SPAD Derringer Building Instructions

The Derringer (like the Derelict) also does not contain any new secrets or design breakthroughs, in fact it's basically a scaled down version of the Derelict, and it is extremely simple to construct like all it's other SPAD family members. We have discovered that our local Pay-Less Cashways carries a Canadian brand of PVC gutter pipe that has a thinner wall & also has a smaller O.D. measurement (2 3/8"), and it is much lighter than American made gutter pipe (about half the weight!). We have also discovered that our local Coroplast® supplier can special order 2 MIL Coroplast®, which is half the thickness, and almost half the weight of the 4 MIL we have been using. The Derringer uses the 2 MIL Coroplast® for the wing, and 4 mil for the tail and ailerons. The 2 MIL Coroplast® is flexible enough to bend perfectly over the wing spar, without the need for any upper airfoil folds! The prototype was equipped with an O.S. FP .15 (slightly modified), a 270 mah battery pack and three Hitec® HS-81 servos - it weighed in at just 1 lb 12 oz! This plane is most certainly geared towards experienced builders and flyers, so these instructions will be right to the point. If you have any further questions, please don't hesitate to post them on our SPAD message board .

Fuselage:

1) Starting with a 20" piece of Gutter pipe, measure, mark, and cut out the radio access hole, and rear cut out as shown on the fuselage drawing. A Dremel® with a cutting wheel works best for this. There in NO down or right thrust on the Derringer. If you are using full size radio gear - see the note below, if not, procede to step 2.

NOTE: If you are planning on using full size radio gear, we highly recommend installing all of the radio gear, engine and fuel tank in the fuselage first (before drilling the wing hold down dowel holes). Then take the wing and tape it to the fuselage - sliding it fore and aft as necessary - until the correct CG position is achieved. Mark the fuselage where the leading and trailing edges are on the fuselage. Then mark and drill for the dowel holes - keeping them 1/2" in front of the leading edge mark and a 1/2" aft of the trailing edge mark you made earlier. If you build the Derelict per plans, and you use full size gear, you will have an extremely tail heavy airplane that you may not be able to balance correctly!

2) Drill for, and install the 4 1/2" long x 3/16" dia. wing hold down dowels as shown. Fuel proof the hold down dowels with CA.

NOTE: Install the wing hold down dowels as close to the upper fuselage gutter pipe radius as

possible to assure proper fuel tank clearance!

3) With the rear fuselage cut out scrap, fabricate 4 control horns, two wing rubber band protectors, one V-tail support, and two small aileron servo mounting pieces (size will be determined by the servo you use).

4) The firewall is fabricated from 1/2" plywood cut to the inside diameter of the gutter pipe, and is mounted flush with the forward edge of the fuselage with four #6 x 1/2" self tapping screws.

5) Drill a small hole in the rear left side lip of the fuselage for combat streamer attachment!

Tail:

1) Cut the V-tail from 4 MIL Coroplast® as shown on the tail drawing, with the corrugations running spanwise.

2) Hinge the elevators by cutting away the bottom side of the hinge line corrugation.

3) Using a straight edge, and small blunt tipped item (such as a #1 phillips screwdriver) score the inside radius of the two fold lines, and bend the V-tails over the edge of a table.

4) Mark the PVC V-tail support bend locations. Using a propane torch (even a cigarette lighter will work) heat up the PVC, and bend each side to a 45° angle. Bending over a block of wood or table edge will assure a nice crisp bend.

5) Using a propane torch "flame" the tail and V-tail support. Using medium CA, glue the V-tail support in place as shown in the drawing.

6) The tail is attached to the fuselage using two #6 x 1/2" self tapping screws. Make sure the pilot holes you drill in the fuselage are small enough to allow good screw grip!

NOTE: The location of the V-tail support, and the tail mounting screws is not critical, as long as the support is roughly centered in the "meat" of the tail, and the mounting screws are near the outer edge of the fuselage. What is critical is getting the tail mounted square! Also, the outward pressure of the 4 MIL Coroplast® on the V-tail support may enlarge your V-tail angle. This is acceptable up to 120° total angle, and will even give your elevators more authority!

