Yak-55M

PERFORMANCE SERIES™

INSTRUCTION MANUAL

SPECIFICATIONS

Wingspan: 88 in [2235mm]
Wing Area: 1473 in^2 [95 dm^2]
Wing Loading: 28–31 oz/ft^2 [85–95 g/dm^2]
Length: 82.5 in [2095mm]
Weight: 18–19.5 lb [8160–8840 g]
Engine: 50-55cu in [3.0 – 3.4cc] two-stroke gasoline engine
Radio: 5 channel minimum / 9 channel or greater preferred

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.

GREAT PLANES® MODEL MANUFACTURING COMPANY

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

TABLE OF CONTENTS

INTRODUCTION

For the latest technical updates or manual corrections to the Yak-55M visit the Great Planes web site at www.greatplanes.com. Open the "Airplanes" link, then select the Yak-55M 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.

Academy of Model Aeronautics

If you are not already a member of the AMA, please join! The AMA is the governing body of model aviation and membership provides liability insurance coverage, protects modelers' rights and interests and is required to fly at most R/C sites.

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302-9252

Ph. (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.

International Miniature Aircraft Assoc.

The Great Planes Yak-55M is an excellent sport-scale model and is eligible to fly in IMAA events. The IMAA (International Miniature Aircraft Association) is an organization that promotes non-competitive flying of giant-scale models. If you plan to attend an IMAA event, obtain a copy of the **IMAA Safety Code** by contacting the IMAA at the address or telephone number below, or by logging on to their web site at:

www.fly-imaa.org/imaa/sanction.html.

IMAA
205 S. Hilldale Road
Salina, KS 67401

(913) 823-5569

SAFETY PRECAUTIONS

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

1. Your Yak-55M 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 Yak-55M, 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 good condition, a correctly sized engine, and other components as specified in this instruction manual. All components must be correctly installed so that the model operates correctly on the ground and in the air. You must check the operation of the model and all components before **every** flight.
5. 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.
6. 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.
7. **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 (wheel pant, cowl) 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 Yak-55M that may require planning or decision making before starting to build. Order numbers are provided in parentheses.

Radio Equipment

A five-channel radio is the minimum requirement to fly the Yak-55M. However, it is recommended that you use a computer radio with more than five channels. We would recommend at least a seven channel radio with mixing capabilities and inputs to put all of the servos on their own channel instead of using "Y" connectors. When choosing servos be sure to use high quality servos with torque ratings that are equal or greater than those listed here. The Yak has very large control surfaces that will strain inexpensive or lower than recommended torque rated servos.

Radio Recommendations

- ❍ Futaba® 7C (FUTJ67**)
- ❍ Futaba 10C (FUTJ9150)
- ❍ Futaba 10CAG (FUTK9255)

Servo Recommendations

- ❍ Ailerons – Minimum rating of 150 oz-in. Two required. Futaba 9155 (FUTM0215)
- ❍ Elevator – Minimum rating of 150 oz-in. Two required. Futaba 9155 (FUTM0215)
- ❍ Rudder – Minimum rating of 250 oz-in. One required. Futaba 9156 (FUTM0216)

  (The rudder can also be controlled with two servos ganged together. Each servo should have at least a 125 oz-in or greater rating if you choose the tandem servo method.)
- ❍ Throttle and choke – Any precision servo of at least 30 oz-in is acceptable. Futaba 9001 (FUTM0075)

Battery Recommendations

- ❍ Receiver battery with a minimum capacity of 4.8V and 3000 mAh HCAM6355)
- ❍ Ignition battery with a minimum capacity of 1000 mAh

Engine Recommendations

The recommended engine size range for the Yak-55M is a 50 to 55 cc two-stroke gasoline engine. The DLE™ 55 (DLEG0055) is a perfect choice for this airplane. This engine provided enough power to hover and pull straight out from the hover when coupled with an APC 22x10 propeller (APCQ2201).

Muffler Recommendations

This airplane has been designed to accommodate a wide variety of muffler configurations. The stock muffler and Pitts style mufflers will require cutting some of the cowl to provide clearance. We have also provided a tunnel that can be used with either a canister or tuned pipe. We flew our test model with the canister. This provided very good power and quiet flights. The choice is yours. The following are some of the available mufflers that will work with the Yak-55M:

- ❍ Bison Inverted Wrap Around Pitts Muffler (BISG1052)
- ❍ KS Canister Model 86 with KS Flexible header
- ❍ KS Tuned Pipe Model 1060 with KS Flexible header

ADDITIONAL ITEMS REQUIRED

Required Hardware & Accessories

This is the list of hardware and accessories required to finish the Yak-55M. Order numbers are provided in parentheses.

- ❍ 1/2 oz. [15g] Thin Pro™ CA (GPMR6001)
- ❍ 1 oz. [30g] Medium Pro CA+ (GPMR6008)
- ❍ 1/2 oz. [15g] Thick Pro CA- (GPMR6013)
- ❍ Pro 30-minute epoxy (GPMR6047)
- ❍ Pro 6-minute epoxy (GPMR6045)
- ❍ Super RC Z 56 glue (JOZR5007)
- ❍ Drill bits: 1/16" [1.6mm], 3/32" [2.4mm], 1/8" [3.2mm], 3/16" [4.8mm], 13/64" [5.2mm
- ❍ #1 Hobby knife (HCAR0105)
- ❍ #11 blades (5-pack, HCAR0211)
- ❍ Masking tape (TOPR8018)
- ❍ Microballoons (TOPR1090)
- ❍ 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] gasoline fuel tubing (GPMQ4135)
- ❍ 6" [150mm] servo extension (HCAM2701 for Futaba)
- ❍ Four - 12" [300mm] servo extension (HCAM2711 for Futaba)
- ❍ Two - 36" [914mm] servo extension (HCAM2726 for Futaba)
- ❍ Two - 1-1/2" [38mm] heavy duty servo arm (FUTM2118)
- ❍ Two - 1" [25mm] heavy duty servo arm (FUTM2120)
- ❍ Two - Heavy duty switch harness (FUTM4385)
- ❍ Dubro® Fuel Line Barb (DUB0670)
- ❍ Ernst Futaba charge jack (ERNM3001)

Optional Supplies & Tools

Here is a list of optional tools mentioned in the manual that will help you build the Yak-55M.

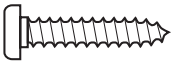
- ❍ 21st Century® sealing iron (COVR2700)
- ❍ 21st Century iron cover (COVR2702)
- ❍ 2 oz. [57g] spray CA activator (GPMR6035)
- ❍ Epoxy brushes (6, GPMR8060)
- ❍ Mixing sticks (50, GPMR8055)
- ❍ Mixing cups (GPMR8056)
- ❍ Hobbico® Duster™ can of compressed air (HCAR5500)
- ❍ Rotary tool such as Dremel®
- ❍ AccuThrow™ Deflection Gauge (GPMR2405)

IMPORTANT BUILDING NOTES

- There are three types of screws used in this kit:

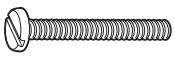
Sheet Metal Screws are designated by a number and a length. For example #6 × 3/4" [19mm].

This is a number six screw that is 3/4" [19mm] long.



Machine Screws are designated by a number, **threads per inch,** and a length. For example 4-40 × 3/4" [19mm].

This is a number four screw that is 3/4" [19mm] long with forty threads per inch.



Socket Head Cap Screws (SHCS) are designated by a number, **threads per inch**, and a length. For example 4-40 × 3/4" [19mm].

This is a 4-40 SHCS that is 3/4" [19mm] long with forty threads per inch

- 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 Yak-55M is factory-covered with Top Flite® MonoKote® film. Should repairs ever be required, MonoKote can be patched with additional MonoKote purchased separately. MonoKote is packaged in six-foot rolls, but some hobby shops also sell it by the foot. If only a small piece of MonoKote is needed for a minor patch, perhaps a fellow modeler would give you some. MonoKote is applied with a model airplane covering iron, but in an emergency a regular iron could be used. A roll of MonoKote includes full instructions for application. Following are the colors used on this model and order numbers for six foot rolls.

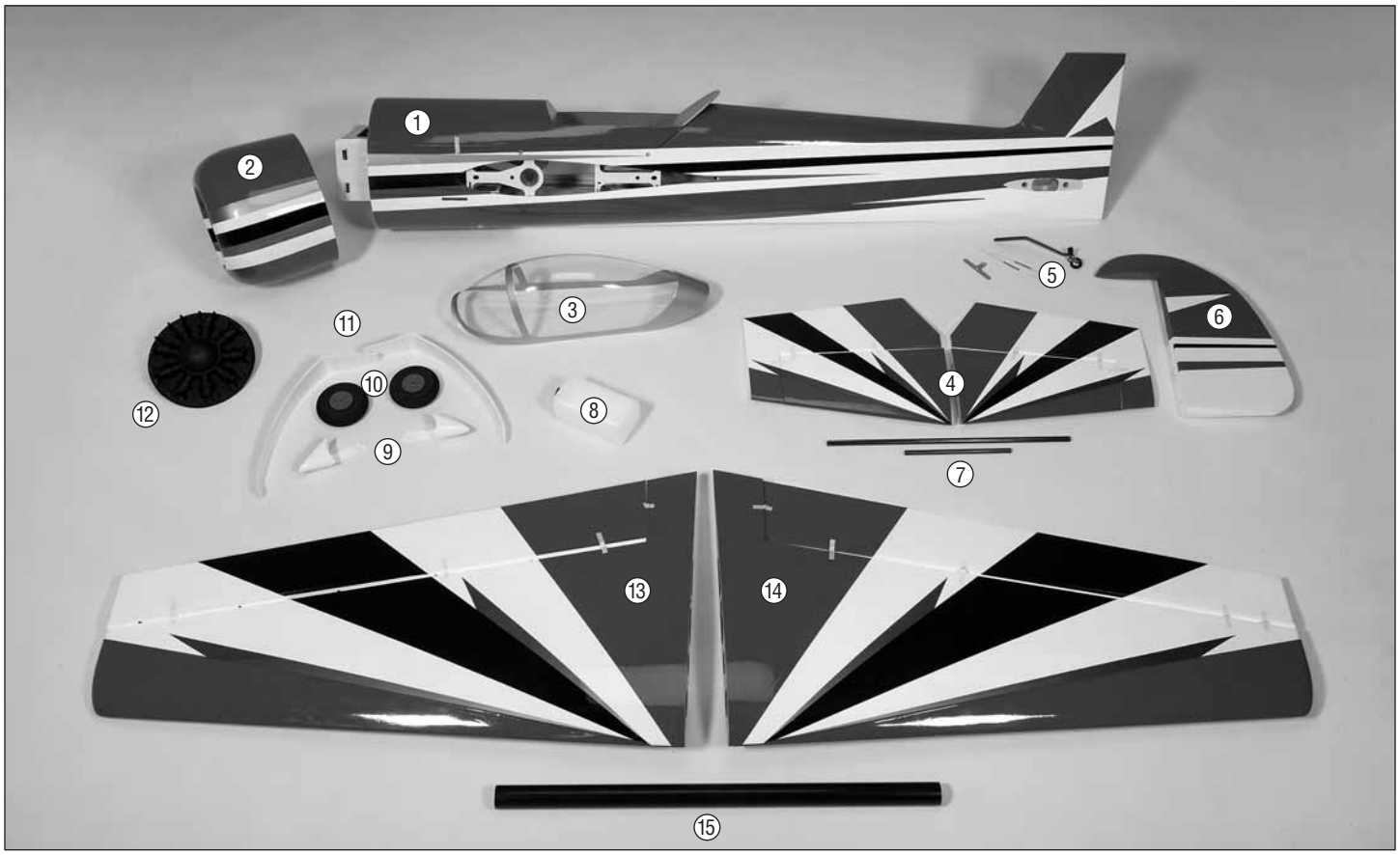
True Red (TOPQ0227) **Black** (TOPQ0208)
Jet White (TOPQ0204) **Metallic Platinum** (TOPQ0408)

KIT INSPECTION

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

Great Planes Product Support
3002 N Apollo Drive, Suite 1 Ph: (217) 398-8970, ext. 5
Champaign, IL 61822 Fax: (217) 398-7721
E-mail: airsupport@greatplanes.com

KIT CONTENTS



1. Fuselage
2. Cowl
3. Canopy
4. Stabilizers with Elevators
5. Tail Wheel Assembly
6. Rudder
7. Stabilizer Tubes
8. Fuel Tank
9. Wheel Spats
10. Wheels
11. Landing Gear
12. Dummy Engine
13. Right Wing
14. Left Wing
15. Wing Tube

ORDERING REPLACEMENT PARTS

Replacement parts for the Great Planes Yak-55M 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. Select "Where to Buy" in the menu across the top of the page and follow the instructions provided to locate a U.S., Canadian or International dealer.

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

Mail parts orders and payments by personal check to:
Hobby Services
3002 N Apollo Drive, Suite 1
Champaign IL 61822

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

If additional assistance is required for any reason contact **Product Support**

by e-mail at productsupport@greatplanes.com
or by telephone at (217) 398-8970

REPLACEMENT PARTS LIST

Order No.	Description
GPMA4050	Fuselage
GPMA4051	Wing
GPMA4052	Horizontal Stabilizers
GPMA4053	Rudder
GPMA4054	Cowl
GPMA4055	Landing Gear
GPMA4056	Gear Spats
GPMA4057	Canopy
GPMA4058	Canopy Hatch
GPMA4059	Tail Wheel Assembly
GPMA4060	Decals
GPMA4061	Wing Joiner Tube

PREPARATIONS

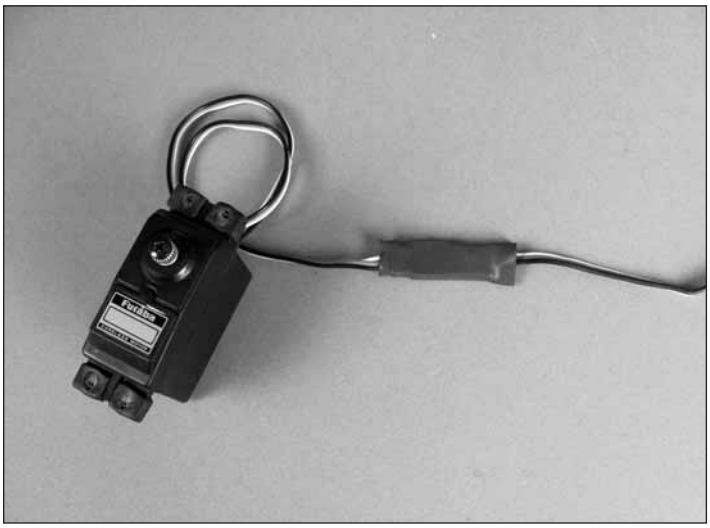
❏ 1. If you have not done so already, remove the major parts of the kit from the box and inspect for damage. If any parts are damaged or missing, contact Product Support at the address or telephone number listed in the "Kit Inspection" section on page 5.

❏ 2. Use a covering iron with a covering sock on high heat to tighten the covering if necessary. Do this for all of the components of the model. Apply pressure over sheeted areas to **thoroughly** bond the covering to the wood.

ASSEMBLE THE WING

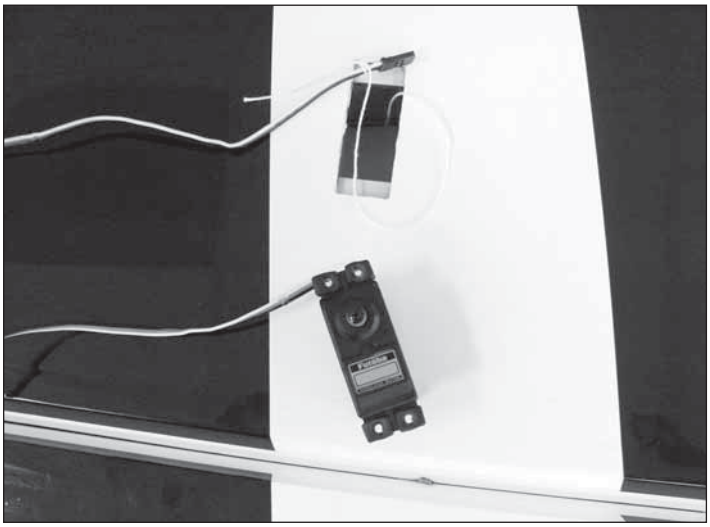
Note: *Throughout this instruction manual you will be instructed to use screws to secure different parts. In all cases, whenever a screw is threaded into wood sheeting or wood blocks, we recommend that you install the screw and then remove it. Apply a drop of thin CA glue into the hole to harden the threads. After the glue has hardened, re-install the screw. Following this step will insure that you have a solid thread for your screws.*

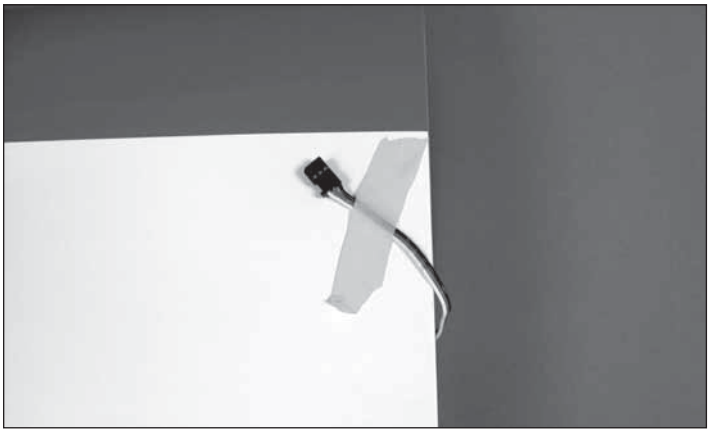
Whenever a screw is threaded into a blind nut or a nut is installed onto a screw, it is recommended that you always apply a drop of thread locker to them.



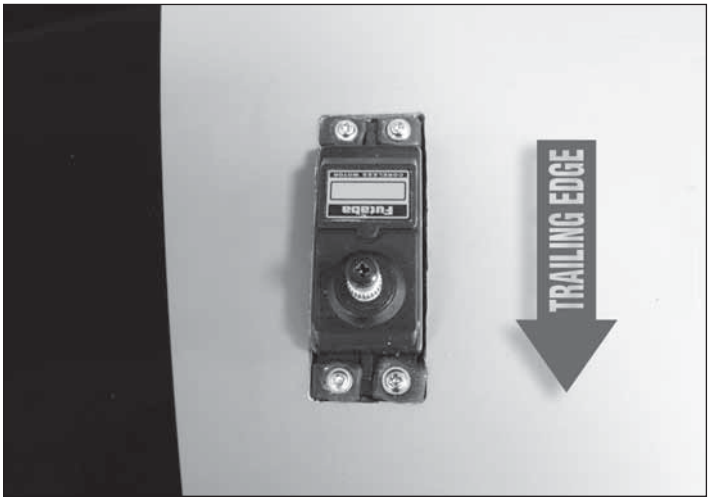
Begin with your right **wing panel** first so your assembly matches the photos in the manual.

