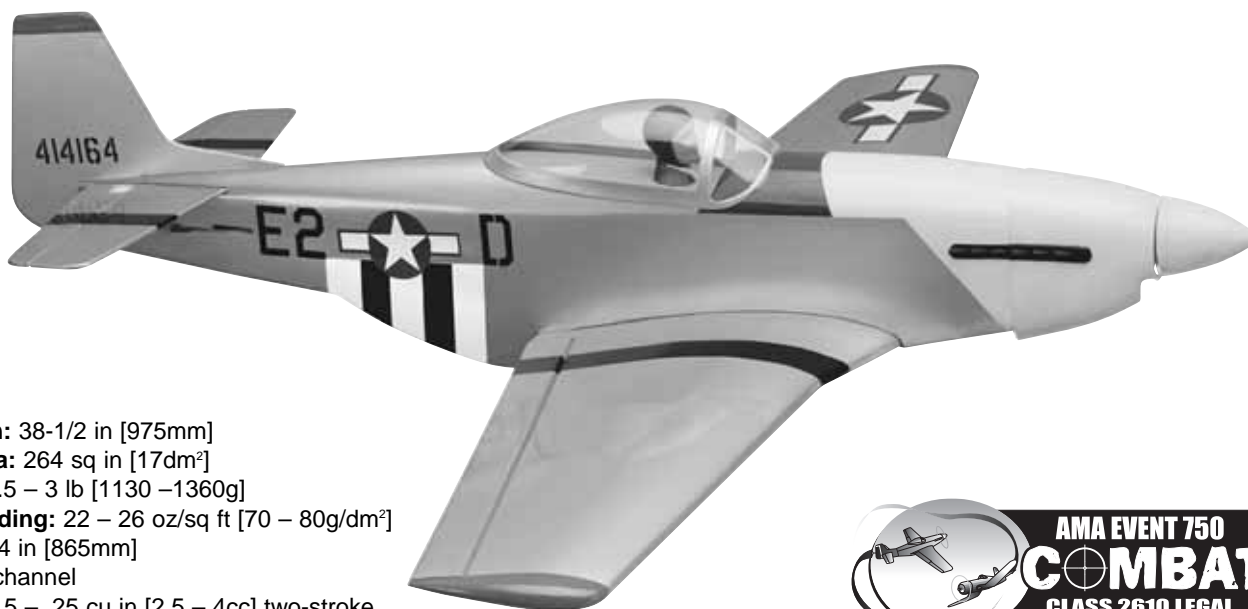


COMBAT MUSTANG

1/12 SCALE AMA EVENT 750, CLASS 2610 ARF

INSTRUCTION MANUAL



Wingspan: 38-1/2 in [975mm]
Wing Area: 264 sq in [17dm²]
Weight: 2.5 – 3 lb [1130 – 1360g]
Wing Loading: 22 – 26 oz/sq ft [70 – 80g/dm²]
Length: 34 in [865mm]
Radio: 3-channel
Engine: .15 – .25 cu in [2.5 – 4cc] two-stroke,
.30 cu in [5cc] four-stroke



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.



Champaign, IL
(217) 398-8970, Ext. 5
airsupport@greatplanes.com

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INTRODUCTION

The Great Planes 1/12-scale Combat P-51 ARF is a great flying model suitable for sport flying or Combat Class #2610. Whether you are a competitor or just want a great looking and great flying P-51, this 1/12-scale Combat P-51 ARF will become a favorite.

For the latest technical updates or manual corrections to the Combat P-51 ARF visit the Great Planes web site at

www.greatplanes.com. Open the "Airplanes" link, then select the Combat 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.

PROTECT YOUR MODEL, YOURSELF & OTHERS...FOLLOW THESE IMPORTANT SAFETY PRECAUTIONS

1. Your Combat 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 Combat P-51 ARF, 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 already an experienced R/C pilot, you should fly the model only with the help of a competent, experienced R/C pilot.

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, the modeler is responsible for taking steps to reinforce the high stress points.

9. **WARNING:** The cowl in this kit is made of fiberglass, the fibers of which may cause eye, skin and respiratory tract irritation. Never blow into the 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.

If you 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.

In addition to joining an R/C club, we strongly recommend you join the AMA (Academy of Model Aeronautics). AMA membership is required to fly at AMA sanctioned clubs. There are over 2,500 AMA chartered clubs across the country. Among other benefits, the AMA provides insurance to its members who fly at sanctioned sites and events. Additionally, training programs and instructors are available at AMA club sites to help you get started the right way. Contact the AMA at the address or toll-free phone number below.



Academy of Model Aeronautics
 5151 East Memorial Drive
 Muncie, IN 47302
 Tele: (800) 435-9262
 Fax (765) 741-0057
 Or via the Internet at:
<http://www.modelaircraft.org>

ADDITIONAL ITEMS REQUIRED

Hardware & Accessories

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

- 3-Channel radio
- 3-Channel (or greater) receiver
- (3) Micro servos with 34 oz-in of torque
- 12" [305mm] Servo extension
- Switch harness
- 500mAh Battery
- .15 - .25 cu in [2.5 - 4cc] Two-stroke or .30 cu in [5cc] four-stroke engine
- Propellers suitable for your engine.

Adhesives & Building Supplies

In addition to common household tools and hobby tools, this is the "short list" of the most important items required to build the Combat P-51 ARF. **Great Planes Pro™ CA and Epoxy glue are recommended.**

- 1/2 oz. [15g] Thin Pro CA (GPMR6001)
- 1/2 oz. [15g] Medium Pro CA+ (GPMR6007)
- Pro 30-minute epoxy (GPMR6047)
- Pro 6-minute epoxy (GPMR6045)
- 4-40 Tap and drill set (GPMR8101)
- #1 Hobby knife (HCAR0105)
- #11 Blades (5-pack, HCAR0211)
- 2 oz. [57g] Spray CA activator (GPMR6035)
- R/C-56 Canopy glue (JOZR5007)
- CA applicator tips (HCAR3780)

Optional Supplies & Tools

Here is a list of optional tools mentioned in the manual that will help you build the Combat P-51 ARF.

- Epoxy brushes (6, GPMR8060)
- Mixing sticks (50, GPMR8055)
- Mixing cups (GPMR8056)
- Builder's Triangle Set (HCAR0480)
- Curved-tip canopy scissors for trimming plastic parts (HCAR0667)
- Masking tape (TOPR8018)
- Denatured alcohol (for epoxy clean up)
- Switch & Charge Jack Mounting set (GPMM1000)
- Rotary tool such as Dremel® Moto-Tool®
- Rotary tool reinforced cut-off wheel (GPMR8200)
- Servo horn drill (HCAR0698)
- Hobby Heat™ micro torch (HCAR0750)
- Dead Center™ Engine Mount Hole Locator (GPMR8130)
- AccuThrow™ Deflection Gauge (GPMR2405)
- CG Machine™ (GPMR2400)
- Precision Magnetic Prop Balancer™ (TOPQ5700)

IMPORTANT BUILDING NOTES

- When you see the term **test fit** in the instructions, it means that you should first position the part on the assembly **without using any glue**, then slightly modify or *custom fit* the part as necessary for the best fit.
- Whenever the term **glue** is written you should rely upon your experience to decide what type of glue to use. When a specific type of adhesive works best for that step, the instructions will make a recommendation.

