

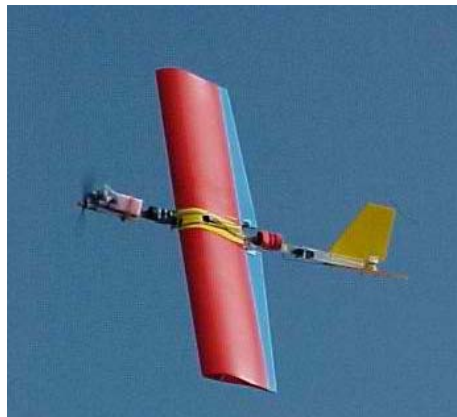


SPAD

Simple Plastic Airplane Design



SPAD HOR



The SPAD Hell On Rails (HOR) is the simplest Spad we have built yet! In it's first ever combat competition, Kraout and myself placed first and second with this aircraft.

Type: SCC Combat and Sport

Wingspan: 48"

Length: 32"

Engine: .15 to as much as you dare!

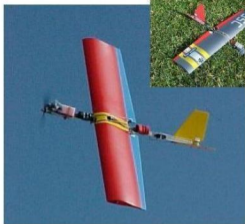
Channels: 3 - Elevator, Ailerons & Throttle



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[\[Wing\]](#) [\[Radio\]](#) [\[Finish\]](#)

Spad Hell On Rails



Engine- .15
 Span- 48"
 Length-32"
 Channels: Elevator,
 Ailerons & Throttle

Designed for RCCA Slow
 Survivable Combat (SSC)
 Competition.

The Spad Hell On Rails (HOR) is the simplest Spad we have built yet! In it's first ever combat competition, Kraut and myself placed first and second with this aircraft. This design is wide open to modifying the deminsions, or simply using the ideas presented here for your own creation. These instructions represent the how I built the original Hell On Rails. I used a Magnum .15 XL with an 8x3 MAS prop and 4 ounce fuel tank. All standard sized servos and a 600 Ma battery were used as well.

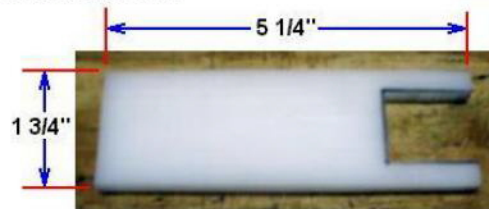
Materials needed to build the Hell On Rails

- 1/16" x 1" x 32" long aluminum "L" channel (fuselage)
- 3/8" thick x 5 1/4" x 1 3/4" HDPE for engine mount (Wal-Mart cutting board)
- 48" x 17" 2mm Coroplast with flutes running the 17" direction (wing)
- 17" x 3" 2mm Coroplast with flutes running 3" direction (wing wrap)
- 48" x 3" 4mm Coroplast with flutes running in the 48" direction (ailerons)
- 16" x 7" 4mm Coroplast with flutes running in the 16" direction (tail)
- Two cheap yardsticks (spar)
- Four 6-32 x 3/4" bolts and nuts (wing hold downs)
- Three 1/4" x 1" Nylon bolts (engine mount to fuselage)
- #6 x 1/2" (or anything close) self tapping screws (tail and horn mounting)
- Scrap PVC gutterpipe (back plates and control horns)
- Zip-ties and double sided foam mounting tape (Radio mounting)
- Propane torch and medium CA glue (wing assembly)
- Your Radio, engine, fuel tank, associated hardware and rubber bands
- Standard shop tools plus hack saw, drill and sharp drill bits

Please review the Hints and Tip section at www.spadtothebone.com for helpful hints and procedures for gluing Coroplast. If you have any questions or comments, please visit the Spadworld or RCCA topic forum!

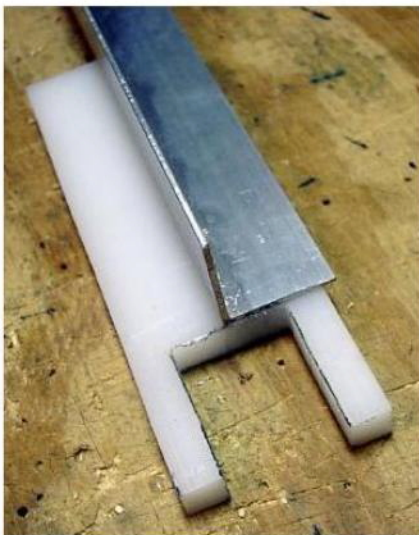
Spad Hell On Rails-Fuselage

The fuselage is simply a 32" long piece of 1/16" x 1" x 1" aluminum "L" channel. The picture on the right shows the sticker on the piece I used. It comes in 8 foot lengths for about \$10 at Lowes. It cuts real easy with a hack saw.

