- Clear canopy
- 3mm x 15mm socket head machine screw (2)

Tools and Adhesives

- Hobby scissors
- Canopy glue
- Low-tack tape
- Thin CA
- Medium CA
- Pencil
- Hex wrench or ball driver: 2.5mm
- Hobby knife with #11 blade

☐ **Step 1**

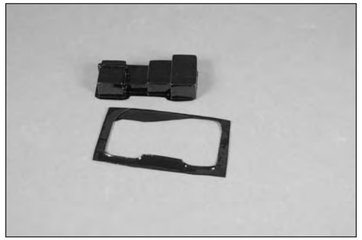
Remove the instrument panel from the decal sheet. Apply the decal as shown.



Hint: Wait a few minutes before proceeding to make sure the decal is going to adhere to the cockpit. If it does not, apply a thin bead of thin CA around the edge of the decal to keep it from peeling away from the cockpit.

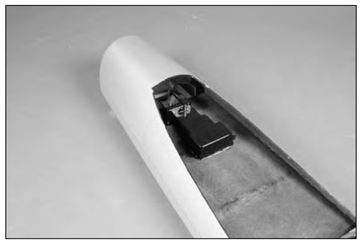
☐ **Step 2**

Use hobby scissors to trim the excess material from the scale radio. Make sure to leave a small flange so the scale radio can be glued in the cockpit.



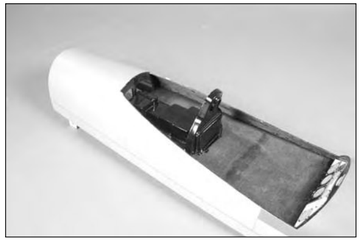
☐ **Step 3**

Position the scale radio in the cockpit area. Use medium CA to glue the scale radio to the cockpit floor as shown.



☐ **Step 4**

The scale backrest is then installed right in front of the scale radio. Use medium CA to glue the scale backrest in position.



☐ **Step 5**

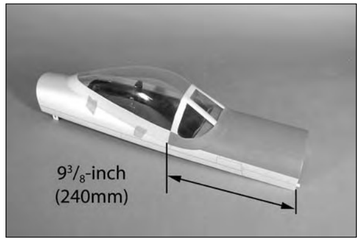
At this time you will need to decide if you want to install the optional scale pilot. Use the photos on the box to determine the correct location for the pilot. Use medium CA to glue the pilot in position in the cockpit.



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☐ **Step 6**

Use medium grit sandpaper to lightly sand the inside edge of the canopy where it contacts the canopy hatch. Use a paper towel and rubbing alcohol to remove any debris or oils after sanding. Apply a thin bead of canopy glue around the bottom inside edge of the canopy. Position the canopy on the cockpit hatch so the rear edge of the frame around the canopy is $9^3/_8$-inch (240mm) behind the front edge of the hatch. Use low-tack tape to hold the canopy in position until the glue fully cures.



☐ **Step 7**

Position the canopy hatch back on the fuselage. Remember to insert the pins at the front first.



☐ **Step 8**

There are two holes in the fuselage at the rear of the canopy hatch. Use a hobby knife and #11 blade to remove the covering. The canopy is secured using two 3mm x 15mm socket head machine screws that are tightened using a 2.5mm hex wrench or ball driver.



☐ **Step 9**

A pencil can be used to draw the scale panels lines and rivets on the cowling. Use a flexible ruler to help in aligning the panels lines to those you will be drawing on the cowling. For more details visit www.horizonhobby.com.



☐ **Step 10**

If you have purchased one of the optional decal sheets, use the box or go to the Horizon Hobby website (http://www.horizonhobby.com/Products/Default.aspx?ProdID=HAN2420) for the P-51 Mustang to assist in locating each of the decals. Mix a drop of dish washing detergent in a spray bottle and lightly mist the area where the decal will be placed so it can be slid on the airframe. Use a paper towel to squeegee the decal and remove the majority of the liquid from under the decal. Allow the decal to set overnight to remove the remaining liquid and bubbles.

