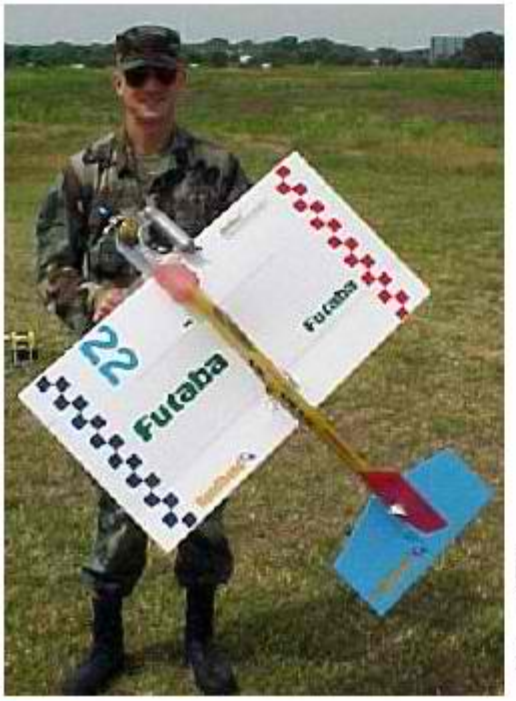
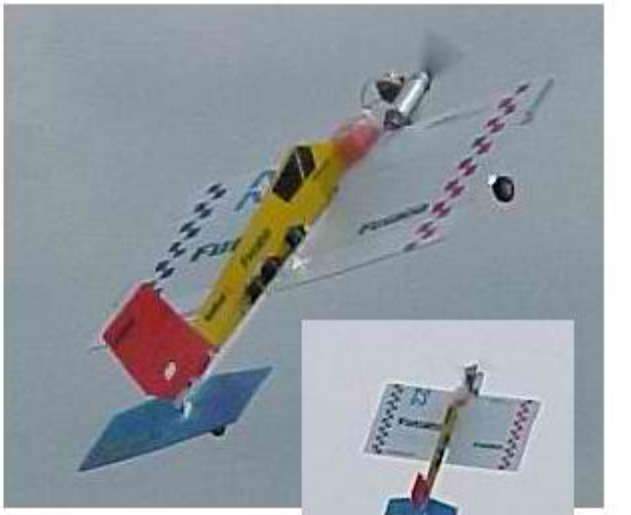




SPA3D

Aircraft Type- Fun Fly
Engine- .46- .47
Wingspan- 36"
Length- 36"
Channels- Aileron, Elevator, Rudder, Throttle
Weight- 4 1/2 pounds
Construction- Coroplast, Aluminum, HDPE and PVC
Design by Dean Tuinstra (Tattoo)

Simple Plastic Aluminum 3D (SPA3D)

http://www.spadtothebone.com

36"

5"

Crease 5 flutes for leading edge fold

Wing

6"

7/8" square hole

5/32"x18" Long Music Wire in flute

4mm Coroplast flutes

7/8" x 4" fuselage slot

24"

5/32"x18" Long Music Wire in flute

4"

Aileron Hinge Line

2"

Horizontal Stab/Elevator

7/8"

2"

flutes

4"

Hinge line

4"

4mm Coroplast

16"

23"

Profile Fuselage

5 1/2"

flutes

4mm Coroplast

Trim fuselage as needed to fit your airplane, shape is not critical, be creative!

Vertical Stab/Rudder

4mm Coroplast

2"

4"

8"

flutes

5 1/2"

2"

4"

1/2"

Engine mount

1"

3"

5"

POLY kitchen Cutting board Available at Wal-Mart Usually @ 7/16" thick

PVC Parts

3"

3/4"

Tank mount zip-tie doubler (Make 2)

Wing, tail, fuselage mounting back plate (Make 10)

3/4"

3/4"

Control horn backplate (Make 4)

3/4"

1 1/2"

1"

3/4"

1 1/2"

Control horn (Make 4)

1" Landing Gear 3" 1"

20"

1"x 1/8" thick aluminum stock (Easily bent to shape using vice and hammer)

1/16"x1/2"x3/4"x1/2" I.D. x36" Long Aluminum "U" Channel Fuselage

GMS .47

CG is 6" from Leading Edge

10 OZ

Tank mounted on PVC Doublers with two sided foam mounting tape and zip-ties

Engine, Mount, and landing gear are mounted with #6x3/4" self tapping screws

#6 x 1/2" self tapping screws used for wing, tail and fuselage mounting

Skewer

GMS

Design by Dean "Tattoo" Tuinstra

1/2"