- Whenever just **epoxy** is specified you may use **either** 30-minute (or 45-minute) epoxy **or** 6-minute epoxy. When 30-minute epoxy is specified it is highly recommended that you use only 30-minute (or 45-minute) epoxy, because you will need the working time and/or the additional strength.
- **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.

COMMON ABBREVIATIONS

- Fuse = Fuselage
- Stab = Horizontal Stabilizer
- Fin = Vertical Fin
- LE = Leading Edge
- TE = Trailing Edge
- LG = Landing Gear
- " = Inches
- mm = millimeters

ORDERING REPLACEMENT PARTS

Replacement parts for the Great Planes Combat 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. Parts may also be ordered directly from Hobby Services, but full retail prices and shipping and handling charges will apply. Illinois and Nevada residents will also be charged sales tax.

To locate a hobby dealer, visit the Hobbico web site at 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. If a hobby shop is not available, replacement parts may also be ordered from Tower Hobbies at www.towerhobbies.com, or by calling toll free (800) 637-6050, or from Hobby Services by calling (217) 398-0007, or via facsimile at (217) 398-7721. 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, or by telephone (217) 398-8970.

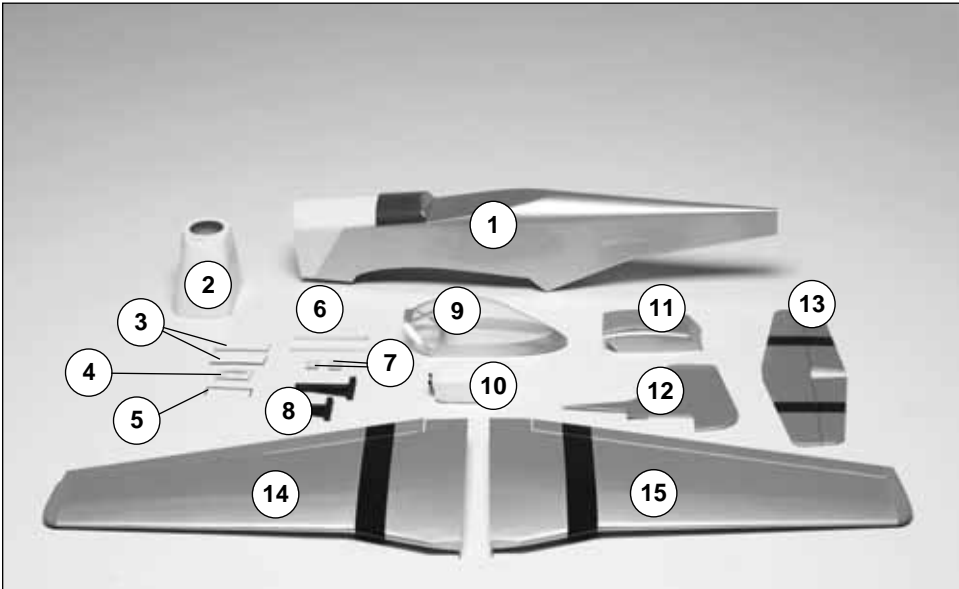
Replacement Parts List

<u>Order Number</u>	<u>Description</u>	<u>How to Purchase</u>
	Missing pieces	Contact Product Support
	Instruction manual	Contact Product Support
	Full-size plans.....	Not available
GPMA2620	Fuselage	} Contact Your Hobby Supplier to Purchase These Items
GPMA2621	Wing Set	
GPMA2622	Tail Set	
GPMA2623	Canopy	
GPMA2624	Cowl	
GPMA2625	Decal	

KIT CONTENTS

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 **Great Planes Product Support**. When reporting defective or missing parts, use the part names exactly as they are written in the “*Kit Contents*” list on this page.

Great Planes Product Support:
Telephone: (217) 398-8970, ext. 5
Fax: (217) 398-7721
E-mail: airsupport@greatplanes.com

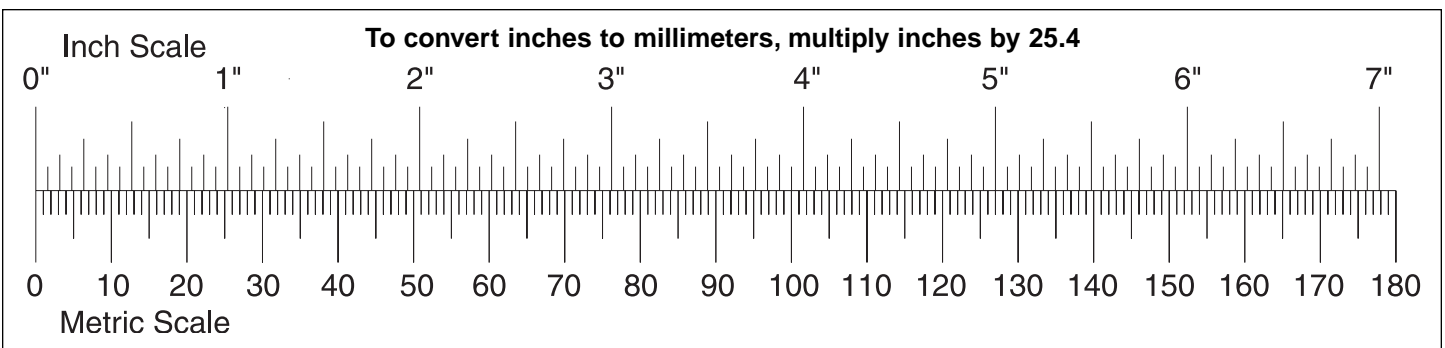


Kit Contents

1. Fuselage
2. Cowl
3. Wing Joiners (2)
4. Aileron Servo Tray
5. Elevator Joiner Wire
6. Balsa Sticks (2)
7. Wing Bolt Plates
8. Engine Mounts
9. Canopy
10. Fuel Tank
11. Belly Pan
12. Vertical Fin w/Rudder
13. Horizontal Stabilizer w/Elevators
14. Right Wing Panel w/Aileron
15. Left Wing Panel w/Aileron

Kit Contents (not photographed)

- | | | |
|--|--|--|
| <ul style="list-style-type: none"> (1) 2 x 248mm Nylon Tube (2) 2 x 114mm Threaded Pushrod Wire (2) 1 x 508mm Wire (4) 3 x 19mm Screws (4) 3mm Blind Nuts (8) 3mm Flat Washers (2) Nylon Clevises (2) Silicone Clevis Retainers (2) Nylon FasLinks (2) Screw-Lock Pushrod Connectors | <ul style="list-style-type: none"> (2) Knurled Nut for Screw-Lock Pushrod Connector (12) Hinges (1) Nylon Control Horn (4) 3mm Lock Washers (2) Aileron Torque Rod Horns (2) 2mm Flat Washers (2) 1/4-20 Nylon Wing Bolts (4) 3 x 19mm Machine Screws (8) 2 x 19mm Washer Head Screws | <ul style="list-style-type: none"> (2) 2.5mm Set Screws (1) 2.5mm Hex Wrench (1) Elevator Joiner Wire (1) Spinner (1) ABS Sheet, Exhaust Stacks |
|--|--|--|



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 Contents*” section on page 5.

