SPAD

***S**imple **P**lastic **A**irplane **D**esign*

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Spad Dart

Here we have the Dart. Now this little hybrid is the epitome of all of our efforts! As with the Dagger, the Dart was purpose built for one thing and one thing only; to rule the skies! This machine is pure performance! With no drag inducing landing gear or vertical stab, and only three channels (no mixing here!), the Dart is a performance cravers delight. If you are looking for the ultimate non-scale combat airplane, you've found it! The Dart has no equal!

Type: Combat

Wingspan: 47"

Length: 30"

Engine: .40 to .46

Channels: 3 - Elevator, Ailerons & Throttle

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SPAD Dart Building Instructions

Fuselage:

1. Cut a 30" section of gutter downspout for the fuselage. A table saw or a Dremel® with a cutting wheel works
good for this. The Dart has no down thrust or right thrust.

2. Cut out the radio access hole and tail cradles as shown on drawing #2. DO NOT THROW THE SCRAPS
AWAY, they are used for doublers and control horns!

3. Using a propane torch, heat gun, or a cigarette lighter and foil, gently heat up the tail cradle bend line and
bend them out 45°. ACCURACY OF THIS BEND IS CRITICAL TO YOUR AIRPLANES PERFORMANCE.

4. Drill holes, and install wing hold down dowels – exposed portion of dowels should be fuel proofed.

Tail:

1. Cut the tail from one piece of Coroplast® to the dimensions shown on drawing #6 (use a good sharp razor or
X-acto knife). The corrugations run span-wise.

2. Hinge the elevators as shown, and cut out the elevator center notch.

3. Use a straight edge and small blunt tipped object to score the inside radius of the stab fold lines, and bend
each to 45°.

4. Trial fit tail to fuselage, trim forward corners of tail cradles to contour of tail.

Tail attachment:

1. Fabricate three PVC doublers as shown on the template drawing (Sheet metal shears work good for cutting PVC).
Trim right and left hand doublers as needed. Drill doubler holes to 1/16". Evenly space the holes – exact

location is not critical.

2. Use doublers as templates to mark and drill tail cradles and fuselage bottom. Enlarge holes IN FUSELAGE ONLY to 1/8". PROPER CENTERING OF THE TAIL IS CRITICAL TO YOUR AIRPLANES PERFORMANCE.

3. Attach tail to fuselage using #6 x 1/2” screws, self-tapping into doublers (as shown in drawing #6).

4. Install panel edging to tail leading edges if desired.

Power Pack:

1. Fabricate a firewall from 3/4" plywood. We like to "step" our firewalls for greater impact strength, but mounting it flush with the forward edge of the fuselage works fine.

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 two 1/2" yardstick standoffs in place. Placement of the center standoff is not critical, BUT MUST NOT INTERFERE WITH RADIO GEAR. We like to put our center stand-off 8" from the firewall.

4. CA a piece of PVC scrap to the yardstick, directly above the center standoff. This is for added mount screw grip. Fabricate a switch bracket from an angled piece of PVC scrap, then glue to the rear of the power pack, above the rear stand-off. Size of bracket will be dependant on the size of your switch.

5. Using assembled power pack as a guide, mark approximate location of 1/2" standoffs on outside bottom of fuselage. Install powerpack into fuselage, and drill 1/16" holes through fuselage, and power pack, at standoffs. Remove power pack 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 #7). 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 line, 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. 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 (it is acceptable to cut two if the Coroplast® is stiff), forward of the hinge line.

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) 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 spar. (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. Your firewall should be fuel proofed before engine installation.

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

3. Install engine and mount to firewall.

4. Install fuel tank to power pack, on a layer of foam, using #64 rubber bands.

Radio Installation:

1. Fabricate four PVC control horns, and back plates. Drill horn mount holes to 1/8 " and back plates to 1/16,
then drill clevis hole to size of clevis you are using. Install to ailerons and elevator(s) with #6 x ½" screws. Use
a dowel in 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 rear spar. The servo should fit snug,
with the servo "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 wing with a zip-tie. Cut a small hole in the wing bottom for the servo lead.

5. TEMPORARILY install all your radio equipment to the power pack as shown on the radio installation drawing. Use
Masking tape or rubber bands. ENGINE, MOUNT AND GAS TANK MUST BE INSTALLED AT THIS POINT!

6. Temporarily install power pack into fuselage, and wing on fuselage, to check your Dart's CG.

7. The Dart MUST BALANCE LEVEL TO SLIGHTLY NOSE HEAVY at the wing spar (forward top spar fold line). If
it does not, reposition radio equipment to achieve proper balance.

NOTE: If using an engine larger than a .40 (like a BB .46), we recommend moving the elevator servo to the
cutout area aft of the powerpack (see the Dominator elevator servo installation procedures).