Coat hanger support inserted in flutes at wing-tips

2" Foam wheels

Battery Rx

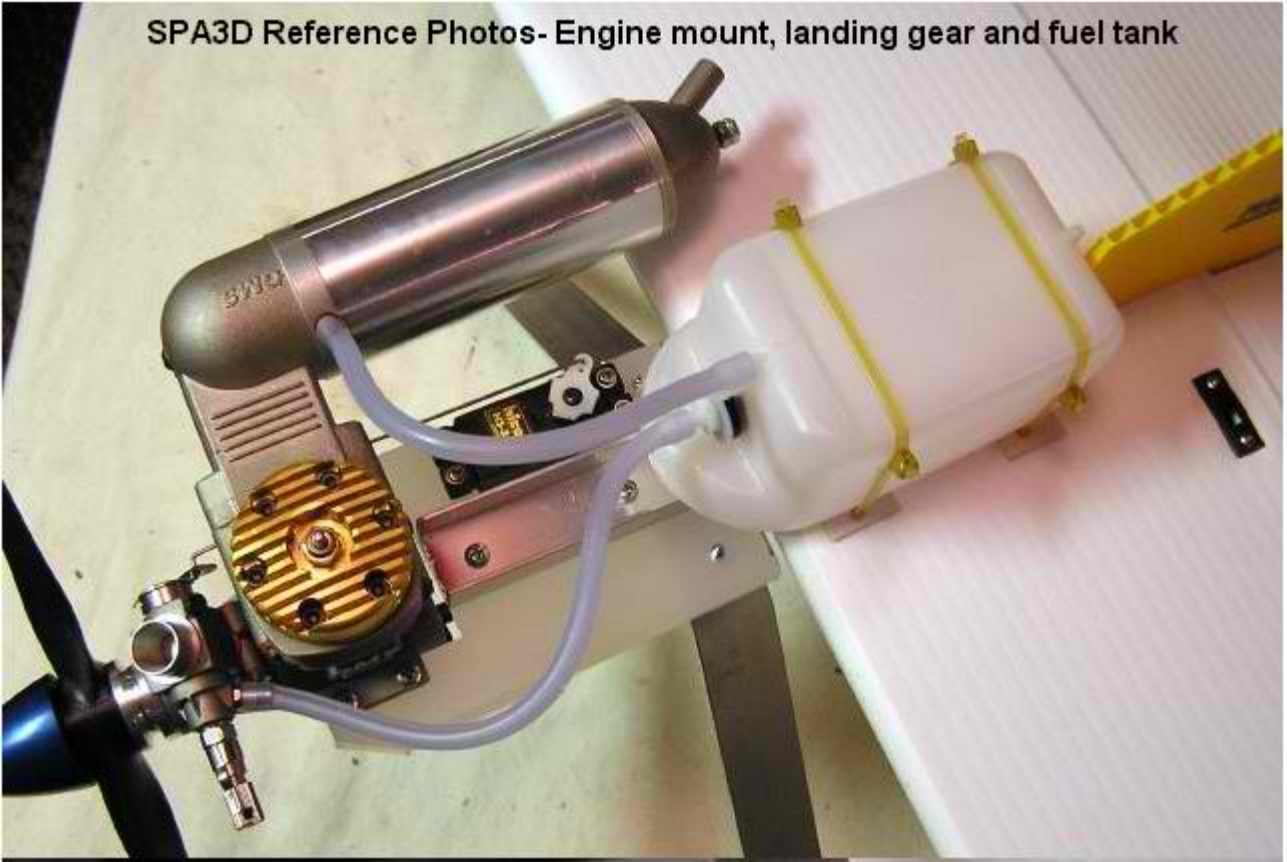
Battery, Rx and servos are mounted with zip-ties

