

Design and plans by
Dean "Tattoo" Tuinstra

.40-.46 4 channel sport plane

*Trike gear
with nose gear
steering*

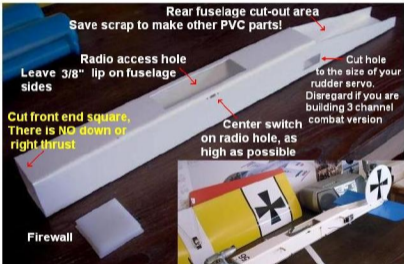
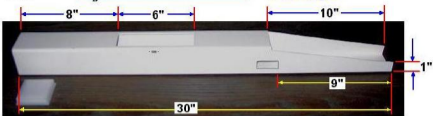
*Span-48"
length-30"*

*Also makes a great hand
launched C-class combat plane
minus landing gear and rudder channel*

Building Supplies

- 1) 2 1/2" square American PVC Gutter Pipe
- 2) 4mm and 2mm Coroplast
- 3) 1/2" Plywood or HDPE plastic for firewall
- 4) Yardsticks for spar
- 5) 1/4" dowels
- 6) Zip-ties for servo mounting
- 7) Double sided foam mounting tape for servo mounting
- 8) 27" of plastic tubing for throttle and nose gear
- 9) .047 and .062 music wire for throttle and nose gear push rods
- 10) #6 x 1/2" self tapping screws, or something close
- 11) Medium CA and a propane or butane torch for flashing Coroplast for gluing
- 12) Your Radio, engine, mount, fuel tank, landing gear, pushrods and associated hardware
- 13) Standard shop tools. A Dremel and tin snips really help too!

The Das Plas-Stick is perhaps the best flying, cheapest and quickest building 4 channel sport plane you'll find anywhere! For RCCA C-class combat, build it as a hand launched 3 channel combat airplane!



OK...Let's get busy...!!!
Cut out your fuselage from American 2 1/2" O.D. PVC gutterpipe. A Dremel with a fiber impregnated cut-off wheel is our favorite tool for this. It is wise to round the corners for stress relief. Don't throw the rear cut-out scrap away, you will need it to make other PVC parts! Make a firewall from 1/2" plywood or HDPE plastic. This plastic can be found at Wal-Mart as kitchen cutting boards. It will work fine to make your firewall fit flush and snug with the front of the fuselage. We like to "step" ours as shown in the photos. This is done on a table saw and increases impact strength!

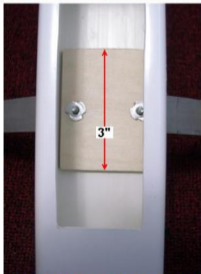
Flight ready fuselage for reference

Landing gear made out of 1/8" x 1" aluminum bar stock available at hardware or home improvement stores

I used Sullivan Sky Lite 2.50 wheels

You can also buy Landing gear at your hobby shop. Any .40 sized gear will work

Attach a 15" section of plastic tube to the outside lower left side of the fuselage by drilling holes and using small zip-ties. Make sure front zip-tie is at least 1/2" from front of fuselage so it won't interfere with firewall. You can get plastic tubing at your hobby store, or improvise with something close.



Install your main landing gear, and nose gear steering plastic pushrod guide tube. I installed my gear using a 3" long 3/16" plywood doubler and 6-32 blind nuts and bolts. I found the blind nuts (called "T" nuts) and bolts at a hardware store for pennies. You can make your own gear from aluminum bar stock, or use any hobby store bought .40 sized gear. If you are building your plane as a hand launched 3 channel combat plane, simply disregard this whole page.