Wing:

1) The wing is fabricated from a 36" x 19" piece of 2 MIL Coroplast®, with the corrugations running chordwise

2) The ailerons are fabricated from 4 MIL Coroplast® with the corrugations running spanwise. Hinge as shown in the drawing. A 4" piece of 4 MIL scrap is used as a filler between the ailerons.

3) Mark the wing leading edge fold line, and spar glue line. Using a straight edge and small blunt tipped object, score the inner radius of the leading edge fold line, and bend over the edge of a table.

NOTE: Flame all plastic parts with a propane torch before gluing! Medium CA is used for all wing

construction. USE SMALL 1/8" DROPS EVERY INCH OR SO. A BEAD OF GLUE MAY NOT WORK! USING TOO MUCH GLUE IS THE BIGGEST MISTAKE HERE!

4) Cut down a yardstick to 7/8" wide, then glue the cutdown yardstick to the spar glue line.

5) Test bend the wing top panel over the spar. Here is where things can get tricky, and it's nice to have 5 hands or a helper! The bottom wing panel should remain flat, and the top panel trailing edge must be marked and trimmed flush with the bottom panel trailing edge. Once accomplished, unfold the wing, and glue the ailerons and filler piece to the bottom wing panel.

6) Fold and glue the top panel to the spar and trailing edge. A wood 2 x 4 works great for holding the trailing edge down! Kraut has found that holding the leading edge down with a piece of angle iron while glueing also works great!

NOTE: By nature, the leading edge of your finished wing may be slightly raised, and your lower wing may be slightly undercambered towards the rear. This is acceptable, and is what gives this airplane such great performance!

7) Glue the PVC rubber band protectors to the leading and trailing edge as shown on the overview drawing.

Engine and Fuel Tank:

1) The fuel tank is wrapped in foam for a snug fit, and the engine and engine mount are mounted conventionally. Make sure the throttle pushrod housing doesn't chafe directly on the fuel tank (we've learned this one the hard way!). We have also learned that mounting the engine at 45° (muffler down) not only helps keep goop off your plane, but helps fuel draw during high G maneuvers!

Radio Installation:

NOTE: Your engine and gas tank should already be mounted at this point. USE YOUR RADIO EQUIPMENT PLACEMENT TO ACHIEVE PROPER CG. Your Derringer MUST balance level to slightly nose heavy at the wing spar. A tail heavy condition is not acceptable, and is VERY unsafe!

1) Glue the elevator and aileron control horns in place. Be sure to take into account the pushrod angles on the ailerons. FLAMING OF THE HORNS AND CONTROL SURFACES PRIOR TO GLUEING IS VERY IMPORTANT!!!

2) Cut a hole in the wing just aft of the spar for a snug aileron servo fit. Flame and glue the two PVC aileron servo mounts to the wing. Cut a small hole in the bottom of the wing for the servo lead. Drill for, and mount the aileron servo using servo screws.

3) Mount the elevator servo by cutting a hole in the rear fuselage to accept the servo, and secure using servo screws.

4) Secure the throttle servo to the inside of the fuselage using two sided foam mounting tape. For extra security, you may wish to drill a hole on each side of the servo in the fuselage, and secure with a zip-tie.

5) The battery and receiver are wrapped in foam for a snug fit. We have also used two sided foam mounting tape or Velcro® for this. As this is a combat plane, we recommend filling all voids inside the fuselage with foam to protect your equipment. We also recommend drilling holes in the fuselage on each side of the battery, and further securing
it in place with a zip-tie!

6) Switch mounting and antenna routing are a matter of personal preference. A section of plastic tubing glued to the inside of the fuselage makes a great antenna guide, and the switch on the prototype is mounted on top of the fuselage near the elevator servo.

7) Set your control surface throws as follows: set ailerons & elevators - 1/2" to 3/4" up & down (1" to 1 1/2" total).

NOTE: When rigging your ailerons, ensure that the bottom of the ailerons are parallel to the top of the fuselage! Do not allow then to droop (like flaps)! If your ailerons droop, they will drastically affect pitch trim!

Flying your Derringer:

1) Follow ALL AMA safety codes!

2) Attach your wing with at least 8 #64 rubber bands

3) Make sure your prop is clocked to stop horizontal, and that your throttle is rigged to shut the engine off for landing.