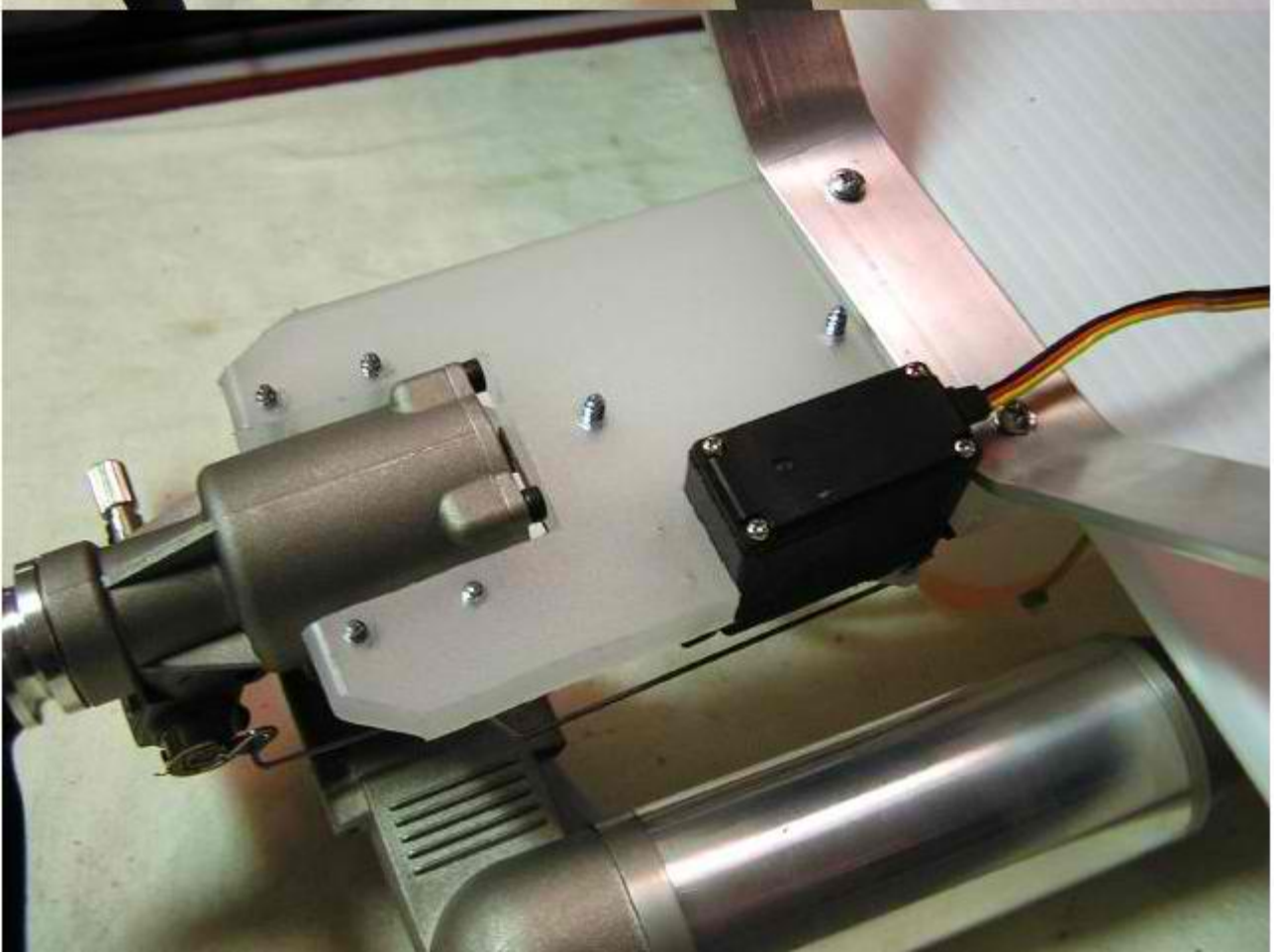
.078 Music wire

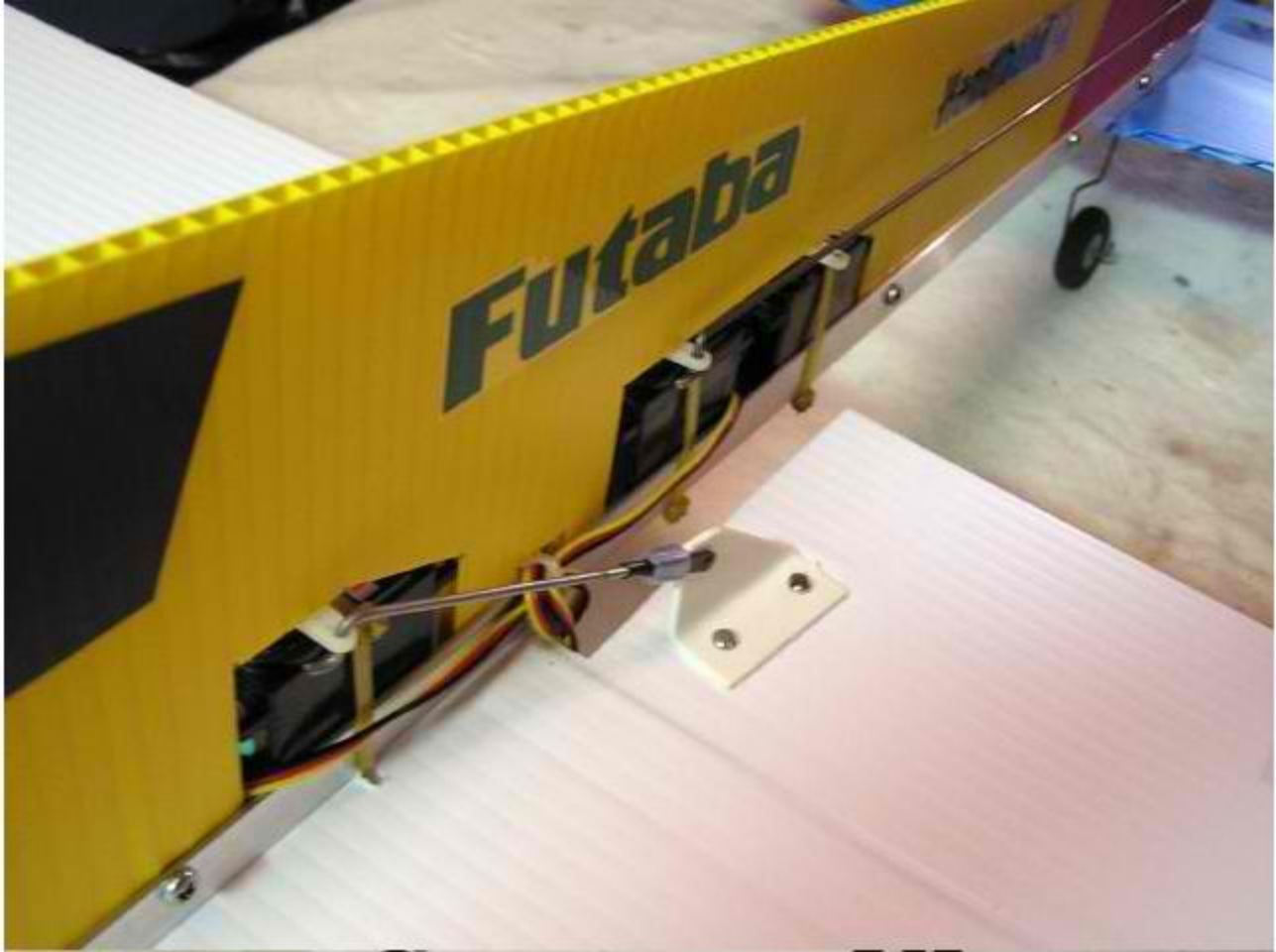
1 1/2" Foam wheel

All hinges made by cutting away one side of a Coroplast flute. Set all control surface throws to "Barn Door" (3" or more total travel)

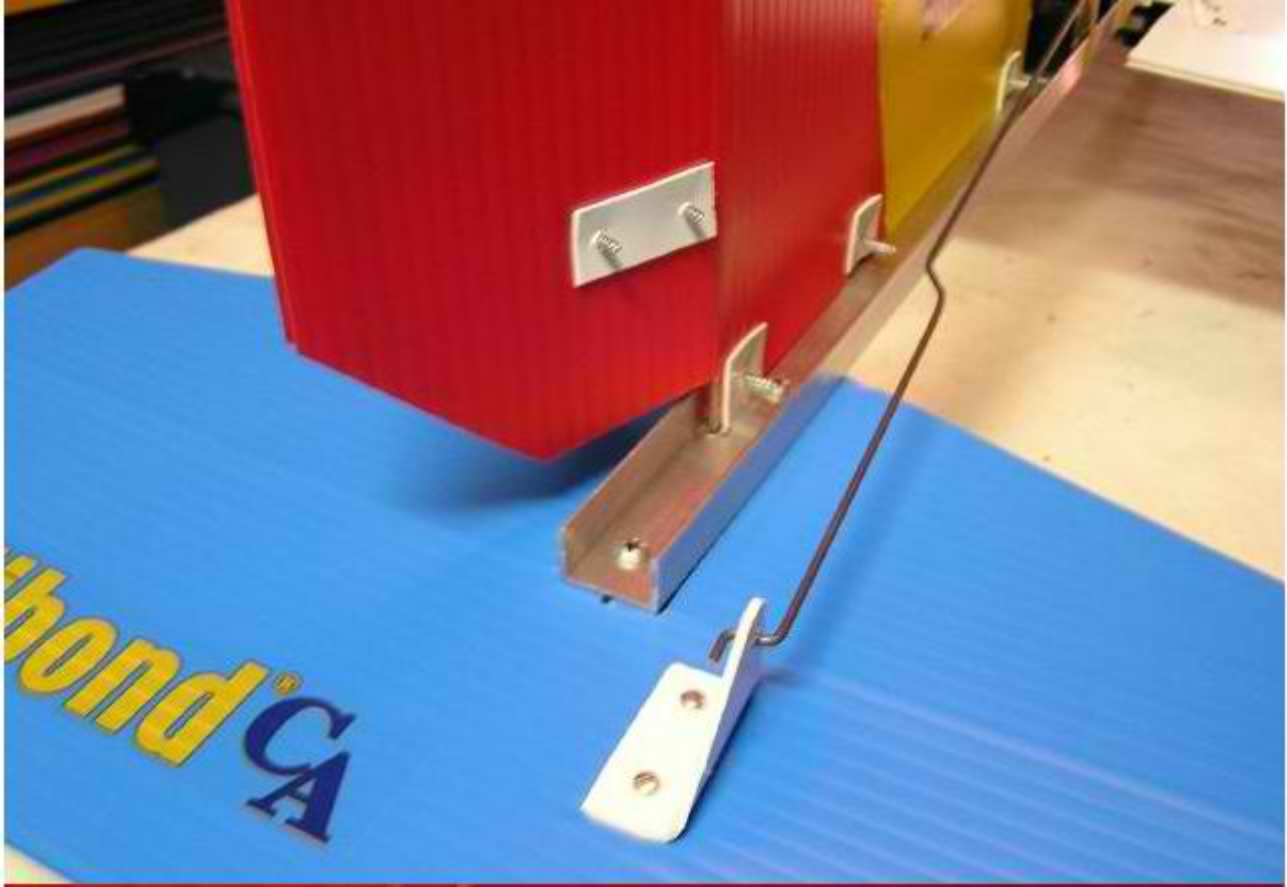
SPA3D Reference Photos- Engine mount, landing gear and fuel tank