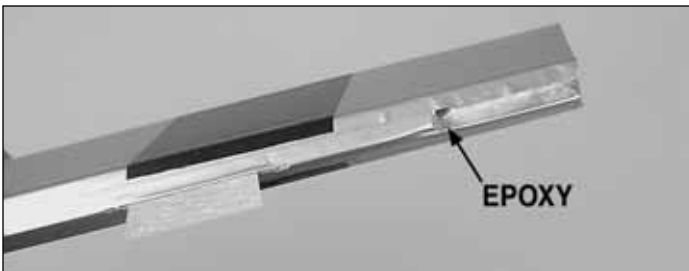


2. Remove the tape and separate the ailerons from the wing and the elevators from the stab. Use a covering iron with a covering sock on high heat to tighten the covering if necessary. Apply pressure over sheeted areas to **thoroughly** bond the covering to the wood.

BUILD THE WING

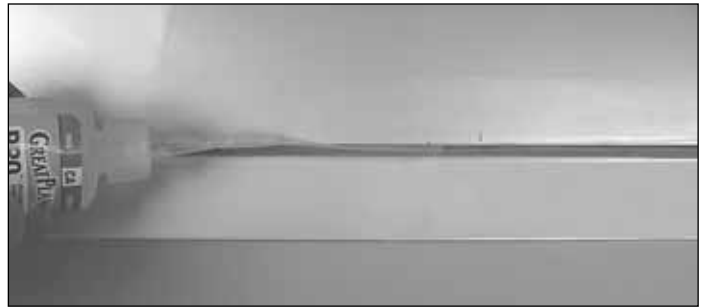
Install the Ailerons

1. Test fit the **ailerons** to the **wing** with the hinges, making sure the **aileron torque rod** fits into the hole in the aileron. Once you are satisfied with the fit, remove the aileron from the wing. Insert the hinges into the slots in the aileron. If the hinges did not remain centered, stick a pin through the middle of the hinge to hold it in position.



2. Apply a small amount of 6-minute epoxy into the hole in the aileron for the aileron torque rod. Working quickly, install the aileron to the wing. Use rubbing alcohol to clean any excess epoxy from the aileron and wing.

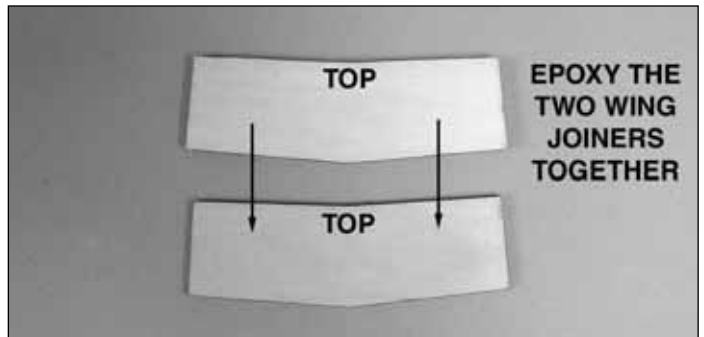
3. Remove any pins you may have inserted into the hinges. Adjust the aileron so there is a small gap between the LE of the aileron and the wing. The gap should be small, just enough to see light through or to slip a piece of paper through.



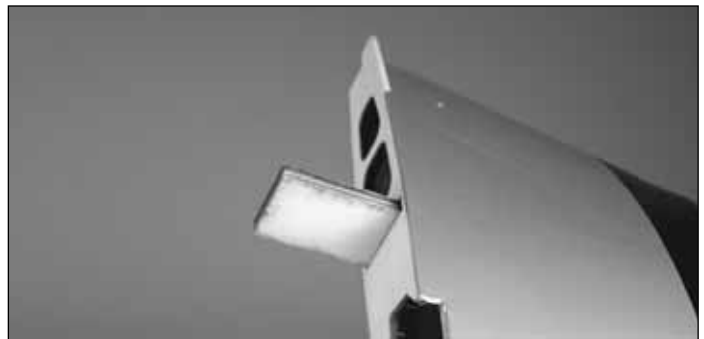
4. Apply six drops of thin CA to the top and bottom of each hinge. Do not use CA accelerator. After the CA has fully hardened, test the hinges by pulling on the aileron.

5. Repeat steps 1-4 for the left wing panel.

Join the Wing



1. Locate the two hardwood **wing joiners**. Look closely and you will see that the joiner has a definite angle on the top and the bottom. The top of the joiner must be facing the top of the wing when it is installed into the wing in the next step.

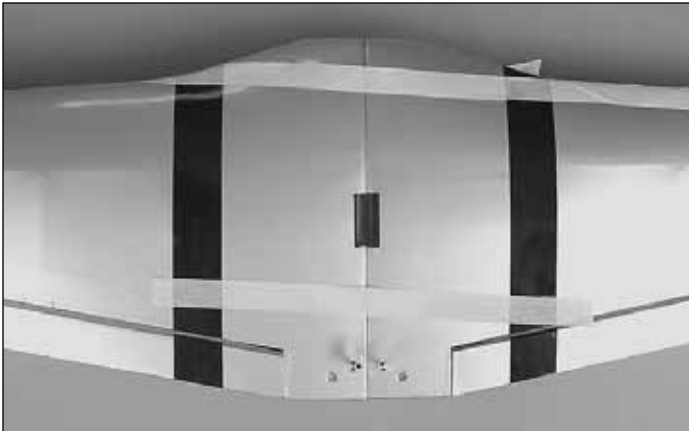


2. Test fit the joiner into both wing halves. The joiner should fit slightly loose to allow room for glue. If the joiner is snug, sand the face, top or bottom of the joiner as needed to get a good fit.

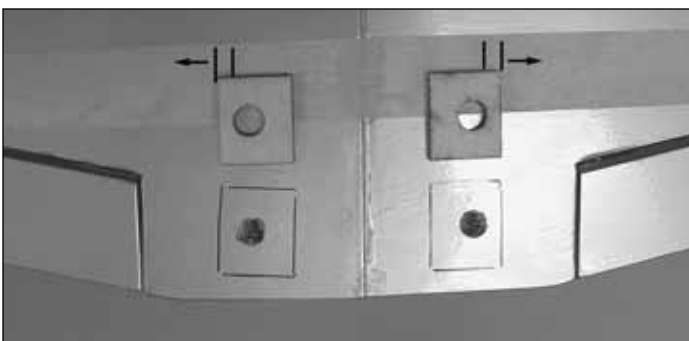
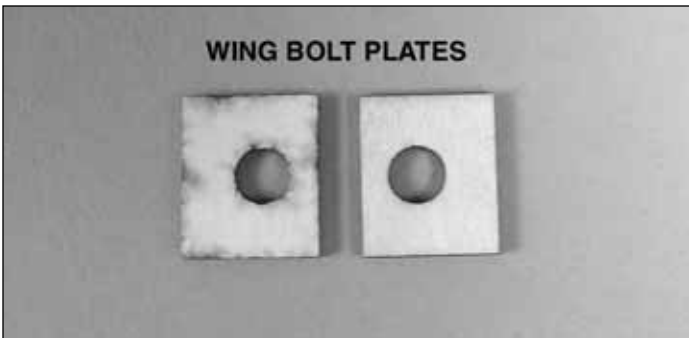


3. Temporarily tape the wings together. Place the wing on the bench. With one wing panel placed flat on the bench, the other wing should measure approximately 3-3/8"

[86mm] from the tip of the wing to the bench. The dihedral is not critical. A measurement between 3" [76mm] and 3-5/8" [92mm] is acceptable.



