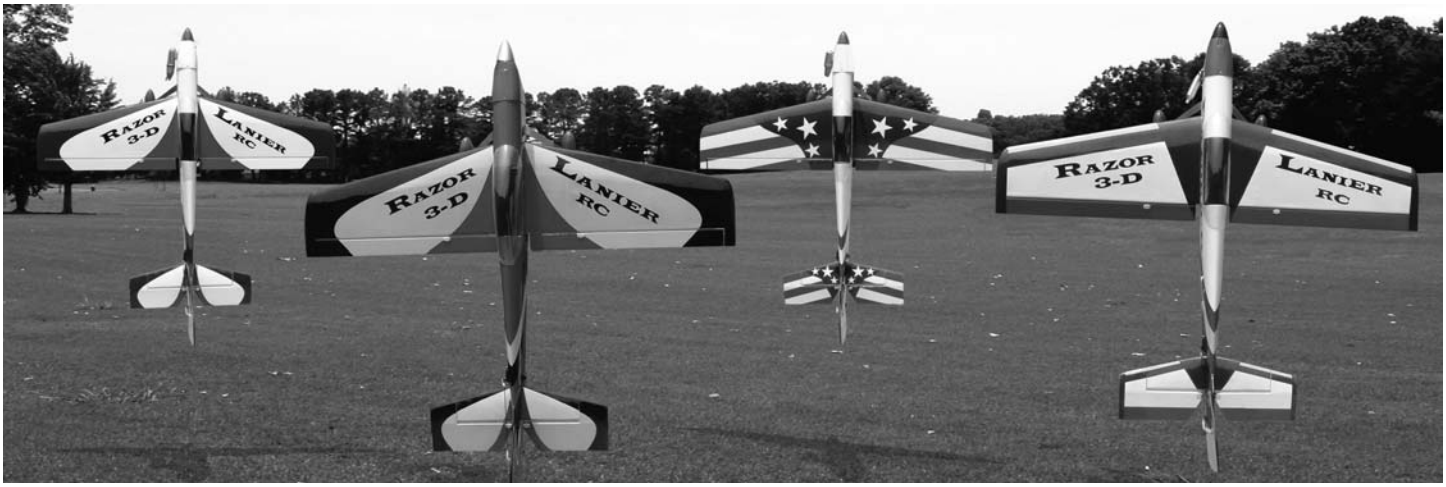
LANIER RC



Razor 3-D ARF

Lanier RC
21st Century ARFs
Made Worldwide

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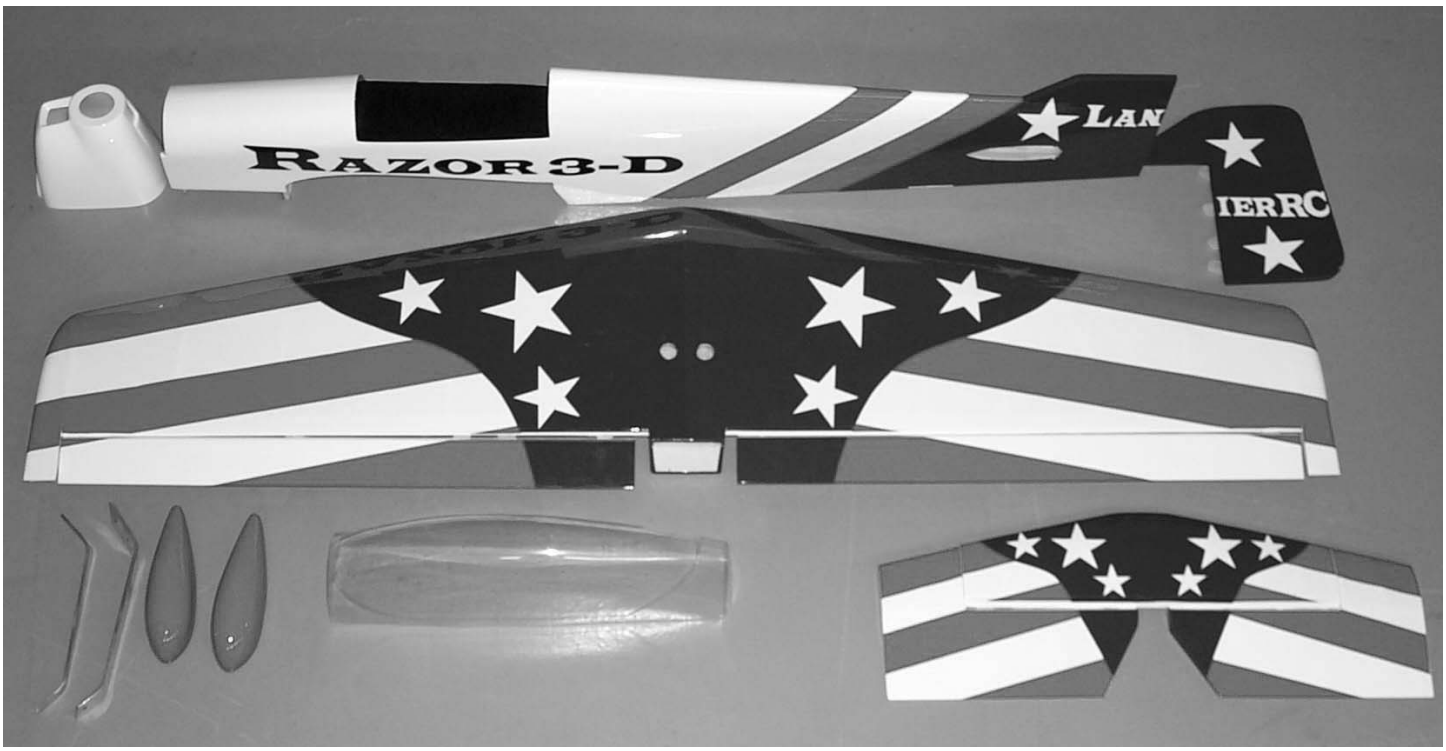