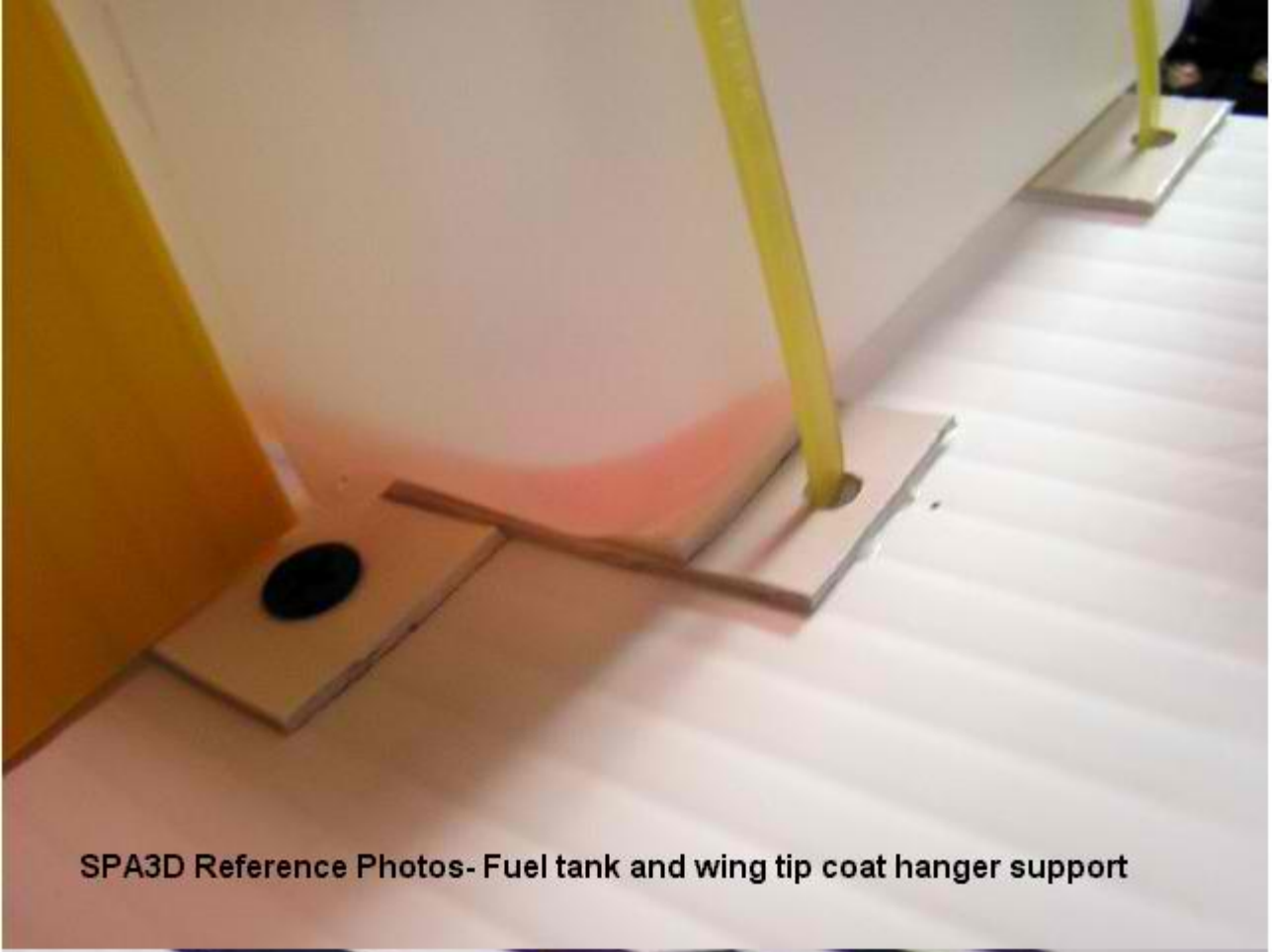


SPA3D Reference Photos- Fuselage and servo mounting



SPA3D Reference Photos- Tail

SPA3D Reference Photos-Tail wheel and radio installation



SPA3D Reference Photos- Fuel tank and wing tip coat hanger support

Simple Plastic Aluminum 3D (SPA3D)

http://www.spadtothebone.com

36"

5"

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Profile Fuselage

5 1/2"

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Trim fuselage as needed to fit your airplane, shape is not critical, be creative!

