

# SPORT SCALE MUSTANG



## INSTRUCTION MANUAL

### SPECIFICATIONS

<b>Wingspan:</b> 56 in [1420mm]	<b>Length:</b> 50 in [1270mm]	<b>Engine:</b> .40-.55 cu in [7-9cc] two-stroke, .70 cu in [11.5cc] four-stroke, RimFire .55 (42-60-480) brushless out-runner motor
<b>Wing Area:</b> 543 in <sup>2</sup> [35 dm <sup>2</sup> ]	<b>Weight:</b> 6.5–7.25 lb [2950–3290 g]	
<b>Wing Loading:</b> 28–31 oz/ft <sup>2</sup> [85–95 g/dm <sup>2</sup> ]	<b>Radio:</b> 4-channel minimum with 4-5 servos & standard size receiver	

### WARRANTY

Great Planes® Model Manufacturing Co. guarantees this kit to be free from defects in both material and workmanship at the date of purchase. This warranty does not cover any component parts damaged by use or modification. **In no case shall Great Planes' liability exceed the original cost of the purchased kit.** Further, Great Planes reserves the right to change or modify this warranty without notice.

In that Great Planes has no control over the final assembly or material used for final assembly, no liability shall be assumed nor accepted for any damage resulting from the use by the user of the final user-assembled product. By the act of using the user-assembled product, the user accepts all resulting liability.

**If the buyer is not prepared to accept the liability associated with the use of this product, the buyer is advised to return**

**this kit immediately in new and unused condition to the place of purchase.**

To make a warranty claim send the defective part or item to Hobby Services at the address below:

#### Hobby Services

3002 N. Apollo Dr. Suite 1  
Champaign IL 61822 USA

Include a letter stating your name, return shipping address, as much contact information as possible (daytime telephone number, fax number, e-mail address), a detailed description of the problem and a photocopy of the purchase receipt. Upon receipt of the package the problem will be evaluated as quickly as possible.

READ THROUGH THIS MANUAL BEFORE STARTING CONSTRUCTION. IT CONTAINS IMPORTANT INSTRUCTIONS AND WARNINGS CONCERNING THE ASSEMBLY AND USE OF THIS MODEL.



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## INTRODUCTION

Congratulations on the purchase of the Great Planes Sport Scale P-51 ARF! If you prefer to spend more time flying and less time building, then you have made the perfect choice for your next model. The Sport Scale P-51 is a bolt-together design with very little measuring necessary and is a virtually

glue-free assembly! And because the parts are bolted together, replacement parts can be installed in a snap should your plane suffer from a rough or unexpected landing.

The P-51 flies great with both glow and electric power systems. Like most current Great Planes models, the P-51 includes all the necessary hardware to mount your brushless motor and ESC. A magnetic battery hatch makes battery changing take only a moment. With economy in mind, only low-cost standard servos are needed with a minimum of servo extensions. Even a pre-assembled plywood brushless motor mount is included to save you the cost of purchasing an aluminum mount. In the air, the P-51 is a great sport flyer for both the veteran pilot or as a first low-wing plane.

For the latest technical updates or manual corrections to the Great Planes Sport Scale P-51 ARF, visit the Great Planes web site at [www.greatplanes.com](http://www.greatplanes.com). Open the "Airplanes" link, then select the Sport Scale P-51 ARF. If there is new technical information or changes to this model a "tech notice" box will appear in the upper left corner of the page.

## AMA

We urge you to join the AMA (Academy of Model Aeronautics) and a local R/C club. The AMA is the governing body of model aviation and membership is required to fly at AMA clubs. Though joining the AMA provides many benefits, one of the primary reasons to join is liability protection. Coverage is not limited to flying at contests or on the club field. It even applies to flying at public demonstrations and air shows. Failure to comply with the Safety Code (excerpts printed in the back of the manual) may endanger insurance coverage. Additionally, training programs and instructors are available at AMA club sites to help you get started the right way. There are over 2,500 AMA chartered clubs across the country. Contact the AMA at the address or toll-free phone number below:

### Academy of Model Aeronautics

5151 East Memorial Drive  
Muncie, IN 47302-9252

Tele. (800) 435-9262  
Fax (765) 741-0057



Or via the Internet at: <http://www.modelaircraft.org>

**IMPORTANT!!!** Two of the most important things you can do to preserve the radio controlled aircraft hobby are to avoid flying near full-scale aircraft and avoid flying near or over groups of people.

## SAFETY PRECAUTIONS

**Protect Your Model, Yourself & Others.....  
Follow These Important Safety Precautions**

1. Your Sport Scale P-51 ARF should not be considered a toy, but rather a sophisticated, working model that functions very much like a full-size airplane. Because of

its performance capabilities, the P-51, if not assembled and operated correctly, could possibly cause injury to yourself or spectators and damage to property.

2. You must assemble the model **according to the instructions**. Do not alter or modify the model, as doing so may result in an unsafe or unflyable model. In a few cases the instructions may differ slightly from the photos. In those instances the written instructions should be considered as correct.
3. You must take time to **build straight, true and strong**.
4. You must use an R/C radio system that is in first-class condition, and a correctly sized engine and components (fuel tank, wheels, etc.) throughout the building process.
5. You must correctly install all R/C and other components so that the model operates correctly on the ground and in the air.
6. You must check the operation of the model before **every** flight to insure that all equipment is operating and that the model has remained structurally sound. Be sure to check clevises or other connectors often and replace them if they show any signs of wear or fatigue.
7. If you are not an experienced pilot or have not flown this type of model before, we recommend that you get the assistance of an experienced pilot in your R/C club for your first flights. If you're not a member of a club, your local hobby shop has information about clubs in your area whose membership includes experienced pilots.
8. While this kit has been flight tested to exceed normal use, if the plane will be used for extremely high stress flying, such as racing, or if an engine larger than one in the recommended range is used, the modeler is responsible for taking steps to reinforce the high stress points and/or substituting hardware more suitable for the increased stress.
9. **WARNING:** The cowl included in this kit is made of fiberglass, the fibers of which may cause eye, skin and respiratory tract irritation. Never blow into a part to remove fiberglass dust, as the dust will blow back into your eyes. Always wear safety goggles, a particle mask and rubber gloves when grinding, drilling and sanding fiberglass parts. Vacuum the parts and the work area thoroughly after working with fiberglass parts.

We, as the kit manufacturer, provide you with a top quality, thoroughly tested kit and instructions, but ultimately the quality and flyability of your finished model depends on how you build it; therefore, we cannot in any way guarantee the performance of your completed model, and no representations are expressed or implied as to the performance or safety of your completed model.

**Remember: Take your time and follow the instructions to end up with a well-built model that is straight and true.**

## DECISIONS YOU MUST MAKE

This is a partial list of items required to finish the Sport Scale P-51 ARF that may require planning or decision making before starting to build. Order numbers are provided in parentheses.

### Radio Equipment

The P-51 requires a minimum 4-channel radio system with four 44 oz.-in. [3.2 kg-cm] minimum standard sized servos. If you are installing a glow engine, an additional standard servo is required for the throttle.

In addition, two 6" [152mm] servo extensions are required for the aileron servos. If you are using a radio system that does not support mixing functions, a Y-harness will also be required to connect the aileron servos to the receiver.

Recommended part numbers for the radio components are provided below:

- Futaba® S3004 Standard Ball Bearing Servo (FUTM0004)
- Hobbico® 6" Extension Futaba J (HCAM2000)
- Futaba® Dual Servo Extension 6" J (FUTM4130)
- Ernst Charge Receptacle Futaba J FM (ERNM3001)

### Power System Recommendations

The recommended engine/motor size for the P-51 is a .40-.55 cu in [7-9 cc] two-stroke engine, .70 cu in [11.5cc] four-stroke engine, or a RimFire™ .55 (42-60-480) brushless outrunner motor. Engine and motor order numbers are provided below:

- O.S.® .46AX ABL w/Muffler (OSMG0547)
- Great Planes RimFire .55 (42-60-480) Outrunner Brushless (GPMG4715)

If using the recommended brushless motor, a 60A brushless ESC is required:

- Great Planes Silver Series 60A Brushless ESC High Voltage (GPMM1850)

### Propeller

If you are installing a glow engine, choose a prop based on the engine manufacturer's recommendation. If you are installing the recommended RimFire brushless motor, we suggest a 13x10E APC propeller.

- APC 13x10 Electric Propeller (APCQ4140)

### Batteries and Charger

For a brushless motor installation, two 3350mAh 11.1V Lithium Polymer battery packs connected in series are recommended. Order numbers for the battery packs and series connector are provided below:

- Great Planes LiPo 3350mAh 11.1V 25C Discharge w/Balance (GPMP0541)
- Great Planes Series Deans® U 2 to 1 Adapter (GPMM3143)

A cell balancer is required for the LiPo battery pack listed above:

- Great Planes ElectriFly™ Equinox™ LiPo Cell Balancer 1-5 (GPMM3160)

A suitable charger is also required. The Great Planes PolyCharge4™ is designed for LiPo packs only, but is able to charge four LiPo packs simultaneously. The Great Planes Triton2™ charger will only charge one pack at a time, but is capable of charging NiCd, NiMH, LiPo, and Pb acid batteries. Order numbers for both are provided below:

- Great Planes PolyCharge4 DC Only 4 Output LiPo Charger (GPMM3015)

**OR**

- Great Planes ElectriFly Triton2 DC Comp Peak Charger (GPMM3153)

## ADDITIONAL ITEMS REQUIRED

### Required Hardware & Accessories

This is the list of hardware and accessories required to finish the Sport Scale P-51 ARF. Order numbers are provided in parentheses:

- R/C foam rubber 1/4" [6mm] (HCAQ1000)
- 3' [900mm] standard silicone fuel tubing (GPMQ4131) (glow engine only)

### Adhesives & Building Supplies

This is the list of Adhesives and Building Supplies that are required to finish the Sport Scale P-51 ARF:

- 1/2 oz. [15g] Thin Pro™ CA (GPMR6001)
- Great Planes Pro Epoxy 6-Minute Formula 4 oz (GPMR6042)
- Threadlocker thread locking cement (GPMR6060)
- Denatured alcohol (for epoxy clean up)
- Drill bits: 1/16" [1.6mm], 5/64" [2mm]
- Great Planes Tap & Drill Set 6-32 (GPMR8102) (Glow engine installation only)
- Tap handle (GPMR8120) (Glow engine installation only)
- Rotary tool with cutting bit
- Revell® Premium Soft Handle Knife w/Blades (5) (RMXR6900)
- Top Flite® MonoKote® sealing iron (TOPR2100)
- Top Flite Hot Sock™ iron cover (TOPR2175)
- Panel Line Pen (TOPQ2510)

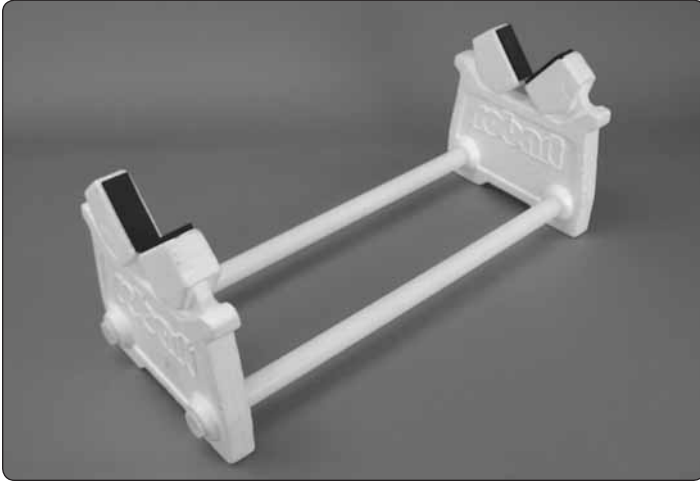
## Optional Supplies & Tools

Here is a list of optional tools that will help you build the Sport Scale P-51 ARF:

- 1/2 oz. [15g] Thick Pro CA- (GPMR6013)
- Pro 30-minute epoxy (GPMR6047)
- 1/2 oz. [15g] Medium Pro CA+ (GPMR6007)
- 2 oz. [57g] spray CA activator (GPMR6035)
- 4 oz. [113g] aerosol CA activator (GPMR6034)
- CA applicator tips (HCAR3780)
- CA debonder (GPMR6039)
- Pro 6-minute epoxy (GPMR6045)
- Epoxy brushes 6, (GPMR8060)
- Mixing sticks (GPMR8055)
- Mixing cups (GPMR8056)
- Pliers with wire cutter (HCAR0630)
- T.A. Emerald Performance Duster Compressed Air (TAEC1060)
- Rotary tool reinforced cut-off wheel (GPMR8200)
- Servo horn drill (HCAR0698)
- Hobby Heat™ micro torch II (HCAR0755)
- Dead Center™ Engine Mount Hole Locator (GPMR8130)
- Precision Magnetic Prop Balancer (TOPQ5700)
- AccuThrow™ Deflection Gauge (GPMR2405)
- CG Machine™ (GPMR2400)
- Hobbico Flexible 18" Ruler Stainless Steel (HCAR0460)
- Top Flite MonoKote trim seal iron (TOPR2200)
- Top Flite MonoKote heat gun (TOPR2000)
- Hobbico Pin Vise 1/16 Collet w/6 Bits (HCAR0696)
- Hobbico 8-Piece Ball Tip Hex L Wrench SAE (HCAR0520)
- Hobbico 7-Piece Ball Tip Hex L Wrench Metric (HCAR0521)
- Great Planes Clevis Installation Tool (GPMR8030)



## Building Stand



A building stand or cradle comes in handy during the build. We use the Robart Super Stand II (ROBP1402) for all our projects in R&D, and it can be seen in pictures throughout this manual.