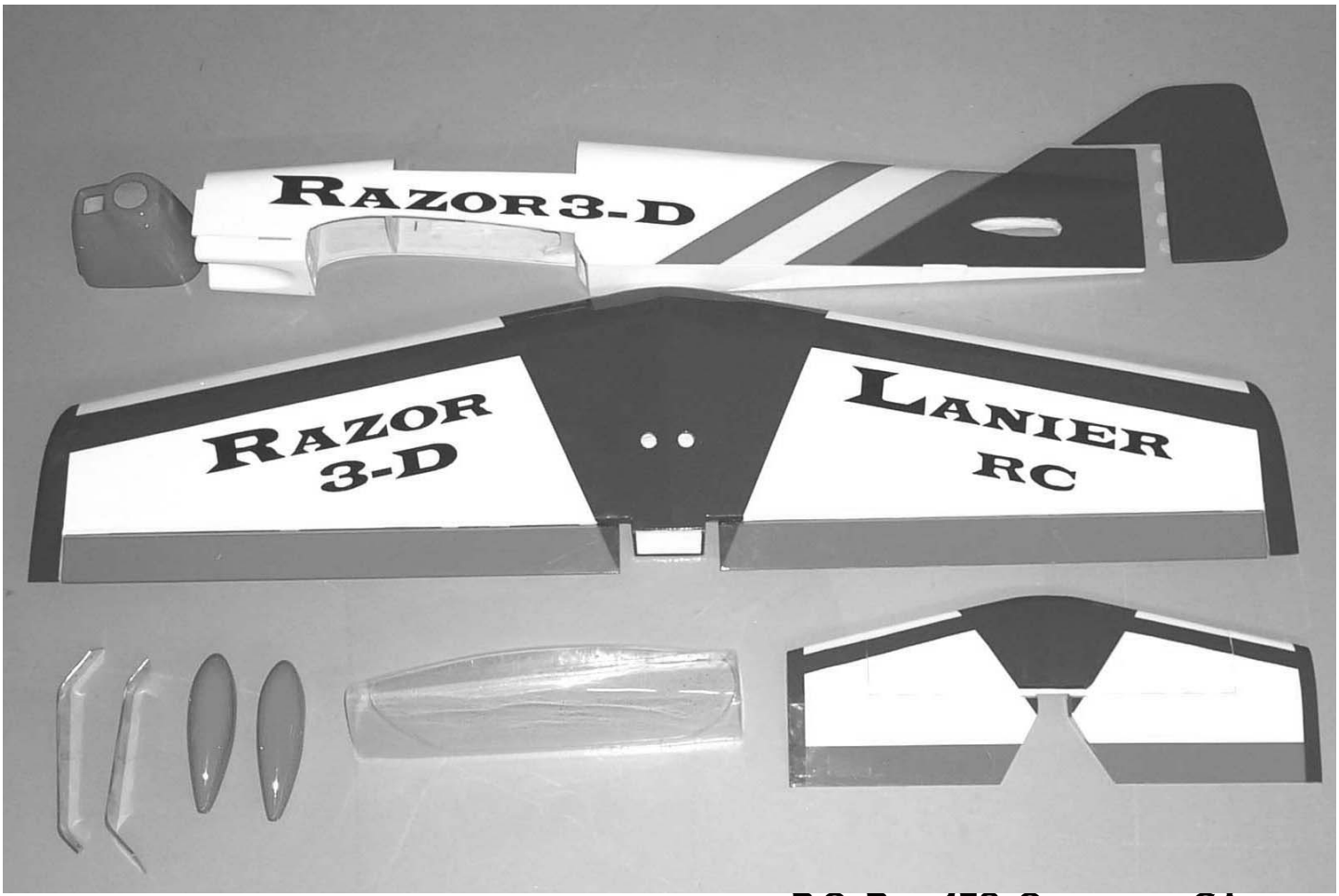

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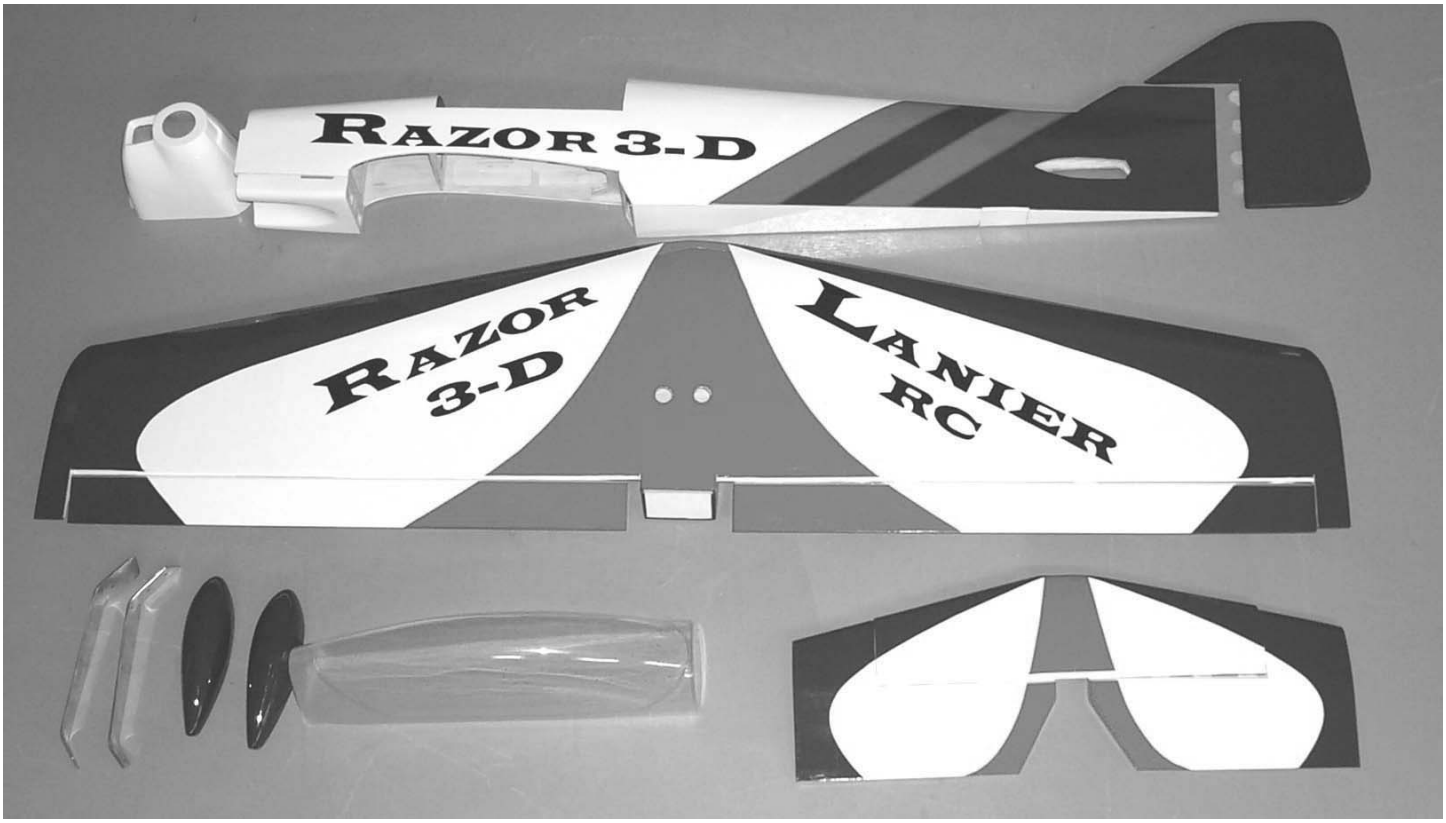

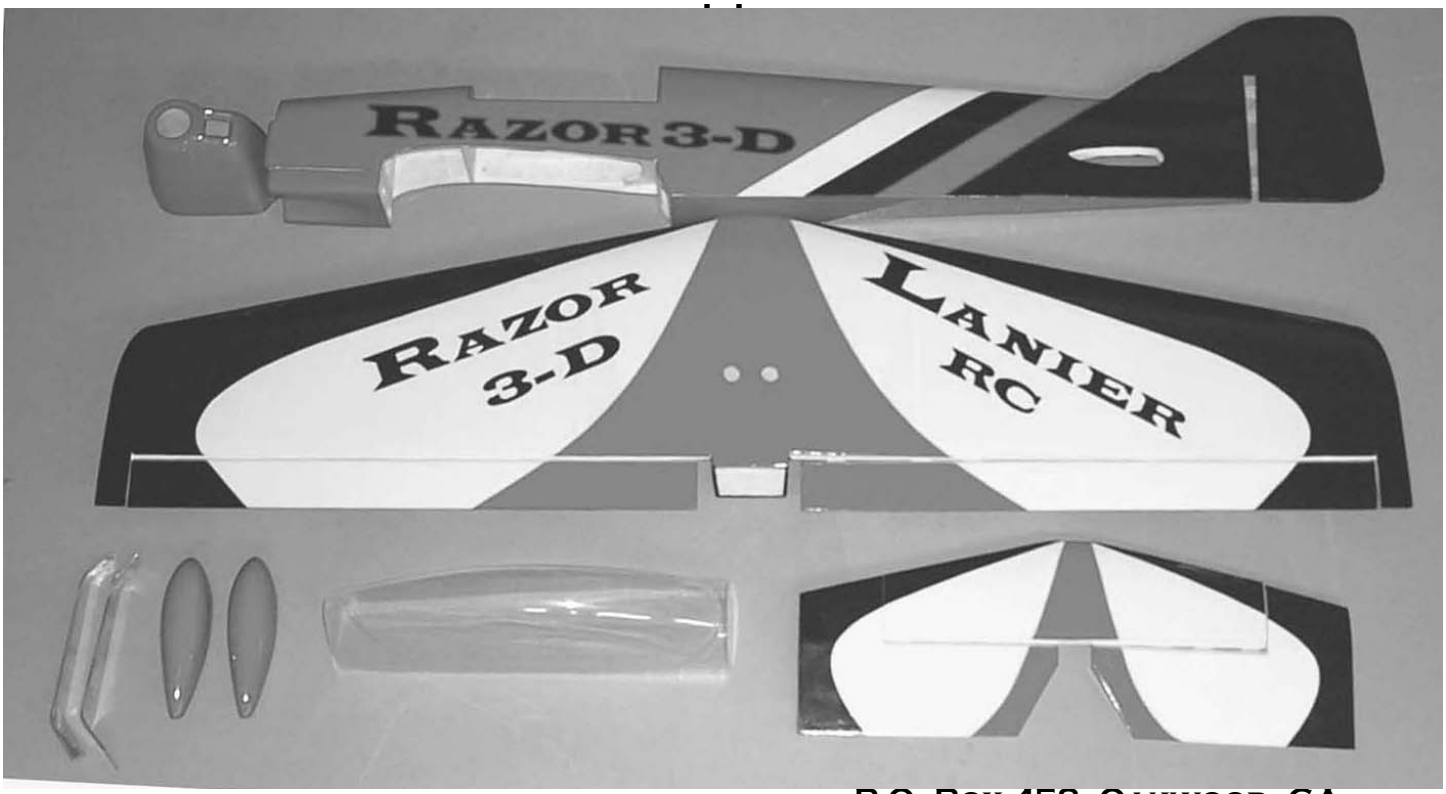

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Parts List

1. Fuselage
2. Fiberglass Cowl
3. One piece wing /ailerons
4. Stab/elevator assembly
5. Rudder
6. Fiberglass wheel pants
7. Canopy
8. Fiberglass landing gear cover

Hardware List

Motor

1. (2) Motor Mounts
2. (4) 4mmx25mm bolts
3. (4) 4mm blind nuts (installed)
4. (4) 4mm lock washers
5. (4) 4mm flat washers

Landing Gear

1. Main Gear 1 left 1 right
2. (4) 3mmx12mm bolts
3. (4) 3mm flat washers
4. (4) 3mm blind nuts installed in fuselage
5. (2) 2-1/4" main wheels
6. (2) 4mmx40mm bolts (axels)
7. (2) 4mm nuts
8. (2) 4mm flat washers
9. (2) 4mm wheel collars

Tail wheel

1. (1) Tail wheel bracket
2. (1) 7/8" tail wheel
3. (2) 2mmx10mm screws
4. (2) 2mm wheel collars

Wing

1. (2) 5mmx40mm nylon wing bolts

Elevator pull-pull hardware

1. (1) Steel cable
2. (4) Aluminum swage
3. (2) threaded cable ends
4. (2) cable ends with z bends
5. (1) bellcrank assembly with hard ware

Cowl

1. (4) 2mmx10mm screws for cowl mounting
2. (4) 2mmx10mm screws for gear cover mount

Control System

1. (5) Nylon control horns
2. (5) Nylon control horn plates
3. (8) 2mmx20mm bolts
4. (2) 2mmx24mm bolts
5. (7) Nylon clevis
6. (7) Silicone clevis keepers
7. (5) Nylon swing in keepers
8. (2) E-Z connectors
9. (1) 1.25mmx50cm Throttle rod
10. (1) 3.25mmx41.5cm nylon tube
11. (1) 2mmx23cm Rudder push rod threaded on one end.
12. (2) 2mmx13cm Elevator pushrods threaded on one end.
13. (2) 2mmx13cm Aileron pushrods threaded on one end.

