

AEROWORKS

50cc YAK-54 ARF-QB (Quick Build)

ASSEMBLY MANUAL



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Thank you for choosing the Aeroworks YAK-54 ARF-QB. We put great effort into making this plane the best model you will ever build and fly. We provide you with the highest quality kit and performance possible. We wish you great success in the assembly and flying of your new Aeroworks YAK-54 ARF-QB.

WARNING

An R/C aircraft is not a toy! If misused, it can cause serious bodily harm and property damage. Fly only in open areas, and AMA (Academy of Model Aeronautics) approved flying sites. Follow all instructions included with your plane, radio, and engine.

INTRODUCTION

Your new 50cc YAK-54 ARF-QB is a highly aerobatic airplane. It is capable of both precision and 3-D maneuvers. The aircraft builds easily, quickly, and precisely due to its state of the art CAD design, LASER cut technology, and outstanding hardware included. We hope you enjoy building and flying your YAK-54 ARF-QB.

Great care has been taken in both the design and manufacturing of the 50cc YAK-54 ARF-QB to allow for the strongest and lightest construction possible. Only the highest quality materials from the covering, paint, wood and hardware have been used in the construction of this model.

The 50cc YAK-54 ARF-QB has been individually hand built, covered and painted by trained and experienced craftsmen with over 25 years of manufacturing experience. Using CAD design, laser cut technology and jig-built assures accuracy in all stages of production.

The 50cc YAK-54 ARF-QB is designed for gas engines in the 50cc category. A DA-50 two stroke is shown in the assembly instructions. The aircraft was tested with the DA-50 and has outstanding performance. The final choice of engine is left up to the builder. A computer radio is recommended to allow the pilot to take advantage of the full capabilities of this aerobatic aircraft.

IMPORTANT Please read through this manual carefully, before starting the assembly of your new 50cc YAK-54 ARF-QB. Inventory and inspect all parts and hardware for any imperfections or damage. Please notify **AEROWORKS** immediately if there are missing or damaged parts.

INTENDED USE

This plane should not be regarded as a toy. This is an aerobatic plane and is recommended for pilots who are beyond the trainer-stage and are comfortable with flying an aerobatic sport plane.

WARRANTY

It is important to notify Aeroworks of any damage or problems with the model within 30 days of receipt to be covered under warranty. If you wish to return this aircraft for any reason a 15% restock fee will be charged to the customer. In addition the customer is responsible for all return shipping cost and all prior shipping cost will not be refunded. Parts will be exchanged or replaced once the original item is returned at the owner's expense. If you have any problems, please contact Aeroworks.

Aeroworks cannot insure the skill of the modeler and can not influence the builder during the construction or use of this aircraft, therefore, will not be accountable for any property damage, bodily injury or death caused by this aircraft.

The purchaser/operator accepts all responsibility of any and all structural or mechanical failures.

KIT CONTENTS



MATERIALS LIST FOR 50cc YAK54

Basic Aircraft Parts:

Fuselage with vertical fin – covered, firewall fuel-proofed:

- (4) M4 blind nuts installed for main landing gear
- (2) M3 blind nuts installed for hatch cover of the landing gear
- (4) M3 blind nuts installed for the mounting of the stab.
- (4) M3 blind nuts installed for the mounting of cowl-ing.
- Hatch cover for the landing gear installed by (2) M3x10mm hex style bolts and (2) flat washers.
- Canopy base—painted with (4)M3 blind nuts in-stalled

- (1) Tinted Canopy—glued on the canopy base and painted, installed on the fuselage by (4) M3x10mm hex style bolts
- (4) 3mm flat washer for the mounting of the canopy
- (4) #6 bonded washer for the mounting of the canopy
- (1) Antenna Tube installed

Left Wing with Aileron – covered:

- M4 blind nuts installed for the wing mounting.
- (2) located pins installed
- (6) pin point hinges glued
- (1) Aileron servo string installed

Right Wing with Aileron – covered:

- M4 blind nuts installed for the wing mounting.
- (2) located pins glued
- (6) pin point hinges installed
- (1) Aileron servo string installed

Horizontal Stabilizer with elevator assembly

(8) pin point hinges (glued)---covered

Rudder with (5) pin point hinges (not glued) – covered

SUB ASSEMBLIES:

#1:

- (1) Fiberglass Cowling—painted with (4) screws holes
- (4) M3x12mm hex style bolts for mounting cowling
- (4) 3mm flat washers for mounting cowling
- (4) #6 bonded washers for mounting cowling.

#2:

- (1) 5mm 7075 Aluminum Main Landing Gear -- painted
- (2) 5mm AL Axle Bolts
- (2) M8 lock nuts
- (4) 5mm i.d. Wheel Collars with set-screws
- (2) 80mm Dia. Main Wheels (Lite Type)
- (4) M3x12mm hex style bolts for mounting wheel pants
- (4) 3mm flat washer for mounting wheel pants
- (4) 3mm split ring lock washer for mounting wheel pants
- (4) M4x25mm hex head bolts for mounting main landing gear
- (4) flat washers for mounting main landing gear
- (4) split ring lock washers for mounting main landing gear.

#3:

- (2) Wheel Pants—1 Left and 1 Right---Painted
- (4) M3 blind nuts installed on the wheel pants, 2 per side.

#4:

- (1) AL Tail Wheel Assembly – Medium

#5:

- (1) 32mm o.d. Aluminum Tube for wing joint—Anodized
- (2) 12.5mm o.d. Aluminum Tube for stab joint – one front and one rear, Anodized.
- (4) M4x25mm Hex head bolts for wing mounting
- (4) 4mm flat washers for wing mounting
- (4) 4mm split ring lock washer for wing mounting
- (4) M3x12mm Hex head bolts for stab mounting
- (4) 3mm flat washer and (4) 3mm split ring lock washer for stab mounting
- (4) #6 bonded washers

#6:

- (2) 4-40 2-1/2" two end threaded pushrod with nuts for elevator
- (2) 4-40 3" two end threaded pushrod with nuts for ailerons.
- (1) 1.8x300mm Threaded pushrod with metal clevis for throttle.

#7:

- (2) 1x1100mm plastic coated pull-pull steel cable.
- (4) 4-40 Metal R/C links with metal clevises and nuts
- (4) 3.5x5mm brass pull-pull swaging tubes
- (6) AL double control horns
- (24) T2.6x16mm Phillips head mounting screws
- (12) T2.6X12mm Phillips head mounting screws.

#8:

- 650cc Gas Fuel Tank assembly
- Additional brass tubes
- 3' large gas fuel line

#9:

- (2) Throttle servo plates
- (2) Engine mounting template (DA50 and 3W50)
- (1) Plywood support for the pull-pull of the Rudder
- (1) 130x70x6mm foam for the Fuel tank.
- (2) 300x80x6mm foam for the receiver and battery
- (1) 100x30x6mm silicon plate for the muffler mounting
- (8) Nylon Ties for the fuel tank mounting
- (1) 5mm i.d. x260mm silicon tube
- (1) 610x20mm Velcro
- (1) Pipe mount (fuel-proofed)
- (2) Pipe mounting hardware with M3 blind nuts
- (2) M3x20mm Hex head bolts
- (2) 3mm flat washers
- (2) 3mm split ring lock washers.
- (1) Balsa former to close off tunnel—painted and fuel-proofed

#10:

- (24) 6mm aluminum engine stand offs.

ITEMS NEEDED TO COMPLETE

Hardware:



- 50 CC Gas engine and ignition
- Muffler or header with canister or pipe
- Mounting bolts, lock nuts, and washers.
- 3 1/2" Spinner and propeller
- 2 x aileron servos (min 130 in./oz. torque)
- 1 x rudder servo (min 130 in./oz. torque)
- 2 x elevator servos (min 130 in./oz. torque)
- 1 x throttle servo (fast / Reliable)
- Servo extensions 2 x 6," 3 x 12," 2 x 18" 2 x 36"
- 1 8 channel receiver (PCM recommended)
- 1 x receiver battery (min 4.8 volt / 1700ma)
- 1 x ignition battery (min 4.8 volt / 1700ma)
- 2 x switches/charge jacks

Tools:



- Allen wrenches US and Metric.
- Dremel cutting disc and sanding drum tool
- Electric drill and selection of bits
- Razor saw
- Flat head screwdriver
- Hobby heat gun
- Hobby iron
- Masking tape
- Modeling knife
- Needle nose pliers or crimping tool
- Paper towels
- Pen, pencil or felt tipped marker
- Phillips screwdriver
- Rubbing alcohol
- Ruler and tape measure
- Scissors
- T pins
- Waxed paper

Adhesives:



- 15-30 Minute epoxy
- Blue Loctite
- Epoxy mixing cups, sticks, brushes
- CA kicker (optional)
- Thick, thin and medium CA
- Rubbing alcohol
- Wipes

TIGHTENING AND RE-SHRINKING THE COVERING

1. Open your kit slowly and take care not to damage any parts of the kit. Remove all parts from their plastic protective covers for inspection. Before doing any assembly or installation of any decals it is very important to re-shrink or re-tighten the already applied covering. Due to the shipping process, heat and humidity changes from different climates, the covering may become loose and wrinkle in the sun. If you take the time to re-tighten the covering, you will be rewarded with a long lasting beautifully covered model.



2. Using your covering iron with a soft sock, gently apply pressure and rub in the covering. If any bubbles occur, your iron may be too hot. Reduce heat and work slowly.



3. If bubbles persist, use a small pin to punch holes in the bubble to relieve trapped air and reheat.



4. Use your heat gun with extreme caution. Take care not to apply too much heat to one area for long periods of time. This may cause the trim colors to over shrink and pull away leaving unsightly gaps on the color lines. The trim stripes are especially vulnerable to over shrinking.



5. Your model is covered with Ultracote covering. In case of repairs, the colors are:
Midnight Blue #885
Dark Yellow #889
True Red #866
White #870

Tightening and re-shrinking the covering is now complete.

WING ASSEMBLY

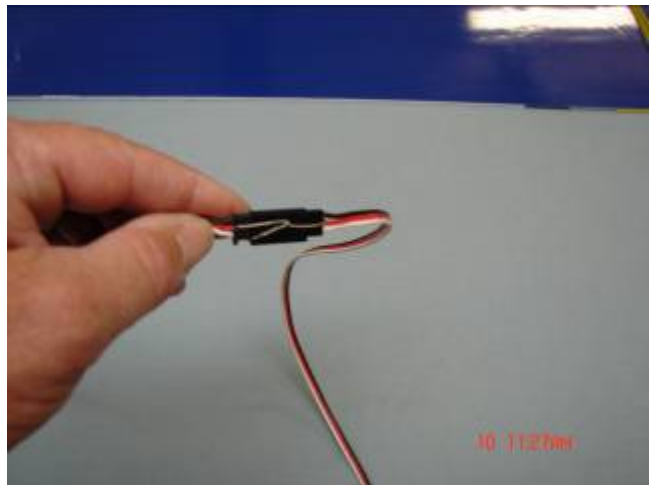
1. The ailerons have been pre-hinged and glued to the wing panels and are ready for flight. No other steps are necessary for hinging. Gather one wing panel, one aileron servo, and one 18" servo extension as shown below for servo installation.



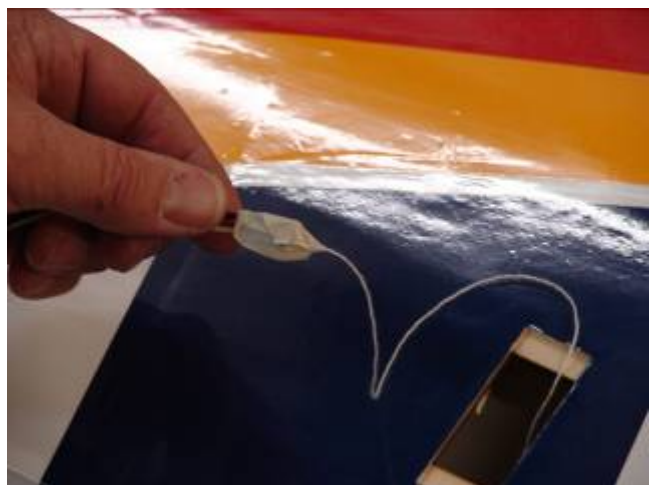
2. Layout the servo and extension on the wing to test fit the installation and ensure servo extension is the correct length.



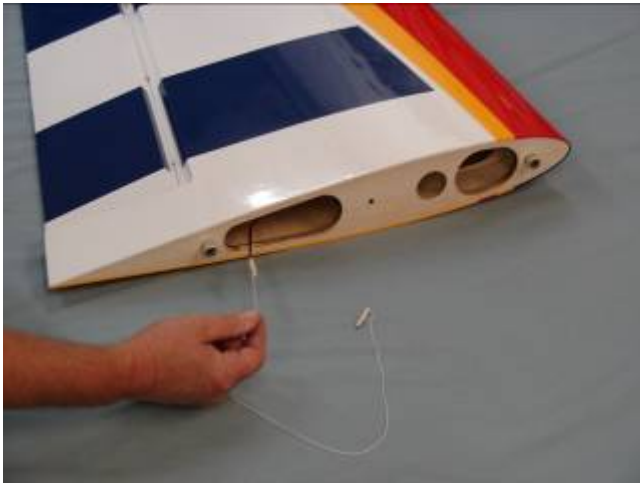
3. Attach the 18" extension to the servo lead and secure with safety wire, string, tape, or other method. Ensure the plugs will not come apart from vibration or light tension.



4. Fasten the pull string from the servo hole to the male plug of the servo extension. Secure with tape so that the strings pulls from the front end of the plug. Taper the tape to avoid hang-ups inside the wing.



5. Draw the 18" servo extension through the wing and pull through the wing root rib.



6. Install servo in servo well with the output arm toward the leading edge of the wing and mark locations of servo mounting holes.



7. Remove servo and use a 1/16 bit to drill servo mounting holes.



8. Install servo with servo mounting screws.



9. Aileron servo mounted in bottom of wing.



Aileron Control Linkage Installation

1. Gather the aileron control linkage parts as shown below. There is 1 pushrod, 2 ball link assemblies, 1 left and 1 right side control horn, and 6 wood screws for each wing panel.



2. Assemble the pushrod and control horn assembly as shown. The ball link goes between the left and right sides of the control horn sides and is secured with a nylon lock nut. Start with the center hole in the control horn. The ball link may be moved up or down for more or less control throw.



3. Use a ruler against the outboard side of the servo case to project a line to the leading edge of the aileron and mark as shown.



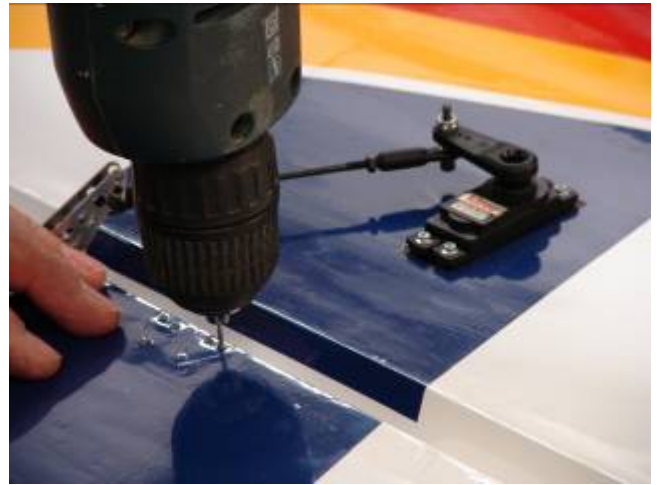
3. From that mark measure 1/2" toward the wing tip and mark the leading edge of the aileron as shown. This mark will be the center of the aileron control horn.



4. Tape the inboard trailing edge of the aileron to the trailing edge of the wing in the neutral position. Plug the servo into the receiver and turn on. Ensure the servo is centered and the servo arm is parallel to the aileron hinge line. Attach front ball link to servo arm. Adjust the length of the pushrod so that the leading edge of the control horn is aligned with the leading edge of the aileron. Center the control horn over the mark as shown and mark the position of the control horn mounting holes.



5. Use a 1/16" bit to drill the control horn mounting holes.



6. Mount the control horn using six wood screws as shown.



7. Ensure the servo does not bind at either end point at full deflection. A 1" servo arm is recommended for best results. A 1 1/4" servo arm is required for full deflection of the aileron 55° bevel.