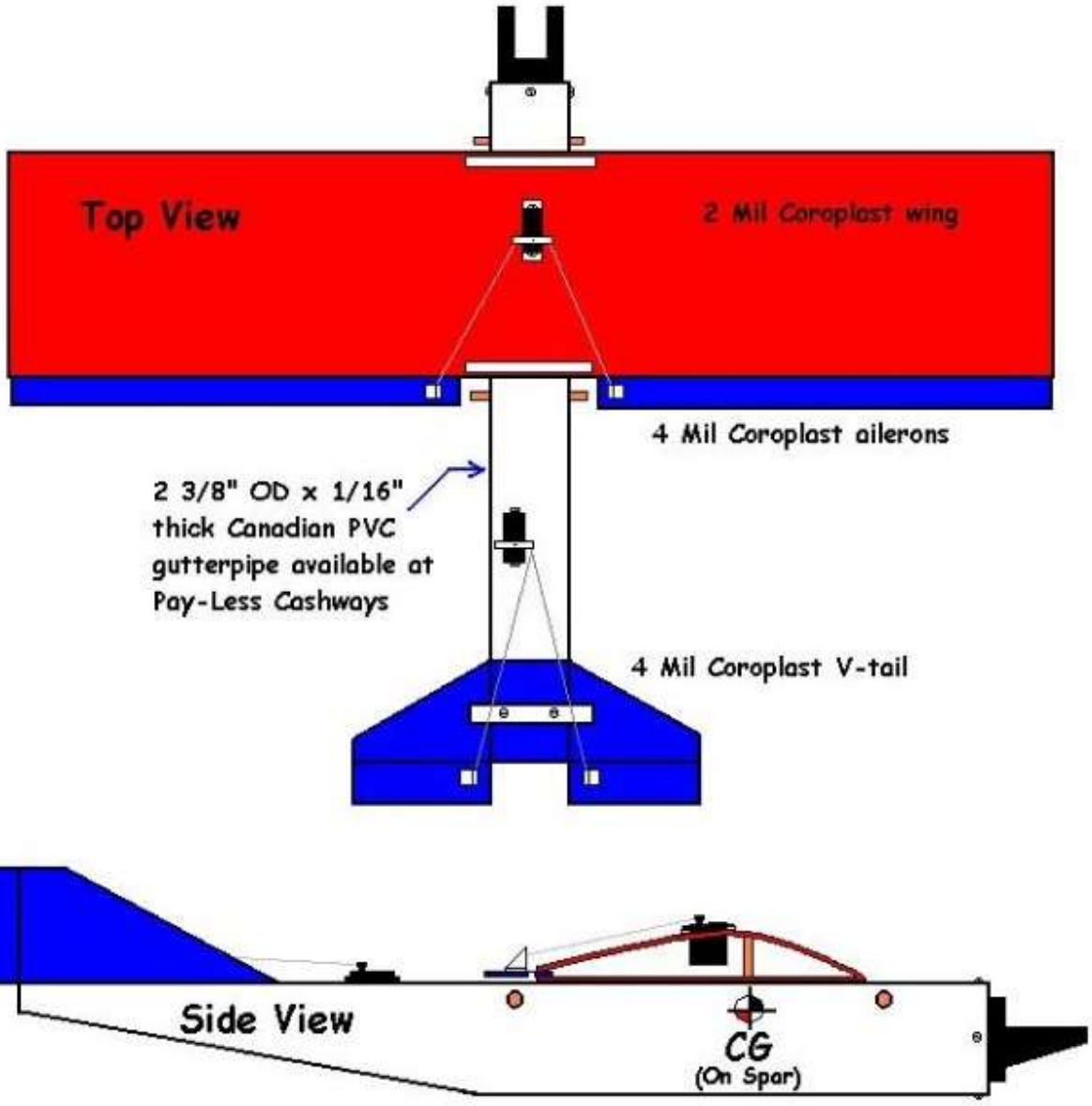
4) Have some one else hand launch your plane until you have it trimmed out properly. IF YOU ARE NOT AN EXPERIENCED PILOT, DO NOT ATTEMPT TO FLY YOUR DERRINGER BY YOURSELF - PLEASE FIND SOMEONE EXPERIENCED TO HELP YOU!