Fuel Tank

1. (1) Fuel Tank
2. (1) Rubber stopper
3. (2) Metal caps for stopper
4. (1) Screw
5. (1) Clunk
6. (3) Aluminum fuel tubes
7. (1) Silicone fuel line

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Congratulations on your purchase of the Lanier Razor 3-D ARF. This is a very unique dual-purpose aircraft, capable of flying any FAI pattern sequence with ease, while exhibiting remarkable 3-D capabilities. Every effort has been made to produce a lightweight, straight, easy to assemble aircraft. Because of its oversize control surfaces which are double beveled to allow for extreme throws, great care must be taken in the set-up and flying of this airplane. Quality hardware components have been provided to allow for 3D set-up while maintaining adequate mechanical advantage to eliminate flutter. It is you responsibility as an advanced pilot to fly the aircraft in an intelligent manner. THROTTLE MANAGEMENT IS A MUST!!!!!!!! We ar Lanier have put the Razor through a very rigorous flight-testing schedule and have stressed the airframe beyond all practical parameters without a single failure. Lanier will NOT warrant the Razor against flutter due to improper set-up or excessive speed maneuvers. having said that, we believe you will find the Razor to be one of the most responsive, in-the-grove aircraft on the market. The Razor excels at high-alpha maneuvers including Harriers (both upright and inverted), high-alpha rolls, and high-alpha knife edge. Torque rolls, waterfalls, knife edge loops and elevators are all within the performance parameters of this unique aircraft. Just remember to use common sense when flying this high performance machine.

A word about ARF's in General

We are very proud of the construction of the Razor and all of our other ARF aircraft. Each aircraft is jig built to insure a straight true airframe. Every effort is made to build as light an aircraft as possible. As with any professional builder, glue is used sparingly. Please take a moment during assembly and run a bead of CA or aliphatic resin into the high stress joints that you can reach such as the landing gear plate, servo mounting trays, wing hold down blocks, etc. Also, during the course of shipping from the manufacturer to our facility in the United States, it is not uncommon for the aircraft to experience several changes in climate. This may cause the iron-on covering to develop wrinkles. This is not a fault of the manufacturer. Please take a few minutes with your heating iron and heat gun to iron down the seams and re-shrink the covering where needed. The results will be a beautiful aircraft with a breathtaking finish that you will be proud to display at your flying club. Now lets get started with assembly!

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Before beginning assembly of your Razor, we highly recommend that you study this manual in its entirety. You should begin planning your radio installation based on your choice of engine and equipment from the beginning, as space is limited within the fuselage of the Razor.

Because the Razor is intended for those with some degree of modeling experience, every minute detail will not be covered. This is not a basic trainer. Assembly of this aircraft will be easy for the experienced modeler, and by following the instructions within this manual and using the skills you've gained during your modeling career you will be able to produce a first class aircraft.

Building supplies needed

Hobby knife w/#11 blades
Thin Zap CA
Medium Zap CA
Zap canopy glue
30 minute z-poxy
Pacer thread lock
Diagonal wire cutters
Pliers
Assorted drill bits
Various sized screwdrivers(both Phillips and standard head)
Tape measure
Dry-erase marker
Paper towels
Rubbing alcohol

1. Begin construction by locating the fuselage, wing, nylon wing bolts, and the horizontal stab. Using a #11 blade, remove the covering from the stab location at the rear of the fuselage.

2. Insert the stab into the slot and center using a tape measure or ruler to measure from the fuselage side to the tip of the stab.

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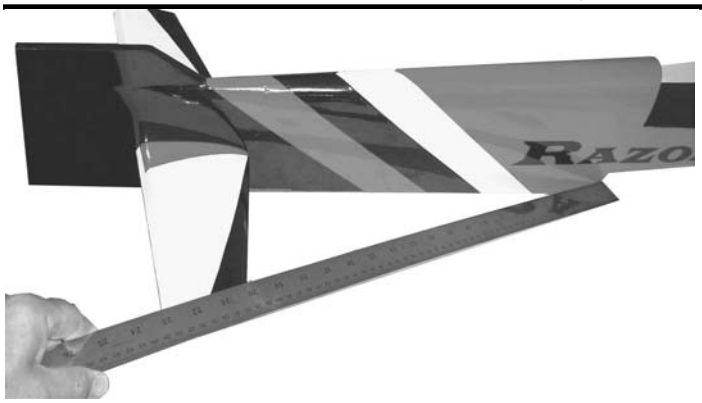
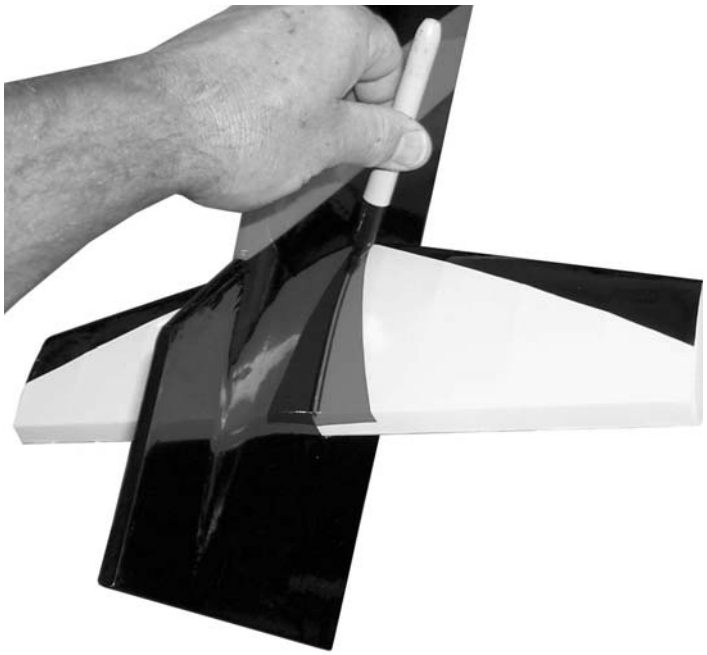
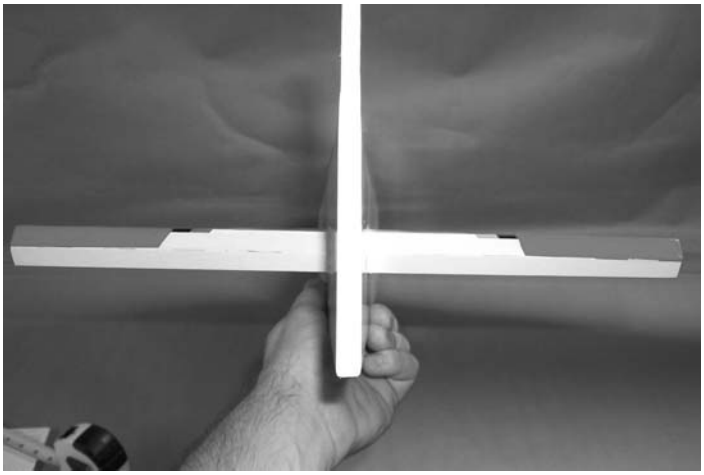


3. With the stab centered, measure from one tip to the back of the wing cut out. Move stab until this figure is the same on both sides.



4. When satisfied with the alignment, use a dry-erase marker to draw a line on side of the stab, top and bottom where it meets the fuselage. Remove stab from opening.

5. Using the #11 blade, remove the covering on the top and bottom of the stab between the lines. Cut about 1/8" inside the lines so that there is no exposed wood when glued in place. Be careful to cut only the covering and not into the wood of the stab as this would weaken the stab.



6. Bolt the wing to the fuselage. This will help you achieve proper alignment. Insert the stab into the fuselage one more time before gluing and check alignment with wing. Wing and stab should be parallel. When satisfied with alignment, remove stab. Mix some 30- minute epoxy and apply to stab opening in fuselage and to bare balsa on the stab. Re-insert stab into fuselage and check alignment using all previous methods. Wipe away any excess epoxy using rubbing alcohol and a paper towel. Use masking tape to maintain alignment while glue dries.

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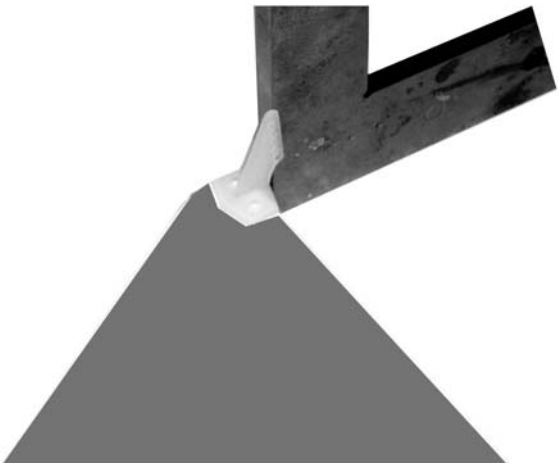
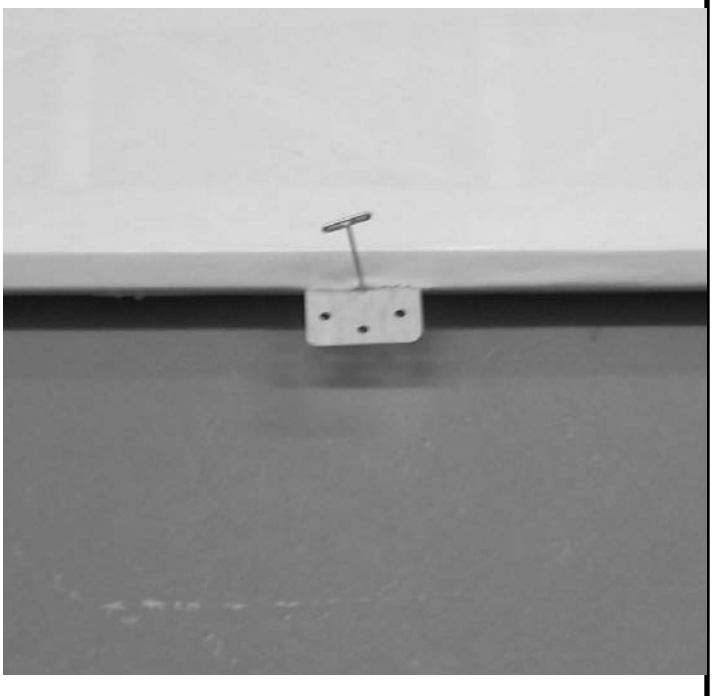


7. While the epoxy dries on the stab, mount the control horns on the elevators. Align on the inside edge of elevator on the bottom side , with the holes on the horn aligned over the hinge line. Use a square to check alignment of holes over hinge line, this is important to maintain even throw on both elevators. Use a long drill, piece of wire, or pencil to mark the holes through the control horn. Remove the horn and drill the holes using a 5/64" drill. . Mount the horns to the elevators using the 2mmx20mm bolts and the nylon plates on top of the elevator.



