SR X250tm Assembly Instructions ©1999

Introduction

You are in for a real treat. You're going to find that your new X250 is one of the fastest building and best flying aircraft you've ever owned. Nothing has been taken for granted. If you follow our instructions, you'll be amazed at how fast you'll have your X250 in the air.

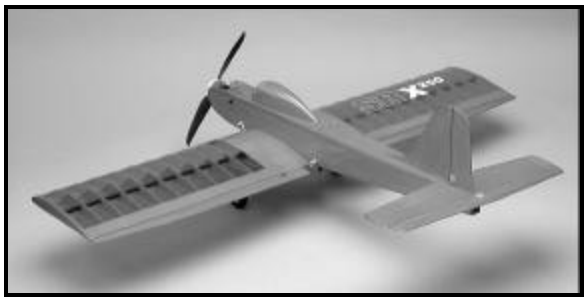
We've photographed just about every step in completing the X250. The notes that accompany each photograph will give you a "heads up" about any tricks or possible problems you could run into while completing that particular step. Please read the instructions!

We used thin, fast setting, CA glue in assembling all of the X250 prototypes. If we recommend a different glue for a particular step, we'll mention it in the notes.

Although any small radio system can be used, we've specifically set up the X250 for the very popular Hitec HS-60 servos and the Hitec "555" or "Super Slim" Series sub micro receivers. These servos and receivers will work with any brand of transmitter and we strongly recommend them. If you can't find them locally, we always keep them in stock at SR.

Finally, you'll find that a 5/64" Ball Driver and a Higley Trimmer will really speed things up. Both are available from SR if you don't already have them.

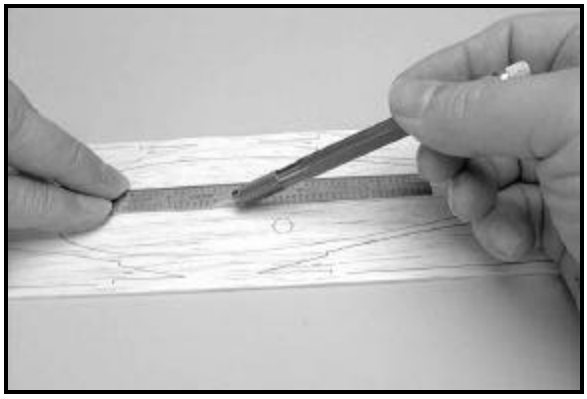
On the following page you'll find detailed technical specifications and power system recommendations.



Preparing the parts...

We've included a master parts sheet that identifies each part in the kit and tells you where the part is located. We've deliberately left all of the MicroLaser Cut parts for the X250 in their sheets to protect them. Use your modeler's knife and a straight edge to finish the cuts and release the parts. Just about all of the cuts will be with the grain to make it easier for you. You can either cut out all of the parts before you begin or leave them in their sheets until you're ready for them. It's up to you, but you'll be less likely to lose a part if you leave it in its sheet until you're ready for it.

In most cases, the SR MicroLaser Cut process leaves the balsa parts with a honey colored edge that needs no sanding. Unfortunately, the glues used in making plywood tend to glaze the edges of the plywood parts when they are laser cut. We use a special plywood that is designed for laser cutting, but we recommend that all plywood parts be lightly sanded along their edges before gluing the part in place. In addition, like spruce, plywood parts tend to have an oily film on their surfaces which prevents CA glues from taking a good hold. For this reason, we recommend that all plywood parts be given a light sanding on all surfaces before you glue them in place.



Technical Specifications...

In spite of the X250's small size, it's probably one of the most carefully designed model aircraft ever kitted. Literally hundreds of hours of computer time were spent optimizing the design. Rather than just designing an aircraft, we designed an entire system. There's no point in designing an aircraft that requires a motor, gear ratio, battery, or prop that doesn't exist. Instead we evaluated dozens of combinations of components to come up with the optimum, complete ***system***.