8. Install the two aft power pack mount screws, and pilot drill for firewall mount screws. Us a 1/16" drill bit, and
make at least one hole per fuselage side, taking care not to hit a fuel line, throttle wire, or engine mount bolt.

9. BEFORE REMOVING POWERPACK, MEASURE FOR LENGTH OF ELEVATOR PUSHROD(S). Two pushrods can be
used (originating from the same side of the servo wheel) or you can fabricate a “wishbone” pushrod.

10. Remove power pack, and enlarge firewall screw holes IN FUSELAGE ONLY to 1/8"

11. Secure elevator and throttle servo to yardstick using double-sided foam mounting tape and zip-ties. Secure
battery and receiver to yardstick with zip-ties (be sure to wrap then in foam). Mount switch to the PVC
bracket.

12. Rig throttle as desired – assure it will shut engine off for landing!

13. Install elevator pushrod(s) to elevator servo. ENSURE SERVO ARM IS SET AT NEUTRAL

14. Install flight ready powerpack, and secure with power pack and firewall screws (#6 x ¾” sheetmetal screws)

15. Run antenna up through a tail Coroplast® corrugation or tubing.

16. Hook up elevator pushrods, and install aileron pushrods. Adjust for neutral, and rig elevator(s) for 1 1/2"
TOTAL travel, and ailerons for 3/4" TOTAL travel.

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!

17. In combat competition, your Dart may be subject to midair's and violent crashes. We highly recommend adding
extra foam to fill fuselage voids for the maximum radio equipment protection.

Finishing:

1. Install a dowel inside top trailing edge corrugation of wing wrap and in a corrugation near the L/E, to prevent
rubber bands from crushing Coroplast®.

2. Drill a small hole in the rear of the fuselage, below the tail, for attaching combat streamer.

3. We highly recommend using some bold graphics on the TOP of the wing for in flight visual orientation!

Flying the Dart:

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 Dart will shoot 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 Dart will track like a dart on it's way to a bulls-eye! All maneuvers will be stable and
predictable, but happen VERY FAST. There are no bad flight characteristics, and the V-tail makes it almost
spin proof! Be ready for quite 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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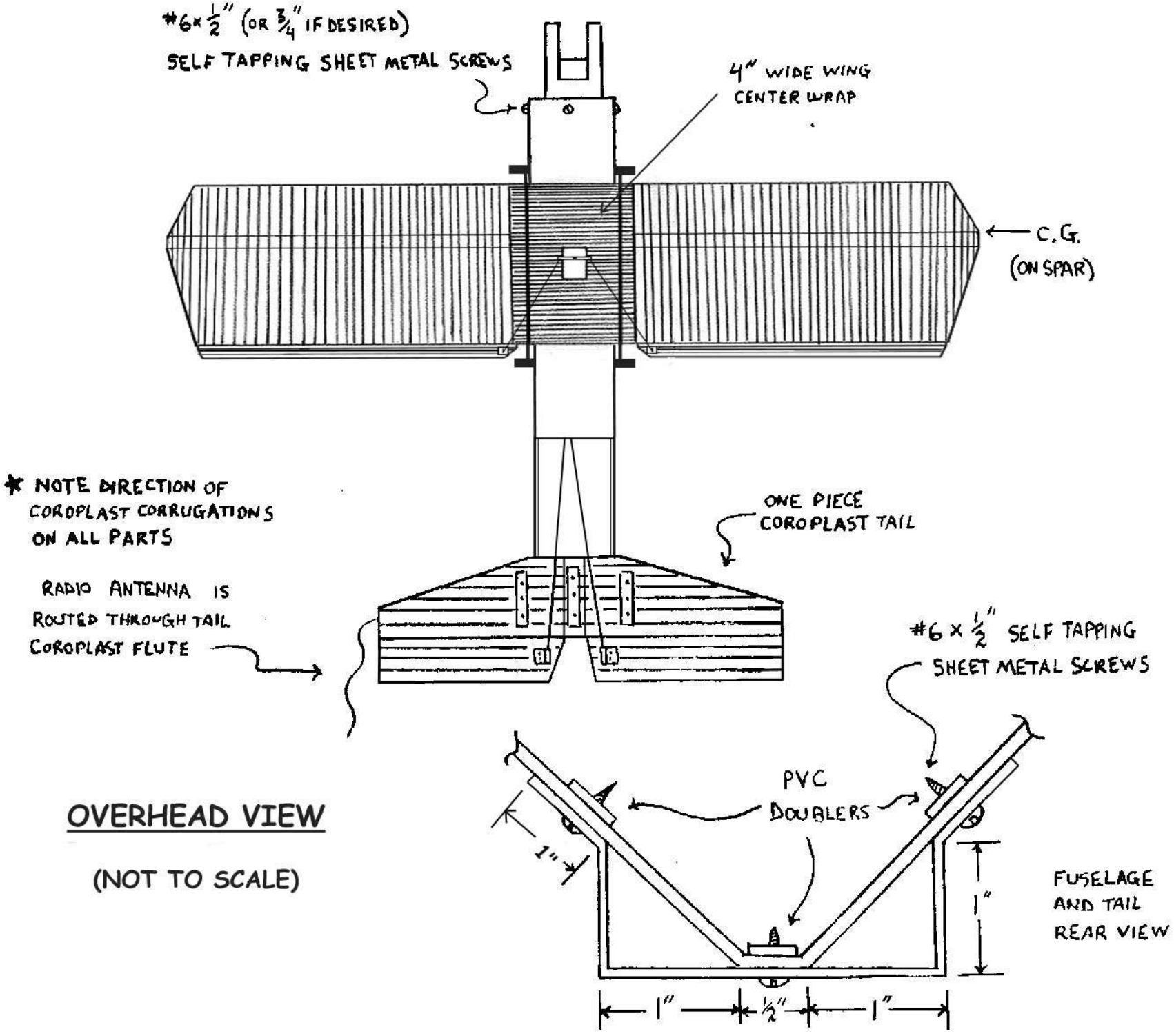
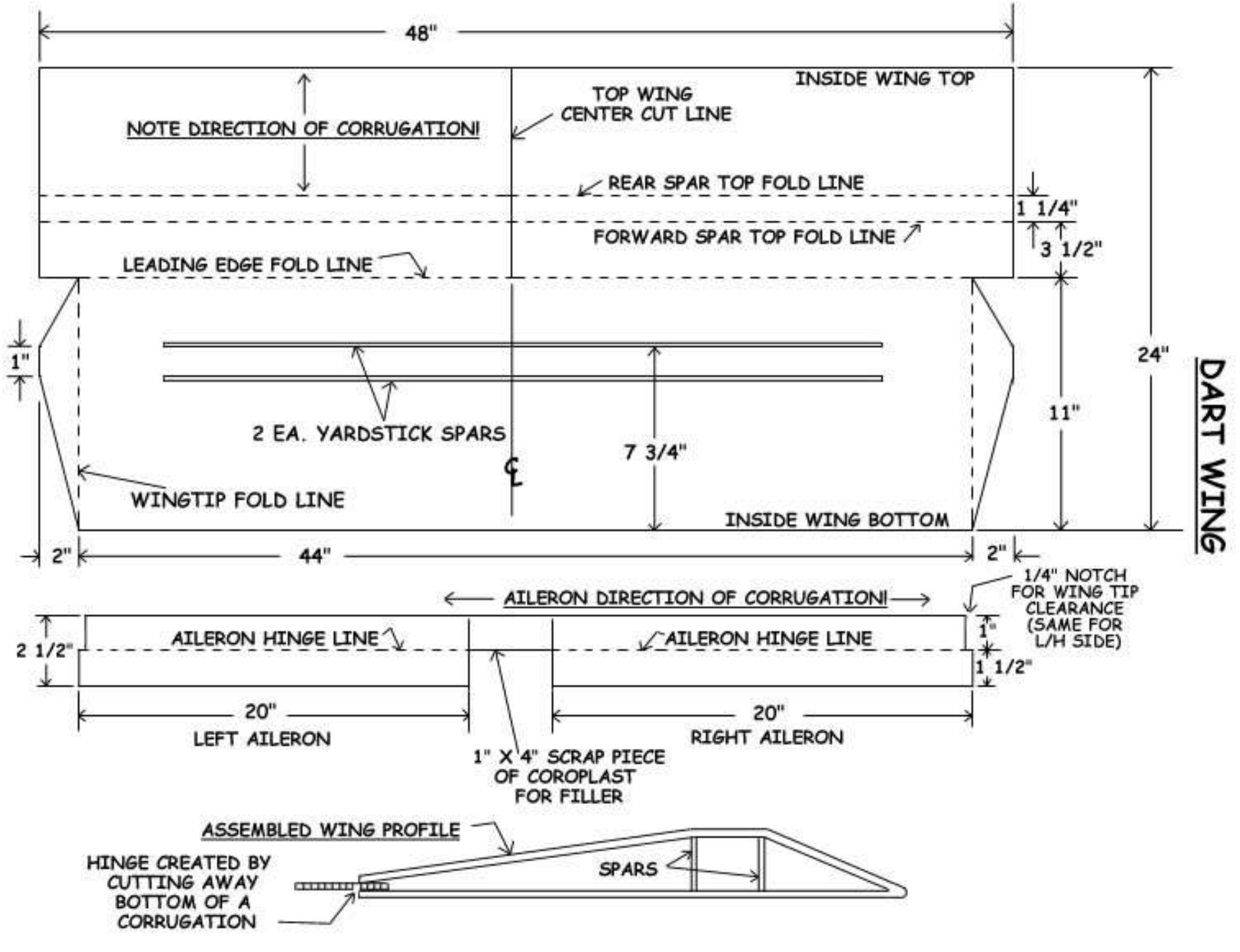
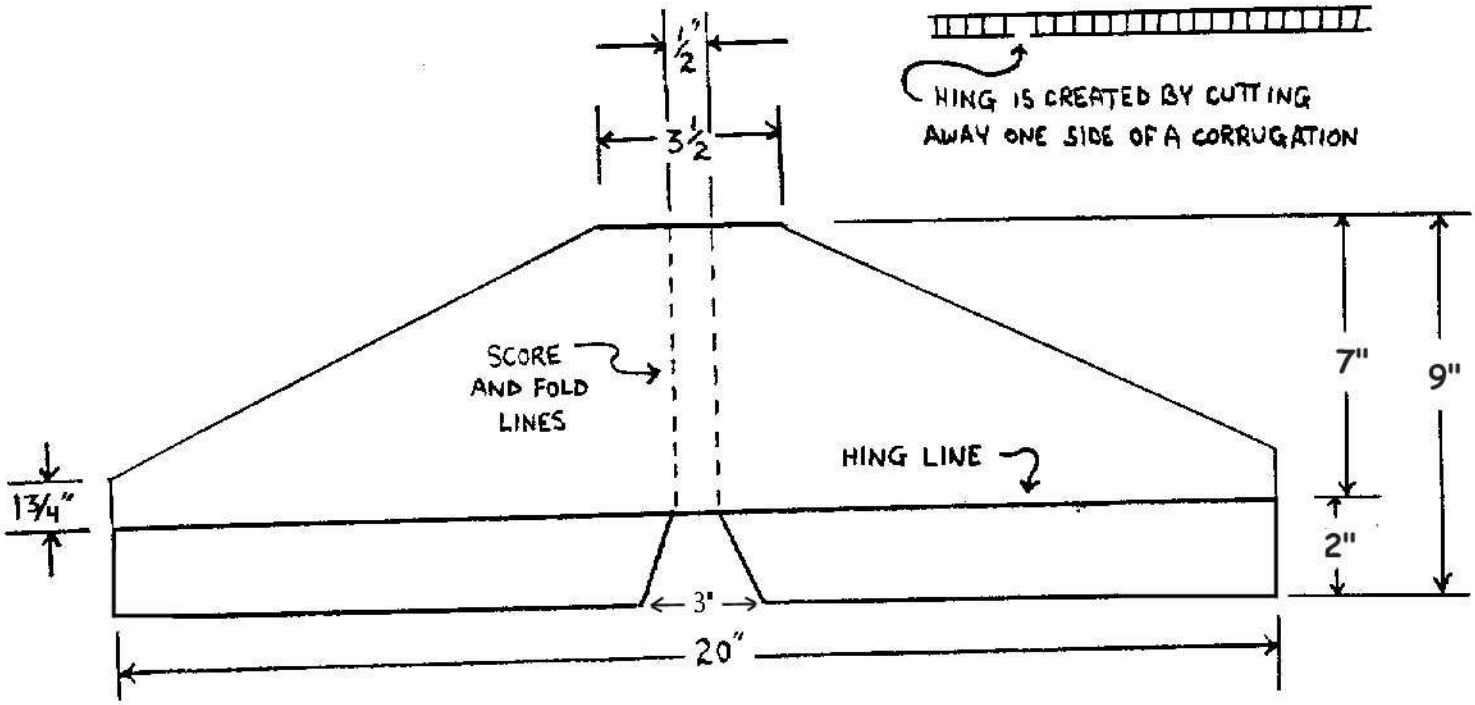