## IMPORTANT BUILDING NOTES

- **Photos** and **sketches** are placed **before** the step they refer to. Frequently you can study photos in following steps to get another view of the same parts.
- The stabilizer and wing incidences and engine thrust angles have been factory-built into this model. However, some technically-minded modelers may wish to check these measurements anyway. To view this information visit the web site at [www.greatplanes.com](http://www.greatplanes.com) and click on "Technical Data." Due to manufacturing tolerances which will have little or no effect on the way your model will fly, please expect slight deviations between your model and the published values.

## KIT INSPECTION

Before starting to build, take an inventory of this kit to make sure it is complete, and inspect the parts to make sure they are of acceptable quality. If any parts are missing or are not of acceptable quality, or if you need assistance with assembly, contact **Product Support**. When reporting defective or missing parts, use the part names exactly as they are written in the Kit Contents list.

### Great Planes Product Support

3002 N Apollo Drive, Suite 1 Ph (217) 398-8970, ext. 5  
Champaign, IL 61822 Fx (217) 398-7721

E-mail: [airsupport@greatplanes.com](mailto:airsupport@greatplanes.com)

## ORDERING REPLACEMENT PARTS

Replacement parts for the Great Planes Sport Scale P-51 ARF are available using the order numbers in the **Replacement Parts List** that follows. The fastest, most economical service can be provided by your hobby dealer or mail-order company.

To locate a hobby dealer, visit the Hobbico web site at [www.hobbico.com](http://www.hobbico.com). Choose "Where to Buy" at the bottom of the menu on the left side of the page. Follow the instructions provided on the page to locate a U.S., Canadian or International dealer.

Parts may also be ordered directly from **Hobby Services** by calling (217) 398-0007, or via facsimile at (217) 398-7721, but full retail prices and shipping and handling charges will apply. Illinois and Nevada residents will also be charged sales tax. If ordering via fax, include a Visa® or MasterCard® number and expiration date for payment.

Mail parts orders and payments by personal check to:

### Hobby Services

3002 N Apollo Drive, Suite 1  
Champaign IL 61822

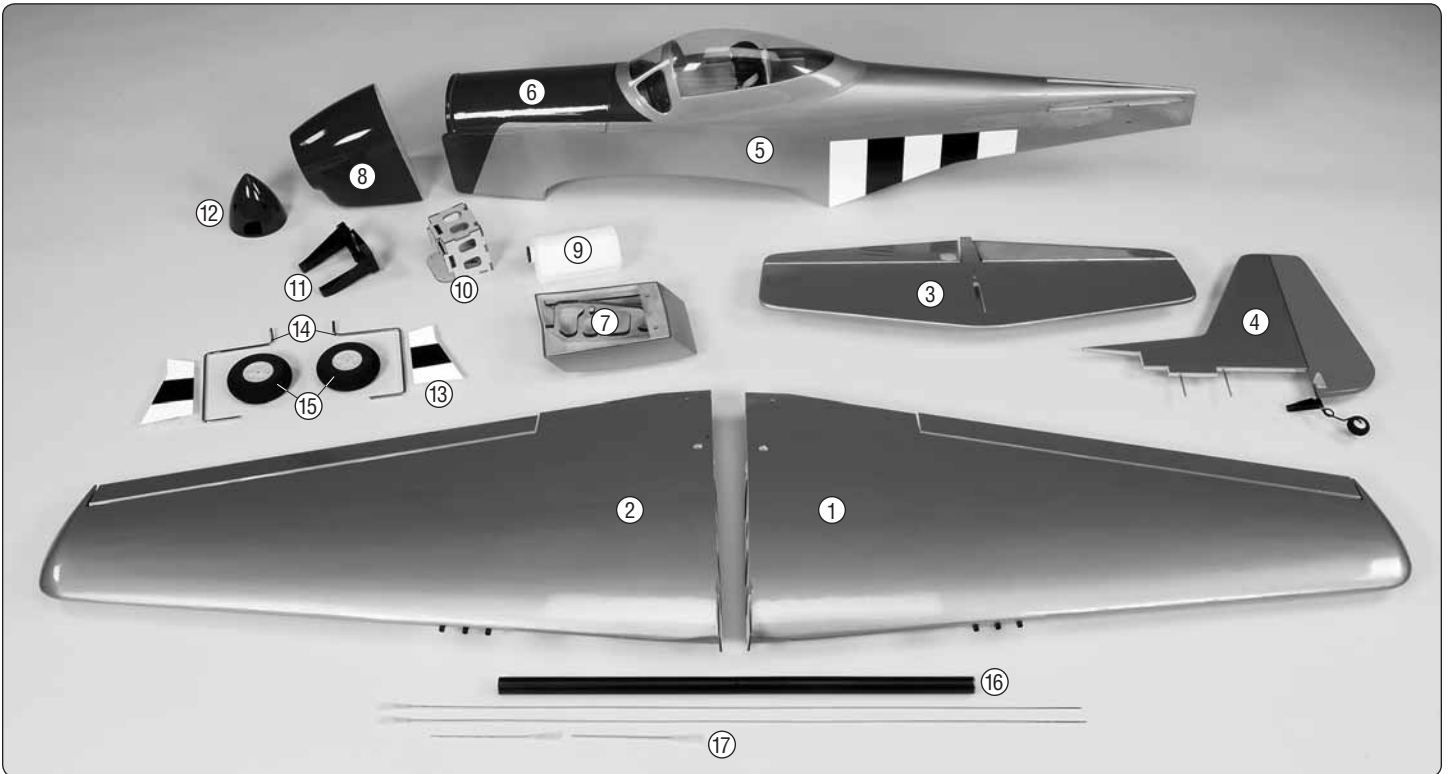
Be certain to specify the order number exactly as listed in the **Replacement Parts List**. Payment by credit card or personal check only; no C.O.D.

If additional assistance is required for any reason contact Product Support by e-mail at [productsupport@greatplanes.com](mailto:productsupport@greatplanes.com), or by telephone at (217) 398-8970.

## REPLACEMENT PARTS LIST

Order No.	Description
GPMA4080	Fuselage
GPMA4081	Wing
GPMA4082	Vertical Stabilizer
GPMA4083	Horizontal Stabilizer
GPMA4084	Cowl
GPMA4085	Hatch with Canopy
GPMA4086	Canopy
GPMA4087	Wing Tube
GPMA4088	Landing Gear
GPMA4089	Gear Doors
GPMA4090	Spinner
GPMA4091	Wing Scoop
GPMA4092	Decals

## KIT CONTENTS



- |                          |                           |                        |                      |
|--------------------------|---------------------------|------------------------|----------------------|
| 1. Left Wing Panel       | 6. Hatch                  | 11. Engine Mount       | 16. Wing Joiner Tube |
| 2. Right Wing Panel      | 7. Air Scoop              | 12. Spinner            | 17. Pushrods         |
| 3. Horizontal Stabilizer | 8. Cowl                   | 13. Landing Gear Doors |                      |
| 4. Vertical Fin          | 9. Fuel Tank              | 14. Landing Gear Wires |                      |
| 5. Fuselage              | 10. Brushless Motor Mount | 15. Main Wheels        |                      |

## PREPARATIONS

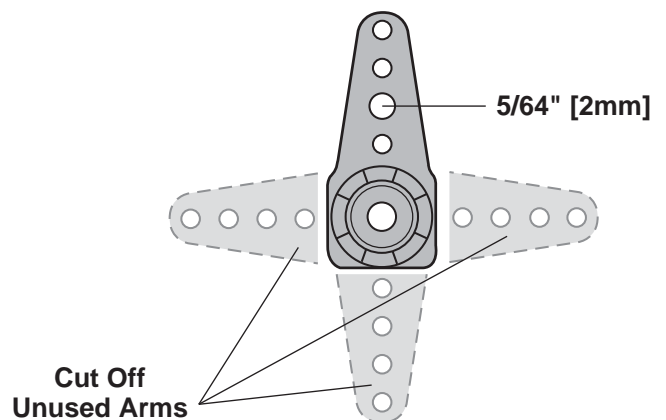
❑ 1. If you have not done so already, remove the major parts of the kit from the box and inspect for damage. If any parts are damaged or missing, contact Product Support at the address or telephone number listed in the "Kit Inspection" section on page 5.



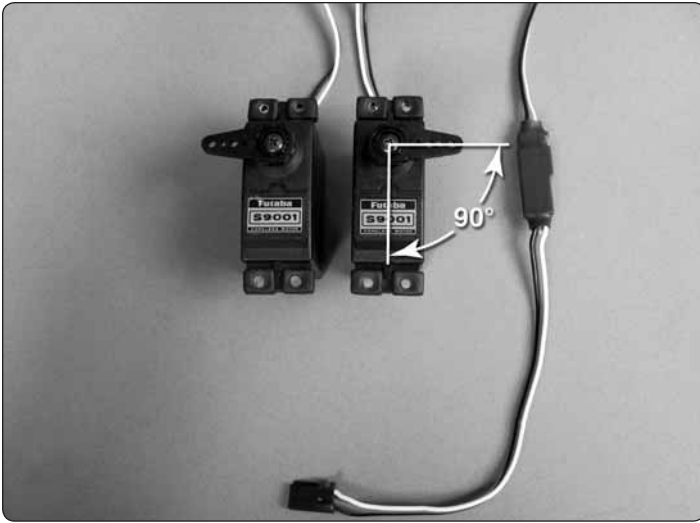
❑ 2. Remove the tape and separate all the control surfaces. Use a covering iron with a covering sock on high heat to tighten

the covering if necessary. Apply pressure over sheeted areas to **thoroughly** bond the covering to the wood.

## ASSEMBLE THE WINGS



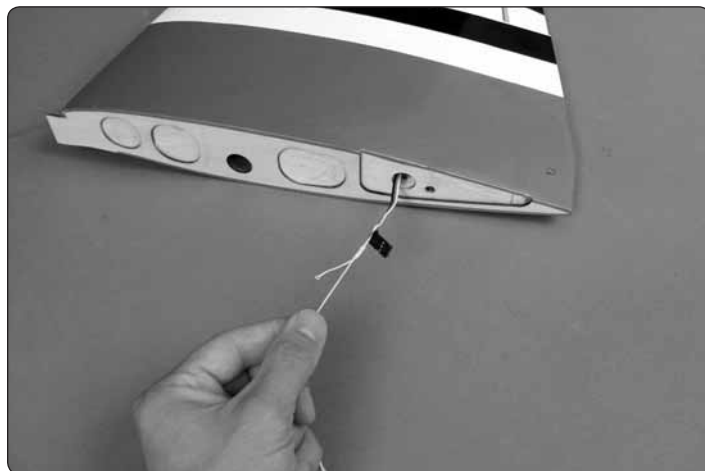
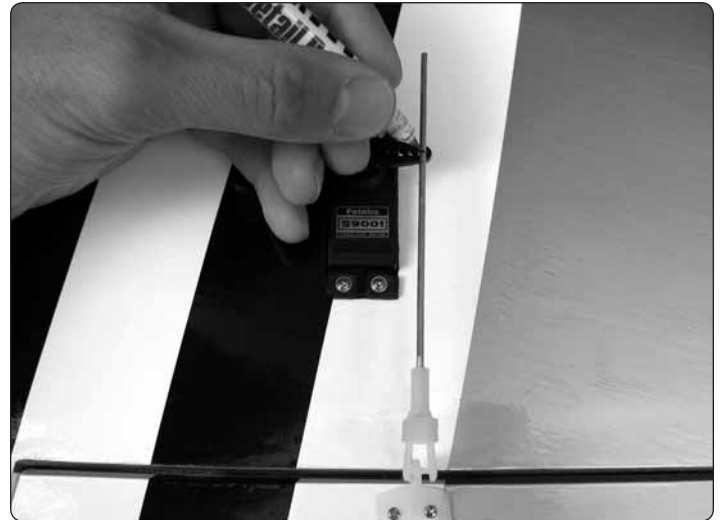
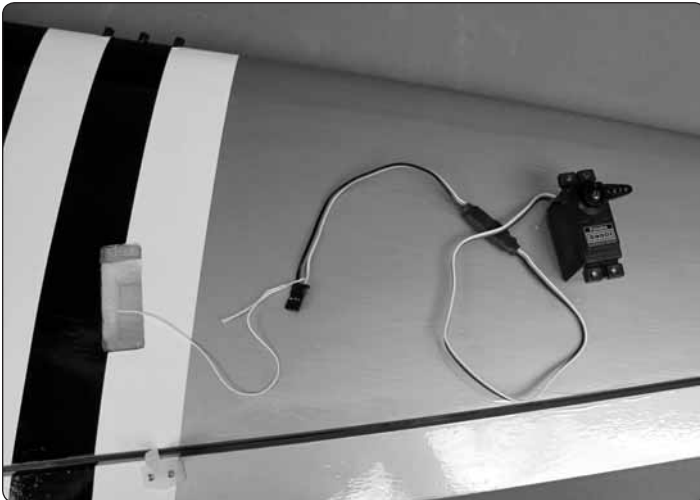
❑ 1. Test fit a four-armed servo arm onto each aileron servo and determine the best orientation of the arms that will position them closest to perpendicular to the servo cases. Look at the photo in step 2 and cut off three of the four arms of each servo arm to match the photo. Enlarge the **second inner** hole of each remaining arm with a 5/64" [2mm] drill bit.