We know that some of you will be tempted to change some of the components in the power system. We suggest that you don't. Our target was an aerobatic aircraft that would easily do consecutive loops yet still give you 7 to 9 minutes of aerobatic flight and 12 to 15 minutes of sport flying. The X250 fulfills this goal. If you change any of the components, you may gain a small advantage in one area of performance, but you'll definitely be losing performance in another area. Here is our definition of *Optimum Performance*:

Optimized Performance	
Aircraft	SR X250 (aileron version)
Wing area	266 square inches
Wing Span	36"
Aspect Ratio	4.3:1
CG Limits	2" to 2.75"
Airfoil	Computer Optimized by SR
Typical Wt. w/ 10 cell pack	24 oz.
Typical Wing Loading	13 oz. / sq. ft.
Stall Speed	13 MPH
Max. Speed	40 MPH
10 Cell Current Draw	10 Amps
Thrust	18 oz.
Climb Rate	900'/min. @ 23 MPH
Flight Time, Aerobatic	7 to 9 min.
Flight Time, Sport	12 to 15 min.
Minimum Sink Rate	2.761 ft./sec.
Maximum Glide Ratio (L/D)	11.595
Best L/D Speed	25.157 MPH

The following table lists the specific equipment we've evaluated and tested to yield the above performance data. You can purchase these items locally, or SR has several packages available which will save you time and money.

Optimized Components	
Aircraft	SR X250 (aileron version)
Prop	Graupner 9x5 Slim, Fixed
Motor	Graupner Speed 400, 7.2V
Gear Ratio	2.33:1
Speed Control	Jeti 350
Cell	SR 500 Max Series
Cell Count	10
Pack Shape	Rectangular, 5x2
Connector	Sermos
Alternative Prop	Graupner CAM 9x5, Folding
Receiver	Hitec, 555
Servo	Hitec, HS-60
Covering Material	Goldberg, UltraCote Lite

Why the Jeti 350 Speed Control?

The Jeti 350 is overkill as far as current draw goes. However, it has one feature we really like. Its BEC circuit is designed to handle up to 4 servos rather than the usual 3. As we're using 3 servos, we liked the extra safety margin. In addition, it's one of the few speed controls that will allow you to turn off the Brake function.

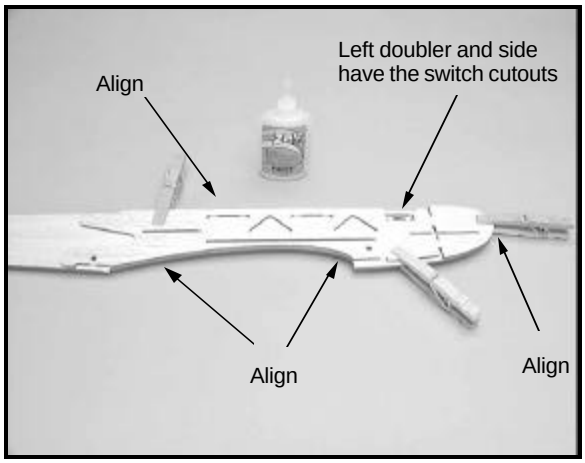
Why the SR 500 Max Series cell?

With a capacity of almost 600 mah, yet still having a very low internal impedance, this cell is optimum for Speed 400 applications. At only .7 oz per cell it's hard to beat.

Which prop, folding or fixed?

Originally, we recommended the CAM 9x5 folding prop. The advantage of the folding prop was that it would fold back rather than break if it hit the ground. However, after over 1,000 flights on our various test aircraft, we've come to the conclusion that the fixed Slim prop gives a slight performance edge for aerobatic flight. You wouldn't be wrong if you decided to use the CAM folding prop, but our first choice would be the Graupner 9x5 Slim prop. If you do decide to use a folding prop, be sure you turn off your speed control's brake so that the prop blades won't fold back when you shut down the motor in a stall turn.

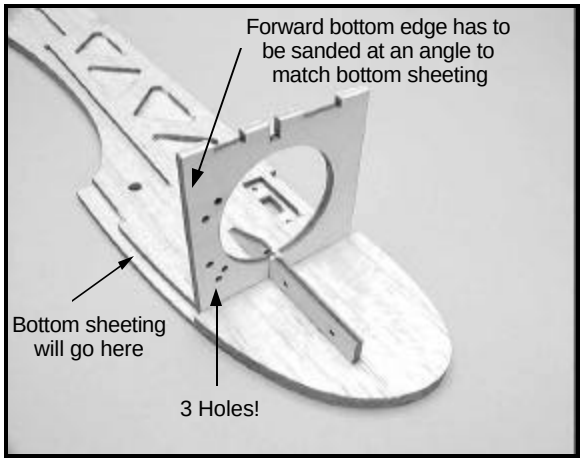
Warning, Warning, Warning!!!



This is the single most important step in building your X250. The entire trueness of the fuselage depends on you properly aligning the fuselage doublers to the sides of the fuselage before you glue them to each other. Take your time and don't rush this step even though it may seem very simple. DON'T MAKE TWO LEFTS!!!

