

Revolver

INSTRUCTION MANUAL



SPECIFICATIONS

Wingspan:	70 in [1780mm]	Weight:	8.5 – 9.25 lb [3850 – 4190 g]	Radio:	4-channel minimum with 4-5 servos and standard size receiver
Wing Area:	832 in ² [53.7 dm ²]	Wing Loading:	24 – 26 oz/ft ² [73 – 79 g/dm ²]	Engine:	.61 – .75 [10–12.5 cc] two stroke .81–.91 [13.5–15 cc] four stroke
				Motor:	RimFire™ 80 (50-55-500) outrunner brushless motor

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

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INTRODUCTION

Congratulations on the purchase of the Great Planes Revolver .61 ARF! After the great success of the .46 Revolver and your many requests for a larger version, we are proud to bring you the Revolver .61. This plane was designed for the average sport pilot who wants an airplane that looks good, flies fast, and is capable of performing a wide range of aerobatic maneuvers. Loops, rolls, positive and negative snap rolls, hammerheads, and lomcevak are all within the capabilities of this airplane. We have incorporated many features found only on larger airplanes. The plug-in wings, composite landing gear, and a removable canopy for easy access to the inside of the fuselage are all features you will come to appreciate.

For the latest technical updates or manual corrections to the Revolver ARF visit the Great Planes web site at www.greatplanes.com. Open the "Airplanes" link, then select the Revolver .61 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

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.

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

1. Your Revolver 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 Revolver, 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 and wheel pants included in this kit are 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 Revolver .61 ARF that may require planning or decision making before starting to build. Order numbers are provided in parentheses.

Radio Equipment

The Revolver .61 ARF requires a minimum 4-channel radio system with five 50 oz.-in. [3.6 kg-cm] minimum standard 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.

If you plan to install a brushless motor, you will need a 6" [152mm] servo extension for the ESC. If you plan to install a glow engine, you will need a 12" [305mm] servo extension for the receiver battery pack.

A charge jack receptacle is optional, but is useful for recharging the receiver pack without removing the canopy hatch and is shown in the assembly of the plane. Recommended part numbers for the radio components are provided below:

- Futaba® S9001 Servo Aircraft Coreless BB (FUTM0075)
- Hobbico® Pro™ HD Extension 6" [152mm] Futaba J (HCAM2701)
- Hobbico Pro HD Y-Harness Futaba J (HCAM2751)
- Hobbico Pro HD Extension 12" [305mm] Futaba J (HCAM2711)
- Ernst Charge Receptacle Futaba J FM (ERNM3001)

Power System Recommendations

The recommended engine/motor size for the Revolver ARF is a .61– .75 [10 – 12.5 cc] two stroke, .81 – .91 [13.5 – 15 cc] four stroke, or a RimFire™ 80 (50-55-500), with SS60 ESC, 6S 3200 mAh LiPo, and 15 x 7E prop. Engine and motor order numbers are provided below:

- O.S.® .61 FX ABL (OSMG0561)
- SuperTigre® G – 75 (SUPG0205)
- O.S. 81FS (OSMG0981)
- O.S. 91FS (OSMG0890)
- Bisson O.S. 61SF/50FX Pitts Muffler (BISG4061)
- Great Planes RimFire .80 (50-55-500) Outrunner Brushless Motor (GPMG4740)
- Great Planes Brushless Large Motor Mount (GPMG1260)

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

- Great Planes Silver Series 60A Brushless ESC High Volt (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 an APC 15x7E Electric Propeller (APCQ1830).

Batteries and Charger

For a brushless motor installation, two 3200mAh 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 3200mAh 11.1V 20C Discharge w/ Balance (GPMP0623)
- 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 lead 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

This is the list of hardware and accessories required to finish the Revolver .61 ARF. Order numbers are provided in parentheses:

Adhesives and Building Supplies

This is the list of Adhesives and Building Supplies that are required to finish the Revolver ARF:

- 1/2 oz. [15g] Thin Pro CA (GPMR6001)
- 1/2 oz. [15g] Medium Pro CA+ (GPMR6007)
- Pro 30-Minute Epoxy (GPMR6047)
- Masking Tape (TOPR8018)
- Threadlocker Thread Locking Cement (GPMR6060)
- Denatured Alcohol (for epoxy clean up)
- R/C Foam Rubber (1/4" [6mm], HCAQ1000; or 1/2" [13mm], HCAQ1050)
- 3' [900mm] Standard Silicone Fuel Tubing (GPMQ4131)
- Drill bits: 1/16" [1.6mm], 5/64" [2mm], 3/32" [2.4mm], 9/64" [3.6mm]
- Great Planes Tap & Drill Set 8-32 (GPMR8102, Glow Engine Installation Only)
- Tap Handle (GPMR8120)
- Small Metal File
- #1 Hobby Knife (HCAR0105)
- #11 Blades (5-pack, HCAR0211)
- Medium T-pins (100, HCAR5150)
- Top Flite® MonoKote® Sealing Iron (TOPR2100)
- Top Flite Hot Sock™ Iron Cover (TOPR2175)
- 220-grit Sandpaper
- 1/2" [13mm] Double-sided Foam Mounting Tape (GPMQ4440, Brushless Installation Only)
- Microballoons (TOPR1090)
- Panel Line Pen (TOPQ2510)

Optional Supplies and Tools

Here is a list of optional tools that will help you build the Revolver ARF:

- 1/2 oz. [15g] Thick Pro CA- (GPMR6013)
- 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)
- Hobbico Duster™ Compressed Air (HCAR5500)
- Switch & Charge Jack Mounting Set (GPMR1000)
- Rotary Tool such as Dremel
- Rotary Tool Reinforced Cut-Off Wheel (GPMR8020)
- Servo Horn Drill (HCAR0698)
- Hobby Heat™ Micro Torch (HCAR0750)
- 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)

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.

- 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 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.

ORDERING REPLACEMENT PARTS

Replacement parts for the Revolver .61 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 Great Planes web site at www.greatplanes.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 telephone at (217) 398-8970, or by e-mail at productsupport@greatplanes.com.



REPLACEMENT PARTS LIST

Order No.	Description
GPMA3275	Fuselage (<i>No Canopy or Hatch</i>)
GPMA3276	Wing Set
GPMA3277	Tail Set
GPMA3278	Cowl
GPMA3279	Landing Gear
GPMA3280	Wheel Pants
GPMA3281	Canopy
GPMA3282	Spinner
GPMA3283	Decal
GPMA3284	Wing Tube

NOTE ►	Full-size plans are not available. You can download a copy of this manual at www.greatplanes.com .
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KIT INSPECTION

Before starting to build 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

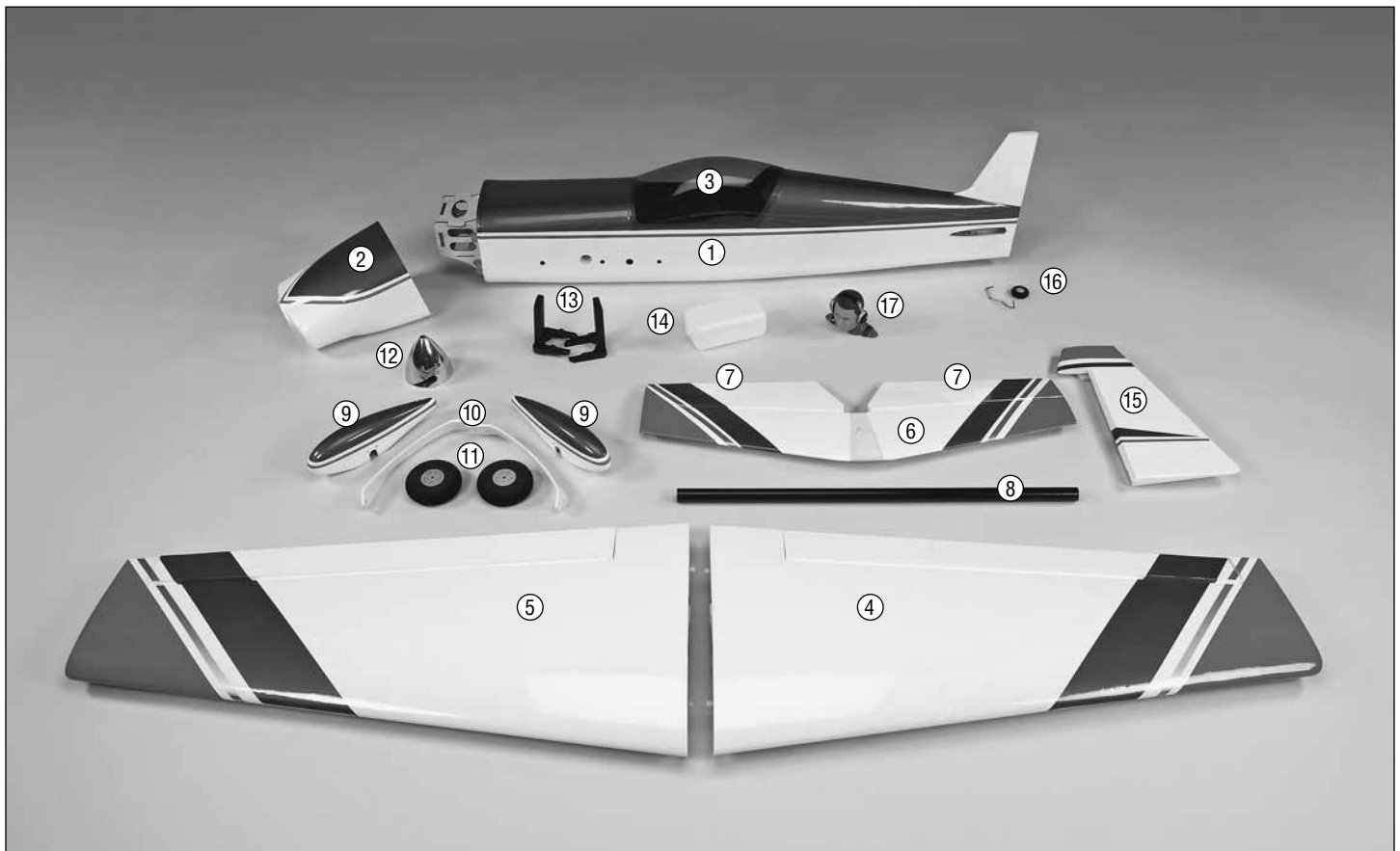
3002 N. Apollo Drive, Suite 1
Champaign, IL 61822

Telephone: (217) 398-8970, ext. 5

Fax: (217) 398-7721

E-mail: airsupport@greatplanes.com

KIT CONTENTS



- | | | |
|-------------------------------|--------------------------|------------------|
| 1. Fuselage | 7. Elevator Halves (L&R) | 13. Engine Mount |
| 2. Cowl | 8. Composite Wing Tube | 14. Fuel Tank |
| 3. Canopy Hatch | 9. Wheel Pants (L&R) | 15. Rudder |
| 4. Left Wing Panel w/Aileron | 10. Landing Gear (L&R) | 16. Tail Wheel |
| 5. Right Wing Panel w/Aileron | 11. Main Wheels (2) | 17. Pilot Figure |
| 6. Horizontal Stabilizer | 12. Spinner | |

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" on the previous page.

