Sassy's Rudder Rail

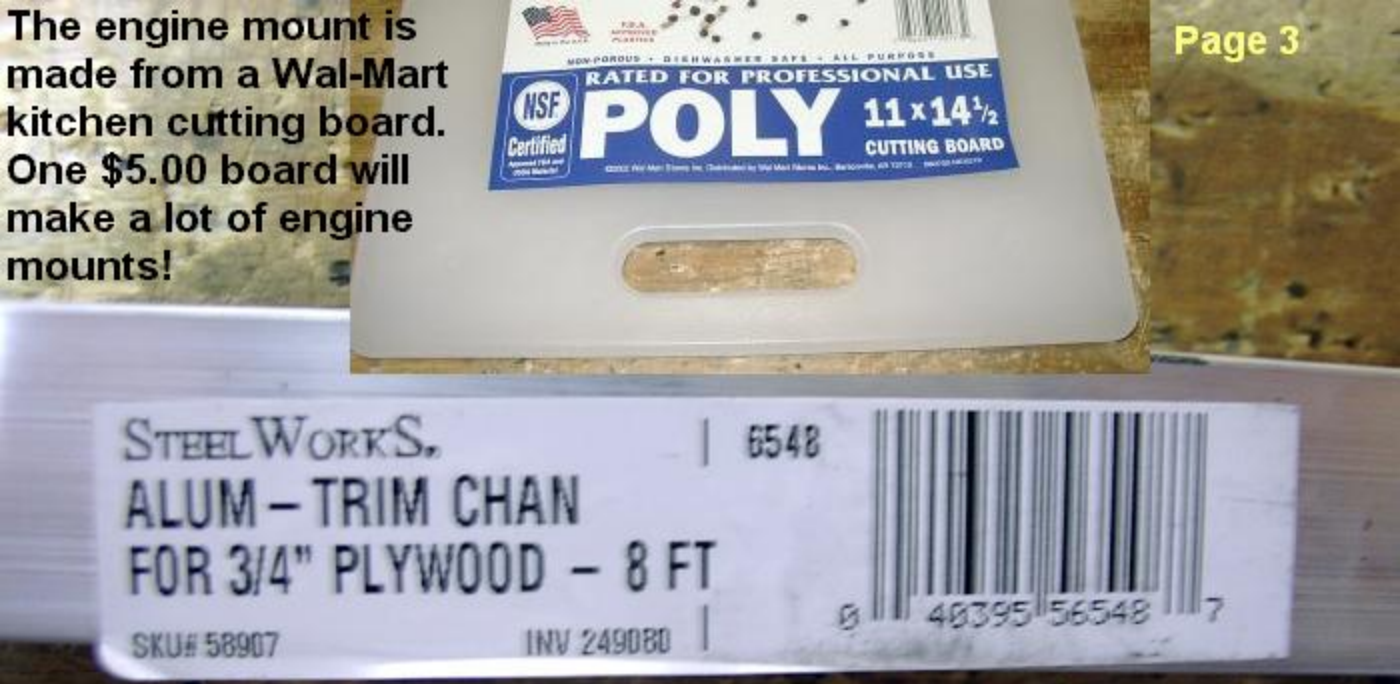
Photo Essay

I hope these pictures will explain how to build this airplane, or give you some good ideas for designing your own Spad "Rail"

Sassy

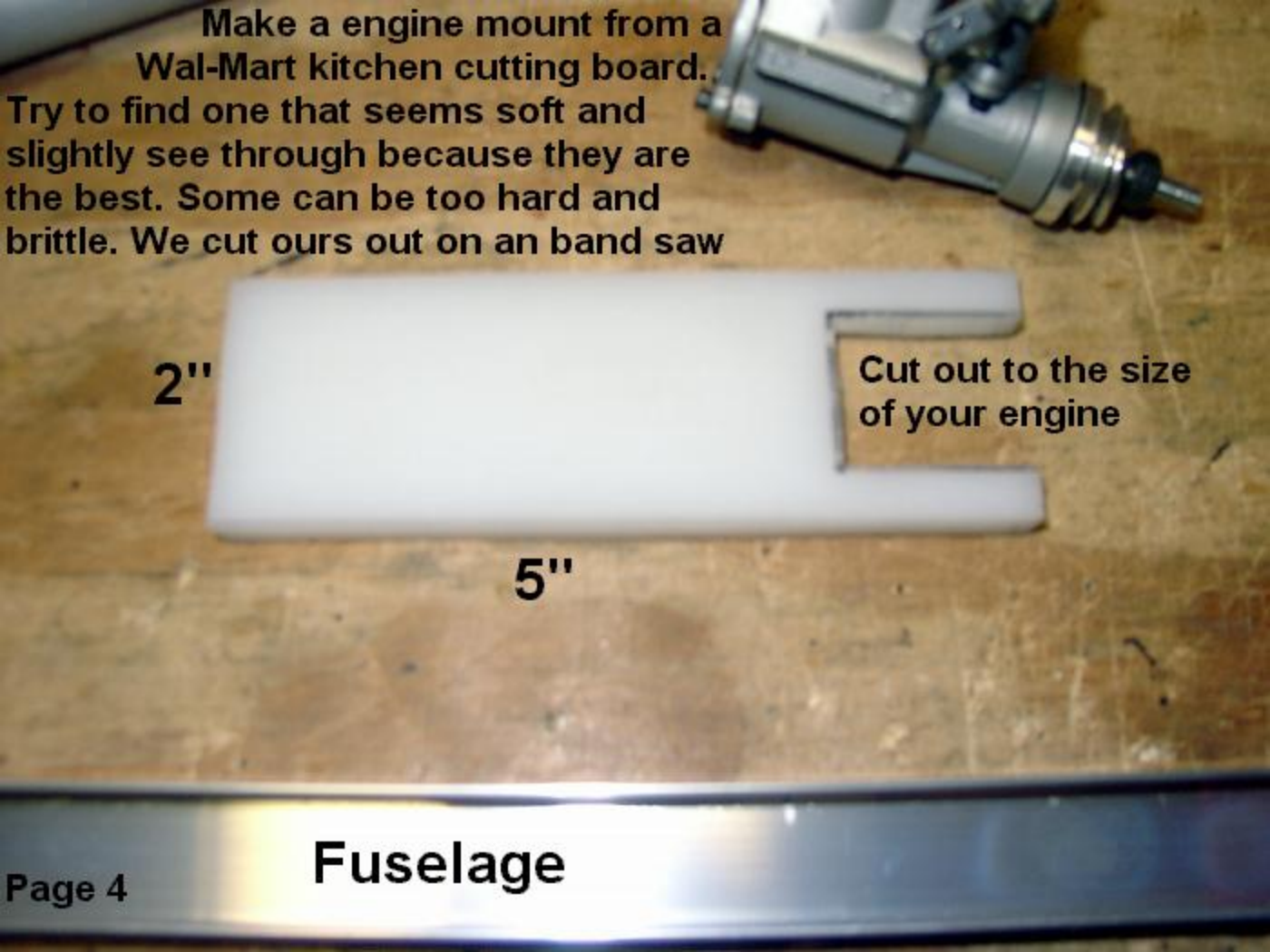
Things you will need to make this plane: Aluminum "U" channel, 2 mm Coroplast for the wing & 4mm Coroplast for the tail, two yardsticks for the spar, HDPE Wal-Mart cutting board for engine mount, scrap PVC gutterpipe for the control horns and tail mounting back plates, zip-ties and foam mounting tape for servo installation, small self tapping screws for engine mount and tail mounting, two pieces of scrap coat hanger, some foam, your radio and engine plus engine mounting bolts and nuts and pushrods, fuel tank, propeller, fuel tubing, rubber bands, and four 6-23 bolts and nuts for wing hold downs. You will also need a hack saw to cut the "U" channel and a drill with sharp drill bits for drilling through the aluminum. Also needed will be standard shop tools and a propane torch and Medium CA glue for wing building.

The engine mount is made from a Wal-Mart kitchen cutting board. One $5.00 board will make a lot of engine mounts!

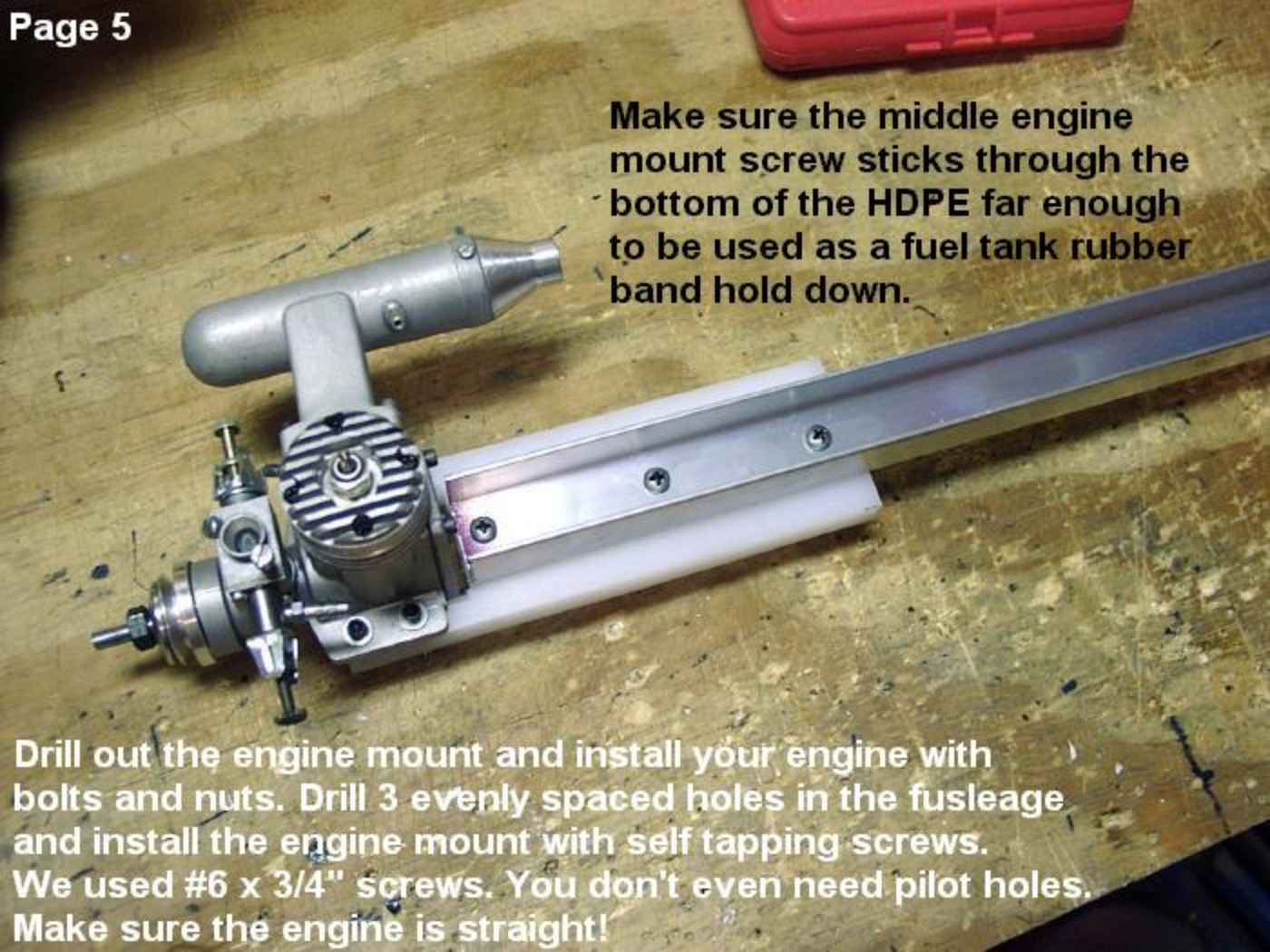


The fuselage is made out of aluminum "U"channel. It measures 3/4" on the bottom and 1/2" on the sides. It comes in 8 foot sections. We found ours at ACE Hardware Store for about $10.00. Cut a 32" piece for your fuselage.