There is a right and left fuselage side and a right and left doubler. You can identify the left fuselage side and doubler by the cutout for the speed control switch. Carefully align the doubler with the fuselage side. Hold them together with clothes pins and check that they are absolutely lined up with each other in the nose, wing saddle, and fuselage top areas. When you're satisfied with their registration, glue them together. Glue the doubler around its edge and around all of the cutouts in the doubler.

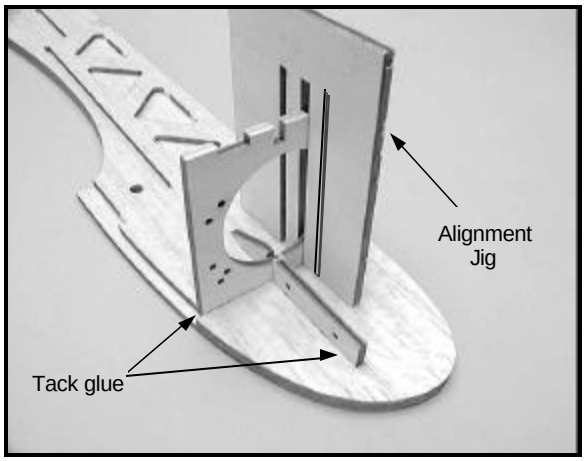
Trial fit the left motor mount and firewall...



Insert, *but don't glue*, the left motor mount and firewall into the left doubler. ***Note*** that the lower right corner of the firewall (viewed from the front) has 3 holes for mounting the nose gear!

The forward, bottom edge of the firewall needs to be reshaped. When the 1/8" bottom sheeting is added to the fuselage, it will rest on the bottom of the firewall. If you locate and trial fit the bottom sheeting, you'll see how much of the bottom, forward edge of the firewall will have to be sanded away to form the proper angle.

Use the alignment jig...

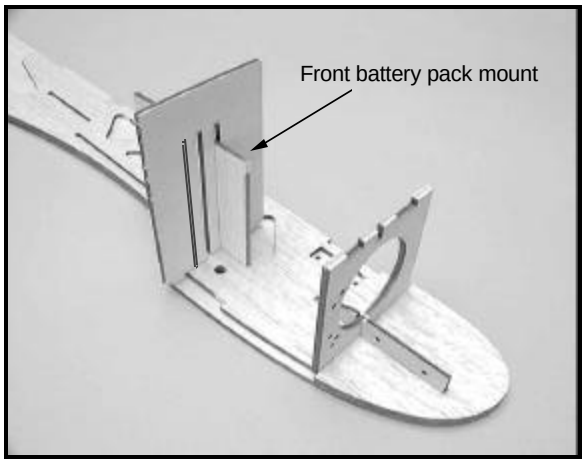


We've given you a plywood alignment jig to keep everything aligned properly. The jig has three slots. The center slot is used with plywood parts. The largest slot is for aligning the vertical stabilizer after it's covered and the narrowest slot is used with 3/32" parts. The outer corners of the jig are cut at exactly 90° which will come in handy later.

With the firewall and motor mount firmly seated in their recesses in the doubler, use the alignment jig to make sure the firewall is square with the doubler. Tack glue the firewall and motor mount to the doubler in a corner of each and let the glue set. Remove the jig and then glue the motor mount and firewall in place along their entire edges. Don't forget to glue the motor mount to the firewall too.

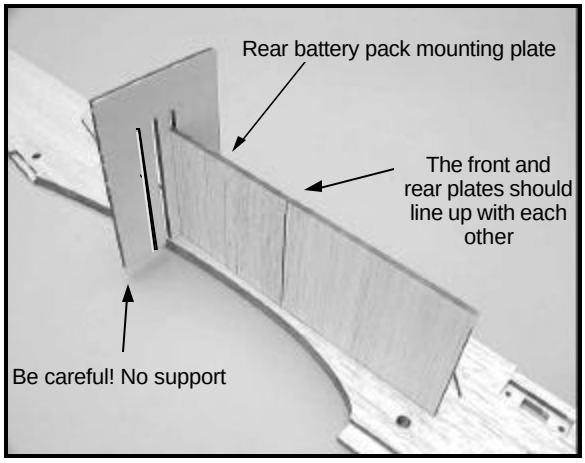
Front battery pack mounting plate...

Use the alignment jig to make sure the front battery pack mounting plate is square to the side of the fuselage and that it is firmly seated in the recess in the doubler. Tack glue the mounting plate in place. When the glue has set, remove the jig and finish gluing the mounting plate in place.



Rear battery pack mounting plate...

