



SPAD

Simple Plastic Airplane Design



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SPAD Dagger



The Dagger was specifically designed for use in the non-scale combat arena. With no landing gear and only three channels (Aileron, Elevator & Throttle), this lighter weight, lower drag little rocket is one tough adversary!

Type: Combat

Wingspan: 47"

Length: 30"

Engine: .40 to .46

Channels: 3 - Elevator, Ailerons & Throttle

NEW!! DXF Files provided by Minnesota Jim. To download, click [HERE!](#)

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SPAD Dagger Building Instructions



Fuselage:

1. Cut a 30" section of gutter pipe for the fuselage. A table saw or Dremel® with a cutting wheel works good for this. The Dagger has no down thrust or right thrust.
2. Cut out the lower rear fuselage as shown on drawing #1. DO NOT THROW THE SCRAP AWAY, use it to make other PVC parts!
3. You will be installing the wing hold down dowels and cutting the radio access hole at FINAL ASSEMBLY, after proper CG is determined.

Tail:

1. Cut the one piece horizontal stab/elevator and the vertical fin from Coroplast® as shown on drawing #5. Use a good sharp razor or X-acto knife.
2. Hinge the elevator by cutting away one side of a Coroplast® corrugation. A box opener type knife or razor wrapped in masking tape with just the tip exposed works good for this.

Tail attachment:

1. Fabricate two PVC tail mounting "L" brackets as shown on drawing #5 (Sheet metal shears work good for cutting PVC)
2. Trim forward edge of "L" brackets to contour of vertical fin.
3. Drill 3 evenly spaced 1/16" holes in each "L" brackets for vertical fin screws. Enlarge holes in ONE SIDE ONLY to 1/8"
4. Attach "L" brackets to vertical fin with #6 x 1/2" self-tapping screws. (CA can be used to tack parts together)

while installing screws)

5. Drill 3 evenly spaced 1/16" holes in each "L" bracket for horizontal stab attachment.
6. Use the "L" brackets/vertical fin assembly as a template to mark and drill 1/16" tail attachment holes in fuselage. PROPER CENTERING OF TAIL TO FUSELAGE IS CRITICAL TO YOUR PLANES PERFORMANCE.
7. Enlarge holes in "L" BRACKETS ONLY, to 1/8"
8. Attach vertical fin, and horizontal stab/elevator to fuselage using #6 x 1/2" self-tapping screws.

Power pack:

1. Fabricate a firewall from 3/4" plywood. We like to "step" our firewalls for greater impact strength (as shown on power pack top view drawing). Mounting it flush with the forward edge of the fuselage works fine also (as shown on the power pack side view)
2. Cut a groove, centered, at the bottom of the firewall, and CA a 1" yardstick standoff in place.
3. CA the power pack yardstick to the 1" standoff, and CA the middle and aft 1" yardstick standoffs in place.
Placement of the middle standoff is not critical, BUT IT MUST NOT INTERFERE WITH RADIO GEAR.
4. CA a piece of PVC scrap to the power pack yard stick directly above the middle standoff. This is for added mount screw grip.
5. Fabricate a PVC switch mount bracket (Size will be determined by your switch), and CA to Power pack yard stick directly above rear standoff.
6. Using power pack assembly as a guide, mark approximate locations of middle and aft standoffs on the outside bottom of the fuselage. Install power pack into fuselage and drill 1/16" holes through fuselage, and power pack, at middle and aft standoff locations. Remove power pack from fuselage and enlarge holes IN FUSELAGE ONLY to 1/8"

Wing:

1. The wing is laid out on a 2' x 4' piece of Coroplast® with the corrugations running CHORDWISE (as shown on

drawing #6). It is acceptable to build this wing from two 2' x 2' Coroplast® pieces butted up against at the wing center line.

2. Mark all fold lines, spar lines, and wing tips on the Coroplast®.
3. Cut Coroplast® material away from the outside edges of the bottom panel wing tips.
4. Cut the top wing centerline, to the leading edge fold line ONLY!