Make a engine mount from a Wal-Mart kitchen cutting board. Try to find one that seems soft and slightly see through because they are the best. Some can be too hard and brittle. We cut ours out on an band saw



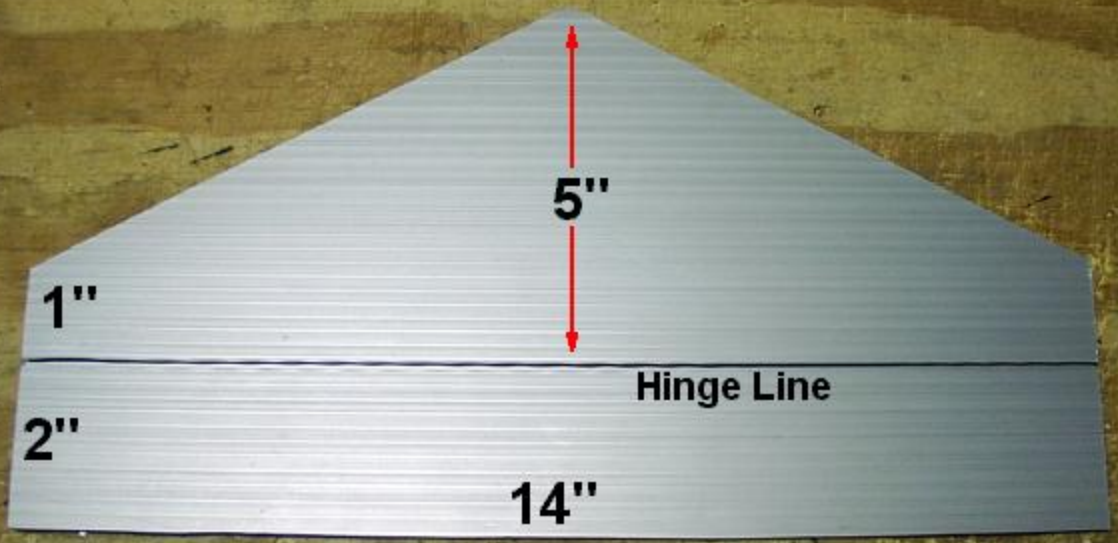
Fuselage



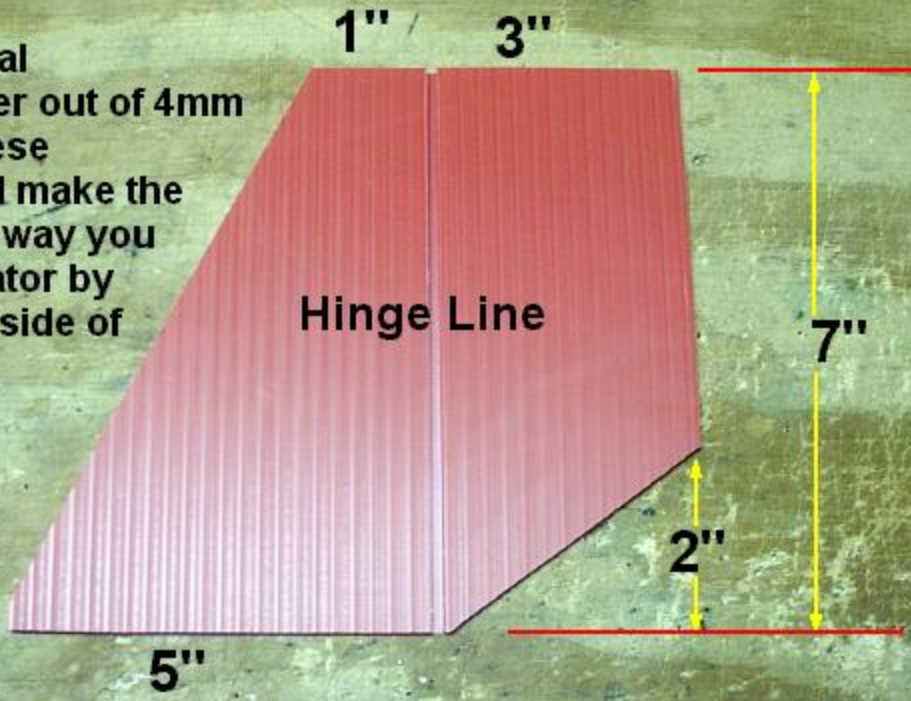
Make sure the middle engine mount screw sticks through the bottom of the HDPE far enough to be used as a fuel tank rubber band hold down.

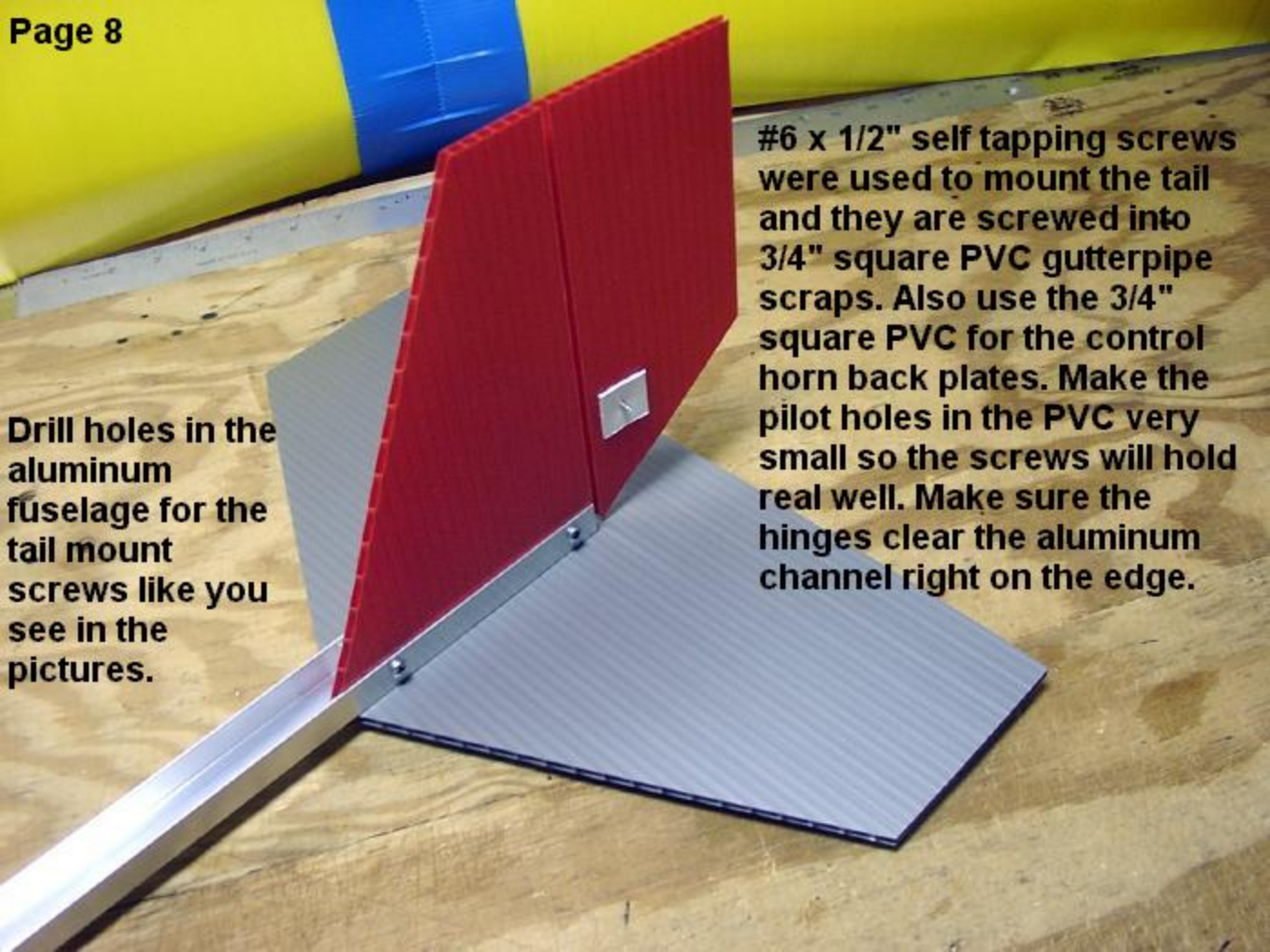
Drill out the engine mount and install your engine with bolts and nuts. Drill 3 evenly spaced holes in the fusleage and install the engine mount with self tapping screws. We used #6 x 3/4" screws. You don't even need pilot holes. Make sure the engine is straight!

Make the Horizontal Stabilizer/Elevator out of 4mm Coroplast with these dimensions. Just cut out one side of a flute for the hinge.



Make the Vertical Stabilizer/Rudder out of 4mm Coroplast to these dimensions and make the hinge the same way you did for the elevator by cutting out one side of a flute.