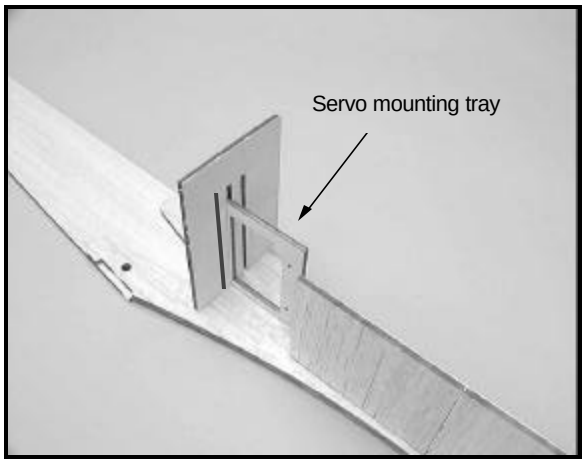
Use the alignment jig to position the rear battery pack mounting plate in place. You don't have full support along the bottom of the jig so be careful. A double check that the alignment is correct is that the rear motor mounting plate should line up with the front motor mounting plate.



Servo mounting tray...

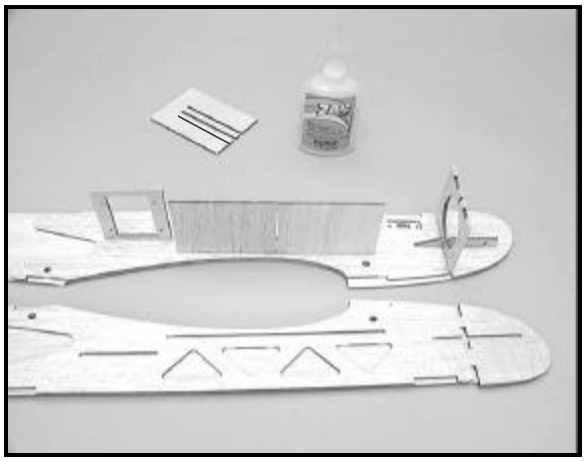
The servo mounting tray is setup for Hitec HS-60 servos. Check to see if the cutout is properly sized for the servos you're going to use. We've left plenty of extra material in the plate so just open up the hole until it fits the servos you're going to use.

Use the alignment jig to hold the servo mount perpendicular to the side of the fuselage while the glue sets. Again, tack glue first. Then remove the jig and complete gluing the servo mount in place.



The left side is done...

Here's what the left fuselage side should look like at this point. The left motor mount, firewall, battery pack mounting plate and servo tray are in place.



Attach the right fuselage side...

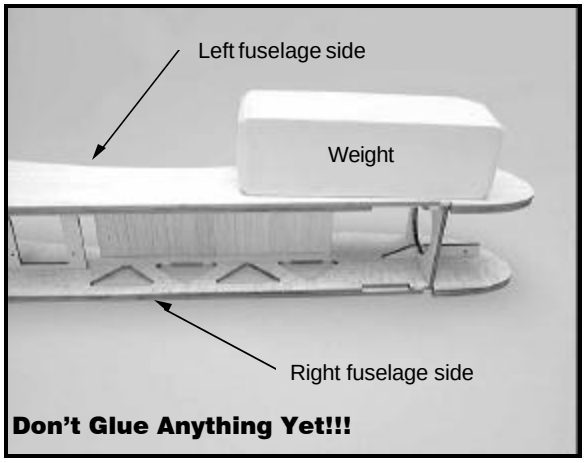
Following these instructions will assure a straight and true fuselage without any twists.

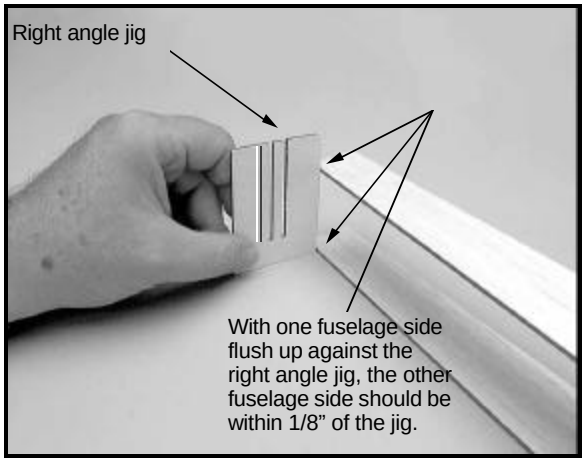
Dry!!! fit the right side of the fuselage. Insert the ***right motor mounting plate***, firewall, battery pack support plate, and servo tray into their corresponding recesses in the right side doubler. Make sure that the parts are firmly seated in their recesses and that nothing is preventing them from completely seating.