❑ 2. Attach a 6" [152mm] servo extension to each aileron servo and secure the connector using tape or heat shrink tubing (not included). Center the servos with your radio system and install the servo arms to the servos perpendicular to the servo cases as shown. Be sure to reinstall the servo arm screws into the servos. Install the rubber grommets and eyelets onto the servo mounting tabs.

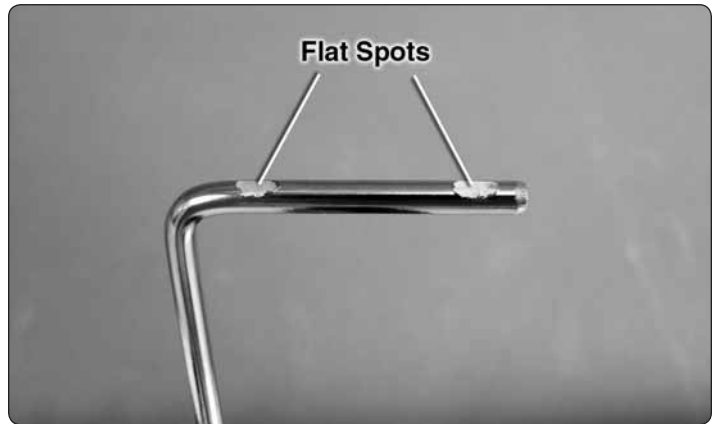
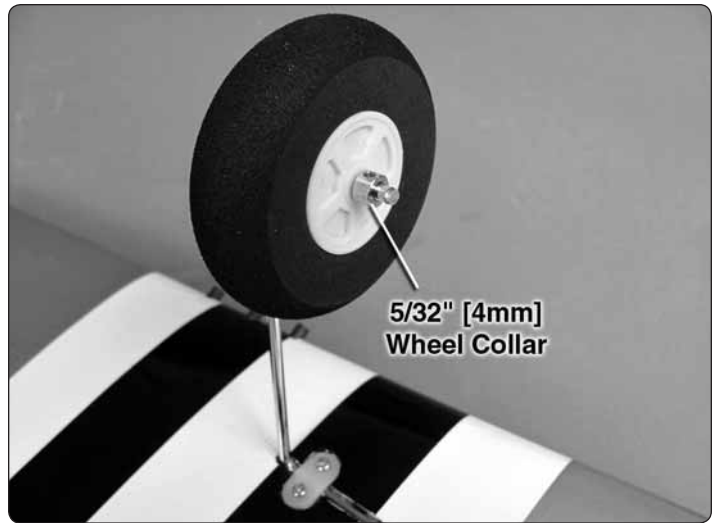
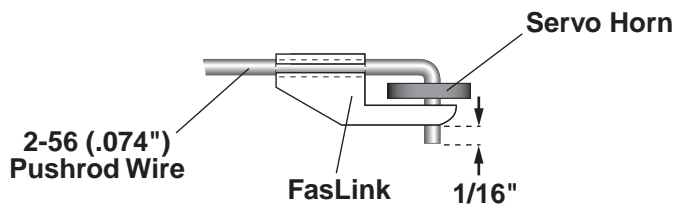


❑ 4. Fit the servos into the servo openings and drill 1/16" [1.6mm] holes through the mounting tabs on the servo cases into the rails. Thread a servo mounting screw (included with the servo) into each hole and back it out. Apply a drop of thin CA to each hole to harden the surrounding wood. When the CA has dried, install the servos into the openings using the screws supplied with the servos.



❑ 3. Use the strings taped inside the aileron servo openings to pull the servo leads through the wing.

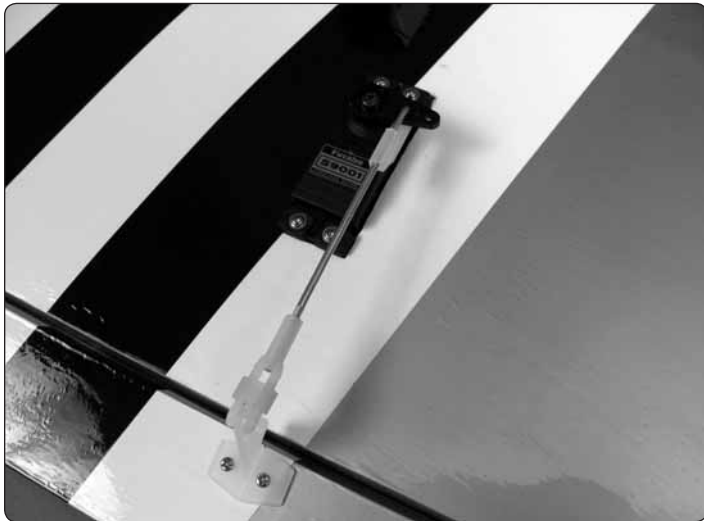
❑ 5. Locate the two 4" [102mm] pushrods that have clevises already threaded onto the ends of the wires. Slide a silicone clevis retainer onto the base of each clevis. Attach the clevises to the outer holes of the aileron control horns. With the ailerons in the neutral positions (use tape or a small clamp to hold them in place), mark the pushrod wires where they cross the second inner holes in the servo arms.



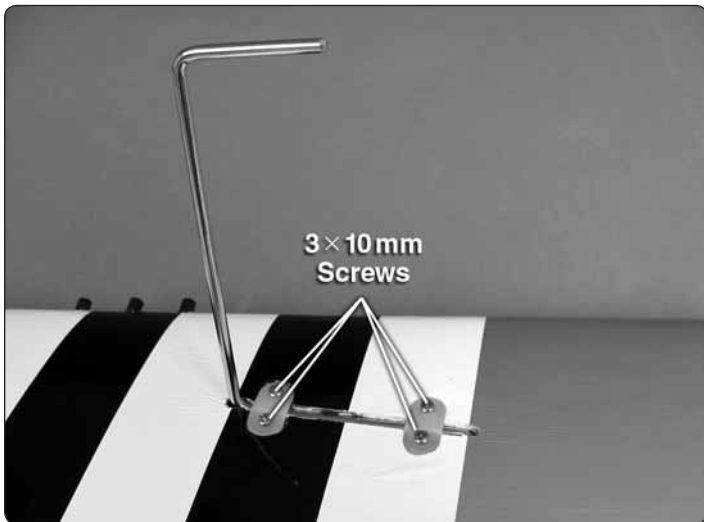
❑ 8. Slide a 5/32" [4mm] wheel collar onto each axle followed by a main wheel and another 5/32" [4mm] wheel collar. With the collars and wheels centered on the axles, use a felt-tip pen to mark the hole location of each collar onto the axles. Remove the collars and wheels and use a file or rotary tool to grind flat spots onto the axles at your marks.



❑ 9. Reinstall the wheel collars and wheels onto the axles. Tighten a 3x5mm machine screw with thread locking compound into each wheel collar. Be sure that the wheels rotate freely. A couple drops of oil onto each axle is recommended.

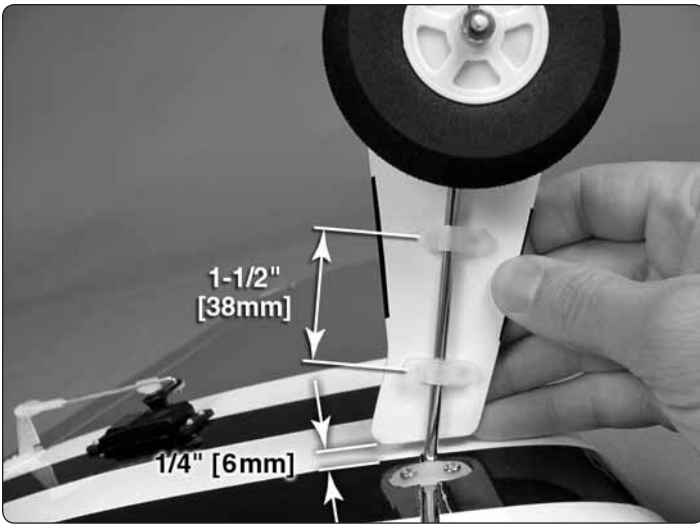


❑ 6. Make a 90 degree bend at the mark on each pushrod and cut off the excess pushrod 1/4" [6mm] beyond the bends. Attach the pushrods to the servo arms using nylon FasLinks. Thread the clevises up or down on the pushrods as necessary to center the ailerons with the servo arms still perpendicular to the servo cases. When satisfied, slide the silicone clevis retainers to the ends of the clevises to secure them.

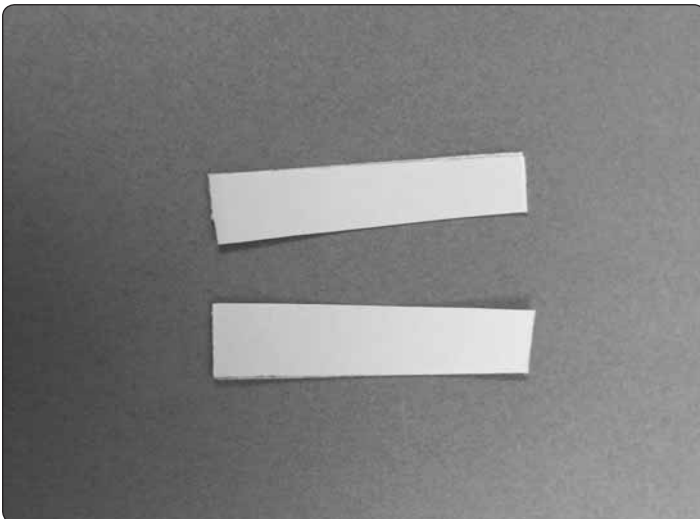


❑ 7. Thread a 3x10mm self-tapping screw into each landing gear strap hole and back it out. Apply a drop of thin CA glue to each hole and allow the glue to dry completely. Fit the main landing gear legs into the slots in the wings and secure them using nylon landing gear straps and 3x10mm self-tapping screws.

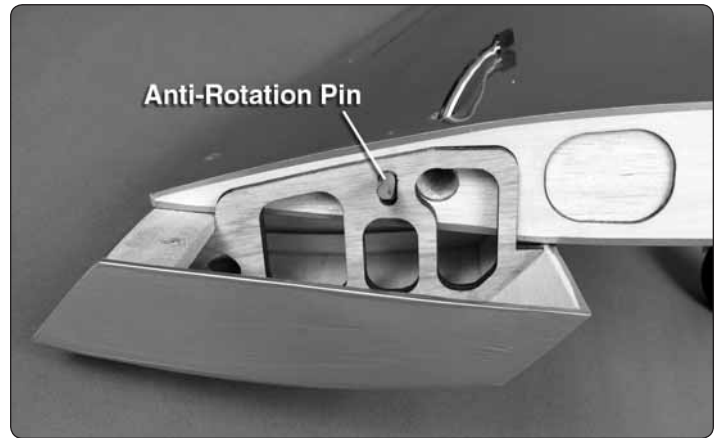




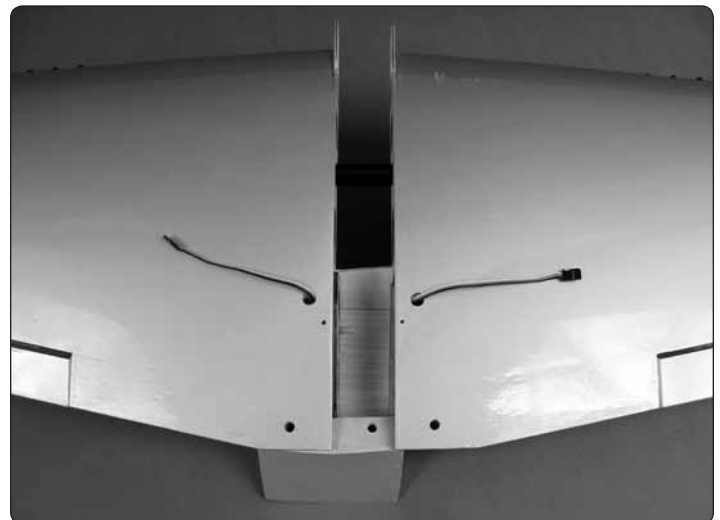
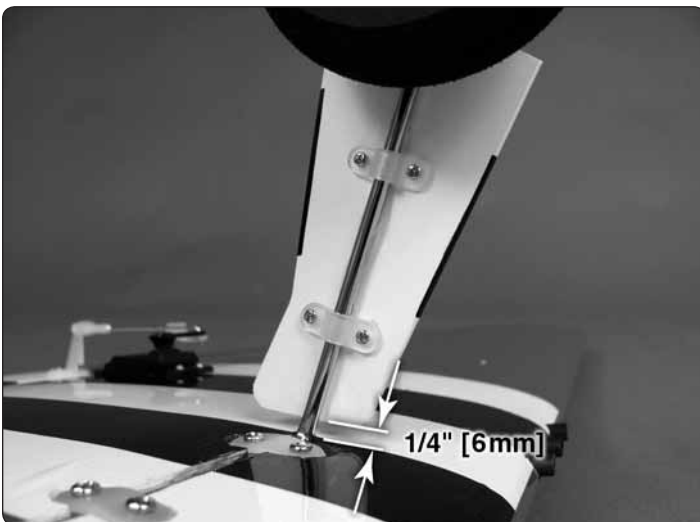
❑ 10. Temporarily place two landing gear door straps onto one of the landing gear legs approximately 1-1/2" [38mm] apart. Hold the gear door against the landing gear leg, leaving a 1/4" [6mm] gap between the door and the wing. Use a felt-tip pen to mark the location of the strap holes onto the door. Drill 5/64" [2mm] holes through the door. Repeat this step for the other wing panel.