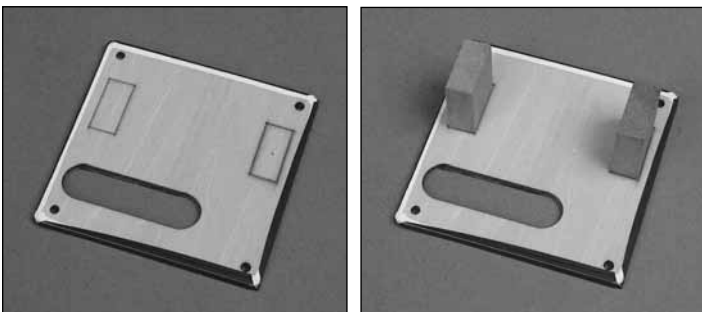


❑ 2. Carefully remove the tape and separate all the control surfaces. Use a covering iron with a covering sock on high heat to tighten the covering if necessary. Apply pressure over sheeted areas to **thoroughly** bond the covering to the wood.

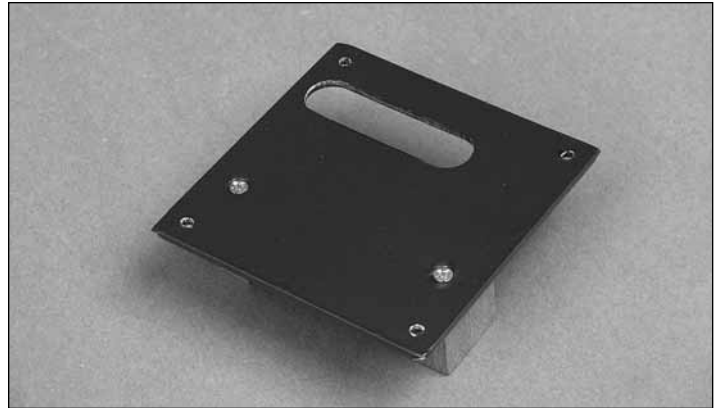
BUILD THE WING

Install the Aileron Servos & Pushrods

Before completing this section, confirm that the servos that you will be using will properly fit between the servo mounting block locations on the aileron servo hatch covers. Make adjustments as necessary for your brand servos. The block locations shown in this section will fit a standard size Futaba brand servo.

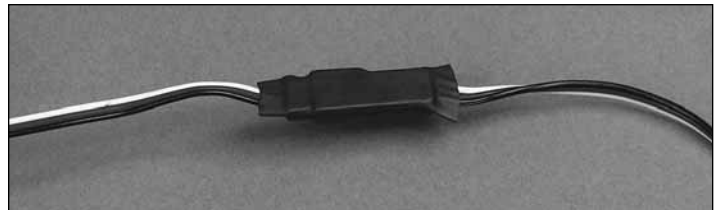


❑ 1. Use epoxy to glue the 11/16" x 11/16" x 5/16" [17.5mm x 17.5mm x 7.9mm] hardwood servo mounting blocks to the insides of the hatch covers. Be sure that the blocks are aligned over the rectangles with the grain direction perpendicular to the covers as shown. Allow the epoxy to cure.

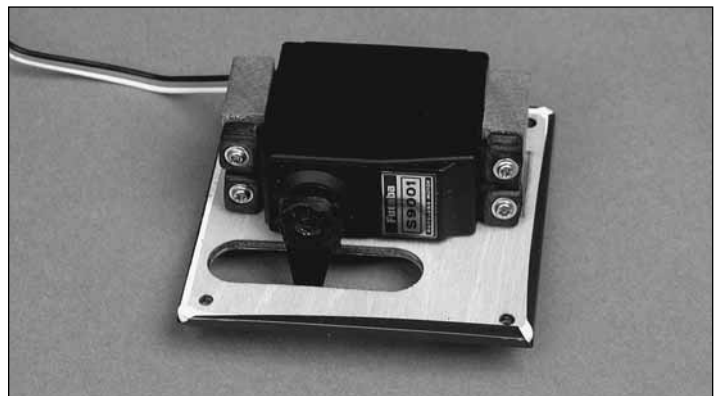


❑ 2. Drill a 1/16" [1.6mm] hole in the hatch covers through the mounting blocks approximately 3/8" [9.5mm] deep. Thread a #2 x 3/8" [9.5mm] flat head wood screw into each hole and back it out. Apply a drop of thin CA glue to each hole to harden the wood. When the CA glue has dried, thread a #2 x 3/8" [9.5mm] flat head screw into each of the four holes.

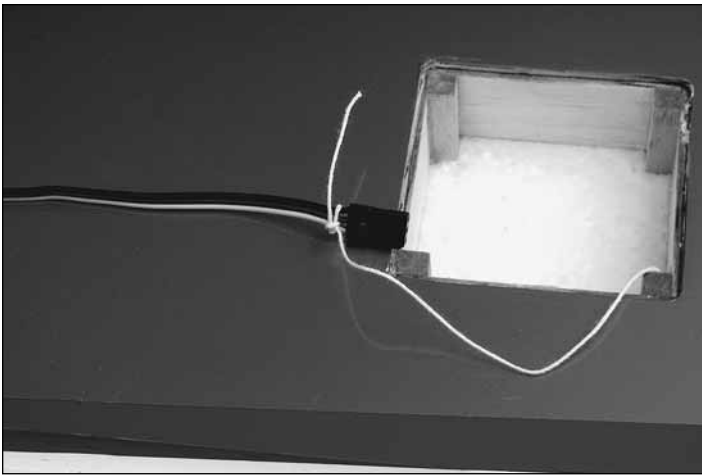
❑ 3. Cut three arms from a four-armed servo arm for each aileron servo. Enlarge the outer hole of each remaining arm with a 5/64" [2mm] drill bit.



❑ 4. Attach a 6" [152mm] servo extension to the 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.



❑ 5. Position the servos against the underside of the aileron servo hatch covers between the mounting blocks. Drill 1/16" [1.6mm] holes through the mounting tabs on the servo cases into the blocks. 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 wood. When the CA has dried, install the servos onto the hatch covers using the hardware supplied with the servos.



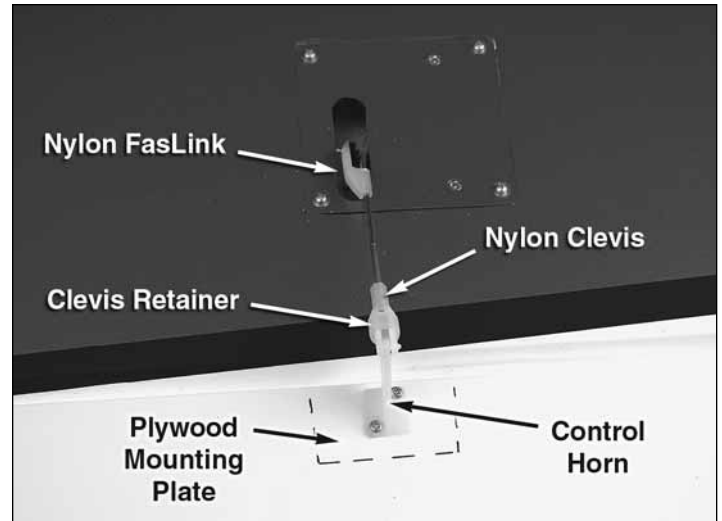
❑ 6. Inside the servo bay string is taped. Tie the string to the servo lead. Taped to the root rib you will find the other end of the string. Pull the string and the servo lead through the wing.



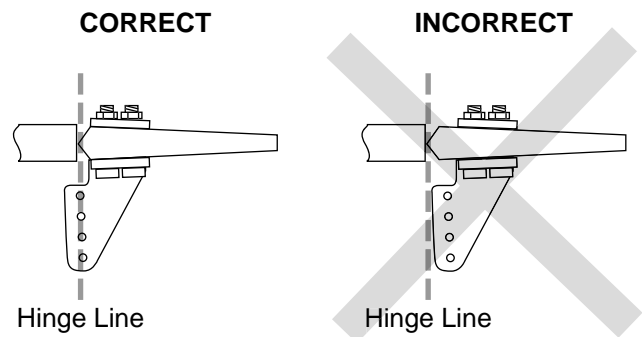
❑ 7. Position the aileron servo hatch covers in place and drill a 1/16" [1.6mm] hole through the mounting holes and into the hatch mounting blocks. Thread a #2 x 3/8" [9.5mm] screw into each hole and back it out. Apply a drop of thin CA to each hole to harden the wood. Install the hatch covers to the wings using four #2 x 3/8" [9.5mm] and four #2 flat washers.



❑ 8. Thread a nylon clevis 20 complete turns onto each 6" [152mm] pushrod. Slide a silicone clevis retainer onto each clevis and connect the clevis to the outer hole of a nylon control horn.

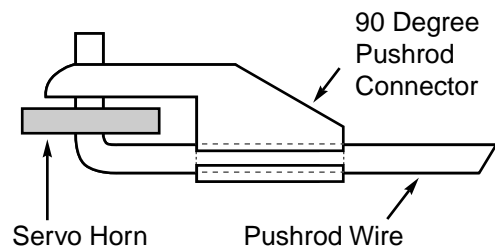


Refer to this photograph for steps 9-11



❑ 9. Position the control horns over the plywood plate in the aileron (if you cannot see it, hold the aileron at a shallow angle in good lighting or use a small pin to puncture the covering) using the position of the servo arms as a guide. Align the holes in the control horns directly over the aileron hinge line and mark the location of the control horn mounting holes.