Before gluing any parts together, use a weight to hold the parts in place and use the right angle jig to check how closely the two fuselage sides line up at the tail. Put the jig flat on the building surface and see how close each of the fuselage sides comes to the jig.

If you were careful about lining up the doublers with the fuselage sides and all of the parts were firmly seated in their recesses before you glued them into the left fuselage side, the fuselage sides should line up very closely with one another.

If the fuselage sides are close to being square (within an 1/8" or so), go ahead and glue the right side and doubler in place. If the two are way off (1/4" or more), try to sand and adjust the ends of the parts and the recesses in the doubler until you can align the two fuselage sides with one another. They should be within 1/8" of being square. However, if you're within an 1/8", just pull the fuselage sides into perfect alignment before you glue the right side in place.

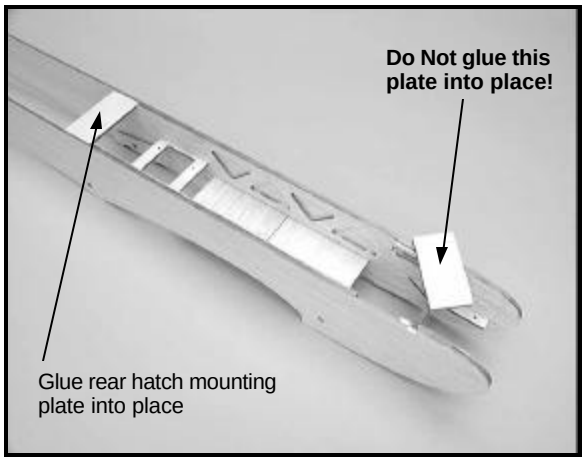


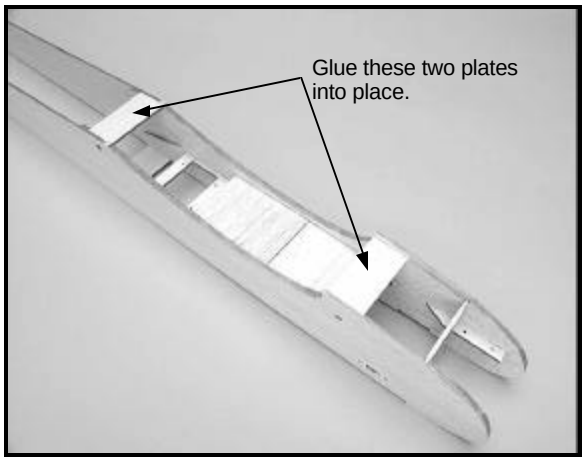


1" Wide ply plates...

There are three, 1" wide plates that you should glue in next. Before you do, lightly sand them to remove any oil or glazing from their surfaces.

The upper rear plate is for securing the hatch and the lower two plates are to reinforce the fuselage and provide mounting points if you should choose to add floats for flying off of water at a later date. ***Do not glue the upper front plate in! It will be glued to the hatch rather than the fuselage top!***

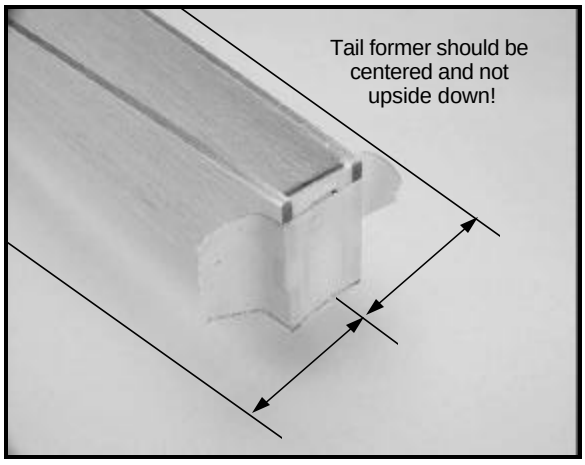




Glue tail former into place...

Hold the sides of the fuselage together and tape the tail former into place. ***Make sure you don't glue in the tail former upside down as there's a right way and a wrong way!*** If you've got it right, the former will be flush with the top and bottom of the fuselage sides.

With the tape holding the tail together, check the alignment of the fuselage. Either lay the fuselage over the top view on the plans or draw three parallel lines on your building board. The tail former should be centered. If need be, pull it to the right or left to center it and glue it in place. You'll be able to correct minor misalignments when you glue the top and bottom sheeting in place, but that's no reason to not make it as right as possible now.