❏ ❏ 1. Install a 12" [305mm] servo extension to your aileron servo. Secure it with heat shrink tubing, tape or other method for securing them together.

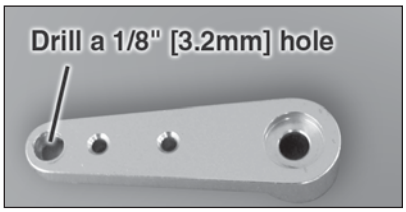




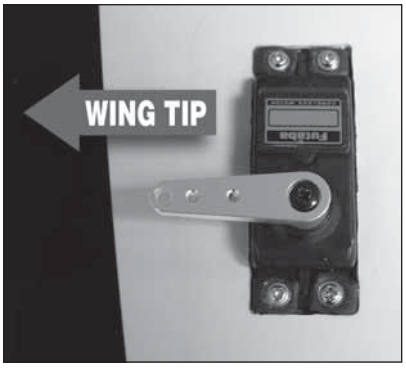
❑ ❑ 2. Inside the aileron servo compartment you will find a string. Tie the string to the servo lead. The other end of the string is taped to the root wing of the rib. Pull the leads through the wing and then tape the servo lead to the wing to prevent it from falling back into the wing.



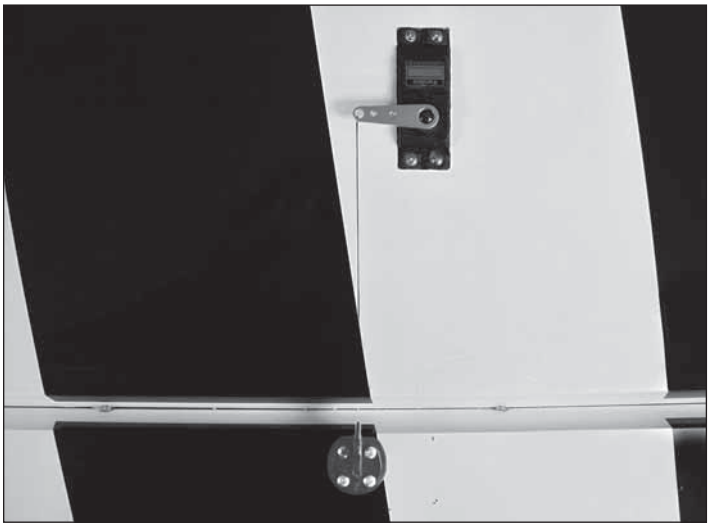
❑ ❑ 3. Place your servo onto the mounting blocks. Drill a 1/16" [1.6mm] hole through the servo mounting tabs into the mounting blocks. Secure the servos to the mounting blocks with the screws that came with your servos. **Note:** When installing the servo into the wing, the end of the servo with the spline should be located towards the trailing edge of the wing.

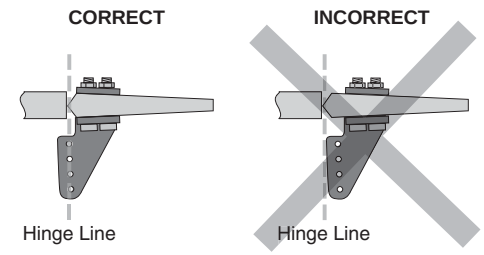


❑ ❑ 4. The aileron servo will require a 1" [25mm] servo arm to get the required aileron throw. We recommend that a high strength metal servo arm be used. For our model we used the aluminum Futaba arm (FUTM2120). Open up the outermost hole in the servo arm by drilling a 1/8" [3.2mm] hole through it.

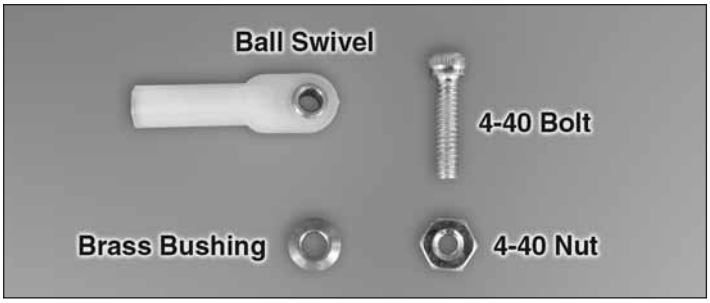


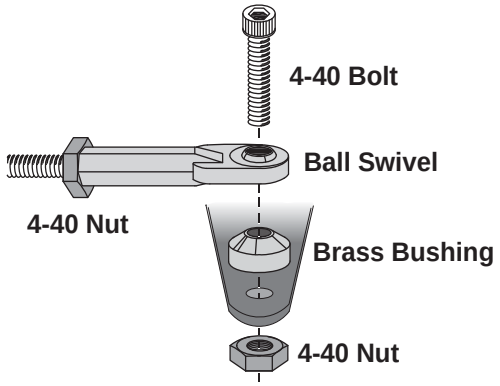
❑ ❑ 5. Install the servo arm to the servo as shown. Be sure to apply thread locker to the spline screw.



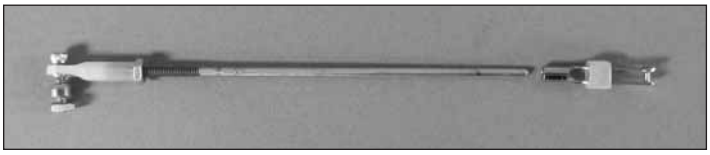


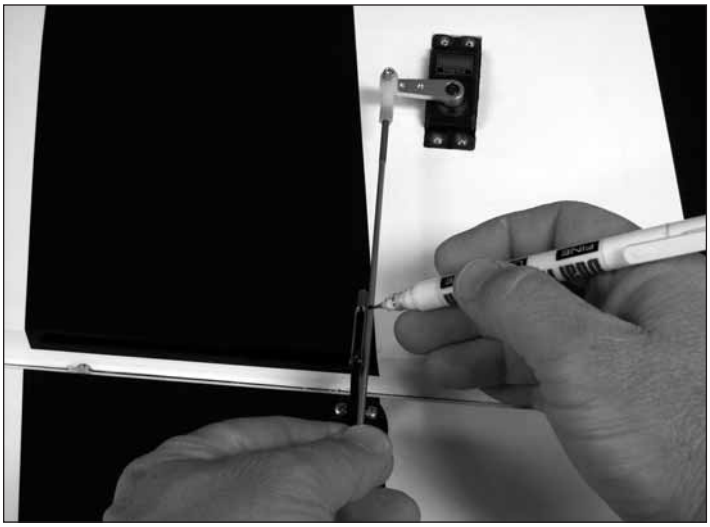
❑ ❑ 6. Located in the aileron is a plywood mounting plate. If you look at the control surface at a slight angle you will be able to see the plate through the covering. Draw a line from the outer hole of the servo horn perpendicular to the hinge line with a felt tip marker. Place a large nylon black control horn on the plate, in line with the line you have drawn. Position the control horn on the hinge line as shown in the illustration. Drill a 3/32" [2.4mm] hole through each of the holes in the control horn. Drill only through the plywood plate. **Do not drill through the top of the control surface**. Mount the horn with four #4 x 1/2" [13mm] screws.





❏ ❏ 7. Locate all of the components shown in the picture, a 4-40 x 5 3/4" [146mm] pushrod wire and an additional 4-40 nut. Examine the diagram that shows the proper way to assemble the swivel ball link. Mount the swivel ball link into the hole you drilled in the servo arm.





❏ ❏ 8. The photo shows how your pushrod assembly should look. Center the aileron and the aileron servo. Install the servo arm onto the servo and the solder clevis into the second most outer hole of the control horn. Mark where to cut the pushrod wire. Cut the wire on the mark you made. Remove all of the components of the pushrod wire from the clevises and the control horn. Solder the pushrod wire to the solder clevis using the soldering "Hot Tip" that follows.

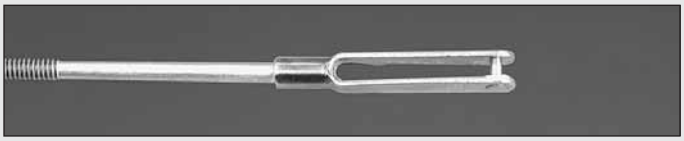
How to Solder

1. Use denatured alcohol or other solvent to thoroughly clean the pushrod. Roughen the end of the pushrod with coarse sandpaper where it is to be soldered.

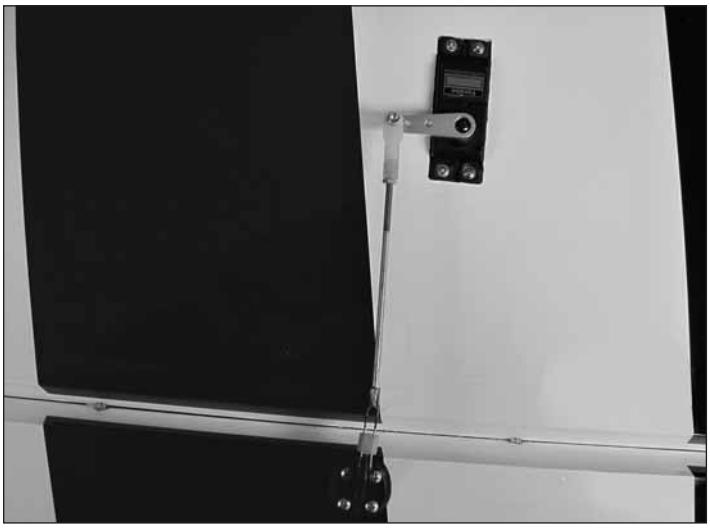
2. Apply a few drops of soldering flux to the end of the pushrod, then use a soldering iron or a torch to heat it. "Tin" the heated area with silver solder by applying the solder to the end. The heat of the pushrod should melt the solder – not the flame of the torch or soldering iron – thus allowing the solder to flow. The end of the wire should be coated with solder all the way around.

3. Place the clevis on the end of the pushrod. Add another drop of flux, then heat and add solder. The same as before, the heat of the parts being soldered should melt the solder, thus allowing it to flow. Allow the joint to cool naturally without disturbing. Avoid excess blobs, but make certain the joint is thoroughly soldered. The solder should be shiny, not rough. If necessary, reheat the joint and allow to cool.

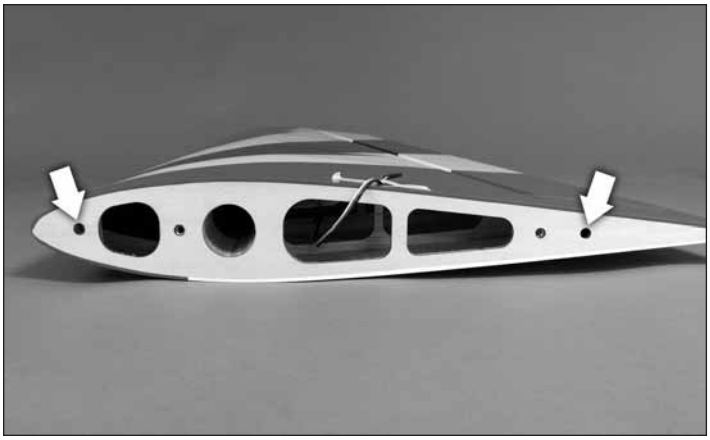
4. Immediately after the solder has solidified, but while it is still hot, use a cloth to quickly wipe off the flux before it hardens. **Important:** After the joint cools, coat the joint with oil to prevent rust. **Note:** Do not use the acid flux that comes with silver solder for electrical soldering.

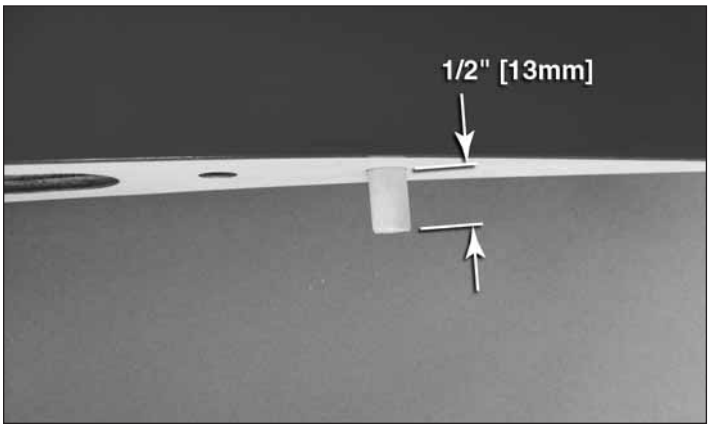


This is what a properly soldered clevis looks like – shiny solder with good flow, no blobs and flux removed.



❏ ❏ 9. After the solder cools, install the pushrod assembly to the aileron servo and the aileron. Be sure to use thread locker on the nuts and a silicone clevis keeper on the clevis.





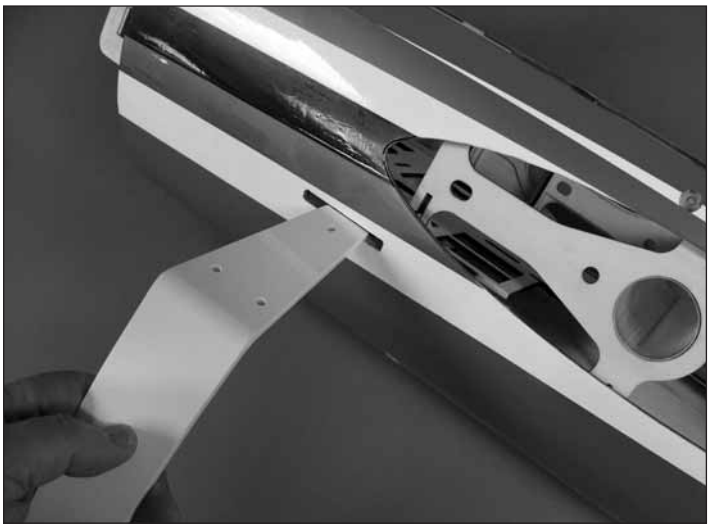
❏ ❏ 10. Glue a 5/16" x 1" [7.9mm x 25mm] wood dowel into the two outermost holes in the wing root. The dowel should extend out of the wing 1/2" [13mm].

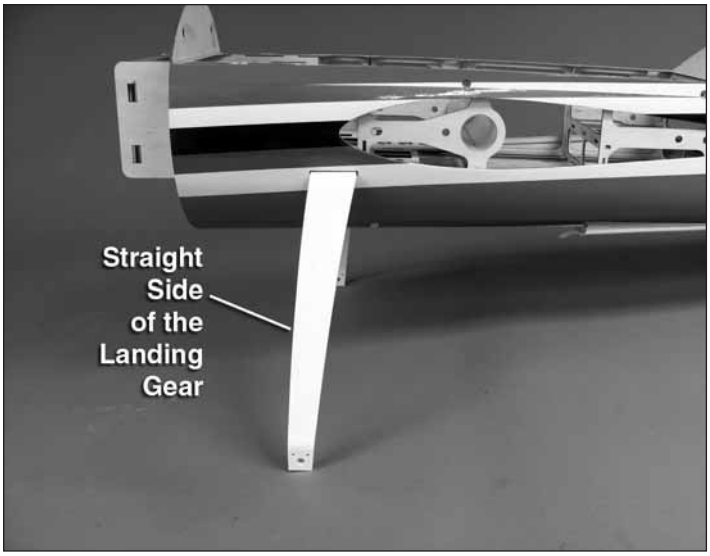
❏ 11. Repeat steps 1- 10 for the left wing panel.

ASSEMBLE THE FUSELAGE

Install the Main Landing Gear

The following steps explain mounting the main landing gear. We will finish the tail wheel gear and installation of the wheels later in the manual. You will find the fuselage much easier to work with when the landing gear is installed.





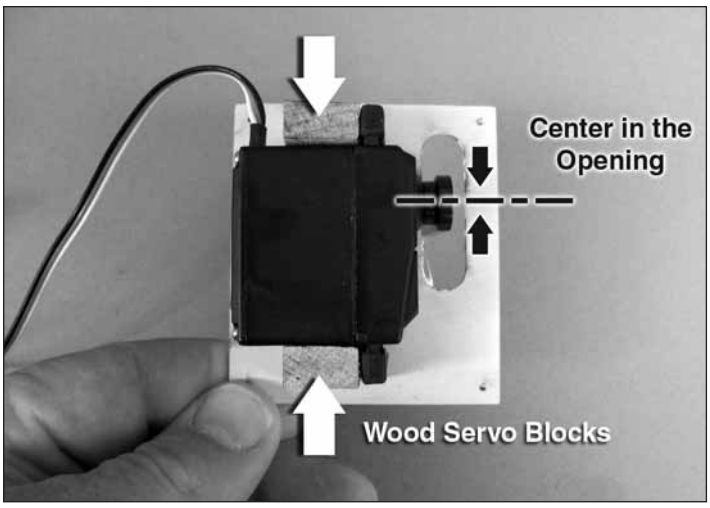
❏ 1. Slide the landing gear into the fuselage on both the left and right side of the fuselage. The straight side of the landing gear should be towards the front of the fuselage.

❏ 2. Secure the landing gear with 8-32 x 3/4" SHCS, #8 lock washers and #8 flat washers. Be sure to apply thread locker to the screw threads.

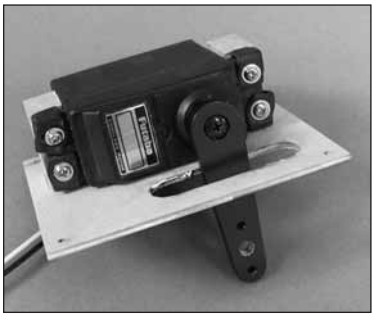
Install the Stabs & Elevators

❏ 1. Including the servo lead from the servo, you will need 58" [1475mm] of wire to reach from the elevator to the radio compartment in the airplane. For a Futaba servo this means you will need some combination of servo leads to equal 45" [1145mm] or more. We used a 12" [305mm] and 36" [914mm] lead plugged together. Be sure to secure all of the connections with heat shrink tubing, tape or some other method to secure all of the connections. If you have the ability make your own leads you may choose to do this and eliminate one of the connections. Make two of these extensions. Install the rubber servo pads and metal grommets on the servos.