❑ 10. Drill 1/16" [1.6mm] holes at the marks you made through the plywood plates. **Do not drill all the way through the ailerons!** Thread a #2 x 3/8" [9.5mm] screw through each hole and back it out. Apply a couple drops of thin CA glue to each hole to harden the wood. When the glue has dried, install the control horns onto the ailerons using two #2 x 3/8" [9.5mm] screws.



❑ 11. Use tape to hold the aileron in the neutral position. Make a mark on the pushrod where they cross the outer holes in the servo arms. Make a 90 degree bend at the mark on the pushrod and cut off the excess pushrod 1/4"

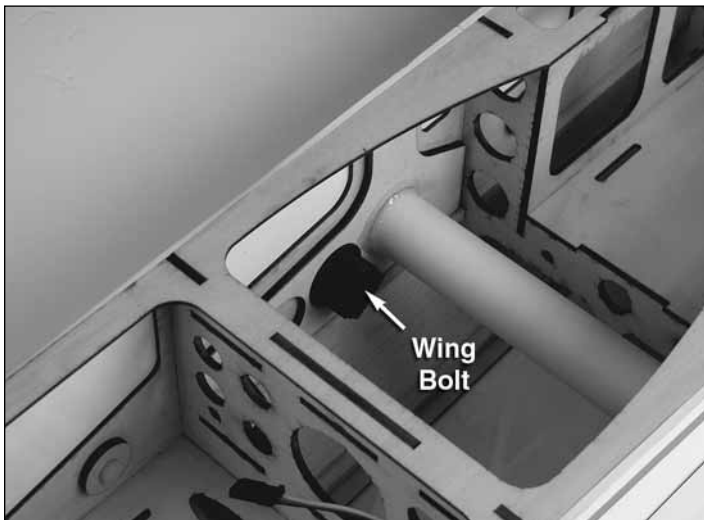
[6.4mm] beyond the bend. Attach the pushrod to the servo arm using a nylon FasLink. Thread the clevis up or down on the pushrod as necessary to center the aileron with the servo arm centered. When satisfied, slide the silicone clevis retainer to the end of the clevis to secure it.

❑ 12. Repeat steps 1-11 for the opposite wing.

BUILD THE FUSELAGE

Assemble the Tail Section

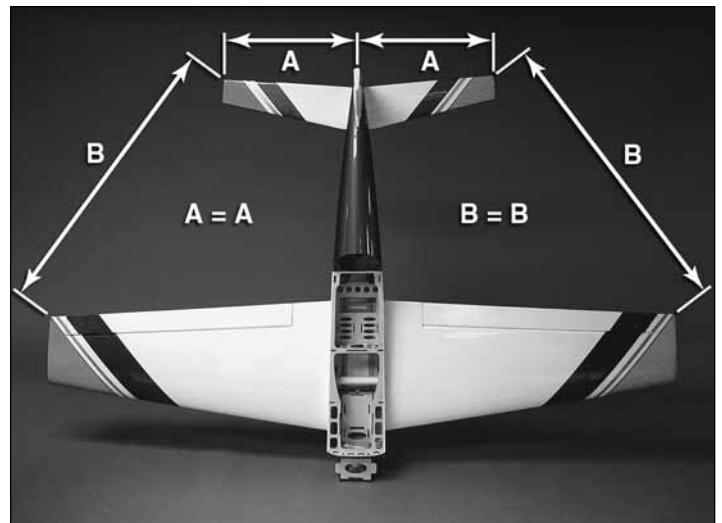
❑ 1. Slide the **wing tube** into the **fuselage** centering the tube in the fuselage.



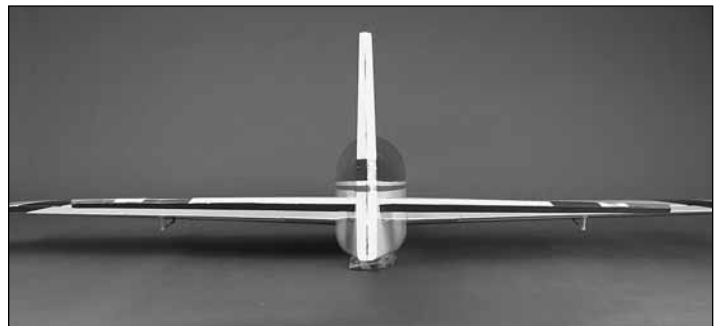
❑ 2. Install the **wing panels** onto the wing tube and secure them to the fuselage using two nylon wing bolts.



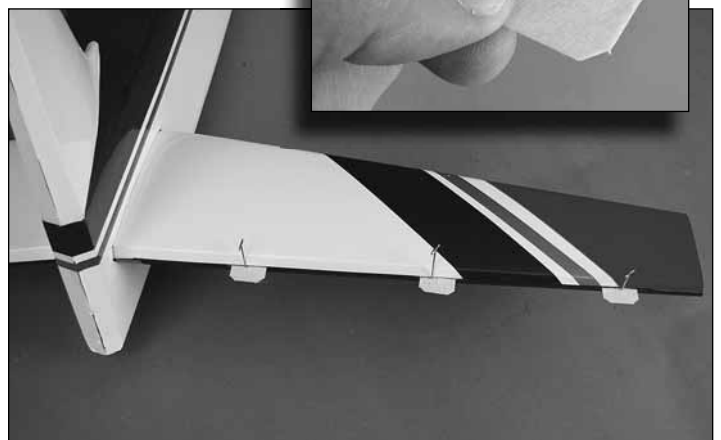
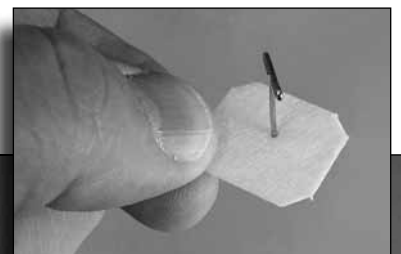
❑ 3. Slide the **horizontal stabilizer** into the stab slot at the aft end of the fuselage.



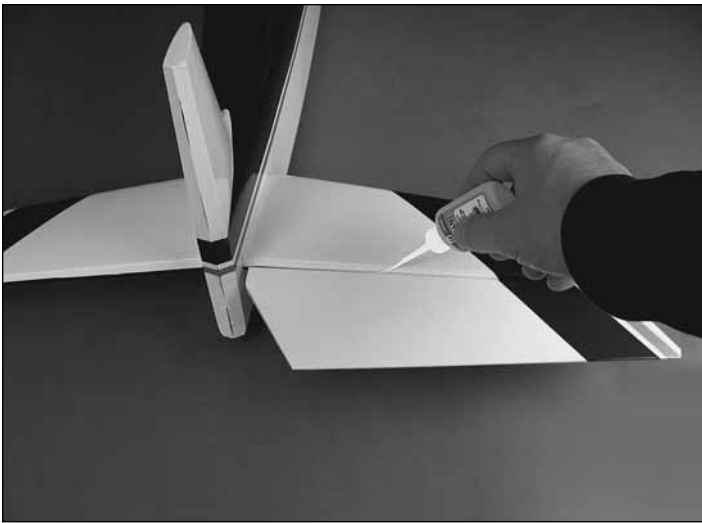
❑ 4. Center the stab left and right in the fuselage, using the uncovered balsa as a guide. Measure the distance from the stab tips to the wing tips and make the measurements equal.



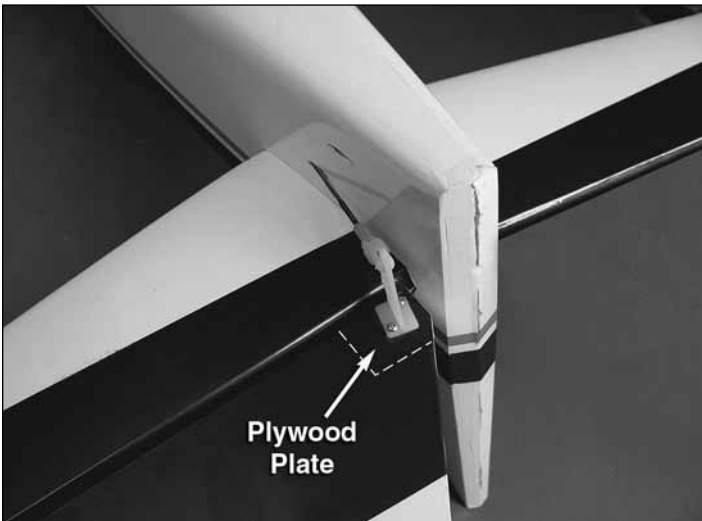
❑ 5. View the model from behind and confirm that the stab is parallel with the wing panels. If not, lightly sand the stab slot to adjust the position of the stab. Use 30-minute epoxy to glue the stab into the fuselage. Use denatured alcohol to clean up any excess epoxy. Allow the epoxy to cure undisturbed.



❑ ❑ 6. Locate three hinges. Insert a pin through the center of each hinge and then insert the hinge into the hinge slots in the trailing edge of the stabilizer.

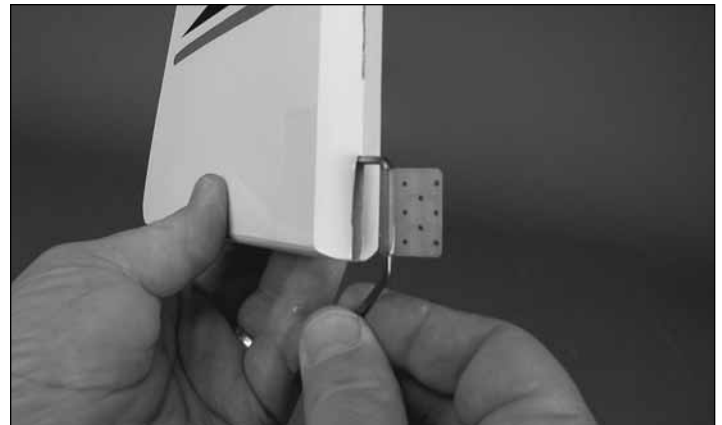


7. Slide the hinges into the slots in the elevator, sliding the elevator tightly to the stabilizer. Apply six drops of thin CA to each of the hinges. Allow the glue to harden. Do not use CA accelerator on the hinges. This will cause the hinge to get brittle and possibly crack.