8. Repeat all the above steps for the other wing.



STAB AND ELEVATOR ASSEMBLY

Elevator Servo Installation

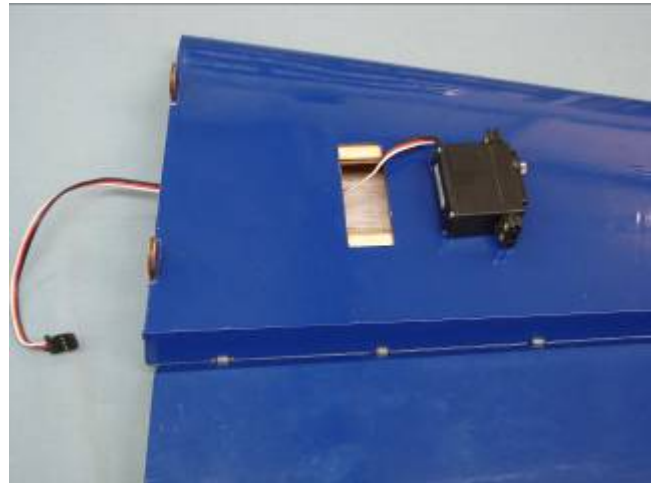
1. The elevators have been pre-hinged and glued to the stabs and are ready for flight. No other steps are necessary for hinging. Gather the stabs and elevators, two elevator servos, and two 36" servo extensions as shown below.



2. Gather the elevator control linkage parts as shown below. There are 2 pushrods, 4 ball link assemblies, 4 metal threaded RC links, 2 left and 2 right side control horns, and 12 wood screws for each stab and elevator.



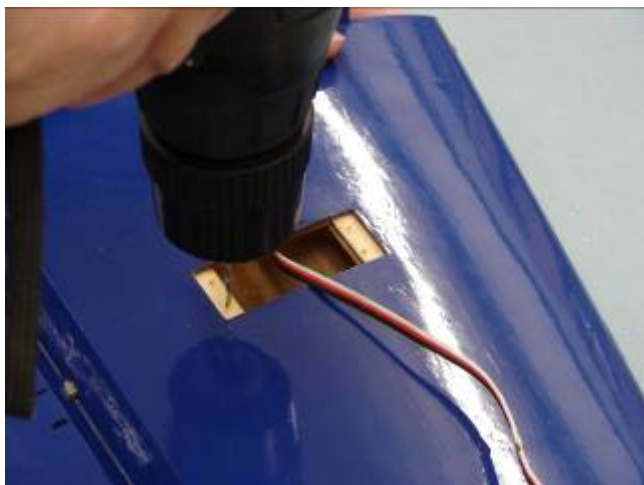
3. Feed the servo wire through the pre-cut elevator servo well and out the root rib of the stab as shown.



4. Install servo in servo well with the output arm toward the leading edge of the stab and mark locations of servo mounting holes.



5. Remove servo and use a 1/16 bit to drill servo mounting holes.



6. Install servo with servo mounting screws.



Elevator Control Linkage Installation

1. Assemble two pushrod and control horn assemblies as shown. The ball link goes between the left and right sides of the control horn sides and is secured with a nylon lock nut.



2. Use a ruler against the outboard side of the servo case to project the line to the leading edge of the elevator and mark as shown.



3. From this mark measure 1/2" toward the stab tip and mark the leading edge of the elevator as shown. This mark will be the center of the elevator control horn.



4. Tape leading edge of the elevator balance tab to the leading edge of the stab in the neutral position. Plug the servo into the receiver and turn on. Ensure the servo is centered and the servo arm is parallel to the elevator hinge line. Attach front ball link to servo arm. Adjust the length of the pushrod so that the leading edge of the control horns are aligned with the bottom leading edge of the elevator. Center the control horn over the mark and mark the



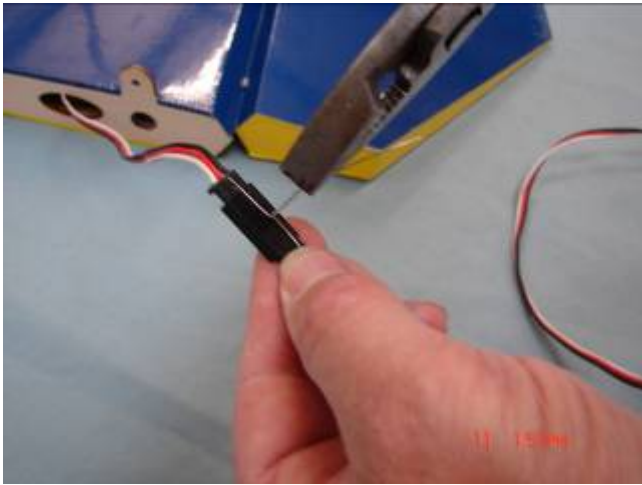
5. Use a 1/16" bit to drill the control horn mounting holes.



6. Mount the control horn using six wood screws as shown. A 1 1/2" servo arm is recommended to achieve full deflection of the elevator bevel.



7. Plug the servo wire into the female end of the 36" extension and secure the servo plugs with safety wire, string, tape, or other method. Ensure the plugs will not come apart from vibration or light tension.



8. Ensure the servo does not bind at center or either end point at full deflection.
9. Repeat the above steps for the other stab and elevator.



RUDDER AND TAILWHEEL ASSEMBLY

Rudder Installation

1. Gather the rudder, six hinges and epoxy materials as shown. Use 15-30 minute epoxy to ensure adequate working and cleanup time.



2. Prep all hinges for installation by applying Vaseline petroleum jelly or light oil to the hinge joint. This ensures no epoxy gets into the hinge during assembly.



3. Mix epoxy in mixing cup and use a tapered stick to apply the epoxy inside the pre-drilled holes in the trailing edge of the fin. Apply epoxy to one side of each hinge and insert the hinge completely into the hole. Ensure the hinge axis is vertical and parallel to the trailing edge of the fin before epoxy cures. Wipe away excess epoxy with alcohol wetted wipes.



4. Epoxy the hinges into the fin first and allow epoxy to fully cure.



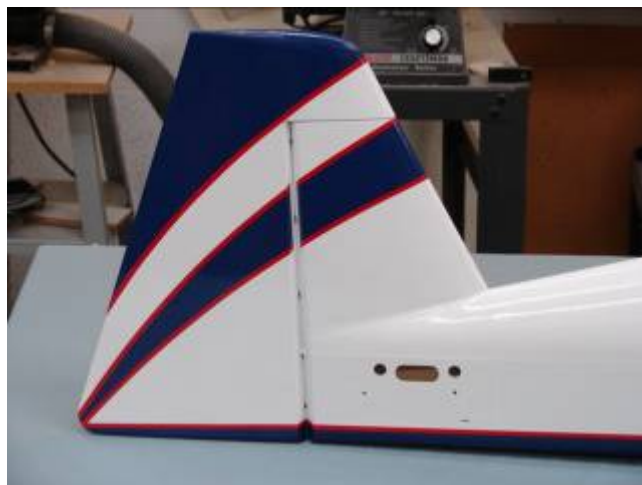
5. Mix epoxy in mixing cup and use a tapered stick to apply the epoxy inside the pre-drilled holes in the leading edge of the rudder. Apply epoxy to trailing edge of each hinge.



6. Carefully slide the rudder onto each hinge and against the trailing edge of the fin. Wipe away excess epoxy with alcohol wetted wipes.

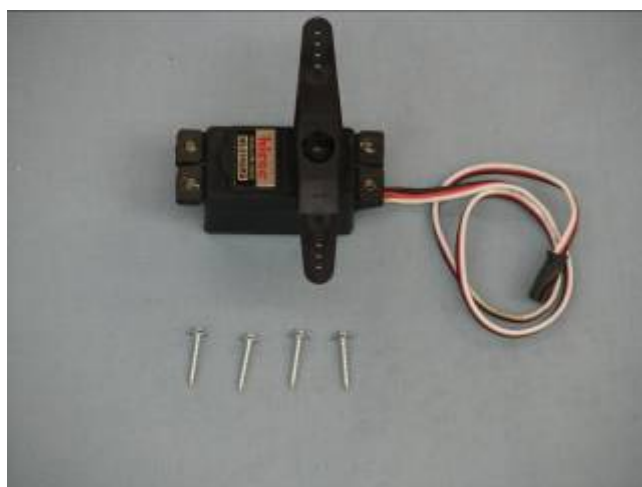


7. Ensure there is no gap between fin and rudder.



Rudder Servos Installation

1. Gather one rudder servo as shown below.



2. Install the rudder servo in the forward servo cutout with the output shaft to the rear.



3. Mark and use a 1/16 bit to drill the rudder servo mounting holes.



4. Install rudder servos with servo screws.



Rudder Pull-Pull Cable Installation

1. Gather the rudder control linkage parts shown below. Rudder cable, 2 ball link assemblies, 4 threaded metal RC links, 4 threaded couplers, 4 brass swaging tubes, 2 left and 2 right side control horns, and 12 wood screws.



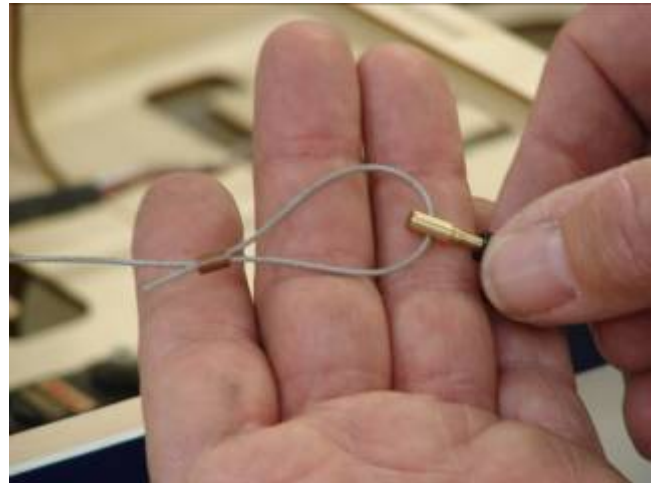
2. Gather the rudder control linkage parts shown below. 2 Rudder cables, 2 threaded metal RC links, 4 threaded couplers, and 4 brass swaging tubes.



3. Feed the rudder cable through the cable exit tube in the tail of the fuse toward the front of the fuse. Repeat on other side.



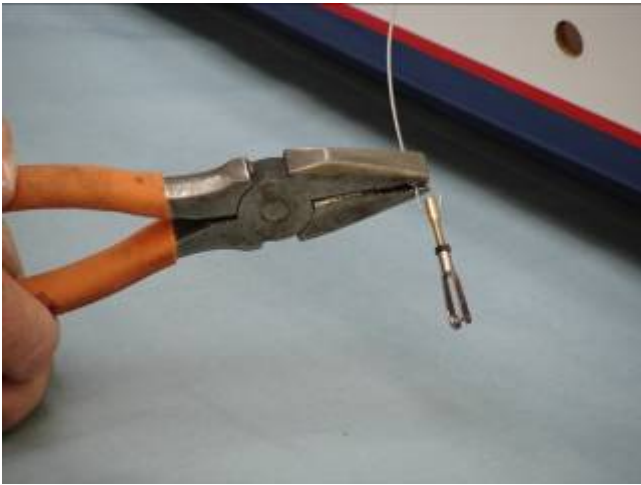
4. Insert rudder cable through the brass swage tube, then through the threaded coupler hole, and back through the brass swage tube as shown.



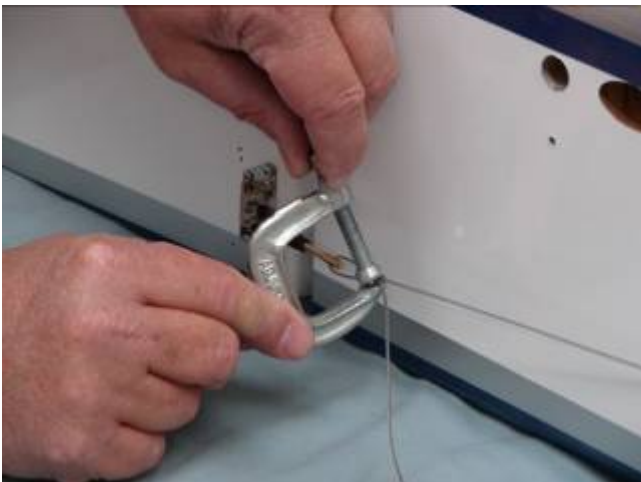
5. Loop the cable back through the brass swage tube as shown.



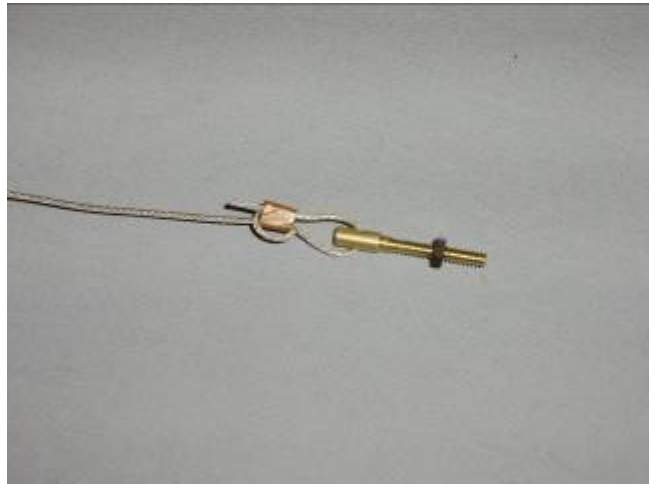
6. Crimp the brass tube with a crimping tool or pliers.



7. If additional crimping is needed a small C-Clamp may be used for additional crimping pressure.



8. Tighten the second loop through the brass swage tube and crimp the brass tube with a crimping tool or pliers. Cut off excess cable as shown.



9. A drop of thin CA may be applied to the swage tube to help secure the cable
10. Repeat above steps for the other side rudder cable.



11. Attach a metal threaded RC link to each threaded coupler. Attach the RC links to the rudder servo arm and then attach the servo arm to the rudder servo as shown. A 2 3/4" to 3" arm is recommended.



Rudder Control Horn Installation

1. Gather the rudder control horn parts as shown below. 2 ball link assemblies and 2 left and 2 right side control horns. Assemble the ball links between the control horns as shown. Secure with nylon lock nut.



2. Measure up from the bottom of the rudder 1 1/4" and place a mark on the rudder leading edge.



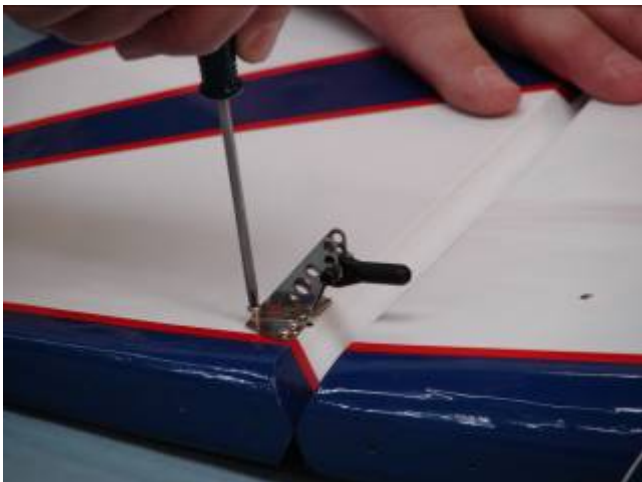
3. Center the rudder control horn over the mark and mark the locations of the control horn mounting holes.



4. Use a 1/16 bit to drill control horn mounting holes.



5. Mount rudder control horns using six wood screws.
6. Repeat the above steps for mounting the other side rudder control horn.



7. Plug the rudder servo into the rudder channel of the receiver and power up. Turn on transmitter to center rudder servo.



8. Tape the rudder balance tab to the top leading edge of the vertical fin in the neutral position as shown. This ensures the rudder is straight when the cables are attached.