NOTE: This is done to facilitate folding half of the wing at one time, making assembly much easier. If you are building your wing from two separate pieces, this will already be done.

5. Cut two 2 1/2" x 20" pieces of Coroplast® with corrugations running LENGTHWISE for ailerons. Refer to drawing 3, and mark the hinge line, and notch the outboard edge 1/4", forward of the hinge line only (this is for wing tip folding clearance).
6. Hinge the ailerons by cutting away the BOTTOM portion of one corrugation, forward of the hinge line as shown in drawing #6.

NOTE: If the hinge seems a bit stiff (Coroplast® varies), you can cut out two flutes and that should help soften the hinge.

OK! We now have all the pieces, let's build the wing!

7. Score and pre-bend ALL fold lines. Pre-bend leading edge 180°, the upper spar lines 90°, wing tips 45°,

NOTE: Scoring is accomplished by using a straight edge and blunt tipped object (Small Allen wrench or Apex works well here) and running it firmly along the fold line until you are satisfied a bend can be accomplished.

Folds ALONG a corrugation require little scoring, and bend easily. (score one corrugation for the wing tips).

Folds AGAINST the corrugations require heavy scoring (sounds like a baseball card in bicycle spokes) and are best accomplished by turning the wing over and bending along a straight table top edge. Use palm pressure, and work along the fold. Please be patient, this is not easy and takes a little getting used to. But once mastered, it sure beats balsa wood and Monokote®!

8. Lay the wing out flat, and glue the two yardstick spars to the bottom panel as shown on drawing 3.

NOTE: IF USING EPOXY, ROUGHEN UP THE COROPLAST® WITH COURSE GRIT SANDPAPER AT ALL

SURFACES TO BE GLUED, OR IF USING CA, HEAT FLASH THE SURFACE WITH A PROPANE TORCH....BUT

BE CAREFUL!!!! 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!

9. Test fold the wing, and trim the trailing edge excess off the top panels, to make them flush with the bottom panels.

NOTE: When folding the wing, the top panel pressure will tend to pull up on the leading edge, causing the lower panel to curve slightly up. A small amount of this is acceptable, and will even improve your plane's performance!

10. Glue the ailerons to the lower wing panel trailing edges, with the hinge fully exposed, and outboard edge even with the wing tip fold line. If desired, trim aileron outboard edges to contour with the wing tips. Fill the 4" gap between the ailerons at the lower panel center section trailing edge with a piece of scrap trimmed from a top panel.

11. Working one top panel at a time, fold over and glue upper wing to the top of the spars. (a board and weights works good here)

12. Glue the top panel trailing edges down, using care not to get glue on the aileron hinge area.

13. Fold the wing tips up into the top panels, and glue in place. When dry, trim off the excess.

14. Cut out a 4" x 24" wing center wrap. Test fit, score, pre-bend, and trim for a good fit (flush with trailing edge). When satisfied, glue in place.

Engine Installation:

1. Drill holes for your engine mount, fuel tubes, and throttle pushrod. The engine mount is centered on the firewall.

2. Fuel proof your firewall before engine installation.

3. Install engine and mount to firewall.

4. Install fuel tank and tubing to power pack, on a layer of foam. Secure with #64

rubber bands.

Radio Installation:

1. Fabricate 3 PVC control horns and back plates. Drill horn mount holes to 1/8", back plates to 1/16", and clevis holes to size of clevises you are using. Install to ailerons and elevator using #6 x 1/2" self tapping screws. CA can be used to tack horns in place while installing screws. Install a dowel inside the corrugation to prevent crushing the Coroplast®.
2. Cut a hole in the top of the wing for the aileron servo, just aft of the spar. The servo should fit snug, with the "ears" resting on the wing wrap.
3. Fabricate a PVC aileron servo zip-tie doubler. Using it as a template, drill two holes in the bottom of the wing, directly below the aileron servo.
4. Secure servo to the wing with a zip-tie. Cut a small hole in the bottom of the wing for the servo lead.
5. Install throttle servo, elevator servo, battery, receiver, and switch to power pack as shown on radio installation drawing. Battery and receiver are wrapped in foam and secured with zip-ties. Throttle and elevator servos are STUCK DOWN WITH DOUBLE FACE FOAM MOUNTING TAPE, and secured with zip-ties. Take care when mounting radio gear that it must clear the fuselage on each side.