8. Thread a nylon clevis 20 complete turns onto each 36" [914mm] pushrod. Slide a silicone clevis retainer onto each clevis and connect the clevis to the second hole from the end of the control horn. Slide the pushrod wire into the hole closest to the stabilizer on the right side of the fuselage. Slide the wire into the fuselage until the control horn rests on the plywood plate in the elevator. Drill 1/16" [1.6mm] holes at the marks. Do not drill all the way through the elevator halves! Thread a #2 x 3/8" [9.5mm] screw into each hole and back it out. Apply a couple drops of thin CA glue to each hole and let it harden. Attach the elevator control horn to the elevator using four #2 x 3/8" [9.5mm] screws.

9. Repeat step 5 – 8 for the remaining elevator half, installing the remaining pushrod into the hole on the left side of the fuselage.



10. Roughen the portion of the tail wheel wire assembly that fits into the rudder with 220-grit sand paper and clean it off with alcohol. Glue the tail wheel wire into the hole in the LE of the rudder with medium or thick CA glue. Be sure not to get glue onto the nylon tab where it rotates on the wire (oil applied on the tail wheel wire around the tab will help prevent glue from sticking to it).



11. Place pins through the center of three hinges. Insert the hinges into the slots in the rudder. Test fit the rudder to the fuselage with the tail wheel assembly. Make any adjustments necessary so the nylon tab on the tail wheel wire fits all the way into the slot in the fuse.



12. Once you are satisfied everything fits, apply a light amount of epoxy to each side of the nylon tab. Install the

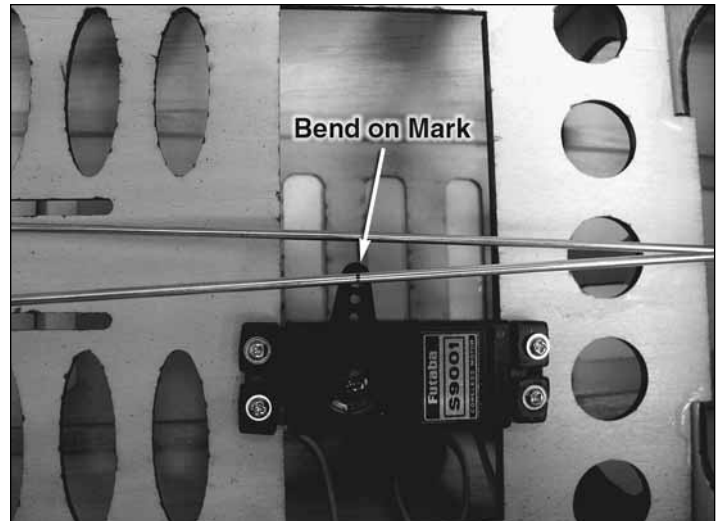
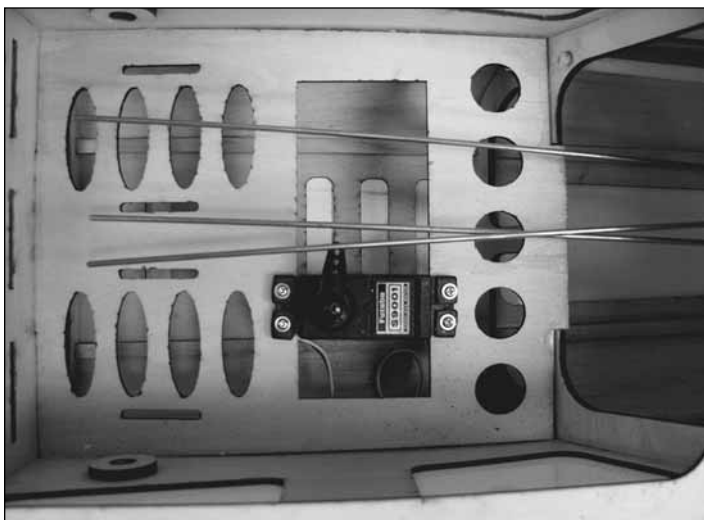
rudder to the fin. Position the rudder and then apply six drops of thin CA to each of the hinges. Set the plane aside until the glue hardens.

- ❑ 13. Secure the tail wheel to the **tail wheel assembly** with a 3/32" [2.4mm] wheel collar and a 4-40 set screw. Be sure that the tail wheel rotates freely on the axle. Oil the axle if necessary.

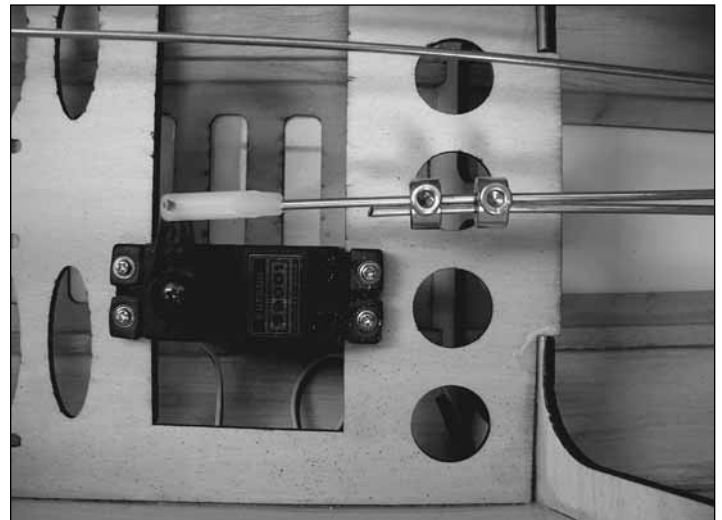


- ❑ 14. Thread a nylon clevis 20 complete turns onto the remaining 36" [914mm] pushrod. Slide a silicone clevis retainer onto the clevis and connect the clevis to the second hole from the end of the control horn. Slide the pushrod wire into the lower hole on the left side of the fuselage. Slide the wire into the fuselage until the control horn rests on the plywood plate in the rudder. Drill 1/16" [1.6mm] holes at the marks. Do not drill all the way through the rudder! Thread a #2 x 3/8" [9.5mm] screw into each hole and back it out. Apply a couple drops of thin CA glue to each hole and let it harden. Attach the rudder control horn to the rudder using two #2 x 3/8" [9.5mm] screws.

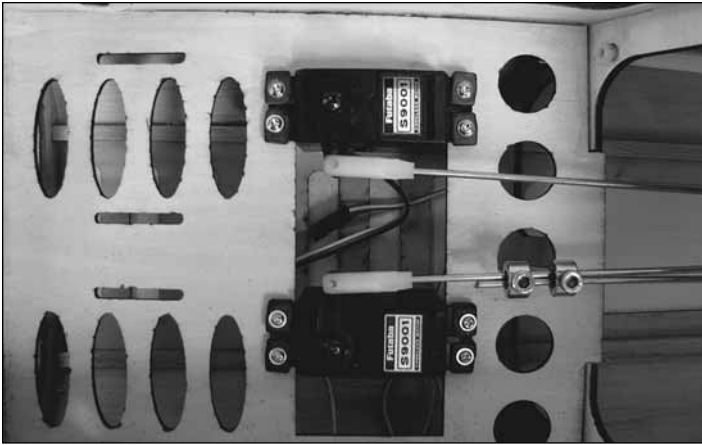
Install the Elevator & Rudder Servos



- ❑ 1. Install the elevator servo into the servo tray with the hardware that came with the servo. Locate the servo where shown. Align the last hole in the servo arm with the pushrod wire for the **left** elevator. Center the left elevator half. Make a mark on the wire where it aligns with the outer hole in the servo arm. Make a 90 degree bend at the mark on the pushrod and cut off the excess pushrod 1/4" [6.4mm] beyond the bend.



- ❑ 2. Position the right elevator in the neutral position and then cut off the excess pushrod wire 1" [25.4mm] behind the elevator servo arm. Join the two elevator pushrods together using two 5/32" [4mm] wheel collars, two 6-32 x 1/4" [6.4mm] SHCS and thread locking compound. View the model from behind and confirm that the elevator halves are parallel. If not, make any adjustments as necessary to the clevises or wheel collars until they are. When satisfied, slide the silicone clevis retainer to the end of the clevises. Drill a 5/64" [2mm] hole in the outer hole in the servo arm and then secure the elevator pushrod wire to the servo with a nylon Faslink.

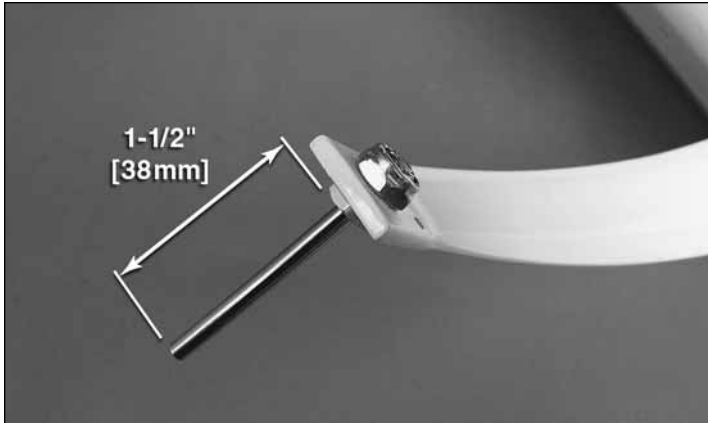


□ 3. Install the rudder servo as shown using the hardware included with the servo. With the rudder in the neutral position and the rudder servo arm perpendicular to the pushrod, mark where the pushrod crosses the outer hole of the servo arm. As you did with the elevator pushrod, make a 90 degree bend at the mark and cut off the excess pushrod 1/4" [6.4mm] beyond the bend. Drill a 5/64" [2mm] hole in the servo arm and then secure the pushrod to the servo arm with a nylon FasLink. Make any adjustments necessary to the nylon clevis so that the rudder is properly centered and slide the silicone clevis retainer to the end of the clevis.

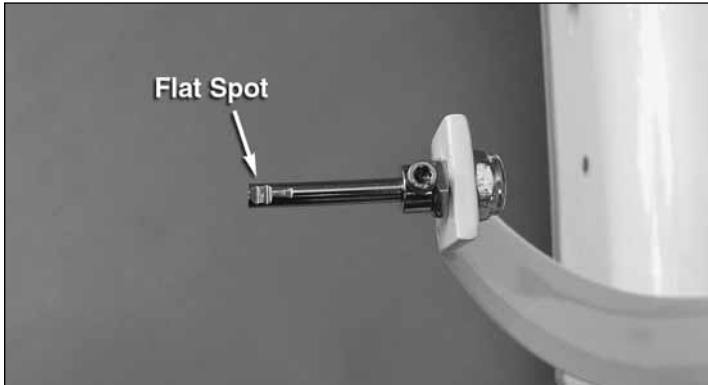
***Assemble and Install
the Main Landing Gear***



□ 1. Attach the landing gear legs to the fuselage using four 8-32 x 3/4" [19.1mm] SHCS, four #8 flat washers, four #8 lock washers, and thread locking compound. When installed properly the landing gear sweeps back.