9. Remove ball links from the rudder control horns. Attach two threaded couplers to ball links as shown.



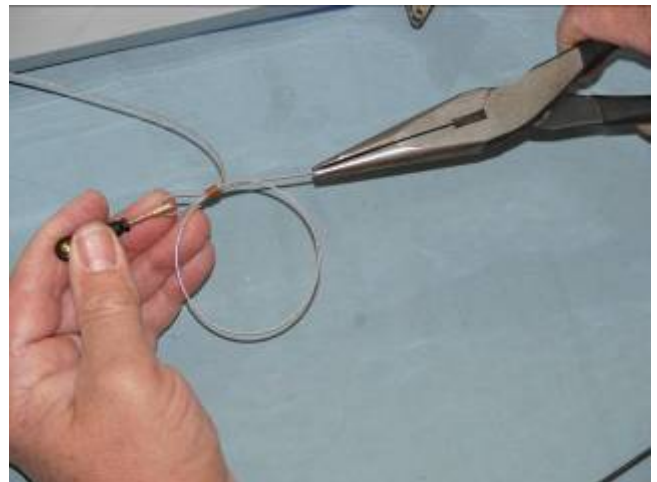
10. Hold the threaded coupler below the cable attach holes to thread into the ball link as shown. Do not hold coupler at the top where the cable hole is located. This may cause burrs on the coupler that can eventually cut the rudder pull cable.



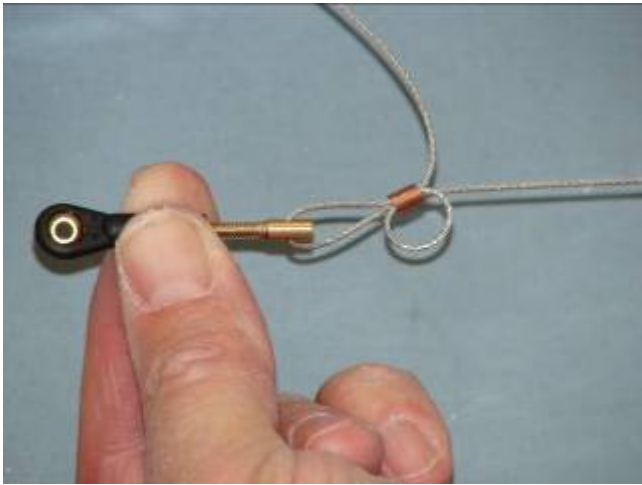
11. Attach ball link to rudder control horn on both sides of the rudder. Thread the rudder cable through a brass swage tube, then the threaded coupler, and back through the brass swage tube on both sides. Pull light tension on the cable through the coupler on both sides as shown. The loop through the coupler should be approximately 1/2" long.



12. Loop the cable back through the brass swage tube as shown.



13. Tighten the second loop through the brass swage tube as shown.



14. Crimp the brass tube with a crimping tool or pliers.



15. A drop of thin CA may be applied to the swage tube to help secure the cable.



16. Hold the threaded coupler below the cable attach holes to thread into the ball link as shown. Do not hold coupler at the top where the cable hole is located. This may cause burrs on the coupler that can eventually cut the rudder pull cable.



17. Attach ball link to rudder control horn on both sides of the rudder.

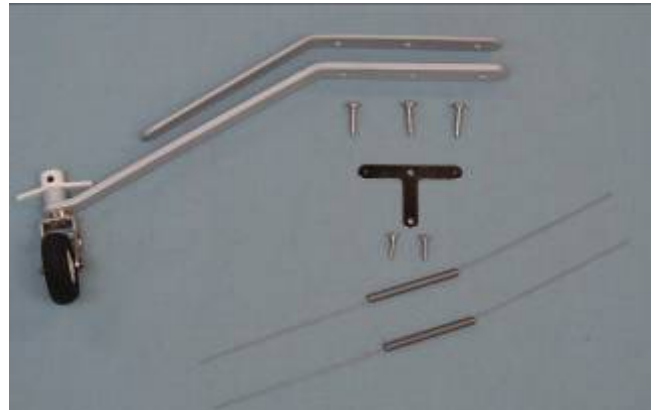


18. Adjust rudder pull-pull cables to desired tension by screwing in or out on the threaded couplers and or ball links. Make all adjustments with the rudder servos still powered up and centered, and the rudder still taped in the neutral position. Ensure the servo does not bind at center or at either end point.



Tail Wheel Installation

1. Gather the tail wheel parts shown below. Tail wheel strut and leaf spring, 3 tail wheel mounting screws, steering tiller, 2 mounting screws, and 2 steering springs.



7. Apply a drop of thick CA to the mounting screws before inserting in the holes.



8. Mount the tail wheel steering tiller using two wood screws.



9. Place the tail wheel spring on top of the tail wheel strut. Position the tail wheel and spring on the bottom of the fuse. Place a drop of thick CA on tail wheel strut mounting screws before inserting in the pre-drilled mounting holes on the bottom rear of the fuse.



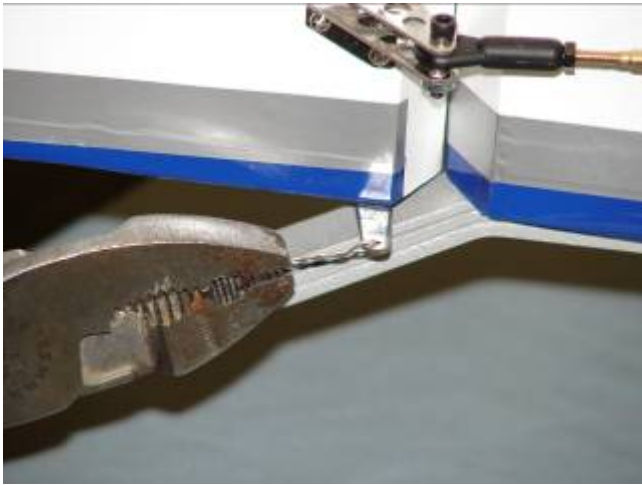
10. Mount the tail wheel struts and springs using three wood screws.



11. Attach the steering springs on both sides of the tail wheel to the rudder tiller and tail wheel tiller. Center the springs between both tillers.



13. Use pliers to twist spring ends closed around the tillers after desired tension and direction adjustments are complete.



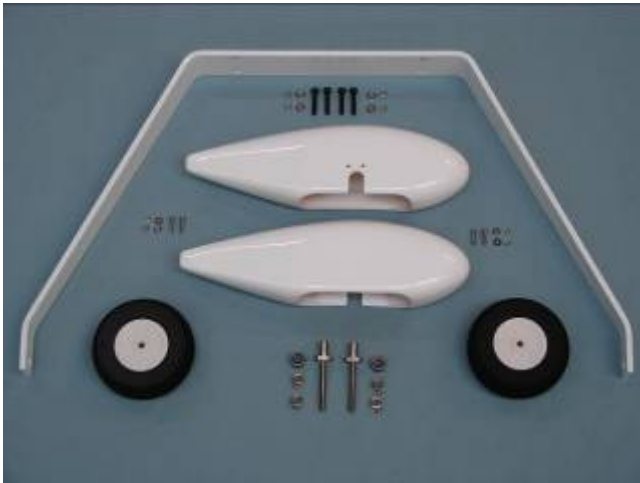
14. Tail wheel final assembly is complete.



MAIN LANDING GEAR ASSEMBLY

Main Landing Gear Installation

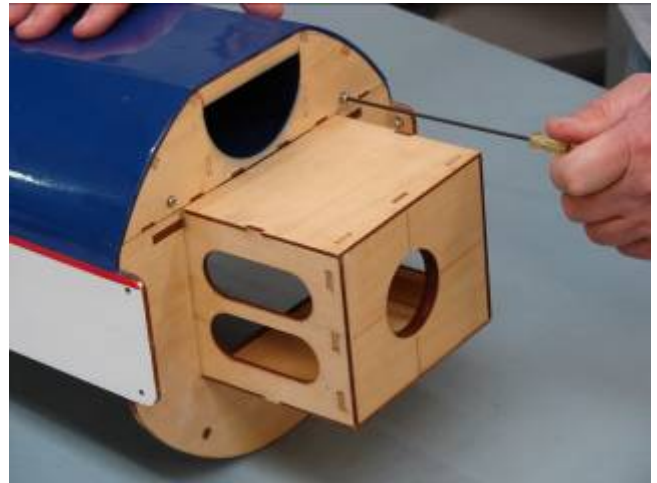
1. Gather the landing gear parts as shown below. Landing gear strut, 4 mounting bolts, washers, and lock washers, 2 wheels, 2 axles, and 4 collars as shown below.



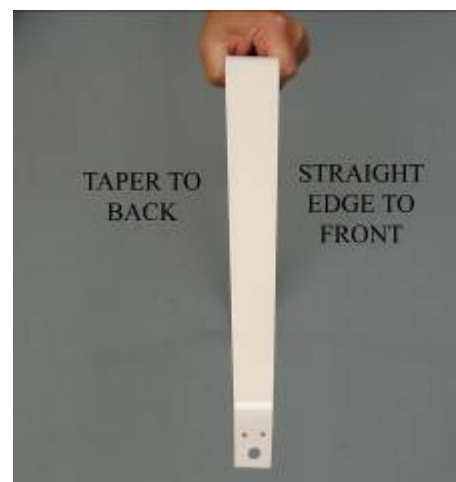
2. Gather the gear strut, 4 mounting bolts, washers, and lock washers, as shown below.



3. Remove landing gear cover from fuse by removing the two screws from the front former.



4. Note that the trailing edge of the landing gear strut is tapered. The tapered edge goes toward the rear of the fuse.



5. Use a drop of blue lock tite on landing gear bolts before attaching the landing gear.



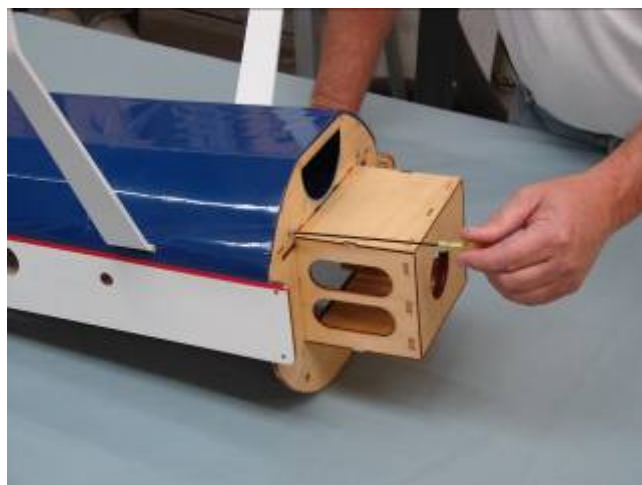
6. Bolt landing gear strut to fuse with 4 bolts and washers. Ensure tapered edge of the gear strut is facing toward the rear.



7. Use a drop of blue lock tite on landing gear cover bolts before attaching the landing gear cover.



8. Reinstall the gear cover.



Wheels and Wheel Pants Installation

1. Gather the wheels, axles, and collars as shown below.



2. Use a drop of blue lock tite on landing gear axle bolt before attaching the landing gear axle with the nylon lock nut.



3. Install the axle into the gear strut with nylon lock nut **but do not tighten**.



4. Snug axle to gear strut with the flat sides vertical. Align axle with wheel pant slot.



5. Slide wheel pant over axle and install the wheel pant mounting bolts to hold the wheel pant in alignment but do not tighten wheel pant bolts.



6. Tighten the axle so it does not rotate during final tightening.



7. Remove the wheel pant and use wrenches to permanently tighten the axle to the gear strut.



8. Install the inner wheel collar next to the axle bolt. Tighten the inner wheel collar in place. Install the wheel and outer wheel collar. Use blue lock tite on the wheel collar set screw before final tightening.



9. Wheel mounted on center of the axle.



10. Slide the lock washer then the flat washer on the wheel pant mounting bolts. Use blue lock tite on the bolts before final tightening.



11. Install wheel pants with two mounting bolts.



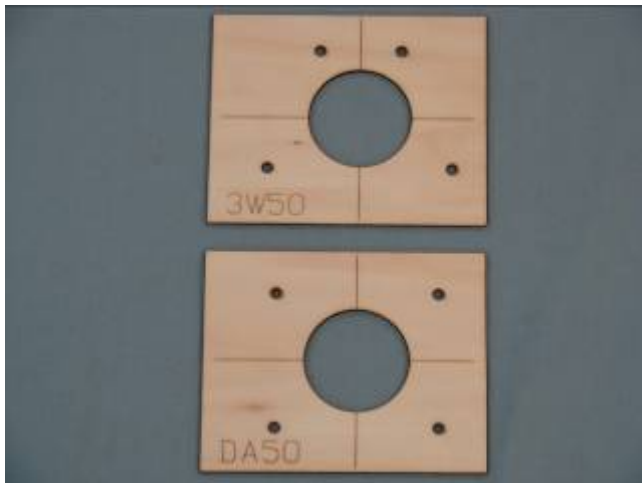
12. Repeat above steps for other wheel and wheel pant.



ENGINE, THROTTLE, MUFFLERS, TANK, AND COWL INSTALLATION

Engine Installation

1. Locate the laser cut engine mounting template for either the DA-50 or 3W-50. If other engines are used the templates may be modified for any mounting pattern.



2. Line up the template with the firewall thrust lines and mark the location of the engine mounting holes.



3. It is recommended to center punch the location of the engine mounting holes prior to drilling.



4. Use a 1/4 drill to drill the engine mounting holes.



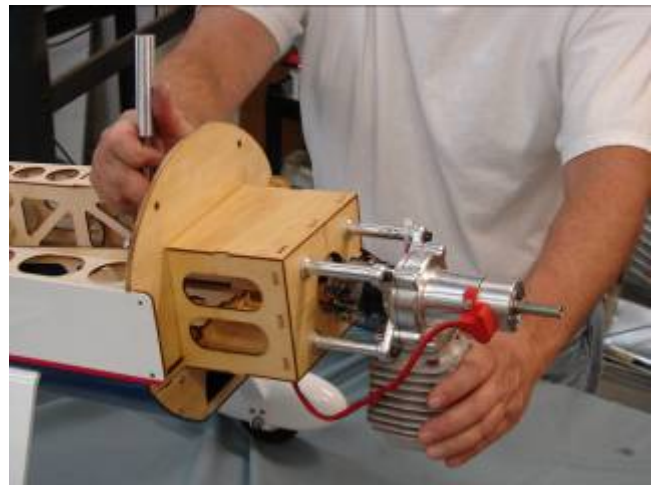
5. Gather the engine and mounting hardware as shown. 4 mounting bolts, 4 washers and 4 2 1/2" stand offs. Stand offs available thru Desert Aircraft



6. Use a drop of blue lock tite on the engine mounting bolts prior to installing.



7. Insert the bolts through flat fender washers, the firewall and into the engine stand offs. Tighten firmly.



8. Be sure to use flat fender washers on the back side of the firewall to distribute bolt pressure.



Throttle Servo and Choke Installation

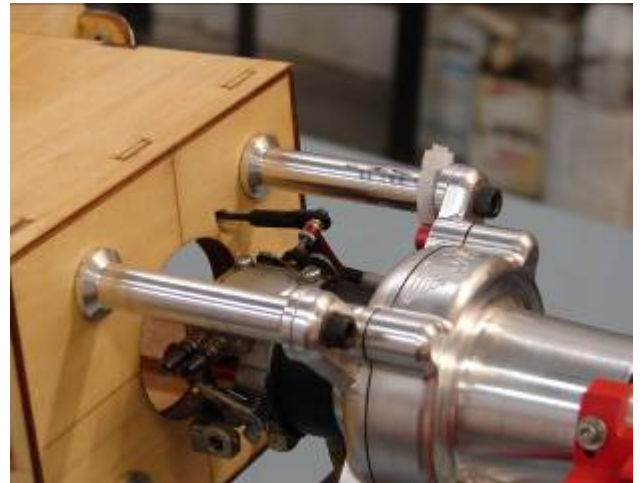
1. Gather the left and right plywood throttle servo mounting trays, the throttle servo, and pushrod parts as shown below. Due to the wide range of engine and throttle hook up choices. Throttle linkage hardware has not been included. The following steps are recommendations.



2. Use a 1/4 bit to drill a pushrod exit hole in the firewall in line with the engine carburetor throttle arm.



3. Attach the 2-56 ball link to the throttle pushrod and secure to the carburetor throttle arm with a 2-56 bolt and nylon lock nut.



4. The throttle servo is mounted on the side of the fuse that aligns with the engine carburetor throttle arm. Insert the throttle servo into the appropriate throttle servo mounting tray with the output arm forward. Insert the throttle pushrod into the servo arm easy link and dry fit inside the fuse. Align the servo tray so there is no binding on the throttle pushrod.