9.Install the elevators on the hinges and with the elevators pushed tightly against the stab, remove the pins. Using thin CA, glue each hinge in place by apply two to three drops on each hinge. Have the elevators deflected to full up when gluing the bottom side of the hinges and deflected to full down when gluing the top side of the hinges. This will insure that you get full throw later.

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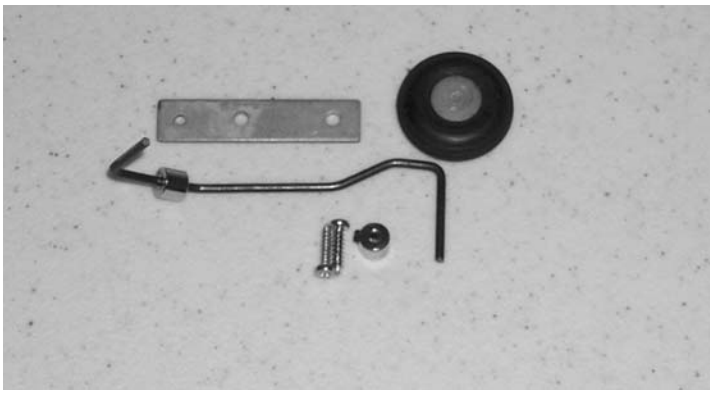
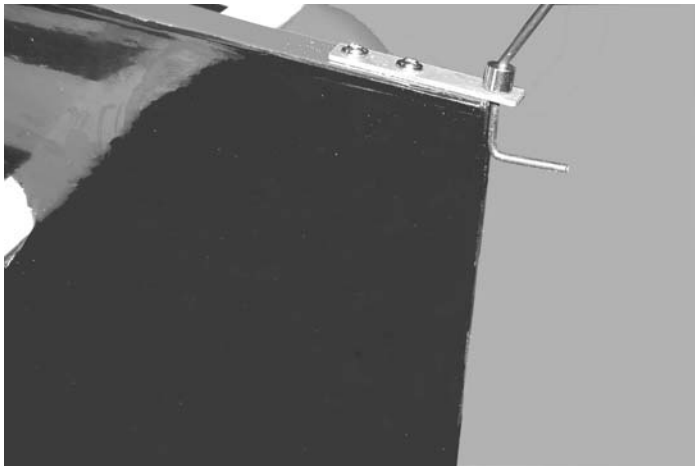
10. Locate the tail wheel hardware, mounting plate, wire, wheel, wheel collar, and screws.



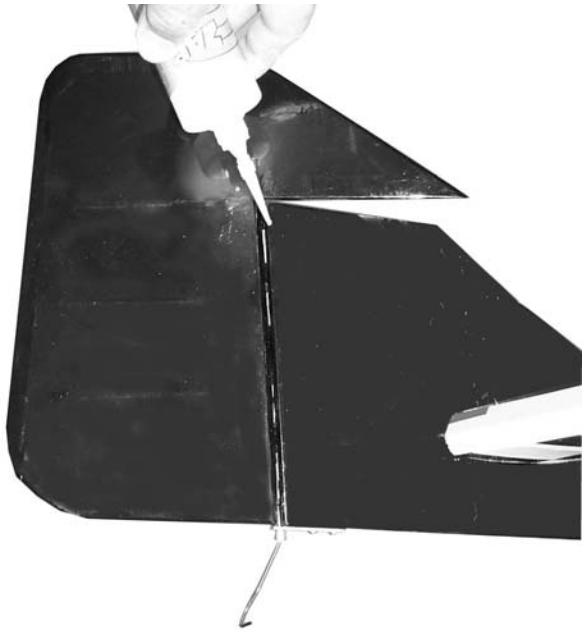
11. Insert the wire through the hole in the plate and align the wire against the back edge of the fin.



12. Drill a 1/16" hole in the location of the two mounting holes and install using the 2mm screws.

13. Mark the location of the tail wheel wire on the rudder and drill a 3/32" hole into the rudder to accept the tail wheel wire. Notch the leading edge of the rudder so the hinge line of the rudder will be flush against the fin.

14. Locate the rudder horn 5" from the bottom edge of the rudder on the left side. Mark the holes and drill using 5/64" drill as was done with the elevator. Mount the horn using the 2mmx24mm bolts and nylon plate.



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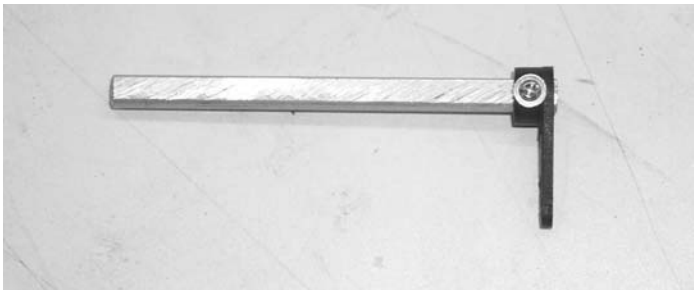
15. using pins to center the hinges as was done with the elevators, install the rudder.
Deflect to full throw and glue the hinges in place using thin CA.

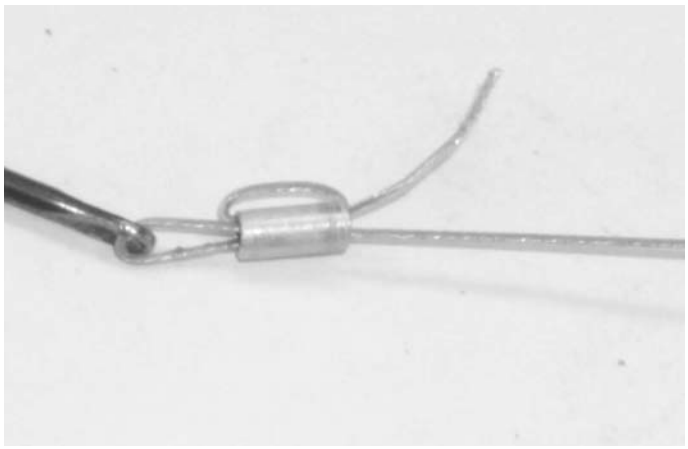
Elevator Bellcrank

1. Locate the elevator bellcrank hardware.



2. The aluminum shaft has a hole on one end, Install one of the control arms on that end using the 2mm screw into the hole. It may be necessary to run a 5/64" drill through the hole in the aluminun shaft.

3. Locate the center tiller arm and the the two cable ends with the z-bends on one end. Install the z-bends into the tiller arm.



4. Take the steel cable and thread it through the swage, through the end of the fitting and back through the swage. Loop it back around the swage and through it again. Crimp the swage using a pair of pliers. Repeat this to the other fitting.

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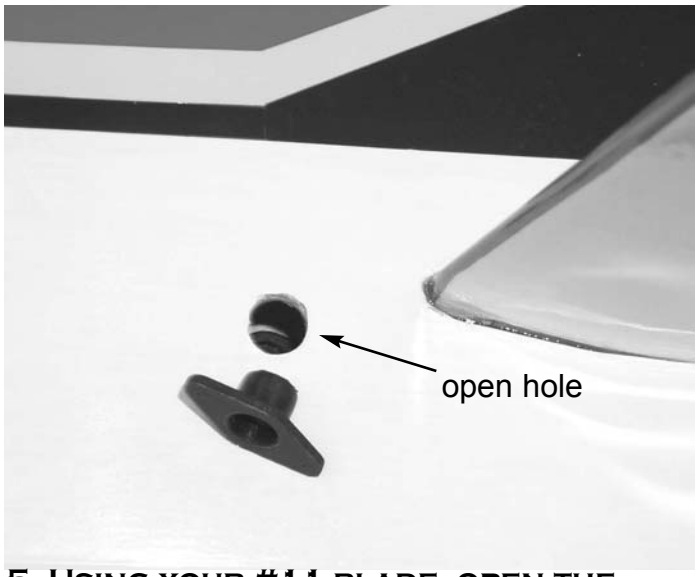
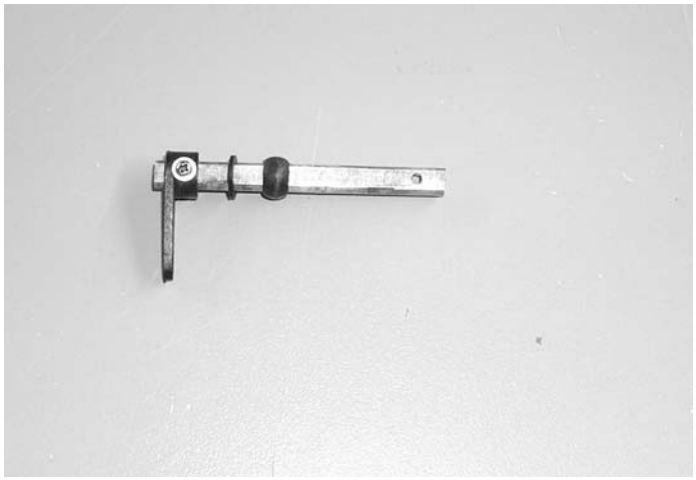
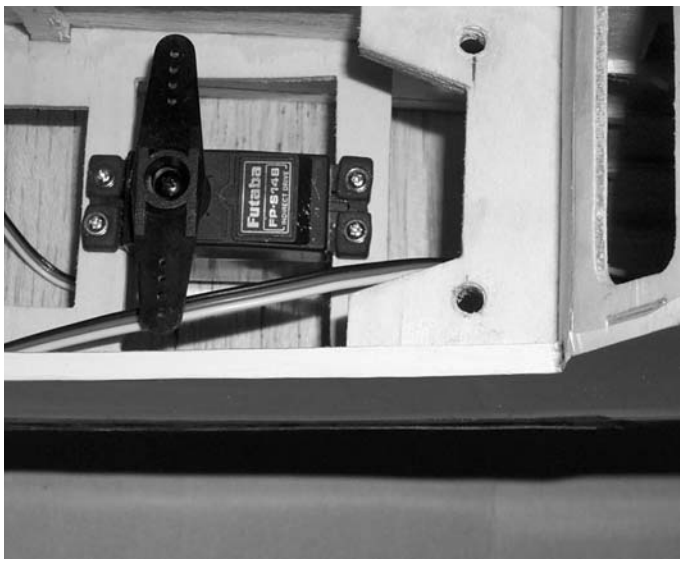