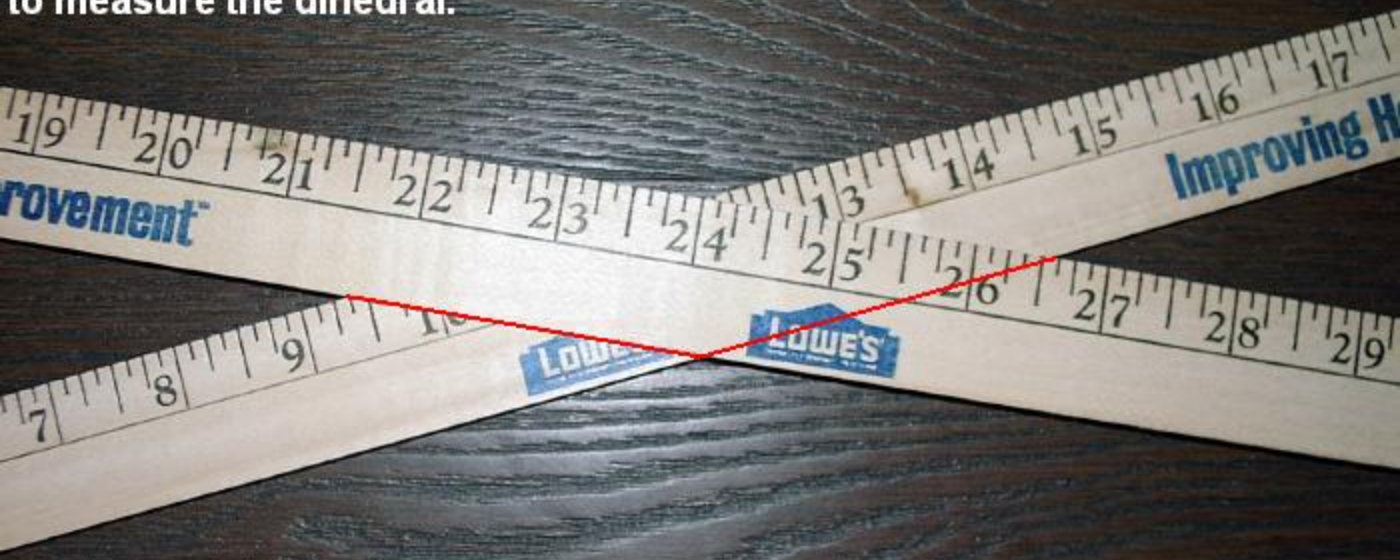
#6 x 1/2" self tapping screws were used to mount the tail and they are screwed into 3/4" square PVC gutterpipe scraps. Also use the 3/4" square PVC for the control horn back plates. Make the pilot holes in the PVC very small so the screws will hold real well. Make sure the hinges clear the aluminum channel right on the edge.

Drill holes in the aluminum fuselage for the tail mount screws like you see in the pictures.

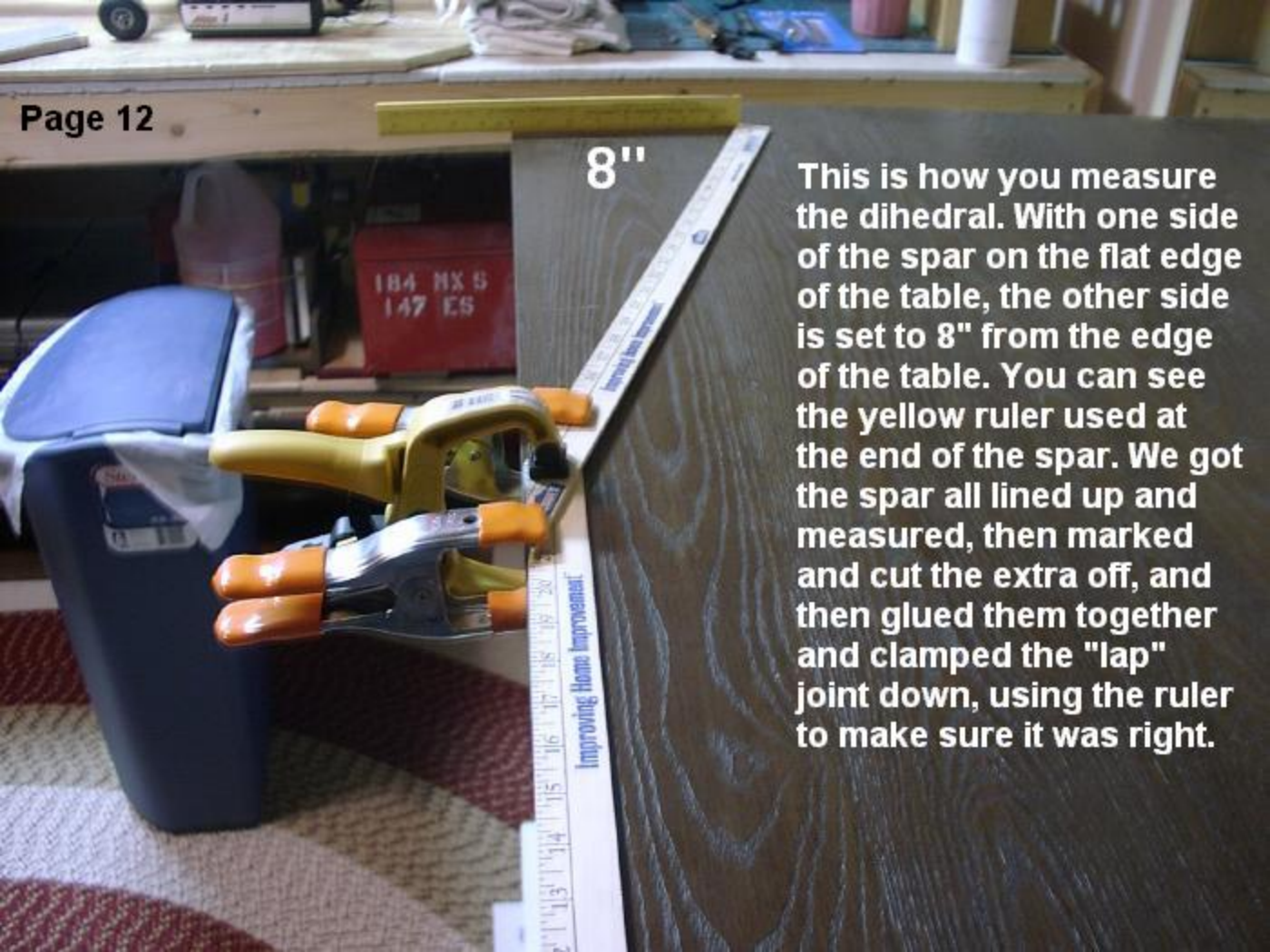

The control horns are made from PVC gutterpipe and are 1" high by 1" long by 1/2" wide base. Clean the parts and use drops of CA to hold them in place so adding the screw is easier. Extra screws that come with Dave Brown engine mounts make perfect control horn screws.
If you have sheet metel tin snips, they make cutting out the control horns and backing plates real easy!


Make sure the control horns are as close as you can get them to the hinge, but also make sure they don't interfere with the hinge operation.

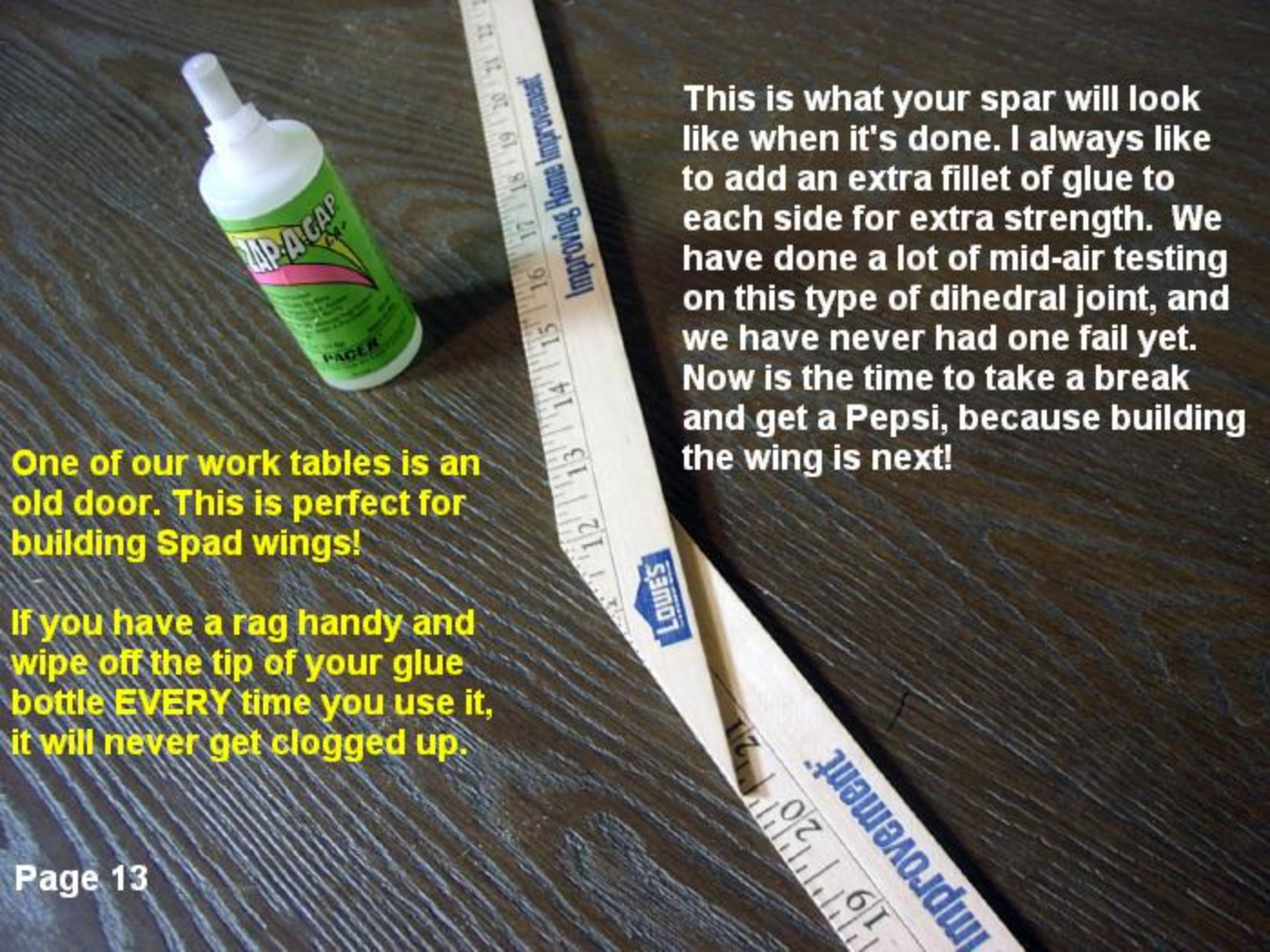
You will make the spar from 2 yardsticks. You will cross them like this picture and glue them together. This will make a very strong "lap" joint. Then you will cut off the extra where the red line is on the picture. Make sure that there is 24" from the center of the spar to each end, this will give you a 48" spar. We built this wing with 8" of dihedral. See page 12 for how to measure the dihedral.