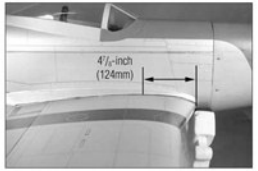
Center of Gravity

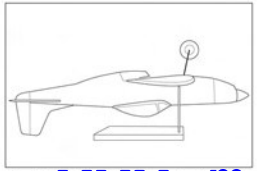
An important part of preparing the aircraft for flight is properly balancing the model.

Caution: Do not inadvertently skip this step!

The recommended Center of Gravity (CG) location for the your model is 4 7/8-inch (124mm) back from the leading edge of the wing. Mark the location for the Center of Gravity on the bottom of the wing next to the fuselage as shown. The CG range for your model is 4 3/8 to 5 inches (117mm to 127mm) from the leading edge of the wing

When balancing your model, support the plane inverted at the marks made on the bottom of the wing with your fingers or a commercially available balancing stand. This is the correct balance point for your model. You may need to add a small amount of weight to either the front or back of the fuselage to achieve the correct balance.





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

Control Throws

☐ **Step 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.

☐ **Step 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.

☐ **Step 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.

☐ **Step 4**

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

Aileron High Rate

Up	¾ inch	(19mm)	18 degrees
Down	¾ inch	(19mm)	18 degrees

Aileron Low Rate

Up	1/2 inch	(13mm)	13 degrees
Down	1/2 inch	(13mm)	13 degrees

Elevator High Rate

Up	5/8 inch	(16mm)	15 degrees
Down	5/8 inch	(16mm)	15 degrees

Elevator Low Rate

Up	1/2 inch	(13mm)	12 degrees
Down	1/2 inch	(13mm)	12 degrees

Rudder High Rate

Left	1 inch	(25mm)	15 degrees
Right	1 inch	(25mm)	15 degrees

Rudder Low Rate

Left	7/8 inch	(22mm)	13 degrees
Right	7/8 inch	(22mm)	13 degrees

Flap Positions

Up	Aligned with wing trailing edge		
Mid	7/8 inch	(22mm)	22 degrees
Down	1-3/4 inch	(44mm)	43 degrees

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

These are general guidelines measured from our own flight tests. You can experiment with higher or lower 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.

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Flight Preparations

Flight preparations must be checked each time you travel to the flying field. Because your model will encounter a variety of situations, it is best to keep an eye on the various components of your model to keep it in the best flying condition.

☐ **Checking the Frequency**

When using a Spektrum radio system, follow the guidelines for use of DSM radio systems at your particular field.

☐ **Checking the Controls**

Before starting your engine, check to make sure the controls are operating in the correct directions and the linkages and surfaces are not binding anywhere. Also look at the clevises and clevis retainers to make sure they are secure and will not come loose or fail in flight.

☐ **Fueling your Model**

Fill the fuel tank with the proper fuel. Fill the tank by connecting the fuel pump to the line going to the needle valve or to the fuel dot on the side of the cowling. Disconnect the fuel line attached to the pressure fitting of the muffler; your tank is full when fuel begins to run out of the pressure line. Reconnect the fuel lines to the needle valve assembly or insert the plug into the fuel dot and connect the line to the muffler.

Note: It is very important to reconnect the lines to the correct place. If they are reconnected incorrectly, the engine will not run properly.

Flying Your P-51 Mustang

Take Off

Prior to your first flight, we recommend that you do some low-speed taxi tests. Use these tests to center the tail wheel steering to allow for a takeoff straight down the runway. Once you have finished this, be sure and take a minute to refuel the tanks and take one last look at the airframe to be sure all screws and control linkages are secure.

The flaps are not needed if you are taking off from a hard packed runaway such as asphalt; even fields with short grass do not require the use of flaps. If you are taking off from a grass field that is rough or has not been mowed recently, then we recommend that you use the half-flap position and allow a little extra takeoff roll.

Once you have the P-51airborne, maintain a shallow rate of climb and allow the model to gain speed prior to making the first turn. The flaps should be retracted at this point and you should be entering into the normal traffic pattern. If you are using retracts, then we suggest that you retract the landing gear prior to retracting the flaps.