5. Using your #11 blade, open the hole on both sides of the fuselage. Install the mounts in both sides using the 2mm screws supplied. There is an access hole in the bottom of the fuselage for installing the plate on the inside.



6. Install the shaft through the mounts by first putting a washer, then the ball shaped bearing,and inserting in one side. You must then pull the steel cable through the opening in the bottom of the fuselage and install the tiller arm on the shaft as it passes through the fuselage. On the other side install the ball shaped bearing, another washer and then the other control arm. You must now mark the location of the hole on the aluminum shaft and drill a 5/64" hole to accept the 2mm screw. Install the screw. Rotate the shaft so as both control arms point to the bottom of the fuse. Through the access hole on the bottom of the fuse, install the set screw in the tiller arm so it is on the flat side of the aluminum shaft. Center the tiller arm in the fuselage.

7. you can mount the hatch cover on the bottom of the fuselage using clear tape.



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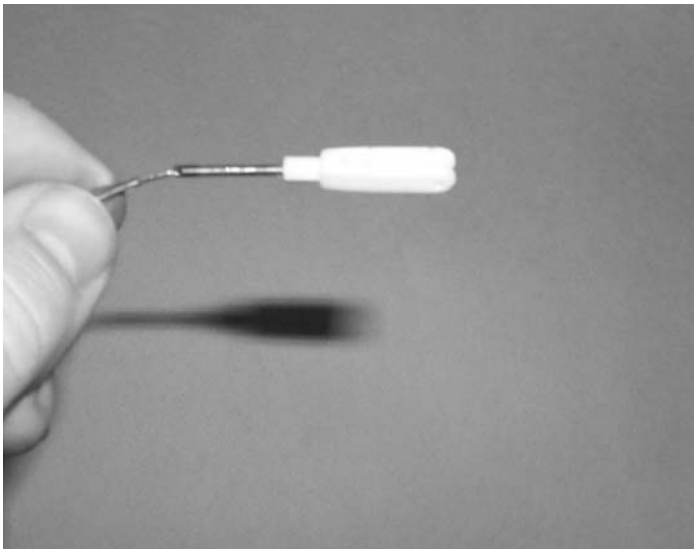
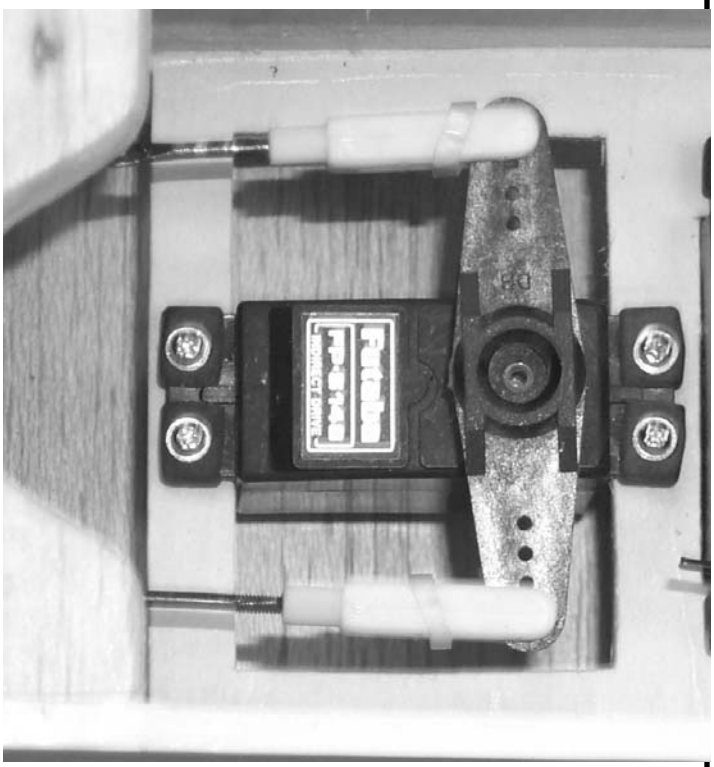
8. Center the elevator servo in the tray and mount using the hardware supplied with the radio.



9. Locate the other two pull-pull cable ends and thread a clevis on each. Use the silicone retainers.



10. With the servos centered, install the two clevis on the arm and thread the steel cable from the tiller arm through the swage, through the end of the fitting and back through the swage. Do not crimp yet. Pull the cables tight and make sure they are not twisted together and have a straight shot to the tiller arm. Make sure the arms on the outside of the fuselage are at 90 degrees to the elevator. When satisfied with the alignment, pull tight and loop back through the swage and crimp.

11. Locate the two 2mmx13cm elevator pushrods and thread a clevis on each. Install the clevis on the elevator horn and mark the location of the bend at the bellcrank. Bend the rod 90 degrees and cut to a length of 3/8".

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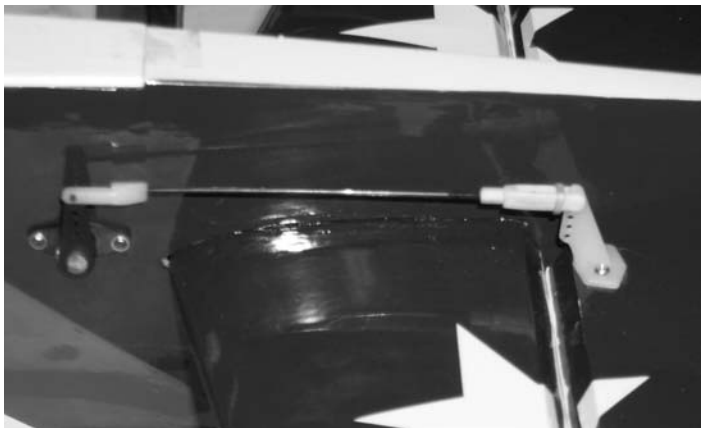
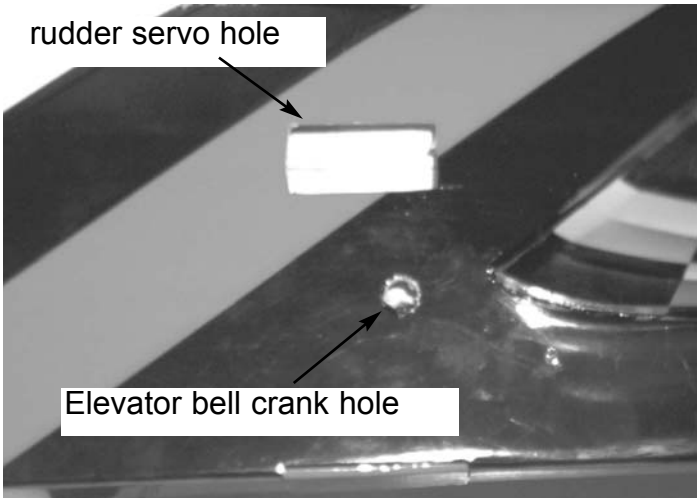
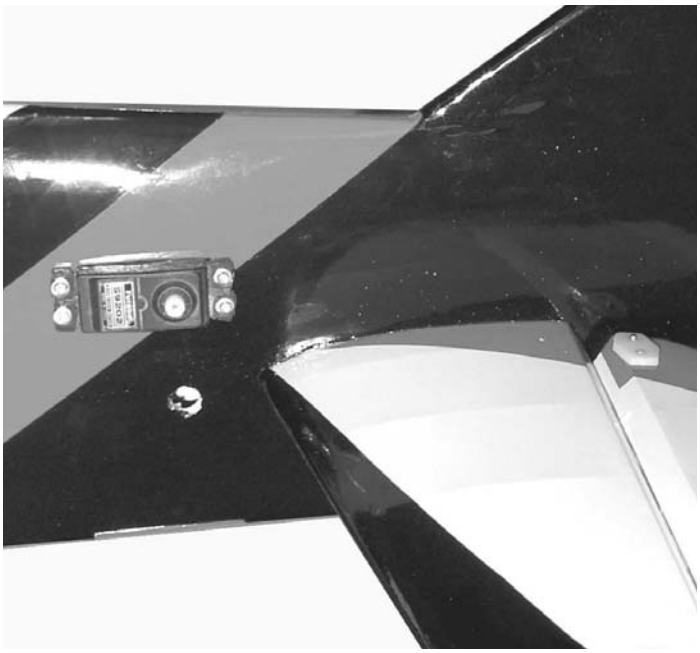


12. Install the elevator pushrod using the nylon swing in keeper on the bellcrank end.

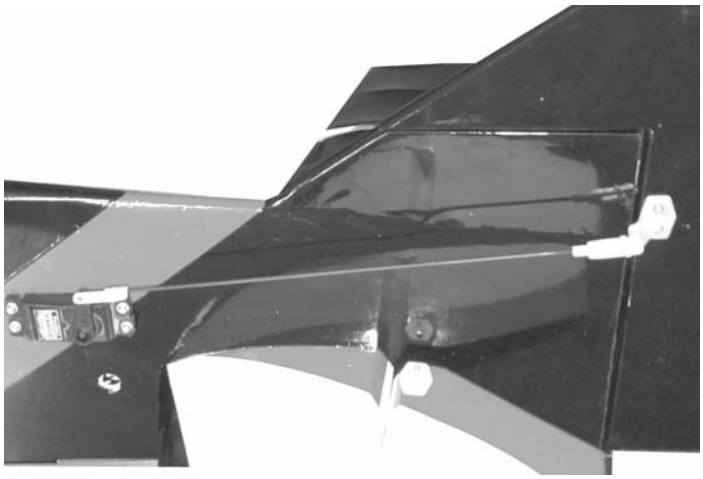
Rudder Servo



1. Remove the covering over the rudder servo cutout with you #11 blade. It is just above the elevator bell crank hole on the right side of the plane.