We buy our yardsticks from LOWES and they are in the paint department. Try to be real picky and get ones that are not warped.



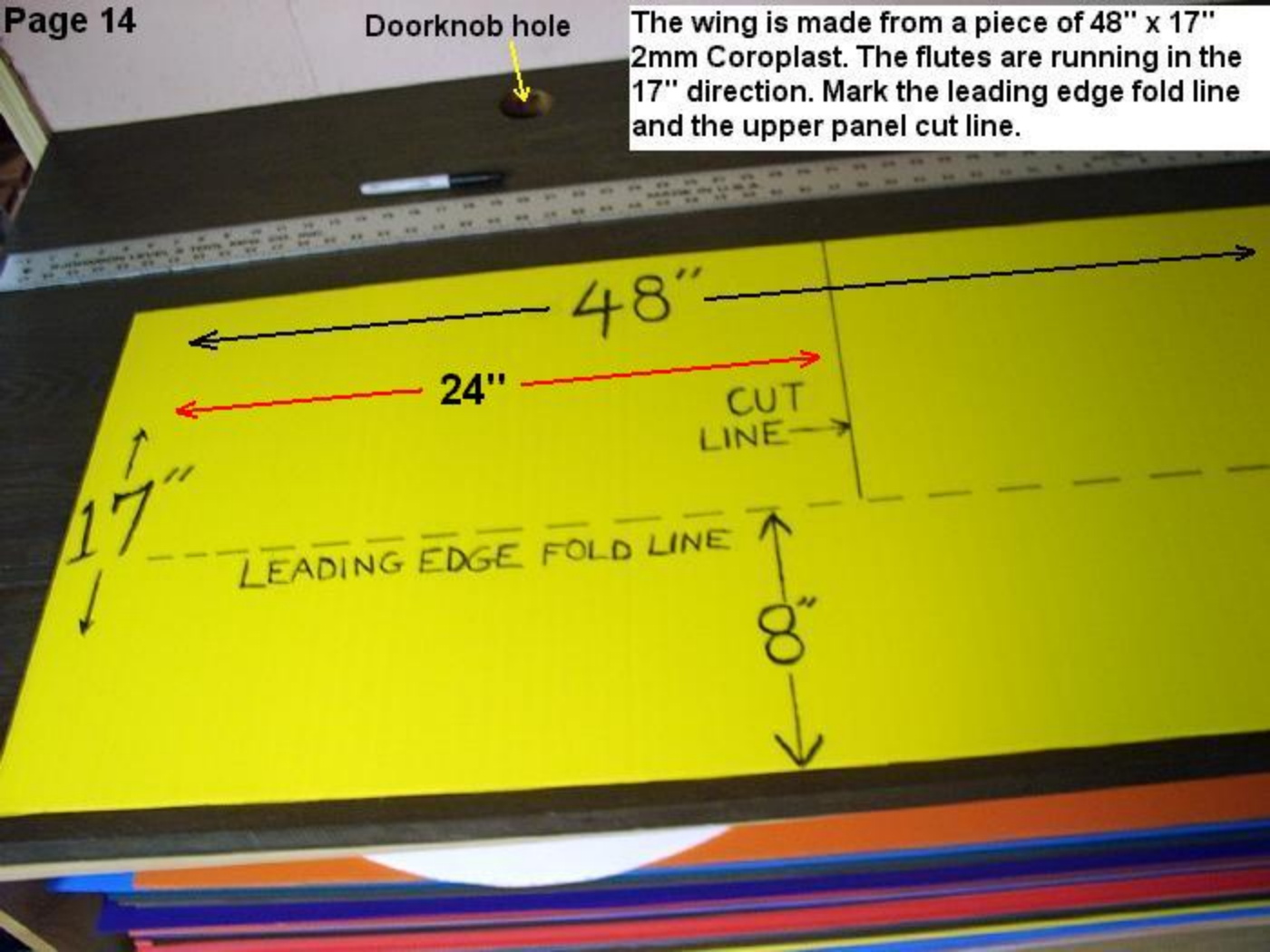
This is how you measure the dihedral. With one side of the spar on the flat edge of the table, the other side is set to 8" from the edge of the table. You can see the yellow ruler used at the end of the spar. We got the spar all lined up and measured, then marked and cut the extra off, and then glued them together and clamped the "lap" joint down, using the ruler to make sure it was right.

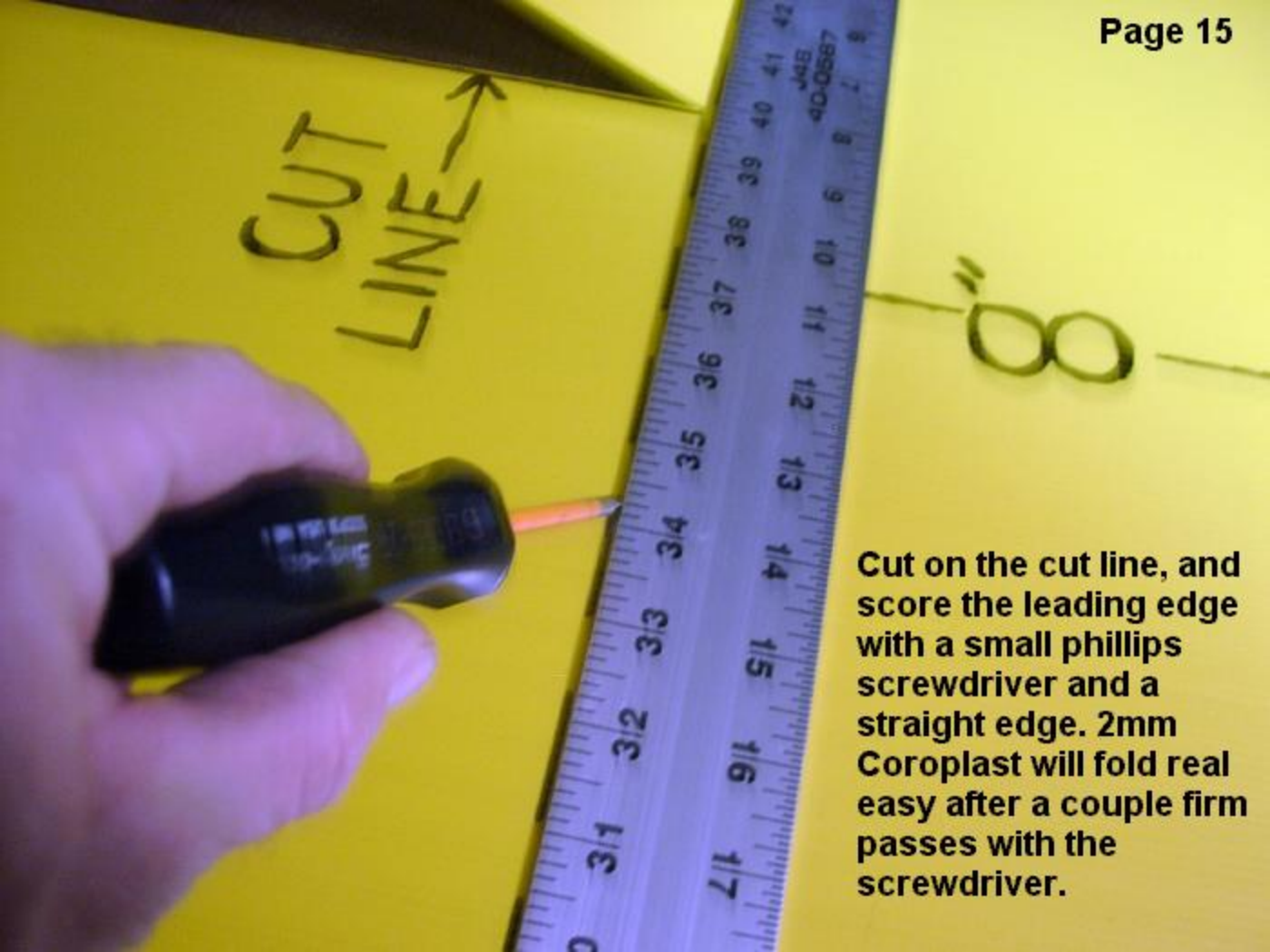


This is what your spar will look like when it's done. I always like to add an extra fillet of glue to each side for extra strength. We have done a lot of mid-air testing on this type of dihedral joint, and we have never had one fail yet. Now is the time to take a break and get a Pepsi, because building the wing is next!

One of our work tables is an old door. This is perfect for building Spad wings!