5. Mark the location of the servo mounting tray on the fuse side.



6. Prepare to epoxy the servo mounting tray to the fuse side. Apply epoxy to the back of the servo mounting tray.



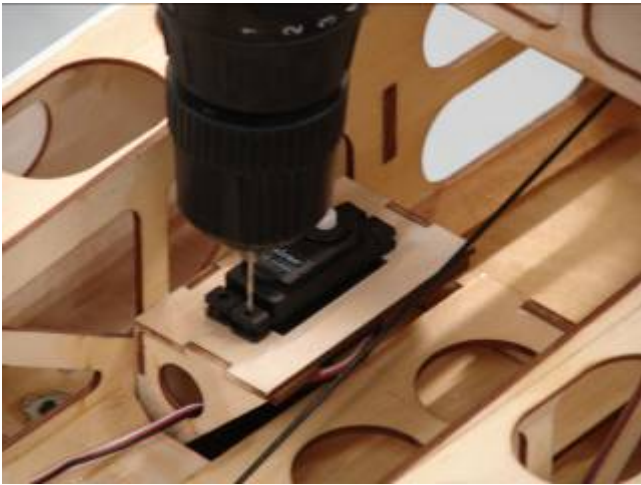
7. Install the servo mounting tray to the fuse side aligned with the marks. Keep the pushrod away while allowing the epoxy to cure.



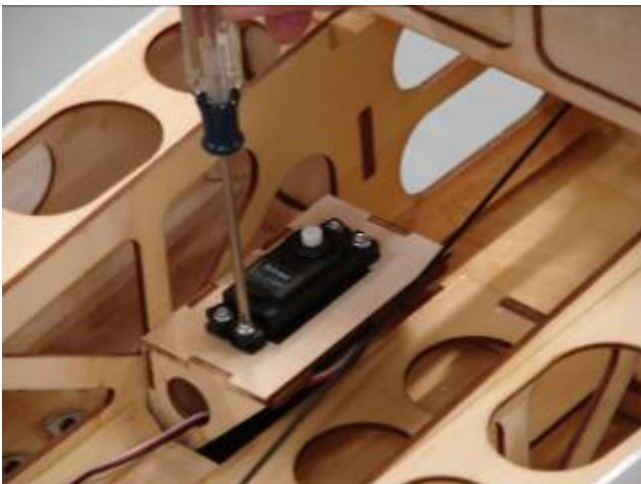
8. Insert the servo into the mounting tray and mark the location of the servo mounting holes.



9. Use a 1/16" bit to drill the servo mounting holes.



10. Install the servo using servo screws.



11. Insert the throttle pushrod through the throttle servo easy link. Move the throttle servo arm to the centered position and the pushrod so that carburetor is at half open. Then tighten the easy link set screw.



12. Cut off the excess pushrod wire as shown.



13. Final throttle servo installation.



14. We recommend installing the carburetor choke pushrod as shown. Use nylon ties to provide support and holding friction for the choke pushrod. Place silicon fuel tubing over the wire pushrod to prevent damage from vibration and provide holding friction. You can install a choke servo if desired. Use the same mounting steps as the throttle servo.



Muffler, Canister, and Tuned Pipe Installation

1. The following sections describe installation of either the pits style muffler, header and canister, or tuned pipe. Use the steps that apply to the exhaust system you will use.

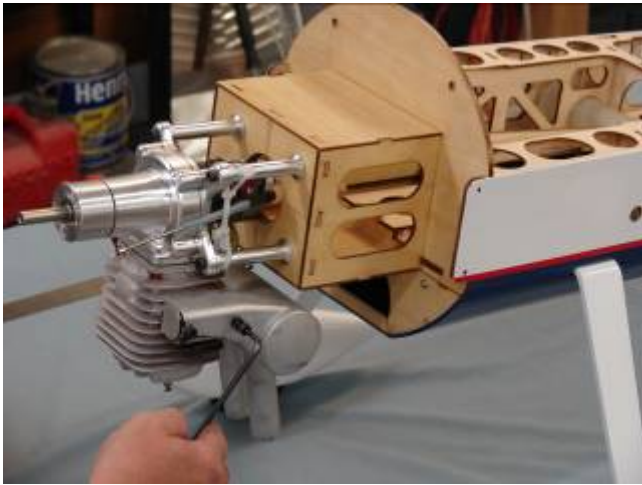


Muffler and Cowl Installation

1. Use a drop of blue lock tite on the muffler bolts prior to installation.



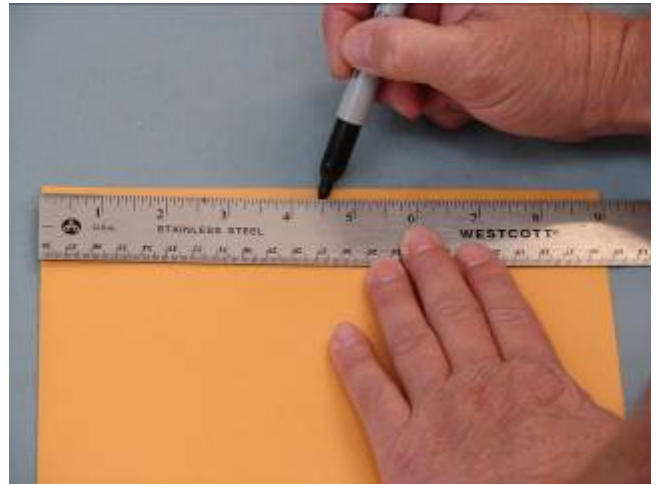
2. Install the muffler on the engine exhaust port and tighten securely.



3. Gather the following material for making a cowl cutout template. Use a large envelope or cardboard file folder for template material.



4. Measure $\frac{3}{16}$ " from the edge of the template. This will allow for the overhang of the cowl to the front former.



5. Mark a line $\frac{3}{16}$ " from the edge of the template.



6. Mark the center of the template as shown below.



7. Mark a centerline on the bottom of the front former as shown.



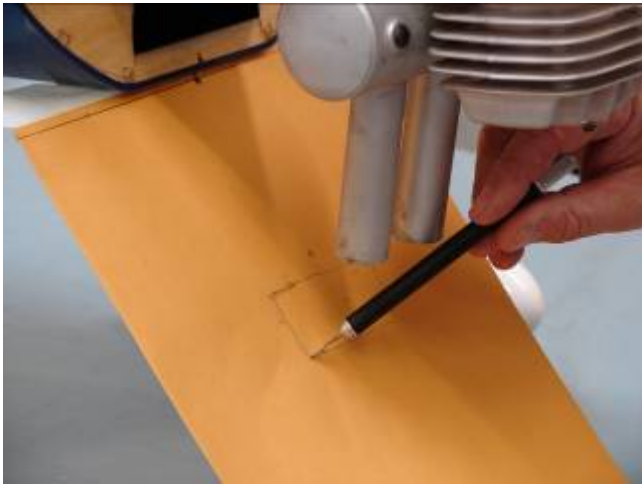
8. Tape the template to the bottom of the fuse 3/16" back from the front former and on centerline as shown.



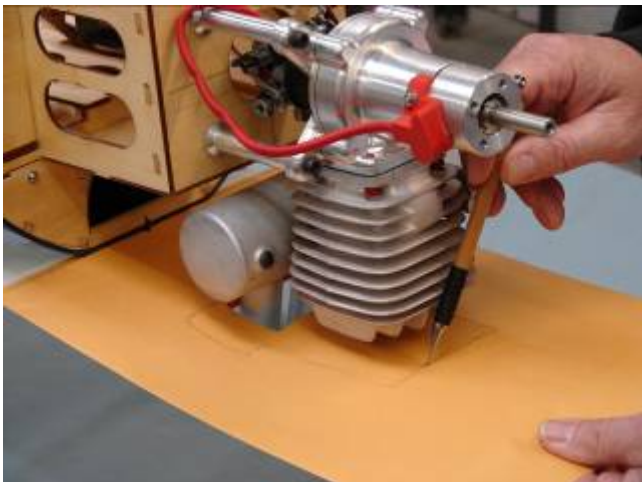
9. Hold the template up to the exhaust stacks and trace the location of the exhaust stacks as shown



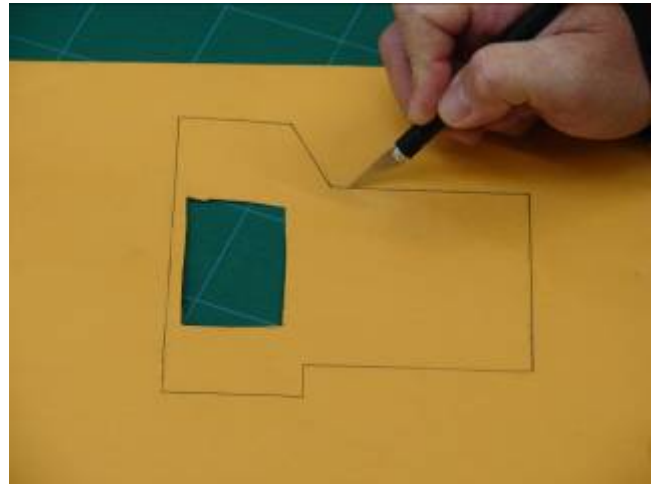
10. Draw a rectangle around the exhaust stack locations and cut it out with a hobby knife.



11. Pull up the template to the engine cylinder head and muffler can. Trace around the engine cylinder and muffler can so that they can extend below the template after the tracing is cut out.



12. Remove the template and cut out the tracing with a hobby knife.



13. With template centered and flush with rear of cowl tape the template to the cowling. Cut the template to clear the air intake on the bottom of the cowl and allow the template to lay flat against the bottom of the cowl.



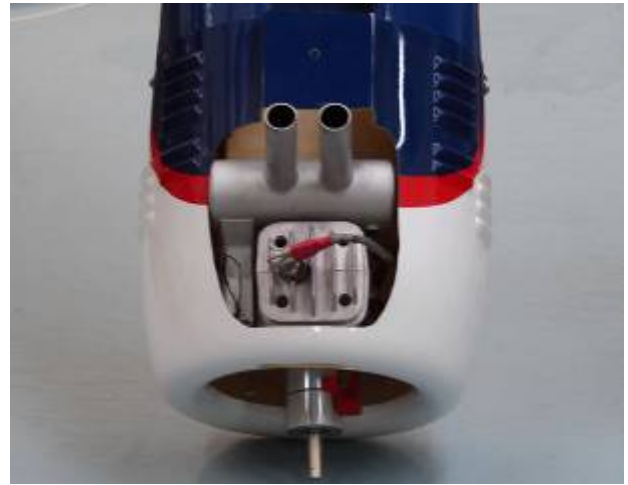
14. Tape the template flat against the bottom of the cowl and trace the opening onto the cowl as shown.



15. Use a rotary cutting tool to cut out the opening in the bottom of the cowl.



16. Dry fit the cowl and make any adjustments to the cut out as necessary. Install the cowl using the four cowl mounting bolts and rubber backed washers.



17. Final cowl installation with engine muffler.

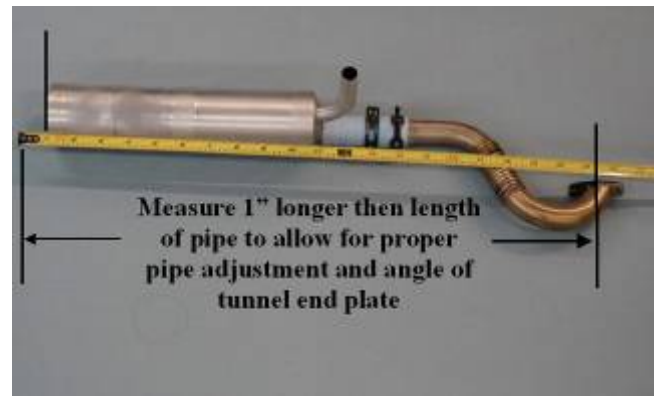


Header and Canister Muffler Installation

1. Gather the header and canister muffler parts as shown below. 1 header, coupler, clamps, and canister assembly, plywood mounts, silicon tubing, silicon rubber, and canister holding bracket with screws.

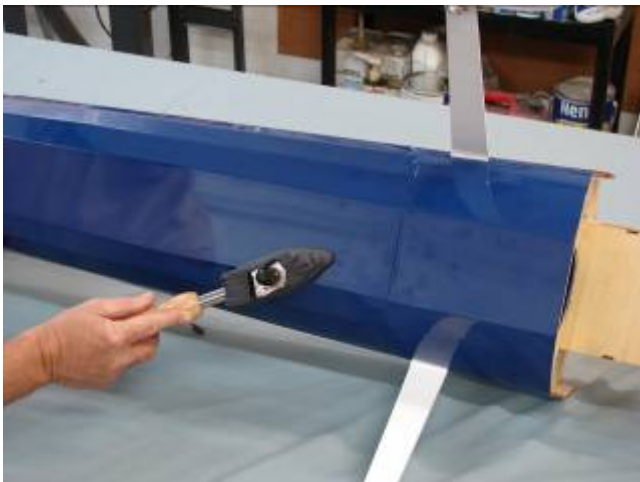


2. Measure the length of the header and canister from the center of the header mounting flange to the rear of the canister and add 1 inch.

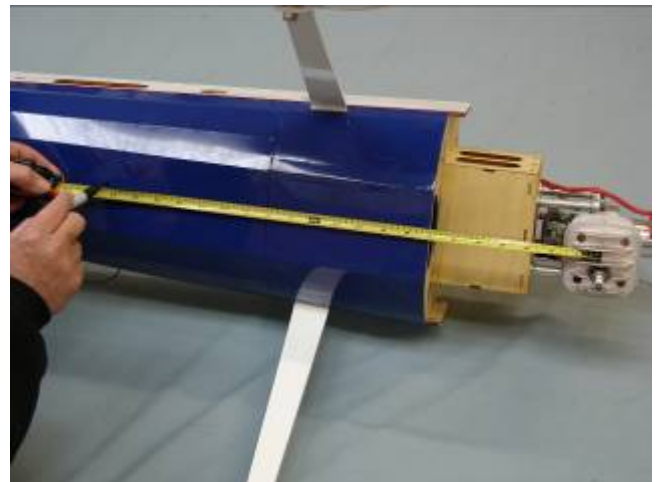


Canister Tunnel Preparation

1. Iron the bottom covering to ensure it is tight and well sealed to the wood.



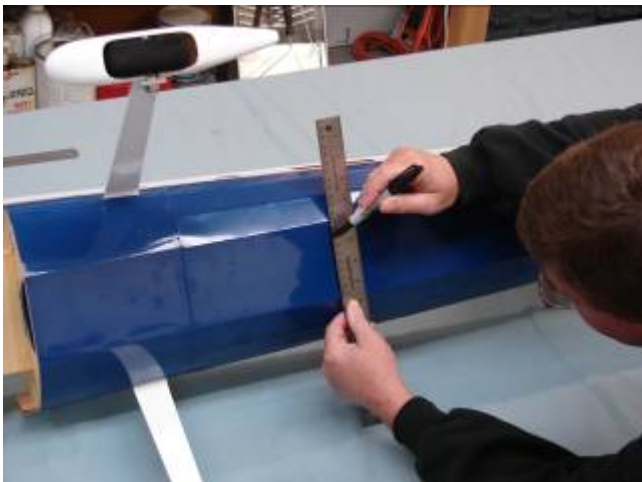
3. Transfer this distance to the bottom of the fuse starting from the center of the engine cylinder head.



4. Dry fit the header and canister to the bottom of the fuse and ensure there is one inch of space from the line just marked to the rear of the canister.



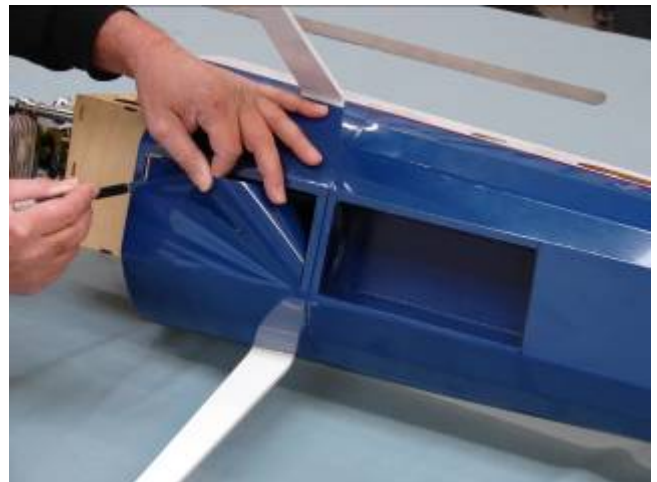
5. Draw a line across the fuse belly on the mark location as shown. This will be the location of the rear former of the canister tunnel.