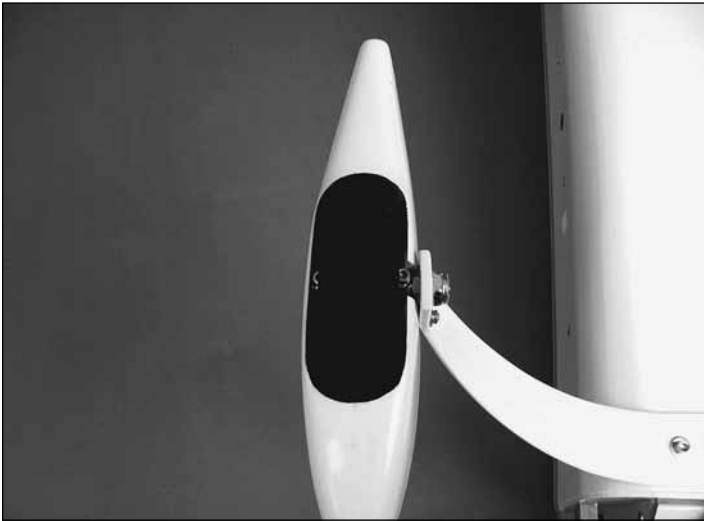
□ □ 2. Cut the axles to a length of 1-1/2" [38mm]. Secure the axles to the landing gear legs using the 5/16"-24 nylon lock nuts.



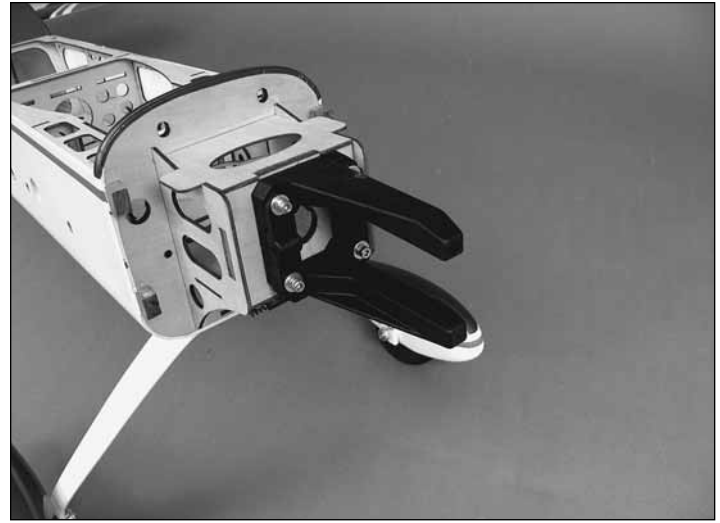
□ □ 3. Slide a 3/16" [4.8mm] wheel collar onto each axle followed by a 3-1/4" [83mm] wheel and then another 3/16" [4.8mm] wheel collar. Mark the location of the threaded holes in the wheel collars onto the axles. Use a file or rotary tool such as a Dremel to grind flat spots at the marks on the axles.



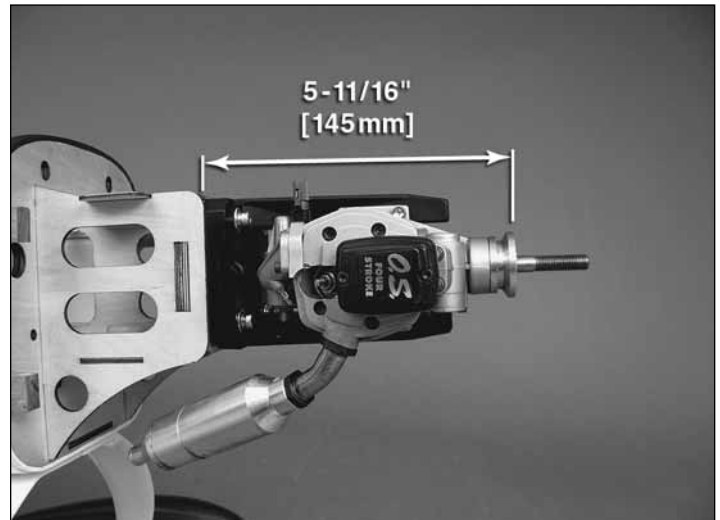
□ □ 4. Reinstall the wheel collars and wheels onto the axles. Thread a 6-32 set screw into each wheel collar and tighten the set screws against the flat spots on the axles. Be sure that the wheel rotates freely on the axle. Oil the axles if necessary.



□ □ 5. Attach the wheel pants to the landing gear legs using four 4-40 x 1/2" [12.7mm] machine screws, four #4 flat washers, four #4 lock washers, and thread locking compound. Adjust the wheel and wheel collars as needed, to center the wheel in the wheel pant.



□ 1. Using four 8-32 x 1" [25.4mm] SHCS, four #8 flat washers, four #8 lock washers, and thread locking compound, attach the engine mount side-mounted to the firewall so that the engine head will be on the right side. 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.



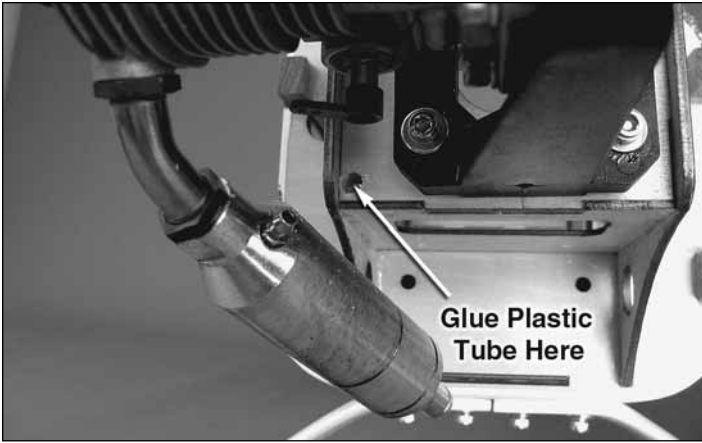
□ 2. Position the front of the engine drive washer 5-11/16" [145mm] from the front of the engine mounting box. Mark the location of the engine mount holes onto the mount rails using a Dead Center Hole Locator (GPMR8130). Remove the engine from the mount and drill a 9/64" [3.6mm] or #29 hole through each of the marks you made in the landing gear rails. Use an 8-32 tap to create threads in the four mounting holes. Attach the engine to the mount using four 8-32 x 3/4" [19.1mm] SHCS, four #8 flat washers, and four #8 lock washers.

□ 3. If you installed a two-stroke engine, attach a Pitts-style in-cowl muffler. The stock muffler could also be used, but excessive cutting of the cowl would be necessary. We suggest using a Pitts-style muffler.

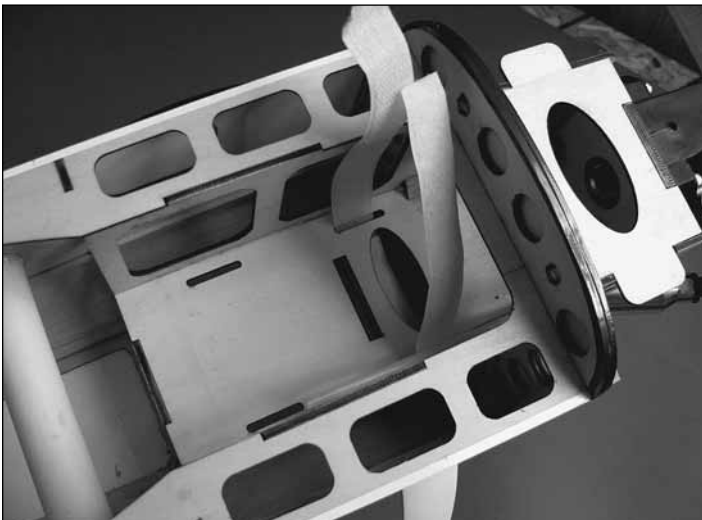
INSTALL THE POWER SYSTEM

Glow Engine, Throttle Servo and Fuel Tank Installation

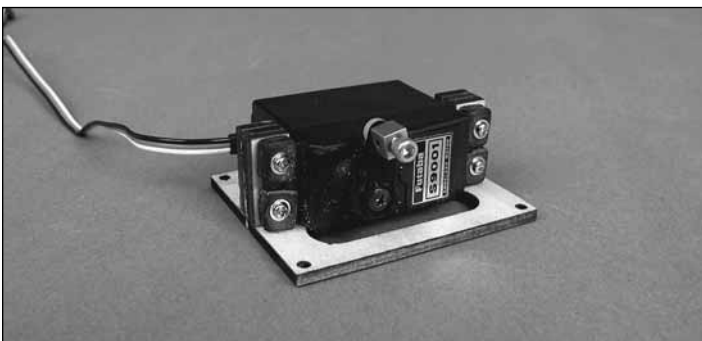
The Revolver .61 ARF is designed to be flown with a .61–75 two-stroke glow engine, .81–.91 four-stroke glow engine, or a RimFire .80 (50-55-500) Outrunner Brushless motor. If you plan to install a brushless motor, skip ahead to page 16 "Brushless Motor Installation".