5) Fuel up and go kick some serious butt!

As always, send pictures if you would like to show off your plane on the SPAD gallery! And if you have any further questions, please don't hesitate to post them on our SPAD message board !

[S.P.A.D.] [SPAD Index] [Derringer] [Build] [Overview] [Fuselage] [Wing] [Tail] [Rx Install]

Derringer Overview



Note: V-tail mounted to fuselage with two #6 x 1/2" self tapping screws

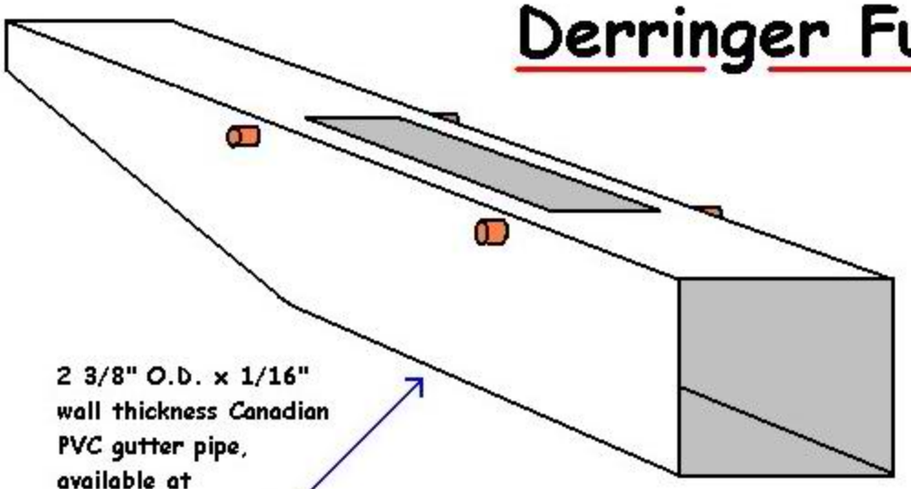
Note: PVC rubber band protectors glued to wing leading and trailing edge

Note: Firewall mounted with four #6 x 1/2" self tepping screws

Note: "Flash" all plastic parts with a propane torch prior to gluing in place with meduim CA. (Control horns, V-tail support, aileron servo mounts, wing rubber band protectors)

[S.P.A.D.] [SPAD Index] [Derringer] [Build] [Overview] [Fuselage] [Wing] [Tail] [Rx Install]

Derringer Fuselage



2 3/8" O.D. x 1/16" wall thickness Canadian PVC gutter pipe, available at Pay-Less Cashways

1/2" Plywood Firewall

4 1/2" long x 3/16" Diameter wing hold down dowels

3/16"

Top View

6"

4 1/2"

9"

2 1/4"

20"

3/8"

Side View

Install wing hold down dowels as close to top fuselage radius as possible to assure fuel tank clearance!

10"

Other PVC parts

V-Tail support

1"

4 1/2"

Wing rubber band protector (2 EA.)

3/16"

4"