OVERHEAD VIEW

(NOT TO SCALE)

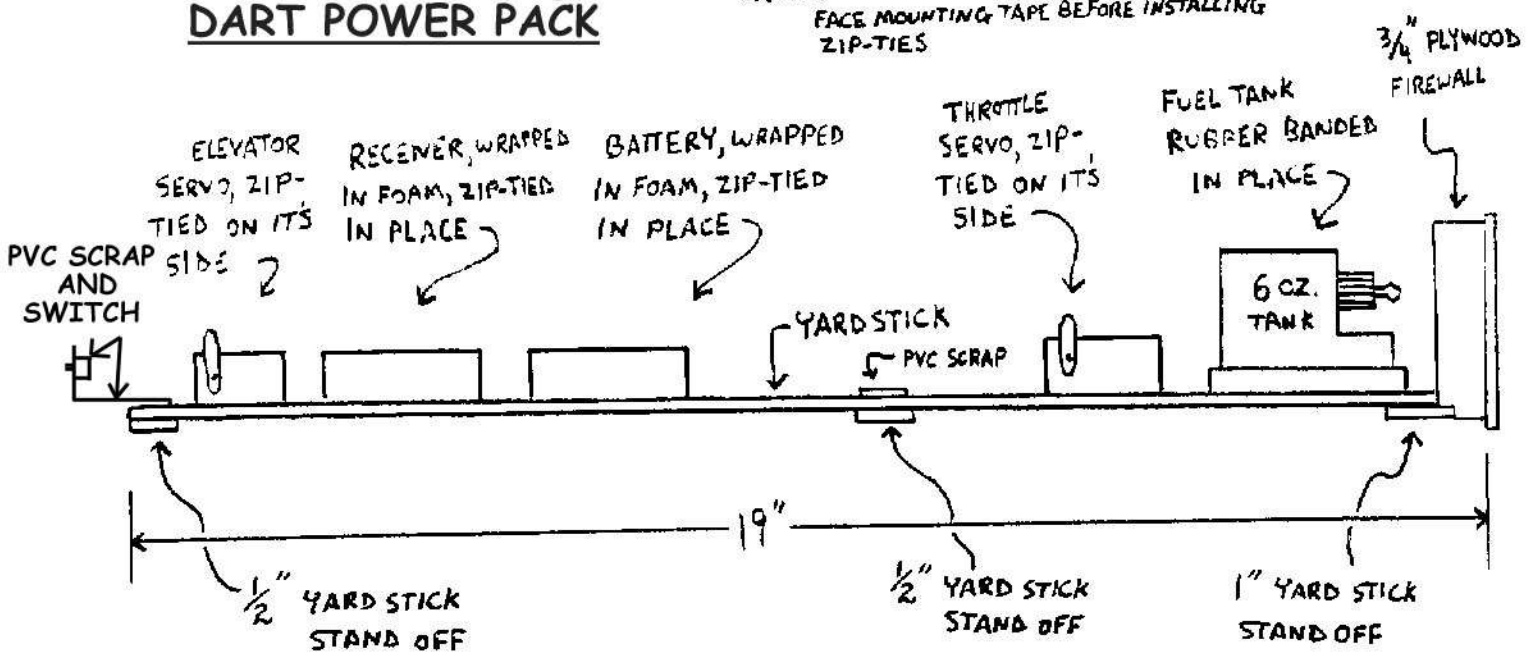

48"
INSIDE WING TOP
TOP WING
CENTER CUT LINE
NOTE DIRECTION OF CORRUGATION!
REAR SPAR TOP FOLD LINE
1 1/4"
FORWARD SPAR TOP FOLD LINE
3 1/2"
LEADING EDGE FOLD LINE
24"
1"
2 EA. YARDSTICK SPARS
7 3/4"
11"
WINGTIP FOLD LINE
INSIDE WING BOTTOM
2"
44"
2"
DART WING
AILERON DIRECTION OF CORRUGATION!
1/4" NOTCH
FOR WING TIP
CLEARANCE
(SAME FOR
L/H SIDE)
AILERON HINGE LINE
AILERON HINGE LINE
2 1/2"
1"
1 1/2"
20"
LEFT AILERON
20"
RIGHT AILERON
1" X 4" SCRAP PIECE
OF COROPLAST
FOR FILLER
ASSEMBLED WING PROFILE
HINGE CREATED BY
CUTTING AWAY
BOTTOM OF A
CORRUGATION
SPARS