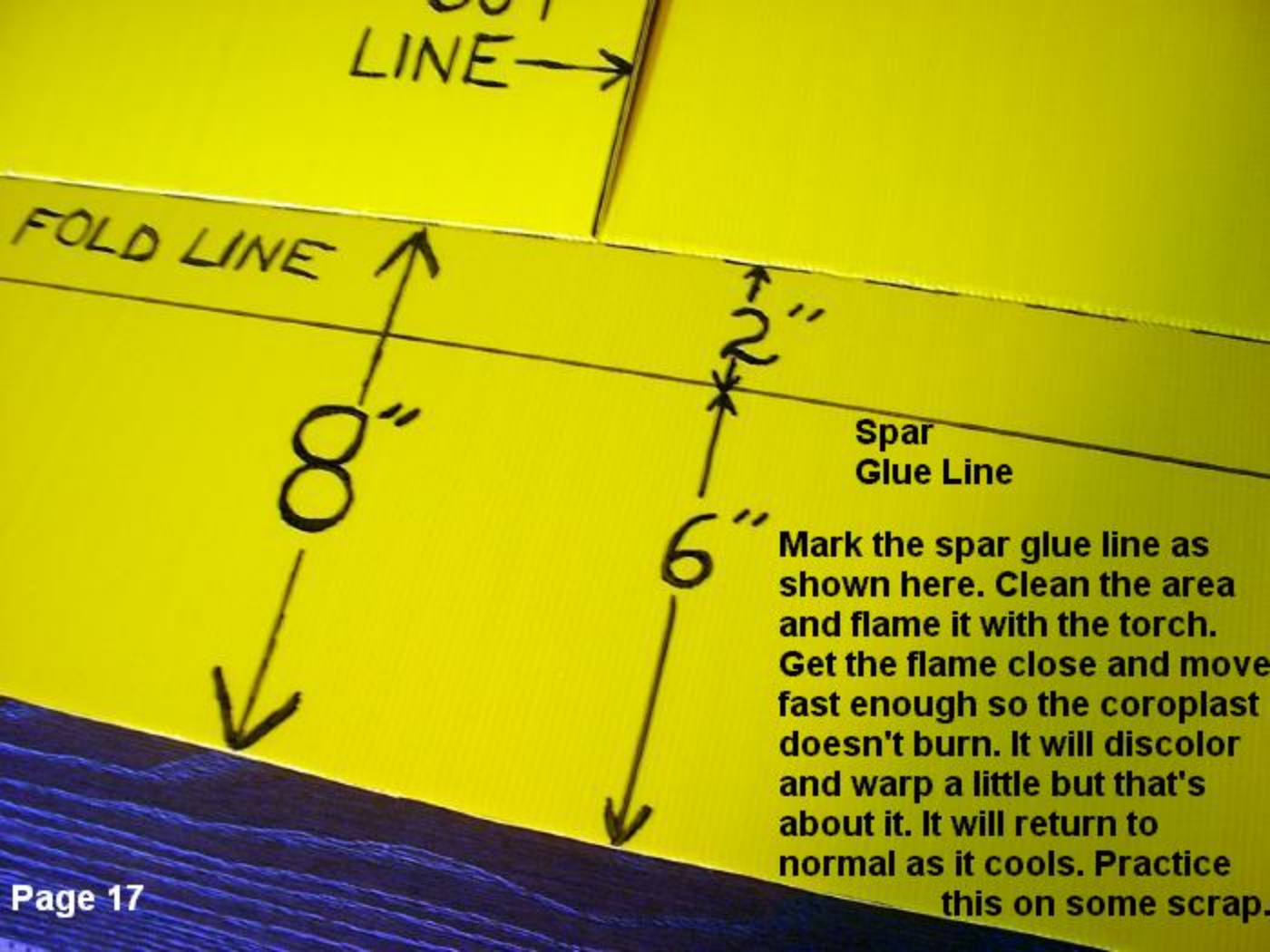
If you have a rag handy and wipe off the tip of your glue bottle EVERY time you use it, it will never get clogged up.


Doorknob hole
The wing is made from a piece of 48" x 17" 2mm Coroplast. The flutes are running in the 17" direction. Mark the leading edge fold line and the upper panel cut line.
48"
24"
CUT LINE
17"
LEADING EDGE FOLD LINE
8"

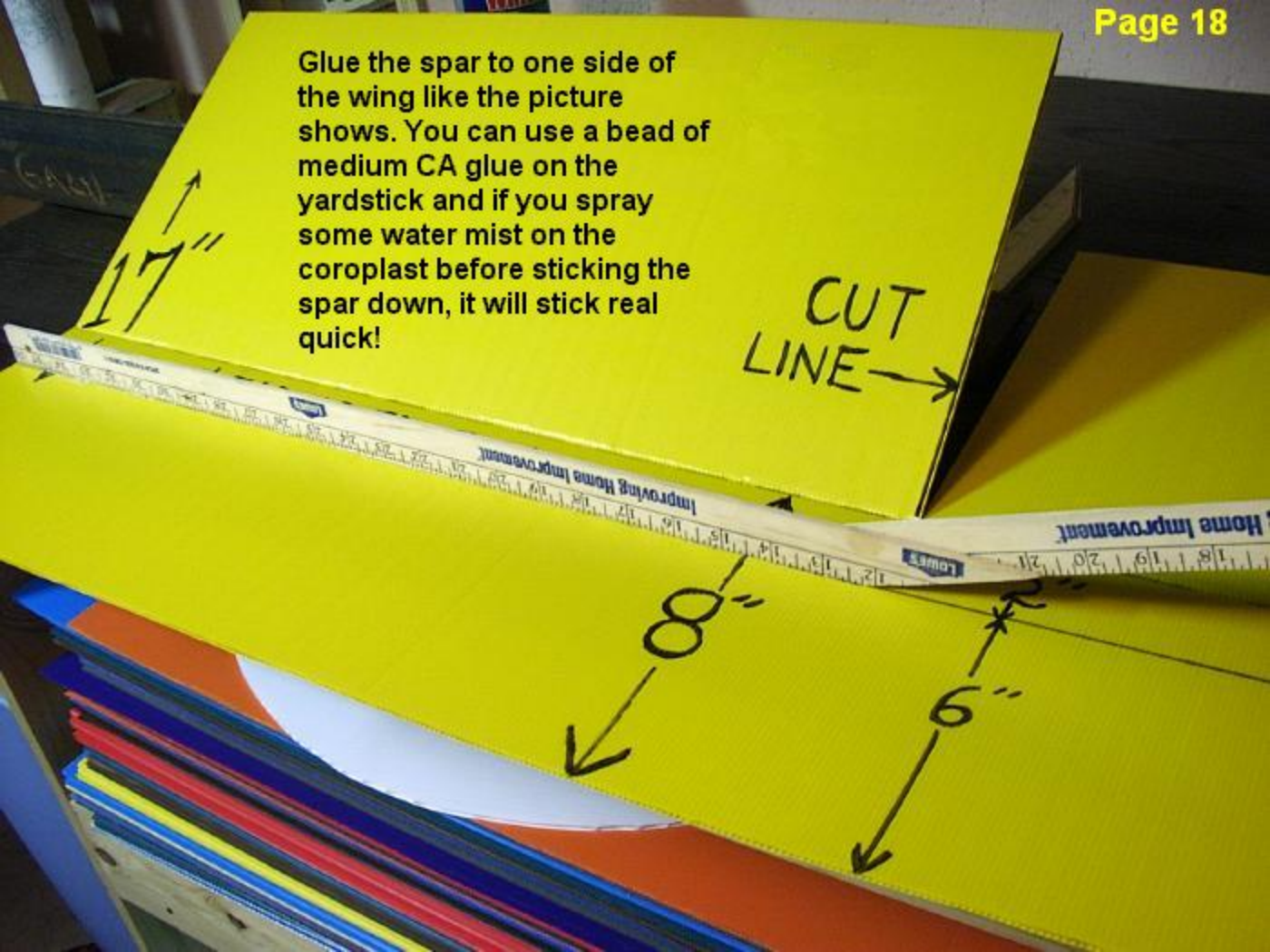


Cut on the cut line, and score the leading edge with a small phillips screwdriver and a straight edge. 2mm Coroplast will fold real easy after a couple firm passes with the screwdriver.

This is what you need for gluing Coroplast. First Clean it. Then "Flame" it with a propane torch. Then apply a water mist to one side and Medium CA glue to the other side of the glue joint. It should set up in less than 30 seconds when using water mist. You can use a bead of glue when gluing the wooden spar to the Coroplast, but when gluing Coroplast to Coroplast ONLY USE A SMALL drop about every half an inch. If you use too much glue it will not set up. For the wing you are about to build, you can use two rows of glue dots for the trailing edges. When you "flame" the Coroplast, get the torch close and move very fast. It's ok to wrinkle the Coroplast a little because the glue joints are on the inside of the wing anyways. "Flaming" gets the oils out of the plastic.

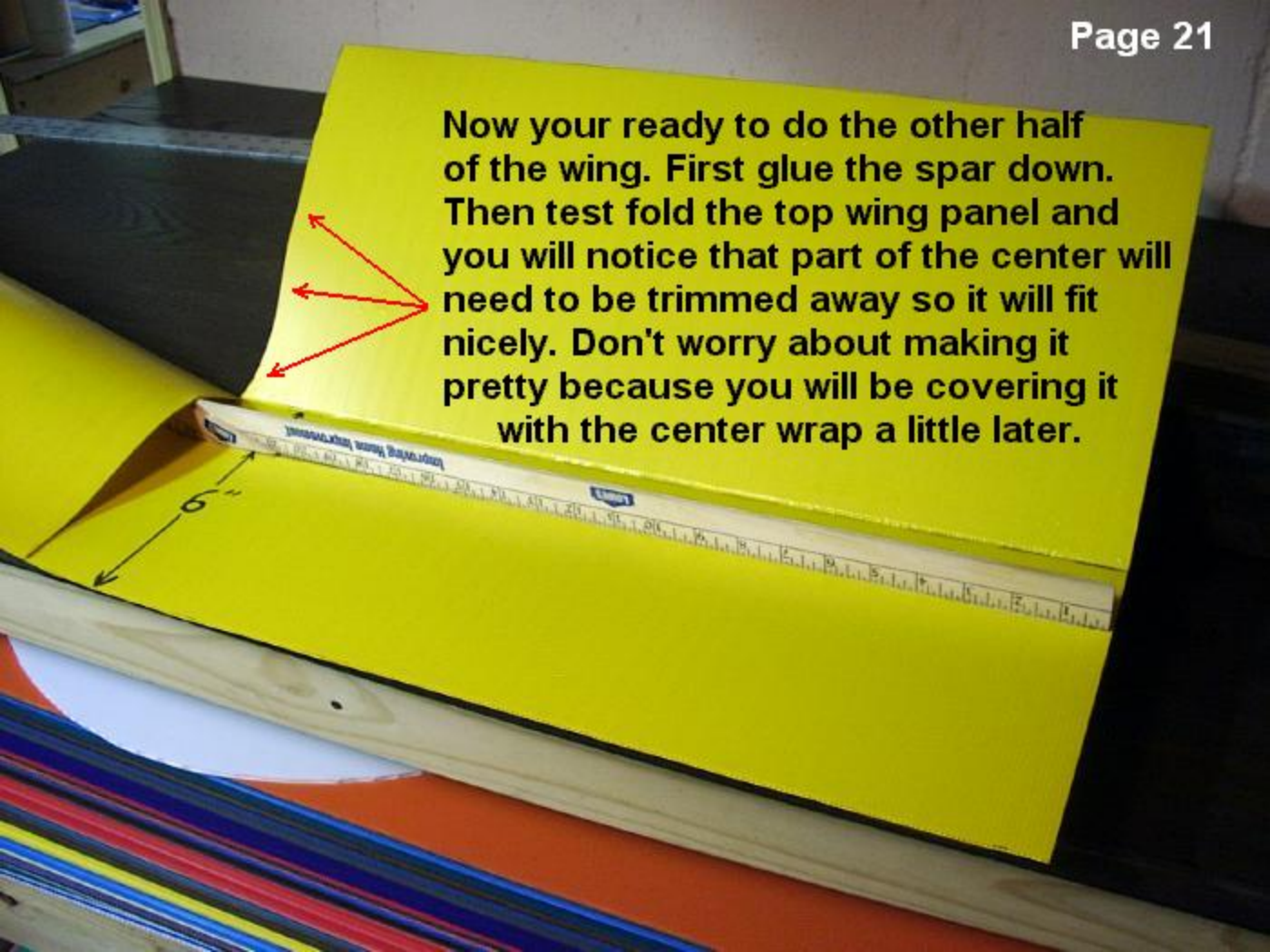


Mark the spar glue line as shown here. Clean the area and flame it with the torch. Get the flame close and move fast enough so the coroplast doesn't burn. It will discolor and warp a little but that's about it. It will return to normal as it cools. Practice this on some scrap.