Now for the business end of your plane. I used a Thunder Tiger Gp .42 and a Great Planes adjustable engine mount with nose gear holes molded in. You could also simply drill holes in a Dave Brown mount for the nose gear. Also needed is your firewall, 4 firewall screws (I used #6 x 1/2" self tapping screws), 12" of plastic tubing for throttle pushrod guide tube, and your fuel tank and fuel tubing. I used a Great Planes 6 ounce fuel tank. If you want longer flight time, a Hayes Slim 8 ounce tank will fit great. If you are using a wood firewall, mount your engine mount to firewall with blind nuts and bolts. If you use a HDPE plastic firewall, self tapping deck screws work great! Speaking of firewalls, I have seen builders use pine, walnut, oak, and even dense particle board (yuck) for firewalls, and they all work great. Another great idea is to use 1/8" ply laminated to 1/2" ply to create a "stepped" firewall without the challenge of cutting it from one piece.

Drill for and install throttle guide tube with 1/2" sticking out. Wrap fuel tank in thin foam, attach fuel tubes, then install to firewall. I like to use tape around throttle tube to help hold things in place while installing

Note very small pilot holes for self tapping deck screws for engine mount

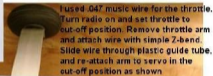
Fuel tank and firewall assembly installed

Engine and mount installed

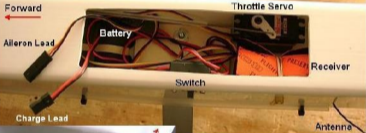
Take care not to intersect fuel lines or engine mount screws with firewall screws! Make sure there is foam between firewall and tank in case screws protrude through rear of firewall. Exact positioning of engine on firewall is not critical, make sure steering arm is not obstructed!



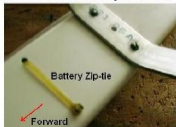
Drill very small pilot holes and mount rudder servo with servo screws. Mount elevator servo with double sided foam tape and a zip-tie as far forward as possible in rear cut-out area. Mount throttle servo the same way. Zip-tie receiver to left side of fuselage, and battery to floor of fuselage. If you are building the 3 channel combat version, forget the rudder servo!



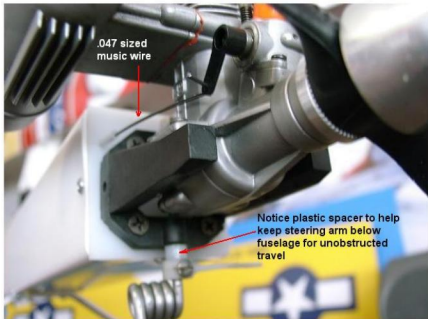
If you are building a 3 channel combat version, zip-tie your battery to the left side of the fuselage in front of the switch. Hard belly landings on rough ground can break floor mounted zip-ties!



Drill a small hole directly behind the receiver for the antenna. Once you put the tail on, the antenna will be routed through a stab flute



Disregard Rudder servo if you are building 3 channel combat version!



This is my favorite and simplest way to hook up a throttle, I have never had one come loose using this method, but it will pop out in the event of a crash sparing your throttle arm and throttle servo gears! Look close at the picture, and you will notice that the wire has a slight inwards bow in it. This is because there is "pre-load" or "spring pressure" naturally holding it outward against the throttle arm. To accomplish this, gauge where the "L" bend needs to be to hold the throttle arm in cut-off position (remember the servo is already pre-set). Now, simply grab your throttle wire with needle nose pliers at the correct location to accomplish this, and make your "L" bend. Now snip off the excess, leaving the "L" as long as possible to still get it in the hole. Before installing it in the throttle arm, grab the wire and bend it slightly outboard so that it will generate some outward pressure as described above. Now simply insert the "L" into the throttle arm and walla...you're done!

If your radio has "end point adjustments" you can use them to get you're throttle to open and close perfectly now. When I use the term "cut-off", that means the carburetor is fully closed at that point. On computer radios this is what is referred to as the "kill" switch. Make sure your servo doesn't want to move the throttle further than it will go, or you could damage your servo, or at the very least, cause your battery to drain quickly. There should be no servo "hum" when full open or full closed. This means the servo is still trying to move, but the throttle is as far as it will go!