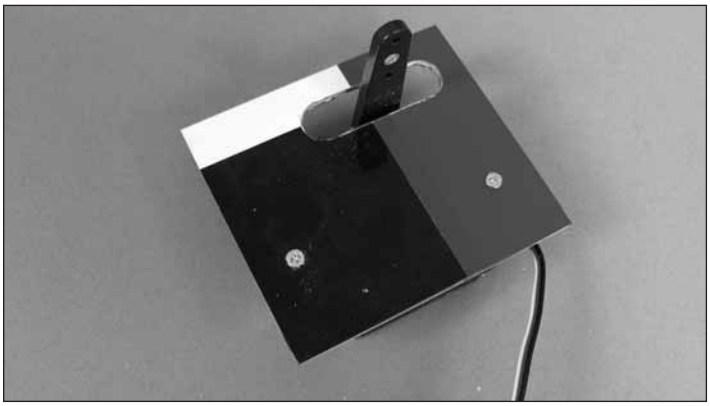
❏ ❏ 2. To achieve proper elevator control you will need to use a 1-1/2" heavy duty servo arm. We used the Futaba aluminum arm (FUTM2118). Enlarge the hole that is 1-1/4" [32mm] from the center of the servo spline with a 1/8" [3.2mm] drill. *(The 1-1/4" [32mm] dimension is approximate. You may find that for your brand of servo, the holes might be spaced slightly different than the Futaba. Open up the hole closest to this dimension.)*



❏ ❏ 3. Center your servo and then install the arm to the servo. Remove the servo tray cover from the left stab. Place the servo on the tray with the servo arm centered in the slot. Glue a 5/16" x 9/16" x 13/16" [8mm x 14mm x 21mm] wood servo block on each side of the servo.

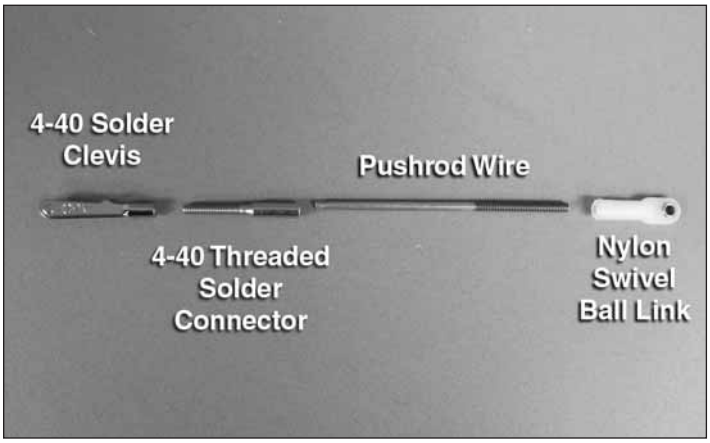


❏ ❏ 4. Drill a 1/16" [1.6mm] hole through each of the mounting tabs of your servo. Mount the servo with the hardware that came with your servos.



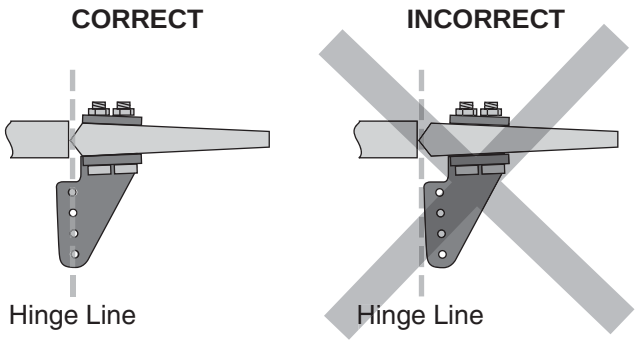
❏ ❏ 5. Drill a 1/16" [1.6mm] hole through the servo cover into the hardwood blocks you glued in place. Install a #2 x 3/8" [9.5mm] wood screw into each block to secure them.

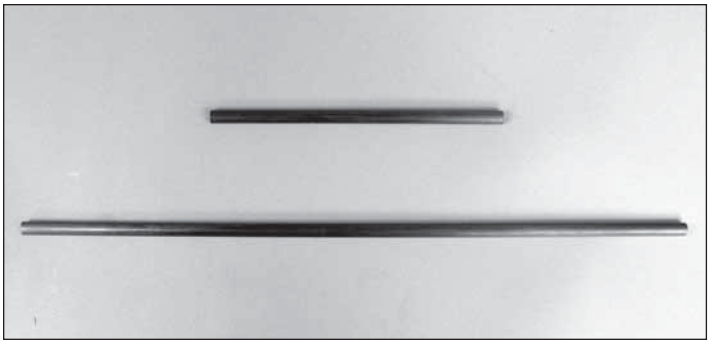
❏ ❏ 6. Guide the servo lead through the stab exiting through the root rib. Secure the servo cover in place with four #2 x 3/8" [9.5mm] screws and #2 flat washers.

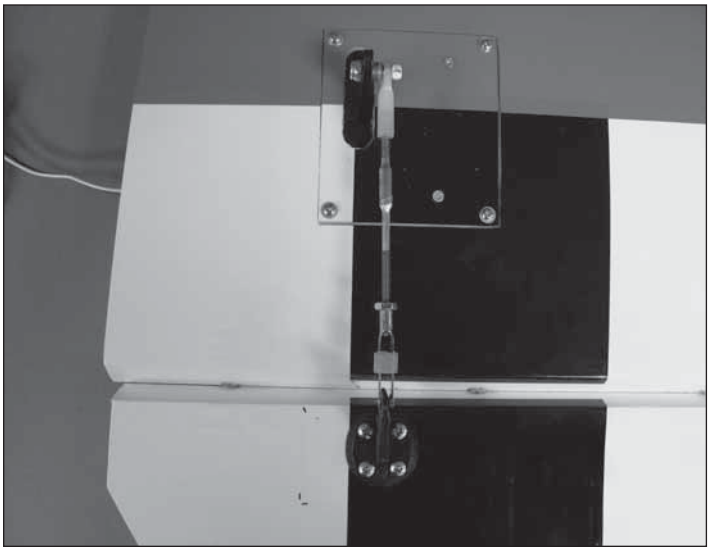


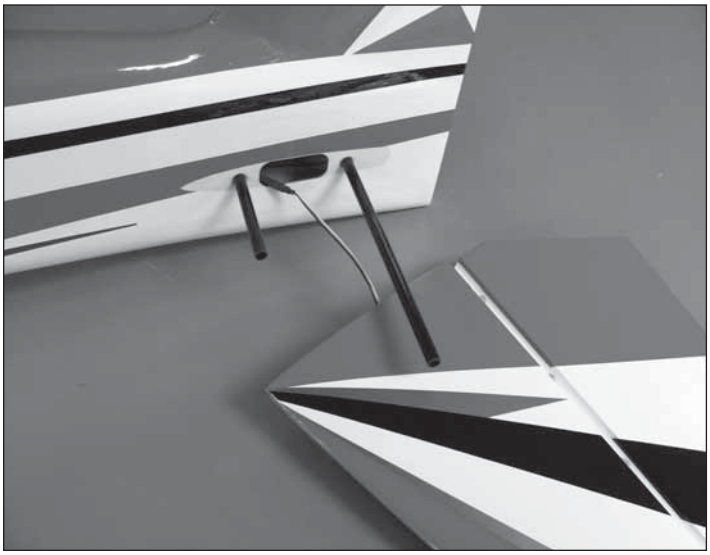
❏ ❏ 7. Cut one of the 4-40 x 5-3/4" [146mm] pushrod wires to a length of 2-3/4" [70mm]. Using the solder technique used on the ailerons, solder the unthreaded end of the wire to the 4-40 threaded solder connector.

❏ ❏ 8. Assemble the pushrod as shown in the photo. Be sure to use thread locker on the nuts when doing the final assembly. Install the nylon swivel ball link to the servo arm with a 4-40 x 1/2" [13mm] screw and 4-40 nut.

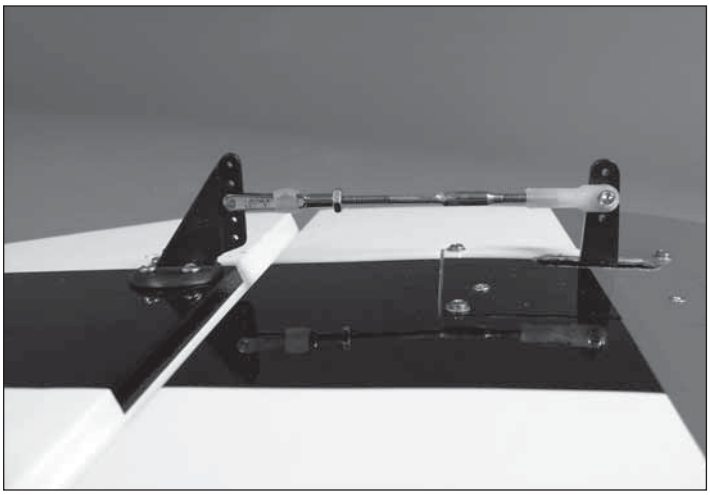








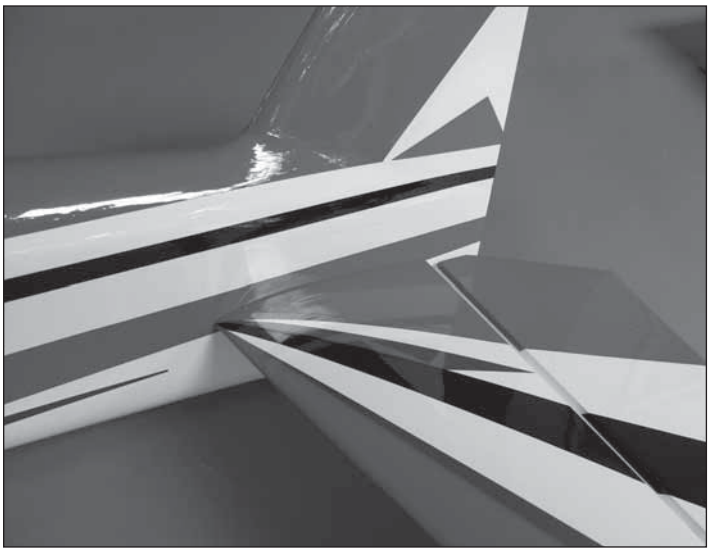
❑ ❑ 9. Using the pushrod wire as a guide, locate the plywood plate in the elevator servo. Position the large nylon black control horn on the plate, in line with the pushrod wire. Position the control horn on the hinge line the same way you did for the ailerons. Drill a 3/32" [2.4mm] hole through each of the holes in the control horn. Drill only through the plywood plate. **Do not drill through the top of the control surface**. Mount the horn with four #4 x 1/2" [13mm] screws.



❑ ❑ 10. Install the servo pushrod as shown. Make any adjustments required to the arm to get the proper length for the pushrod so when the servo is centered, the elevator is aligned with the stabilizer.

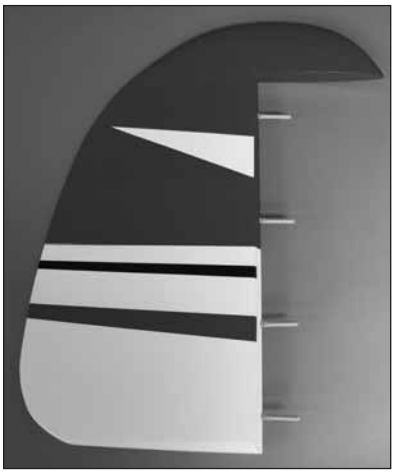
❑ 11. Repeat steps 2-10 for the right side stabilizer / elevator.

❑ 12. Locate the two carbon fiber stab tubes. Slide the shorter length tube into the forward most hole in the rear of the fuselage and the longest tube in the rear hole in the fuse. Through the opening in the back of the fuselage, install the servo leads into the fuselage up to the radio compartment and then test fit the stabs to the fuselage.



❑ 13. When you are satisfied with the fit, glue the stabs one side at a time to the fuselage with 30-minute epoxy. Apply the glue to the tubes, the root rib of the stab and the fuselage side. Clean any excess epoxy with a paper towel and rubbing alcohol. Use masking tape to hold the stabs tight to the fuselage while the glue is curing.

Install the Rudder



❏ 1. Without using any glue, install four hinges into the holes in the trailing edge of the **rudder**. Note that the pivot point of each hinge must align with the center of the trailing edge. To achieve this alignment, the hinges will be fairly deep in the fin. Also note that the hinges must be perpendicular to the leading edge.

❏ 2. Again without glue, test fit the rudder to the fin. Remove the rudder and all the hinges. Add a small drop of oil to the pivot point on the hinges. This will prevent the epoxy from adhering to the pivot point. Make sure oil does not get on the gluing surface of the hinge. If it does, clean the oil off with a paper towel square dampened with denatured alcohol.

❏ 3. Mix up approximately 1/4 oz. [7.4cc] of 30-minute epoxy. Use a toothpick to thoroughly apply the epoxy in the holes in the fin and rudder. Use the toothpick to get the epoxy out of the opening of the holes in the rudder and fin so it doesn't get into the hinge pin. Wipe away any excess epoxy around the outside of the holes with a couple of the small paper towel squares dampened with denatured alcohol.

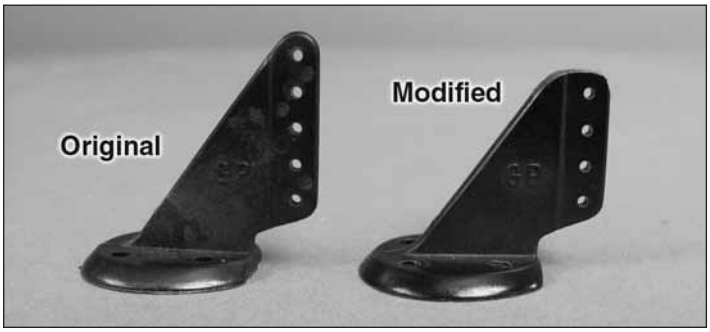
❏ 4. Use the toothpick to apply epoxy to the ends of the rudder hinges that go into the fin. Insert each hinge into the fin and wipe away any excess epoxy that squeezes out of the hole.

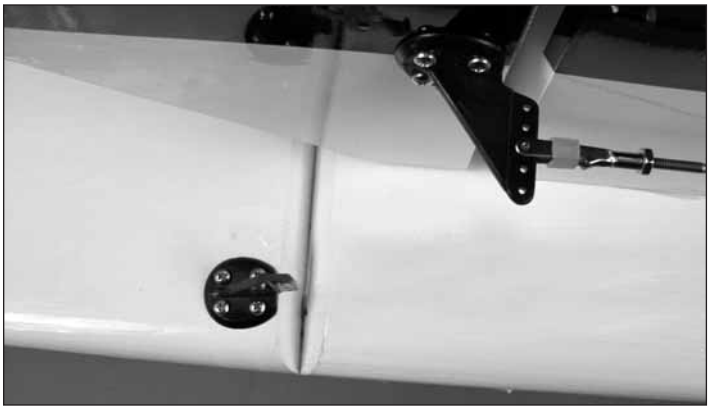
❏ 5. Apply epoxy to the other end of the hinges. Join the rudder to the fin, pushing the hinges only about 3/4 of the way into the rudder. Use a toothpick to wipe away any epoxy that squeezes out. Then fit the rudder the rest of the way in.

❏ 6. Move the rudder left and right to align the hinges. If needed, use a length of masking tape to hold the rudder to the fin. Allow the glue to fully cure.

Install the Rudder Servos

We have designed this airplane with the option to use one servo with 250 oz-in. of torque or to use two, lower strength servos in tandem. If you are more of a sport flyer and not an aspiring 3-D pilot, you can use a single servo with approximately 125 oz-in. You will need to make a decision on the number of servos you will be using. Should you decide to use a single servo and later decide you would like to use two servos you can add the second servo later.

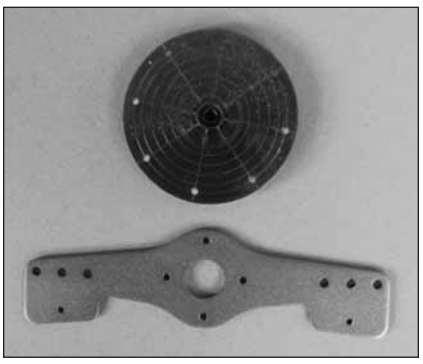




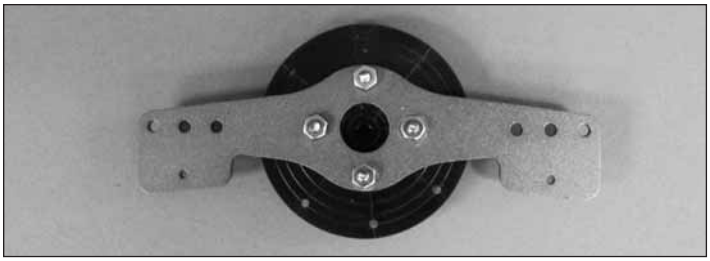
❏ 1. Modify two large black nylon control horns as shown. This is easily completed with a high speed motor tool, small belt sander or a sanding block with coarse sandpaper. As you did with the ailerons horns, locate the plywood plate on each side of the rudder. Position the horns over the plates. Drill a 3/32" [2.4mm] hole through each of the holes in the control horn. Drill only through the plywood plate. ***Do not* drill through the control surface.** Mount the horn with four #4 x 1/2" [13mm] screws. Do this on both sides of the rudder.

SINGLE SERVO INSTALLATION

If you will be installing two servos, skip ahead to, "Two Servo Installation".

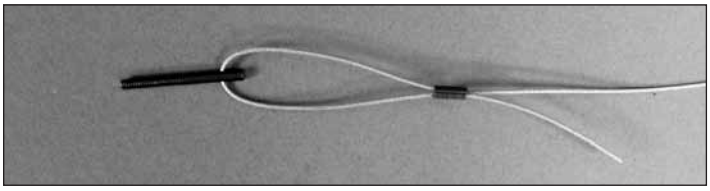


❏ ❏ 2. For the rudder servo arm installation you will need one of the aluminum servo arms included in the kit and one of the round servo disks included with your radio system. The round servo disk needs to be at least 1" [25mm] in diameter.

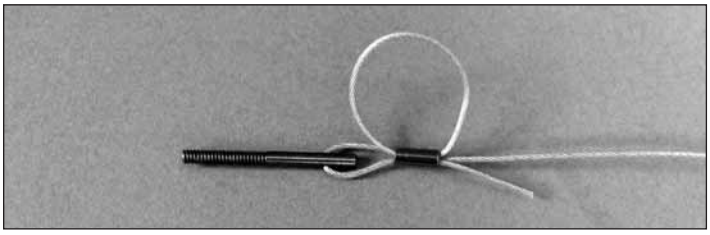


❏ ❏ 3. Position the aluminum servo arm on top of the disk. Drill a 3/32" [2.4mm] hole through the aluminum arm and through the disk. Do this for all four holes. Secure the arm to the disk with four 2-56 x 1/2" [13mm] machine screws and 2-56 nuts. Be sure to secure the nuts with a drop of thread locker. After the nuts are secure, cut off the thread from the bolt that extends above the nut. This can be done with a high speed motor tool or a good side cutter.