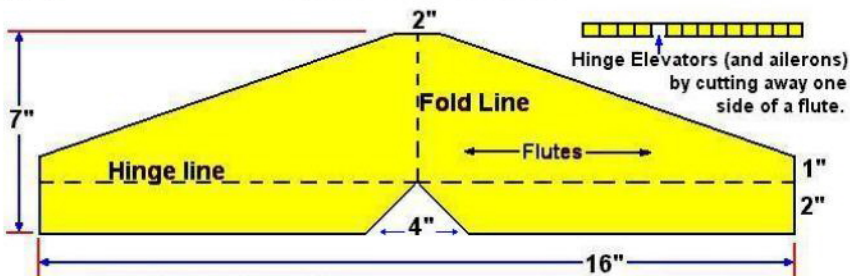


My engine mount is made from a 3/8" thick piece of HDPE cut to the deminsions shown. Make the engine cut-out whatever size needed for your engine. The most common source for HDPE is Wal-Mart kitchen cutting boards.

HDPE cutting boards can vary slightly in color and thickness, as well as density. The softer and more translucent it seems, the better it is. If it feels very hard and not slightly translucent, it may be prone to crack easier. Also, the harder it is to cut the better it is. The good stuff tends to try to melt back together behind the blade of a band saw, so go slowly! Mount your engine mount to the fuselage, positioned as shown on the right. This will put your engine at the center of the aircraft's thrust line. There is no down or right thrust. Make sure the engine cut-out is centered as shown. I used three 1/4" nylon bolts, and threaded the HDPE. I only did this because I found them in a junk drawer and it's probably overkill. Using self tapping screws would work just fine.



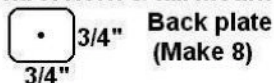
Exact positioning of the mount to fuselage screws is not critical. If you do use self tapping screws, only a very small pilot starter hole is necessary to assure good screw grip. Also make sure the center screw will protrude far enough below the engine mount to be used as the fuel tank rubber band hold down.



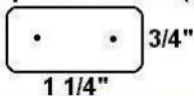
PVC Gutterpipe parts



Control Horn & tail mount

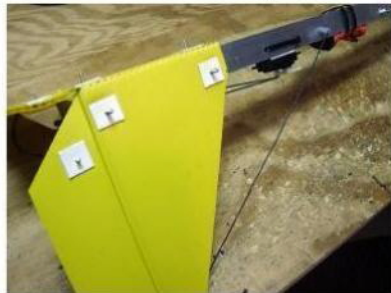


Aileron Zip-Tie Doubler (make 1)



Cut out the tail from 4 mm Coroplast as shown, with the flutes running in the spanwise direction. Hinge the elevators by cutting away the bottom side of the hinge line flute. Use a small blunt tipped object such as a phillips screwdriver to score and crease the tail fold line. Attach the tail to the fuselage using PVC scrap doublers and self tapping screws. While you're at it, cut out the rest of the PVC parts that you will need as shown here.

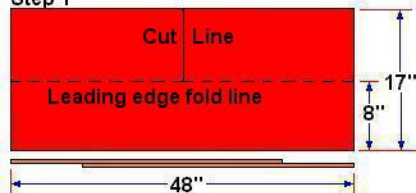
Note: When using self tapping screws to hold plastic airplane parts together, drill the screw head hole large enough for the screw and USE ONLY A SMALL PILOT HOLE for the self tapping side!



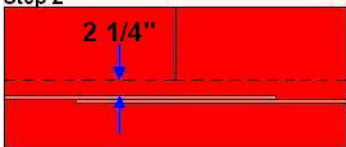
Mount the tail as shown, with the hinge just aft of the rear fuselage edge. Exact placement of the tail mount screws and back plates is not critical. Making sure hinges are not obstructed, mount control horns as shown, as close to hinge line as possible. Clean and use several small drops of medium CA to tack PVC parts in place before drilling and screwing.

Spad Hell On Rails- Wing Build

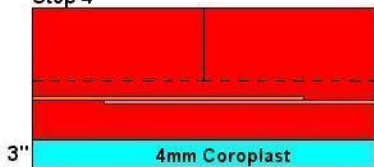
Step 1



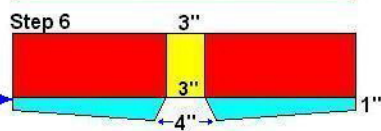
Step 2



Step 4



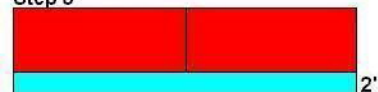
Step 6



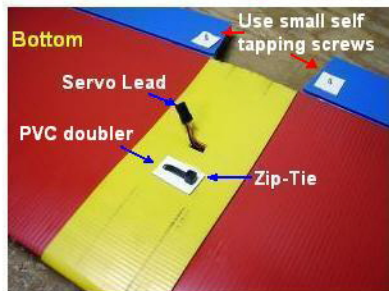
Step 3



Step 5

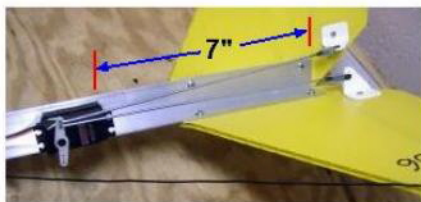


Once the glue has set and the pressure is let off of your wing, it is normal for your leading edge to be slightly raised and the trailing edge will be slightly undercambered.