❑ 11. Cut the included piece of double-sided tape lengthwise into two strips. Apply the tape to the landing gear legs on the side that the gear doors will be installed. Install the gear doors using 2x6mm phillips machine screws, 2mm flat washers and 2mm nuts.



❑ 12. Route the aileron servo leads through the holes in the tops of the wing panels. Fit the air scoop into place onto the wing panel with the anti-rotation pin as shown.

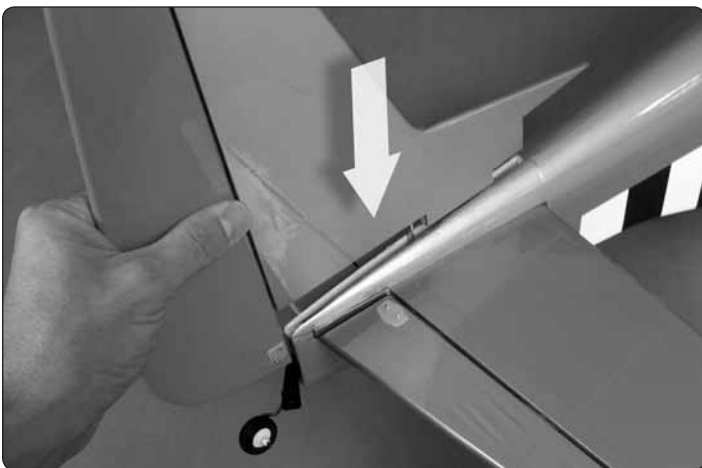
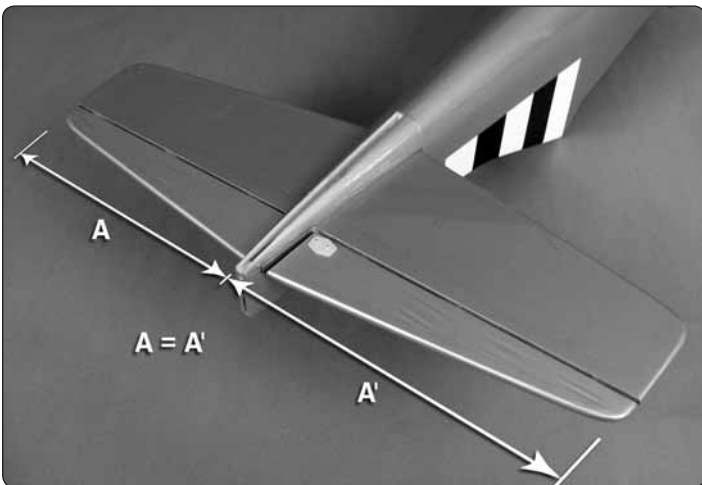


❑ 13. Join the wing panels together on the aluminum wing tube.



□ 14. Thread a 3x10mm self-tapping screw into each strap hole on the tops of the wing panels and back it out. Apply a drop of thin CA to each hole and allow the glue to dry. Install a nylon strap to secure the wing panels together using two 3x10mm screws.

## ASSEMBLE THE TAIL SECTION



□ 1. Slide the horizontal stabilizer into the slot in the aft end of the fuselage and center it left and right. Temporarily fit the vertical fin in place by aligning the threaded rods preinstalled in the fin with the holes in the fuselage.



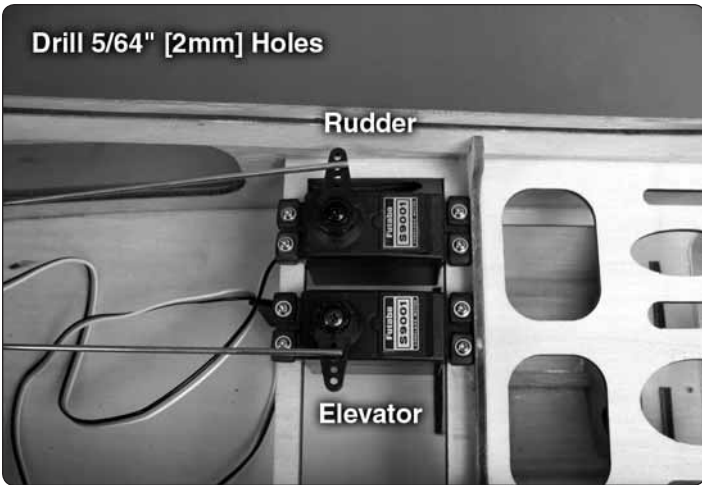
□ 2. Remove the vertical fin, taking care not to move the horizontal stab as it has now been properly aligned by installing the fin. Install a 2.5x25mm self-tapping screw into the hole in the aft end of the fuselage to secure the stab in place.



□ 3. Reinstall the vertical fin into the fuselage and secure it using the two included nylon tail bolts.



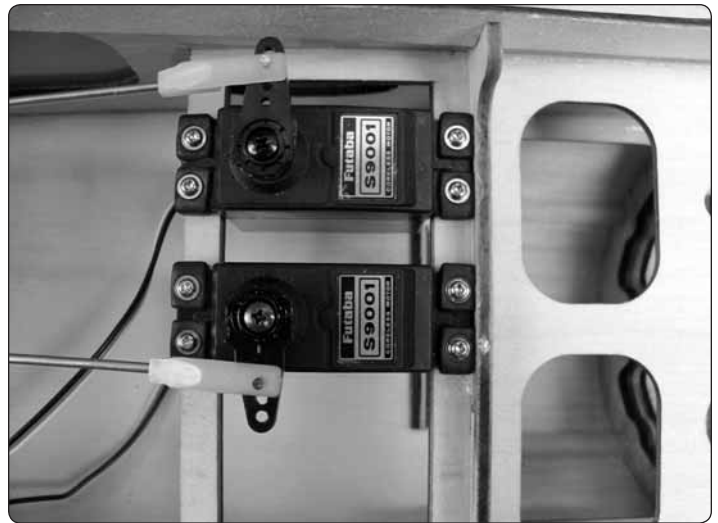
□ 4. Center the nylon tail wheel bracket onto the underside of the fuselage and mark the locations of the screw holes onto the fuse. Drill two 1/16" [1.6mm] holes at the marks you made and secure the bracket using two 2.5x8mm self-tapping screws. Slide the wheel collar against the bracket and tighten the set screw in the collar.



❑ 5. As you did with the aileron servos, prepare the tail servos by centering them with your radio system, installing the servo arms perpendicular to the servo cases and installing the rubber grommets and eyelets onto the mounting tabs. Insert the 26" [660mm] pushrods into the elevator and rudder outer pushrod tubes. Position the servos onto the servo tray as shown and align the **third outer hole** in the rudder servo arm with the rudder pushrod and the **second outer hole** in the elevator servo arm with the elevator pushrod. Install the servos onto the tray using the screws included with the servos.



❑ 6. Slide a silicone clevis retainer onto each tail pushrod clevis. Attach the elevator clevis to the **fourth outer hole** in the elevator control horn. Attach the rudder clevis to the **outer hole** in the rudder control horn.

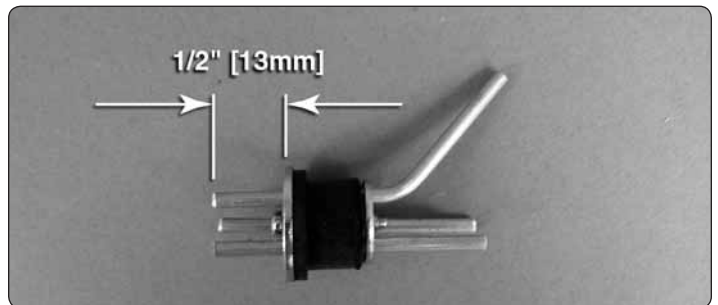
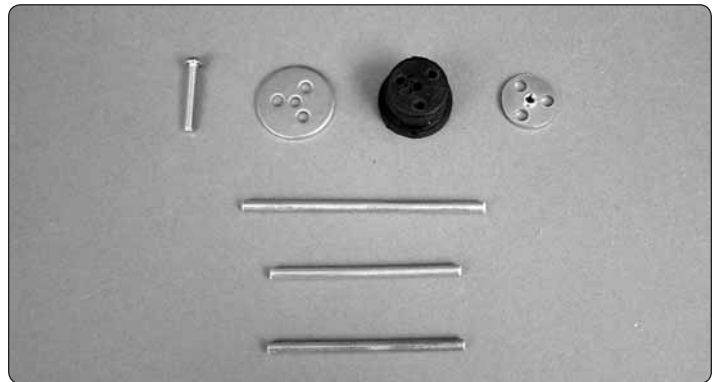


❑ 7. Connect the tail pushrods to the servos using FasLinks.

## INSTALL THE POWER SYSTEM

### Glow Engine Installation

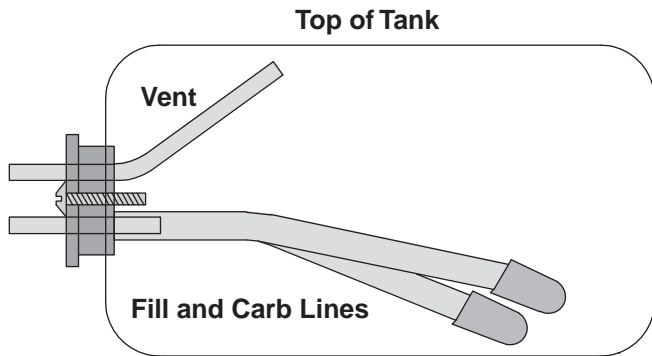
*The P-51 is designed to be flown with a .40-.55 two-stroke glow engine, .70 four-stroke glow engine, or a brushless outrunner motor. If you plan to install a brushless motor, skip this section as it only contains information relevant to installing a glow engine.*



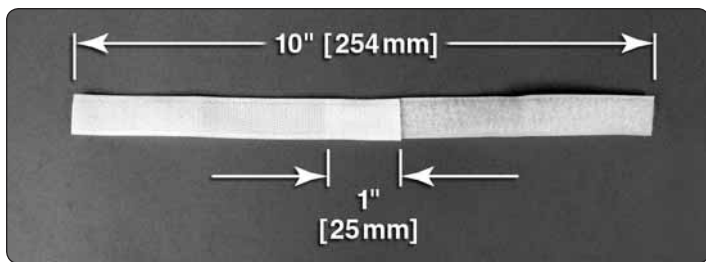
❑ 1. The fuel tank can be assembled as a two line system consisting of a vent (pressure) line to the muffler and a carb line. Filling and emptying of the tank would need to be done through the carb line, or an optional fuel fill valve (not included). The tank can also be assembled as a three line system having a vent line, carb line, and fill line. If installing a fill line, puncture



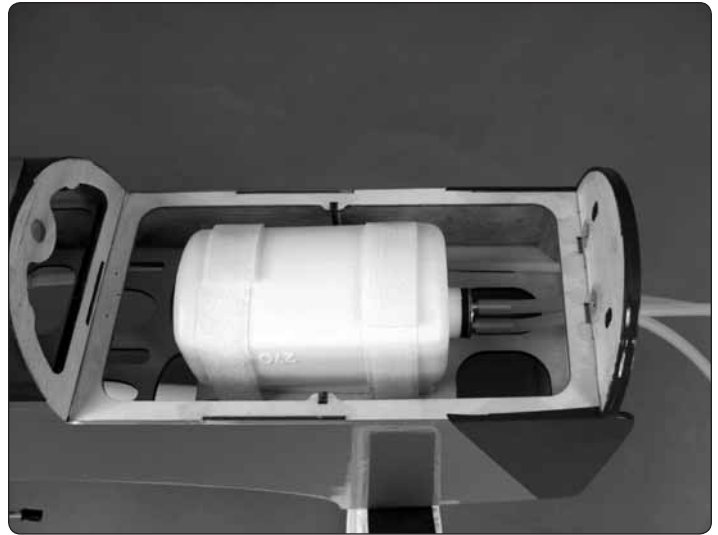
the top of the stopper above the sealed off fuel tube hole. The fill and carb lines should extend out 1/2" [13mm] beyond the stopper and the vent line should be bent upwards and left uncut. With the tubes installed in the stopper, fit the stopper plates loosely in place with the 3 x 25mm phillips screw to hold the assembly together.