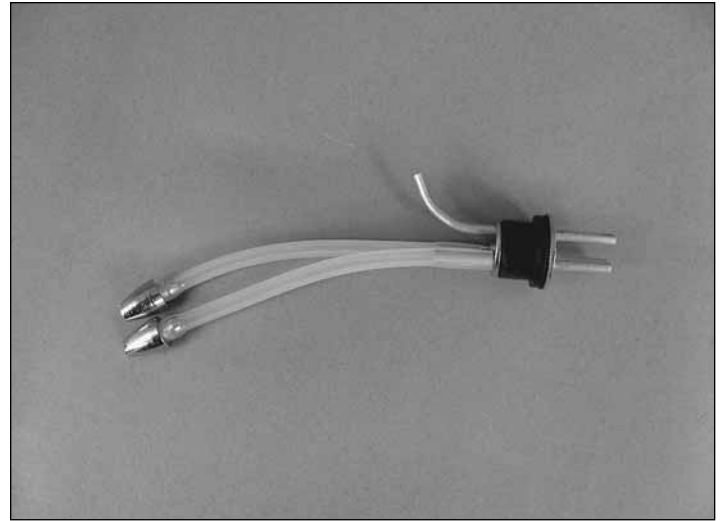
❑ 4. Make a mark on the firewall that is aligned with the throttle arm and the throttle servo. On the mark drill a 3/16" [4.8mm] hole. Locate the 12" [305mm] plastic tube. Cut it to a length of 7-3/4" [197mm] and roughen the end of the tube with 180 grit sandpaper. Slide the tube into the hole so the roughened end of the tube makes contact with the firewall. Adjust the tube so it is aligned with the throttle servo. Apply glue to the roughened end of the tube gluing the tube to the firewall.



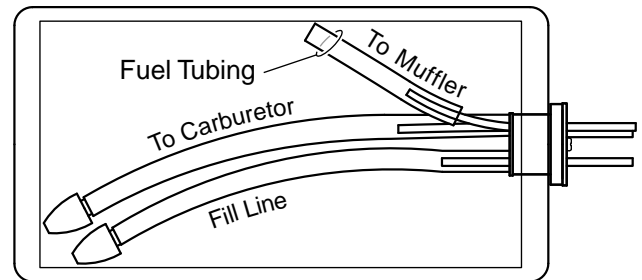
❑ 5. Install Velcro through the forward slots as shown.



❑ 6. Mount your throttle servo to the throttle servo tray with the hardware that came with the servo. Install a short servo horn and then install a brass screw lock connector in the outer hole of the arm. Secure it to the arm with a nylon retainer. Install a 4-40 x 1/4" [6.4mm] socket head cap screw into the connector.

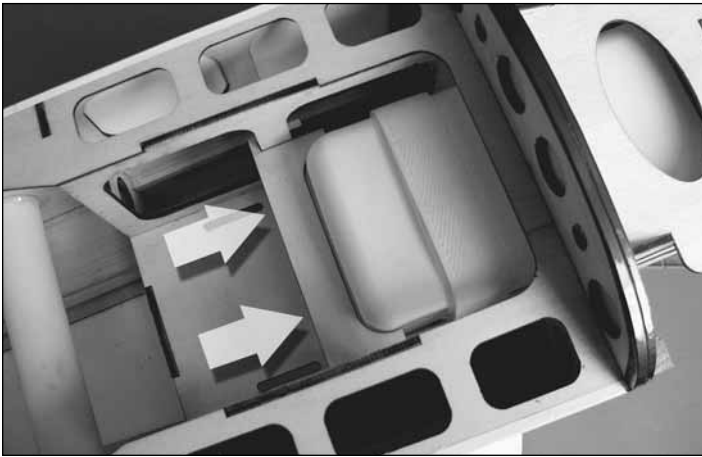
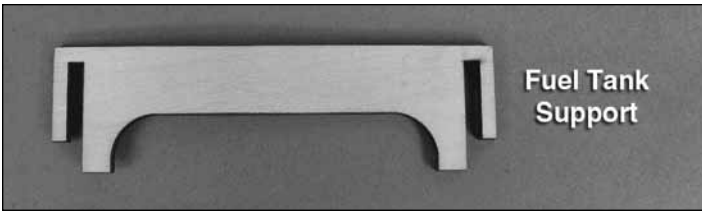


❑ 7. Assemble the fuel stopper as shown. The fuel system shown here is a three line system having a vent line, carb line, and fill line. The rubber stopper has two open holes for the aluminum tubing and one additional hole that you will need to puncture above the sealed off fuel tube hole. The fill and carb lines should extend out 1/2" [12.7mm] 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 3x25mm phillips screw to hold the assembly together.

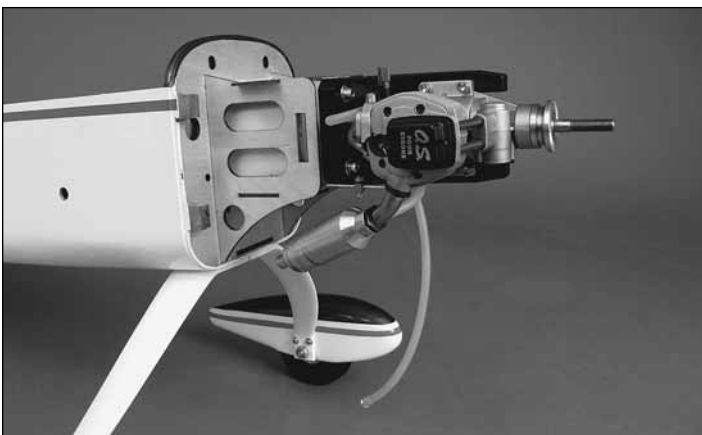


❑ 8. Fit the stopper assembly into the tank with the vent line pointing toward the top of the tank, but not touching. The fuel tubing and clunks (fuel pickup) on the carb and fill lines should almost reach the back of the tank but not touch. The clunks must be able to move freely inside the tank when 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. We also suggest marking the tubes in the stopper.

❑ 9. Attach fuel tubing onto each line coming from the tank. Insert the tank into the fuselage with the correct side facing up. The fuel tubing should be routed through the hole in the center of the firewall. Secure the tank with the Velcro you installed earlier.



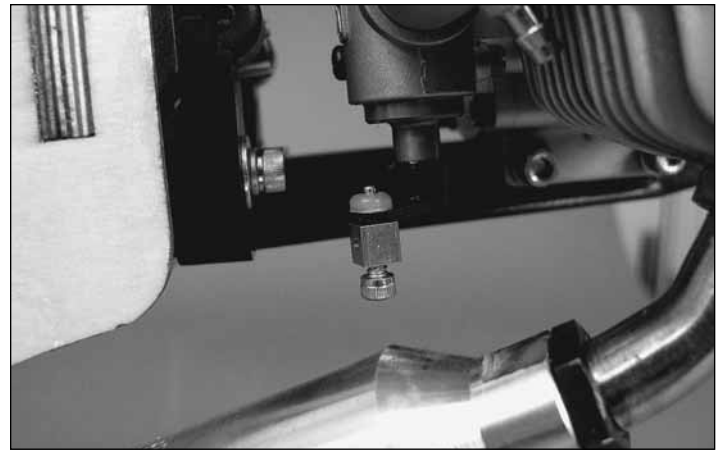
❑ 10. Locate the plywood fuel tank support. Glue it in place behind the fuel tank as shown.



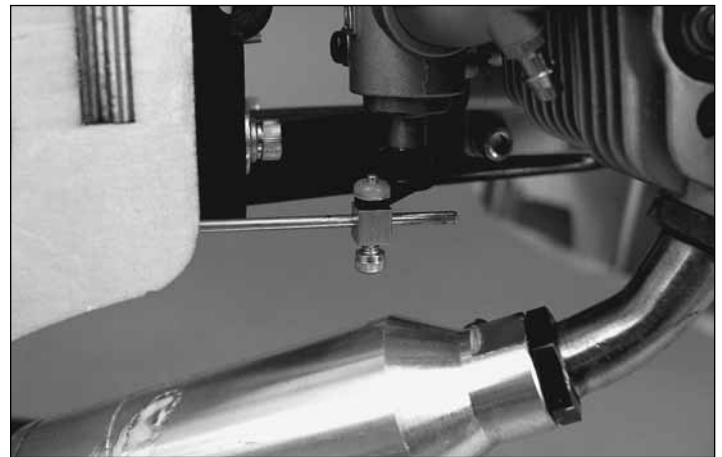
❑ 11. Cut the fuel tubing coming from the tank to the proper length and connect the pressure and carb lines to the engine. The fill line should be plugged with the included aluminum fuel line plug and able to hang free from the bottom of the plane. Be sure to replace the fuel line plug after filling or draining the fuel tank.



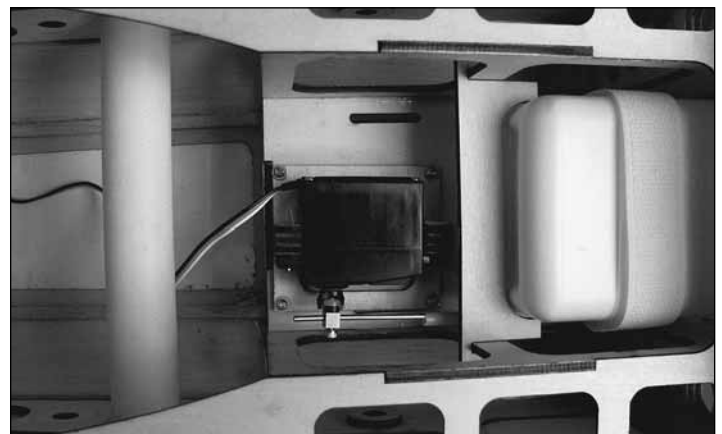
❑ 12. Cut the threads off the end of the 2-56 x 12" [305mm] pushrod wire. Install one end of the wire into the screw lock connector on the throttle servo. Apply thread locking compound to the set screw and then tighten the set screw against the wire.



❑ 13. Install another brass screw lock connector, nylon retainer and 4-40 x 1/4" [6.4mm] set screw to the outer hole of the throttle arm.



13. From inside of the fuselage, slide the opposite end of the wire into the plastic tube you installed. As the wire exits the firewall, slide the wire through the screw lock connector. Temporarily tighten the set screw to the wire. You will make the final adjustments to this when you finalize the radio installation.



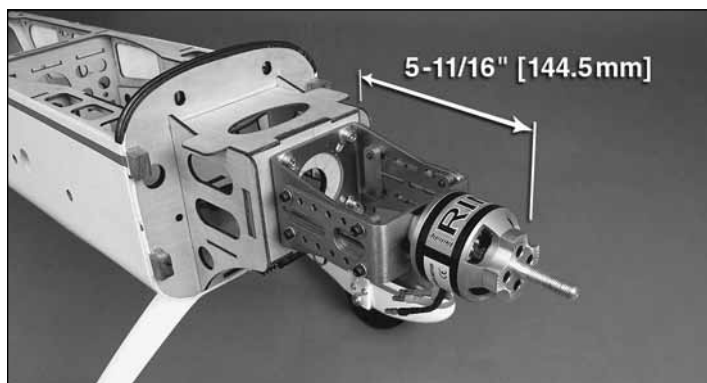
❑ 14. Position the throttle servo behind the fuel tank as shown. Drill a 1/16" [1.6mm] hole through each of the mounting holes into the plywood floor. Thread a #2 x 3/8" [9.5mm] screw through each hole and back it out. Apply a couple drops of thin CA glue to each hole to harden the wood. When the glue has dried, install the servo tray.