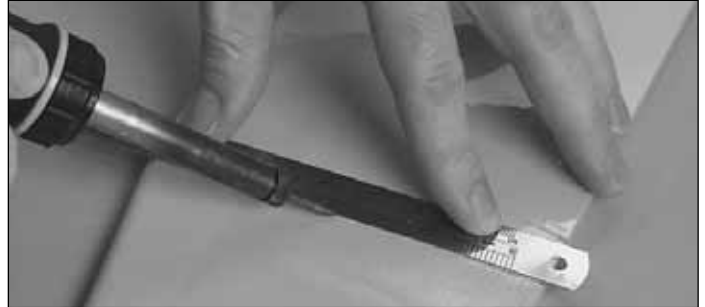
4. Mix approximately 1/2 ounce of 30-minute epoxy. Apply a liberal amount of epoxy into the joiner pocket of each wing, the root rib of each wing and the joiner. Insert the joiner into the right wing and then slide the left wing onto the joiner. Push the two wing halves firmly together. Clean excess epoxy from the wing surface with rubbing alcohol. Hold the wing halves together with masking tape until the glue has completely cured.



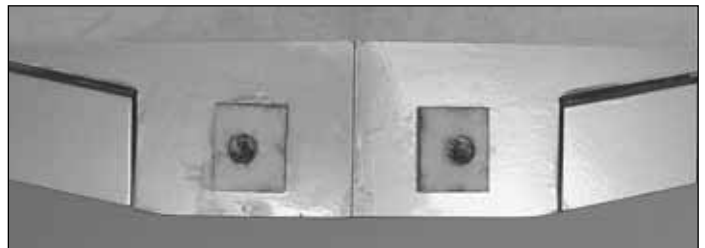
5. Locate the **wing bolt plates**. Cut the covering from the holes in the wing. Place the plates in position on the bottom of the wing at the trailing edge as shown. The offset hole must be towards the wing tip. With a fine-tip, felt-tip pen, draw the outline of the plates onto the wing. Using a sharp #11 hobby blade or the "Expert Tip" that follows, carefully cut the covering from the wing. **Be careful to only cut through the covering and not the wood!**



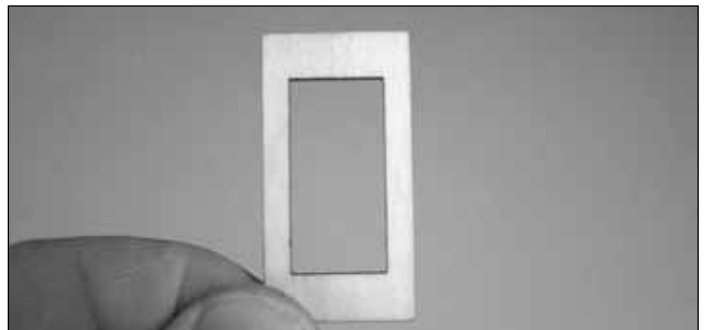
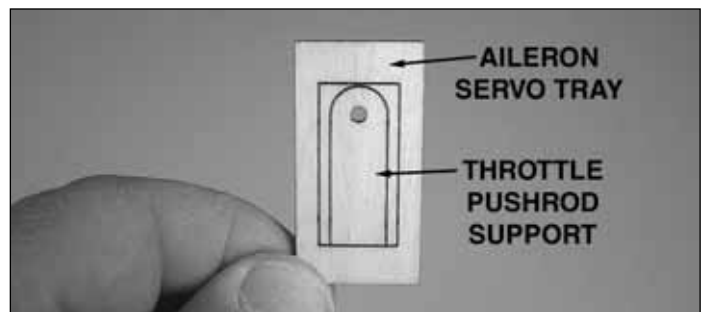
HOW TO CUT COVERING FROM BALSA



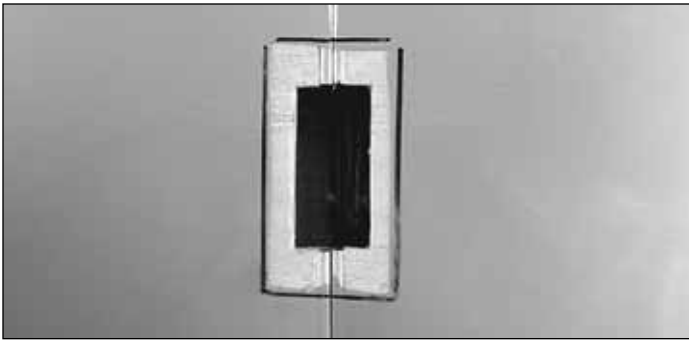
Use a soldering iron to cut the covering from the stab. The tip of the soldering iron doesn't have to be sharp, but a fine-tip does work best. Allow the iron to heat fully. Use a straightedge to guide the soldering iron at a rate that will just melt the covering and not burn into the wood. The hotter the soldering iron, the faster it must travel to melt a fine cut. Peel off the covering.



6. Glue the wing bolt plates to the bottom of the wing with 6-minute epoxy. Be sure that you are careful to align the holes in the plates with the offset holes toward the wing tip.



7. Remove the components from inside the plywood aileron servo tray. Set them aside.

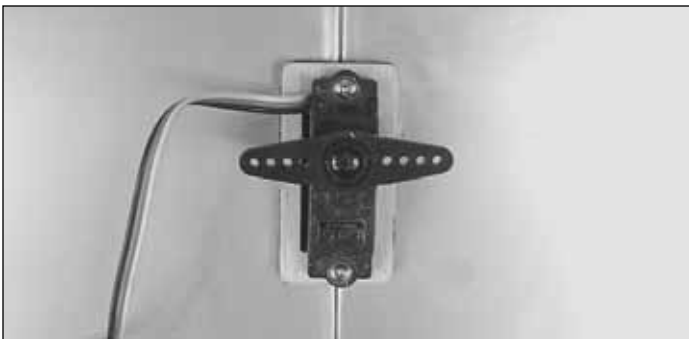


❑ 8. Position the plywood aileron servo tray over the servo location in the center-section of the wing. Trace the outline of the tray onto the wing with a fine-tipped marker. Carefully cut the covering from the wing inside the lines you have made on the wing. Be sure to only cut through the covering and not the wood.



❑ 9. Glue the plywood aileron servo tray to the wing with 6-minute epoxy.

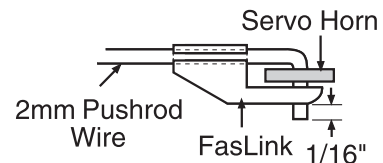
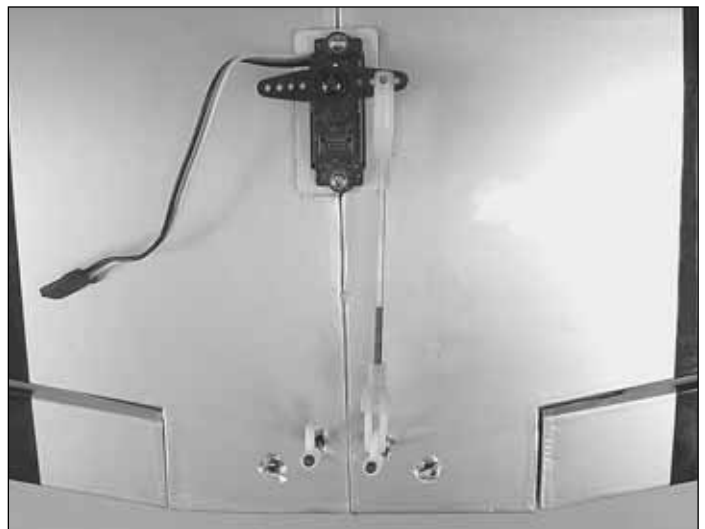
Install the Aileron Servo & Pushrods



❑ 1. Insert the aileron servo into the aileron servo tray. Using the servo as your guide, drill a 1/16" [1.6mm] hole through the servo tray for each of the mounting holes. Remove the servo from the tray. Insert and then remove a servo mounting screw (included with your servo) from each of the holes you have drilled. Apply a couple of drops of thin CA into the holes to harden the threads. When the CA has cured, install the servo into the servo tray using the hardware provided with your servo.