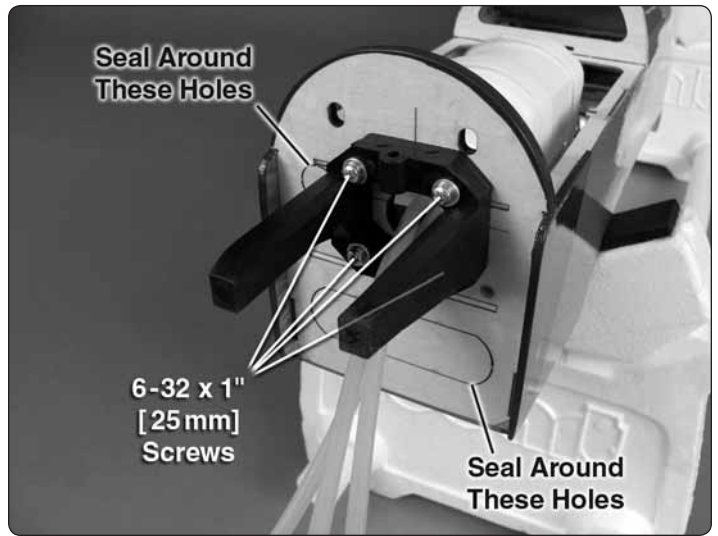
2. Fit the stopper assembly into the tank with the vent line pointing toward the top of the tank, but not touching. *Note: the writing on the tank will be upside down when the tank is installed on the fuel tank tray.* The fuel tubing and clunks (fuel pickup) on the carb and fill lines should almost reach the back of the tank but not touch. The clunks must be able to move freely inside the tank when assembled. Adjust the length of the fuel tubing accordingly. When satisfied, tighten the 3x25mm screw in the stopper to secure it in place (do not over-tighten). Mark the side of the tank that must face up when installed in the plane, and we also suggest marking the tubes in the stopper.



3. Make two 10" [254mm] straps from the included hook and loop material by overlapping the mating ends by approximately 1" [25mm].

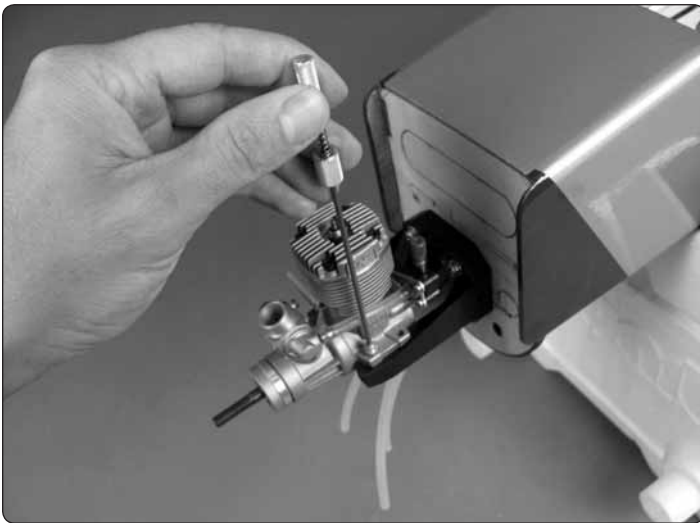
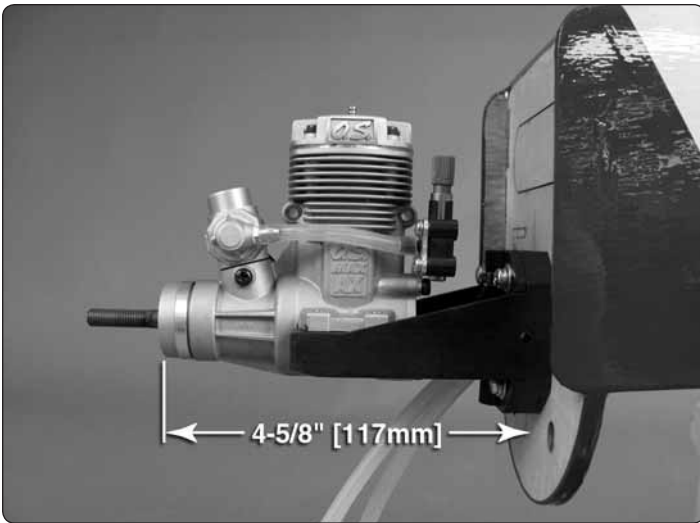


4. Connect a 6-7" [152-178mm] piece of standard fuel tubing to each tube protruding from the fuel tank. Cut a piece of 1/4" [6mm] foam rubber (not included) and place it on the fuel tank tray. Insert the hook and loop straps through the slots in the fuel tank tray. Fit the fuel tubing attached to the tank through the hole in the firewall (with the correct side of the tank facing up) and use the straps to tightly secure the tank to the tray.

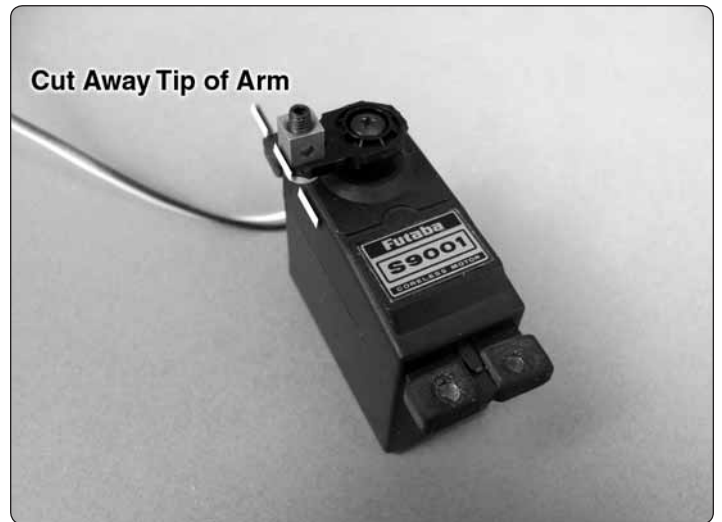


5. Using four 6-32 x 1" [25mm] screws, four #6 flat washers, four #6 lock washers and thread locking compound, attach the engine mount inverted to the firewall. Leave the screws slightly loose. Test fit your engine between the mount halves. Slide the mount halves against the sides of the engine and finish tightening the mount screws. Apply a bead of medium or thick CA glue around each cool air hole perforation to seal them from fuel.



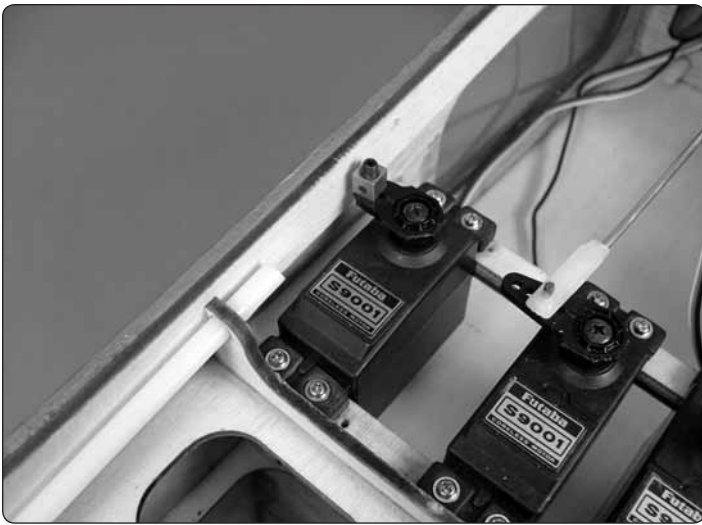


- 7. Install your muffler onto the engine.
- 8. Cut the fuel tubing coming from the tank to the proper length and connect the pressure and carb lines to the engine. The fill line (if installed) should be plugged with the included fuel line plug and can be routed through a hole in the cowl which will be done later in the assembly (remember to replace the fuel line plug after filling or draining the fuel tank).

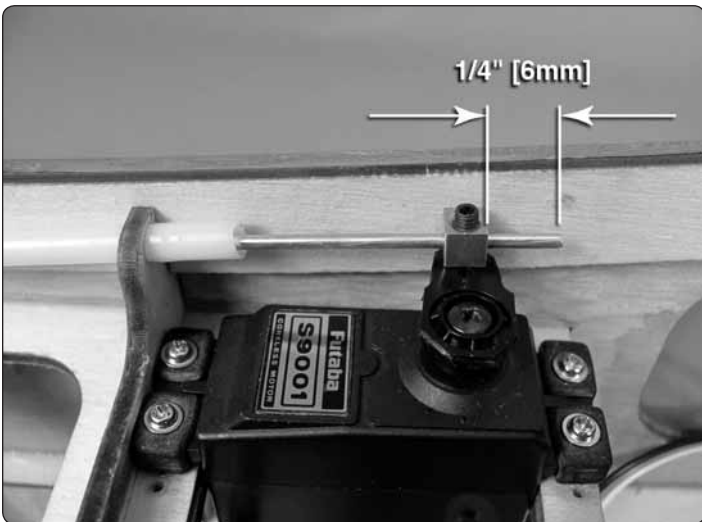


- 6. Position the front of the engine drive washer 4-5/8" [117mm] from the front of the firewall. Mark the location of the engine mount holes onto the mount rails using a Dead Center Hole Locator. Remove the engine from the mount and use a 6-32 tap and drill set to create threads in the four mounting holes. Attach the engine to the mount using four 6-32 x 3/4" [19mm] screws, four #6 flat washers and four #6 lock washers.

- 9. Cut three arms from a four-armed servo arm included with your throttle servo. Center the servo with your radio system (50% throttle) and install the arm perpendicular to the servo case. Install a screw-lock pushrod connector into the second outer hole in the remaining arm and secure it in place with a nylon screw-lock connector retainer. Loosely install a 3x4mm set screw into the screw-lock pushrod connector. Cut off the tip of the servo arm beyond the screw-lock connector.



❑ 10. Install the throttle servo onto the throttle servo tray using the hardware supplied with the servo. The screw-lock pushrod connector should be in line with the throttle outer pushrod tube.



❑ 11. Install a silicone clevis retainer onto the remaining pushrod. Insert the pushrod through the throttle outer pushrod tube and through the screw-lock connector. Connect the clevis to the throttle arm on the carburetor. Slide the silicone

clevis retainer to the end of the clevis. With the servo arm still perpendicular to the servo case, rotate the carb barrel by hand until it is half open. Tighten the set screw in the screw lock connector and cut away the excess pushrod 1/4" [6mm] beyond the screw-lock connector. Use the radio system to test the operation of the throttle making sure the carb properly opens and closes. Make any adjustments if necessary.

### **Brushless Motor Installation**

*The P-51 is designed to be flown with a .40-.55 two-stroke glow engine, .70 four-stroke glow engine, or a brushless outrunner motor. If you have installed a glow engine, skip this section as it only contains information relevant to installing a brushless motor.*

*Be sure to read and understand the instructions that come with the ESC and motor before attempting to operate the system.*



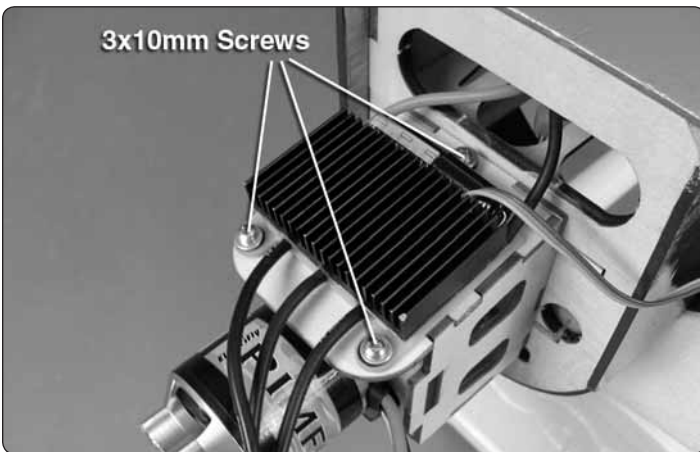
❑ 1. Open up the perforated cool air holes in the fuselage.



❑ 2. Attach the brushless motor mounting box to the firewall using four 6-32 x 3/4" [19mm] screws, four #6 flat washers, four #6 lock washers and thread locking compound.



❑ 3. Install the aluminum X-mount and prop adapter onto the motor using the hardware included in the motor package and thread locking compound. Attach the motor to the mounting box using four 6-32 x 1/2" [13mm] machine screws, four #6 flat washers and thread locking compound.

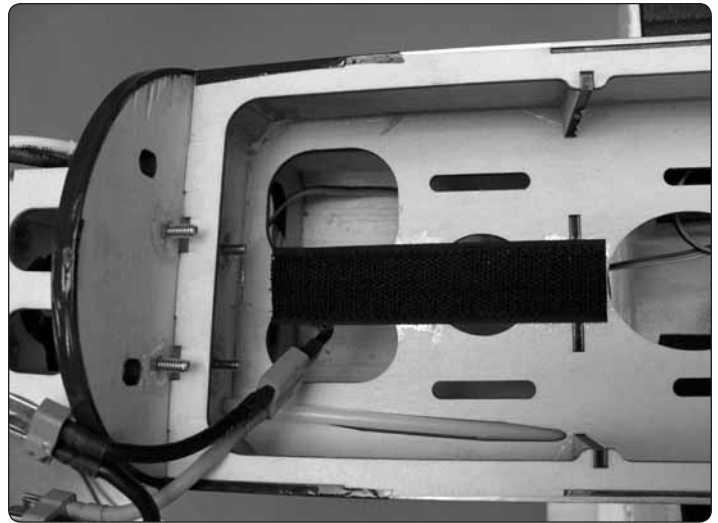


❑ 4. Thread a 3x10mm self-tapping screw into each ESC mounting hole in the underside of the motor mounting box and back it out. Apply a drop or two of thin CA to each hole to harden the surrounding wood. Install the ESC to the underside of the mounting box using three 3x10mm self-tapping screws and three 3mm flat washers.