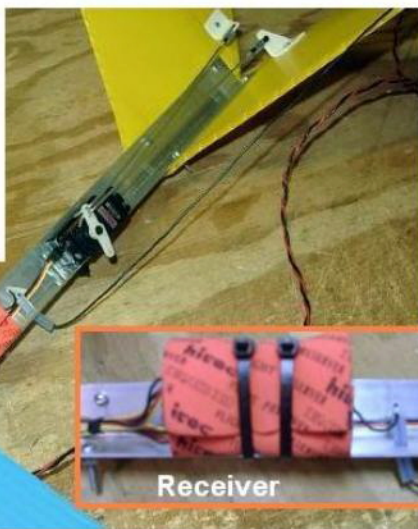


1. Layout 2mm wing with flutes going the 17" direction. Build spar from 2 yardsticks with a lap joint. Score leading edge fold line with a straight edge and phillips screwdriver. Cut upper panels on cut line.**2.** Glue spar to wing bottom as shown.**3.** WHILE HOLDING LEADING EDGE DOWN FLAT ON TABLE test fold top panels, mark, and trim top trailing edges flush with bottom trailing edges.**4.** Glue 4mm Coroplast strip (flutes going in 48" direction) to bottom trailing edge with a 1" overlap (at least 2" hanging off edge).**5.** WHILE HOLDING LEADING EDGE DOWN FLAT ON TABLE fold and glue wing top panels to spar and trailing edge.**6.** Cut out center section of ailerons 3" tapering out to 4". Taper ailerons from 2" wide at wing root to 1" wide at tips. Hinge ailerons by cutting away bottom of first available flute. Glue on 3" wide (flutes going in 3" direction) wing center wrap and trim flush with trailing edge. Install control horns as shown as close to hinge as possible noting slight angle towards servo. Install servo just aft of spar, make it a tight fitting hole and secure with a zip-tie through the bottom of the wing using PVC zip-tie doubler.

Spad Hell On Rails- Radio Installation

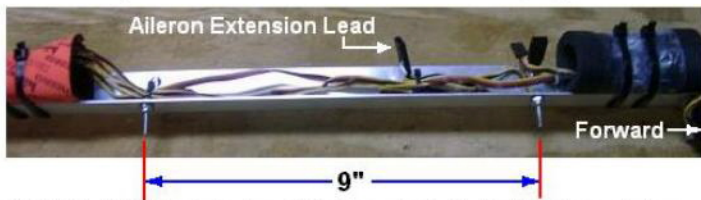


The elevator servo is stuck in place using foam mounting tape and a zip-tie through the side of the aluminum. I used 2 pushrods for the elevators, notice the rod closer in on the servo arm is also further down on the horn. This is for equal elevator travels. The Receiver is simply zip-tied in place. Notice the antenna routes through fuel tubing

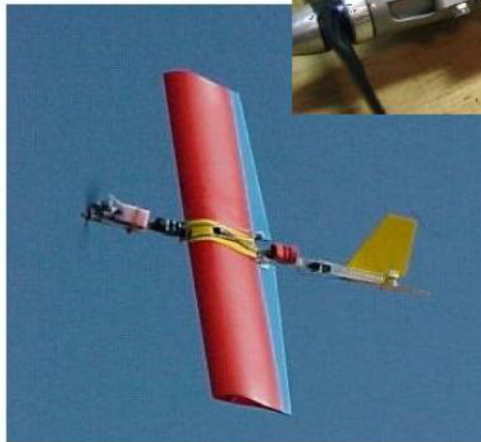


The throttle servo is secured with foam mounting tape and a zip-tie to the HDPE. Notice the throttle arm is positioned up so the pushrod runs above the muffler. The battery simply zip-ties in place





With EVERYTHING installed and flight ready (with fuel tank empty) you can now install the four 1" long 6-32 wing rubber band hold down bolts and nuts. Tape wing to fuselage and position for perfect CG balance DIRECTLY AT WING SPAR. Mark leading and trailing edge positions on fuselage and remove wing. install hold down bolts 1/2" FORWARD OF LEADING EDGE MARK AND 1/2" AFT OF TRAILING EDGE MARK. I did not use a switch on my Hell On Rails, instead I simply used an extension lead plugged into the battery receptical of the Rx, and plug the battery in for "ON" (you can see this connection just behind the battery). The Rx antenna is routed through the fuselage (through a piece of fuel tubing) and then simply slid down a tail flute. Make sure to use foam between the fuel tank and aluminum to prevent fuel foaming. The fuel tank is held on with rubber bands to the middle engine mount to fuselage bolt. Set elevator travel to 1" each way (2" total) set aileron travel to 3/4" each way (1 1/2" total). If you are using your airplane for RCCA Slow Survivable Combat (SSC) make sure you use a MAS 8 x 3 prop and have a spinner or spinner nut installed.



Attach your wing with at least 6 #64 rubber bands per side (12 total) and make sure your prop is clocked to stop horizontal for dead stick landings. FOLLOW ALL AMA SAFETY GUIDELINES AND GO KICK SOME BUTT!!! If you have questions or comments, please visit the Spadworld or RCCA forum links at <http://www.spadtothebone.com>