Vertical Stab/Rudder

4mm Coroplast

2"

4"

8"

flutes

5 1/2"

2"

4"

1/2"

Engine mount

1"

3"

5"

POLY kitchen Cutting board Available at Wal-Mart Usually @ 7/16" thick

PVC Parts

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Tank mount zip-tie doubler (Make 2)

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Tank mounted on PVC Doublers with two sided foam mounting tape and zip-ties

Engine, Mount, and landing gear are mounted with #6x3/4" self tapping screws

#6 x 1/2" self tapping screws used for wing, tail and fuselage mounting

Skewer

GMS

Design by Dean "Tattoo" Tuinstra

1/2"

Coat hanger support inserted in flutes at wing-tips

2" Foam wheels

Battery Rx

Battery, Rx and servos are mounted with zip-ties

.078 Music wire

1 1/2" Foam wheel

All hinges made by cutting away one side of a Coroplast flute. Set all control surface throws to "Barn Door" (3" or more total travel)

SPA3D

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Instructions

Building Instructions/Essay

Design and instructions by Dean "Tattoo" Tuinstra
Simple Cheap Fun-Fly 3D design
Engine--.46-.47 (GMS .47 used on prototype)
Wingspan--36"
Length--36" (length of "rail" fuselage not including engine and rudder)
Weight--4 ½ pounds (approx)
Channels--Aileron, Rudder, Elevator, Throttle

Materials (represents exact materials used on prototype)

__4mm Coroplast (local sign shop, Harbor Sales, Regal Plastics, convenience store or gas station dumpster...ask first!!!)
__Aluminum "U" Channel (1/16" thick x ½" x ¾" x ½" I.D.) (Lowes) 36" needed for fuselage (sometimes called ¾" plywood end cap)
__Poly Kitchen Cutting board (Wal-Mart, American Chef brand used on prototype) For engine mount
__PVC Gutter Pipe (2 ½" O.D. from ACE Hardware used on prototype) For control horns, back plates, doublers
__Aluminum Stock (1" wide x 1/8" thick from Lowes) 20" piece needed for landing gear
__#6 x ¾" long self tapping screws (Lowes) for engine, mount and landing gear mounting
__#6 x ½" long self tapping screws (Lowes) for wing, tail and profile fuselage mounting
__Deck screw 1 ¼" long (scrounged from garage, one used for wing attachment)
__6-32 x 1 ½" long bolts and nuts for wheel axles (2 bolts, 4 nuts)
__5/32 music wire (hobby store) for wing supports (one 36" piece will be cut into two 18" pieces)
__.078 music wire (hobby store) for tail wheel wire and pushrods
__2-56 Threaded pushrods with metal clevises (From hobby store, used on ailerons)
__Regular sized zip-ties and small zip-ties (Dollar General, Wal-Mart, or any home improvement or auto parts store)
__Double sided foam mounting tape (from Wal-Mart hardware department)
__Great planes 10 ounce fuel tank and fuel line (hobby store)
__2" diameter lightweight foamy wheels (From hobby store, two for main gear)
__1 ½" diameter lightweight foamy wheel (From hobby store, one for tail wheel)
__Your engine
__Your radio
__Tools--Normal hand tools, sharp hobby knife & straight edge, hacksaw and drill with 1/16" bit and up a must. Tin snips (sheet metal shears) helpful. If you don't have a band saw, find someone who does for cutting out engine mount.

Note: These instructions represent how I built my SPA3D, what I used, and the exact order in which I built it. This design is wide open to personal preferences, modifications, and further experiments. If you build yours like mine, you will have a good flying airplane...but nothing is perfect and you may have better ideas! Please never hesitate to try them! These planes are far from rocket science and exact screw locations throughout the design are not critical, just put them where you think they will be the most effective, according to the general locations shown in the drawings and reference photos. This design is also easily modified to accommodate different engine sizes by simply changing the wing span and fuselage length, with all other dimensions staying the same. For a BB .46 or .47, build as represented here. For a strong .30 class engine or bushing .40 to .46 build with a 34" span x 34" fuselage rail.

For a strong .20-.30 sized engine build with a 32" span x 32" fuselage rail.

1. ENGINE MOUNT. I started by cutting out the engine mount. It is made from a POLY kitchen cutting board I bought at Wal-Mart. There are several different brands, and they are usually around 7/16" to ½" thick. It is VERY important that what you get says POLY on the label so that you know its high density material. It should be milky white in appearance and slightly see through. The brand name I use is "American Chef". One brand name to stay away from is "Fiberware" as it does not say Poly on the label and is made from recycled "particle plastic" and is brittle and breaks easier. I cut mine out on a band saw. You must go slow or the plastic has a tendency to melt back together behind the blade. Be patient, this is the hardest part of building this airplane. Start by cutting out the 3" x 5" piece. Then use your engine and throttle servo to mark for their respective cutouts. MAKE SURE YOU LEAVE 1" OF MATERIAL BEHIND THE THROTTLE SERVO FOR LANDING GEAR MOUNTING! Making the rectangular cut-outs can be a little tricky. I like to cut both sides first and then make a diagonal cut to take out a "triangle" of material. Using several opposite passes of this method and you can get in there to finish your cut-outs.

2. ENGINE ASSEMBLY. Next I installed my engine (GMS .47) and throttle servo to the engine mount. I used a 1/16" drill bit to pilot drill for the servo screws and then mount the throttle servo with standard servo screws. I used a 3/32" drill bit to pilot drill for the engine screws, and then mounted the engine with #6 x ¾" self tapping screws (bought at Lowes). Next I plugged the throttle servo and a battery into my Rx and rigged my throttle using a .078 diameter music wire (bought at the Hobby Shop) pushrod. Next I installed the muffler to the engine to finish out this assembly.