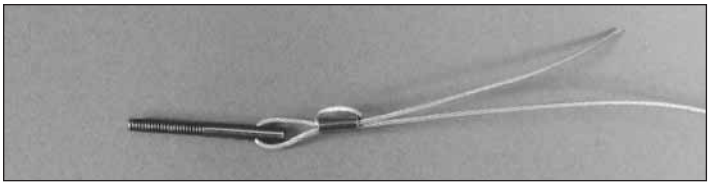
❏ ❏ 4. Install your servo into the rear rudder servo tray using the hardware that came with your servo. Center the servo and then install the servo arm.

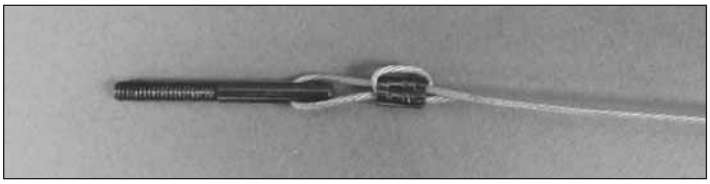


❏ ❏ 5. Use wire cutters to cut the supplied braided cable into two equal lengths. Slide a small tube (called a swage) over the end of one cable. Then, guide the end of the cable through the threaded brass coupler and the back through the swage.



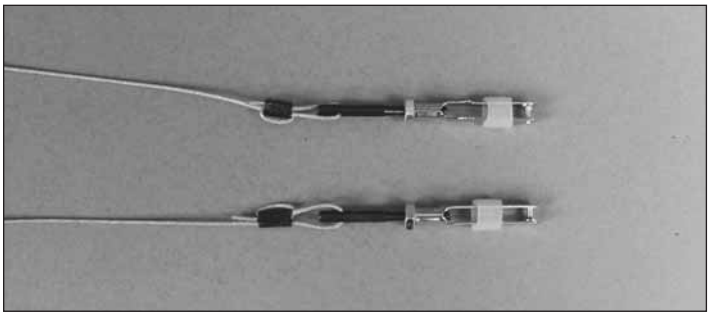
❏ ❏ 6. Wrap the cable back around the swage and back through the swage.





❏ ❏ 7. Use pliers to pull the cable from the first loop to reduce the size of the second loop. Squeeze the swage with pliers and then cut off the excess wire.

❏ 8. Repeat steps 2 – 7 for the remaining cable.

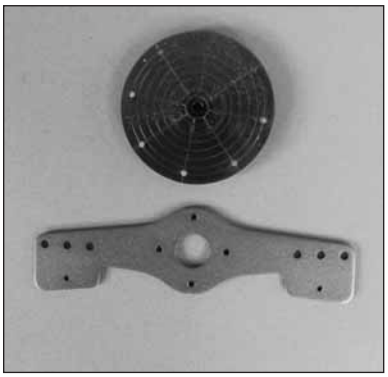


❏ 9 Install a 4-40 thread clevis, 4-40 nut and a silicone clevis keeper onto the threaded connectors.

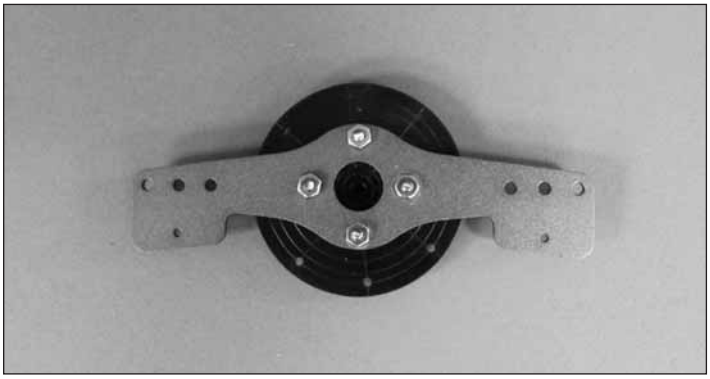
❏ 10. Inside of the fuselage are two white plastic guide tubes. Slide a wire into each of the tubes until they exit out the fuselage sides. Connect the clevis to the hole in the aluminum servo arm. **Note:** When you connect the clevises to the arm be sure that the wires cross each other. In other words, the wire attached to the right side of the servo arm exits the left side of the fuselage and the left side clevis exits out the right side of the fuselage.

If you have completed the single servo installation, skip ahead to, “Complete the Rudder Control Installation”.

DOUBLE SERVO INSTALLATION



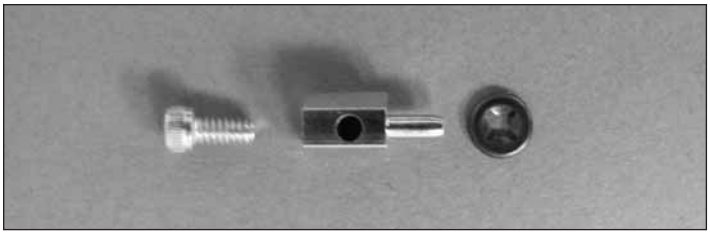
❏❏ 1. For the dual rudder servo arm installations you will need two of the aluminum servo arms included in the kit and two of the round servo disks included with your radio system. The round servo disk needs to be at least 1" [25mm] in diameter.



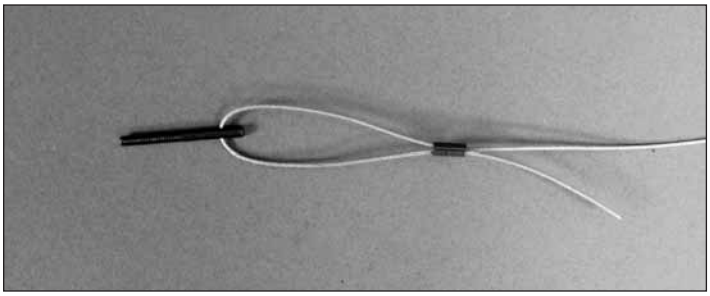
❏❏ 2. Position the aluminum servo arm on top of the disk. Drill a 3/32" [2.4mm] hole through the aluminum arm, through the disk. Do this for all four holes. Secure the arm to the disk with four 2-56 x 1/2" [13mm] machine screws and 2-56 nuts. Be sure to secure the nut with a drop of thread locker. After the nuts are secure, cut off the thread from the bolt that extends above the nut. This can be done with a high speed motor tool or a good side cutter. Do this for both servo arms.

❏❏ 3. Install your servos into the rudder servo tray using the hardware that came with your servo. Center the servos and then install the servo arm.

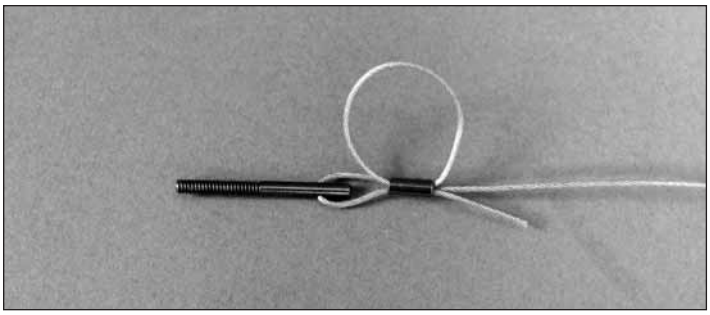
❏❏ 4. Locate two 4-40 x 5-3/4" [146mm] thread pushrod wires. Cut off the threaded end of the wire leaving an unthreaded wire 3-1/2" [89mm] in length.



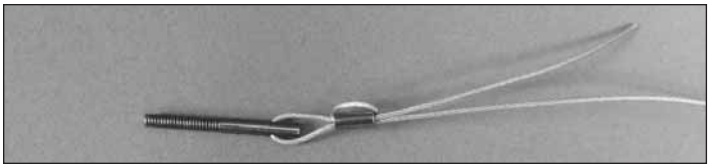
❏❏ 5. Locate four heavy duty screw lock connectors, metal retainer clips and 4-40 x 1/4" [6mm] socket head cap screws. Install the connector into the outer hole of the servo arms and secure them with the retainer clips. Center both servos and then install the two 4-40 wires into the connectors. Secure the rods with the 4-40 screws. Be sure to apply a couple of drops of thread locker to each screw.

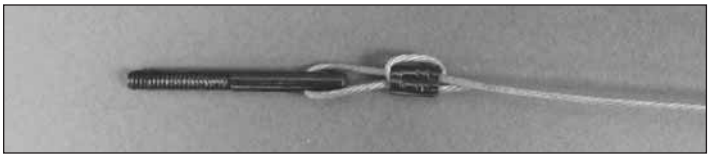


❏❏ 6. Use wire cutters to cut the supplied braided cable into two equal lengths. Slide a small tube (called a swage) over the end of one cable. Then, guide the end of the cable through the threaded brass coupler and the back through the swage.

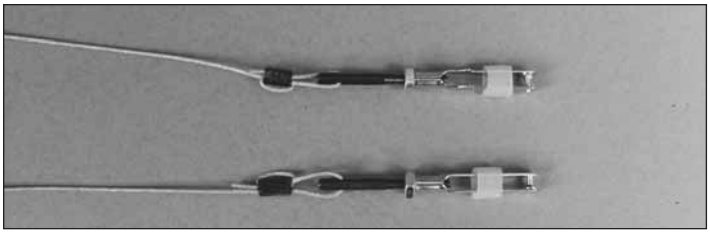


❏❏ 7. Wrap the cable back around and through the swage.





❏ ❏ 8. Use pliers to pull the cable from the first loop to reduce the size of the second loop. Squeeze the swage with pliers and then cut off the excess wire. Do this for both wires.

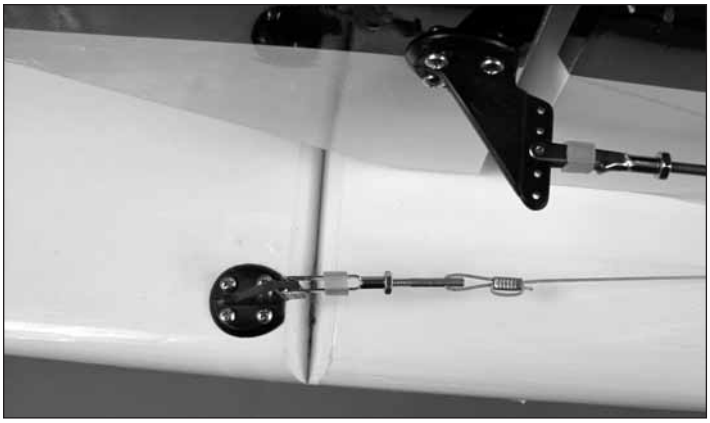


❏ ❏ 9. Install a 4-40 thread clevis, 4-40 nut and a silicone clevis keeper onto the threaded connectors.

❏ ❏ 10. Inside of the fuselage are two white plastic guide tubes. Slide a wire into each of the tubes until they exit out the fuselage sides. Connect the clevis to the hole in the aluminum servo arm. **Note:** When you connect the clevises to the arm, be sure that the wires cross each other. In other words, the wire attached to the right side of the servo arm exits the left side of the fuselage and the left side clevis exits out the right side of the fuselage.

Complete the Rudder Control Installation

❏ 1. Attach a clevis to the outer hole of the rudder control horns that you modified. Center the rudder and the rudder servo. Attach the wire to each of the clevis assemblies and then secure the wire with the swages using the same technique used on the connection at the servo.



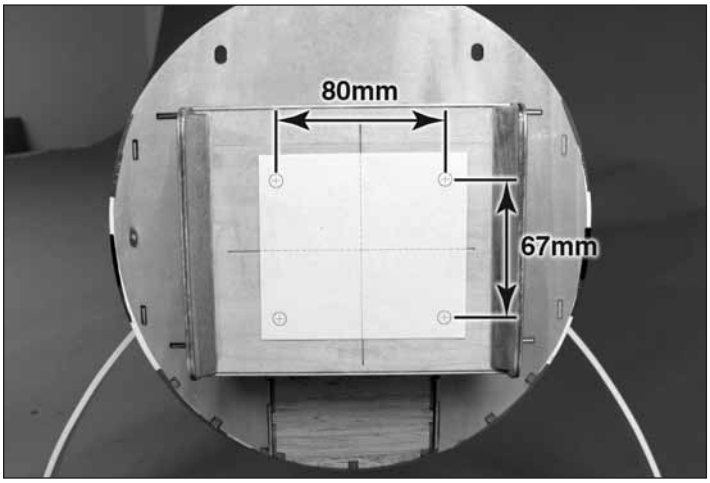
❏ 2. Adjust the tension of the wires by turning the clevises in or out on the connector. Then, lock the nut against the clevis. Be sure to apply a drop of thread locker to the nut.

Install the Engine

The following instructions cover the installation of the DLE55. Other engines will require similar installation. You will need to determine the proper mounting hole positions and location for the throttle connections for your choice of engine.

MOUNT THE ENGINE AND INSTALL THE THROTTLE AND CHOKE SERVOS

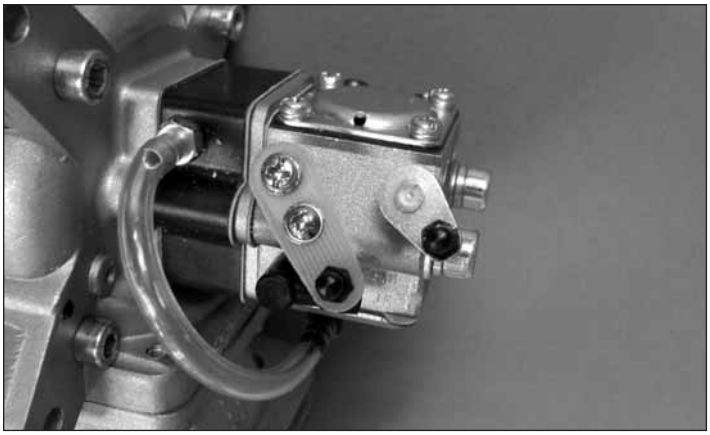
The following instructions will show how to install a servo activated choke. We know some modelers may wish to use some sort of a manual linkage. It is recommended that you read the installation instructions and then decide which method you prefer. We will not be showing installation of a manual linkage. Most modelers will find that this is easy to do and requires little explanation.



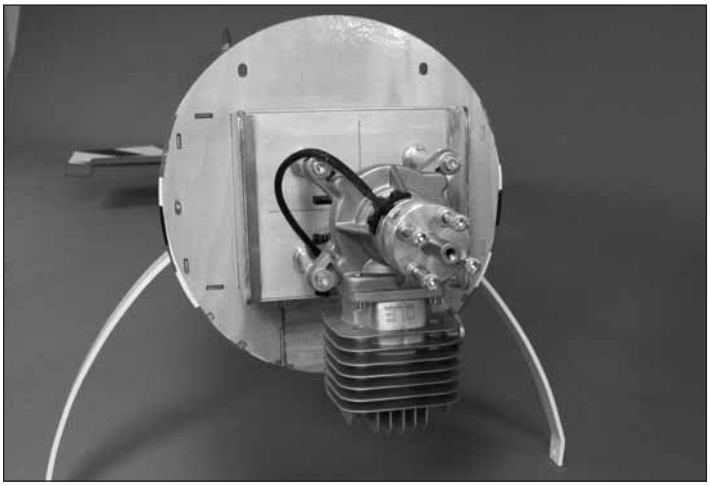
❏ 1. Locate the paper mounting pattern on page 32 of this manual. Tape the pattern to the firewall, aligning the reference lines on the paper pattern with the reference lines on the firewall. When positioning it, the bolt hole pattern should be aligned as shown.

❏ 2. Drill a 1/8" [3.2mm] pilot hole through the center of each mounting hole. Remove the paper pattern and drill a 13/64" [5.2mm] hole through the firewall on each of the pilot holes

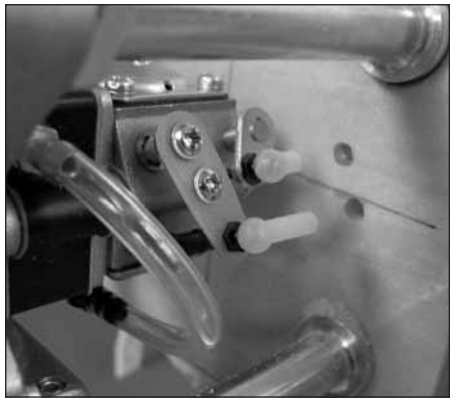
you drilled. (13/64 [5.2mm] is required as a clearance hole for a 10-24 bolt. If you are mounting a different engine, be sure to check the size of the mounting bolts before drilling the holes).



❏ 3. Install the fiber servo arm to the carburetor of the engine. Install a 2-56 ball link and secure it with a 2-56 nut on the throttle. If you will be using our choke method, then install a ball and nut to the choke as well.

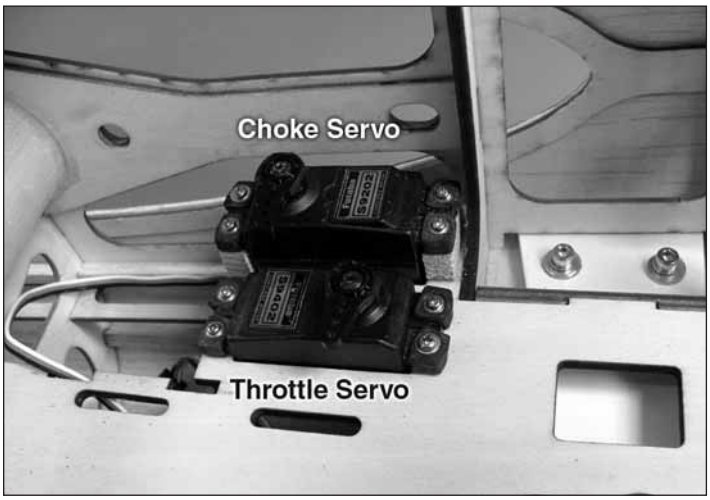


❏ 4. Using the hardware with the engine, mount the engine to the firewall.