DART TAIL



DART POWER PACK

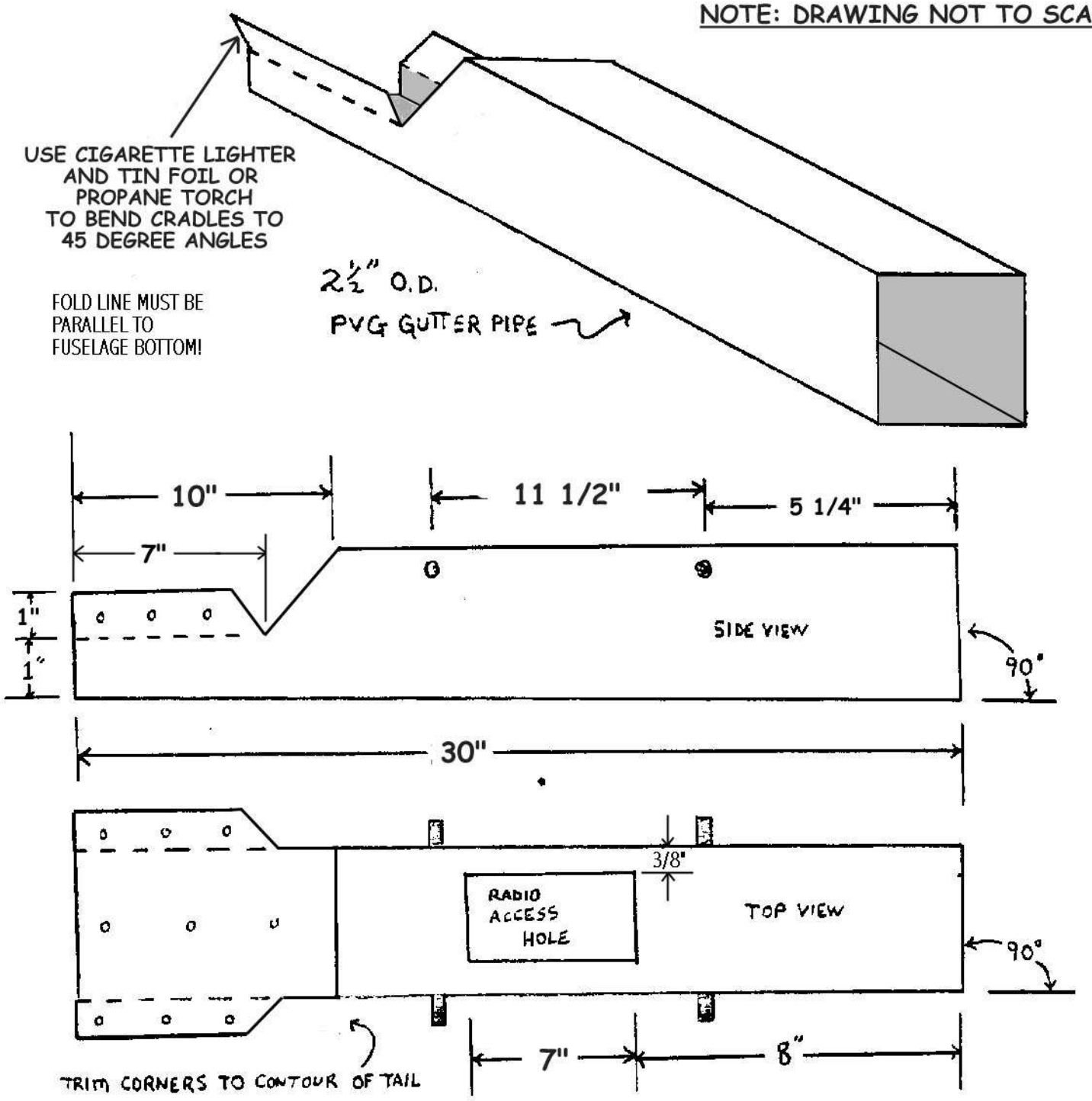
NOTE: STICK SERVOS IN PLACE WITH FOAM TYPE DOUBLE FACE MOUNTING TAPE BEFORE INSTALLING ZIP-TIES



NOTE: ONCE POWER PACK IS INSTALLED, SECURE WITH SELF TAPPING SCREWS FROM OUTSIDE OF FUSELAGE THROUGH ½" YARD STICK STAND OFFS.