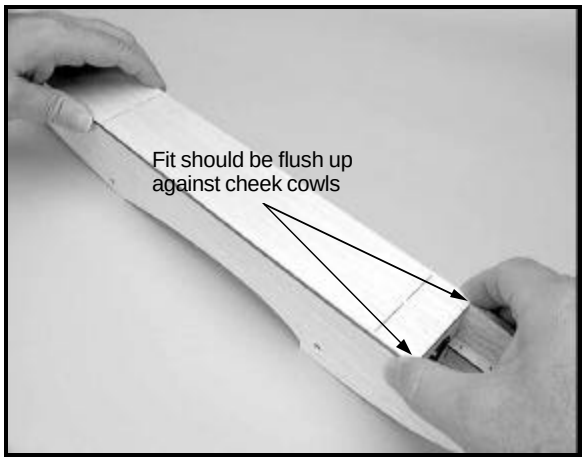


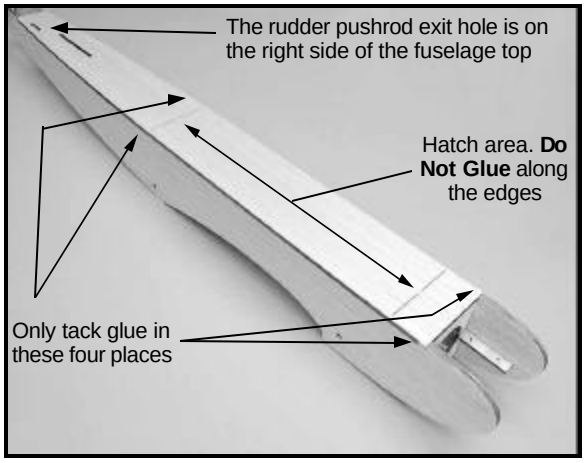
Trial fit the fuselage top...

How well does it fit? Notice that there is a right and left side to the fuselage top! The right side has an exit hole for the rudder pushrod at the tail.

The fuselage top should fit squarely up against the fuselage sides where the cheek cowls begin and it should be centered on top of the fuselage sides at the trailing edge of the wing. Don't worry about alignment at the tail. You'll be able to fix that as long as the fuselage top is square and centered over the forward part of the fuselage. If the top doesn't fit squarely, use a small sanding block to adjust the fuselage sides at the cowl check notches.

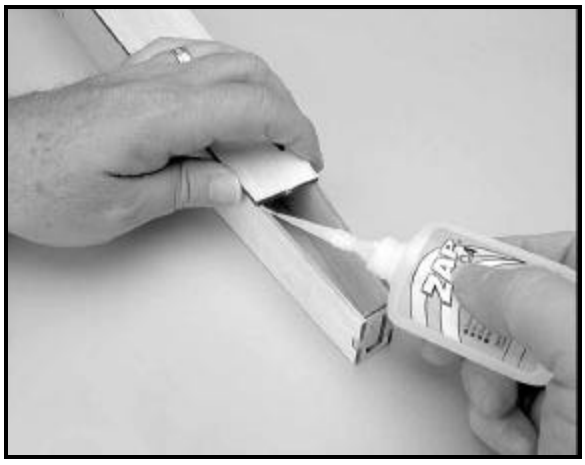
A note before you glue! You do not want to glue the hatch area of the fuselage top or the rear end of the fuselage top to the fuselage sides. At this point, you only want to tack glue the fuselage top to the fuselage sides just in front of and just behind the hatch. Use the smallest amount of glue so that it doesn't spread to the hatch area.





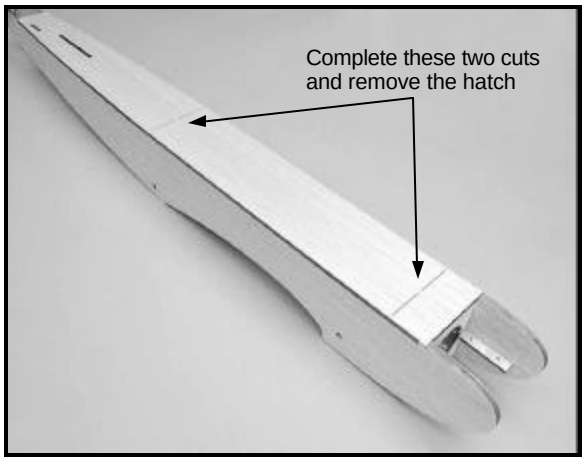
Glue the top at the tail...

The fuselage top is straight. The fuselage sides may be off a little so pull the fuselage sides left or right a little until they line up with the fuselage top. Tack glue the top to the sides only at the tail at this point.



Cut away the hatch...

Complete the cuts we've started for you for the hatch and remove the hatch.