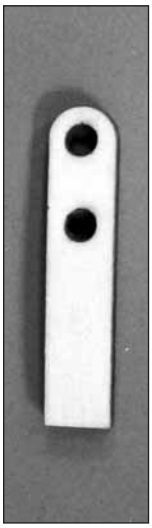


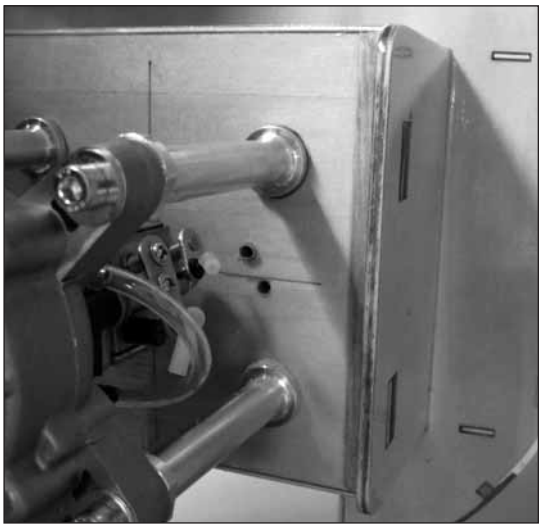
❏ 5. Cut one half off of one of the two nylon ball links included in the kit. Snap the nylon link that you cut onto the choke and the remaining nylon link onto the throttle. Use the links as reference and mark the firewall where the pushrods will pass through. Drill a 3/16" [4.8mm] hole through each of the marks. If you have an extended drill bit you can do this without removing the engine. If not you will need to remove and then reinstall the engine.

❏ 6. Locate two 1/4" x 3/8" x 3/4" [6mm x 10mm x 19mm] hardwood blocks. Glue them in place over the choke servo opening as shown.



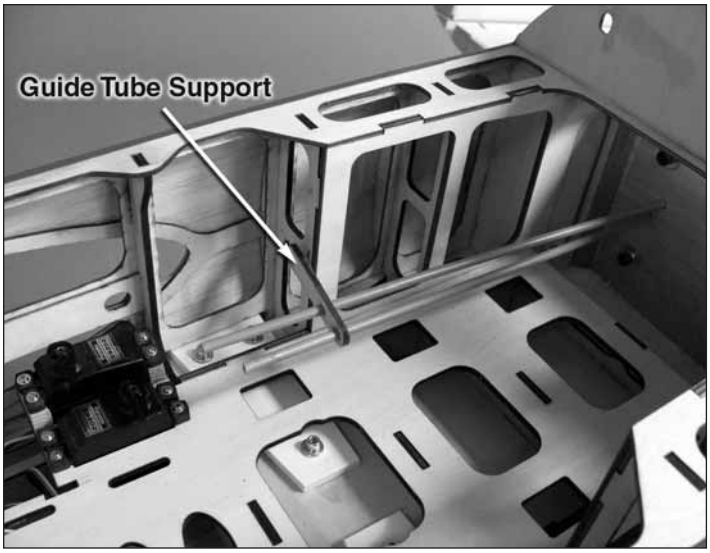
❏ 7. Mount the throttle and choke servos as shown here. If you are not using a choke servo you can mount the throttle servo in either of the two openings.



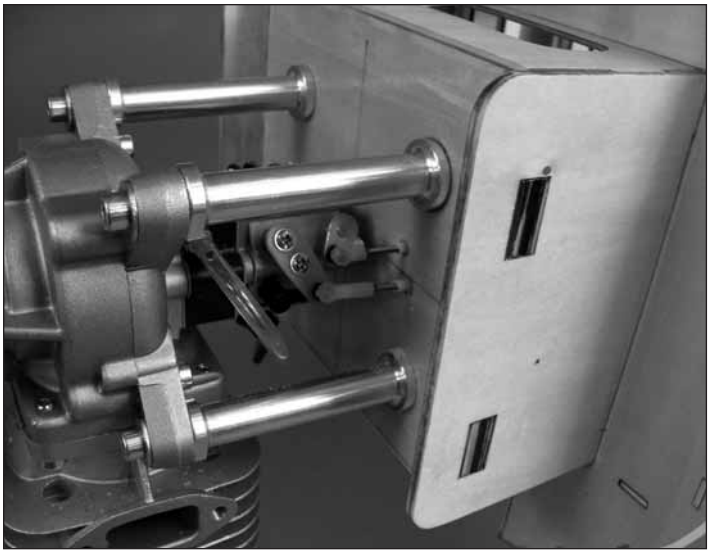


❏ 8. Locate the plywood guide tube support and two 12" [305mm] gray plastic pushrod tubes. Roughen approximately

1" [25mm] on one end of each of the tubes with 200 grit sandpaper. Insert the tubes into the hole you drilled in the firewall. Be sure to insert the smooth end of the tube first so that the roughened end contacts the firewall. Apply glue to the roughened end of the tubes and then make the end of the tube flush with the firewall.



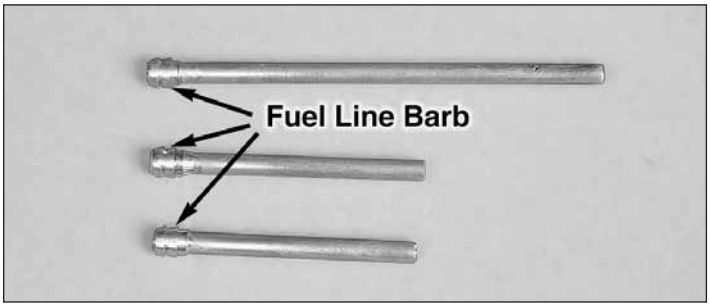
❏ 9. Slide the plywood guide tube support over both tubes. (If you are not installing the choke servo then just slide the tube over the single pushrod tube.) Slide it forward until it is at the former as shown. **Do not glue the support in place!** Cut the tubes so that they end approximatey 2" [51mm] before the servo arms.

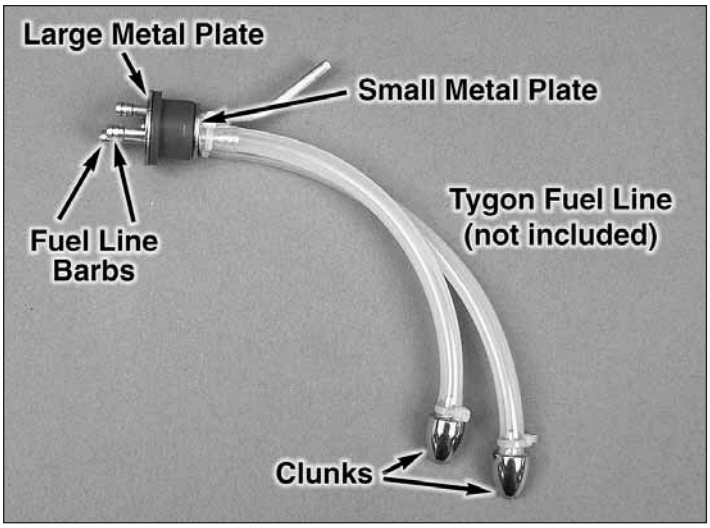


❏ 10. Thread a 2-56 x 1" [25mm] threaded rod into the end of two white nylon inner pushrod tubes (You only need to do one tube if you are not using the servo activated choke) and then screw the nylon ball link connectors to the wires. Slide the pushrods into the plastic tubes you glued to the firewall. Snap the ball links onto the balls. Be sure that you use the pushrod with the shortened ball link for the choke.

❏ 11. Cut the inner white nylon pushrod to the proper length for the position of the servos. Install a 2-56 x 1" [25mm] threaded rod into the end of the pushrod tube followed by a 2-56 nut and a 2-56 metal clevis and silicone clevis keeper. When you are satisfied with the installation, glue the plywood guide tube to the bulkhead. Position it so that the tubes make as straight an exit through the firewall as possible.

Install the Fuel Tank





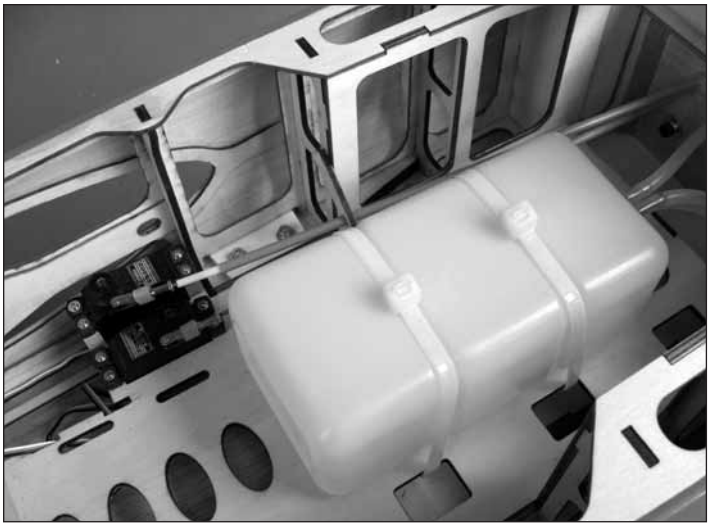
❏ 1. Assemble the fuel tank stopper assembly with the fuel tubes as shown. The easiest way is to first solder a fuel line barb (not included, Dubro Fuel Line Barb DUB0670) at the

end of all three tubes. Insert the tubes into the stopper with the metal plates, and then solder a barb onto the other end of the two short tubes. Bend the vent tube and connect the pickup and gas compatible fueling/defueling lines (not included) to the short tubes. Connect the clunks to the Tygon Fuel lines (not included) and secure the lines to the clunk and brass tubing with the included small tie straps.

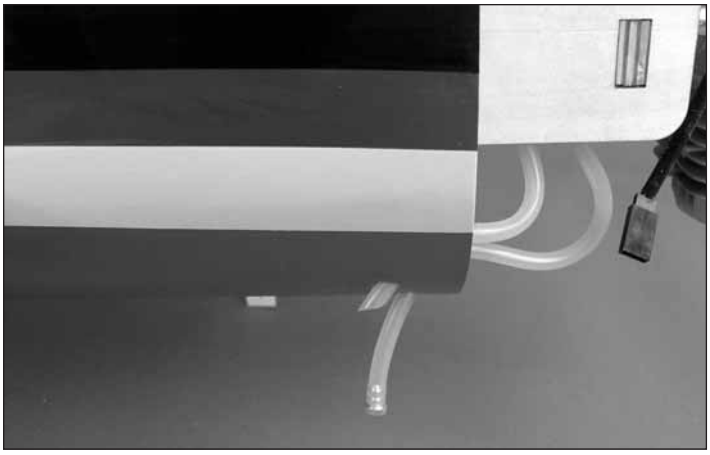
❏ 2. Install the fuel tank stopper assembly in the fuel tank. Check that the clunks move around freely in the fuel tank. Tighten the fuel tank stopper screw.

❏ 3. Install fuel lines onto the brass tubes from the fuel tank. To route the fuel lines where shown, you will need to use a 12" [305mm] length of tubing on the fill and vent line and a 6" [152mm] length on the carburetor line.

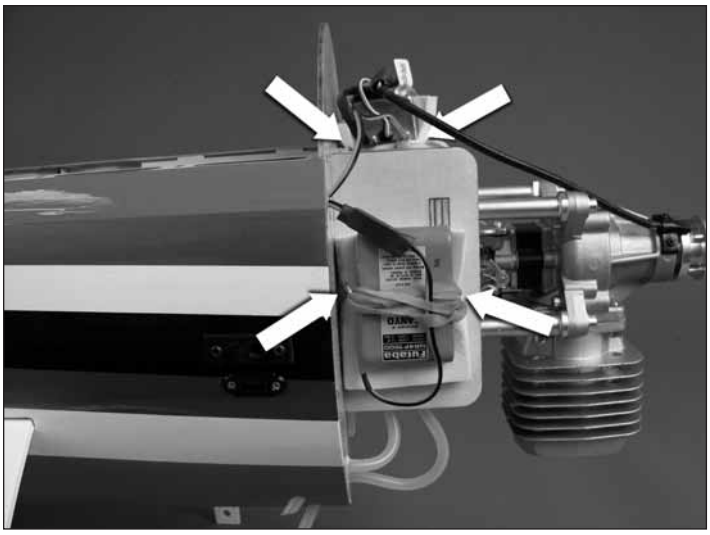
❏ 4. Drill a 1/4" [25mm] hole through the firewall in line with the carburetor inlet.



❏ 5. Install the fuel tank onto the tray in the fuselage. Secure the tank with two large plastic tie wraps. Feed the lines through the firewall. Make sure when you insert the tank that the vent line is at the top of the tank.



❏ 6. Route the carburetor line through the firewall, trim it as needed and attach it to the carburetor. Drill two 1/4" [25mm] holes through the bottom of the firewall box as shown. Pass the vent and fill lines through the holes. To secure the fill and vent line we drilled additional holes in the fuselage. You may wish to do this or secure the lines with a method of your choice. Plug the fill line with the aluminum fuel plug.

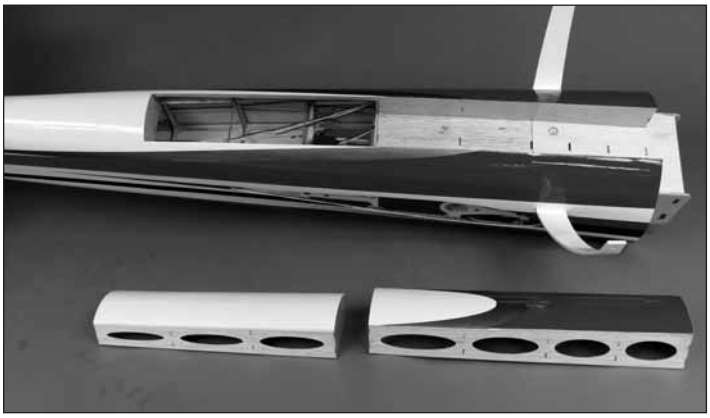


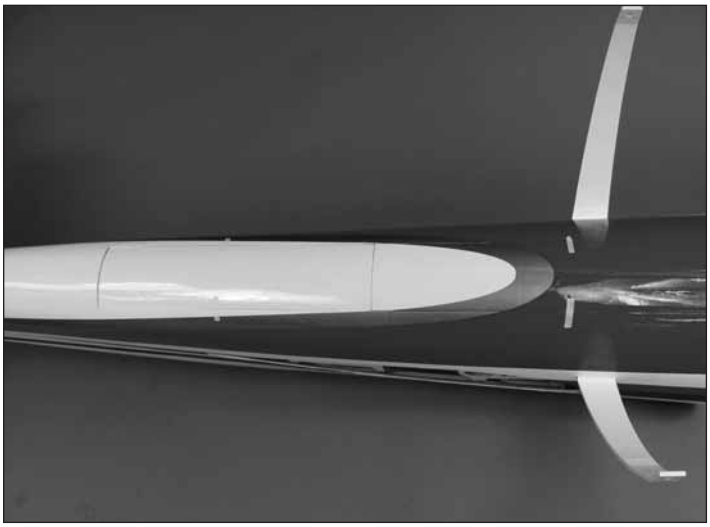
❏ 7. Install the ignition battery and module following the instructions with the engine. We have provided four hooks for securing the module and battery. Be sure to secure all of the electrical connections between the ignition module, battery and switch harness. Mount the ignition switch and charge jack to the fuselage side. We used an Ernst Futaba charge jack (ERNM3001) for our installation.

INSTALL THE MUFFLER

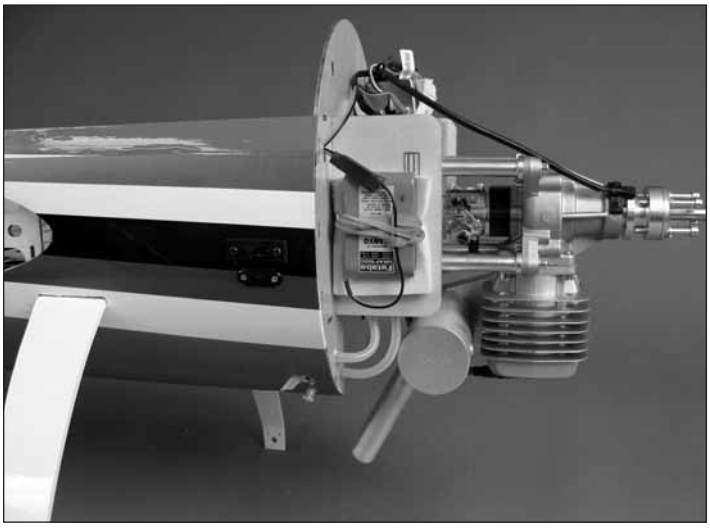
This airplane is designed to allow you the flexibility of installing your choice of a Pitts style muffler, canister or a tuned pipe. For purposes of this manual we will show the full installation of the canister muffler system and give an overview of the requirements to install the tuned pipe and Pitts muffler. You need to decide which system you will use. You might wish to review the installation instructions before determining which option is best for you.

Pitts Style Muffler Installation



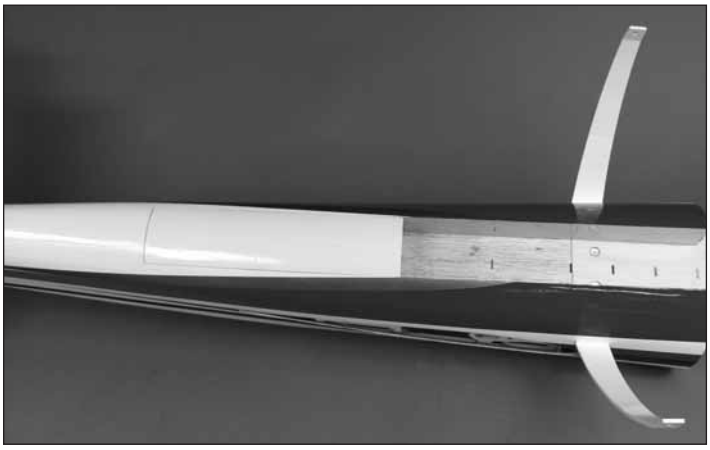


❏ 1. Remove the two covers from the bottom of the fuselage. If you will be using the muffler that came with your engine or using a Pitts style muffler, permanently glue the covers to the fuselage. If you have thoughts of changing between a Pitts style muffler and a canister, you might choose to glue the covers in place with silicone. This would allow the covers to be cut loose at a later time.