DART FUSELAGE

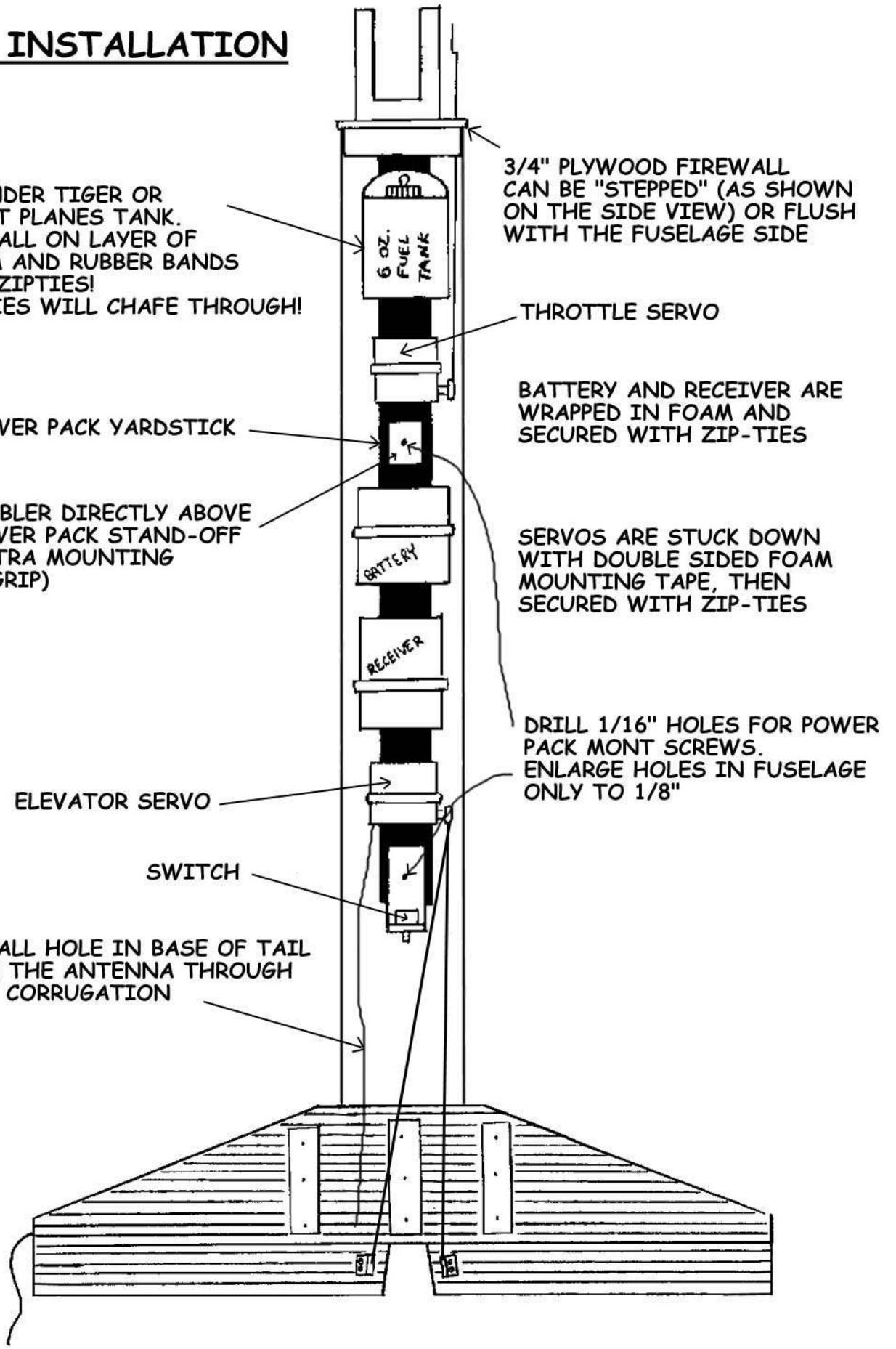
NOTE: DRAWING NOT TO SCALE



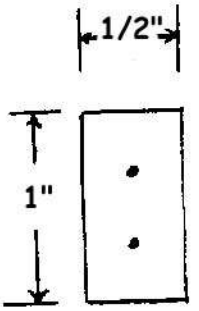
NOTE: ¼" WING HOLD DOWN DOWELS 4½" LONG, ⅜" FROM TOP OF FUSELAGE

TAIL MOUNT HOLES: FABRICATE THREE TAIL MOUNT DOUBLERS AS SHOWN ON TEMPLATE PAGE. USE DOUBLERS AS A TEMPLATE TO DRILL MOUNT HOLES IN FUSELAGE. ENLARGE HOLES IN FUSELAGE ONLY TO ⅛"