NOTE: If you are using an engine larger than a .40 (like a BB .46), we recommend installing the elevator servo to the fuselage side (see the Dominator elevator servo installation procedure). Mount the servo on the inside of the rear cutout, AFT of the powerpack (for CG purposes).
6. Install throttle pushrod and rig to your satisfaction. IT MUST BE ABLE TO SHUT THE ENGINE OFF.
7. Temporarily install power pack into fuselage, and install middle and aft #6 X 3/4" self tapping power pack mount screws.
8. Using a 1/16" drill bit, pilot drill for at least one firewall mount screw on each fuselage side. Take care not to hit a fuel line, engine mount screw, or throttle pushrod.
9. Measure for length of elevator pushrod.
10. Tape wing to fuselage to check CG. Move wing forward or aft until your Dagger

balances perfectly level at the forward top spar fold. Mark wing leading edge location on fuselage. Remove wing.

11. Remove power pack from fuselage, and enlarge firewall mount holes IN FUSELAGE ONLY to 1/8"

Final Assembly:

1. Drill holes for and install wing hold down dowels as shown on drawing #1. The aft edge of the forward hold down dowel must line up with the wing leading edge mark you have made. Fuel proof the exposed portion of the dowels.
2. Cut out radio access hole.
3. Install elevator pushrod to elevator servo. ENSURE SERVO IS SET TO NEUTRAL.
4. Install power pack, and secure with #6 x 3/4" self tapping power pack and firewall mounting screws. If radio wires are near exposed threads of power pack mount screws, put a small piece of fuel tubing over threads!
5. CA a piece of scrap plastic tubing inside upper radius of rear fuselage cut out for the antenna to run through
6. Install wing, and hook up aileron and elevator pushrods. Rig for neutral, and 3/4" travel each way (1 1/2" total) on all surfaces.

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

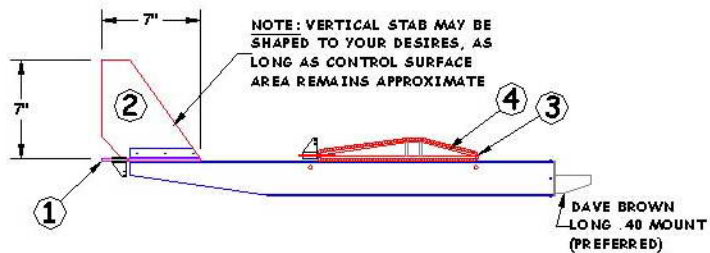
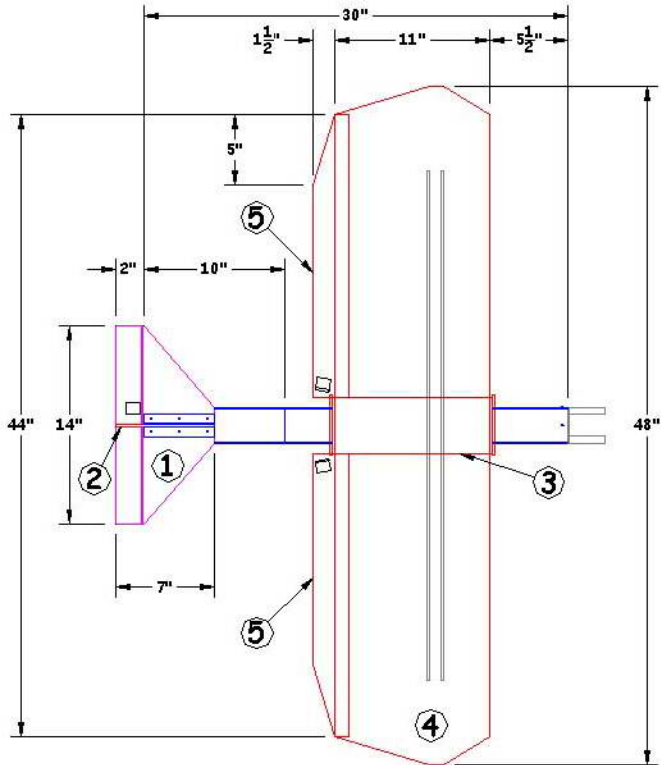
7. Drill a small hole in the left side rear fuselage for combat streamer attachment.
8. We highly recommend putting some bold graphics on the top side of your wing!
9. If you will be landing on rough dry terrain (like we have here in Kansas) you may wish to add spruce or plywood skids to the forward bottom part of your fuselage.