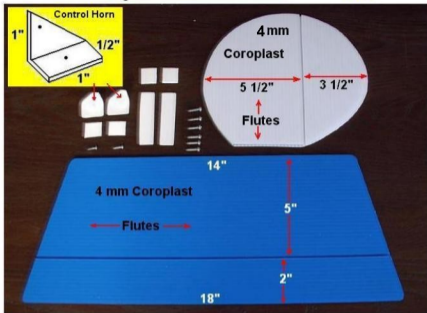
Although the picture already shows the rudder pushrod installed, pretend it's not, because you have to install and rig the nose gear pushrod first! Turn your radio on, and set your rudder stick and trim to center. Remove the rudder servo arm, and attach the nosegear pushrod using a simple z-bend. I used .062 music wire for the nosegear pushrod. Look closely at the picture, and you will see that

that you will need to make an "offset" bend in the pushrod to compensate for the height of the servo arm to the plastic guide tube. Make sure this bend is far enough away from the guide tube to allow full pushrod travel. Once satisfied, install pushrod to servo arm, slide into plastic tube, and install servo arm to servo in the neutral position as shown. Now look at the bottom picture. Simply bend a small "loop" in the pushrod, then an "L" and insert with slightly downward spring pressure using the same idea as the throttle wire! Wow! That was easy! Now simply set your nose wheel perfectly straight using the steering arm set screw. You now have a linkage that will absorb shock, and will pop out in the event of a crash...sparing your servo gears! Now let's put a tail on this puppy!!



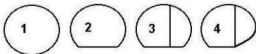
Notice the steering arm in outer most hole. travel for ground

neutral position, and the It doesn't take much handling!



Cut out your tail pieces from 4 mm Coroplast as shown in the picture. Hinge by carefully cutting away one side of a flute. Now take the scrap PVC from the rear fuselage cut out, and make the following parts: Two control horns as shown, two 3/4" square control horn back plates, two 3/4" square vertical stab doublers, and two 3/4" x 2 1/2" horizontal stab doublers. You will also need two small self tapping screws for the control horn attachment, and 6 self tapping screws for the tail feather attachment (I use #6 x 1/2" self tapping screws)

Sheet metal shears (Tin Snips) make a great tool for cutting small PVC parts, and medium CA can be used to tack small parts together for drilling and screwing. Look at the picture below, and you will see how I cut out my vertical tail feather. **1** Cut out a 9" diameter circle. **2** Cut 1" away from the bottom (making it 8" tall). **3** Hinge **4** Trim away enough of the lower rudder to give you the elevator clearance you want, tapering it nicely into the contour of the rudder.



Do not hinge for rudder if you are building 3 channel combat version!




You can tack small PVC parts together with CA for drilling and screwing. It is VERY important to flash and glue all control horns in place along with the screw and back plate!!!



Mount your horizontal stab/elevator to the fuselage using the PVC doublers and self tapping screws. Drill the screw head hole big enough for the screw to go in, but only drill a very small pilot hole for the self tapping side to assure a good screw grip! Tighten only until the Coroplast slightly


compresses. Exact location of screws and doublers is not critical, as long as the tail is square and the elevator hinge clears the end of the fuselage. Install the elevator horn in the same fashion, just slightly right of center. Make sure the horn is as close to the hinge as possible without interfering with it's operation. You can now run your antenna down a flute of the stab as shown in the picture.



Install the vertical stab/rudder in the same manner as the horizontal stab, using the 3/4 square PVC doublers and self tapping screws. Make sure the rudder hinge clears the end of the fuselage. Also install the rudder control horn and back plate.

Disregard rudder control horn for 3 channel combart version!

Turn your radio on and assure your elevator and rudder servos are set to neutral, and install pushrods and adjust your controll surfaces to be perfectly straight. I used a simple Z-bend at the servo arm. It is a VERY good idea to put a small piece of fuel tube on the clevis!