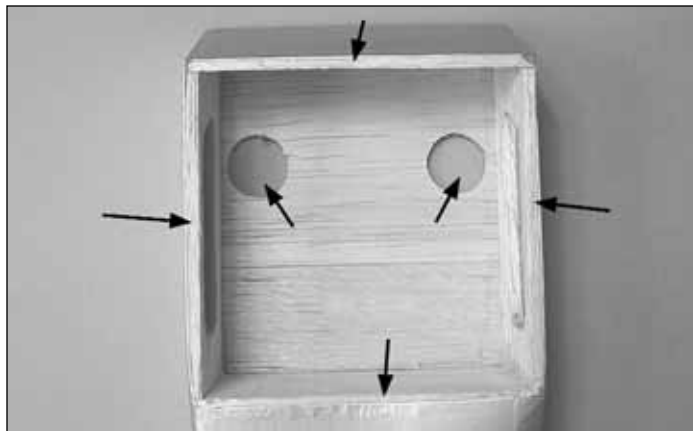


❑ 2. Locate a 2 x 114mm **pushrod wire** threaded on one end. Screw a nylon **clevis** and a silicone **clevis retainer** onto the threaded end of the wire 20 full turns. Install the clevis onto one of the **aileron torque rod connectors**. Center the servo arm and center the aileron. Mark the location where the wire aligns with the hole in the servo arm. Bend the wire 90 degrees on this mark and then cut the excess wire 3/8" [9.5mm] above the bend.



❑ 3. Be sure the aileron servo is centered. Enlarge the second hole in the servo arm with a Hobbico Servo Horn Drill (or a #50 or 5/64" [2mm] drill bit). Attach the clevis to the aileron torque rod connector, slide the silicone clevis retainer over the clevis and install the wire into the servo arm and retain it with a nylon **FasLink**. Do this for both the left and right aileron.

Install the Belly Pan



❑ 1. Cut the covering from the mounting bolt holes and the edges of the **belly pan**.

❑ 2. Install the wing onto the **fuselage** with two 1/4-20 nylon bolts. Place the belly pan in position on the bottom of the wing, aligning the holes in the belly pan with the bolt heads on the bottom of the wing. Trace the outline of the belly pan onto the wing. Cut the covering away from the wing inside the lines you have drawn.



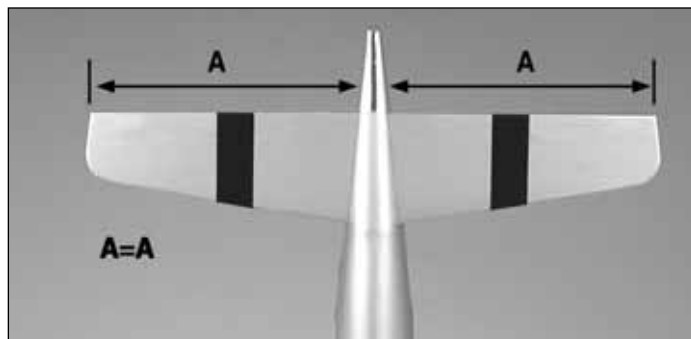
❑ 3. Glue the belly pan to the fuselage by applying a small bead of medium CA to the edges of the belly pan and carefully positioning it on the wing.

BUILD THE FUSELAGE

Install the Horizontal Stabilizer, Elevator & Vertical Fin



❑ 1. Cut the covering away from the fuselage for the **horizontal stabilizer** and **vertical fin**.



❑ 2. Insert the horizontal stab into the fuselage. Position the horizontal stab so that it is centered in the fuselage. The distance from each end of the horizontal stab to the fuselage should be the same distance.



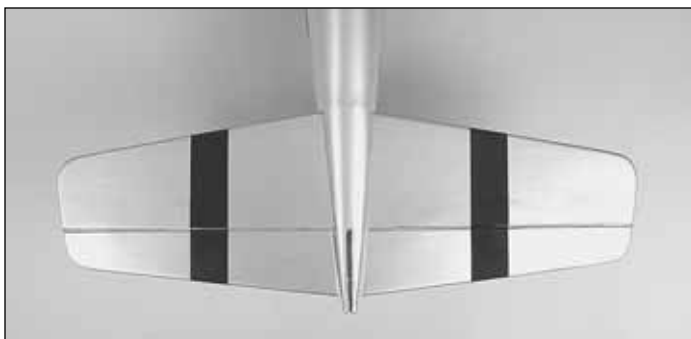
❑ 3. Once the horizontal stab is centered, trace the outline of the fuselage onto the top and bottom of the horizontal stab. Remove the stab from the fuselage. Using a sharp #11 hobby blade, carefully cut the covering from the top and bottom center-section of the horizontal stab. **Be careful to only cut through the covering and not the wood!**



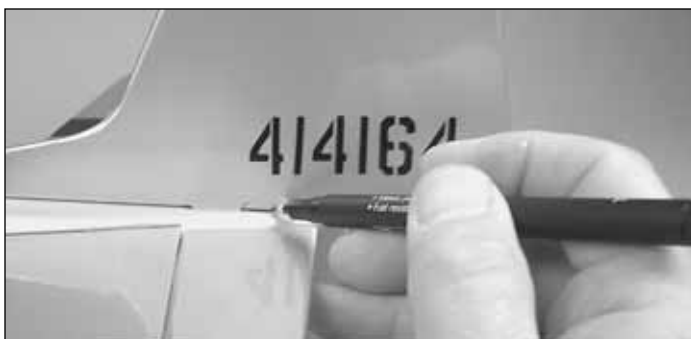
❑ 4. Slide the horizontal stab and **elevator joiner wire** into the slot in the fuselage. Check the position of the horizontal stab by measuring from the end of the horizontal stab to the fuselage. Once the horizontal stab is properly positioned,

glue the horizontal stab to the fuselage by wicking thin CA into the joint. Do this on both the top and bottom of the horizontal stab.

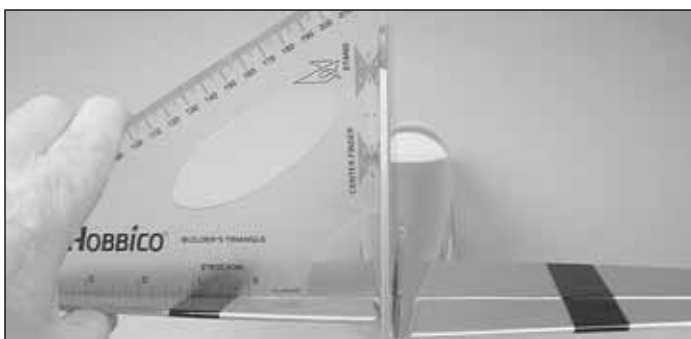
❑ 5. Insert a hinge into each of the **elevator** and horizontal stab hinge slots, checking to be sure the hinge fits easily into the slot. If any of the hinge slots is too tight for the hinge, clean out the hinge slot with a #11 blade. Drill a 5/64" [2mm] hole in the leading edge of each elevator for the elevator joiner wire.