2. Install the rudder servo using the hardware supplied with the radio. You will need an 18" extension added to the servo lead.



3. Locate the 2mmx23cm pushrod and thread a clevis on the end. Install a servo arm on the servo and center the servo. The arm should be position pointing up parallel to the rudder hinge line. Mark the location for the bend and make a 90 degree bend. Cut off at 3/8" and install in the arm using the swing in nylon keeper to retain it. The hole in the servo arm will need to be drilled to a 5/64".

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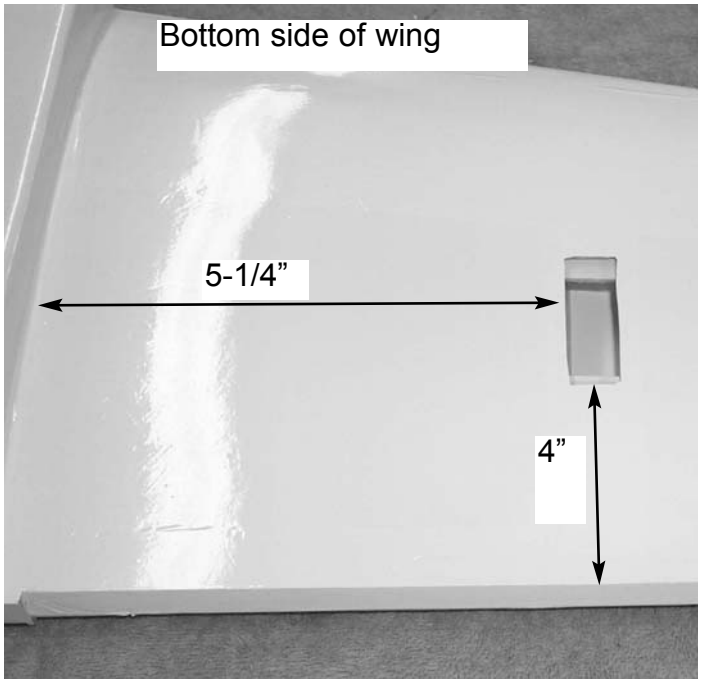
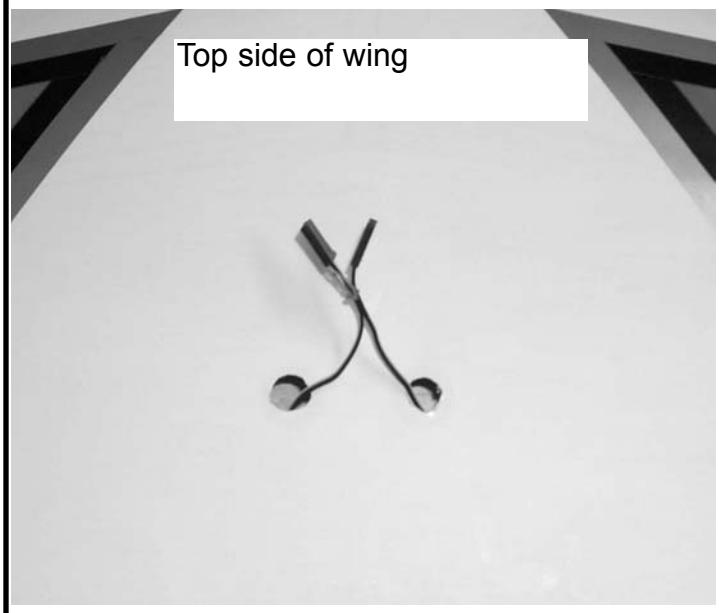
Ailerons

1. Install the ailerons using pins and Thin CA as was done with the elevators and rudder.

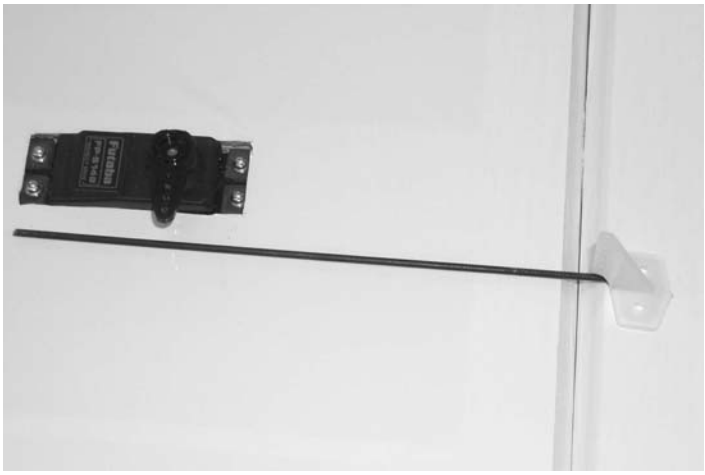


2. Locate the servo hole in the wing and remove the covering with your #11 blade.

3. Install the servo using the hardware supplied with the radio. Inside the cutout you will find a piece of nylon fishing line to use to pull the aileron lead to the center of the wing. Tape your servo lead to the fish line and pull it out the hole in the center of the wing.



4. Install a control horn on the servo and center the servo with the arm 90 degrees to the servo. Locate the position for the control horn by laying the pushrod at the end of the horn and perpendicular to the hinge line. Mark the location and drill two 5/64” holes. Mount the horns using the 2mmx13cm screws



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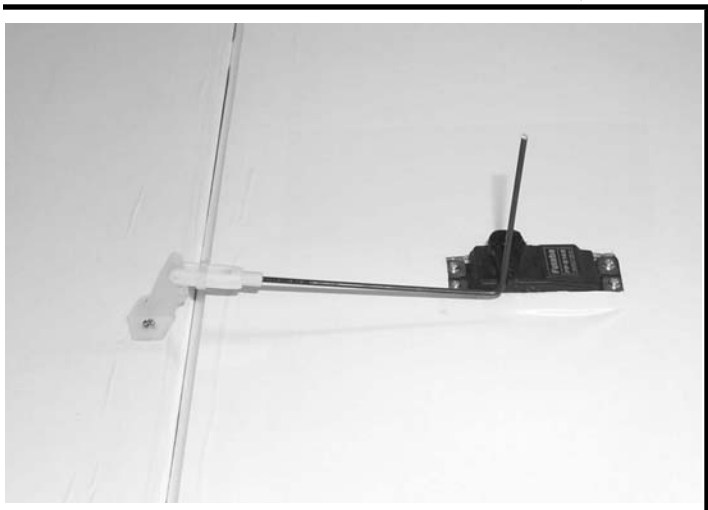
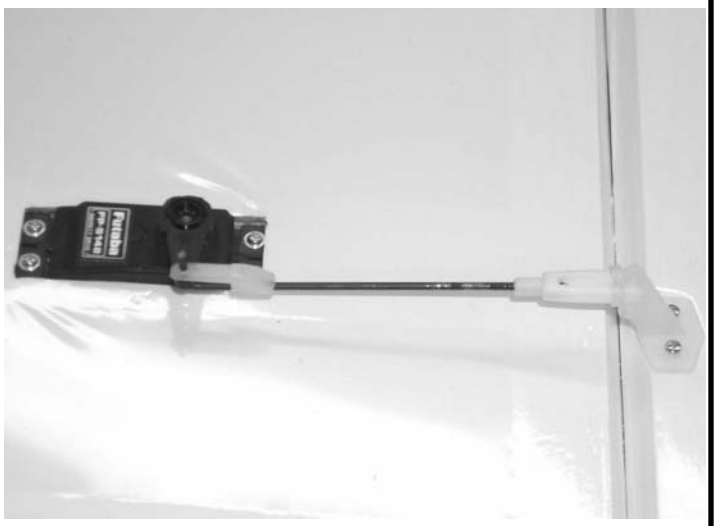


5. Screw the clevis on the end of the pushrod and mark the location on the servo arm. Make a 90 degree bend and cut at 3/8".



6. Use the nylon swing in keeper to retain the pushrod. Use the silicone keeper over the clevis.

Landing Gear.

1. Locate the landing gear and bolt in place using the four 3mmx12mm bolts and flat washers. Use thread lock compound. The blind nuts are already installed in the fuselage.

2. Locate the fiberglass gear cover and install using the four 2mmx10mm screws. Drill a 5/64" hole in four locations, two on the front and one on each side at the rear. Fit in place and drill a 1/16" hole to accept the 2mm screws.