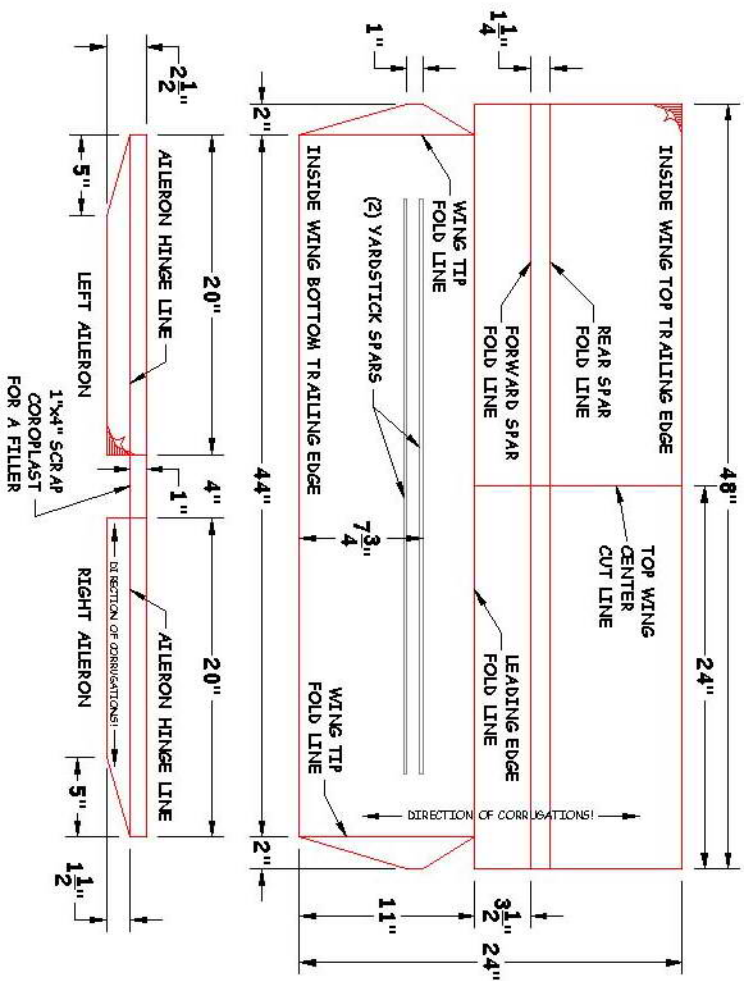
Flying the Dagger:

1. FOLLOW ALL AMA SAFETY REGULATIONS
2. Install wing with at least 12 #64 rubber bands.

3. Range check your radio.
4. Make sure all control surfaces are set to neutral, and your trims have not been bumped!
5. Make sure your prop is "clocked" to stop horizontal when engine is shut down for landing.
6. With a properly tuned .40 sized engine running at full throttle, your Dagger will jump into the air with a light hand launch. DO NOT ATTEMPT THIS BY YOURSELF until your plane has been test flown and properly trimmed out!
7. In flight, your Dagger will track like a dagger thrown at your enemy, and if aimed properly, will cut their streamer clean off for the kill! There are no bad flight characteristics, and the long fuselage makes it tough to spin and gives it a great combat "groove". Be ready for a high dead stick glide slope, but you will be surprised how well it slows down and flares for landing.
8. Happy hunting!