❑ 6. Insert the hinges into the slots in the horizontal stab. If the hinges do not remain centered, stick a pin through the middle of the hinge to hold it in position. Insert each half of the elevator onto the hinges and the elevator joiner wire in the horizontal stab. Remove the pins and then apply six drops of thin CA to each of the hinges.



❑ 7. Insert the vertical fin into the slot in the fuselage. Trace the outline of the fuselage onto the fin. Cut the covering from the fin the same as was done with the horizontal stab.



❑ 8. Check to be sure the vertical fin is perpendicular to the horizontal stab. When satisfied with the positioning of the vertical fin, wick thin CA into the slot.



❑ 9. Once the thin CA glue has cured, position the front of the fin so that it is centered on the fuselage. Wick a **small** amount of thin CA between the fin and the fuselage. There is no need to remove any covering from the fuselage when applying the glue.

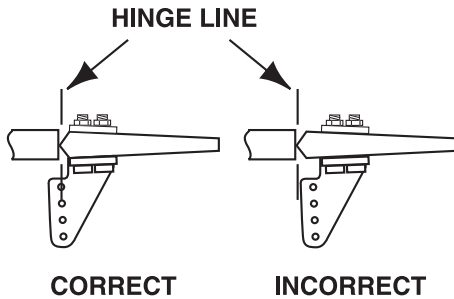
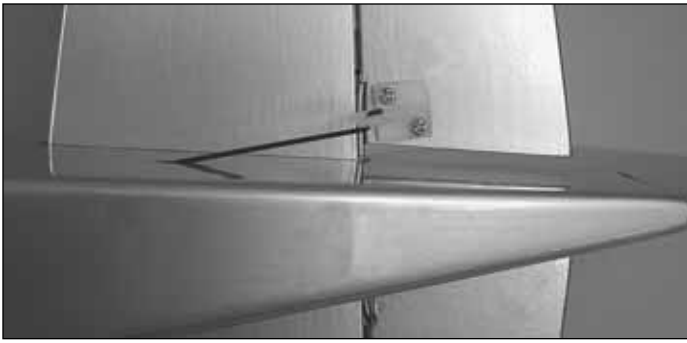
Install the Elevator Pushrods & Servo



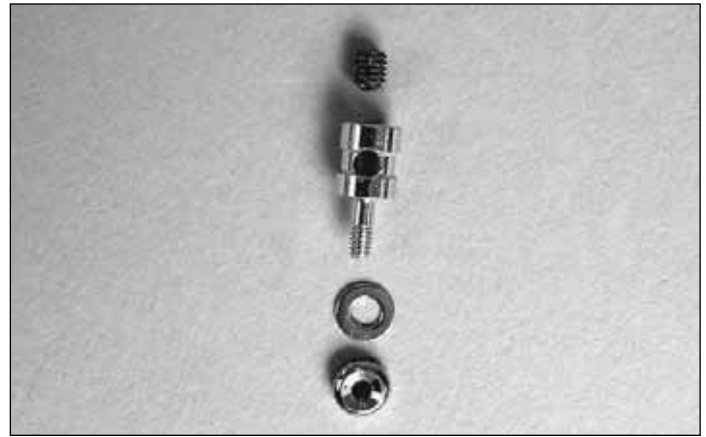
❑ 1. Cut the covering from the left side of the fuselage for the **elevator pushrod opening**.



❑ 2. Install a nylon clevis onto the Z-bend of the 1 x 508mm pushrod wire.



3. Slide the pushrod wire into the hole in the side of the fuselage. Position a nylon control horn onto the elevator. Mark the location of the screw holes. Then drill a 5/64" [2mm] hole on the marks, drilling through the elevator. Install the horn using two 2 x 19mm screws and the nylon plate.



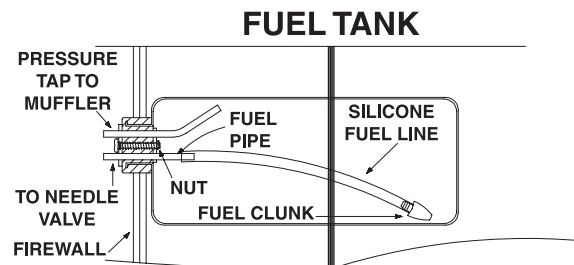
5. Install the **screw-lock pushrod connector** into the last hole of the servo arm. Tighten it to the servo arm with a washer and knurled nut. Slide the pushrod into the connector. Center the servo arm and elevator. Tighten the set screw against the pushrod wire. Cut off the excess pushrod wire.

Refer to this picture for the next three steps.

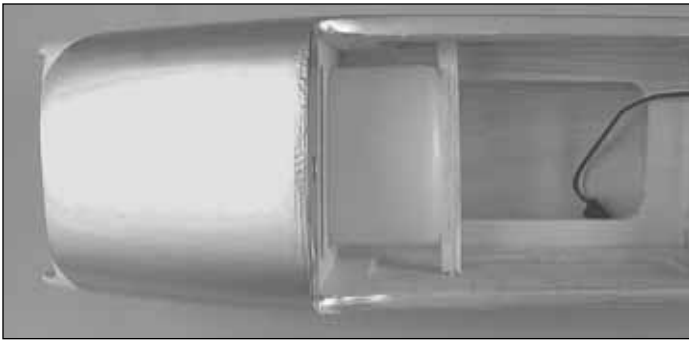


4. Insert the **elevator servo** into the servo tray. Using the servo as your guide, drill a 1/16" [1.6mm] hole through the servo tray for each of the mounting screws. Remove the servo from the tray. Insert and then remove a servo mounting screw (included with your servo) from each of the holes you have drilled. Apply a couple of drops of thin CA into the holes to harden the threads. When the CA has cured, install the servo into the servo tray using the hardware provided with your servo.

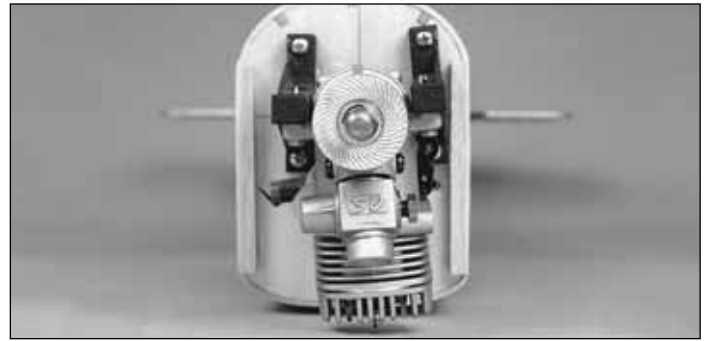
Install the Engine, Fuel Tank & Throttle Servo



1. Assemble the **fuel tank** as shown. If you will be using a **fuel valve** for filling the tank rather than filling the tank by removing the line from the carburetor, install it in the fuel line following the instructions included with the valve. Install the tank into the fuselage, feeding the lines through the hole in the **firewall**.