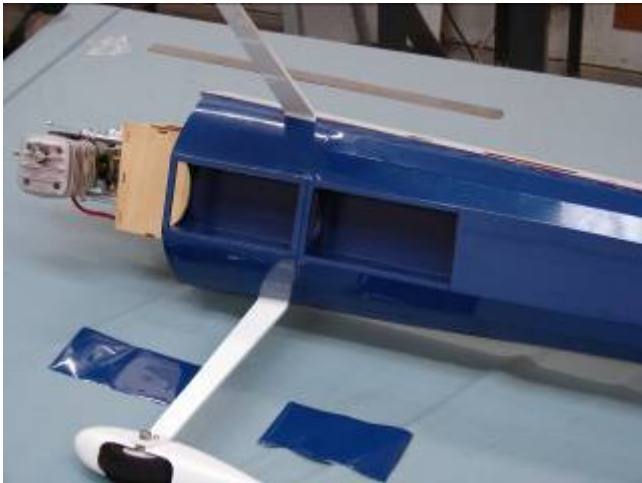
6. Use a hobby knife to remove the covering from the rear of the landing gear cross brace to the mark between the two bottom fuse stringers.



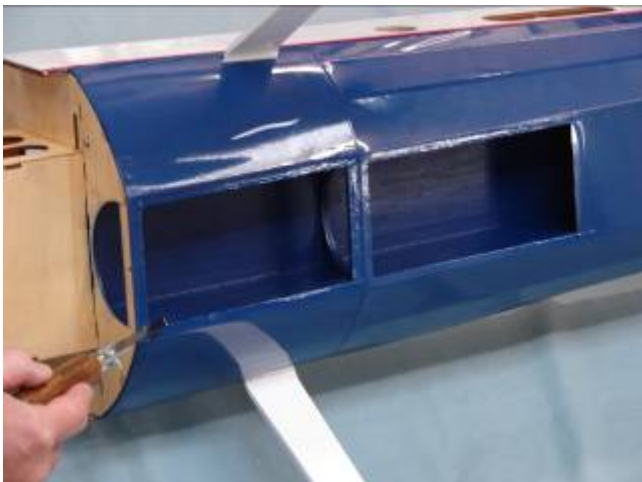
7. Use a hobby knife to remove the covering from the front former to the front of the landing gear cross brace as shown.



8. Covering material removed from two bottom fuse bays.



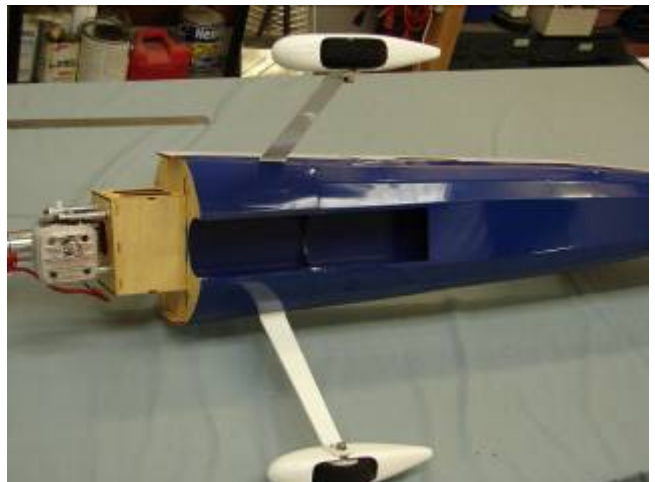
9. Use a razor saw to remove the front former cross brace across the canister tunnel.



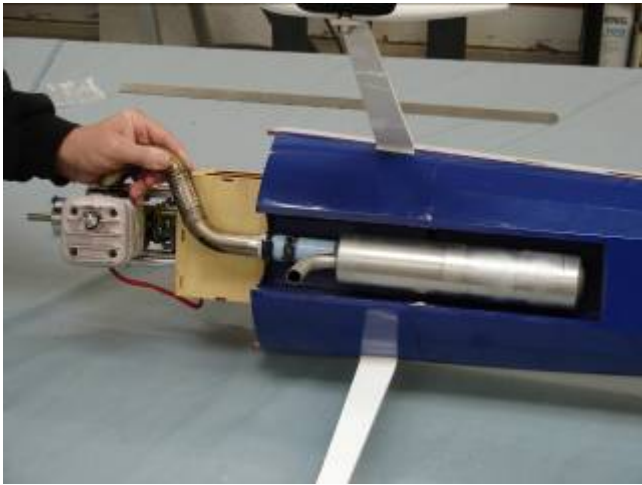
10. Use a razor saw to remove the cross braces just behind the landing gear from the canister tunnel



11. Cross braces removed from canister tunnel.



12. Dry fit the header and canister inside the tunnel and ensure there is clearance on all sides.



13. Locate the pre-painted balsa canister tunnel rear former as shown below.



14. Dry fit the canister tunnel rear former inside the rear of the canister tunnel. Tilt the bottom of the former slightly to the rear at the bottom of the fuse as shown. This will allow the air flow to exit easily.



15. Mark the bottom of the fuse line on the former and mark the top of the canister tunnel where the former makes contact.



16. Use a hobby knife to cut the former to fit the bottom of the fuse.



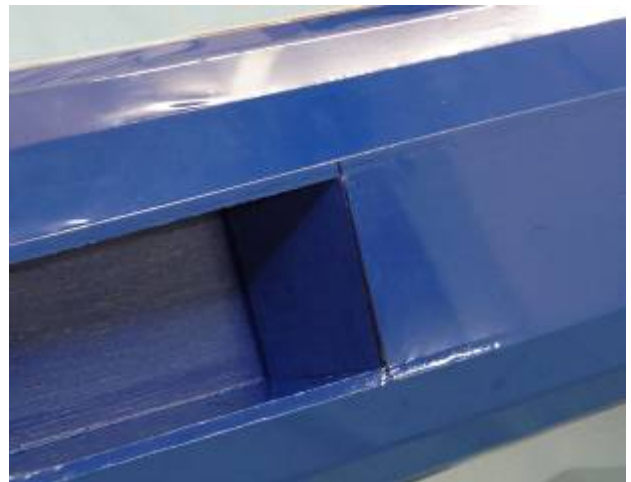
17. Apply thick CA glue to the top and bottom of the canister tunnel former.



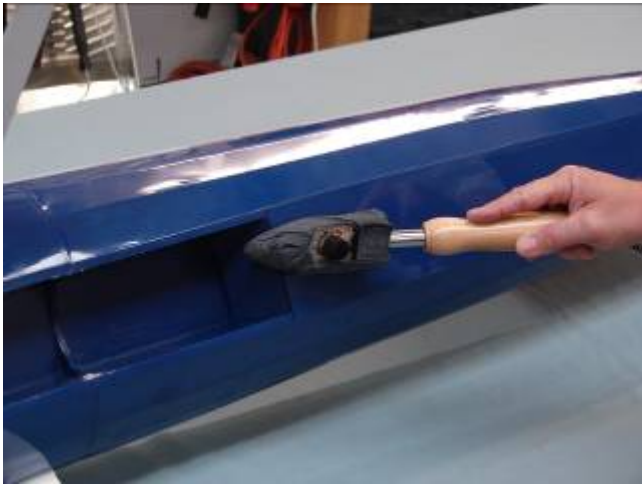
18. Apply CA glue to the sides and bottom to secure the rear canister tunnel former in place.



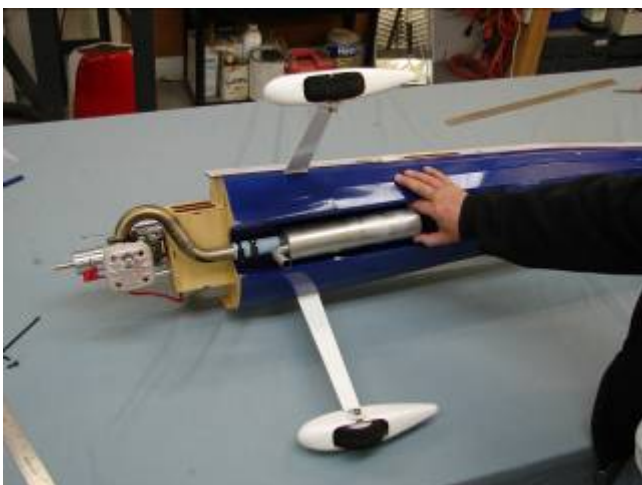
19. Rear canister tunnel former glued in place.



20. Iron the bottom covering to securely seal the covering to the bottom of the rear canister tunnel former.

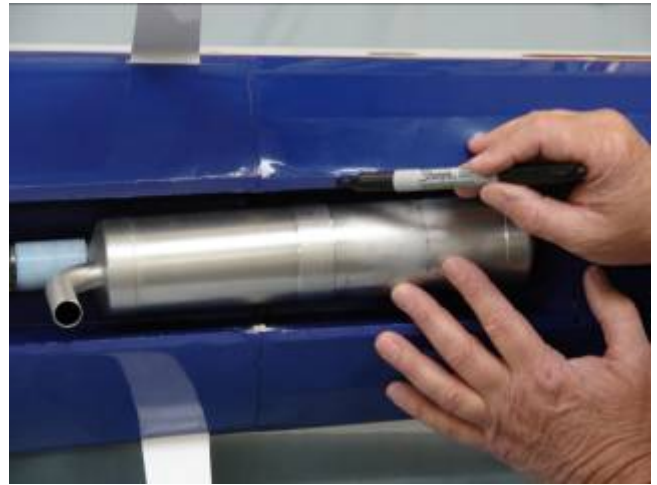


21. Dry fit the header and canister inside the tunnel and ensure there is clearance on all sides.

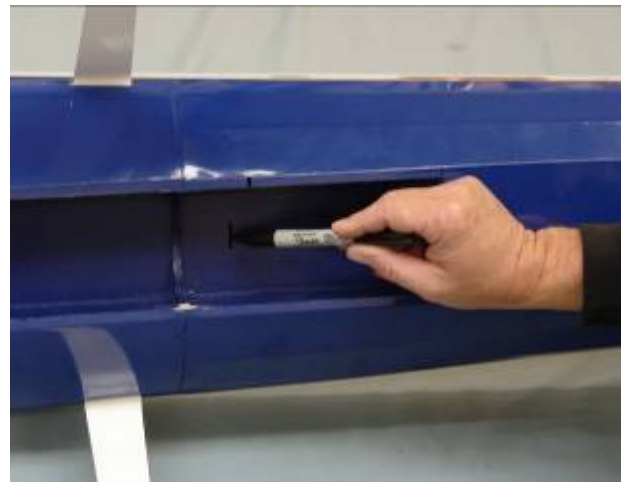


Canister Installation

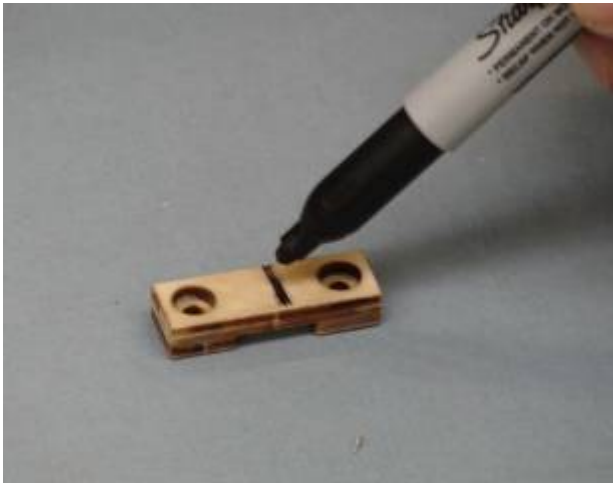
1. Determine the location of the rear canister mounting hanger. This should be approximately two thirds back on the canister or as described in the canister installation instructions and as desired by the builder. Mark this location on the edge of the canister tunnel.



2. Transfer this mark to the top of the canister tunnel. Ensure the mounting holes in the top of the canister tunnel will not interfere with any equipment installed or to be installed inside the fuse.



3. Mark the centerline of the plywood canister mounting bracket.



4. Align the centerline of the plywood bracket with the mounting location previously marked on the top of the canister tunnel. Mark the location of the canister bracket mounting holes.



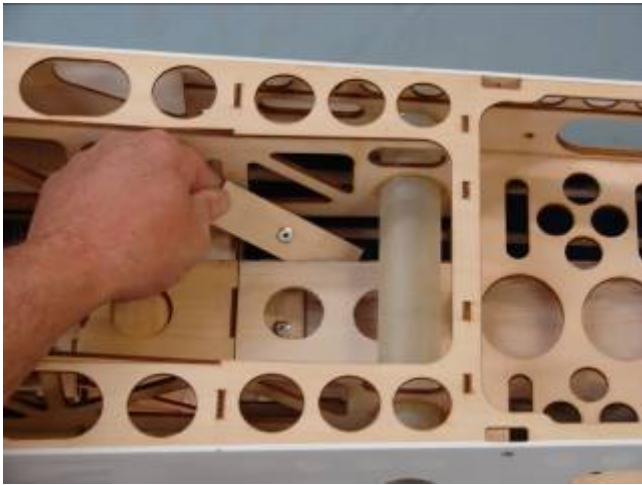
5. Use a 1/8" bit to drill the canister mounting bracket mounting holes.



6. Locate the two plywood canister mounting doublers with pre-installed blind nuts as shown.



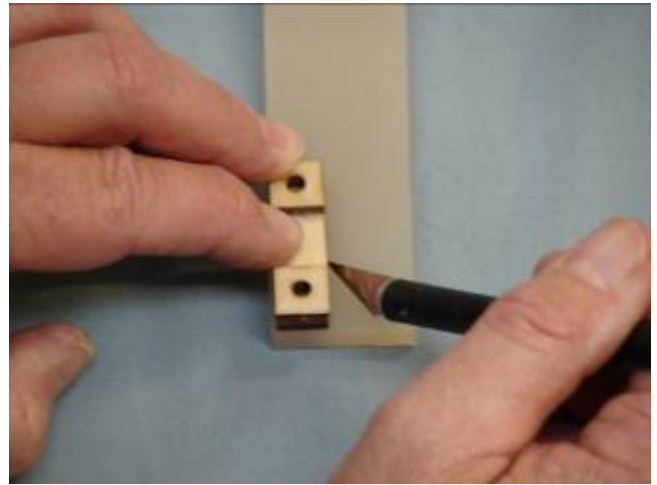
7. Slide the canister mounting doublers under the fuel tank mounting tray and align the blind nuts with the mounting holes. The canister mounting doublers are in two pieces to allow easy access.



8. Install the canister mounting bolts from inside the canister tunnel and screw into the blind nuts to hold the doublers in place. Do not tighten. Tack glue the edges of the doublers to the top of the canister tunnel with CA glue. Remove the bolts and glue the doublers securely in place. Do not allow CA glue to get into the blind nut threads.



9. Trace the shape of the canister mounting bracket on the piece of flat silicon as shown.



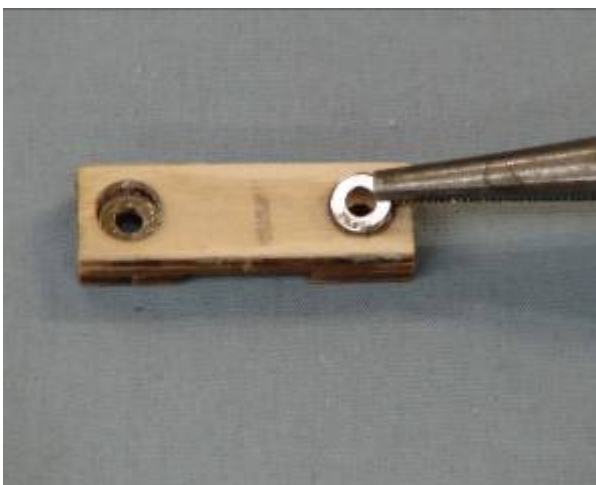
10. Use a hobby knife to cut the flat silicon rubber to match the size of the canister mounting bracket.