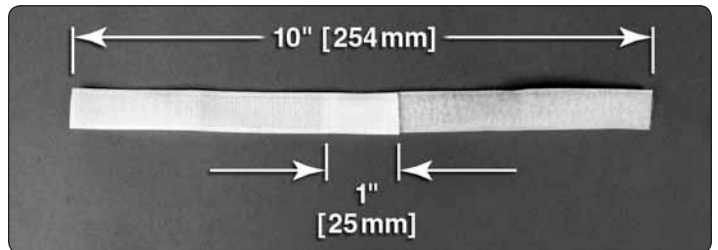


❑ 5. Connect the ESC to the motor and route the receiver wire through the firewall to the radio tray. Now would be a good

time to test the operation of the motor using your radio system. The motor should rotate counter-clockwise when looking at it from the front. If it rotates the wrong direction simply swap two of the three motor leads. Use a tie strap (not included) or tape to secure the motor lead wires to the motor mounting box.

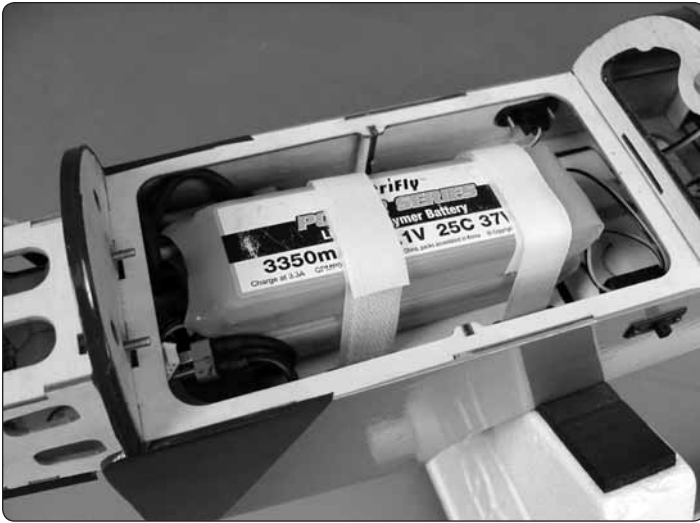


❑ 6. Apply a thin coat of epoxy down the center of the battery tray. This will improve the adhesion of the hook and loop material. When the epoxy has completely cured, attach a piece of the hook side from the included self-adhesive hook and loop strap to the battery tray. The loop side should be attached to your battery pack (use additional pieces to join LiPo packs together for a series configuration).

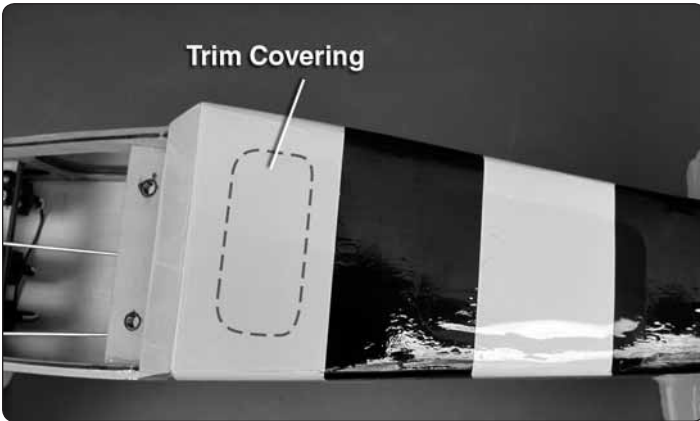


❑ 7. Make two hook and loop straps approximately 10" [254mm] long by overlapping the mating ends 1" [25mm] as shown. Feed the straps through the slots in the battery tray.





❑ 8. Test fit your batteries onto the tray. Adjust the lengths of the straps if necessary.



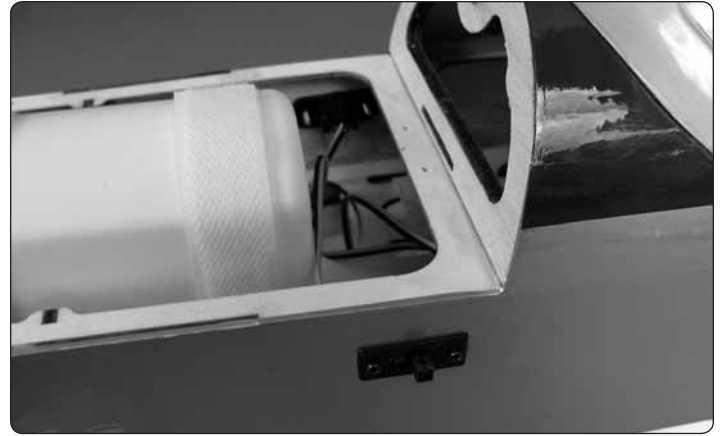
❑ 9. Trim the covering from the cool air exit hole on the underside of the fuselage just behind the wing saddle.

## FINISH THE MODEL



❑ 1. Make a strap from the included hook and loop material to fit your receiver. Cut a piece of foam rubber (not included) to fit your receiver and strap the receiver to the radio tray as

shown. Connect the rudder, elevator and throttle servos (or ESC if applicable) to the receiver.



❑ 2. Mount your radio switch to the fuselage side in the location that you prefer. We mounted ours below the aft bottom edge of the battery hatch opening. We installed a charge jack receptacle on the other side of the fuselage.

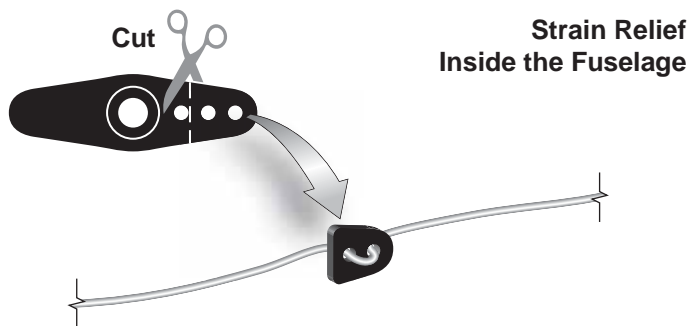


❑ 3. If you have installed a glow engine, install the removable hatch by fitting the two dowels into the holes in the fire wall. Then, slide the hatch back. Secure the hatch in place by threading two 2.5x8mm self-tapping screws through the pre-drilled holes in the fuselage and into the hatch.

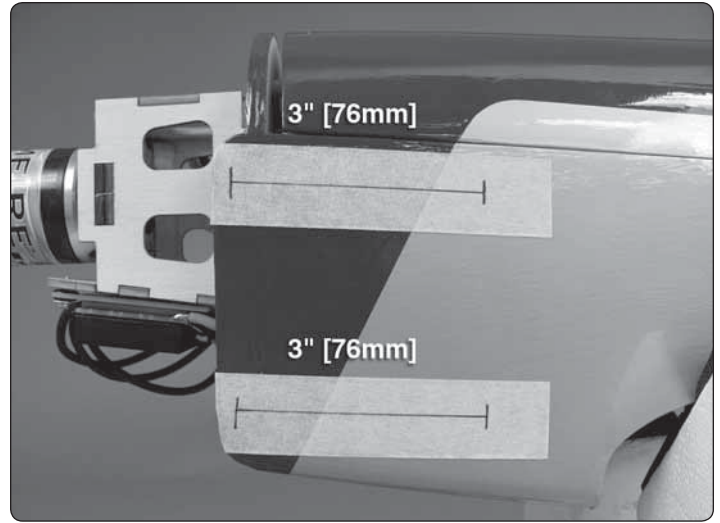




❑ 4. Mount the receiver battery pack next to the receiver in the same manner as you did in step 1. Connect the switch to the receiver and battery, being sure to secure the connection between the switch and battery with tape, heat shrink tubing, or a special clip designed for that purpose.



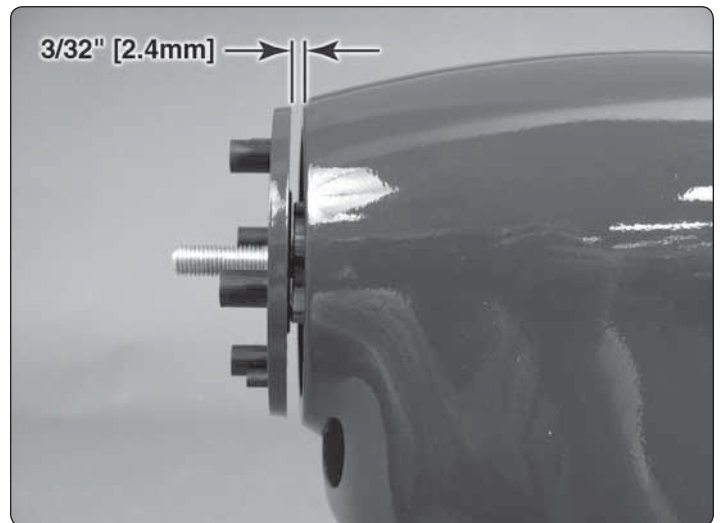
❑ 5. We used some scrap pieces of fuel tubing to support the dual receiver antennas in the correct orientation against the inside of the fuse (see your radio manual for details). If you have installed an FM or PCM receiver, route the antenna through the antenna tube preinstalled in the fuselage and out the aft end. Be sure to install a strain relief on the antenna to protect the solder joint inside the receiver.



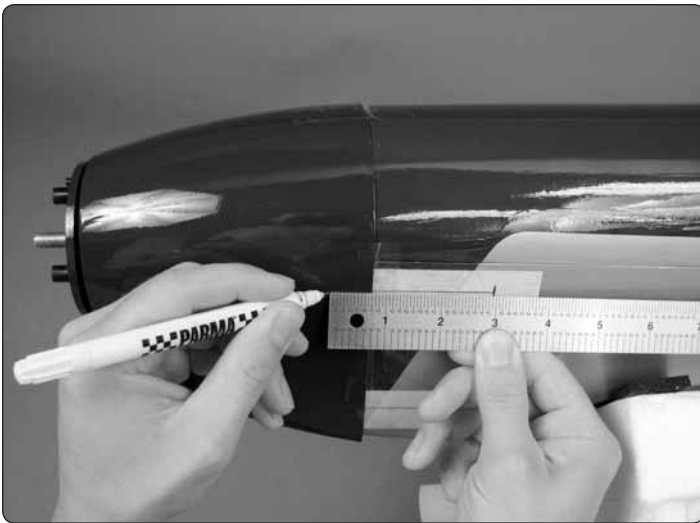
❑ 6. Apply 4" [102mm] pieces of masking tape to both sides of the fuselage in the locations shown. Mark the center of the cowl mounting tab on each piece of tape. Then, accurately draw a 3" [76mm] line using a straight edge along the tape.

❑ 7. If necessary, enlarge the hole in the spinner backplate to fit onto the crankshaft (or prop adapter) using a drill or prop reamer.

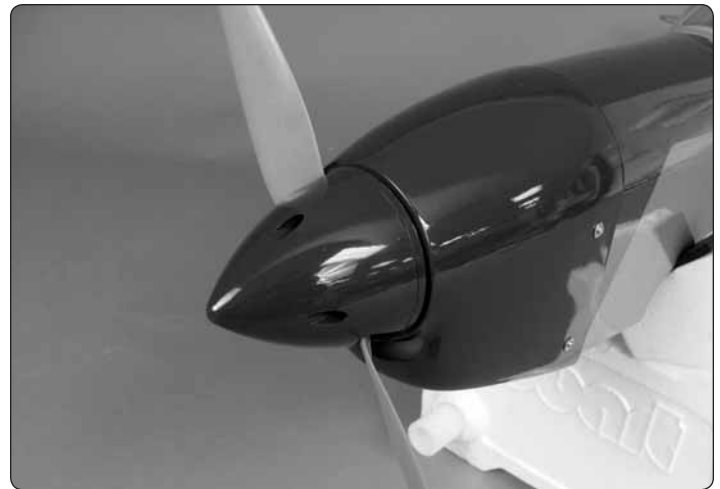
❑ 8. Before fitting the cowl, make any cutouts necessary for your power system. If you have installed a glow engine, a cutout must be made for glow plug access, muffler, and needle valve access. A 1/4" [6.4mm] hole can be drilled or reamed into the cowl for convenient fill line access. The fuel tubing will slide through the hole, but the included fuel line plug will fit snugly into the hole holding it securely in place during flight (slowly enlarge the hole when drilling, checking it often with the fuel line and plug until a good fit is achieved). If you have installed a brushless power system, make a cooling hole cutout at the bottom aft end of the cowl. A template for the cooling hole is provided in the back of this manual.



❑ 9. Slide the cowl onto the fuselage and the spinner backplate onto the prop adapter. Center the cowl 3/32" [2.4mm] behind the spinner backplate and tape it into position.



❑ 10. Measure back along the lines on the tape 3" [76mm] and mark the cowl for the four mounting screws. Drill 5/64" [2mm] holes through the cowl and through the cowl mounting tabs at your marks. Remove the cowl from the fuselage and enlarge the holes in the cowl to 3/32" [2.4mm]. Thread a 2.5x8mm self-tapping screw into each cowl mounting hole in the fuselage and back it out again. Apply a drop of thin CA to each hole. Mount the cowl using four 2.5x8mm self-tapping screws and four 2.5mm washers.