Familiarize yourself with the flight characteristics of the P-51 and practice flying the model at a safe height using both the mid and full flap positions. Be sure to reduce the throttle and allow the P-51 to slow a bit prior to lowering the flaps into the first or mid position. Then lower the flaps to the full position and adjust the power to maintain straight and level flight.

Landing

You will find that the P-51 will slightly balloon or pitch up as you deploy full flaps.

If you allow the model to slow prior to lowering the flaps, this balloon or pitch up will be minimized. You will find that the P-51 benefits from a small amount of down elevator mixed with the flaps when the flaps are extended to the full down position. The amount of down elevator needed varies and is based upon your final center of gravity. So begin with a small amount of down elevator (around 2%) mixed to the flaps and then adjust as needed from there.

To begin the landing approach you will need to first lower the throttle and reduce your flight speed. We recommend this take place on the downwind leg of your flight and that you have the flaps in the full down position prior to beginning your turn to the base leg. Allow the P-51 to begin a slow downward descent and gradually allow the airspeed to bleed off. The idea is to lose altitude and maintain airspeed by keeping the nose down in the turn. As you begin your upwind approach, use the throttle to maintain your sink rate. As you pass over the end of the runway, reduce the throttle to idle and begin to add up elevator and begin your flare to landing. Should you overshoot the landing, then gradually add power and use the rudders to keep the P-51 on track. Keep the flaps in the full down position and begin to set up for a second attempt.

Many safe and happy landings,

The Hangar 9 Team

Maintaining Your Model

The following is a check list that you should follow every time you have completed a flying session with your model. Doing so will keep your aircraft in the best flying condition.

Clean Up

After a long flying session with your model, you will want to clean it up before loading it into your vehicle to head home. Use a cleaner and a paper towel to wipe down the exterior of your plane, removing the fuel residue. Remember, a clean plane will last longer since the fuel won't be allowed to soak into any exposed wood.

Checking the Propeller

Check to make sure the propeller is tightly secured to the engine. If not, remove the spinner and use a crescent wrench to tighten it back down. If you have had any not-so-great landings, you will want to inspect the propeller for any damage. Small nicks and scratches can quickly become fractures, causing the propeller to be unsafe for flight. Always carry a few spare propellers so a damaged propeller can be replaced at the field, increasing your flying time.

Checking the Clevises

Inspect the aileron, elevator and rudder clevises to make sure they are connected and in good working order. If you find a clevis that is showing signs of wear or is broken, replace it with a new clevis. Also check the nylon connectors at the servo for any wear or damage. If they look worn or in bad shape, replace them as well.

Checking the Control Horns

Inspect the control horns to make sure they have not crushed the wood of the control surface. If so, remove the control horn screws to remove the control horn. Place 2–3 drops of thin CA into each of the screw holes. In addition, use a T-pin to poke small holes in the covering in the area where the control horn mounts, then saturate the area with thin CA. This will harden the wood and give the control horns a solid surface to be mounted to.

Checking the Wheel Collars

Check the setscrews on the wheel collars for the main and tail wheel to make sure they are not loose. Use a 1.5mm hex wrench to tighten the setscrews. It is suggested if they loosen frequently to remove them, apply threadlock to the setscrews, then secure the wheel collars back into position. The threadlock and hex wrench are included in the kit for this purpose.

Check the Muffler Bolts

Use a 2.5mm hex wrench (Evolution 2-stroke) or box wrench (Saito 4-stroke) to make sure the hardware holding the muffler onto the engine is tight and has not vibrated loose during flight.

Check the Engine Mount Bolts

Remove the spinner and propeller from the engine. Remove the exhaust stacks from the fuselage, and then remove the cowling from the fuselage. Remove the muffler from the engine, and then use a Phillips screwdriver to make sure the four bolts securing the engine to the mount are tight.

Safety Do's and Don'ts for Pilots

- Ensure that your batteries have been properly charged prior to your initial flight.
- Keep track of the time the system is turned on so you will know how long you can safely operate your system.
- Perform a ground range check prior to the initial flight of the day. See the "Daily Flight Checks Section" for information.
- 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 point the transmitter antenna directly toward the model. The radiation pattern from the tip of the antenna is inherently low.
- 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.