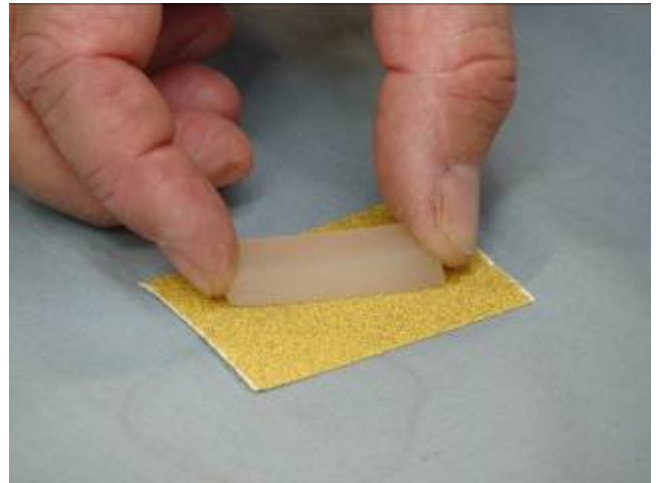
11. Locate the pre-drilled counter sunk holes in the plywood canister mounting bracket and the two flat washers as shown below.



12. Place the flat washers inside the counter sunk holes as shown. Ensure the washer is fully seated inside the counter sunk holes.



13. Use a small piece of medium sand paper to scuff one side of the silicon rubber to ensure a good glue bond.



14. Apply thick CA glue to the scuffed side of the silicon rubber piece.



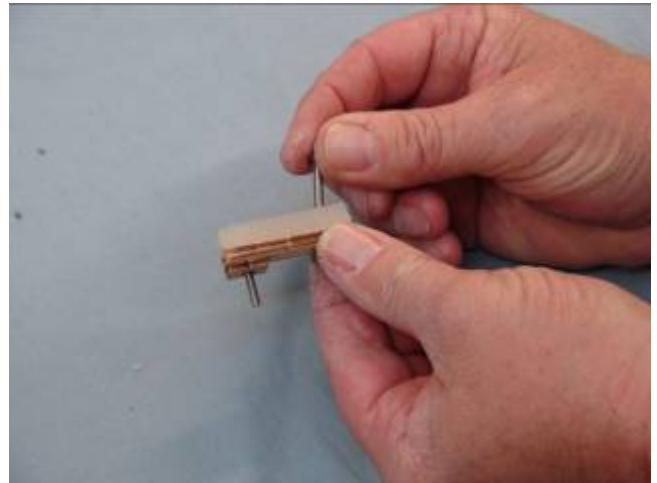
16. Glue the silicon rubber piece on top of the counter sunk holes on the plywood canister mounting bracket. This will seal the washers inside the canister bracket mount as shown.



17. After the CA glue has fully cured, use a hobby knife to cut two small round holes in the silicon rubber. The holes should be just large enough to allow the heads of the canister mounting bolts to pass through the silicon rubber and seat against the washers inside.



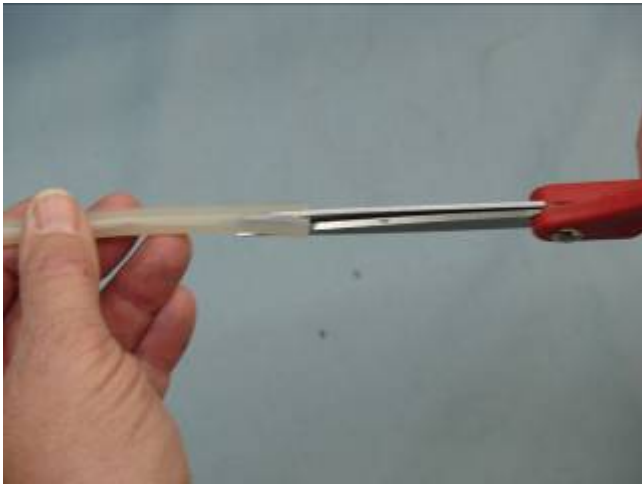
18. Insert the canister mounting bolts through the holes in the canister mounting bracket as shown.



19. Locate the nylon tie canister mounting strap and the silicon rubber tubing as shown below.



20. Use a pair of scissors to split one end of the silicon tubing in half approximately 3/4" deep as shown.



21. After splitting the silicon tubing cut off one side of the split section as shown. This will provide a relief section of the tubing for the nylon tie lock and insulate it from the metal canister surface.



22. Prepare to slide the silicon tubing onto the nylon tie. The split end of the tubing goes opposite the nylon tie lock as shown.



23. Slide the silicon tubing onto the nylon tie as shown to form the canister strap assembly.



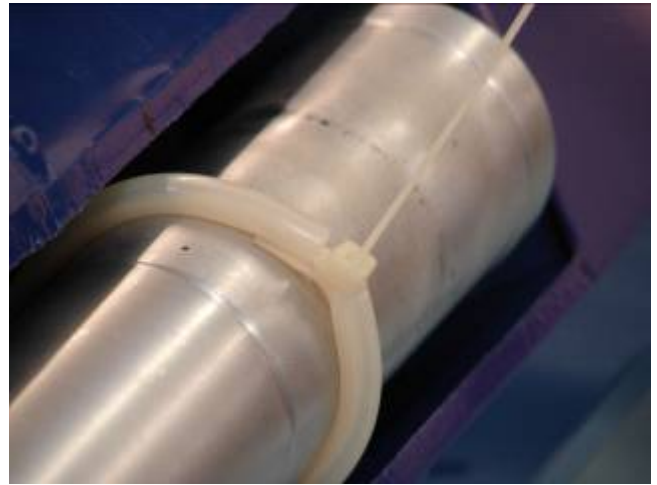
24. Place the canister strap assembly in the canister tunnel as shown. Allow the nylon tie lock to extend out of the tunnel $1/1/2''$ as shown.



25. Place a drop of blue lock tite on each canister mounting bolt. Then place the canister mounting bracket over the canister mounting strap and insert the two mounting bolts through the top of the canister tunnel and into the blind nuts on the opposite side. Tighten the mounting bolts securely.



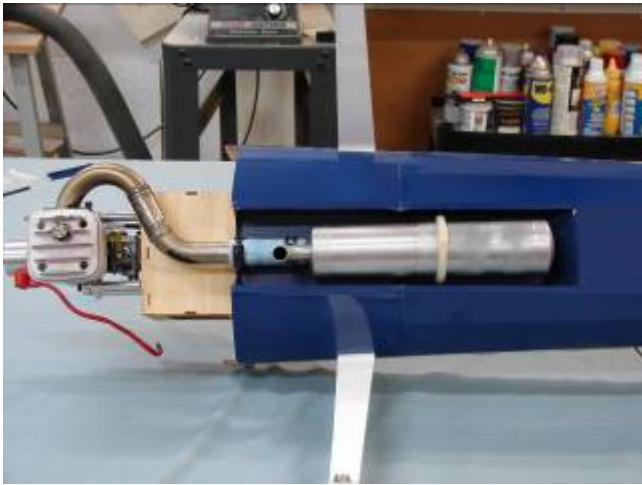
26. Cinch the nylon tie around the canister tube and tighten securely. Ensure that the nylon tie does not touch the metal surface of the canister tube and is properly insulated by the silicon tubing as shown below.



27. Cut off excess tie as shown.



28. Bottom view of the final canister installation.



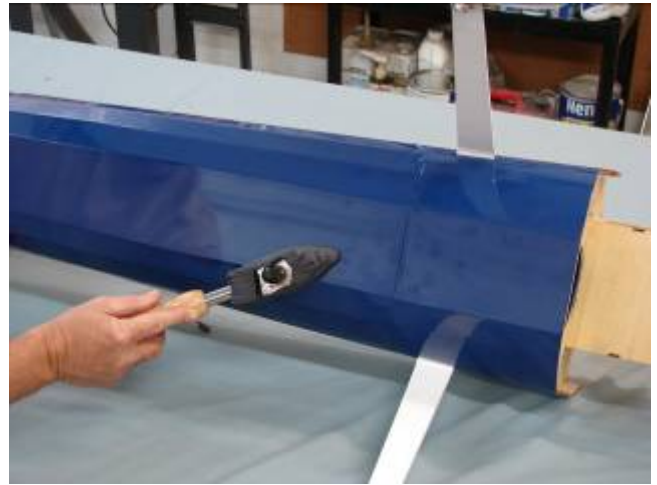
Header and Tuned Pipe Installation

1. Gather the header and tuned pipe parts as shown below. 1 header, coupler, clamps, and tuned pipe assembly.

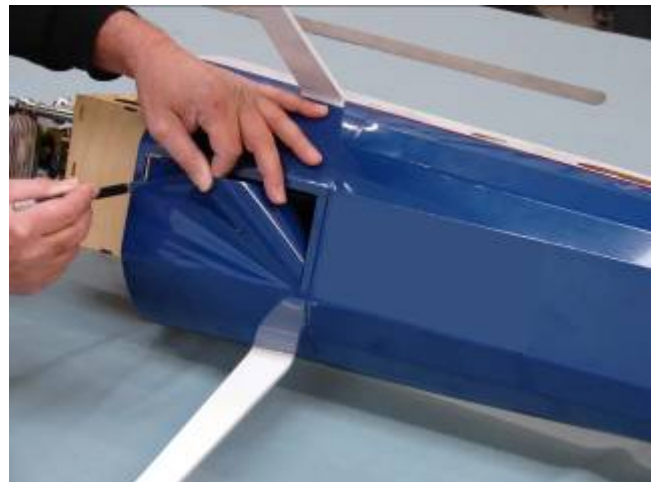


Tuned Pipe Tunnel Preparation

1. Iron the bottom covering to ensure it is tight and well sealed to the wood.



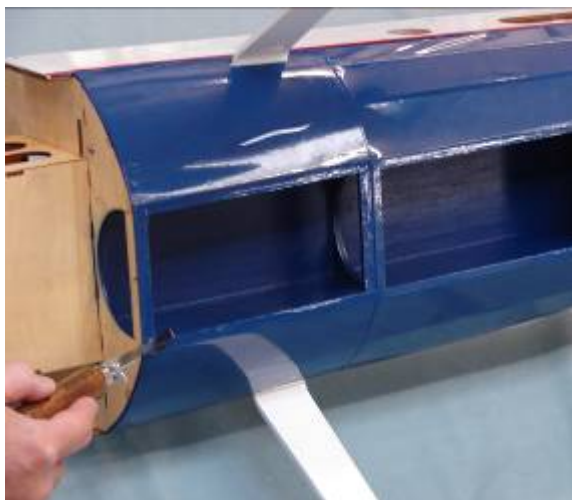
2. Use a hobby knife to remove the covering from the front former to the front of the landing gear cross brace as shown.



3. Use a hobby knife to remove the covering from the landing gear cross brace to the pre-installed rear tuned pipe former as shown.



4. Use a razor saw to remove the front former cross brace across the pipe tunnel.



5. Use a razor saw to remove the cross braces just behind the landing gear from the tuned pipe tunnel.



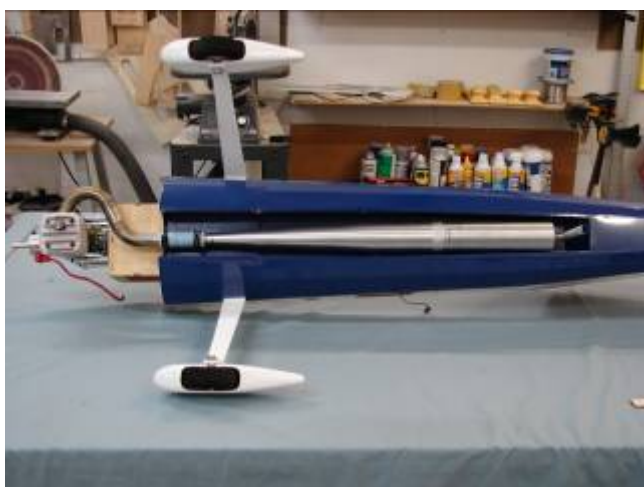
6. Covering and cross braces removed from tuned pipe tunnel.



7. Iron the bottom covering to securely seal the covering to the bottom of the rear tuned pipe tunnel former.

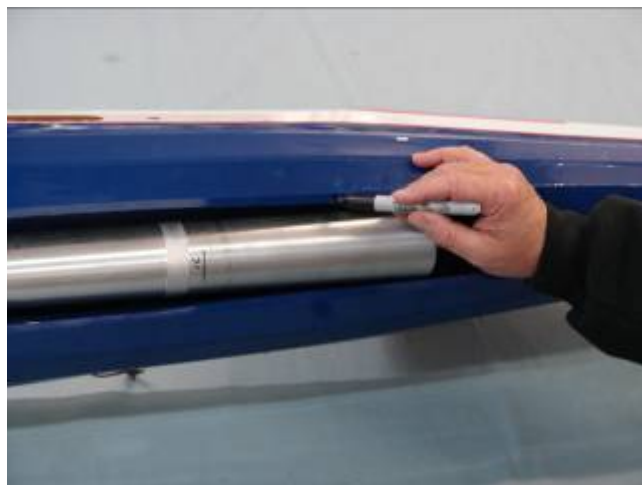


8. Dry fit the header and tuned pipe inside the tunnel and ensure there is clearance on all sides.



Tuned Pipe Installation

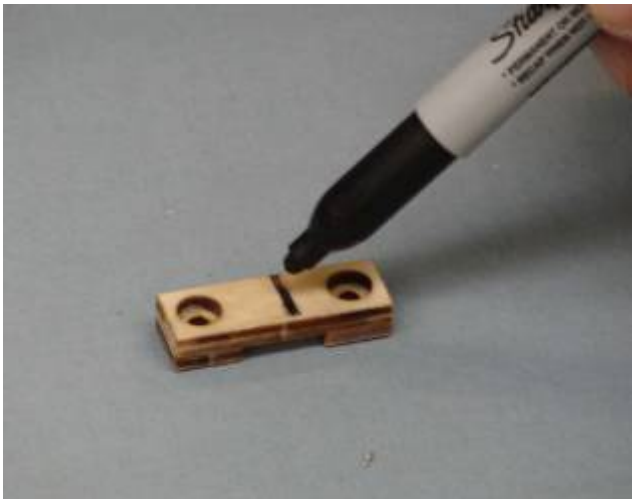
1. Determine the location of the rear tuned pipe mounting hanger. This should be approximately two thirds back on the pipe or as described in the pipe installation instructions and as desired by the builder. Mark this location on the edge of the tuned pipe tunnel.



2. Transfer this mark to the top of the tuned pipe tunnel. Ensure the mounting holes in the top of the pipe tunnel will not interfere with any equipment installed or to be installed inside the fuse.



3. Mark the centerline of the plywood pipe mounting bracket.



4. Align the centerline of the plywood bracket with the mounting location previously marked on the top of the pipe tunnel. Mark the location of the pipe bracket mounting holes.



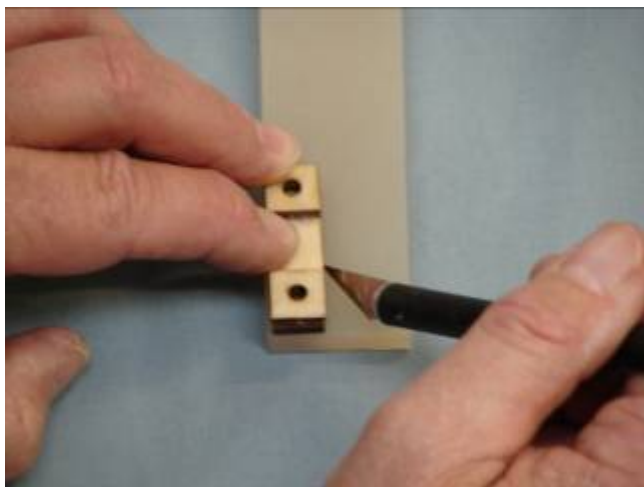
5. Use a 1/8" bit to drill the pipe mounting bracket mounting holes.