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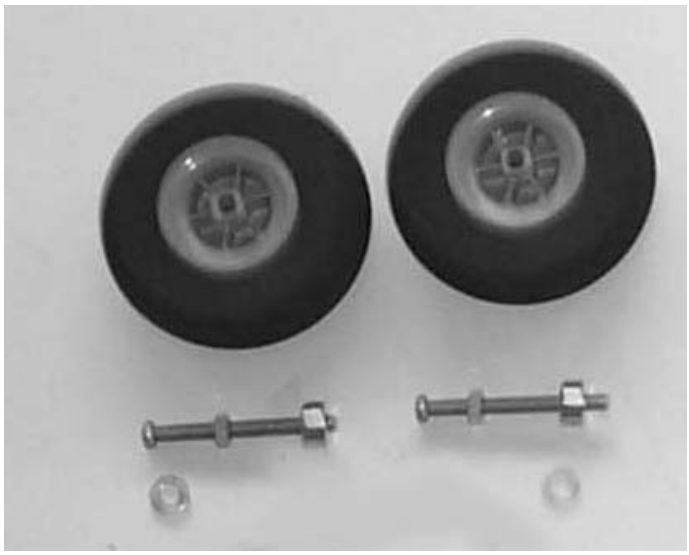
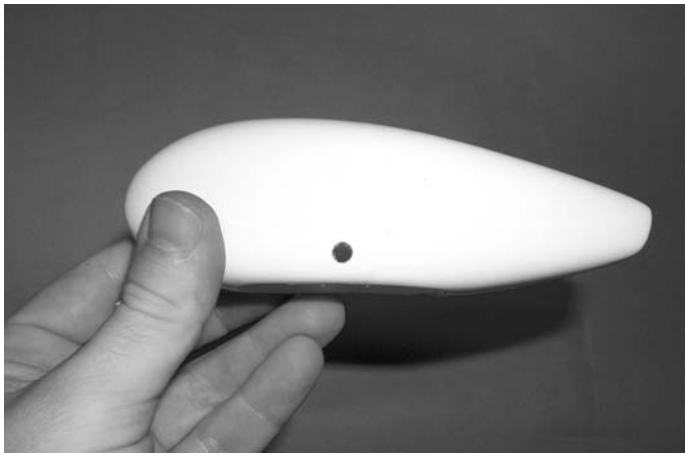


3.Locate the two wheels, axels(4mm bolts) two 4mm nuts, two 4mm washers and two 4mm wheel collars



4. Locate the two fiberglass wheel pants. Look in side the wheel pant and identify the plywood pad. This pad is on the inside portion of the wheel pant. The pants are just alike except for this mounting pad. drill a 5/32" hole into this mounting pad, 1/2" up from the bottom edge and centered on the wheel opening.

5. Insert 4mm bolt through landing gear and hole in wheel pant. Place the washer over the bolt and start the nut on the end. You will now have to put the wheel into the wheel pant and let the bolt go into the wheel as you tighten the nut down. When the nut is tightened all the way down, it will clamp the wheel pant to the landing gear leg. You can rotate the wheel pant into the correct position and finish tightening the nut. A drop of thread lock works well here. You can then install the 4mm wheel collar on the end of the bolt to hold the wheel in place.

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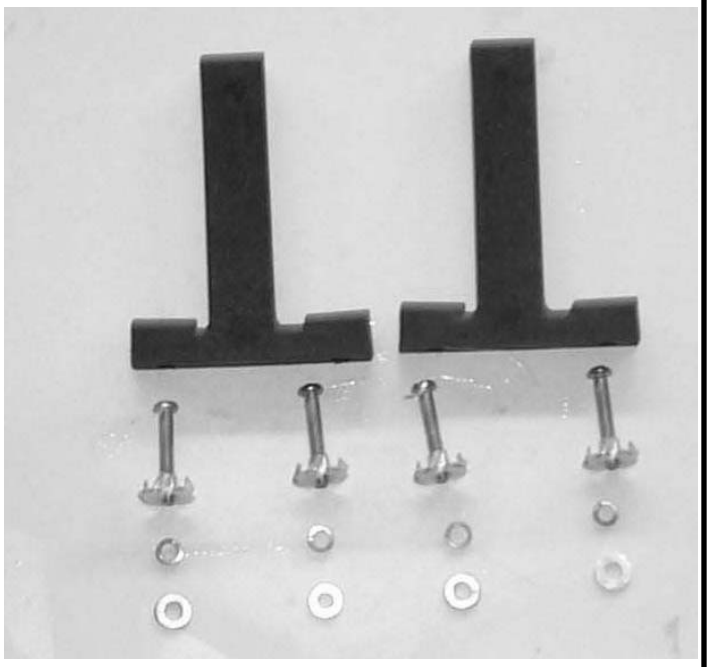
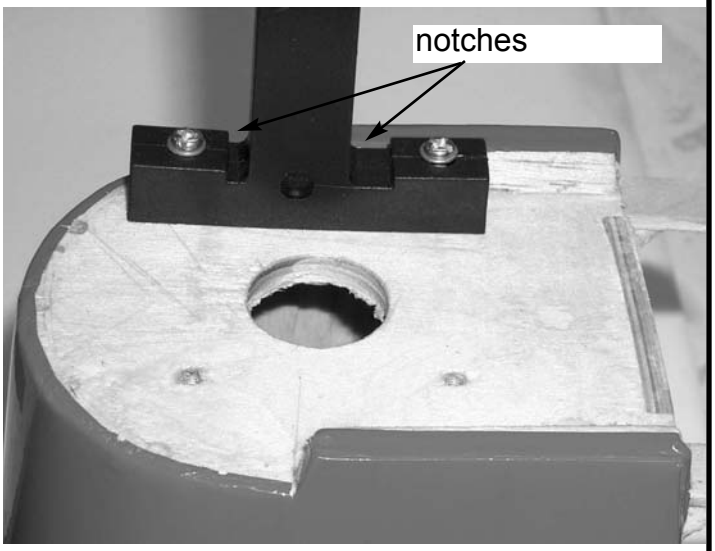
Engine Mounting



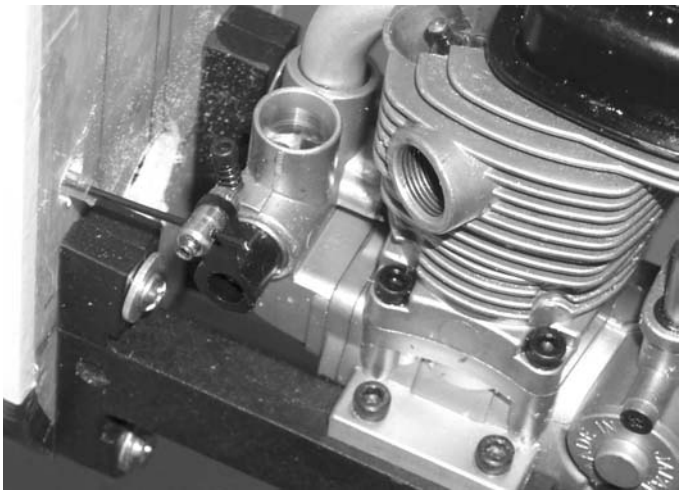
1. Locate the two motor mounts, four 4mmx25mm bolts, four flat washers and four lock washers. The blind nuts are already installed in the fuselage.



2. Bolt one motor mount in place using the 4mm bolts, washers, and lock washers. Use thread lock also. Note the location of the notches on the motor mount and turn in that direction.

3. Install the other motor mount in the same manner.

3. Place you engine in the mounts and adjust till the prop washer is 4-1/2" from the firewall. Clamp the engine in place and and mark the location of the mounting holes. Drill and tap the holes to accept the bolts for the engine. These bolts are not provided in the kit.



4. Drill a 9/64" hole in the firewall in position with the throttle are. Insert the 3.25mm nylon sleeve in the hole. Install an e-z connector in the throttle arm and install the 1.25mmx50cm pushrod.

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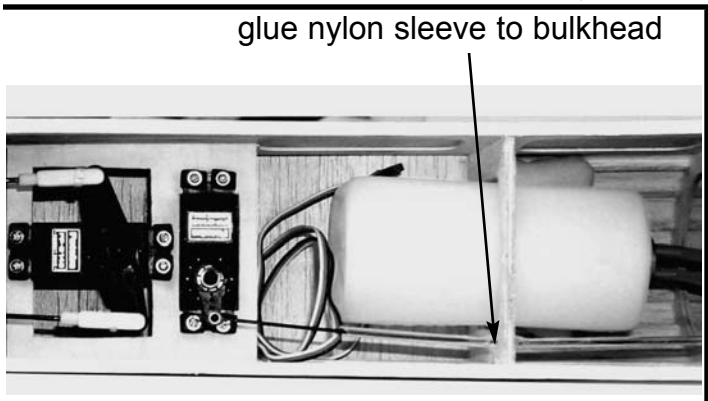
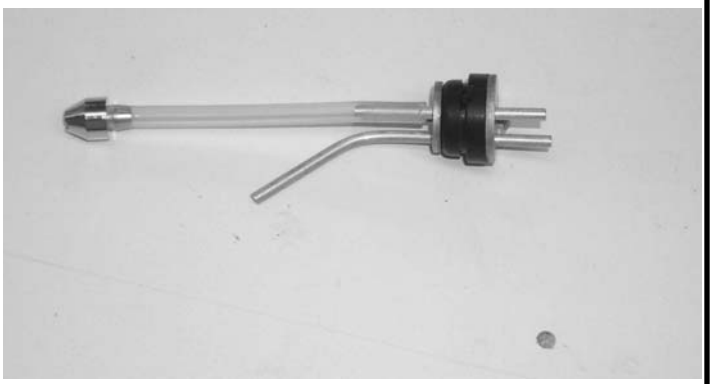


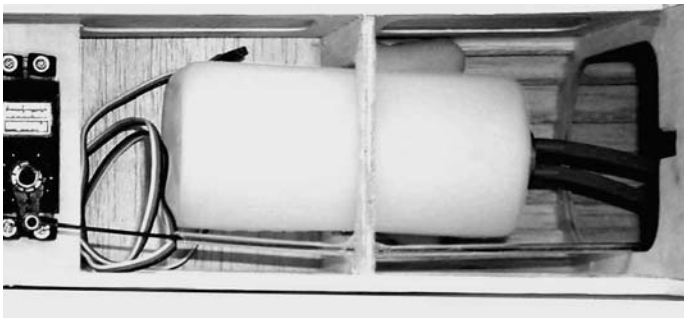
5. Mount throttle servo in tray ahead of rudder servo. Position so the output is on the same side as the throttle pushrod. This may vary depending on the engine used. Glue the nylon sleeve to the bulkhead to prevent flexing of the rod. Install another e-z connector on your servo arm and attach to the throttle pushrod.