I used hobby store bought threaded pushrods/with metal clevises...but bike spokes and self threading nylon clevises also work great!

Congratulations!
Your fuselage is almost flight ready! All you need is a Wing!!!

Now is a good time to make sure your servos go in the right direction. A bad time is when you're 20 feet high at full power!



Review this and the following wing pages, then start folding and gluing! You want to go flying tomorrow right!? This page will give you a brief step by step, hopefully the photos will help! But first...

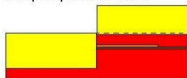
We use medium CA glue for wing building, as well as tacking tail feathers and control horns in place while drilling for screws. In order for the glue to hold, the Coroplast areas to be glued must be "FLASHED" first!!! Practice this on scrap Coroplast first! Pass a medium flame from a butane or propane torch directly over the plastic slow enough to burn the manufacturing oils out of the plastic, but fast enough not to burn the plastic! It only takes SECONDS and there is very little evidence you have done anything. You may see a slight vapor wave on the plastic in front of the flame and the plastic may turn a darker color and warp slightly...it will return to normal in several seconds. If the plastic ripples or turns shiney...you are nanoseconds away from melting it!!! When gluing plastic to plastic...USE ONLY ONE DROP OF MEDIUM CA EVERY 1/4" TO 1/2" OR SO!!! USING TOO MUCH GLUE IS THE BIGGEST MISTAKE HERE! A bead of glue is too much and may not set up. Also, it is imperative that the parts DO NOT MOVE AT ALL after initial contact. Very helpful hint: If you live in a dry climate, or have trouble getting the CA to work, a slight mist of water from a spray bottle, on the opposing surface to be glued, can be used to help the CA activate!

48"

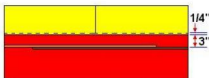


48"

1. Cut out 2 mm and 4mm Coroplast pieces as shown



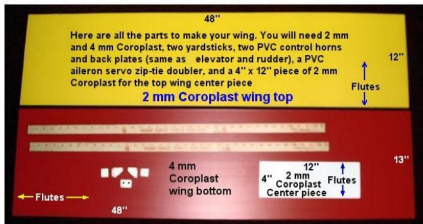
3. Working one side at a time, fold top panels over and glue to spar and lower panel. For trailing edge, use two rows of glue dots spaced 1/2" apart and every 1/4" to 1/2" from each other. You can use a bead of glue for the wood spar. A 2 x 4 block of wood makes a great tool for pressing down on the trailing while the glue sets



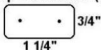
2. Glue top under bottom with 3/4" overlap. Cut top panels apart at center, score and crease leading edge 1/4" from bottom panel. Glue two full size yardsticks together (lap joint) for spar and glue to lower wing



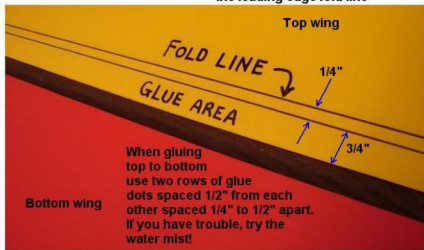
4. Cut material from between ailerons, then taper and hinge them. Also add 2 mm wing center piece to top of wing and install servo, control horns and pushrods. This page only covered the basics, see the photos for more details

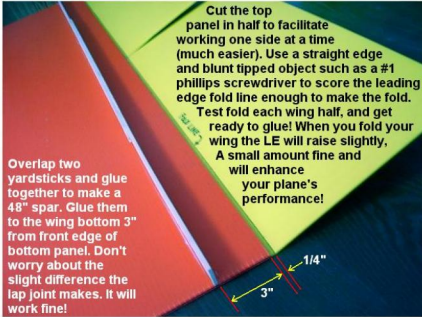


Aileron Zip-Tie Doubler (make 1)