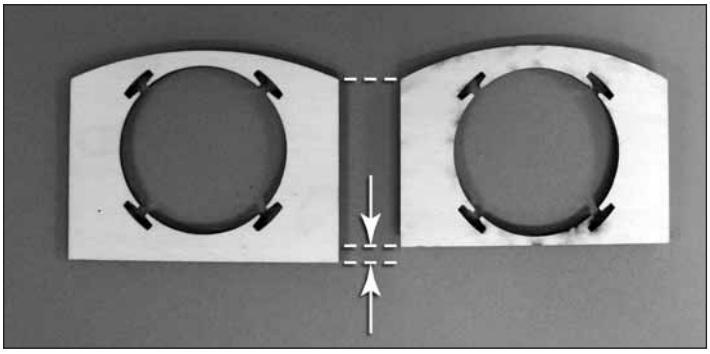


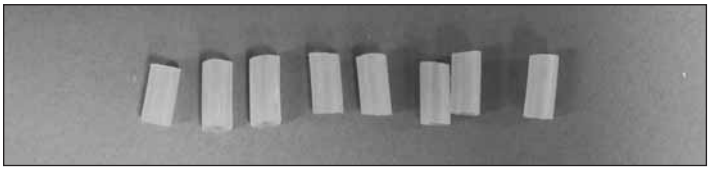
❏ 2. Mount the muffler to the engine. Be sure the spark plug lead from the ignition module is not contacting the muffler.

Canister Muffler Installation

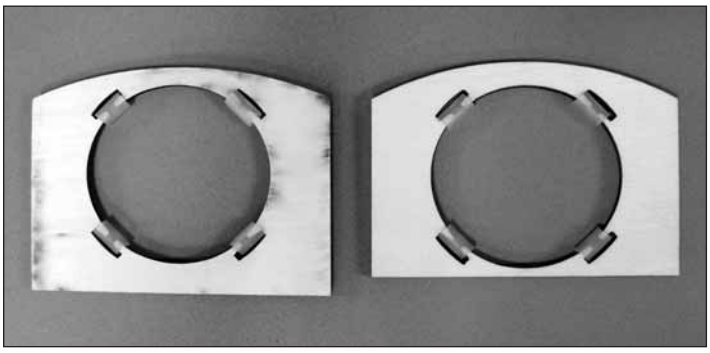


❏ 1. Remove the two covers from the bottom of the fuselage. These two covers allow you to customize the fuselage for your choice of muffler, canister or tuned pipe. For a canister, glue the rear cover in place to the fuselage.

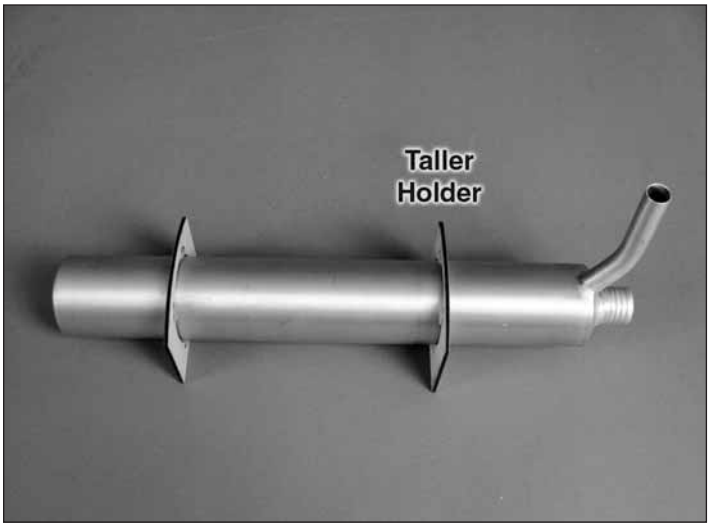




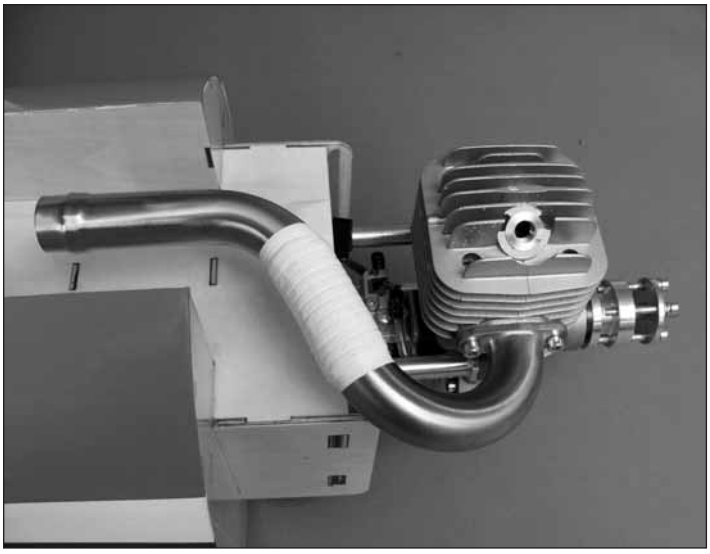
❏ 2. The kit includes 4 plywood canister/pipe holder and one 24" [610mm] piece of silicone tubing. For the canister you will be using two of the holders. From the 24" [610mm] silicone tube, cut eight 1/2" [13mm] length tubes. (The remaining holders and silicone tubing are for use with the installation of a tuned pipe). When choosing the plywood holders, notice that one is slightly taller than the other. You will need one of each.



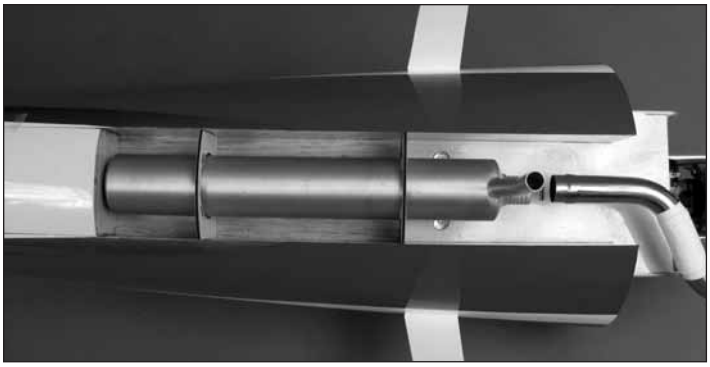
❏ 3. Insert eight silicone tubes onto the tabs in the two plywood holders as shown.



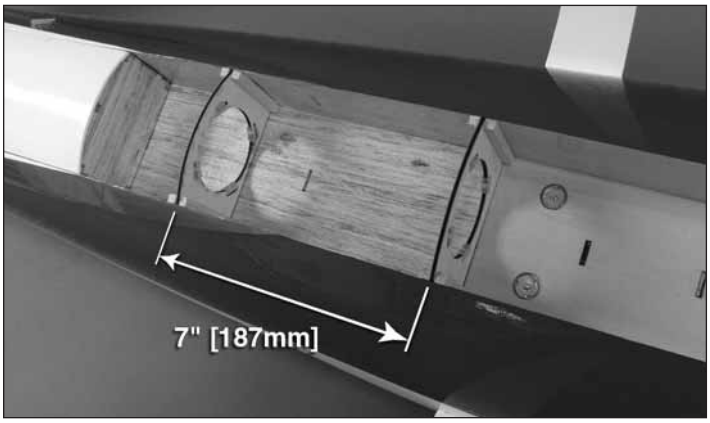
❏ 4. Gather all of the canister components together. Test fit the canister to the holders. The taller of the plywood holders should be at the front of the canister and the shorter holder towards the rear. The canister should fit slightly loose between the silicone holders.



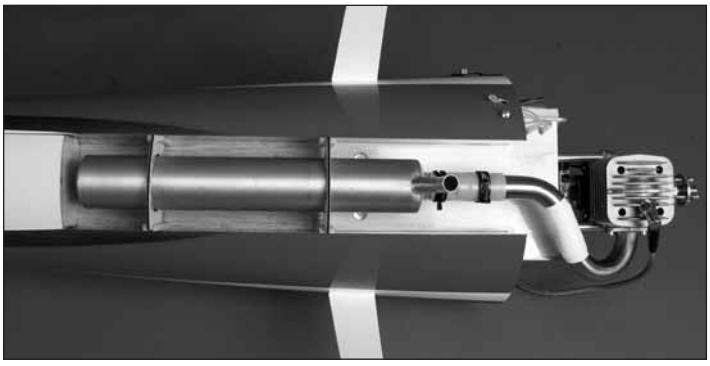
❏ 5. Temporarily mount the exhaust header to the engine.



❏ 6. Test fit the canister and holders into the opening in the fuselage. When you are satisfied everything fits well, remove the canister and remove the holders from the canister.

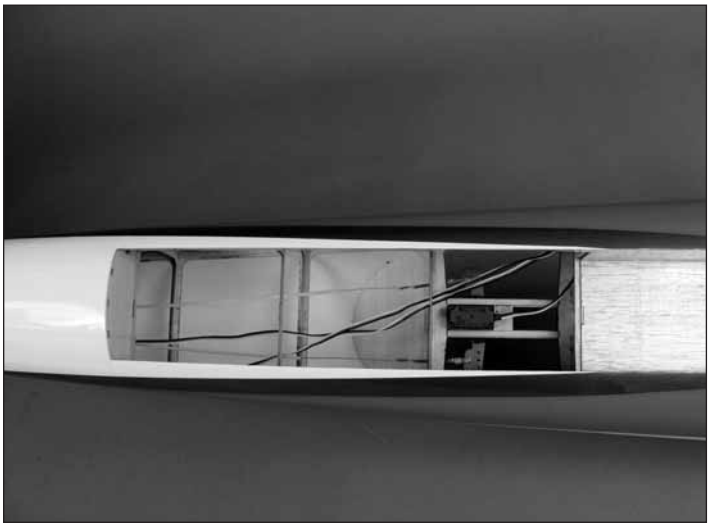


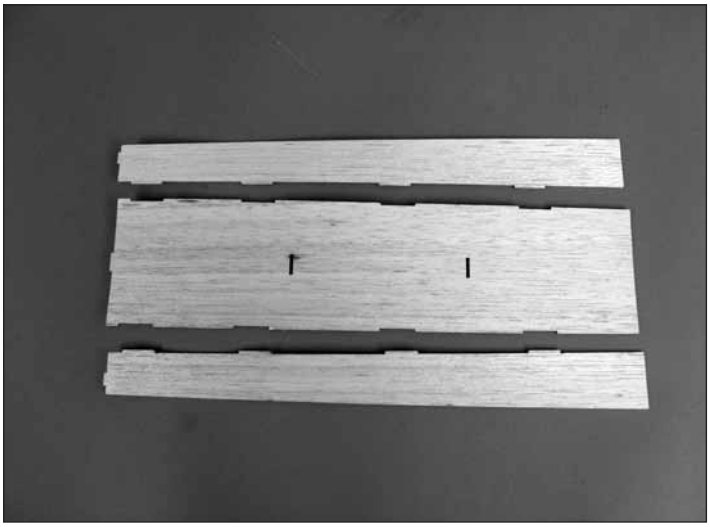
❏ 7. Insert the taller of the two holders into the fuselage. Glue it on the seam where the plywood meets balsa wood. Glue the shorter holder in place 7" [187mm] back from the forward holder. Make supports for the holders from the 1/4 x 1/4 x 24" [6mm x 6mm x 610mm] balsa stick included in the kit. Cut the sticks to length to fit the holders. Glue the sticks to the holders and the tunnel wall. The canister holders are already fuel proofed but you should take a few minutes to fuel proof the sticks. This can be done by brushing a small amount of epoxy over the bare wood.

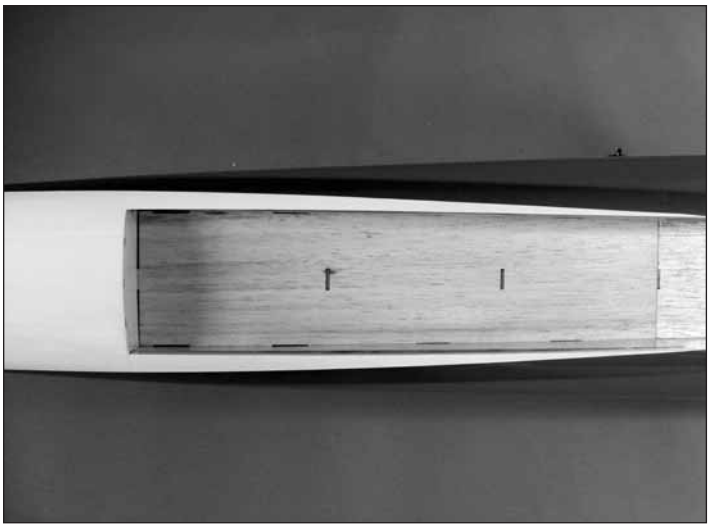


❏ 8. Slide the canister into the holders. Slide the coupling and the clamps onto the exhaust header and the secure the header to the engine. Slide the coupler in place so that there is approximately 1/4" [6mm] between the end of the canister and the exhaust header. Be sure that the end of the canister does not hit the back of the tunnel. You need to leave room for the canister to expand when it gets hot. Be sure the lead from the ignition module is not contacting the muffler.

Tuned Pipe Installation



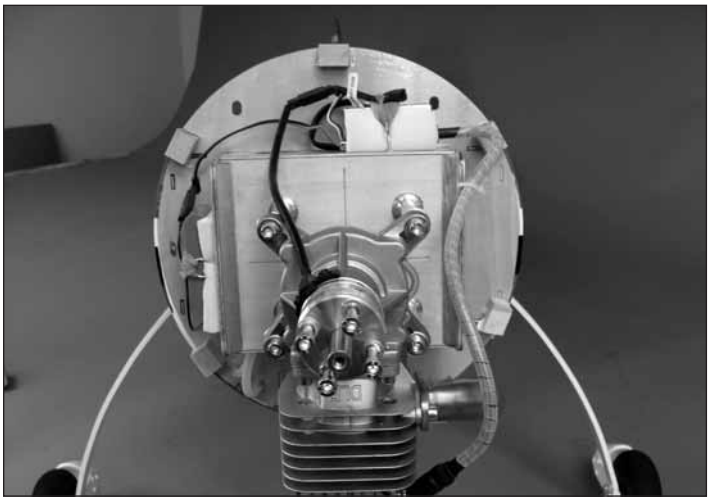




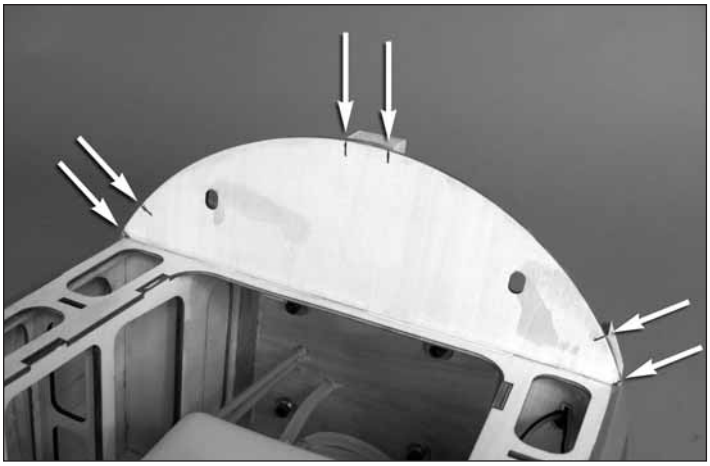
❏ 1. Remove all of the covers from the bottom of the fuselage. Glue the balsa floor and side walls in place in the back of the tunnel.

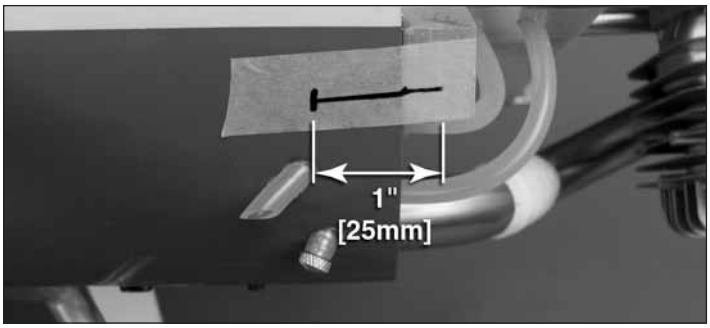
❏ 2. Refer to the instructions for the canister. The procedure is the same except that you will use four pipe holders instead of two that are used for the canister installation.

MOUNT THE COWLING AND DUMMY ENGINE



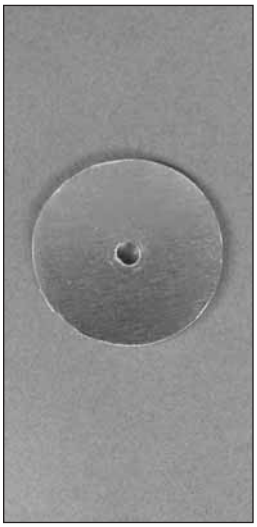
❏ 1. The kit includes six 5/8" x 5/8" x 3/4" [16mm x 16mm x 19mm] hardwood cowl mounting blocks. Depending on the muffler you chose to mount, you may not choose to use all of the blocks. As shown for the canister installation we glued five of the blocks to the front of the fuselage as shown here. Determine how many of the blocks you will use and where they will be positioned. Then, glue them to the firewall with epoxy. After the epoxy has cured be sure to fuel proof the blocks.

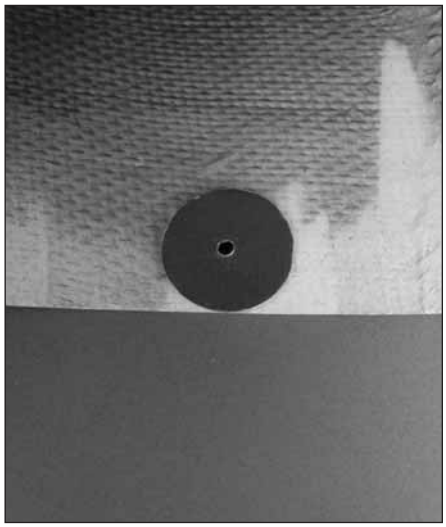




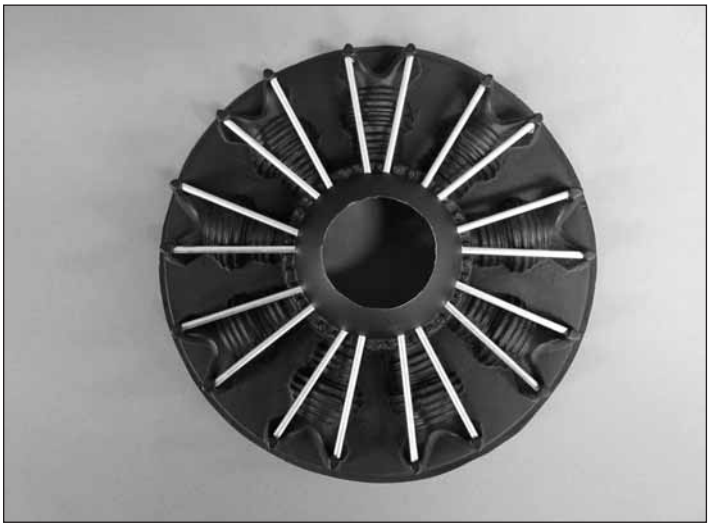
❏ 2. On the back side of the firewall make reference marks for the location of the blocks. On the remaining blocks, tape a piece of masking tape over the block, extending back onto the fuselage. From the center of the block make a line 1" [25mm] long.