Glue the spar to one side of the wing like the picture shows. You can use a bead of medium CA glue on the yardstick and if you spray some water mist on the coroplast before sticking the spar down, it will stick real quick!
17"
CUT LINE
8"
6"
2"
Improving Home Improvement
LOWE'S


Clean and flame the Coroplast at the trailing edge areas and where the spar will meet the upper panel. Apply a bead of glue to the upper spar, and two rows of glue dots to the lower trailing edge. Spray the upper panel with water mist and then fold the top panel over. Weigh the leading edge down with something heavy and hold the trailing edge down with a board.
Cat Food
Heavy piece of angle iron
Press down hard on board for at least a minute
Make sure the Coroplast doesn't shift or move at all after initial contact or else the glue joint may not cure or be very strong!!!


Trim the
excess trailing edge
from the top panel to be flush
with the bottom trailing edge and
your wing is half done!
6"


Now your ready to do the other half of the wing. First glue the spar down. Then test fold the top wing panel and you will notice that part of the center will need to be trimmed away so it will fit nicely. Don't worry about making it pretty because you will be covering it with the center wrap a little later.
6"

Now you just have to glue the other half of the wing just like you did the first half. Notice the yardstick scraps under the angle iron so the leading edge tucks under it real nice.


You are almost done! Trim the trailing edge flush and then cut out a wing wrap from 2mm Coroplast. Make it 17" x 4" with the flutes going in the 4" direction.
Now is a good time to go have a Pepsi. Putting the wing wrap on a dihedral wing is a real butt pain.
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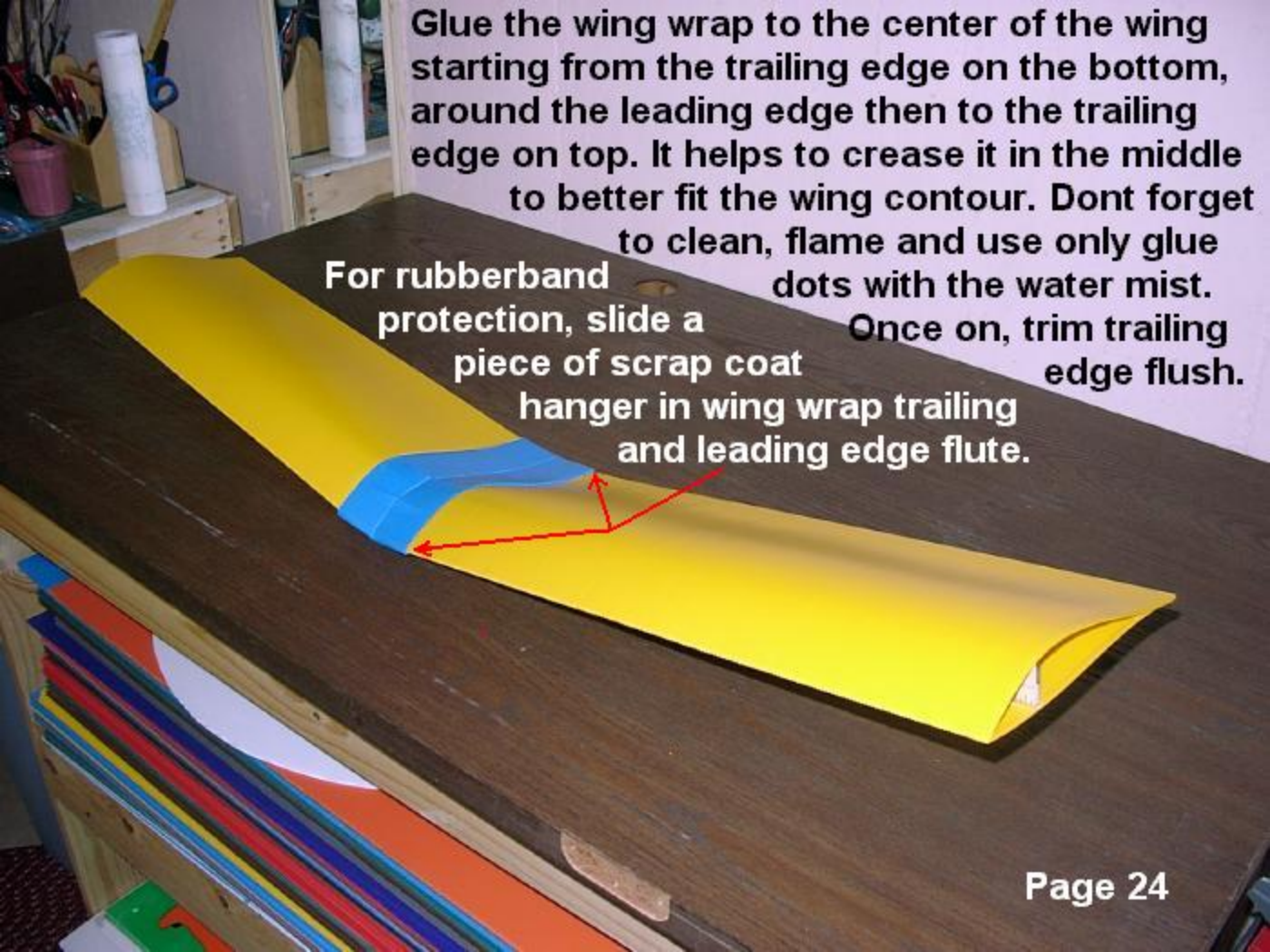
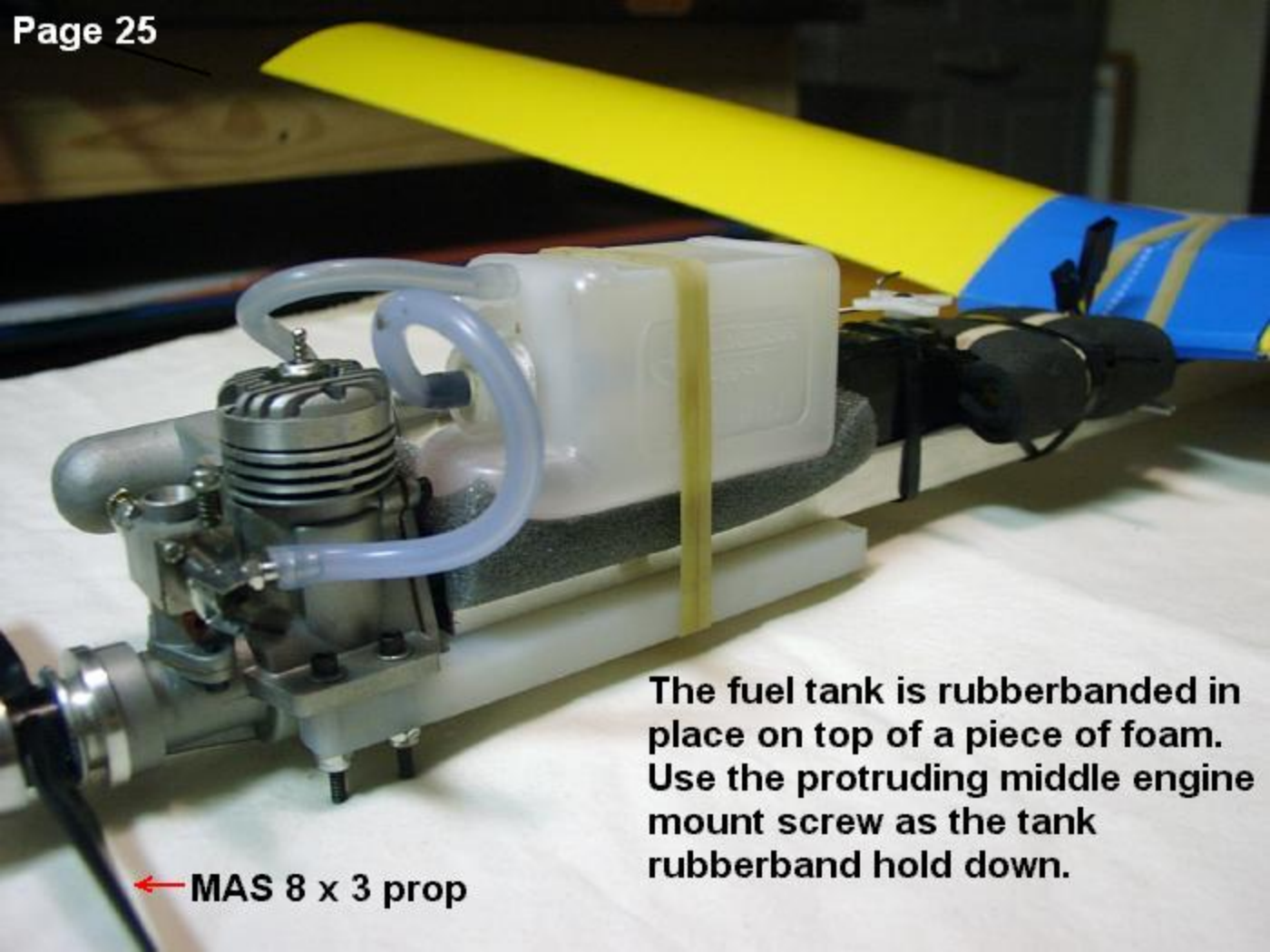
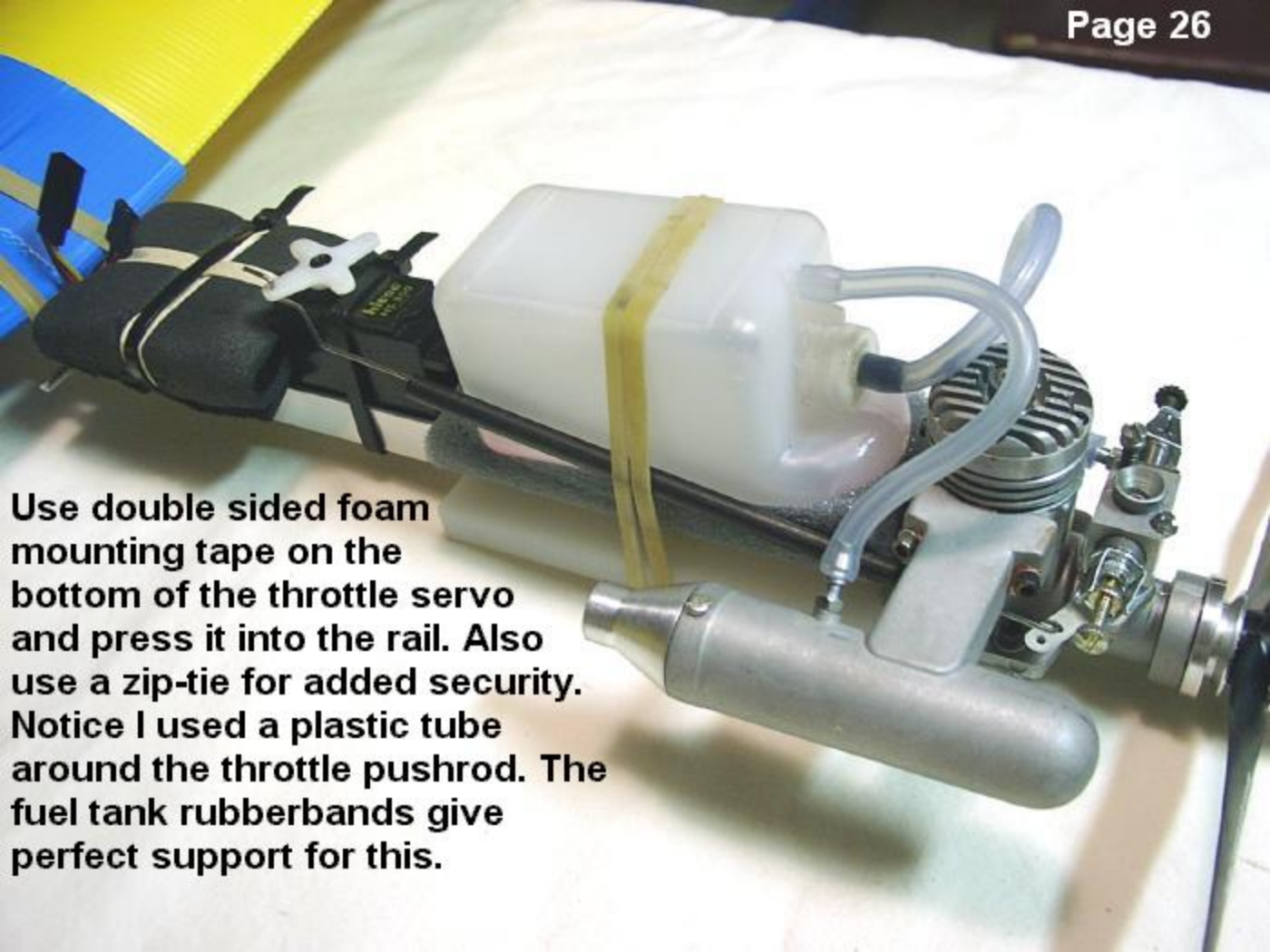