RADIO INSTALLATION

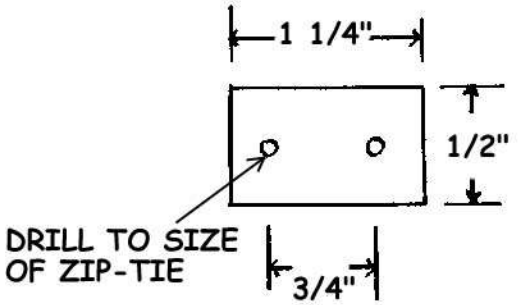


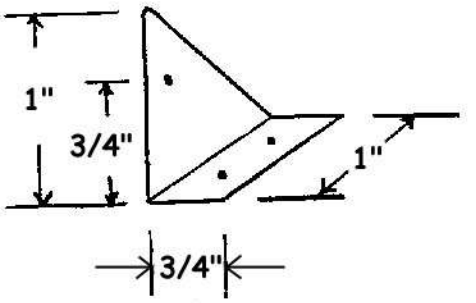
DART TEMPLATES



PVC CONTROL
HORN BACKPLATE

AILERON SERVO
ZIP-TIE DOUBLER
NOT TO SCALE

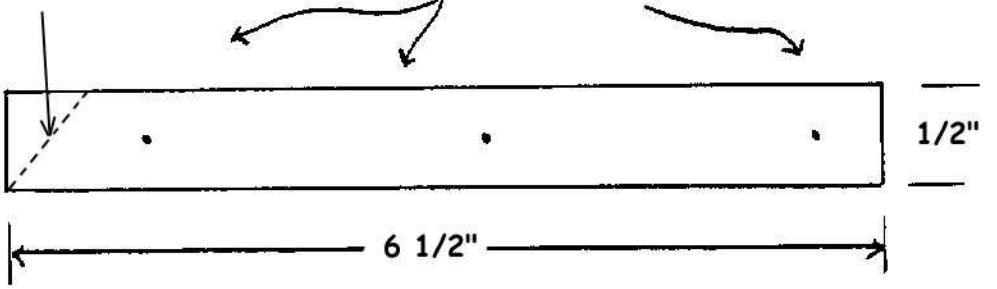




HOMEMADE PVC
CONTROL HORN
4 EACH

CUT TWO DOUBLERS TO
CONFORM TO THE LEADING
EDGE OF THE TAIL

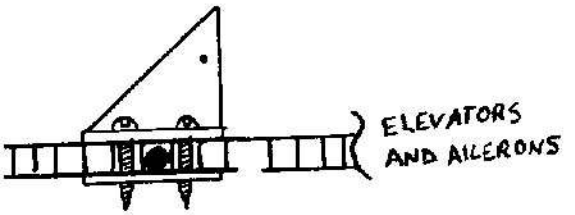
NOTE: 1/16" HOLES TO RECEIVE SELF
TAPPING SCREWS



3 EACH TAIL MOUNT DOUBLER (PVC)

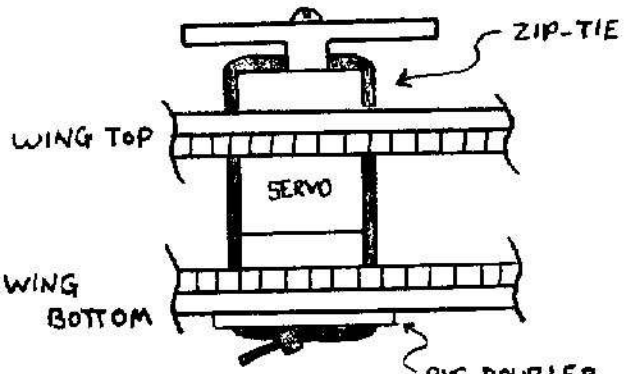
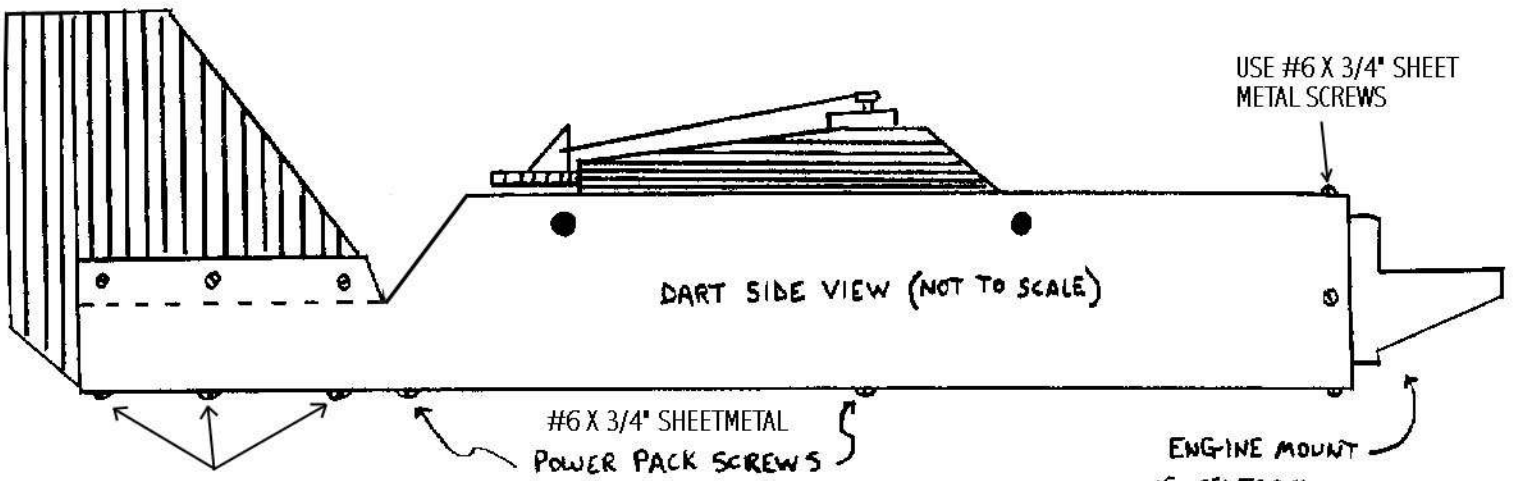
SERVO INSTALLATION & HORN DETAILS

(NOT TO SCALE)



CONTROL HORN INSTALLATION:
USE $\frac{1}{8}$" OR $\frac{5}{32}$" DOWELL INSIDE
CORRUGATION TO PREVENT
COROPLAST CRUSH

USE #6 X 1/2" SHEET
METAL SCREWS



AILERON SERVO INSTALLATION:
DON'T PULL THE ZIP-TIE OVERLY TIGHT
TO CAUSE WING SQUEEZE!