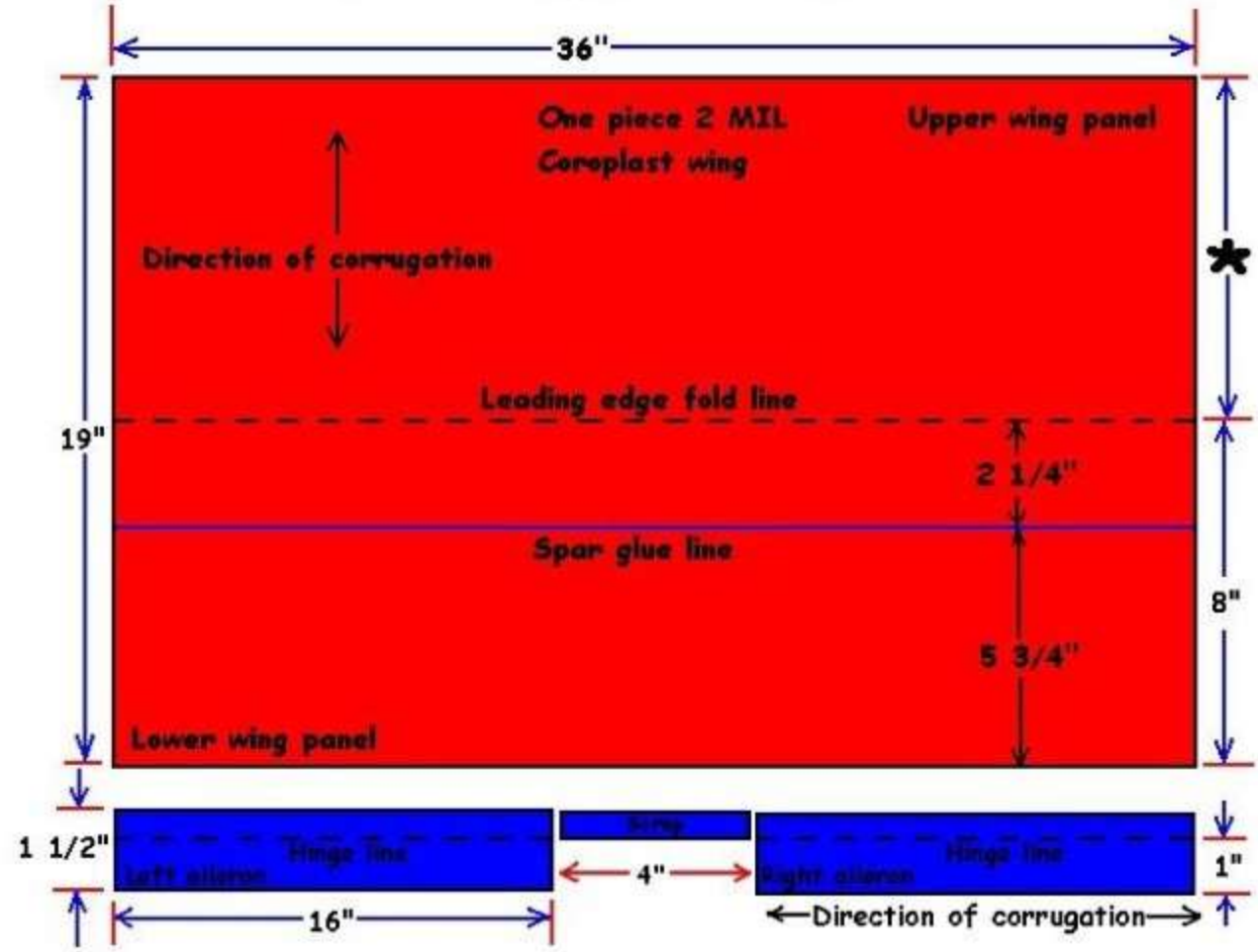
PVC Control horn (4 each)

3/4"

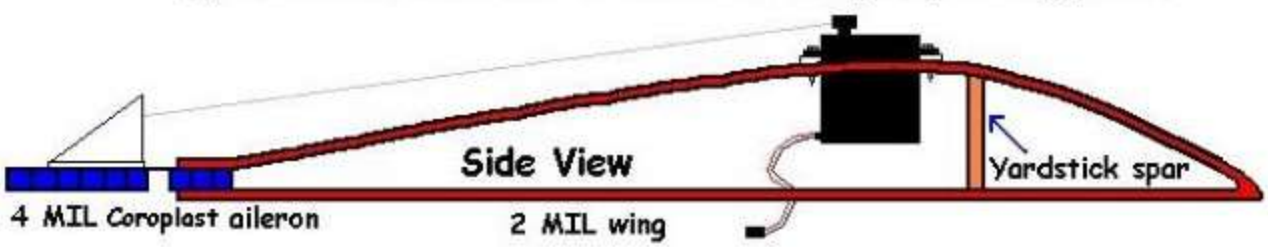
3/4"

1/2"