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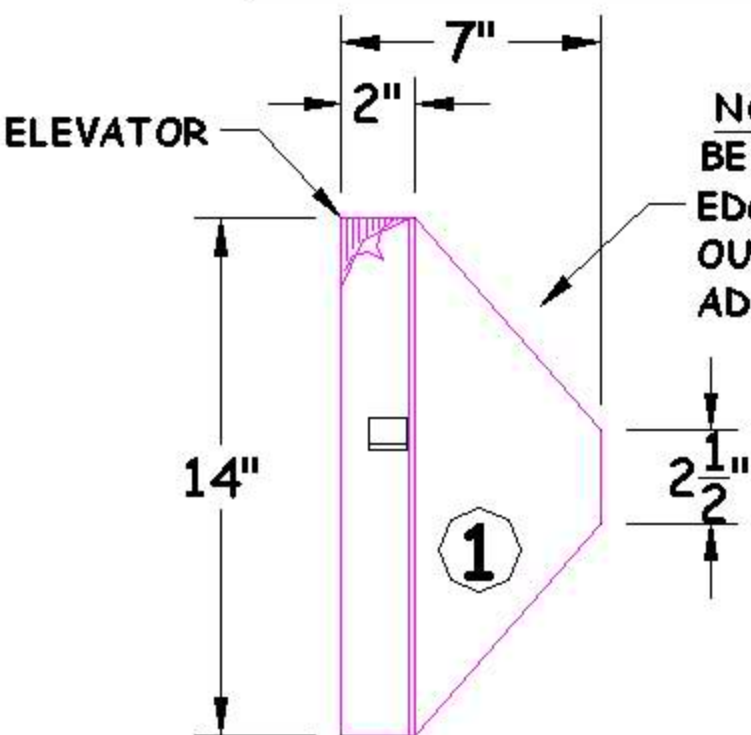


ASSEMBLED WING PROFILE (2X SCALE)

HINGE CREATED BY CUTTING AWAY BOTTOM OF A CORRUGATION

(2) YARDSTICK SPARS

HORIZONTAL STAB



NOTE: PANELING EDGING CAN BE USED TO DRESS UP THE STAB EDGES AND KEEP DIRT AND OIL OUT, AS WELL AS PROVIDE ADDITIONAL STRENGTH.

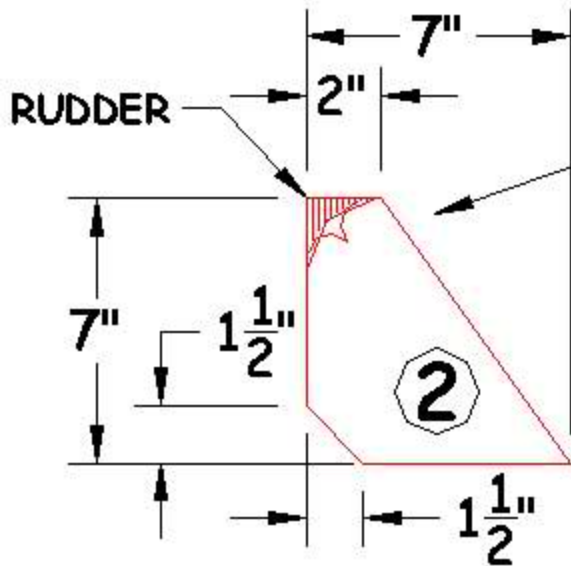
14"

2 1/2"

1

**HINGE IS ACCOMPLISHED BY CUTTING ONE SIDE OF CORRUGATION OUT
CONTROL HORN INSTALLED WITH DOUBLER NOTE: DOWEL SCRAP CAN BE PLACED IN FLUTE**