❑ 11. Install the spinner backplate, propeller, prop washer and prop nut. Install the spinner onto the spinner backplate using the included spinner screws.

❑ 12. Join the aileron servo leads together using a Y-harness. Connect the Y-harness to your receiver and mount the wing to the fuselage using the included wing bolts.



❑ 13. This completes the assembly of the P-51!

### *Apply the Decals*

❑ 1. Be certain the model is clean and free from oily fingerprints and dust. Prepare a dishpan or small bucket with a mixture of liquid dish soap and warm water—about one teaspoon of soap per gallon of water. Submerge the decal in the soap and water and peel off the paper backing. **Note:** Even though the decals have a "sticky-back" and are not the water transfer type, submersing them in soap & water allows accurate positioning and reduces air bubbles underneath.

❑ 2. Position decal on the model where desired. Holding the decal down, use a paper towel to wipe most of the water away.

❑ 3. Use a piece of soft balsa or something similar to squeegee remaining water from under the decal. Apply the rest of the decals the same way.

## GET THE MODEL READY TO FLY

### Install & Operate the Motor Battery (Brushless Only)

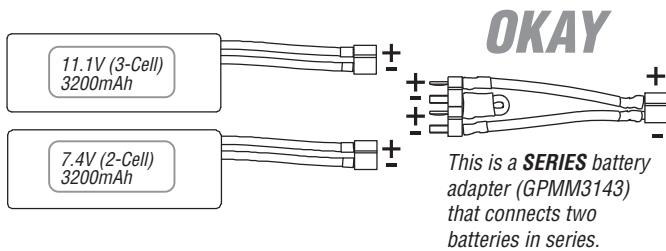
**IMPORTANT:** If using multiple battery packs that are connected with an adapter, never charge the batteries together through the adapter. Always charge each battery pack separately. Charge the batteries, then read the following precautions on how to connect multiple packs for flying the model:

#### BATTERY PRECAUTIONS:

There are two ways to connect multiple battery packs: In **Series** and in **Parallel**.

❑ 1. Connecting batteries in “**Series**” means to connect the (+)’s to the (-)’s and the (-)’s to the (+)’s. This combines the voltages of the batteries, but the capacity remains the same.

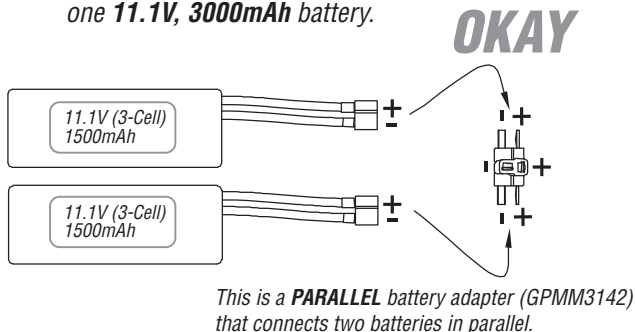
*These are two 3200mAh batteries (one 11.1V and the other 7.4V). When joined in **SERIES**, the result will be a 18.5V, 3200 mAh battery.*



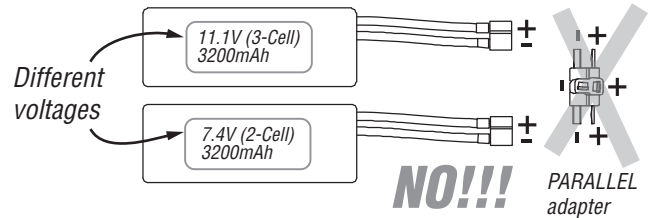
*It's okay to connect batteries with different voltages in series to achieve the new, desired voltage.*

❑ 2. Connecting batteries in “**Parallel**” means to connect the (+)’s to the (+)’s and the (-)’s to the (-)’s. This combines the capacities of the batteries, but the voltage remains the same.

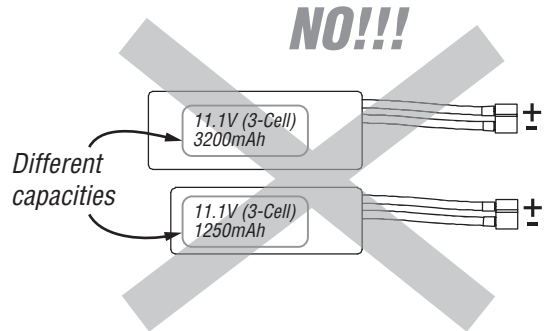
*These two 1500mAh batteries (both 11.1V) are being joined in **PARALLEL**. The result will be one **11.1V, 3000mAh** battery.*



**NEVER** connect battery packs with different voltages in parallel! Only combine them in series. Otherwise, the batteries with lower voltage will try to “equalize” with the batteries that have a higher voltage. Current will flow from the higher voltage battery into the lower one, essentially “charging” the lower voltage battery pack. This situation will likely cause heat and possibly a fire.



**NEVER** connect battery packs with different capacities in series or in parallel.

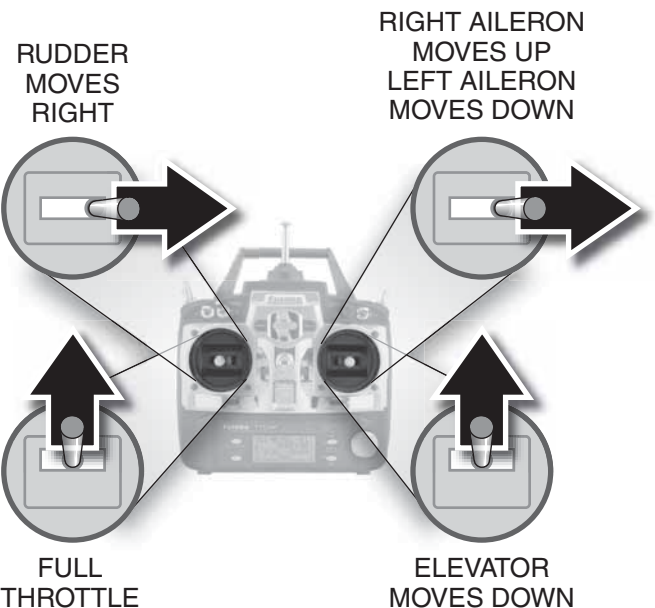


### Check the Control Directions

❑ 1. Turn on the transmitter and receiver and center the trims. If necessary, remove the servo arms from the servos and reposition them so they are centered. Reinstall the screws that hold on the servo arms.

❑ 2. With the transmitter and receiver still on, check all the control surfaces to see if they are centered. If necessary, adjust the clevises on the pushrods to center the control surfaces.

#### 4-CHANNEL RADIO SETUP (STANDARD MODE 2)



❑ 3. Make certain that the control surfaces and the throttle respond in the correct direction as shown in the diagram. If any of the controls respond in the wrong direction, use the servo reversing in the transmitter to reverse the servos connected to those controls. Be certain the control surfaces have remained centered. Adjust if necessary.



## Set the Control Throws



Use a Great Planes AccuThrow (or a ruler) to accurately measure and set the control throw of each control surface as indicated in the chart that follows. If your radio does not have dual rates, we recommend setting the throws at the **low** rate setting.

**NOTE:** The throws are measured at the **widest part** of the elevators, rudder and ailerons.

### These are the recommended control surface throws:

	<b>LOW RATE</b>	<b>HIGH RATE</b>
<b>ELEVATOR</b>	<b>Up &amp; Down</b> 5/16" [8mm] 9°	<b>Up &amp; Down</b> 7/16" [11mm] 12°
<b>RUDDER</b>	<b>Right &amp; Left</b> 1-7/16" [37mm] 27°	<b>Right &amp; Left</b> 1-7/8" [48mm] 36°
<b>AILERONS</b>	<b>Up &amp; Down</b> 1/4" [6mm] 9°	<b>Up &amp; Down</b> 5/16" [8mm] 11°

**IMPORTANT:** The Sport Scale P-51 ARF has been **extensively** flown and tested to arrive at the throws at which it flies best. Flying your model at these throws will provide you with the greatest chance for successful first flights. If, after you have become accustomed to the way the P-51 flies, you would like to change the throws to suit your taste, that is fine. However, too much control throw could make the model difficult to control, so remember, "more is not always better."

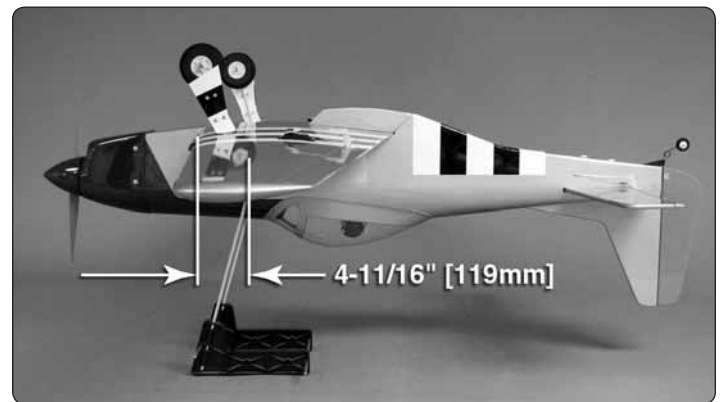
## Balance the Model (C.G.)

More than any other factor, the **C.G.** (balance point) can have the **greatest** effect on how a model flies, and may determine whether or not your first flight will be successful. If you value this model and wish to enjoy it for many flights, **DO NOT OVERLOOK THIS IMPORTANT PROCEDURE.** A model that is not properly balanced will be unstable and possibly unflyable.

At this stage the model should be in ready-to-fly condition with all of the systems in place including the engine or brushless motor, landing gear, and the radio system (and battery pack if applicable).

❑ 1. Use a felt-tip pen or 1/8" [3mm]-wide tape to accurately mark the C.G. on the bottom of the wing on both sides of the fuselage. The C.G. is located 4-11/16" [119mm] back from the leading edge of the wing.

This is where your model should balance for the first flights. Later, you may wish to experiment by shifting the C.G. up to 1/4" [6mm] forward or 7/16" [11mm] back to change the flying characteristics. Moving the C.G. forward may improve the smoothness and stability, but the model may then require more speed for takeoff and make it more difficult to slow for landing. Moving the C.G. aft makes the model more maneuverable, but could also cause it to become too difficult to control. In any case, **start at the recommended balance point** and do not at any time balance the model outside the specified range.



❑ 2. With the wing attached to the fuselage, all parts of the model installed (ready to fly) and an empty fuel tank, place the model on a Great Planes CG Machine, or lift it upside-down at the balance point you marked.

❑ 3. If the tail drops, the model is "tail heavy" and the battery pack and/or receiver must be shifted forward or weight must be added to the nose to balance. If the nose drops, the model is "nose heavy" and the battery pack and/or receiver must be shifted aft or weight must be added to the tail to balance. If possible, relocate the battery pack and receiver to minimize or eliminate any additional ballast required. If additional weight is required, nose weight may be easily added by using a "spinner weight" (GPMQ4645 for the 1 oz. [28g] weight, or GPMQ4646



for the 2 oz. [57g] weight). If spinner weight is not practical or is not enough, use Great Planes (GPMQ4485) “stick-on” lead. A good place to add stick-on nose weight is to the firewall (don’t attach weight to the cowl—it is not intended to support weight). Begin by placing incrementally increasing amounts of weight on the bottom of the fuse over the firewall until the model balances. Once you have determined the amount of weight required, it can be permanently attached. If required, tail weight may be added by cutting open the bottom of the fuse and gluing it permanently inside.

**Note:** Do not rely upon the adhesive on the back of the lead weight to permanently hold it in place. Over time, fuel and exhaust residue may soften the adhesive and cause the weight to fall off. Use #2 sheet metal screws, RTV silicone or epoxy to permanently hold the weight in place.

4. **IMPORTANT:** If you found it necessary to add any weight, recheck the C.G. after the weight has been installed.

### ***Balance the Model Laterally***

1. With the wing level, have an assistant help you lift the model by the engine propeller shaft and the bottom of the fuse under the TE of the fin. Do this several times.

2. If one wing always drops when you lift the model, it means that side is heavy. Balance the airplane by adding weight to the other wing tip. **An airplane that has been laterally balanced will track better in loops and other maneuvers.**

## ***PREFLIGHT***

### ***Identify Your Model***

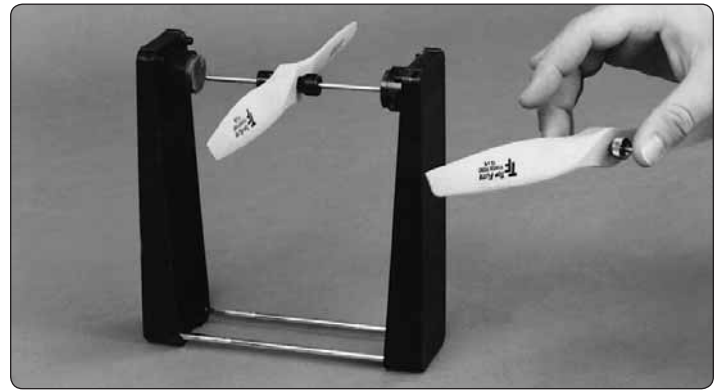
No matter if you fly at an AMA sanctioned R/C club site or if you fly somewhere on your own, you should always have your name, address, telephone number and AMA number on or inside your model. It is **required** at all AMA R/C club flying sites and AMA sanctioned flying events. Fill out the identification tag on page 24 and place it on or inside your model.