❏ 3. Install the cowl onto the fuselage. The cowl should over lap the firewall approximately 1/8" [3.2mm]. Using the lines you drew on the blocks, measure forward 1" from the mark you made. Drill a 3/32" [2.4mm] hole through the cowl and the block. Use the reference marks you made on the back of the firewall to locate the blocks and drill a hole. Do this for all of the cowl mounting blocks. Install and then remove a #4 x 1/2" [13mm] screw into each of the holes you made. Apply a drop of thin CA to harden the threads. Allow the glue to harden.

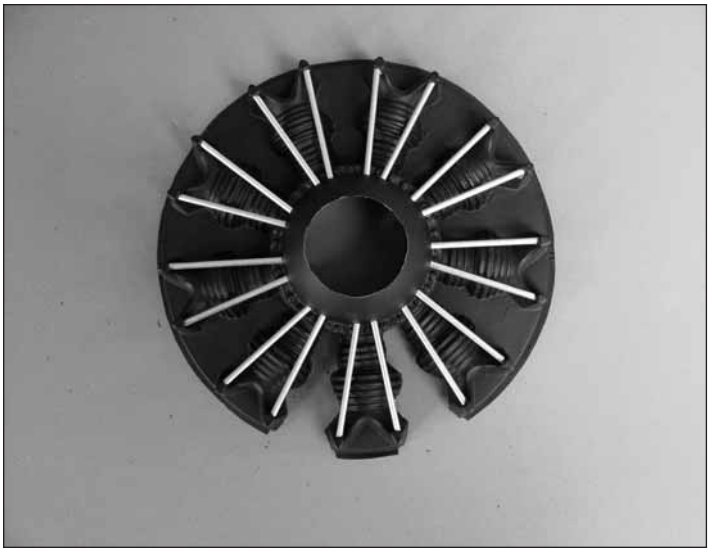




❏ 4. Locate the aluminum cowl mounting disks. Sand one side of each disk with 220 grit sandpaper and then clean them with alcohol. Lightly sand inside the cowl at each of the mounting holes. Clean the area with alcohol. Using 5-minute epoxy, glue a disk to the cowl at each of the mounting holes you drilled. Be sure to align the hole in the disk with the hole you drilled in the cowl.



❏ 5. Drill 1/8" [3.2mm] holes in the dummy engine to accept the 1/8" x 2-1/2" [3.2mm x 64mm] aluminum tubes. Insert the tubes into the holes in the dummy engine. On the back side of the dummy engine apply epoxy to the tubes to secure them in place.



❏ 6. To allow cooling air to flow over the engine cylinder you need to cut the dummy engine as shown. This allowed enough cooling air for our installation. Should you fly in hotter conditions or use the minimum amount of oil required for the engine, you may also wish to cut away the dummy engine cylinder to allow more airflow.

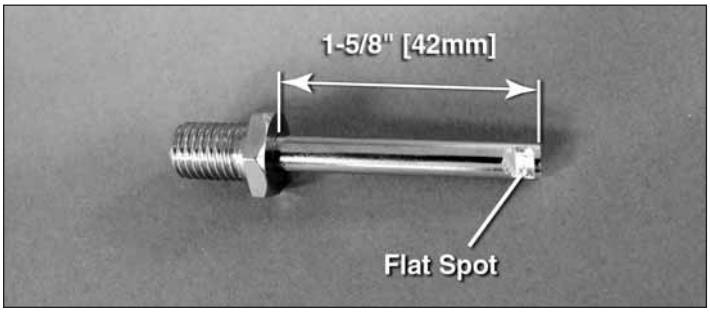
❏ 7. Place the dummy engine into the cowl. Mount the cowl to the fuselage with the cowl mounting screws. Thread a #64 rubber band through the aluminum tubes in the dummy engine on the top and bottom half of the engine. Slide a balsa stick through the rubber bands and place the sticks against the cowl. *(If you chose not to install the tuned pipe you will have a 1/4" x1/4" x24" balsa stick left over. Cut the stick in half. If you have used the stick you will need to provide a stick to complete the installation)* This will pull the dummy engine tight to the inside of the cowl. Position the cowl where it needs to be located. Once you have it properly positioned, carefully remove the cowl.

❏ 8. Using thick CA, tack glue the dummy engine to the cowl in several spots. Re-install the cowl to verify the position of the dummy engine. Make any additional adjustments / cutting away of the dummy engine to achieve a good fit. Once you are

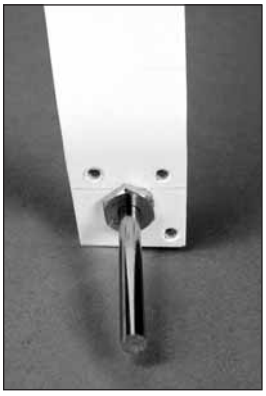
satisfied, permanently glue the dummy engine to the cowl. The dummy engine needs to be glued to the cowl with a mixture of 5-minute epoxy and micro balloons. The addition of the micro balloons will prevent the glue from running.

❏ 9. In order to provide sufficient cooling to the engine you must provide openings for the air to exhaust out of the cowl. If you installed either the canister or tuned pipe there is sufficient exhaust provided by the tunnel. If you are using the Pitts style muffler you will need to provide an opening in the bottom of the cowl approximately 3-1/2" x 3-1/2" [89mm x 89mm].

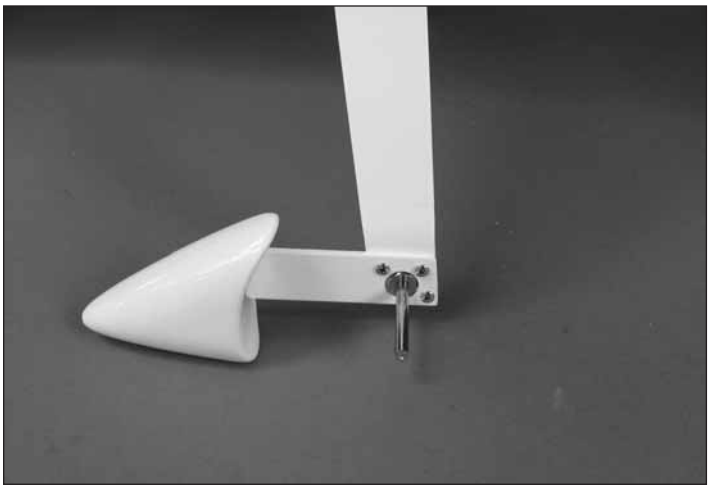
INSTALL THE MAIN & TAIL WHEELS



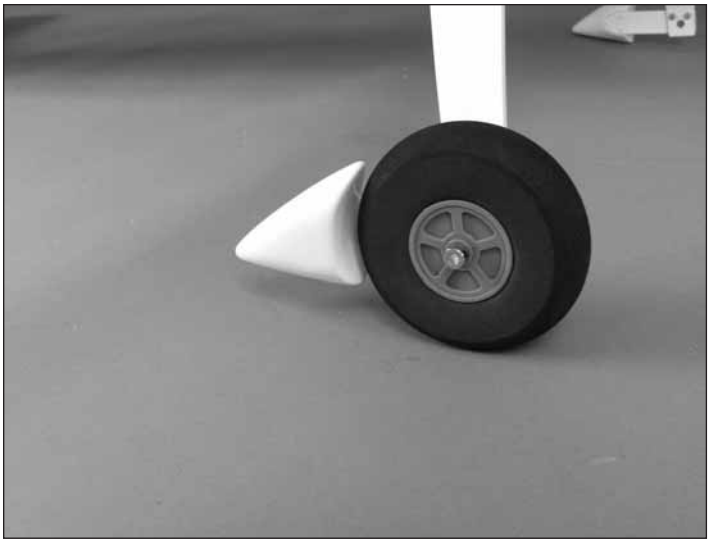
❏ ❏ 1. Cut each of the 2" [52 mm] long axles to a length of 1-5/8" [42mm]. Make a flat spot in the end of the axle. This can be done with a small file or high speed motor tool.



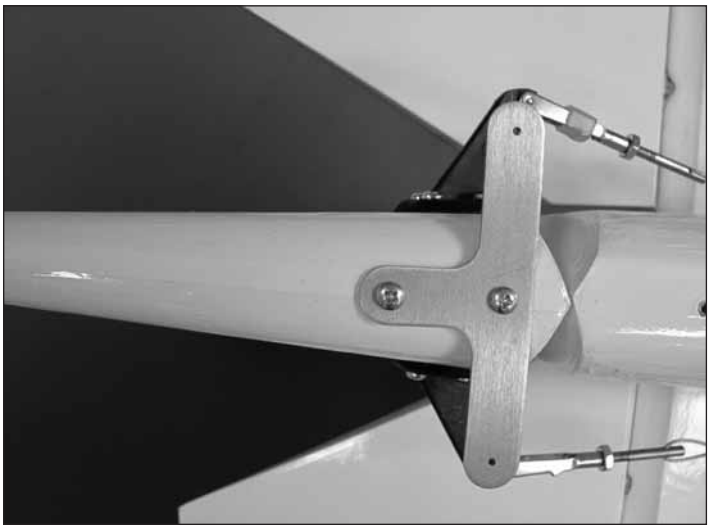
❏ ❏ 2 Install the axles to the landing gear with the large axle nuts.



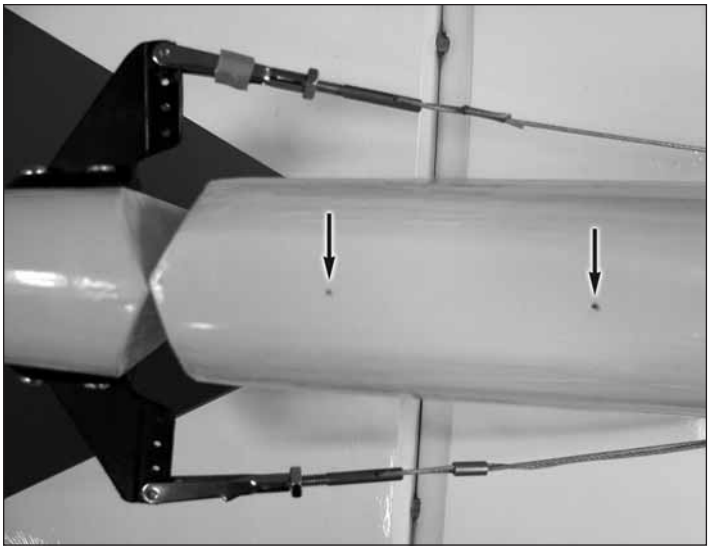
❏ ❏ 3. Secure the wheel spats to the landing gear with three 4-40 x 1/2" [13mm] screws and 4-40 lock nuts. Do this for both landing gear.

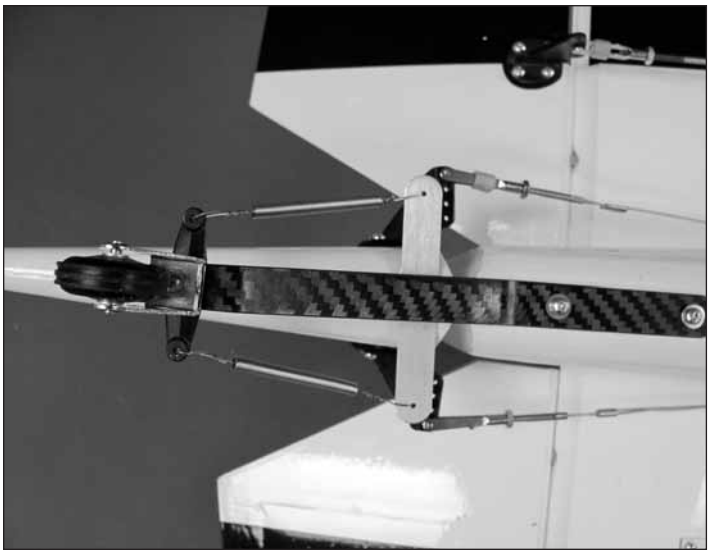


❏ ❏ 4. Install a 6-32 set screw into each of two 3/16" [5mm] wheel collars. Be sure to apply a drop of thread locker to each of the set screws. Slide one wheel collar onto the axle followed by the wheel and another wheel collar. Tighten the set screw on the inner wheel collar against the axle and the set screw in the outer wheel collar against the flat spot you made in the axle. Do this for both the left and right landing gear.



❏ ❏ 5. Place the aluminum “T” bracket onto the bottom of the rudder as shown. Drill a 3/32" [2.4mm] hole through the two center mounting holes, into the rudder. Remove the bracket from the rudder. Insert and then remove a #4 x 1/2 [13mm] screw into each of the holes. Apply a couple of drops of thin CA glue into the holes to harden the threads. After the glue has cured secure the bracket to the rudder with the screws.

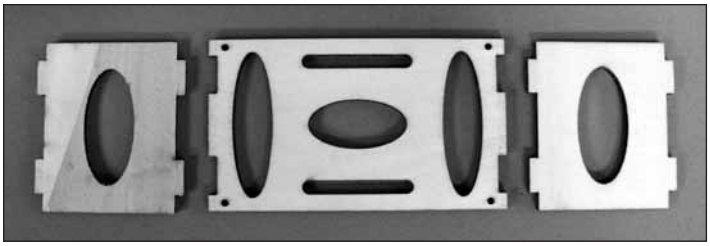


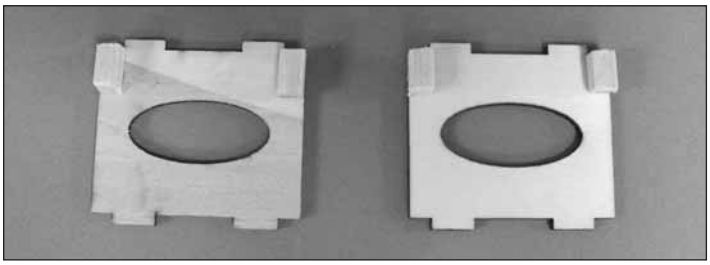


❏ ❏ 6. At the rear of the fuselage you will find two small pilot holes. Drill a 3/32" [2.4mm] hole through the two holes. Insert and then remove a #4 x 1/2 [13m] screw into each of the holes. Apply a couple of drops of thin CA glue into the holes to harden the threads. Mount the tail wheel bracket to the fuselage with the screws and a #4 flat washer and lock washer. Center the rudder servo and the rudder. Attach a spring to each side of the control horn.

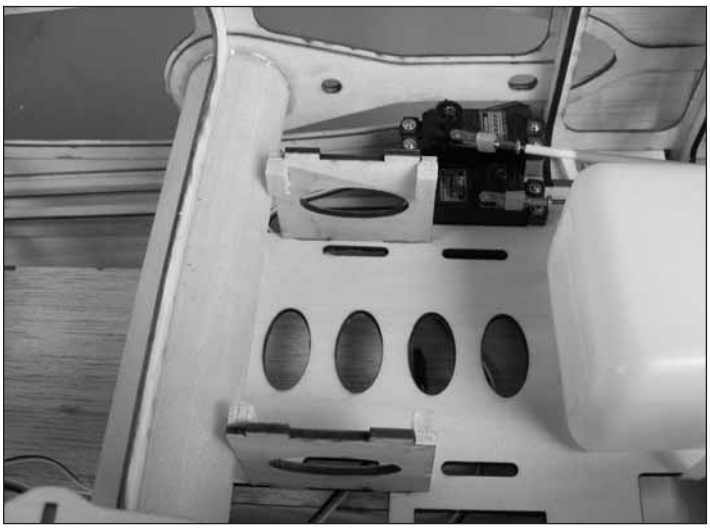
COMPLETE THE RADIO INSTALLATION

The following instructions explain installation of a tray for mounting the battery and receiver. We found that for 3D flying we added a small amount of tail weight to achieve the best balance for this type of flying. If that is your intention for this airplane, you may wish to try to mount the battery/receiver further back into the fuselage rather than adding any weight to the tail.



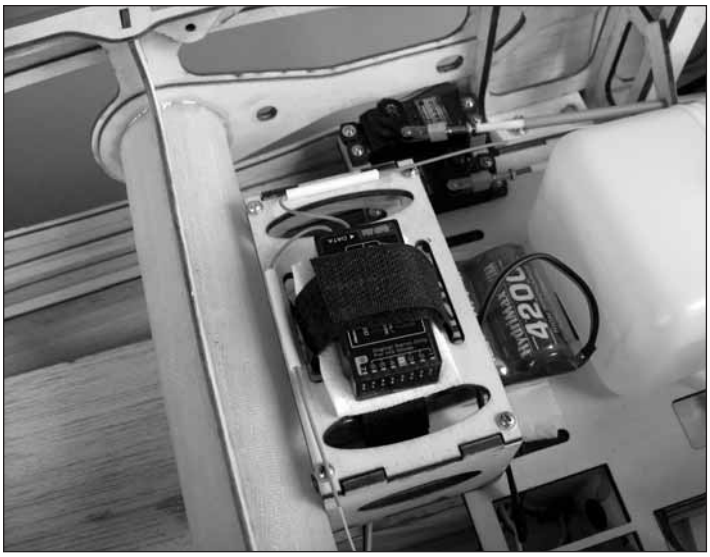


❏ 1. Locate the three plywood parts shown. These will become the servo / battery tray. Glue two 1/4" x 1/4" x 5/8" [6mm x 6mm x 15mm] hardwood blocks to both of the plywood parts as shown. The blocks should be installed even with the corners of the part.