VERTICAL STAB

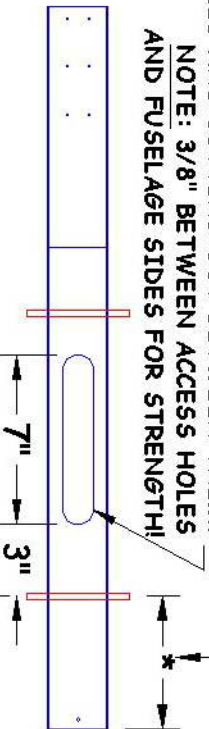


NOTE: PANELING EDGING CAN BE USED TO DRESS UP THE STAB EDGES AND KEEP DIRT AND OIL OUT, AS WELL AS PROVIDE ADDITIONAL STRENGTH.

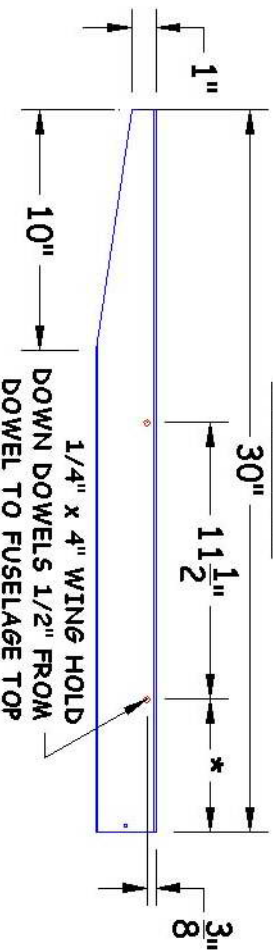
*** THIS DIMENSION IS FIGURED
DURING FINAL ASSEMBLY
(FOR PROPER CG)**

**RADIO ACCESS HOLE MADE BY DRILLING FOR
1/4" HOLES AND CUTTING OUT BETWEEN THEM.**

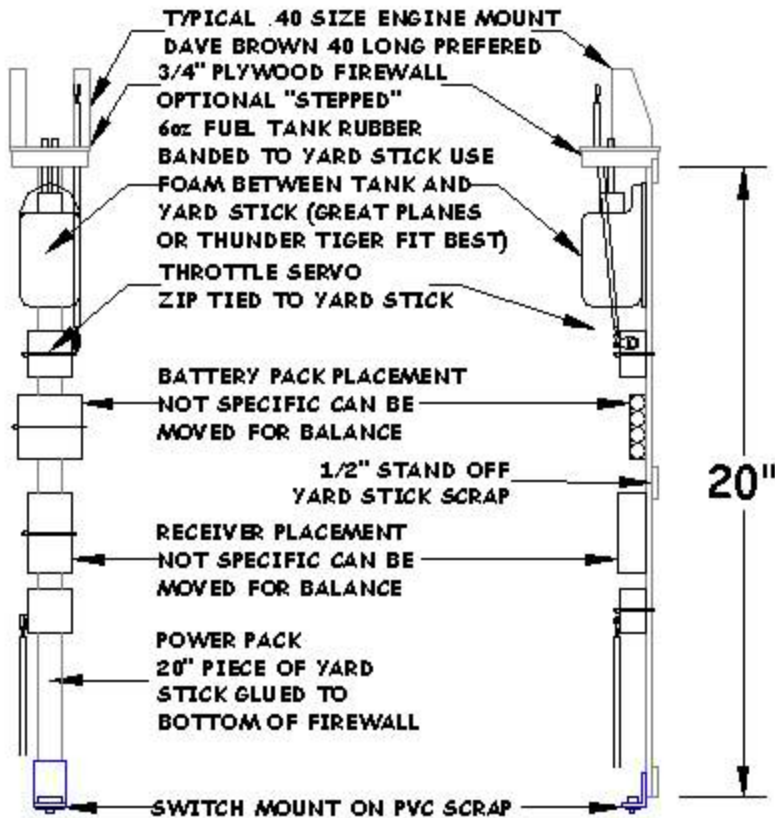
**NOTE: 3/8" BETWEEN ACCESS HOLES
AND FUSELAGE SIDES FOR STRENGTH!**



FUSELAGE