Dual Rate Recommendations

- We recommend that the rudder dual rate be set to Low for takeoff to help minimize overcorrection during the takeoff roll.
- We recommend the rudder dual rate be set to High for landing to help maintain heading as the model transitions from flying speed to taxi speeds.
- Elevator and Aileron dual rates should be adjusted for personal feel and also if there is any unusual wind conditions.

Daily Flight Checks

☐ **Step 1**

Check the battery voltage on both the transmitter and the receiver battery packs. Do not fly below 4.3V on the transmitter if you are using a Spektrum transmitter that uses 4-cells to power the transmitter. Do not fly below 9.5V on the transmitter if you are using a JR or Spektrum transmitter that uses 8-cells to power the transmitter. Do not fly if the receiver pack is at or below 4.7V. To do so can crash your aircraft.

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

☐ **Step 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.

☐ **Step 3**

Ensure that all surfaces are moving in the proper manner.

☐ **Step 4**

Perform a ground range check before each day's flying session.

☐ **Step 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 warn you at this time.

☐ **Step 6**

Check that all trim levers are in the proper location.

☐ **Step 7**

All servo pigtails and switch harness plugs should be secured in the receiver. Make sure that the switch harness moves freely in both directions.

Age Requirements

Age Recommendation: 14 years or over. This is not a toy. This product is not intended for use by children without direct adult supervision.

Safety, Precautions and Warnings

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

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

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

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

Warranty Information

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

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

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

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

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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).

SAFETY PRECAUTIONS

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

QUESTIONS, ASSISTANCE, AND REPAIRS

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, or call 877.504.0233 toll free to speak to a service technician.

INSPECTION OR REPAIRS

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

WARRANTY INSPECTION AND REPAIRS

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

NON-WARRANTY REPAIRS

Should your repair not be covered by warranty the repair will be completed and payment will be required without notification or estimate of the expense unless the expense exceeds 50% of the retail purchase cost. By submitting the item for repair you are agreeing to payment of the repair without notification. Repair estimates are available upon request. You must include this request with your repair. Non-warranty repair estimates will be billed a minimum of 1/2 hour of labor. In addition you will be billed for return freight. Please advise us of your preferred method of payment. Horizon accepts money orders and cashiers checks, as well as Visa, MasterCard, American Express, and Discover cards. If you choose to pay by credit card, please include your credit card number and expiration date. Any repair left unpaid or unclaimed after 90 days will be considered abandoned and will be disposed of accordingly. Please note: non-warranty repair is only available on electronics and model engines.

United States

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

Horizon Service Center
4105 Fieldstone Road
Champaign, Illinois 61822
USA

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

Horizon Product Support
4105 Fieldstone Road
Champaign, Illinois 61822
USA

Please call 877-504-0233 or e-mail us at productsupport@horizonhobby.com with any questions or concerns regarding this product or warranty.

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United Kingdom

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

Horizon Hobby UK
Units 1-4 Ployters Rd
Staple Tye
Harlow, Essex
CM18 7NS
United Kingdom

Please call +44 (0) 1279 641 097 or e-mail us at sales@horizonhobby.co.uk with any questions or concerns regarding this product or warranty.

Germany

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

Horizon Technischer Service
Hamburger Strasse 10
25335 Elmshorn
Germany

Please call +49 4121 46199 66 or e-mail us at service@horizonhobby.de with any questions or concerns regarding this product or warranty.

CE 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.