3. ALUMINUM FUSELAGE. Next I cut (hacksaw) a 36" piece of 1/16" thick x ½" x ¾" x ½" I.D. (inside diameter) aluminum "U" channel for the fuselage rail. I bought this at Lowes (comes in 8' lengths) and it's marketed as "3/4" plywood end cap". Next I mounted my engine assembly to it using two #6 x ¾" self tapping screws. Center the rail behind the engine, on top of the engine mount, with the end of aluminum flush with the back of the engine cut-out and MAKE SURE the aluminum doesn't touch the back of the engine. Drill the aluminum holes large enough for the screws to pass through, but it's good to have a tight tolerance here. I used a 1/16" drill bit to pilot drill the mount for the screws...this makes them nice and tight, and the POLY can take it, so don't worry. The strategy I use here is to drill the holes in the rail first, then pilot drill for, and install the forward screw. Now I can tweak the mount to get it perfectly straight and then pilot drill and install the rear screw. Exact screw location is not critical, just make sure you don't put the rear screw in the rear 1" area of the mount. If you do, the tip of the screw that pokes out of the bottom of the mount will interfere with landing gear mounting.

4. LANDING GEAR . For my landing gear I cut (hacksaw) a 20" piece of 1/8" thick x 1" wide aluminum stock I bought at LOWES. It bends easier than you think and can easily be formed in a vise. I used 2" lightweight foamy wheels I bought at the hobby shop. For axles I used 6-32 x 1 ½" long bolts with two nuts each. Just stick the bolt through the wheel, put a nut on up to the wheel, install to the gear, and put the other nut on good and tight. I installed my landing gear to the bottom of the engine mount, behind the throttle servo, using two #6 x ¾" self tapping screws. Again, you want close tolerance holes in the landing gear and I pilot drilled the mount with a 1/16" drill bit so the screws are good and tight.

5. WING. Next I cut out a 36" x 24" piece of 4mm Coroplast for my wing. Make sure the flutes are running the 36" direction. Measure 5" from the top, this is your first leading edge fold flute. I used a #1 phillips screwdriver to run along (cave in) the inside of the flute so that it

will fold. Do the same for a total of five flutes (where you started and four more above it). The Coroplast may try to fight you here, but keep at it until you have a fairly rounded leading edge. You can now cut out the 7/8" square leading edge fuselage hole, and the 7/8" x 4" long fuselage slot starting 6" behind the lowest leading edge flute. When I cut these holes out I like to error slightly on the small side so I have to slightly force the fuselage through the holes for a nice tight fit. Now cut out the 2" x 4" section between the ailerons. I usually don't hinge the ailerons until later, because I don't like them flopping all around while I'm working on the rest of the plane. Before putting the wing on the fuselage, I drove two 18" pieces of 5/32" music wire (from the hobby shop) into the wing. One is in the flute directly in front of the aileron hinge and the other is in the flute at the front of the 4" long fuselage slot (or 6" behind the lowest leading edge flute). For future reference, this forward piece of music wire is also at the airplanes CG. I found the music wire very hard to slide into the flutes. Using a file, I beveled one end slightly, and then ended up spraying them with Windex and then tapping them in with a hammer, with the wing resting sideways on the floor. I found some scrap 1/8" music wire in my shop to use as a drift to get them centered in the wing.

6. WING ATTACHMENT. Now it's time to slide the wing on to the fuselage like a shiskabob. Once you get the fuselage slid through the wing leading edge hole and fuselage slot, slide the wing all the way up to the engine mount. I then cut (tin snips or sheet metal sheers work great for this) out three ¾" square pieces of PVC from gutter pipe (two for the front screw and one for the back screw). I use 2 ½" square O.D. gutter pipe I bought at a local ACE Hardware store. In two of these I drilled a 1/16" pilot hole for screws to tap into, and in one I drilled a hole big enough for a #6 screw to go through. You want to mount the wing in the front (screw goes all the way through the wing top/PVC piece/fuselage/bottom of the wing/taps into PVC piece) and in the rear, through the fuselage and through the flute just forward of the rear piece of music wire and taps into a PVC piece. I used a #6 x ½" self tapping screw for the rear mount point. I didn't have a #6 screw long enough for the front mount point, so I went scrounging around the garage and found a 1 ¼" long deck screw that worked perfect. Install the forward screw so that it catches the second to the last (rearward or aft) flute in the lower wing folded over section (you want it far enough back so that it won't interfere with fuel tank installation). Tighten the screws just to the point that you see the Coroplast start to crush in slightly and that's enough. Make two "U" shaped wing tip supports out of coat hanger. Start with a 4" piece of hanger and bent it into a "U" so that the inside dimension of the "U" is ½" wide. Now double over each leg of the support so that it's a tight fit into the flutes. Insert these into the last (furthest aft) flute of the bottom wing folded over section, and top wing flute directly above it, at the wing tips.

7. HORIZONTAL STAB/ELEVATOR. I cut my Horizontal stab/elevator from a 16" x 8" piece of 4mm Coroplast with the flutes going in the 16" direction. I gave the stab a 2" taper and hinged it at 4" (see plans drawing) by cutting away the bottom side of the hinge line flute. I then cut out two ¾" square pieces of PVC and drilled a 1/16" hole in them for the screws to tap into. The Horizontal stab/elevator is mounted to the bottom of the fuselage with two #6 x ½" self tapping screws through the fuselage/stab/tap into PVC piece. Make sure the elevator hinge is clear of the end of the fuselage, and that it is mounted straight and centered. I drill the screw holes (close tolerance but large enough for the screws to pass through) in the aluminum fuselage first and then I like to install one screw, and then tweak the stab until it is lined up perfectly straight, and then install the other screw. Tighten the screws through the fuselage/Coroplast/tap into PVC piece, until the Coroplast just starts to crush slightly and that's enough.