Derringer Wing



* This final demension to be determined during wing building process



Note: Aileron hinge created by cutting away one side of a Coroplast corrugation

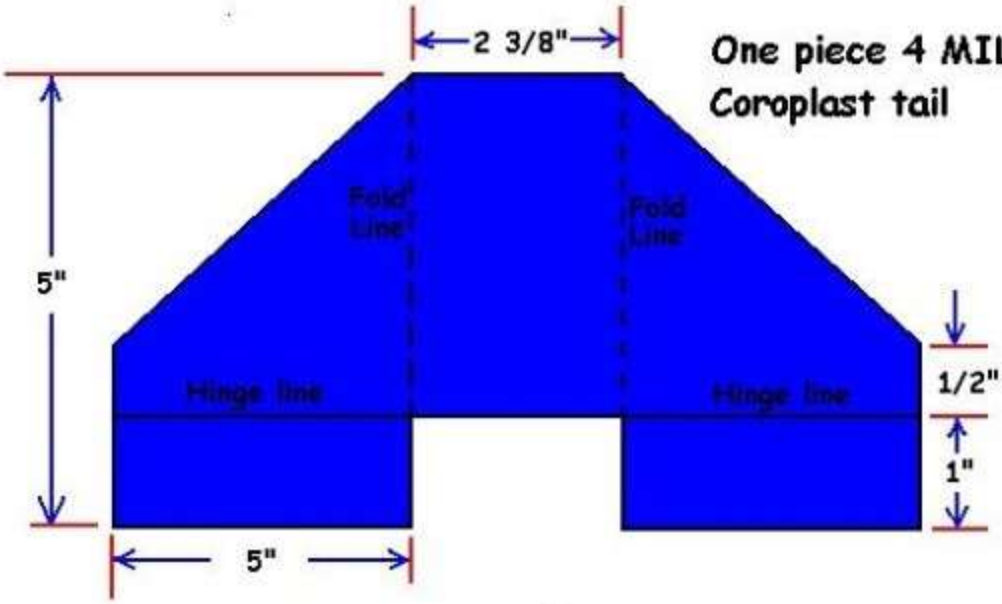
Note: Aileron servo mounted with servo screws onto small PVC scraps glued to wing

Note: Cut a small hole in the bottom of the wing for servo lead to pass through

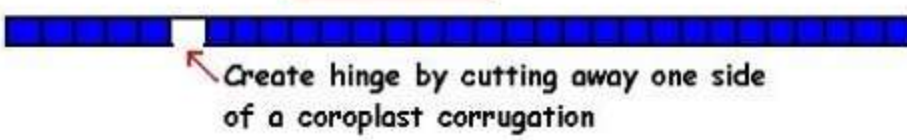
Note: See overview picture for location of PVC wing rubber band protectors

Note: Be sure to "flash" all plastic parts prior to gluing!