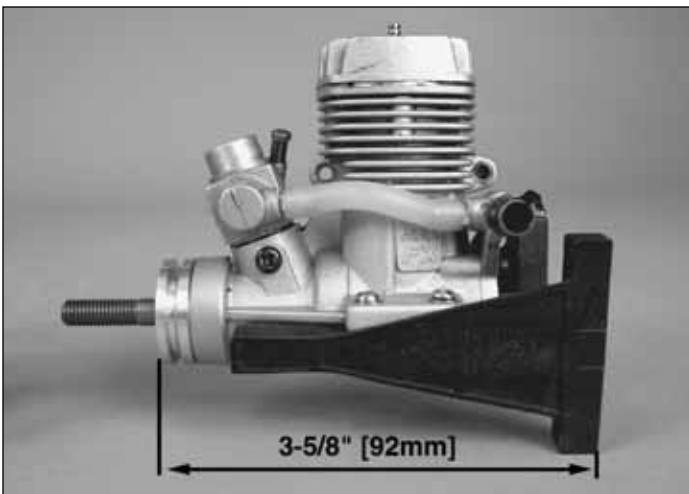
❑ 2. Locate a 4-1/2" [114mm] balsa stick. Cut it as needed to fit in the fuselage to hold the fuel tank in position. When you have completed the installation of the fuel tank and the engine, this stick will be permanently glued in place. You may wish to tack glue it in place as you continue with the rest of the installation.



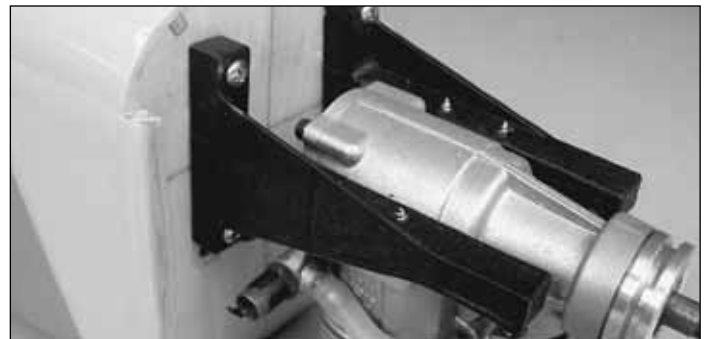
❑ 4. On the side of the engine mount are reference marks. Align the marks that are in line with the engine mounting rails with the lines on the firewall. Align the center of the engine with the lines on the firewall. Tack glue the mount to the firewall.

❑ 5. Mark the location of the mounting holes onto the firewall. Remove the engine mount from the firewall. Drill four 5/32" [4mm] holes through the firewall on each of the four marks.

❑ 6. Install a 3mm blind nut on the back side of the firewall in each of the four holes.



❑ 3. Position your **engine** on the **engine mount** so that the distance from the back of the mount to the front of the thrust washer is 3-5/8" [92mm]. Drill a 3/32" [2.4mm] hole through each of the mounting holes of the engine into the engine mount. Mount the engine to the mount with four 3 x 15mm self-tapping screws and 3mm flat washers.

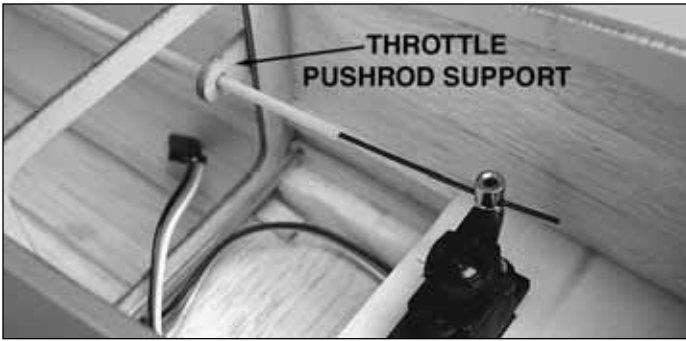


❑ 7. Mount the engine mount to the firewall with four 3 x 19mm screws, 3mm lock washers and 3mm flat washers.



❑ 8. Drill a 3/32" [2.4mm] hole through the firewall, in line with the **throttle arm** on the **carburetor**. Slide the white nylon guide tube into the hole in the firewall feeding it back to the throttle servo. Glue it to the firewall. Insert a 1 x 508mm wire pushrod into the tube. Attach the throttle arm to the Z-bend on the end of the wire.

Refer to this photo for steps 9-12.



- 9. Mount the **throttle servo** as shown using the hardware included with your servo.
- 10. Glue the plywood **throttle pushrod support** in place. Trim the support as needed.
- 11. Install a screw-lock pushrod connector into the outer hole in the servo arm.
- 12. If you removed your tank earlier, reinsert it now. If you have not yet permanently glued the balsa stick in place to hold the tank in position, do it now.

Install the Cowl, Prop & Spinner

Refer to these two pictures for the following steps.



- 1. Carefully cut the **cowl** so that it slips easily over the front of the engine clearing the **muffler**, **needle valve**, etc.
- 2. Slide the cowl over the engine along with the **spinner backplate**. Position the cowl so there is approximately 1/8" [3mm] between the front of the cowl and the back of the spinner backplate.

- 3. Holding the cowl in place, drill four 1/16" [1.6mm] holes in the side of the cowl and through the plywood tab that extends from the fuselage sides. Install a 2 x 8mm washer head screw into each of the holes. Remove the cowl and put a couple of drops of thin CA into each of the holes to harden the threads. When the glue is cured, reinstall the cowl and screws.

- 4. Place the spinner backplate onto the engine followed by the **propeller**. Tighten the **prop nut** against the washer. When the propeller is tight, place the spinner onto the backplate, holding it in place with the two sheet metal screws included with the spinner.

Install the Receiver & Battery

Some modelers will want to use a full-size receiver and battery pack. Others may wish to take advantage of the new smaller **receivers** and **batteries** available today. Depending on your choice of equipment, you may have to make slight modifications to your particular installation.



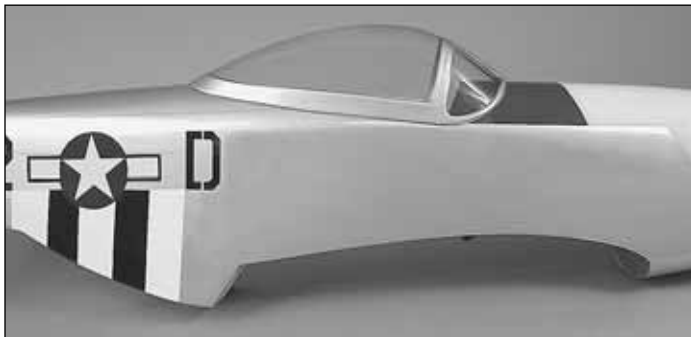
- 1. For our model we utilized the area in front of the servos for the battery and the receiver. If you have a problem with the balance of your plane you may wish to move the battery and receiver in the area behind the servos. When installing the radio be sure you protect the battery and receiver from vibration with 1/4" [6mm] foam. In the photograph the foam has been omitted to show how we stacked the battery and receiver. Once positioned in the fuselage, hold the battery and **antenna** in place by gluing sticks to the fuselage side.



- 2. Cut the covering away from the right side of the fuselage to reveal the **antenna tube exit**. Thread the antenna into the tube inside the fuselage and exiting through the back of the fuselage.

- ❑ 3. Install an on/off switch in the fuselage following the instructions that came with the switch.

Finishing Touches



- ❑ 1. Cut the canopy on the cut lines. Glue the canopy to the fuselage. We find that R/C-56 canopy glue works well for this.



- ❑ 2. Cut the exhaust stacks as shown. Cut the set of six exhaust stacks in half. One half is glued to the cowl and the other is glued to the fuselage. Glue to both sides of the cowl with R/C-56 canopy glue.

- ❑ 3. Use scissors or a sharp hobby knife to cut the decals from the sheet.

- ❑ 4. 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.