After you have made all your parts, mark the top wing for a 3/4" overlap, and then glue it under the bottom wing. There will be 1/4" from edge of bottom panel to the leading edge fold line

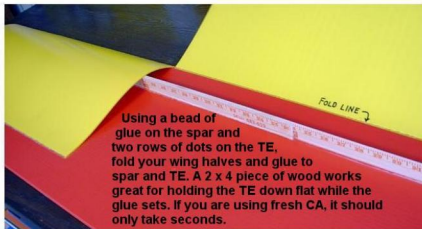




Cut the top panel in half to facilitate working one side at a time (much easier). Use a straight edge and blunt tipped object such as a #1 phillips screwdriver to score the leading edge fold line enough to make the fold.

Test fold each wing half, and get ready to glue! When you fold your wing the LE will raise slightly, A small amount fine and will enhance your plane's performance!

Overlap two yardsticks and glue together to make a 48" spar. Glue them to the wing bottom 3" from front edge of bottom panel. Don't worry about the slight difference the lap joint makes. It will work fine!

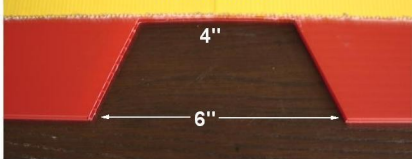


Using a bead of glue on the spar and two rows of dots on the TE, fold your wing halves and glue to spar and TE. A 2 x 4 piece of wood works great for holding the TE down flat while the glue sets. If you are using fresh CA, it should only take seconds.



Your wing should now look like the picture on the left. Cut out the material between the ailerons as shown. Glue the top center piece on and trim flush with LE and TE. Trace for and cut a snug hole for your aileron servo. Position it slightly behind the spar! Make sure before you start cutting!

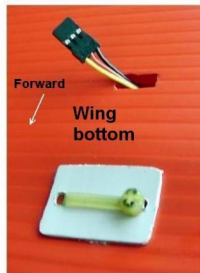
Aileron Cut-out



Taper your ailerons to 1" wide at the wing tips. Use a new blade and be careful. I use a straight edge and also put some scrap 4 mm Coroplast under it to keep it level with my aileron. It also helps to get your Wife, girlfriend, or buddy to hold things down solid. They will feel good about helping, and you will have a good looking wing!

Wing
Center
Piece





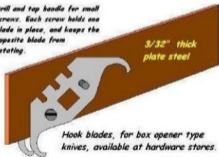
and I also beveled the horn bases slightly so they would fit closer to the hinge. Install the aileron servo using a zip-tie and the PVC zip-tie doubler on the bottom of the wing directly under the servo. Don't forget to cut a small hole behind the servo for the aileron lead. The top left picture shows two 4" pieces of scrap pushrod (coat hanger works great also!). Insert these into the TE and LE flute of the top center piece for rubber band crush protection! Now go have a Pepsi, it's almost time to finish things up and go flying



I have included this picture because this hinging tool really works great! It will cut a perfect hinge as fast as you can pull it! The reason I put this picture at the END of the wing building is because this tool works so good, that I finish everything on my wings and then cut the hinges last! That way the ailerons are not flopping around when I'm installing the servo, horns, and pushrods. Give it a try, and I guarentee you'll never do it any other way! OK...lets balance your plane, install the wing dowels, and then head out to the field!!!

Coroplast Hinging tool

Drill and tap handle for small screws. Each screw holds one blade in place, and keeps the opposite blade from rotating.



Hook blades, for box opener type knives, available at hardware stores.

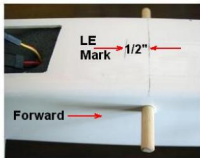
This is the delux model, guarenteed to make perfect hinges in seconds, and make quick work of Coroscale fuselages! A simpler version can be made by glueing blades to a yardstick handle.