6. Locate the two plywood pipe mounting doublers with pre-installed blind nuts as shown.



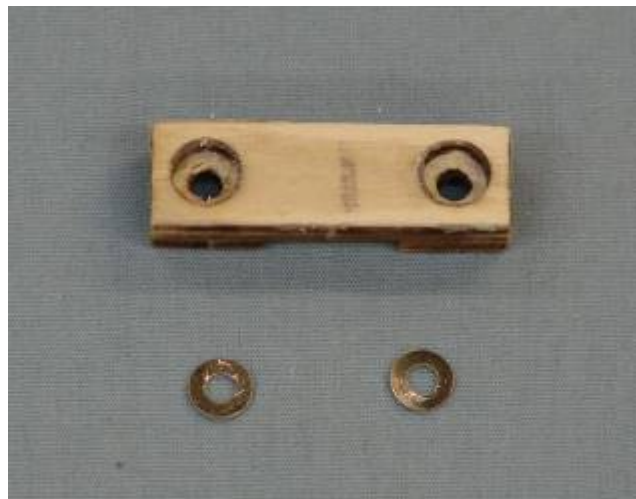
7. Trace the shape of the pipe mounting bracket on the piece of flat silicon as shown.



10. Use a hobby knife to cut the flat silicon rubber to match the size of the pipe mounting bracket.



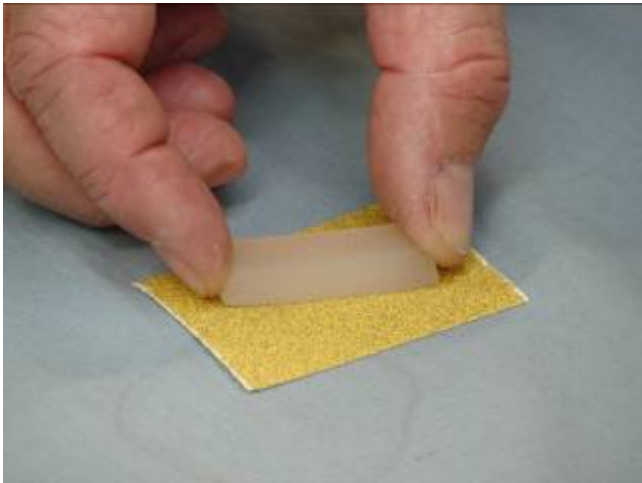
11. Locate the pre-drilled counter sunk holes in the plywood pipe mounting bracket and the two flat washers as shown below.



12. Place the flat washers inside the counter sunk holes as shown. Ensure the washer is fully seated inside the counter sunk holes.



13. Use a small piece of medium sand paper to scuff one side of the silicon rubber to ensure a good glue bond.



14. Apply thick CA glue to the scuffed side of the silicon rubber piece.



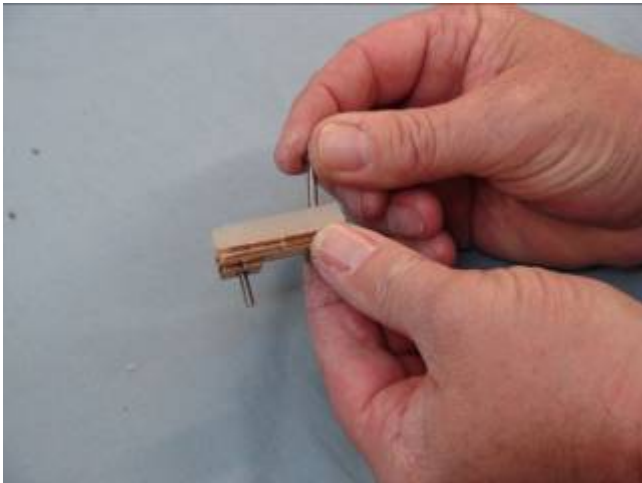
15. Glue the silicon rubber piece on top of the counter sunk holes on the plywood pipe mounting bracket. This will seal the washers inside the pipe bracket mount as shown.



16. After the CA glue has fully cured, use a hobby knife to cut two small round holes in the silicon rubber. The holes should be just large enough to allow the heads of the pipe mounting bolts to pass through the silicon rubber and seat against the washers inside.



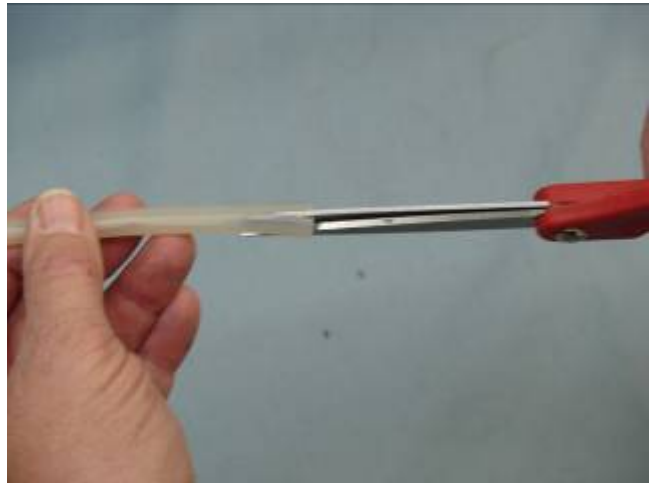
17. Insert the pipe mounting bolts through the holes in the pipe mounting bracket as shown.



18. Locate the nylon tie pipe mounting strap and the silicon rubber tubing as shown below.



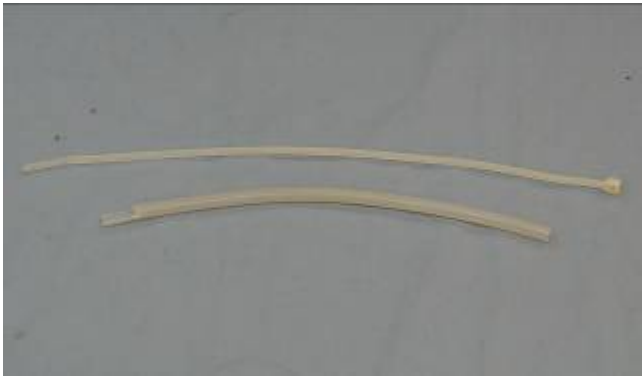
19. Use a pair of scissors to split one end of the silicon tubing in half approximately 3/4" deep as shown.



20. After splitting the silicon tubing cut off one side of the split section as shown. This will provide a relief section of the tubing for the nylon tie lock and insulate it from the metal pipe surface.



21. Prepare to slide the silicon tubing onto the nylon tie. The split end of the tubing goes opposite the nylon tie lock as shown.



22. Slide the silicon tubing onto the nylon tie as shown to form the pipe strap assembly.



23. Slide the pipe mounting doublers under the rudder servo mounting tray and align the blind nuts with the mounting holes as shown.



24. Install the pipe mounting bolts from the inside the pipe tunnel and screw into the blind nuts to hold the doublers in place. Do not tighten. Tack glue the edges of the doublers to the top of the pipe tunnel with CA glue. Remove the bolts and glue the doublers securely in place. Do not allow CA glue to get into the blind nut threads.



25. Place a drop of blue lock tite on each pipe mounting bolt. Then place the pipe mounting bracket over the pipe mounting strap and insert the two mounting bolts through the top of the pipe tunnel and into the blind nuts on the opposite side.



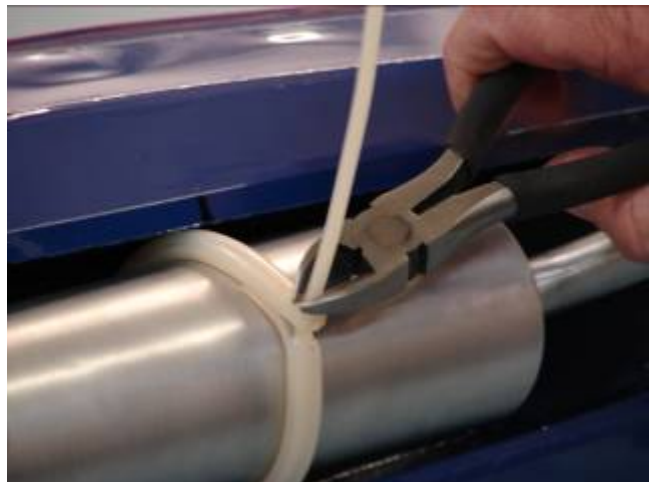
26. Allow the nylon tie lock to extend out of the tunnel 1/2" as shown. Tighten the mounting bolts securely.



27. Cinch the nylon tie around the tuned pipe tube and tighten securely. Ensure that the nylon tie does not touch the metal surface of the tuned pipe tube and is properly insulated by the silicon tubing as shown below.



28. Cut off excess nylon tie as shown.



28. Bottom view of the final tuned pipe installation.

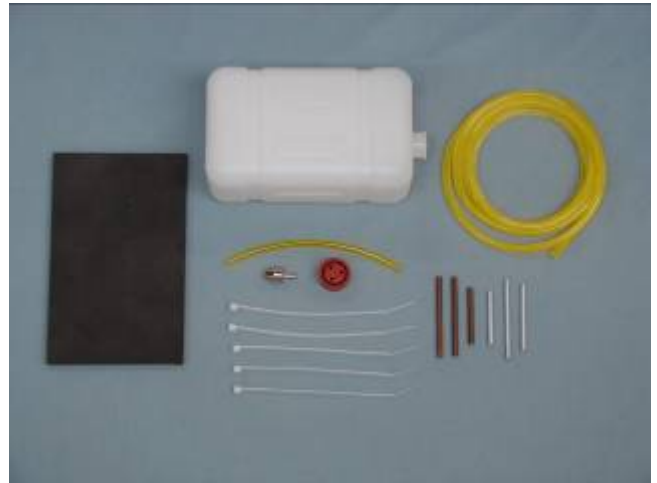


29. Cowl cut out for engine cylinder head with canister and tuned pipe installation. Refer to cowl mounting instructions in the Muffler and Cowl Installation on page 40, steps #1-17.



Fuel Tank Installation

1. Gather the fuel tank parts as shown below.
Fuel tank parts, fuel tubing, and foam rubber.



2. Assemble the fuel tank as shown below. Use large diameter tube for pick-up and small diameter tube for the vent. Secure the fuel tubing with nylon ties to the pick-up tube and clunk.



3. Insert the rubber stopper into the tank with the small diameter vent tube at the top of the tank. Secure the stopper with a nylon tie.

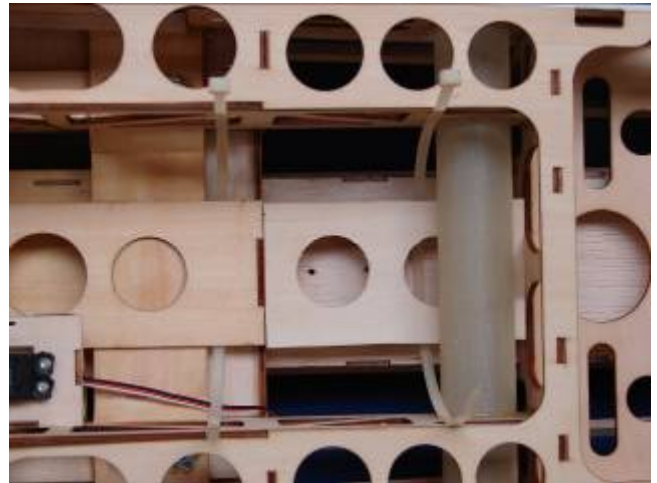


Fuel Tank Installation

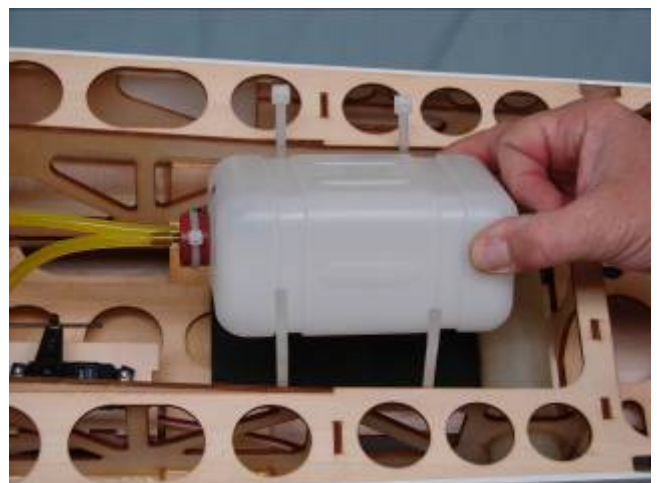
1. Gather the fuel tank parts as shown below. Fuel tank, fuel tubing, and foam rubber, fuel T and fuel dot, nylon ties. Note: The fuel T and fuel dot are not supplied.



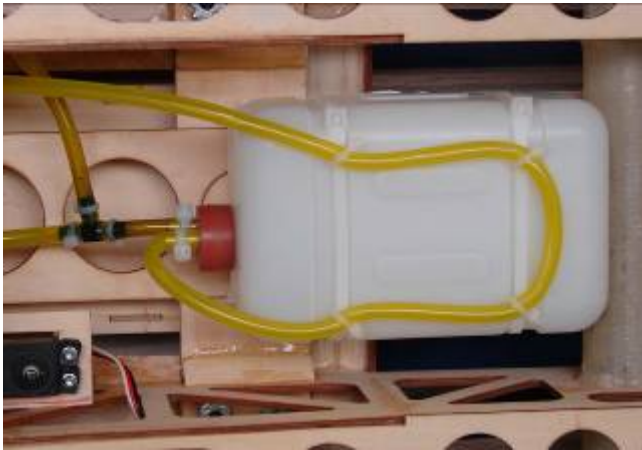
2. Install the fuel tank mounting ties under the fuel tank floor as shown.



3. Install the fuel tank with foam rubber underneath as shown. Cinch the nylon ties securely to hold the tank against the foam on the fuel tank floor.



4. Install the fuel tubing as shown with small nylon ties. You will need an after market fuel T and fuel filling dot. **Note: We recommend looping the vent line to the rear of the fuel tank as shown to prevent fuel spilling when the model tail is lifted or flying a down line.**

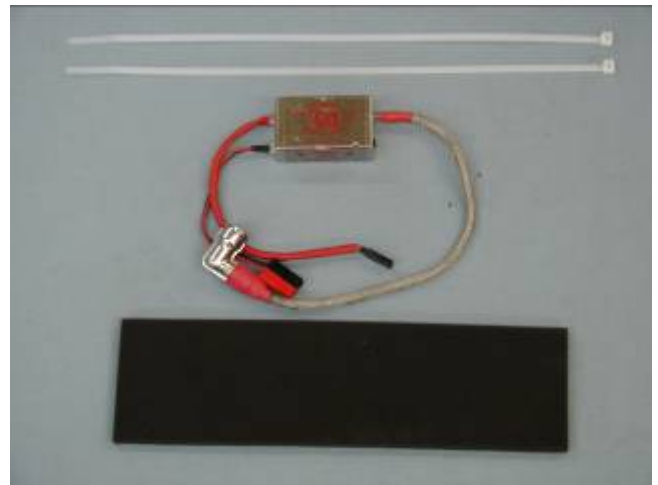


5. Install the fuel filling dot as desired on the side of the fuselage. Do not allow the fuel dot to interfere with the leading edge of the wing. Secure the fuel vent line to the front former for proper draining. Drill a fuel line hole in the bottom of the engine box floor to allow fuel pick up line to connect the engine carburetor fuel intake nipple.



Ignition Installation

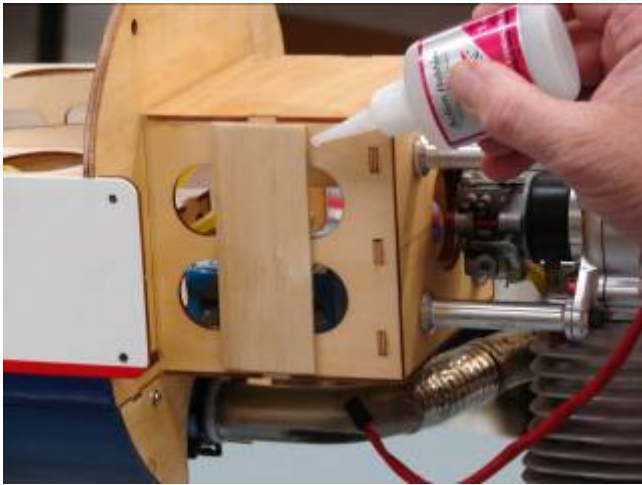
1. Gather the engine ignition parts as shown below. Engine ignition, nylon ties, and foam rubber.