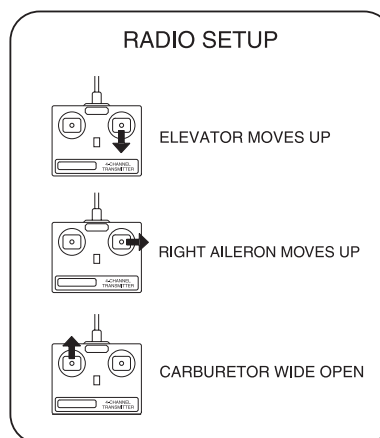
- ❑ 5. Position the decals on the model as seen on the box cover. Holding the decal down, use a paper towel to wipe most of the water away.

- ❑ 6. Working from the middle to the outside, 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

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.



- ❑ 3. Make certain that the control surfaces and the carburetor 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 and ailerons.

These are the recommended control surface throws:

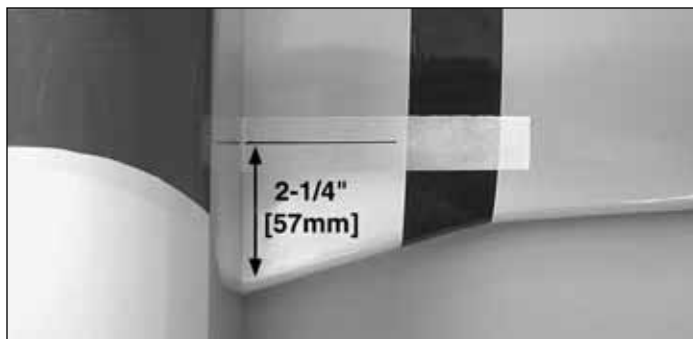
	High Rate	Low Rate
ELEVATOR:	3/8" [9.5mm] up 3/8" [9.5mm] down	1/4" [6mm] up 1/4" [6mm] down
AILERONS:	5/16" [8mm] up 5/16" [8mm] down	1/4" [6mm] up 1/4" [6mm] down

IMPORTANT: The Combat 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 Combat P-51 ARF 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, landing gear, covering and paint, and the radio system.



1. Use a felt-tip pen or 1/8" [3mm] wide tape to accurately mark the C.G. on the top of the wing on both sides of the fuselage. The C.G. is located 2-1/4" [57mm] back from the leading edge of the wing at the fuselage.

This is where your model should balance for the first flights. Later, you may wish to experiment by shifting the C.G. up to 1/8" [3mm] forward or 1/8" [3mm] 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 upside-down 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. weight, or GPMQ4646 for the 2 oz. 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 19 and place it on or inside your model.

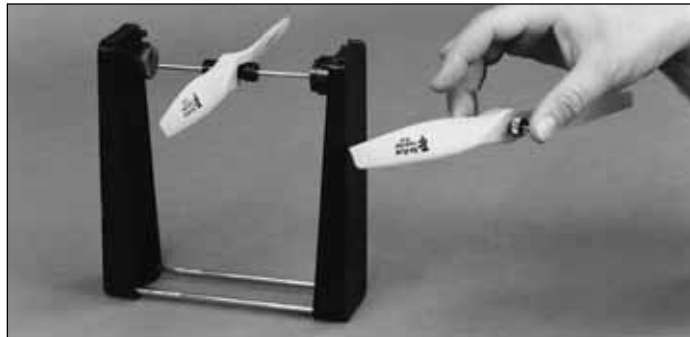
Charge the Batteries

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.

Note: Checking the condition of your receiver battery pack is **highly recommended.** All battery packs, whether it's a trusty pack you've just taken out of another model, or a new battery pack you just purchased, should be cycled, noting the discharge capacity. Oftentimes, a weak battery pack can be identified (and a valuable model saved!) by comparing its actual capacity to its rated capacity. Refer to the instructions and recommendations that come with your cycler. If you don't own a battery cycler, perhaps you can have a friend cycle your pack and note the capacity for you.

Balance the 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. 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, scarfs, 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. To stop a gasoline powered engine an on/off switch should be connected to the engine coil. Do not throw anything into the propeller of a running engine.

AMA SAFETY CODE (excerpts)

Read and abide by the following Academy of Model Aeronautics Official Safety Code:

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 to, and avoid flying in the proximity of full-scale aircraft. Where necessary an observer shall be used 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.

7. I will not fly my model unless it is identified with my name and address or AMA number, on or in the model.

9. 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. I will perform my initial turn after takeoff away from the pit or spectator areas, and I will not thereafter fly over pit or spectator areas, unless beyond my control.

4. I will operate my model using only radio control frequencies currently allowed by the Federal Communications Commission.

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. Fuelproof all areas exposed to fuel or exhaust residue such as the cowl mounting blocks, wing saddle area, etc.
- 2. Check the C.G. according to the measurements provided in the manual.
- 3. Be certain the battery and receiver are securely mounted in the fuse. Simply stuffing them into place with foam rubber is not sufficient.
- 4. Extend your receiver antenna and make sure it has a strain relief inside the fuselage to keep tension off the solder joint inside the receiver.
- 5. Balance your model *laterally* as explained in the instructions.

- 6. Use thread-locking compound to secure critical fasteners such as the set screws, screws that hold the carburetor arm (if applicable), screw-lock pushrod connectors, etc.
- 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. Make sure the fuel lines are connected and are not kinked.
- 14. Balance your propeller (and spare propellers).
- 15. Tighten the propeller nut and spinner.
- 16. Place your name, address, AMA number and telephone number on or inside your model.
- 17. Cycle your receiver battery pack (if necessary) and make sure it is fully charged.
- 18. If you wish to photograph your model, do so before your first flight.
- 19. Range check your radio when you get to the flying field.

FLYING

Mount the Wing to the Fuselage

The Combat P-51 ARF is a great-flying model that flies smoothly and predictably. The Combat P-51 ARF 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.

Hand Launching

For the first flight it is recommended that you get someone experienced in hand launching models. Set your model on a bench, off of the ground. Start the engine and make all needed adjustments holding the plane on the bench. Carefully carry the plane to the area of your flying field you intend to launch the plane from.

Have an assistant hold the plane from the radiator scoop and wing tip. Holding the plane level and pointing into the wind, run a few steps and allow the plane to fly out of your hand. There should not be a reason to actually throw the plane. In fact, throwing the plane can be more difficult than letting the plane fly out of your hand. 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.

Take it easy with the Combat P-51 ARF 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 she 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 grass landing area (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 and climb out to make another attempt. When you're ready to make your landing, flare when the model is a foot or so off the deck, and smoothly increase up elevator until it gently touches down.

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
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OTHER ITEMS AVAILABLE FROM GREAT PLANES



O.S.® .15 LA Engine

Powerful, dependable, user-friendly – that describes the .15 LA sport engine. Its dual-needle carb offers fine-tuned throttle control. Also included are a 1-piece crankcase with reinforcing webbing and cooling fins that extend well down onto the upper crankcase. You'll also appreciate the safety and protection of the remote needle, mounted on a nylon backplate. Ratchet springs and O-ring seals help prevent settings "creep." Also includes glow plug and muffler. **OSMG0015**



O.S. .25 FX Engine

The economical .25 FX engine has dual ball bearings for durability and smooth operation, plus a low crankcase profile that allows for a proportionately taller, semi-squared head to increase cooling fin area. The needle valve is remotely mounted for pilot safety, and an O-ring and ratchet spring minimizes "creep" due to air leaks and vibration. Muffler is included; glow plug required. **OSMG0525**