Derringer Tail

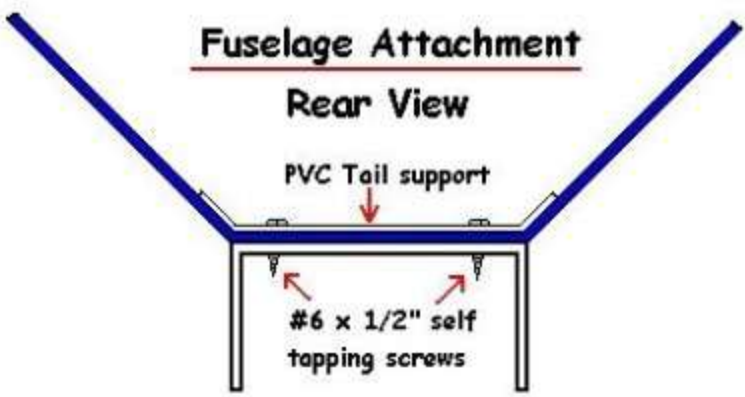


Side View

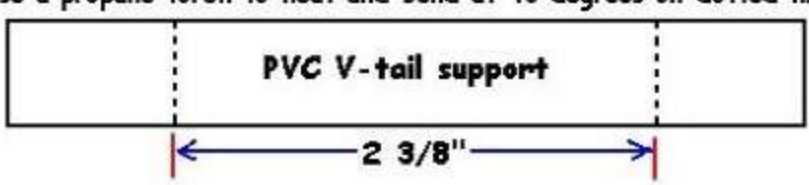


Fuselage Attachment

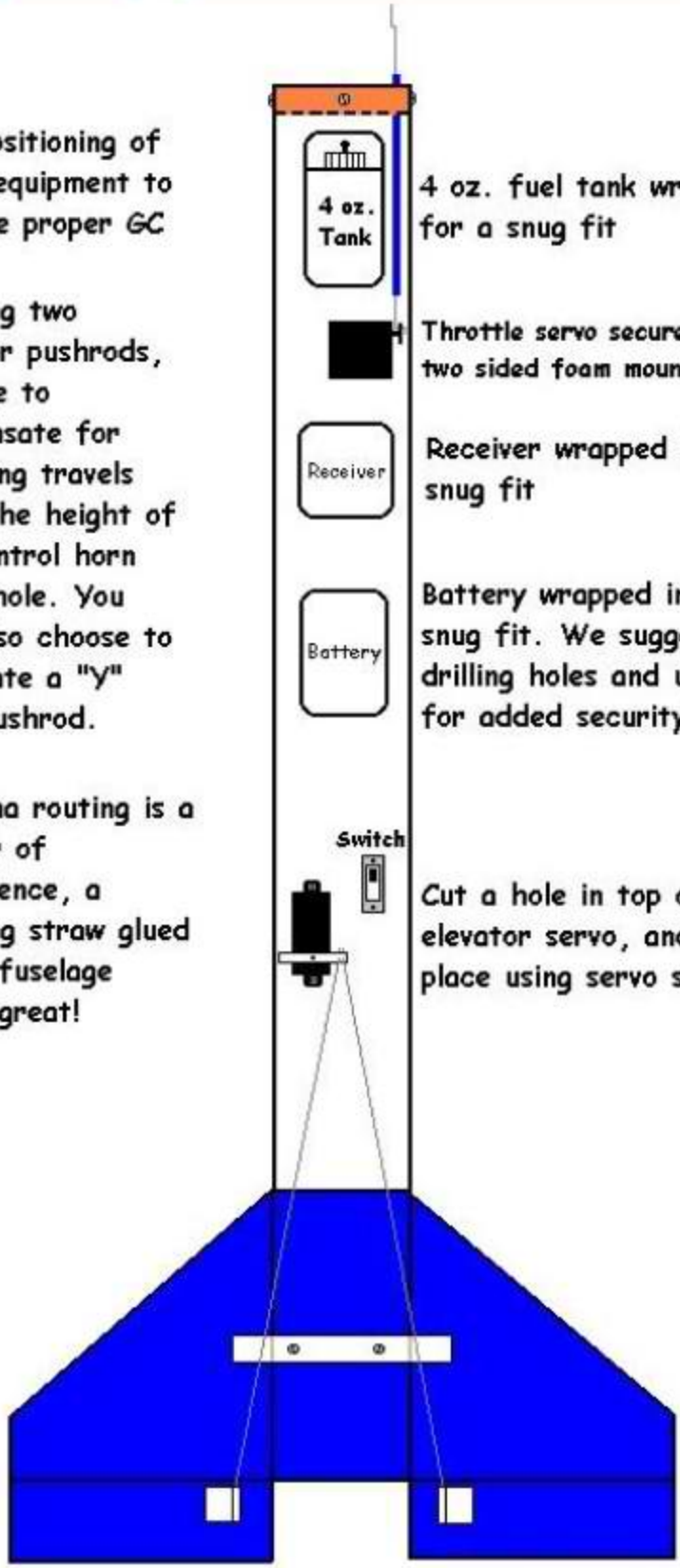
Rear View



Use a propane torch to heat and bend at 45 degrees on dotted lines



Derringer Radio Installation



Note: Use positioning of radio equipment to achieve proper GC

Note: If using two elevator pushrods, be sure to compensate for differing travels using the height of the control horn clevis hole. You may also choose to fabricate a "Y" type pushrod.

Note: Antenna routing is a matter of preference, a drinking straw glued inside fuselage works great!

4 oz. fuel tank wrapped in foam for a snug fit

Throttle servo secured in place with two sided foam mounting tape

Receiver wrapped in foam for a snug fit

Battery wrapped in foam for a snug fit. We suggest also drilling holes and using a zip-tie for added security!

Cut a hole in top of fuselage for elevator servo, and secure in place using servo screws