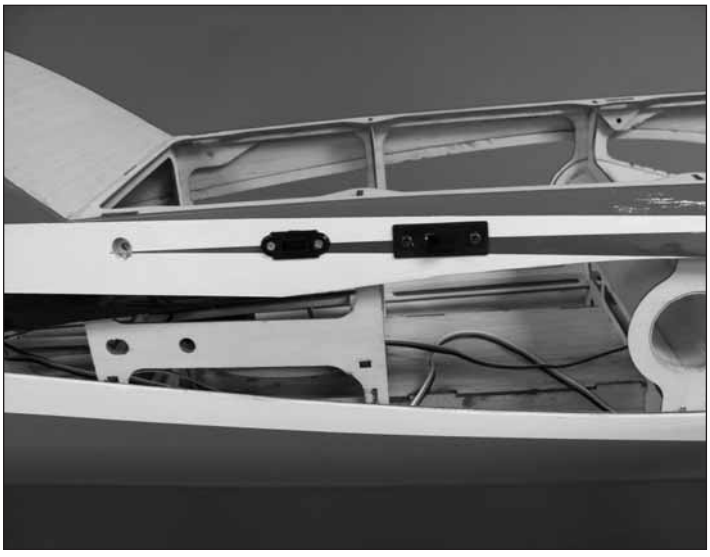


❏ 2. Glue the two side pieces into the slots in the tray inside of the fuselage. Once the glue has hardened, place the remaining

part on top of them as shown. Drill a 1/16" [1.6mm] hole through the holes in each corner of the top piece and into each of the blocks. Insert and then remove a #2 x 3/8" [9.5mm] screw into each of the holes. Apply a couple of drops of thin CA glue into the holes to harden the threads. After the glue has cured secure the top of the tray with four #2 x 3/8" [9.5mm] screws and #2 flat washers.



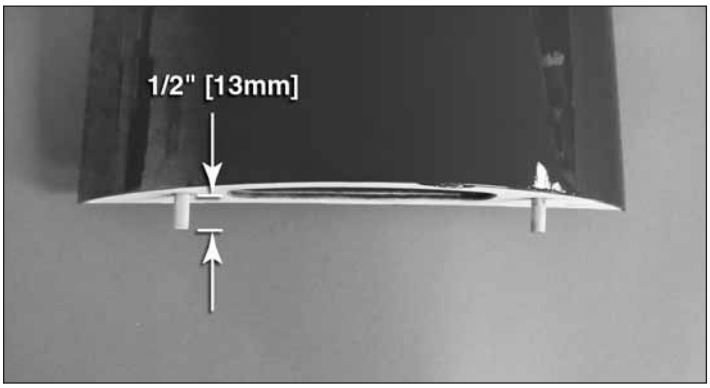
❏ 3. Cut the Velcro straps included with the kit to the proper length to secure your battery and receiver. Install both the battery and the receiver onto foam and secure them with the Velcro. For our installation we installed the battery under the tray and installed the receiver on top. However, you may install the components in either location.



❏ 4. Install the radio switch harness and charge jack into the side of the fuselage. Be sure to leave at least 8" between the radio switch and any of the components of the engine and the ignition system, including the ignition switch.

5. Make all of the servo connections with the receiver. Secure the battery connection to the switch lead with tape, heat shrink tubing or some other method for securing the wires.

INSTALL THE CANOPY, PILOT AND INSTRUMENT PANEL

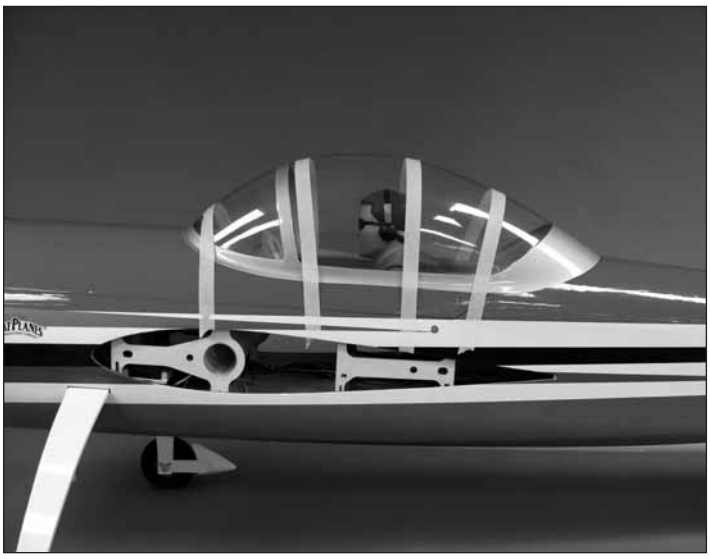


❏ 1. Glue the two 1/4"x 3/4" [6mm x 19mm] dowels into the front of the fuselage hatch. The dowels should extend from the front of the hatch 1/2" [13mm].

❏ 2. Cut the instrument panel decal and then put it place in the front of the cockpit.

❏ 3. If you will be installing a pilot, install it securely in the cockpit.

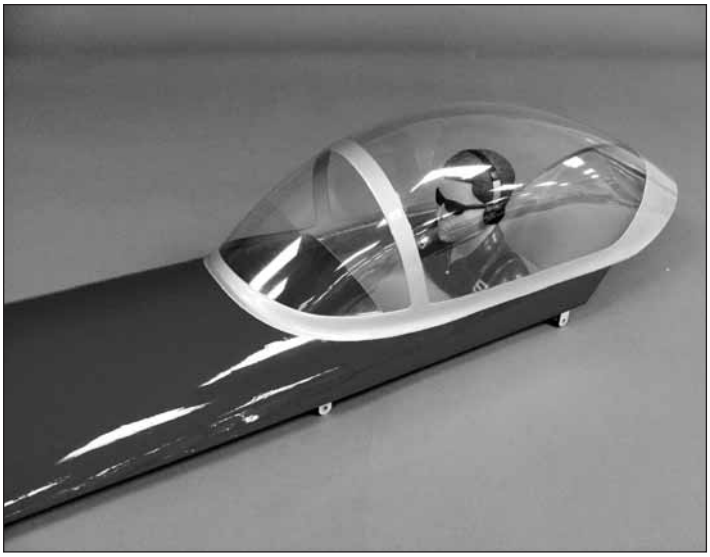
❏ 4. Attach the canopy hatch to the top of the fuselage with four 4-40 x 3/4" [19mm] screws, #4 lock washers and #4 flat washers. Test fit the canopy to the top of the fuselage to determine the mounting position.



❏ 5. Determine the position of the canopy and make a couple of reference marks on the fuselage so that you can easily locate the canopy position. Remove the canopy and apply a bead of RC 56 glue to the inside of the canopy. Note that the canopy rests on both the canopy hatch and the fuselage. **You only want the glue to be applied to the canopy where it will be in contact with the canopy hatch.** Tape the canopy to the canopy hatch. Be sure the tape is only applied to the hatch and not the fuselage below the hatch.

❏ 6. Remove the screws holding the canopy hatch in place and remove the hatch from the fuselage being careful not to disturb the canopy.

❏ 7. Clean any excess glue that may have gotten on the fuselage or the back portion of the canopy with a damp cloth. When you have removed the excess glue, reinstall the canopy onto the fuselage. **IMPORTANT!** *Be sure that you reinstall all four of the screws that secure the canopy hatch. The hatch must be tight to the fuselage while the glue dries.* If needed, add additional tape to secure the canopy. Allow the glue to dry at least 12 hours.



❏ 8. Remove the canopy hatch from the fuselage. Mix a small amount of epoxy and micro balloons and make a small fillet of the glue on the back, underside of the canopy.

APPLY 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. Submerse 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.

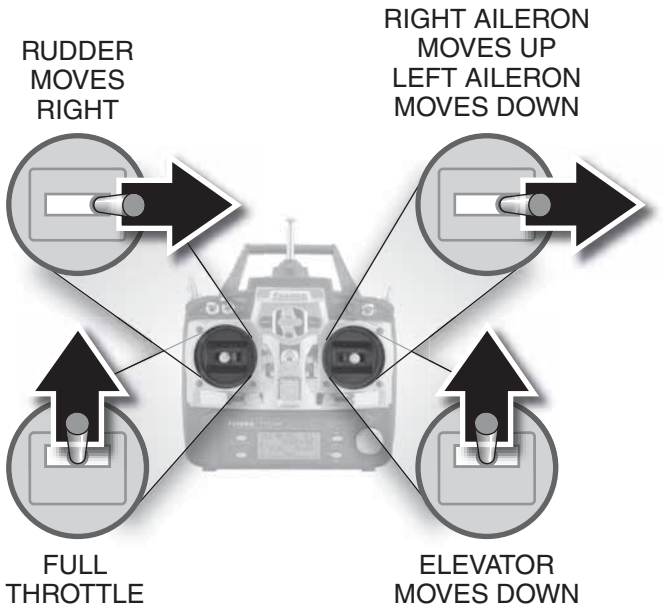
GET THE MODEL READY TO FLY

Check the Control Directions

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

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

4-CHANNEL RADIO SETUP (STANDARD MODE 2)



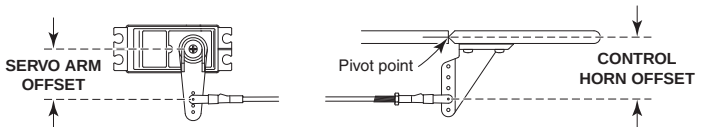
❏ 3. Make certain that the control surfaces and the carburetor respond in the correct direction as shown in the diagram. If any of the controls respond in the wrong direction, use the servo reversing in the transmitter to reverse the servos connected to those controls. Be certain the control surfaces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

Set the Control Throws

To ensure a successful first flight, set up your Yak-55M according to the control throws specified in this manual. The throws have been determined through actual flight testing and accurate record-keeping, allowing the model to perform in the manner in which it was intended. If, after you have become accustomed to the way the Yak-55M flies, you would like to change the throws to suit your taste, that is fine. However, too much control throw could make the model too responsive and difficult to control, so remember, "more is not always better."

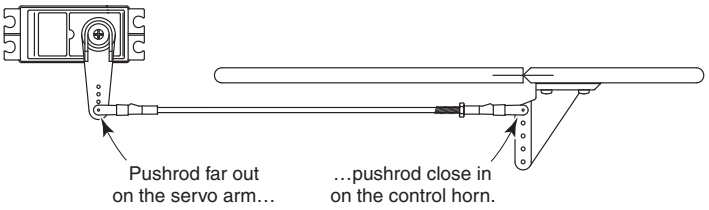
Proper Pushrod Hookup

AVOIDING FLUTTER, MAXIMIZING SERVO OUTPUT TORQUE



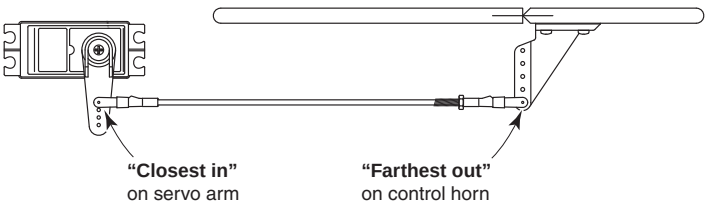
When connecting pushrods and setting up your control throws, it is **critically important** to use proper pushrod geometry—that is the distance from the pushrod on the servo arm to the center of the output shaft (**servo arm offset**) compared to the distance from the pushrod on the control horn to the pivot point (**control horn offset**).

EXTREMELY DANGEROUS PUSHROD HOOKUP



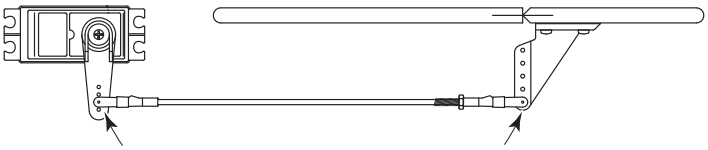
One particularly dangerous situation arises when the pushrod on the servo arm is too "far out" and the pushrod on the control horn is too "close in." This setup is usually chosen by pilots who are trying to achieve maximum, "monster" control throws for 3D flight. But with your pushrods set up this way, any free play (slop) in the linkages or servo will be greatly magnified, possibly causing destructive control surface flutter. Additionally, if you have to turn your ATVs way down for "normal" throw, the result will be poor resolution and poor servo holding/centering capabilities. More importantly, too much force may be transmitted back to the servo, possibly causing control surface blowback, stripped servo gears or stripped servo arms—the latter two likely causing a crash.

PREFERRED PUSHROD HOOKUP



Here is an optimum pushrod setup—the pushrod is "close in" on the servo arm and "far out" on the control horn. This situation gives the greatest mechanical advantage of the servo over the control surface, which will increase the servo's centering capabilities and output torque, minimize any free play in the system and allow high ATV settings for optimum servo resolution and positive control "feel." **Note:** When the pushrod is "close in" on the servo arm, make certain the servo arm can travel through its full range of movement without the pushrod (or clevis or other type of connector) interfering with the servo arm, output shaft or servo case.

ACCEPTABLE PUSHROD HOOKUP



Move the pushrod farther out on the servo arm…

…But leave the pushrod in the farthest out location on the control horn.

If the optimum situation doesn't provide enough control throw, the pushrod may be moved inward on the control horn, but it's better to go **farther out** on the servo arm because this will introduce less free play than the alternative. Only after moving the pushrod all the way out on the servo arm, if you still can't get the throw required, you'll have to resort to moving the pushrod closer in on the control horn. **Note:** If you have a computer radio, it is always desirable to set your ATVs to 100% (or as near 100% as possible to achieve the control throw required). If setting up a model that requires extraordinary control surface throw (for 3D flying for example), start by "maxing-out" your ATVs (typically 130% -- 140%). Then, the dual rates in your "normal" flight mode will still be acceptably high (70% -- 80%) for good servo resolution.

❏ 4. Referring to the **Proper Pushrod Hookup** illustrations above, adjust the location of the pushrod on the servo arm or on the elevator horn and program the ATVs in your transmitter to increase or decrease the throw according to the measurements in the control throws chart.

❏ 5. Measure and set the **low rate** elevator throws and the high and low rate throws for the rest of the control surfaces the same way.

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

These are the recommended control surface throws:			
	LOW RATE	HIGH RATE	3D RATE
ELEVATOR	Up & Down 3/4" [19mm] 7°	Up & Down 1-1/4" [32mm] 12°	Up & Down 4" [104mm] 42°
RUDDER	Right & Left 4" [102mm] 20°	Right & Left 6" [152mm] 42°	Right & Left 8" [203mm] 63°
AILERONS	Up & Down 3/4" [19mm] 8°	Up & Down 1-3/4" [44mm] 19°	Up & Down 2-1/2" [64mm] 27°

Balance the Model (C.G.)

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

At this stage the model should be in ready-to-fly condition with **all** of the components in place including the complete radio system, engine, muffler, propeller, spinner and pilot. The fuel tank should be empty.

❏ 1. Use a fine-point felt tip pen to mark lines on the top of wing on both sides of the fuselage 6.5" [165mm] back from the leading edge. Apply narrow (1/16" [2mm]) strips of tape over the lines so you will be able to feel them when lifting the model with your fingers.

This is where your model should balance for the first flights. Later, you may experiment by shifting the C.G. 1/2" [13mm] forward or 1/2" [13mm] back to change the flying characteristics. Moving the C.G. forward will improve the smoothness and stability, but the model will then be less aerobatic (which may be fine for less-experienced pilots). Moving the C.G. aft makes the model more maneuverable and aerobatic for experienced pilots. 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 and lift it upside-down at the balance point you marked.

❏ 3. If the tail drops, the model is "tail heavy." If possible, move the battery pack and/or receiver forward to get the model to balance. If the nose drops, the model is "nose heavy." If possible, move the battery pack and/or receiver aft. If needed, use Great Planes "stick-on" lead (GPMQ4485). To find out how much weight is required, place incrementally increasing amounts of weight on the fuselage over the location where it would be mounted inside until the model balances. A good place to add stick-on nose weight is to the firewall. Do not attach weight to the cowl—this will cause the mounting screws to open up the holes in the cowl. 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: If mounting weight where it may be exposed to fuel or exhaust, do not rely upon the adhesive on the back to permanently hold it in place. Over time, fuel and exhaust residue may soften the adhesive and cause the weight to fall off. Instead, permanently attach the weight with glue or screws.

❏ 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

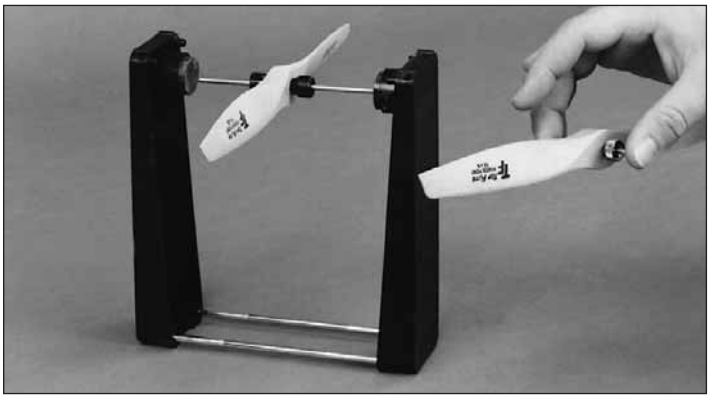
No matter if you fly at an AMA sanctioned R/C club site or if you fly somewhere on your own, you should always have your name, address, telephone number and AMA number on or inside your model. It is **required** at all AMA R/C club flying sites and AMA sanctioned flying events. Fill out the identification tag on page 32 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 and Range Check

Run the engine for a few minutes to make sure it idles reliably, transitions smoothly and maintains full power indefinitely. Afterward, shut the engine off and inspect the model closely, making sure all fasteners, pushrods and connections have remained tight and the hinges are secure. Always ground check the operational range of your radio before the first flight of the day following the manufacturer's instructions that came with your radio. This should be done once with the engine off and once with the engine running at various speeds. 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.

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 (that's why it's called a *check list!*).

❏ 1. Fuelproof all areas exposed to fuel or exhaust residue such as the cowl ring, 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 threadlocking compound to secure critical fasteners such as the set screws that hold the wheel axles to the struts, screws that hold the carburetor arm (if applicable), screw-lock pushrod connectors, etc.

❏ 7. Add a drop of oil to the axles so the wheels will turn freely.

❏ 8. Make sure all hinges are **securely** glued in place.

❏ 9. Reinforce holes for wood screws with thin CA where appropriate (servo mounting screws, cowl mounting screws, etc.).

❏ 10. Confirm that all controls operate in the correct direction and the throws are set up according to the manual.

❏ 11. 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.

❏ 12. 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.

❏ 13. Make sure any servo extension cords you may have used do not interfere with other systems (servo arms, pushrods, etc.).

❏ 14. Secure the pressure tap (if used) to the muffler with high temp RTV silicone, thread locking compound or J.B. Weld.

❏ 15. Make sure the fuel lines are connected and are not kinked.

❏ 16. Balance your propeller (and spare propellers).

❏ 17. Tighten the propeller nut and spinner.

❏ 18. Place your name, address, AMA number and telephone number on or inside your model.

❏ 19. Cycle your receiver battery pack (if necessary) and make sure it is fully charged.

❏ 20. If you wish to photograph your model, do so before your first flight.

❏ 21. Range check your radio when you get to the flying field.

FLYING

The Yak-55M is a great-flying model that flies smoothly and predictably. The Yak-55M 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 Yak-55M 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 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