Glue the wing wrap to the center of the wing starting from the trailing edge on the bottom, around the leading edge then to the trailing edge on top. It helps to crease it in the middle to better fit the wing contour. Dont forget to clean, flame and use only glue dots with the water mist. Once on, trim trailing edge flush.
For rubberband protection, slide a piece of scrap coat hanger in wing wrap trailing and leading edge flute.

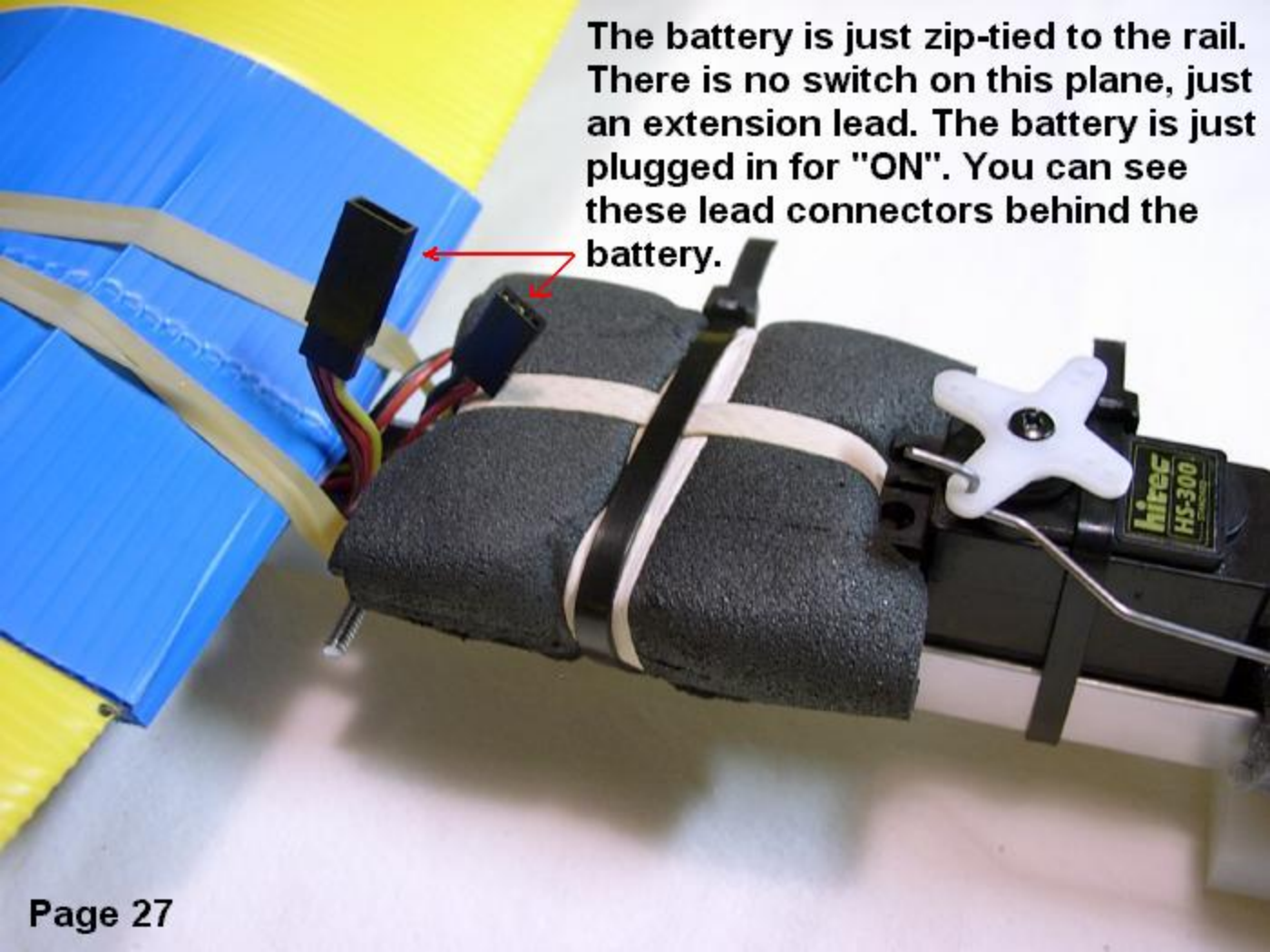


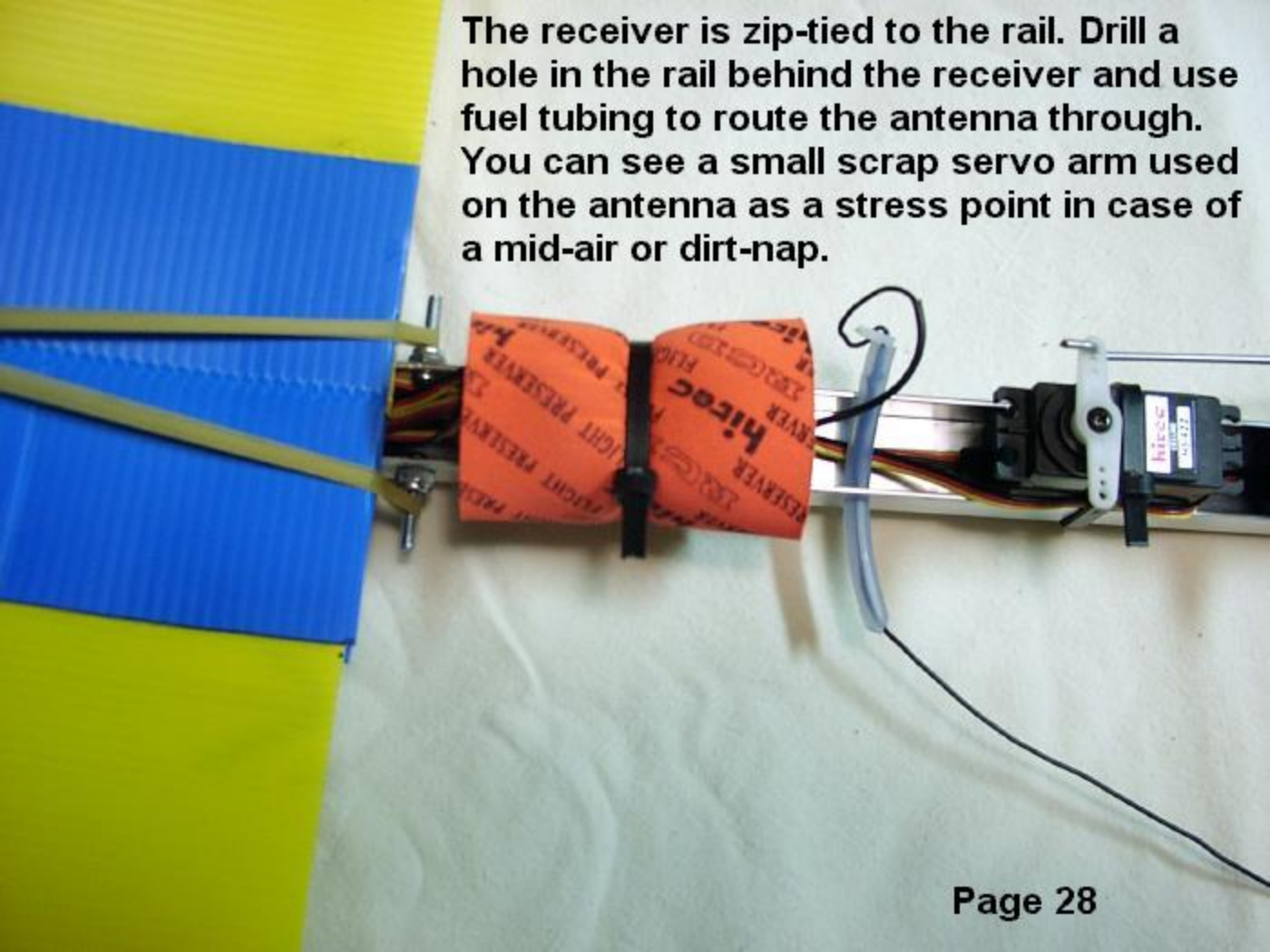
The fuel tank is rubberbanded in place on top of a piece of foam. Use the protruding middle engine mount screw as the tank rubberband hold down.