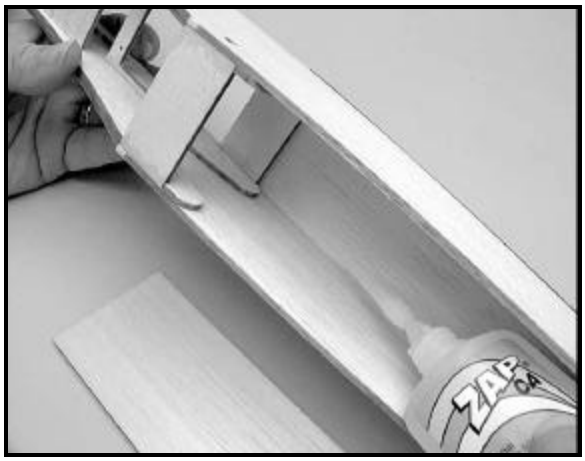


Glue the fuselage top to the sides...

Starting at the tail. Squeeze the fuselage sides together a little if need be so that they line up with the fuselage top and glue the top to the sides. Work on your building board so that you can be pressing down on the fuselage top for a good fit. Continue all the way around the fuselage top both in the front and the rear of the fuselage.

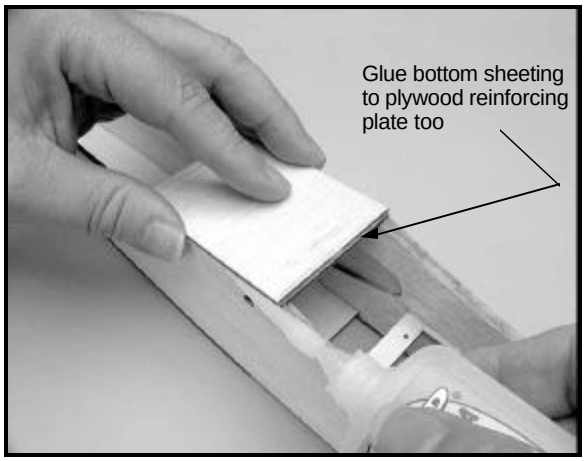
Glue from the inside too...

After you've finished gluing the fuselage top to the sides from the outside, turn the fuselage over and glue the two together from the inside too.



Glue the bottom rear sheeting in place…

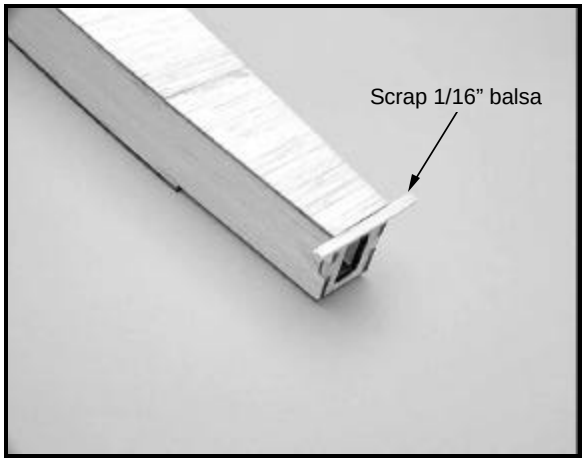
There are five pieces of bottom rear fuselage sheeting. Starting with the widest one, line it up with the fuselage sides just after the cutout for the trailing edge of the wing. Glue it in place pulling the fuselage sides together a little if need be. Don't forget to glue the sheeting to the plywood reinforcing plate too.



Add scrap to tail…

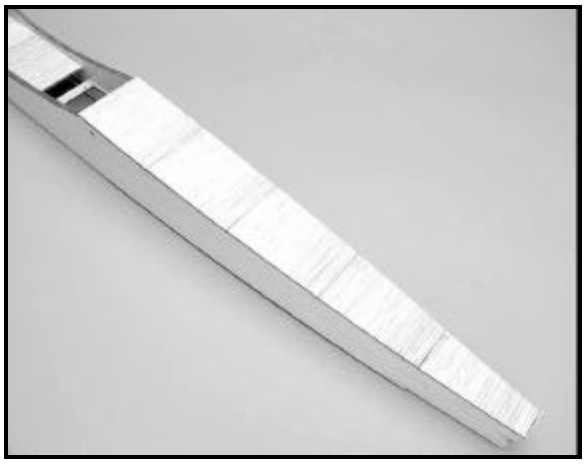
Continue gluing each of the pieces of bottom sheeting in place working your way to the tail. Don't forget to glue each piece to the previous sheet as well as the fuselage sides. Squeeze the sides together as you move along so that they are either flush with the bottom sheeting or so that the bottom sheeting sticks out a little so that it can be sanded flush with the fuselage sides at a later stage.