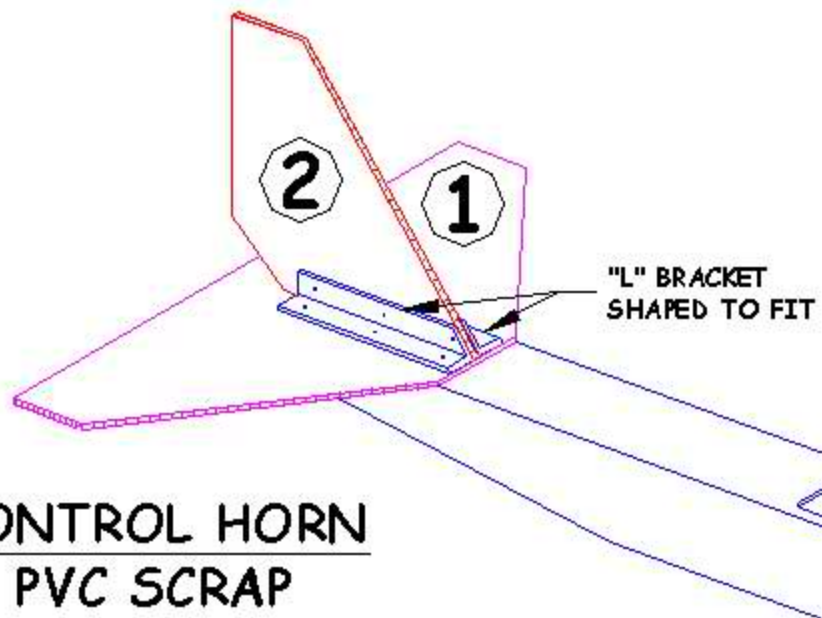
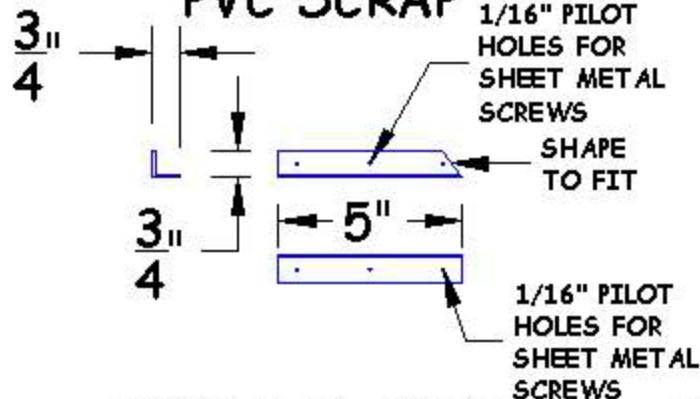


**1/4" x 4" WING HOLD
DOWEL TO FUSELAGE TOP**

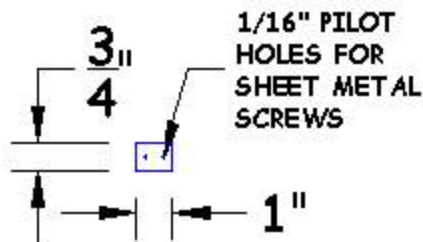


NOTE: MOUNT ENGINE AND RADIO GEAR
AS FAR FORWARD AS POSSIBLE, THIS
AIRPLANE CANNOT BE TAIL HEAVY!
STICK SERVOS IN PLACE USING TWO
SIDED FOAM MOUNTING TAPE AND
ZIP-TIES. WRAP BATTERY AND RECEIVER
WITH FOAM AND ZIP-TIE IN PLACE

**TAIL MOUNT
"L" BRACKET
PVC SCRAP**



**CONTROL HORN
PVC SCRAP**



**CONTROL HORN
PVC SCRAP**