8. VERTICAL STAB/RUDDER. I cut my vertical stab/rudder from an 8" x 8" piece of 4mm Coroplast. I gave the stab a 2" taper and hinged it at 4" by cutting away one side of the

hinge line flute. Cut the bottom ½" of the rudder away (so that it will clear the rail). I was going to leave the rudder squared away at the bottom, but it ended up hitting the elevator control horn, so I trimmed a 2" x 2" triangle off the lower rear corner (see plans drawing). Cut out two ¾" square PVC pieces and drill with a 1/16" drill bit for screw tapping. The vertical stab/rudder will be mounted to the inside of the aluminum fuselage with two #6 x ½" self tapping screws just like you did the horizontal stab/elevator. It really doesn't matter what side you mount it to, but I like to mount mine on the left side to offset muffler weight (however slight that may be).You will notice that I mounted the vertical stab/rudder with the rudder hinge line 2" forward of the aft end of the fuselage, simply because I think it looks cool and gives better elevator/rudder clearance. Before mounting the vertical stab/rudder to your plane, you will want to install the tail wheel wire into the rudder! I used .078 music wire (hobby shop) and started with an 8" piece. Using needle nose pliers, bend a 2" "L" in the wire. You will now poke (solid pressure is all it takes to poke it through the flutes) this into your rudder so that the 2" leg goes into the rudder, 1 ½" above the bottom edge of the rudder, and the 6" leg runs inside the hinge, and out the bottom of the vertical stab/rudder. Using the vertical stab/rudder/tail wheel wire assembly as a guide, you need to figure out where you need to drill the tail wheel wire hole in the bottom of the fuselage. I used a 3/32" drill bit for this which is slightly larger than the .078 music wire. Drill the tail wheel wire hole in the bottom of the fuselage...it will also run through the horizontal stab Coroplast. You can now slide the tail wheel wire through the fuselage hole and position the vertical stab/rudder in place on your airplane, drill for, and install it with the #6 x ½" self tapping screws into the ¾" square PVC pieces. A helpful hint here for positioning the vertical stab mounting screws is to drill the holes in the aluminum close to the top edge of the rail. Once the vertical stab/rudder is installed, you can finish out the tail wheel. I used a 1 ½" diameter foamy wheel I bought from the hobby store. I have found that lightweight foamy wheels sold as electric main gears, work great as tail wheels! I used needle nose pliers to bend an "L" in the bottom of the wire, slipped the tail wheel on, and finished it out with another "L" bend to keep the wheel in place. I guess you could call the finished tail wheel installation a "J" bend. My tail wheel hole was too small for the music wire, so I drilled it out to 3/32" to slide on and spin freely.

9. CONTROL HORNS. If you haven't done it already, hinge your ailerons by cutting away the bottom of the aileron hinge flute. I made my control horns from the angled portion of PVC gutter pipe. I used 2 ½" O.D. gutter pipe I bought from a local ACE Hardware store. Tin Snips (or sheet metal shears) work great for cutting them out. Make four control horns and four control horn back plates. I made the horns 1" high x 1 ½" long x ¾" wide base. The back plates are ¾" wide x 1 ½" long. I used two #6 x ½" self tapping screws for mounting each control horn. The control horns are drilled out close tolerance for the screws and the back plates are pilot drilled with a 3/32" drill bit for the screws to tap into. A helpful hint here it to use a couple drops of CA glue to tack the control horns onto the control surfaces while installing the screws. Make sure you angle the aileron control horns inward slightly to line up better with the aileron servo arm. Install the rudder control horn so that the screws pass through the rudder Coroplast just above the tail wheel wire...this will give the tail wheel wire maximum support for taxiing and landing. Install the elevator horn far enough from center so that it will not interfere with rudder operation. Make sure the control horns are as close to the hinges as comfortably possible. Tighten screws until the Coroplast starts to slightly crush and that's enough. Drill each control horn for the size of pushrod/clevis you are going to use. I drilled my control horn clevis holes ¾" from the base of the horn.

10. RECEIVER AND BATTERY INSTALLATION. I simply wrapped my receiver and battery in foam and zip-tied them to the aluminum fuselage under the wing. I found zip-ties at a local Dollar General Store (a bag full for...a dollar) I put the battery in front of the receiver for the simple reason that if I crash hard enough to break the zip-ties, the battery won't take

the receiver out. Also, with the receiver aft of the battery, there is a better chance of all the servo leads reaching it. For antenna routing I poked a hole in the bottom of a wing flute (with a small drill bit) and ran it down the flute and out the wing tip. I used a scrap servo arm as a "keeper" on the antenna near the Rx. I put a small piece of fuel tubing on the portion of antenna that exits the wing tip, then inserted the antenna back into another wing flute near the wing trailing edge and used the fuel tube crammed in the flute as a "stopper" to keep the antenna from pulling out. I mounted the switch where covenant, near the center, on the left side of the wing. I used a pointed Exacto knife to cut the switch hole in the Coroplast and a 3/32" drill bit for the switch plate screw holes in the Coroplast. Tighten switch plate screws until the Coroplast starts to slightly crush and that's enough.

11. FUEL TANK INSTALLATION. I used a Great Planes 10 ounce tank (hobby store) and mounted it on top of the wing. I mounted it in this location to get it as close to the CG as comfortably possible. Before mounting the tank, make two tank mounting zip-tie doublers made from PVC gutter pipe. I made mine ¾" wide x 3" long. Clean the Coroplast in the tank mount area and the PVC tank mount doublers with Windex (generic brands are cheaper at Dollar General) and glue the doublers to the top of the wing (I used dots of Medium CA). Using a drill bit the size of your zip-ties, drill a hole at each outboard end of the tank mount doublers. Make sure these holes line up with a wing Coroplast flute! Drill the holes so that they go through the PVC AND ONLY THE TOP of the Coroplast flute! It will take four zip-ties to mount the tank. Now take one zip-tie and pre-curl the tip of it. If you do this right, you can push the zip-tie into one hole and it will run through the Coroplast flute and poke out the other hole. Pre-position a zip-tie in each tank mount doubler in this manner. Next I used double sided foam mounting tape (Hardware department at Wal-Mart) between the tank mount doublers and fuel tank to stick the tank to the wing. Once the tank is in place, insert a second zip-tie into each of the zip-ties already in position and cinch them down around the tank. Make sure the zip-ties are tight enough to not vibrate on the tank, but not too tight to distort the shape of the tank. Now you can connect your fuel lines (hobby store) from the tank to the engine's carb and muffler.

12. PROPELLER AND SPINNER. If you haven't already, install your propeller and spinner. I used a Du-Bro ¼-28 spinner nut and a MAS 11x6 prop for the first several flights and then switched to a MAS 12x4 for better hover power.