Brushless Motor Installation

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. Attach the out-runner motor to the brushless motor mount using 3 x 8mm machine screws (included with the motor) and thread locking compound. If you haven't done so yet, install the prop adapter to the motor case with the hardware included with the motor and thread locking compound.



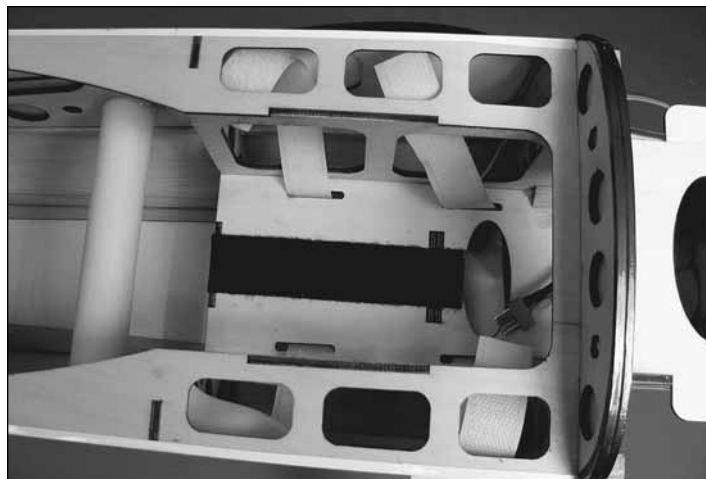
- ❑ 2. Attach the motor mount to the firewall using four 8-32 x 1/2" [13mm] SHCS, four #8 flat washers, four #8 lock washers, and thread locking compound.

- ❑ 3. Loosen the screws that hold the aluminum motor mount halves together and slide them in together so that the front of the prop adapter is 5-11/16" [144.5mm] from the firewall. (Depending on the motor mount used you may find it necessary to shorten the length of the mount by cutting off a short length of the aluminum mount arm). When adjusting the mount, do not inadvertently create any up or down motor thrust angle. Be sure that the center slots in the front and back motor mount halves are aligned together. Use threadlocking compound on the screws that join the motor mount halves.



- ❑ 4. Mount the ESC to the bottom of the firewall box as directed in the instructions with your particular brand of ESC.

Complete the installation of the ESC to the receiver and batteries and the motor to the ESC following the instructions that came with them. Check for proper motor rotation without the prop mounted.



- ❑ 5. Place one half of a self adhesive Velcro strip (not included) on the floor of the battery tray. This will keep the battery from sliding around. Install the Velcro straps through the slots in the battery tray. This will secure the batteries to the battery tray.



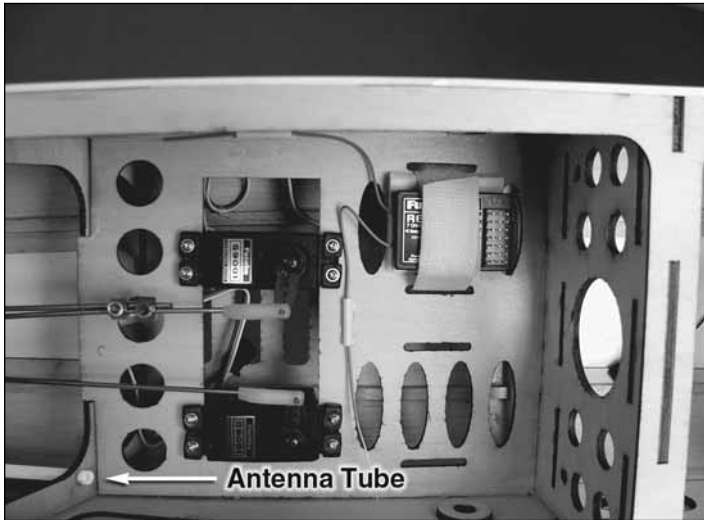
- ❑ 6. Place Velcro on your battery pack and then place your batteries onto the battery tray and secure them in place with the Velcro straps.



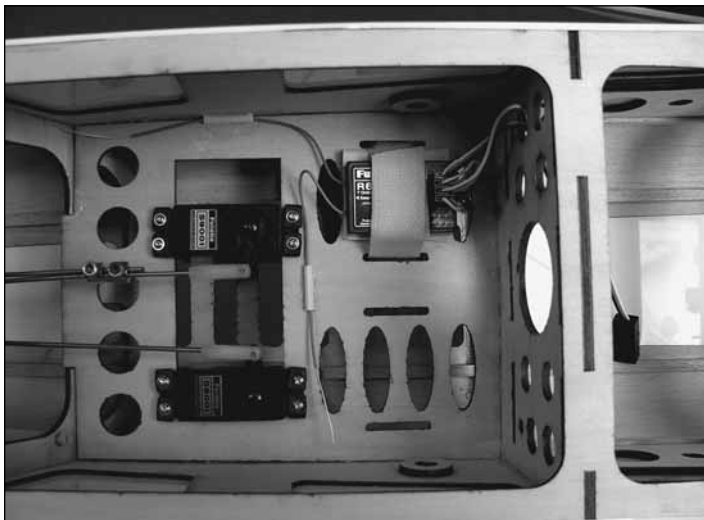
- ❑ 7. Using a sharp hobby knife, cut the covering from the seven cooling slots on the underside of the fuselage.

FINISH THE MODEL

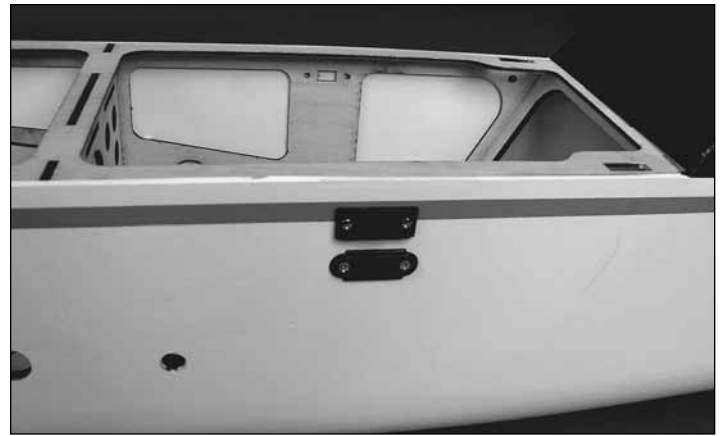
Install the Receiver



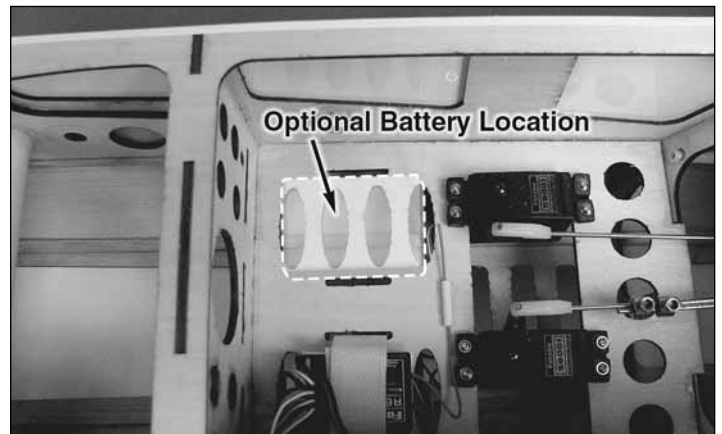
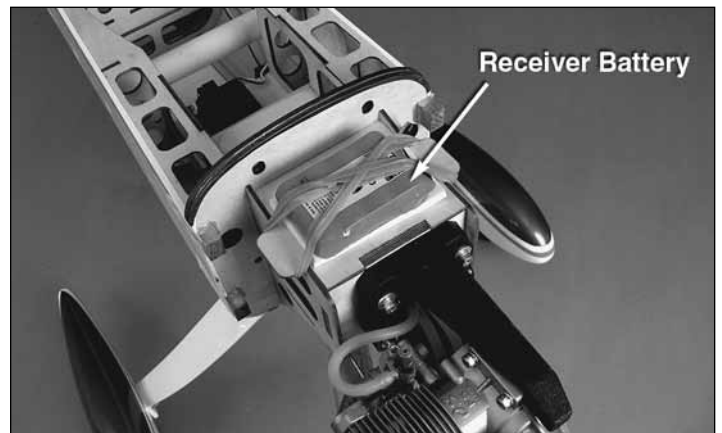
❑ 1. Make a strap from the included hook and loop material to fit your receiver. Cut a piece of foam rubber (not included) to fit your receiver and then strap the receiver in front of the servos as shown. We have installed a 2.4GHz receiver and secured our antenna leads with scrap plastic tube. If you will be installing a conventional 72MHz receiver we have pre-installed a plastic tube for your antenna. It is located behind the servo tray on the right side of the fuselage.



❑ 2. Connect the servos to the receiver following the instructions with your radio system. If you are installing an electric power system, depending on the ESC being used, you may need a servo extension to reach the receiver.



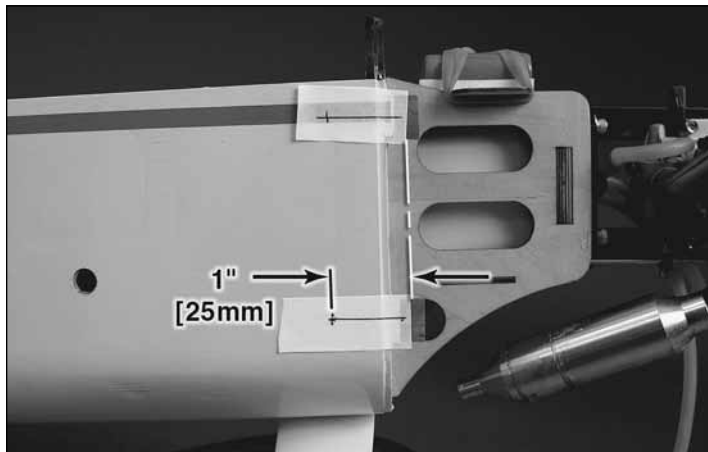
❑ 3. Pre-cut openings are provided on both sides of the fuselage for mounting an on/off switch. The hole spacing is made for a Futaba mini switch harness. If you are using a different switch, you may need to modify the pre-cut opening, or mount it in a different location. An optional charge jack receptacle can be mounted below the switch.