Fuel Tank

1. Locate the fuel and hardware.



2. Assemble the cap by inserting the screw through the large washer, through the black rubber and threading into the small washer on the back side. Insert the three metal fuel lines into the holes in the cap. The short line will be the pickup line and will have the silicone tubing attached to the back end. On the other end of the silicone tube install the clunk. This should be adjusted in length so the clunk is about 1/4" off the bottom of the tank. One of the long tubes should be bent so it rest against the top of the tank. This is the vent line. The other tube will be the fill line. Insert the stopper in the tank and mark the fill, vent, and pickup line so you don't get them mixed up later. If you are using a YS engine which pressurizes the tank, you should wrap the tank in strapping tape with a couple of loops going around the cap to make sure it does not blow off.



3. Install the tank in the fuselage in the notches provided in the bulkhead, and hold in place with foam(not provided). Attach fuel lines(not provided) to the three metal lines and route through the hole in the firewall and to your engine. If you are using an engine without a pump or pressure system you will probably have to mount the tank in the nose of the plane.

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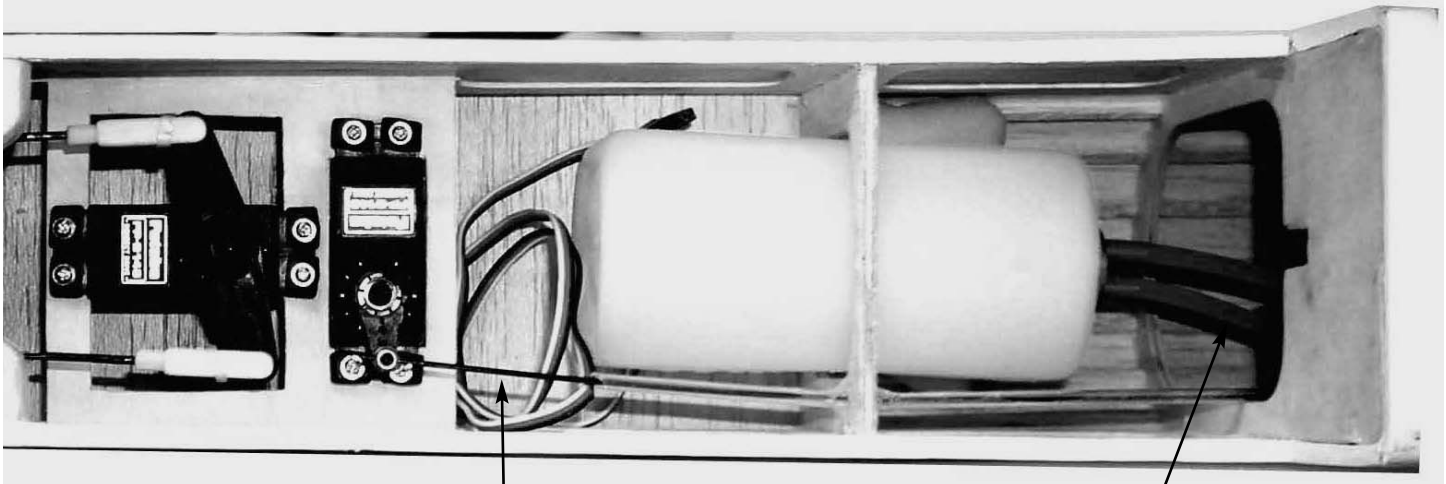
If you mount the tank in the nose the receiver, switch and battery pack will mount just ahead of the servo tray. If you mount the tank just ahead of the servo tray, your receiver, battery, and switch must go in the nose of the plane. The switch can be mounted through the side of the fuselage or on one of the switch mounts made by DuBro. The battery can be wrapped in foam and mounted in the nose of the plane or moved back if the CG requires. Wrap the receiver in foam and mount in the nose.



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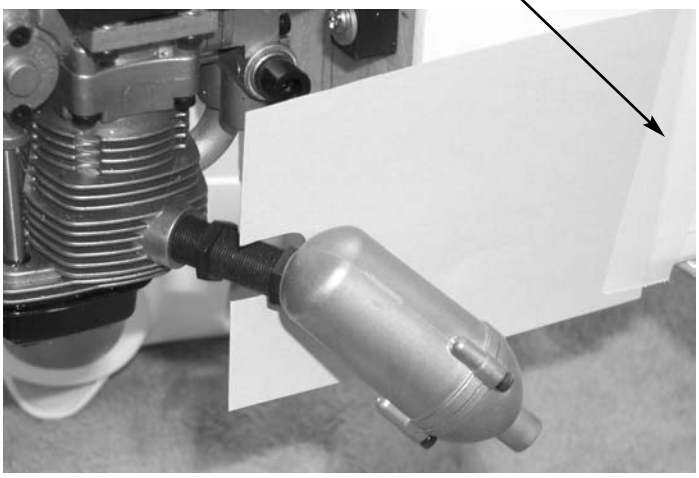
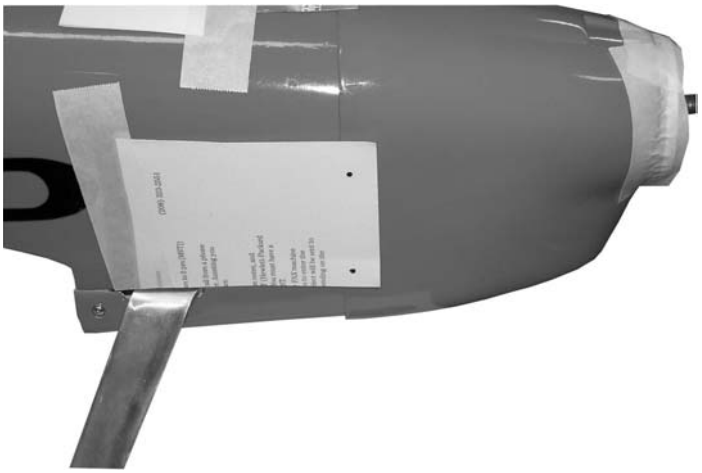
Cowl installation



1. The easiest way to cut the opening for the muffler, needle valve, and head is to use a piece of cardboard and cut it to fit around the part you are fitting. Tape the cardboard to the fuselage about 1" behind where the cowl will end. You can now remove the muffler, slide the cowl in place and transfer the hole to the cowl from the paper template. You will need to start with the head because the cowl will not go on until the head clearance is cut. A Dremel tool with a cutter and a sanding drum does the best job.



2. After all the cutout are made in the cowl, you can use the same method to mount the cowl. Tape the paper templates to the fuse side and make a hole that will be in line with the firewall. This needs to be about 1/8" back from the front edge of the firewall so the screws will hit the solid wood of the firewall and not just the soft balsa of the sides. With the templates in place, install the cowl and put your spinner back plate in place. Place a 1/8" shim between the cowl and spinner back-plate and tape in place. When satisfied with the alignment of the cowl, transfer the holes from the paper templates to the cowl. Remove the cowl and drill 5/64" holes at this location. Reinstall the cowl and tape back into position. Use a 1/16" drill to drill pilot holes for the screws through the holes in the cowl. Install with the 2mm screws provided. It is a good idea to remove the cowl and harden the mounting holes by dropping a couple of drops of thin CA into each hole. Let cure before reinstalling.

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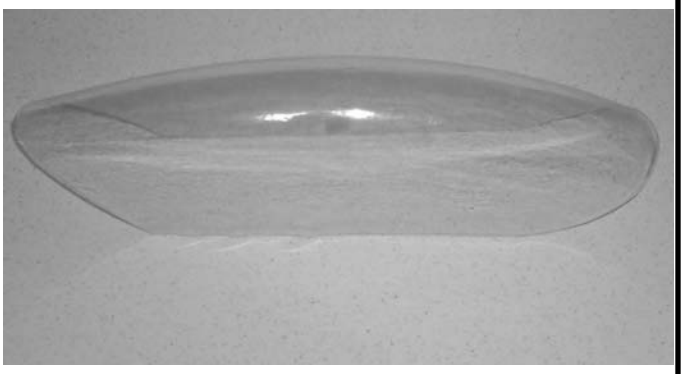
Canopy



1. Locate the canopy and trim to the scribe line. It is a good idea to trim about 1/8" outside the line at first and then trim to fit so as not to get it too small.

2. Position canopy and check fit. When happy with fit glue in place with ZAP canopy glue. Use masking tape to hold in place till glue dries.

Balancing

Your model should balance at 5-1/2" to start. This position is 30%. For extreme 3D you may want to move the cg back even more. Just remember that the further back you go the more sensitive it will become. With extreme throws the model can get beyond the ability of novice pilots very quickly.

Start with the controls set at low rate with the ailerons plus or minus 3/8", the elevator plus or minus 1/2" and the rudder plus or minus 1-1/2". High rate should be all you can get.

Good Luck and I hope you enjoy flying you Razor 3D.

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