Designed by Curtice Nagel



1/4" x 4 1/2"
Dowels

This is the most important step to getting your plane to fly correctly! Everything must be completed and your plane must be in flight ready configuration, with the fuel tank **EMPTY**. Cut two 1/4" x 4 1/2" long wing hold down dowels. Strap them to the bottom of your fuselage using rubber bands over the top of the fuselage. Now tie two rubber bands together to make one long rubber band (you will need two of these). Using these long rubber bands, strap your wing on to your plane (sure looks cool doesn't it?) Move your wing forward or back on your fuselage until you can pick your plane up with a finger tip under each wing tip directly under the spar...and it balances perfectly level. Slightly nose heavy is ok, but tail heavy is **NOT ACCEPTABLE** and your plane will dirt nap for sure. When you are sure your plane is balanced the way you want it, take a pencil and mark the location of your leading and trailing edge on your fuselage. Take the wing off, and measure 1/2" forward of the leading edge mark, and 1/2" rearward of the trailing edge mark. Mark these locations and this is where you will install your wing hold down dowels.



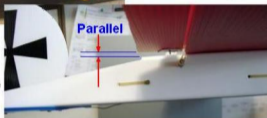
This page shows the proper way to mark for dowel locations. The top picture is marking the leading edge after finding the proper balance point, and the picture to the left shows the dowel installed 1/2" forward of the leading edge mark. Install the rear dowel 1/2" behind the trailing edge mark. Be very carefull when drilling dowel holes not to hit any

radio equipment, and especially your fuel tank! I like to try and install my dowels as high on the fuselage as I can, without getting into the corner radius of the gutter pipe. Once installed, coat your dowels with CA to fuel proof them. And with that, your Spad Das Plas-Stick is done!!! You can celebrate by putting some cool stickers on it!



If you have never flown, **DO NOT TRY THIS ON YOUR OWN**, you will crash I guarantee it. Please get with your local club and get an instructor to help you!

The second most important aspect to getting your plane to fly correctly is to **MAKE SURE** your ailerons are **PARALLEL** to the top surface of the fuselage in the neutral position!



When flying your plane be sure to follow all AMA safety guidelines. Before going to the field, plug your aileron servo in and strap your wing on and check everything out. I like to set all my control surface throws to 1" each way (2" total). Make sure that your ailerons are parallel to the fuselage in the neutral position...**THEY CAN NOT DROOP AT ALL**, or you will experience trim changes at different power settings. Make sure all your control surfaces go in the correct direction! Make sure your rudder and elevator are perfectly straight for neutral, and make sure your nose gear is straight! Make sure your throttle goes to full open and full cut-off. I also like to "Clock" my prop horizontal against the compression stroke of the engine, this way it will be less prone to getting busted in a hard dead stick landing...for you combat pilots who built your plane without landing gear this is a **MUST!!!** I like to put my channel number on the fuselage just behind the firewall, this will always remind me to make sure I have pinned my frequency on the frequency board before I fire up! If you have a computer radio, also put the model number there! The most frequent cause for crashes I've seen in the recent years comes from having the wrong model set in computer radios! I also like to put bold graphics on the **TOP** of my wings, and nothing on the bottom, for good in flight orientation. Make sure your radio is charged and **LETS GO FLYING!** Make sure you strap your wing on with at least 12 #64 rubber bands (6 per side) and for combat I use at least 20 (10 per side). My plane uses a 10 x 6 Master Airscrew prop, and it provides plenty of power. For the hand launched combat version a light hand launch into the wind is all it takes to get airborne. If you have never flown a Spad before, get ready for a plane that will knock your socks off and out turn and spin anything at the field. If you have any more questions than what I've covered in these instructions, then you probably don't have the experience to fly this plane...**PLEASE GET SOME HELP**...you have put too much work into this to dirt nap it now! Feel free to visit the Spad forum link at www.spadtothebone.com and above all, **HAVE FUN and HAPPY FLYING!!!**