❑ 4. We have provided two different locations for mounting the receiver battery. With the O.S .91 four stroke engine installed, our plane balanced with the battery installed on the firewall box. We have also provided a mounting location next to the receiver. Install the battery where it best balances the airplane. If you mount the battery on the firewall box, install the battery on a piece of foam and hold it in place with rubber bands. You will need a 12" [305mm] extension on the battery lead to reach the receiver. If you mount it next to the receiver, secure the receiver with the Velcro included with the airplane.

Install the Cowl

- ❑ 1. Before fitting the cowl, make any cutouts necessary for your power system. If you are installing a glow engine, a cut out must be made for the engine head, exhaust outlets, and needle valve access. A rotary tool such as a Dremel works very well for cutting holes in fiberglass.



- ❑ 2. Apply a piece of masking tape to each side of the fuselage in the location shown. From the center of the cowl mounting block draw a line back towards the fuselage 1" [25.4mm].

- ❑ 3. Fit the cowl to the fuselage and align it with the colors on the fuselage. Temporarily install the spinner back plate onto the motor shaft and make any adjustments to the cowl position so that the back plate is centered with the front of the cowl. When satisfied, tape the cowl into position. Using the lines you made as a reference, measure 1" [25.4mm] forward from the end of the line and make a mark on the cowl. Drill 1/16" [1.6mm] holes at the marks you made on the cowl through the cowl mounting blocks. Drill one hole at a time; insert a #2 x 1/2" [12.7mm] screw in the hole you drilled and then proceed with the remaining three holes. Adjust the cowl as needed before drilling each new hole.



- ❑ 4. Remove the cowl and thread a #2 x 1/2" [12.7mm] self-tapping screw into each hole in the cowl mounting blocks and back it out. Apply a couple drops of thin CA to each hole in the blocks. When the glue hardens, install the cowl onto the fuselage using four #2 x 3/8" [9.5mm] screws, four #2 flat washers, and four #2 lock washers.

Install the Canopy Hatch, Pilot and Spinner



- ❑ 1. A pilot is included that can be installed from the back of the canopy. You can apply a bead of glue to the bottom edge of the pilot to secure it in place or you can achieve a more secure installation by gluing a plywood plate (not included) to the bottom of the pilot and then glue the pilot to the inside of the canopy. Choose your mounting method and install the pilot in the canopy.

- ❑ 2. Secure the canopy to the fuselage with two 4-40 x 3/4" [19.1mm] machine screws, two #4 flat washers, and two #4 lock washers.

- ❑ 3. Install the spinner back plate onto the motor shaft. Use the included bushing (if needed) to fit the engine crankshaft. Install the propeller and threaded spinner nut that matches your shaft thread size.

- ❑ 4. Install the spinner cone onto the back plate with the 4 x 35mm SHCS.

Apply the Decals

Refer to the box photos for placement of the decals.

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

- ❑ 2. 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.

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

4. 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 and Operate the Motor Battery

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.

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.

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.

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.

These are the recommended control surface throws:				
	HIGH RATE		LOW RATE	
	Up	Down	Up	Down
ELEVATOR	3/4" [19mm]	3/4" [19mm]	5/16" [8mm]	5/16" [8mm]
	10 deg	10 deg	5 deg	5 deg
RUDDER	Right	Left	Right	Left
	2-1/2" [64mm]	2-1/2" [64mm]	1-1/2" [38mm]	1-1/2" [38mm]
	22 deg	22 deg	13 deg	13 deg
AILERONS	Up	Down	Up	Down
	1/2" [13mm]	1/2" [13mm]	1/4" [6mm]	1/4" [6mm]
	12 deg	12 deg	6 deg	6 deg

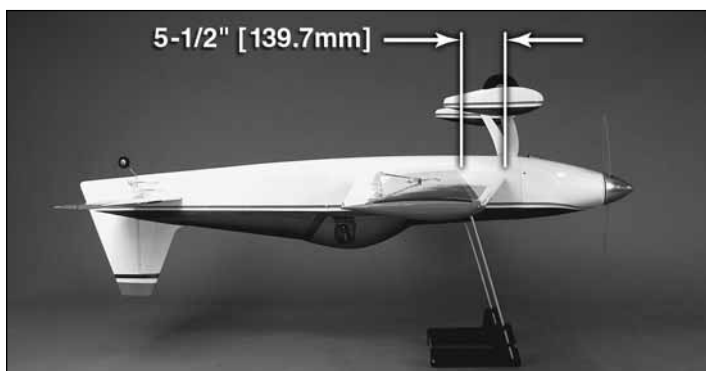
NOTE: The throws are measured at the **widest part** of the elevators, rudder and ailerons.

IMPORTANT: The Revolver 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 Revolver 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 top of the wing on both sides of the fuselage. **The C.G. is located 5-1/2" [139.7mm] 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 1/2" [12.7mm] forward or 1/2" [12.7mm] 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. [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 [30m] 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, 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. 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.

LITHIUM BATTERY HANDLING & USAGE

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

- ONLY use a LiPo 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 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.

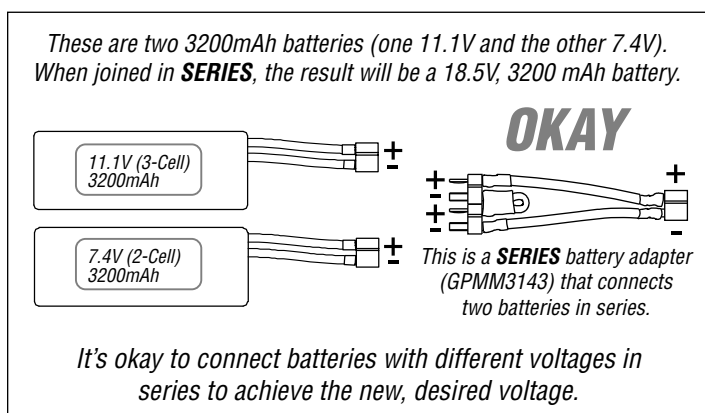
Install and Connect the Motor Battery

Before you can power the radio system and set up the controls, the motor batteries will need to be charged.

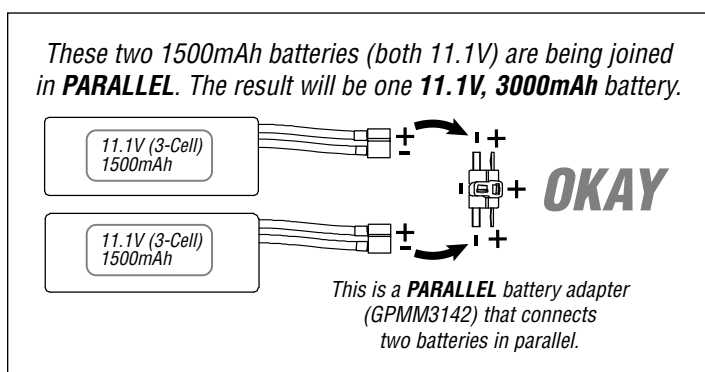
IMPORTANT: If using multiple battery packs that are connected with an adapter, never charge the batteries together through the adapter. Always charge each battery pack separately. Charge the batteries, then read the following precautions on how to connect multiple packs for flying the model:

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

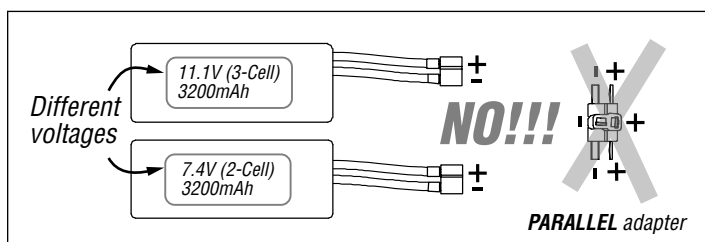
1. Connecting batteries in "**Series**" means to connect the +’s to the -’s and the -’s to the +’s. This combines the battery’s Voltages, but the capacity remains the same.



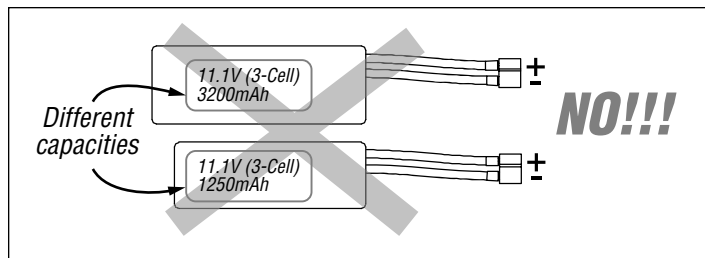
2. Connecting batteries in "**Parallel**" means to connect the +’s to the +’s and the -’s to the -’s. This combines the battery’s capacities, but the Voltage remains the same.



NEVER connect battery packs with different Voltages in Parallel—only combine in Series. Otherwise, the batteries will try to “equalize” with the larger one trying to “charge” the smaller one, thus causing heat and likely a fire.



Also **NEVER** connect battery packs with different capacities in Series or in Parallel.



AMA SAFETY CODE (EXCERPTS)

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.

- 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 thread locking 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, threadlocking 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 Revolver .61 ARF is a great-flying model that flies smoothly and predictably. The Revolver 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 Revolver for the first few flights, gradually getting acquainted with it as you gain confidence. Adjust the trims to maintain straight and level flight. If you have powered the airplane with a .61 [10cc] engine, you will find the plane fast, but not so fast to get yourself in trouble. If you have powered it with a .75 [12.5cc] engine, the airplane becomes very fast so be sure to get fully acquainted with how it performs before attempting complex maneuvers that could get you into trouble. 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

The Revolver is a very clean airframe. Because of this, you will find that it takes longer to slow the plane for landing than some other airplanes you have flown. Be prepared for

this and don't be surprised if you have to go around and set up for your landing a second time. Practice your landing approach at a higher altitude over the runway to familiarize yourself with the low speed characteristics of the plane. 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