2009 Official Academy of Model Aeronautics Safety Code

GENERAL

1. A model aircraft shall be defined as a non-human-carrying device capable of sustained flight in the atmosphere. It shall not exceed limitations established in this code and is intended to be used exclusively for recreational or competition activity.
2. The maximum takeoff weight of a model aircraft, including fuel, is 55 pounds, except for those flown under the AMA Experimental Aircraft Rules.
3. I will abide by this Safety Code and all rules established for the flying site I use. I will not willfully fly my model aircraft in a reckless and/or dangerous manner.
4. I will not fly my model aircraft in sanctioned events, air shows, or model demonstrations until it has been proven airworthy.
5. I will not fly my model aircraft higher than approximately 400 feet above ground level, when within three (3) miles of an airport without notifying the airport operator. I will yield the right-of-way and avoid flying in the proximity of full-scale aircraft, utilizing a spotter when appropriate.
6. I will not fly my model aircraft unless it is identified with my name and address, or AMA number, inside or affixed to the outside of the model aircraft. This does not apply to model aircraft flown indoors.
7. I will not operate model aircraft with metal-blade propellers or with gaseous boosts (other than air), nor will I operate model aircraft with fuels containing tetranitromethane or hydrazine.
8. I will not operate model aircraft carrying pyrotechnic devices which explode burn, or propel a projectile of any kind. Exceptions include Free Flight fuses or devices that burn producing smoke and are securely attached to the model aircraft during flight. Rocket motors up to a G-series size may be used, provided they remain firmly attached to the model aircraft during flight. Model rockets may be flown in accordance with the National Model Rocketry Safety Code; however, they may not be launched from model aircraft. Officially designated AMAAir Show Teams (AST) are authorized to use devices and practices as defined within the Air Show Advisory Committee Document.
9. I will not operate my model aircraft while under the influence of alcohol or within eight (8) hours of having consumed alcohol.
10. I will not operate my model aircraft while using any drug which could adversely affect my ability to safely control my model aircraft.
11. Children under six (6) years old are only allowed on a flightline or in a flight area as a pilot or while under flight instruction.
12. 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.

RADIO CONTROL

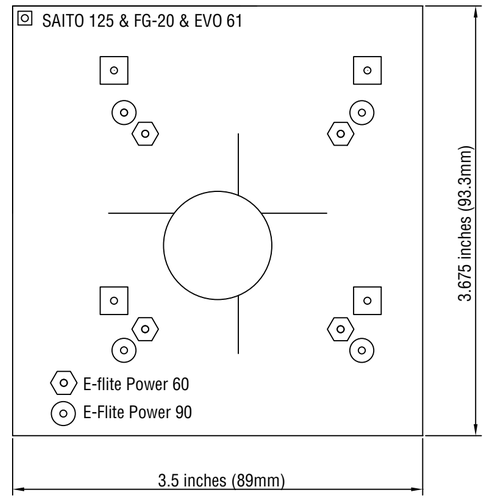
1. All model flying shall be conducted in a manner to avoid over flight of unprotected people.
2. I will have completed a successful radio equipment ground-range check before the first flight of a new or repaired model aircraft.
3. I will not fly my model aircraft in the presence of spectators until I become a proficient flier, unless I am assisted by an experienced pilot.
4. At all flying sites a line must be established, in front of which all flying takes place. Only personnel associated with flying the model aircraft are allowed at or in front of the line. In the case of airshows demonstrations straight line must be established. An area away from the line must be maintained for spectators. Intentional flying behind the line is prohibited.
5. I will operate my model aircraft using only 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.

6. I will not knowingly operate my model aircraft within three (3) miles of any preexisting flying site without a frequency-management agreement. A frequencymanagement agreement may be an allocation of frequencies for each site, a day-use agreement between sites, or testing which determines that no interference exists. A frequency-management agreement may exist between two or more AMA chartered clubs, AMA clubs and individual AMA members, or individual AMA members. Frequency-management agreements, including an interference test report if the agreement indicates no interference exists, will be signed by all parties and copies provided to AMA Headquarters.
7. With the exception of events flown under official AMA rules, no powered model may be flown outdoors closer than 25 feet to any individual, except for the pilot and located at the flightline.
8. 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.
9. Radio-controlled night flying is limited to low-performance model aircraft (less than 100 mph). The model aircraft must be equipped with a lighting system which clearly defines the aircraft's attitude and direction at all times.
10. The operator of a radio-controlled model aircraft shall control it during the entire flight, maintaining visual contact without enhancement other than by corrective lenses that are prescribed for the pilot. No model aircraft shall be equipped with devices which allow it to be flown to a selected location which is beyond the visual range of the pilot.

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Hangar 9 P-51 Mustang 60 ARF Assembly Manual

Engine Mounting Template



HANGAR 9®

Fly First Class™

HORIZON HOBBY

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