### ***Charge the Batteries***

Follow the battery charging instructions that came with your radio control system to charge the batteries. You should always charge your transmitter and receiver batteries the night before you go flying, and at other times as recommended by the radio manufacturer.

**CAUTION:** Unless the instructions that came with your radio system state differently, the **initial** charge on **new** transmitter and receiver batteries should be done for 15 hours **using the slow-charger that came with the radio system.** This will “condition” the batteries so that the next charge may be done using the fast-charger of your choice. If the initial charge is done with a fast-charger the batteries may not reach their full capacity and you may be flying with batteries that are only partially charged.

## ***Balance Propellers***



Carefully balance your propeller and spare propellers before you fly. An unbalanced prop can be the single most significant cause of vibration that can damage your model. Not only will engine mounting screws and bolts loosen, possibly with disastrous effect, but vibration may also damage your radio receiver and battery. Vibration can also cause your fuel to foam, which will, in turn, cause your engine to run hot or quit.

We use a Top Flite Precision Magnetic Prop Balancer (TOPQ5700) in the workshop and keep a Great Planes Fingertip Prop Balancer (GPMQ5000) in our flight box.

## ***Ground Check***

**If the engine is new, follow the engine manufacturer’s instructions to break-in the engine.** After break-in, confirm that the engine idles reliably, transitions smoothly and rapidly to full power and maintains full power—indefinitely. After you run the engine on the model, inspect the model closely to make sure all screws remained tight, the hinges are secure, the prop is secure and all pushrods and connectors are secure.

## ***Range Check***

Ground check the operational range of your radio before the first flight of the day. With the transmitter antenna collapsed and the receiver and transmitter on, you should be able to walk at least 100 feet away from the model and still have control (if using a 2.4GHz radio system, refer to the radio manual for the range checking procedure). Have an assistant stand by your model and, while you work the controls, tell you what the control surfaces are doing. Repeat this test **with the engine running** at various speeds with an assistant holding the model, using hand signals to show you what is happening. If the control surfaces do not respond correctly, **do not fly!** Find and correct the problem first. Look for loose servo connections or broken wires, corroded wires on old servo connectors, poor solder joints in your battery pack or a defective cell, or a damaged receiver crystal from a previous crash.

## ENGINE SAFETY PRECAUTIONS

**Failure to follow these safety precautions may result in severe injury to yourself and others.**

Keep all engine fuel in a safe place, away from high heat, sparks or flames, as fuel is very flammable. Do not smoke near the engine or fuel; and remember that engine exhaust gives off a great deal of deadly carbon monoxide. Therefore **do not run the engine in a closed room or garage.**

Get help from an experienced pilot when learning to operate engines.

Use safety glasses when starting or running engines.

Do not run the engine in an area of loose gravel or sand; the propeller may throw such material in your face or eyes.

Keep your face and body as well as all spectators away from the plane of rotation of the propeller as you start and run the engine.

Keep these items away from the prop: loose clothing, shirt sleeves, ties, scarves, long hair or loose objects such as pencils or screwdrivers that may fall out of shirt or jacket pockets into the prop.

Use a “chicken stick” or electric starter to start the engine. Do not use your fingers to flip the propeller. Make certain the glow plug clip or connector is secure so that it will not pop off or otherwise get into the running propeller.

Make all engine adjustments from behind the rotating propeller.

The engine gets hot! Do not touch it during or right after operation. Make sure fuel lines are in good condition so fuel will not leak onto a hot engine, causing a fire.

To stop a glow engine, cut off the fuel supply by closing off the fuel line or following the engine manufacturer’s recommendations. Do not use hands, fingers or any other body part to try to stop the engine. Do not throw anything into the propeller of a running engine.

## LITHIUM BATTERY HANDLING AND USAGE

**WARNING!!** Read the entire instruction sheet included with your battery. Failure to follow all instructions could cause permanent damage to the battery and its surroundings, and cause bodily harm!

- ONLY use a Li-Po approved charger. NEVER use a NiCd/NiMH peak charger!
- NEVER charge in excess of 4.20V per cell.
- ONLY charge through the “charge” lead. NEVER charge through the “discharge” lead.
- NEVER charge at currents greater than 1C.
- ALWAYS set charger’s output volts to match battery volts.
- ALWAYS charge in a fireproof location.
- NEVER trickle charge.

- NEVER allow the battery temperature to exceed 150° F (65° C).
- NEVER disassemble or modify pack wiring in any way or puncture cells.
- NEVER discharge below 2.5V per cell.
- NEVER place on combustible materials or leave unattended during charge or discharge.
- ALWAYS KEEP OUT OF REACH OF CHILDREN.

## AMA SAFETY CODE

Read and abide by the following excerpts from the Academy of Model Aeronautics Safety Code. For the complete Safety Code refer to *Model Aviation* magazine, the AMA web site or the Code that came with your AMA license.

### General

- 1) I will not fly my model aircraft in sanctioned events, air shows, or model flying demonstrations until it has been proven to be airworthy by having been previously, successfully flight tested.
- 2) I will not fly my model aircraft higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator. I will give right-of-way and avoid flying in the proximity of full-scale aircraft. Where necessary, an observer shall be utilized to supervise flying to avoid having models fly in the proximity of full-scale aircraft.
- 3) Where established, I will abide by the safety rules for the flying site I use, and I will not willfully and deliberately fly my models in a careless, reckless and/or dangerous manner.
- 5) I will not fly my model unless it is identified with my name and address or AMA number, on or in the model. Note: This does not apply to models while being flown indoors.
- 7) I will not operate models with pyrotechnics (any device that explodes, burns, or propels a projectile of any kind).

### Radio Control

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

5) I will not knowingly operate my model within three miles of any pre-existing flying site except in accordance with the frequency sharing agreement listed [in the complete AMA Safety Code].

9) Under no circumstances may a pilot or other person touch a powered model in flight; **nor should any part of the model other than the landing gear, intentionally touch the ground, except while landing.**

## CHECK LIST

During the last few moments of preparation your mind may be elsewhere anticipating the excitement of the first flight. Because of this, you may be more likely to overlook certain checks and procedures that should be performed before the model is flown. To help avoid this, a check list is provided to make sure these important areas are not overlooked. Many are covered in the instruction manual, so where appropriate, refer to the manual for complete instructions. Be sure to check the items off as they are completed (that's why it's called a *check list!*).

- 1. Check the C.G. according to the measurements provided in the manual.
- 2. Be certain the battery and receiver are securely mounted in the fuse. Simply stuffing them into place with foam rubber is not sufficient.
- 3. Extend your receiver antenna.
- 4. Balance your model *laterally* as explained in the instructions.
- 5. Use threadlocking compound to secure critical fasteners such as the set screws that hold the wheel axles to the struts, screws that hold the carburetor arm (if applicable), screw-lock pushrod connectors, etc.
- 6. Add a drop of oil to the axles so the wheels will turn freely.
- 7. Make sure all hinges are **securely** glued in place.
- 8. Reinforce holes for wood screws with thin CA where appropriate (servo mounting screws, cowl mounting screws, etc.).
- 9. Confirm that all controls operate in the correct direction and the throws are set up according to the manual.
- 10. Make sure there are silicone retainers on all the clevises and that all servo arms are secured to the servos with the screws included with your radio.
- 11. Secure connections between servo wires and Y-connectors or servo extensions, and the connection between your battery pack and the on/off switch with vinyl tape, heat shrink tubing or special clips suitable for that purpose.
- 12. Make sure any servo extension cords you may have used do not interfere with other systems (servo arms, pushrods, etc.).

- 13. Secure the pressure tap (if used) to the muffler with high temp RTV silicone, thread locking compound or J.B. Weld.
- 14. Make sure the fuel lines are connected and are not kinked.
- 15. Balance your propeller (and spare propellers).
- 16. Tighten the propeller nut and spinner.
- 17. Place your name, address, AMA number and telephone number on or inside your model.
- 18. Cycle your receiver battery pack (if necessary) and make sure it is fully charged.
- 19. If you wish to photograph your model, do so before your first flight.
- 20. Range check your radio when you get to the flying field.

## FLYING

The Sport Scale P-51 ARF is a great-flying model that flies smoothly and predictably. The P-51 does not, however, possess the self-recovery characteristics of a primary R/C trainer and should be flown only by experienced R/C pilots.

### Fuel Mixture Adjustments

A fully cowled engine may run at a higher temperature than an un-cowled engine. For this reason, the fuel mixture should be richened so the engine runs at about 200 rpm below peak speed. By running the engine slightly rich, you will help prevent dead-stick landings caused by overheating.

**CAUTION (THIS APPLIES TO ALL R/C AIRPLANES):** If, while flying, you notice an alarming or unusual sound such as a low-pitched "buzz," this may indicate control surface *flutter*. Flutter occurs when a control surface (such as an aileron or elevator) or a flying surface (such as a wing or stab) rapidly vibrates up and down (thus causing the noise). In extreme cases, if not detected immediately, flutter can actually cause the control surface to detach or the flying surface to fail, thus causing loss of control followed by an impending crash. The best thing to do when flutter is detected is to slow the model **immediately** by reducing power, then land as soon as safely possible. Identify which surface fluttered (so the problem may be resolved) by checking all the servo grommets for deterioration or signs of vibration. Make certain all pushrod linkages are secure and free of play. If it fluttered once, under similar circumstances it will probably flutter again unless the problem is fixed. Some things which can cause flutter are; Excessive hinge gap; Not mounting control horns solidly; Poor fit of clevis pin in horn; Side-play of wire pushrods caused by large bends; Excessive free play in servo gears; Insecure servo mounting; and one of the most prevalent causes of flutter; Flying an over-powered model at excessive speeds.

## Takeoff

Before you get ready to takeoff, see how the model handles on the ground by doing a few practice runs at **low speeds** on the runway. Hold “up” elevator to keep the tail wheel on the ground. If necessary, adjust the tail wheel so the model will roll straight down the runway. If you need to calm your nerves before the maiden flight, shut the engine down and bring the model back into the pits. Top off the fuel, then check all fasteners and control linkages for peace of mind.

Remember to takeoff into the wind. When you’re ready, point the model straight down the runway, hold a bit of up elevator to keep the tail on the ground to maintain tail wheel steering, then gradually advance the throttle. As the model gains speed decrease up elevator allowing the tail to come off the ground. One of the most important things to remember with a tail dragger is to always be ready to apply **right** rudder to counteract engine torque. Gain as much speed as your runway and flying site will practically allow before gently applying up elevator, lifting the model into the air. At this moment it is likely that you will need to apply more right rudder to counteract engine torque. Be smooth on the elevator stick, allowing the model to establish a **gentle** climb to a safe altitude before turning into the traffic pattern.

## Flight

For reassurance and to keep an eye on other traffic, it is a good idea to have an assistant on the flight line with you. Tell him to remind you to throttle back once the plane gets to a comfortable altitude. While full throttle is usually desirable for takeoff, most models fly more smoothly at reduced speeds.

Take it easy with the P-51 for the first few flights, gradually getting acquainted with it as you gain confidence. Adjust the trims to maintain straight and level flight. After flying around for a while and while still at a safe altitude with plenty of fuel, practice slow flight and execute practice landing approaches by reducing the throttle to see how the model handles at slower speeds. Add power to see how the model climbs as well. Continue to fly around, executing various maneuvers and making mental notes (or having your assistant write them down) of what trim or C.G. changes may be required to fine tune the model so it flies the way you like. Mind your fuel level, but use this first flight to become familiar with your model before landing.

## Landing

To initiate a landing approach, lower the throttle while on the downwind leg. Allow the nose of the model to pitch downward to gradually bleed off altitude. Continue to lose altitude, but maintain airspeed by keeping the nose down as you turn onto the crosswind leg. Make your final turn toward the runway (into the wind) keeping the nose down to maintain airspeed and control. Level the attitude when the model reaches the runway threshold, modulating the throttle as necessary to maintain your glide path and airspeed. If you are going to overshoot,

smoothly advance the throttle (always ready on the right rudder to counteract torque) and climb out to make another attempt. When you’re ready to make your landing flare and the model is a foot or so off the deck, smoothly increase up elevator until it gently touches down. Once the model is on the runway and has lost flying speed, hold up elevator to place the tail on the ground, regaining tail wheel control.

One final note about flying your model. Have a goal or flight plan in mind for **every** flight. This can be learning a new maneuver(s), improving a maneuver(s) you already know, or learning how the model behaves in certain conditions (such as on high or low rates). This is not necessarily to improve your skills (*though it is never a bad idea!*), but more importantly so you do not surprise yourself by impulsively attempting a maneuver and suddenly finding that you’ve run out of time, altitude or airspeed. Every maneuver should be deliberate, not impulsive. For example, if you’re going to do a loop, check your altitude, mind the wind direction (anticipating rudder corrections that will be required to maintain heading), remember to throttle back at the top, and make certain you are on the desired rates (high/low rates). A flight plan greatly reduces the chances of crashing your model just because of poor planning and impulsive moves. **Remember to think.**

**Have a ball! But always stay in control  
and fly in a safe manner.**

**GOOD LUCK AND GREAT FLYING!**

This model belongs to:	Name
	Address
	City, State, Zip
	Phone Number
	AMA Number

### **Brushless Motor Cool Air Exit Hole Template**

Cut out template,  
trace onto underside  
of cowl, and cut out  
using rotary tool