13. SERVO INSTALLATION. At this point, everything on your plane should be done with the exception of servo installation and the profile fuselage installation. I found that the addition of the profile fuselage was negligible in it's effect on the airplane's weight and balance (less than a flute), so I installed the servos and completely balanced and rigged my plane to flight ready condition at this point, before installing the profile fuselage. You will now install your aileron, elevator, and rudder servos into your aluminum fuselage. POSITION THEM TO ACHIEVE PROPER CG. The CG of your plane with THE TANK EMPTY is 6" from the leading edge, or simply the wing flute you inserted the forward piece of 5/32" music wire into. While determining your airplanes balance, don't forget to include the weight of the pushrods you will use. Make sure the aileron servo is far enough forward of the ailerons to insure smooth aileron operation (too close and the downward pushrod angle may get too severe). Once you are satisfied of the servo locations, push the servos down into the bottom of the aluminum channel. Tolerance is very close here, and varies between servo brands and aluminum brands. Sometimes the channel must be spread slightly to insert the servo. If your servos go in real nice and tight, simply wrap a zip-tie around them and the aluminum, cinch them down and your done. If your servos are not tight, or slide right in nice and easy, then you will have to use double sided foam mounting tape between the bottom of the servos and the aluminum to stick them down, then secure with zip-ties. When wrapping the aileron

servo zip-tie around the aluminum fuselage, simply poke a hole (use a drill bit) in the top (top of flute only!) of the Coroplast flute on each side of the aluminum. Curl the tip of the zip-tie. If you do it right, it will go in one hole, down the flute, and come out the other hole on the other side of the fuselage. A helpful hint here is to be careful of where the zip-tie ends are, make sure they will not interfere with the servo arm operation. You can now plug your servos into the receiver. I routed my servo leads around the trailing edge of the wing in the center and then along the bottom of the wing. I bought some really small zip-ties at the Dollar General store that make perfect wire ties. I drilled a small hole in the side of the aluminum fuselage as a servo lead zip-tie location. You can also poke two small holes anywhere in the Coroplast you want to and use the small zip-ties to secure your wire leads. Once done, if you haven't already, you can trim the excess zip-tie ends from all the zip-ties on your plane.

14. RIGGING. If you haven't already, rig your throttle. I used a .078 music wire pushrod for this. I used z-bends at both ends with a zig-zag (slight z-bend) in the middle for adjustments. For my ailerons I used 2-56 threaded pushrods with metal clevises (hobby store). Whenever using clevises, make sure and use a small piece of fuel tubing around them for extra security. For my elevator and rudder pushrods I used .078 music wire. I used z-bends at both ends with a very very very mild low angle zig-zag (mild Z-bend, more like ~) in the middle for adjustments. Rig the rudder and elevator straight away for neutral. Rig the ailerons PARALLEL TO THE FUSELAGE for neutral. Use the furthest outboard holes in your servo arms to give your control surfaces barn door travel (I've never even measured mine, so don't ask me what the travels are...my answer would be AMAP...as much as possible!). Make sure your tail wheel is parallel to your rudder for straight tracking while taxiing and take off. CONGRATULATIONS! Your airplane is now flight ready and you could go fly it if you wanted to.

15. PROFILE FUSELAGE . Adding the profile fuselage will give you a small amount of added stability, but for the most part it's strictly for looks. I started with a 5 ½" wide x 23" long piece of 4mm Coroplast with the flutes going the 5 ½" direction. I simply laid it on top of my plane and started trimming it to fit my plane. I started by measuring for the lower front notch (depth x distance to the tank) and cut it out. Then, with the piece laid on its side on the plane, I marked for the location of the servos. I used a spare servo to mark for the servo height and made the servo cut-outs. I then positioned it in place on the airplane with the aft end overlapping the vertical stab and marked the aft angle with a pencil. I cut the aft side to shape and the piece now fit my airplane. For the top profile contour I simply used my imagination. I chose a very simple, straight cut, sloping fuselage shape and I think it looks pretty cool. I made the front start at the height of the fuel tank and tapered the rear to what I thought looked about right. Be creative here! You can make the profile fuselage any shape you want. Once satisfied, I installed the profile fuselage to the aluminum in the same manner as the vertical stab with #6 x ½" self tapping screws and ¾" square PVC pieces for the screws to tap into. I used one screw under the wing in the front, one forward of the aileron servo, and one aft of the elevator servo. I used a small wood skewer in the Coroplast flutes to lock the rear of the profile fuselage to the vertical stab. I made it from a scrap piece of yardstick cut to the size of a flute. Now all you need to do is deck out your SPA3D with a bunch of cool stickers and trim...AND YOU'RE READY TO ROCK!!!

16. FLYING. Make sure you follow all AMA safety guidelines. If at this point you have any questions regarding the preparing, rigging, starting, running, radio range checking, field rules, trimming and flying of an R/C aircraft...YOU ARE NOT READY TO FLY THIS AIRPLANE. Please get the help of an experienced R/C pilot or local R/C club. The SPA3D will take off after a very short take off run. In flight it should be stable and predictable. You will notice that high G maneuvers at higher speeds will cause the wing to visibly flex, this is normal, but

please use caution and common sense along with your throttle. I have flown mine all out, but I also don't do anything stupid just to "see what she can take"...it is not worth the consequences if something goes wrong. Although this plane will fly at full throttle, its main purpose is having plenty of power for 3D maneuvers. Hovering is straight forward and the most stable hovering Spad yet. Mine hovers at half throttle with the GMS .47. Flat spins using only elevator and rudder are phenomenal, and using slight opposite aileron will even flatten them out even more. If you like upright flat spins...wait until you try an inverted flat spin! Wow! Awesome harriers, inverted harriers, toilet bowls, waterfalls, and most other Fun-Fly maneuvers are not only possible but very sweet, so much so that the SPA3D has been identified by many Fun-Fly pilots as the best 3D trainer around, especially when cost, simplicity and EDF (Emotional Debt Factor) are factored in. Have fun, and if you have any questions, please visit any of several Spad forums as linked to from the Spad Home Page at http://www.spadtothebone.com/

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