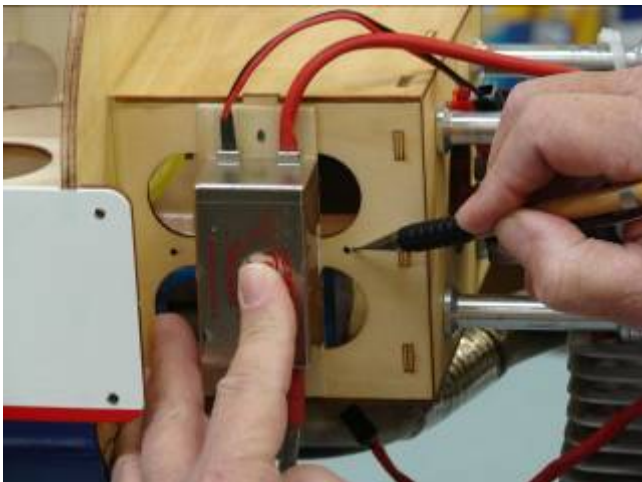
2. Locate the plywood ignition mounting bracket as shown.



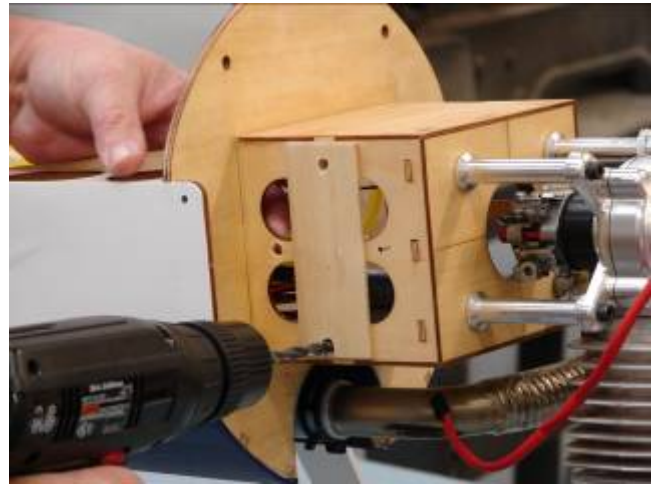
3. Use thick CA to glue the ignition mounting bracket to the side of the engine mounting box.



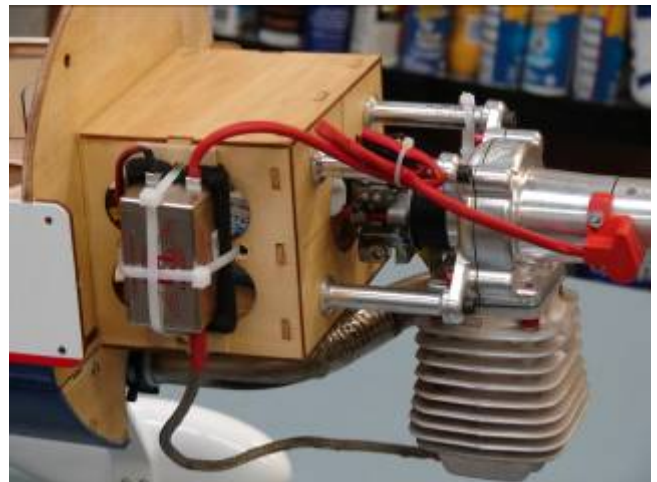
4. Position the engine ignition on the mounting bracket and mark the location of the nylon tie holes as shown.



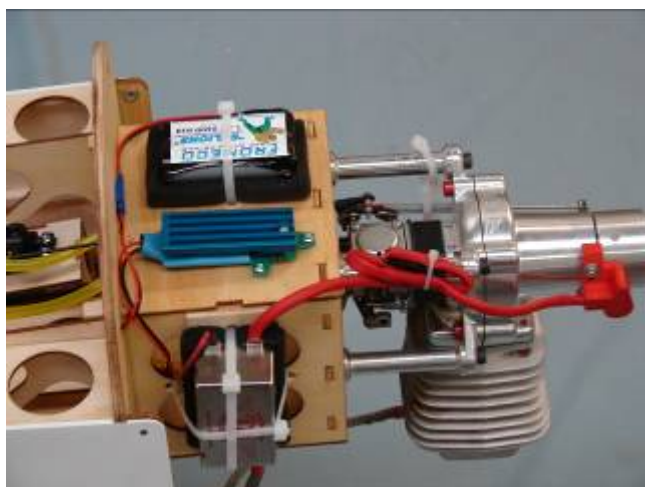
5. Use a 1/8" drill bit to drill the ignition mounting holes.



6. Mount the engine ignition module using nylon ties and foam rubber as shown. Route the ignition wire to the engine as shown and secure with nylon ties as necessary.

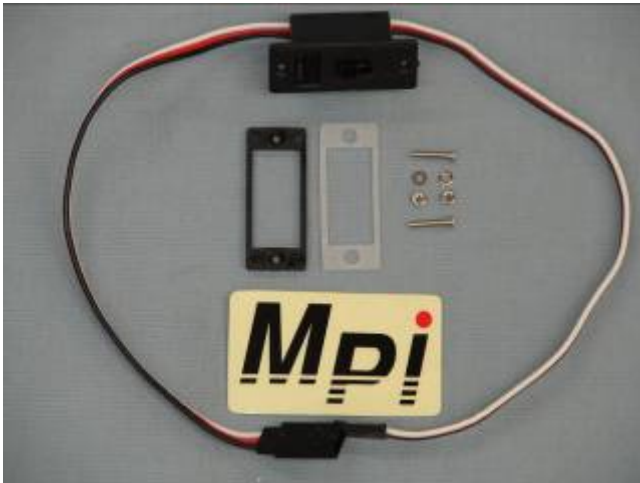


4. Install the ignition battery and regulator if required as desired. A typical installation is shown below. Secure all wiring from excess vibration.



RADIO INSTALLATION

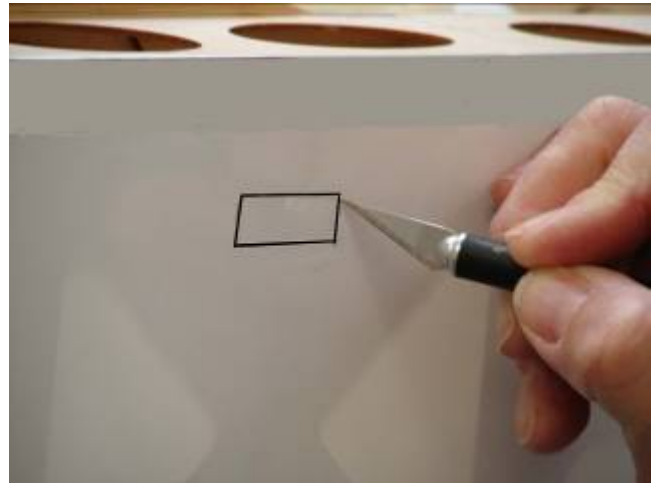
1. Gather the switches and mounting hardware to be used. We used two switches, one for receiver battery, and one for ignition battery. The installation steps are the same for all switches.



2. Switch location is at the discretion of the builder. We chose to place the switches toward the front of the fuse on each side. Mark location for switches using switch template.



3. Use a modeling knife to cut out the switch holes.



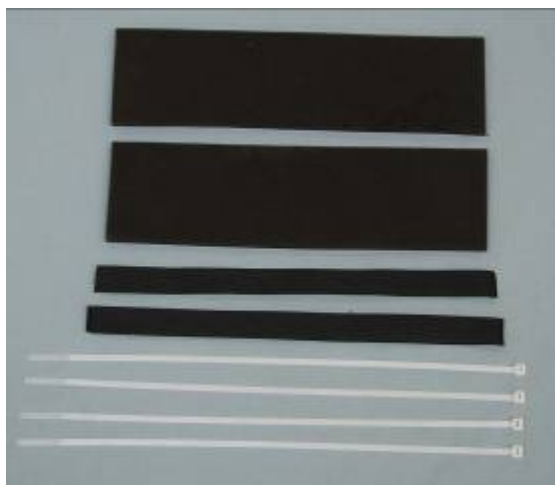
4. Slide switch wires inside fuse through the switch cutout.



5. Mount switches in accordance with the switch instructions and hardware.



6. Gather the supplied radio mounting hardware as shown below. Foam rubber, Velcro straps, and nylon ties.



7. Mount the radio components as desired using the radio tray cutouts. Ensure all wires and plugs are secure and not subject to chafing when routed through the radio tray and formers.



8. Typical installation of RC equipment.



PRE-FLIGHT PREPARATION

3. Gather the 2 wing mounting bolts and 2 #8 rubber large backed washers.



4. Slide the wing tube in the fuse wing tube sleeve. Slide the wings on the wing tube and plug in the aileron servo plugs. Slide the rubber backed washers on the wing mounting bolts and insert bolts through the fuse side and into the wing root blind nuts. Tighten snugly but do not over tighten and crack the fuse or wing root wood.



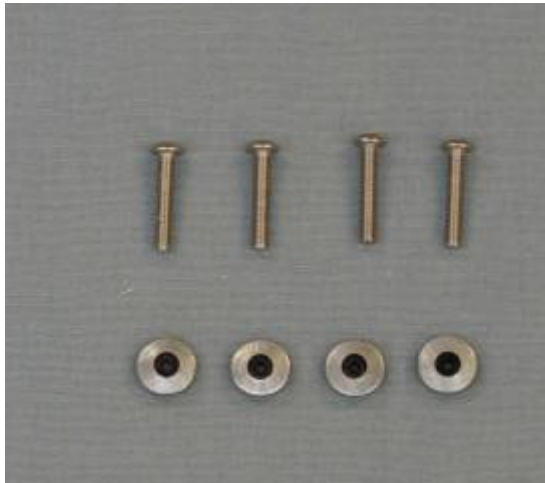
5. Gather the 4 stab mounting bolts and 4 #6 small rubber backed washers.



6. Slide the stab tube in the fuse stab tube sleeve. Slide the stabs on the stab tube and plug in the elevator servo plugs. Slide the rubber backed washers on the stab mounting bolts and insert bolts through the stab mounting tabs and into the fuse blind nuts. Tighten snugly but do not over tighten and crack the stab mounting tabs or the fuse sides.



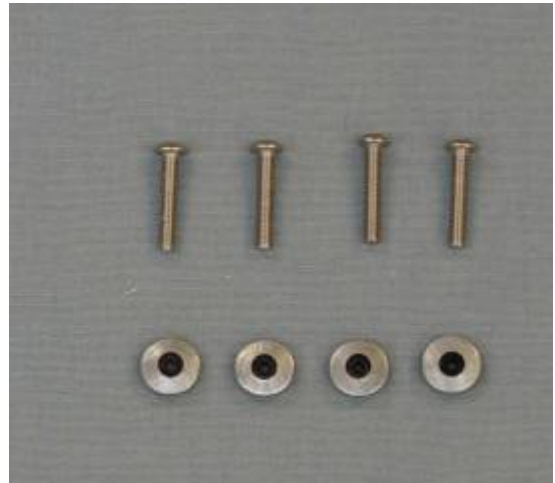
1. Gather the 4 cowl mounting screws and 4 #6 small rubber backed washers.



2. Mount the cowl using the cowl mounting screws and rubber backed washers. The rubber backed washers are to prevent the fiber-glass cowl from cracking from normal engine vibration.



7. Gather the 4 hatch mounting bolts and 4 #6 small rubber backed washers.



8. Slide the rubber backed washers on the hatch mounting bolts and insert bolts through the hatch mounting holes and into the fuse blind nuts. Tighten snugly but do not over tighten and crush the hatch or the fuse sides.



Finishing

1. Decals supplied with the kit may vary from the photos below. Cut the pre printed adhesive backed decals from the decal sheet and apply where desired. Clean the model surface with alcohol to allow a good bond to the surface. The decals may be applied using Windex or a solution of 1 drop of dish detergent to a cup of water sprayed on the model to assist in proper positioning. The water must be pressed out from under the decal after the decal is in position. Use a rubber squeegee or a credit card edge to press the water out.



2. Factory placement of decals.



3. Factory placement of decals.



Center of Gravity

1. **Warning, do not skip this step!** The recommended CG is 4 1/4" back from the wing leading edge at the wing tip as shown.



2. Balance the YAK-54 without fuel in the tank with the batteries installed and ready to fly. The engine, radio, servos, and battery you use will determine the final weight and locations of equipment. Try to balance the model by moving the battery and receiver before adding any ballast.



3. Start at recommended CG until you are comfortable with the flight characteristics of the aircraft. You may find this a bit nose heavy at first but that is fine to start with. After you are comfortable adjust the CG to suit your flying style in small steps, especially when shifting the CG toward the tail. Move the battery or add small stick on weights to the nose or tail as necessary.
4. For aerobatic flying a more aft balance point is better. For smooth sport flying a more forward CG is better. An aircraft that is too nose heavy does not fly well and is difficult to land. A tail heavy aircraft is uncontrollable and will likely crash.

Control Throws

1. Start at the forward end of the CG range until you are comfortable with the flight characteristics of the aircraft. You may find this a bit nose heavy at first but that is fine to start with. After you are comfortable adjust the CG to suit your flying style in small steps, especially when shifting the CG toward the tail. Move the battery or add small stick on weights to the nose or tail as necessary.
2. Aileron throw measured in inches.



3. Elevator throw measured in inches.



4. Rudder throw measured in inches.



5. If a flight control deflection meter is available you can measure the throws in degrees.



6. Elevator throw measured in degrees.



Control Throw Deflection Table

	<u>Low Rate</u>	<u>High Rate</u>
Aileron	2 1/2" or 25° up 2 1/2" or 25° down	3" or 30° up 3" or 30° down
Rudder	2 1/2" or 35° left 2 1/2" or 35° right	3 1/2" or 40° left 3 1/2" or 40° right
Elevator	1 3/8" or 12° up 1 5/8" or 16° down	2" or 18° up 2 1/4" or 24° down

For 3D flying use the following throws:

	<u>3D Rate</u>
Aileron	3 1/2" or 35° up 3 1/2" or 35° down
Rudder	6" or 45° left 6" or 45° right
Elevator	4 1/2" or 45° up 4 1/2" or 45° down

We recommend 15% Expo on low rates, 30% expo on high rates, and 60% expo on 3D rates as a starting point. You can adjust from there to suit your own flying style.

Preflight Checks

Center of Gravity: Check CG is set properly.

Engine: The engine should run smoothly at all throttle settings with smooth transition from idle to full throttle without stalling or hesitation. Do not fly an unreliable engine. Read engine instructions including break in and tuning completely.

Flight Controls: Ensure all flight controls are free from binding and are centered. Check that all hinges are tight and will not pull out. Control linkages must be rigid and tight and have no slop. Confirm proper direction of ailerons, rudder, and elevator. Experienced flyers have lost airplanes due to reversed ailerons. Right roll is right up, left down. Left roll is left up, right down.

Batteries: Transmitter and receiver batteries are fully charged.

Fasteners: Check all wing bolts, hatch bolts, servo screws, control horn bolts, wheel collars, and clevis keepers are tight and secure.

Radio: Check trims set to neutral and controls centered. Check rate and condition switches set properly. Check the receiver antenna is fully extended and not reversed on it self.

Range check: Do a range check with and without the engine running in accordance with the radio manufacturer instructions. If there is insufficient range or a large reduction with the engine running, do not fly until it is resolved!

Fuel: Fill the fuel tank before each flight.

Aerobatics

The 50cc YAK-54 is capable of any aerobatic maneuver. After you gain some confidence and little experience flying the airplane you can cut loose and perform any maneuver you can think of. Here is a list of some of the more popular aerobatic and 3D maneuvers you can try:

- Loops and rolls
- Knife edge flight
- Stall turns
- Snap rolls
- 2, 4, and 8 point rolls
- Slow rolls
- Spins upright and inverted
- Flat Spins upright and inverted
- Harriers upright and inverted
- Water falls
- Torque Rolls
- Rolling circles

The sky and your imagination are your only limits.

FLY and ENJOY!

AEROWORKS

[illegible]