← MAS 8 x 3 prop

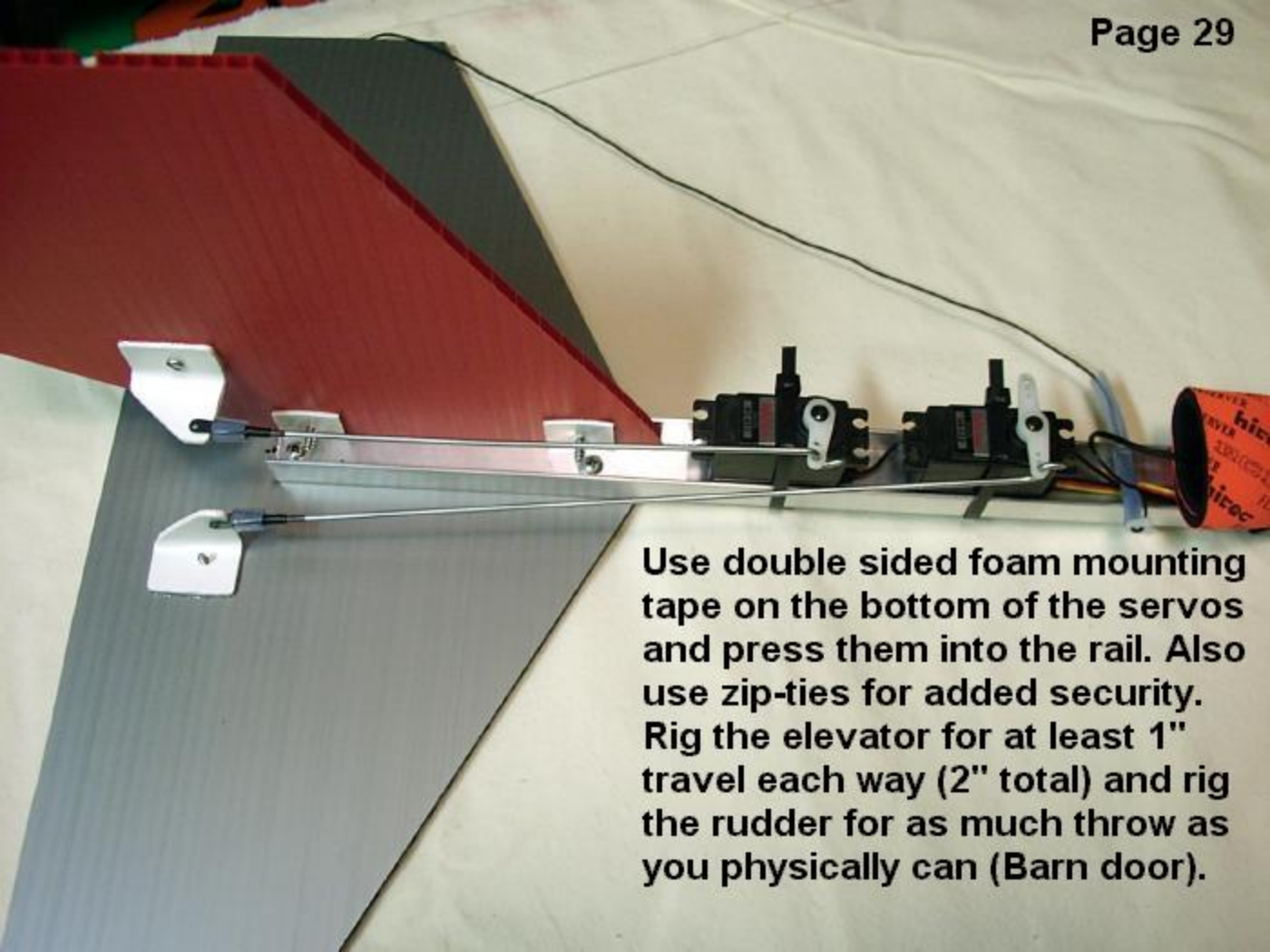


Use double sided foam mounting tape on the bottom of the throttle servo and press it into the rail. Also use a zip-tie for added security. Notice I used a plastic tube around the throttle pushrod. The fuel tank rubberbands give perfect support for this.

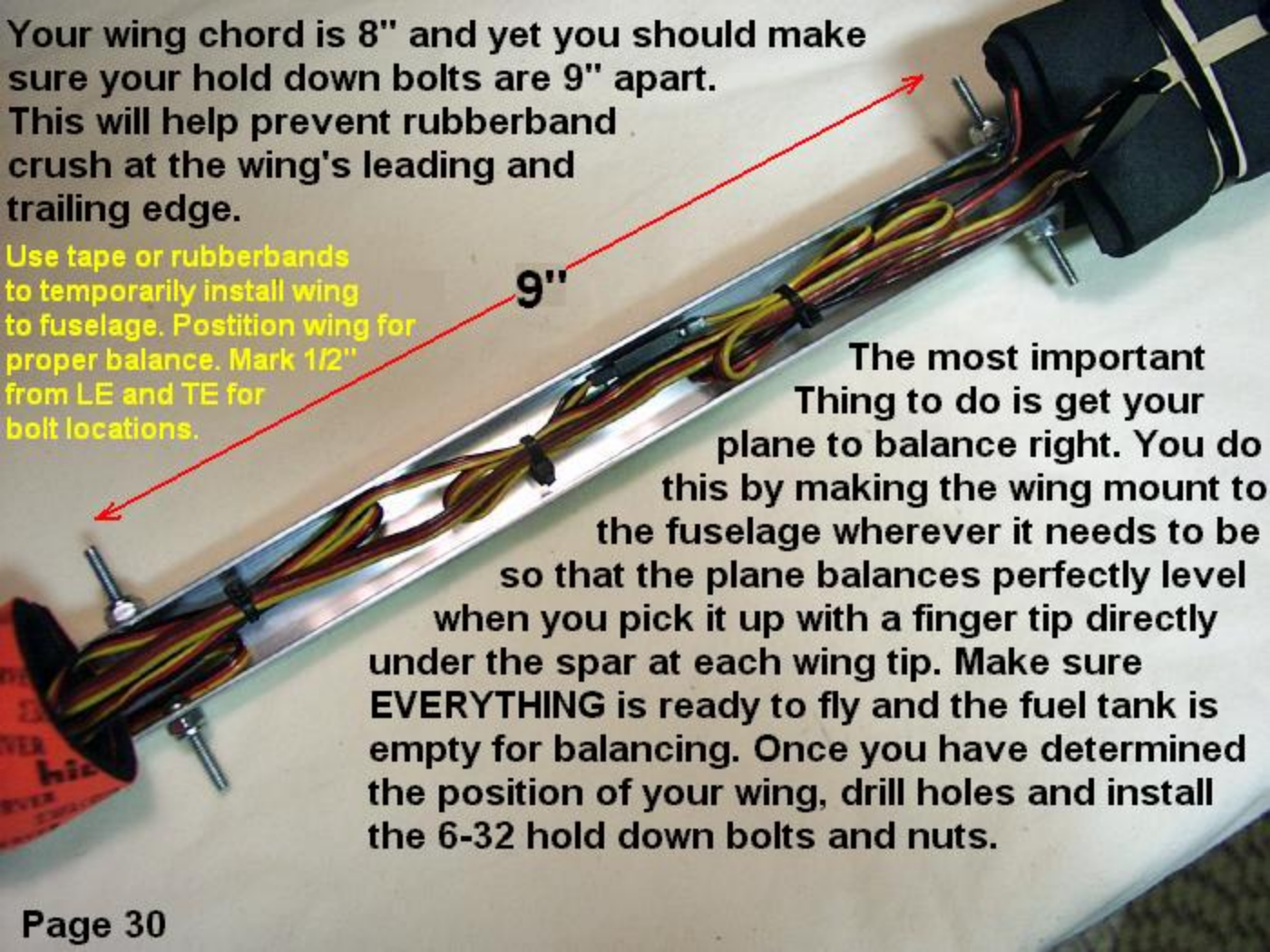

The battery is just zip-tied to the rail. There is no switch on this plane, just an extension lead. The battery is just plugged in for "ON". You can see these lead connectors behind the battery.
hitec
HS-300



The receiver is zip-tied to the rail. Drill a hole in the rail behind the receiver and use fuel tubing to route the antenna through. You can see a small scrap servo arm used on the antenna as a stress point in case of a mid-air or dirt-nap.



Use double sided foam mounting tape on the bottom of the servos and press them into the rail. Also use zip-ties for added security. Rig the elevator for at least 1" travel each way (2" total) and rig the rudder for as much throw as you physically can (Barn door).


Your wing chord is 8" and yet you should make sure your hold down bolts are 9" apart. This will help prevent rubberband crush at the wing's leading and trailing edge.
Use tape or rubberbands to temporarily install wing to fuselage. Postition wing for proper balance. Mark 1/2" from LE and TE for bolt locations.
9"
The most important Thing to do is get your plane to balance right. You do this by making the wing mount to the fuselage wherever it needs to be so that the plane balances perfectly level when you pick it up with a finger tip directly under the spar at each wing tip. Make sure EVERYTHING is ready to fly and the fuel tank is empty for balancing. Once you have determined the position of your wing, drill holes and install the 6-32 hold down bolts and nuts.

Flying Sassy's Rudder Rail

This airplane is very stable and grooves very well. As with all rudder airplanes, there is a slight hesitation and tail wag from the time you move the stick to the time the airplane begins to turn, so be very carefull not to over control. This is true especially during launch, or you might find yourself upside down and crashing. If you are new to combat, this will make a perfect airplane to start with. If you get disoriented all you have to do is let go of the sticks, count to two and then gently pull up... This airplane will right itself and get you right back in the fight! This airplane would also make a VERY GOOD budget trainer with a good instructor. Please follow all AMA safety guidelines! (Use at least 12 (6 per side) #64 rubberbands to hold the wing on and 3 for the tank. Make sure the propeller stops horizontal for dead stick landings! HAVE FUN!!! www.spadtothebone.com