When you install the last sheet, you may find that you're a little short of the tail. If so, glue a small piece of oversized 1/16" scrap in place to finish the job. You can trim the scrap to size after the glue has set.



All done…

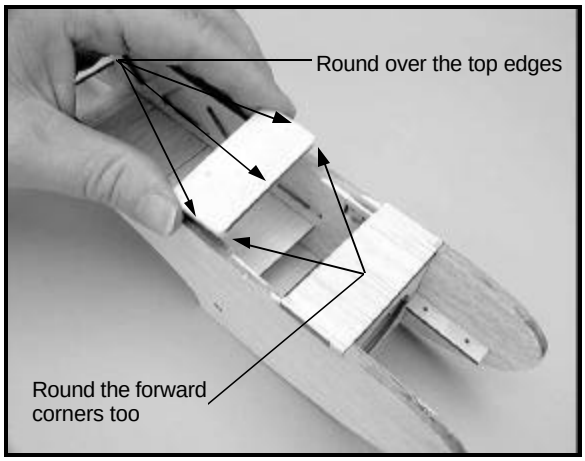
This is what the bottom sheeting should look like. You'll sand it to final shape a little later.

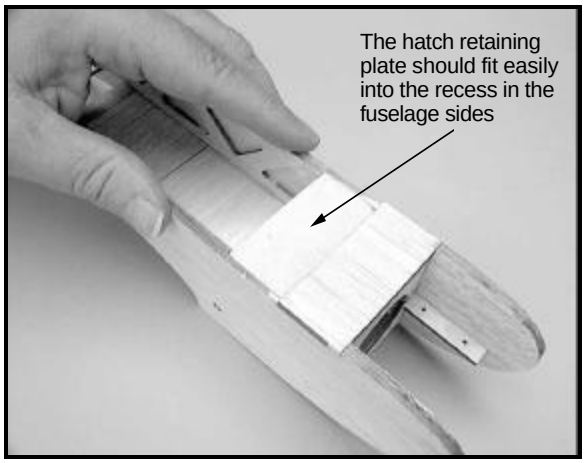


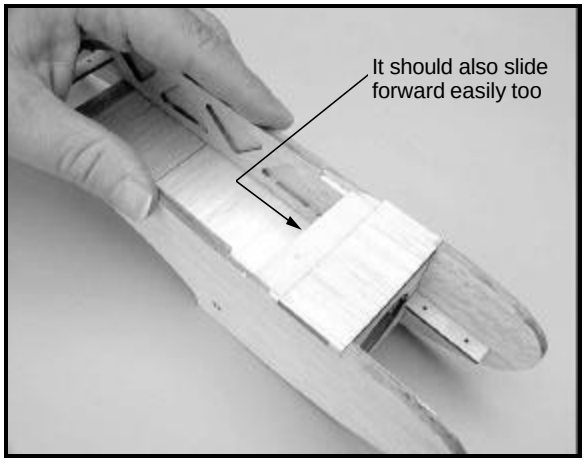
The hatch retaining plate...

Using a sanding block, round over the edges and forward corners of the hatch retaining plate both top and bottom. Trial fit it into the recess in the fuselage sides. It should slide in easily and sit on top of the doublers without any part of the retaining plate sticking up above the height of the fuselage sides. It should also slide forward easily so that only half of the plate is exposed. You don't want a sloppy fit, but you also don't want a tight fit. Adjust the plate until you're happy with the fit.

Leave the plate in place in its forward position and proceed to the next step. Don't glue anything yet.

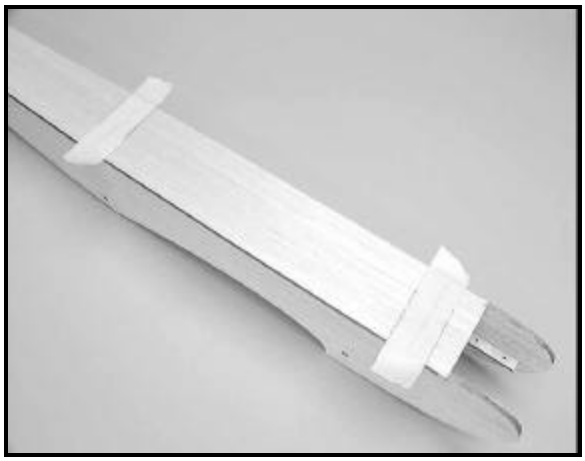






Tape the hatch back in place...

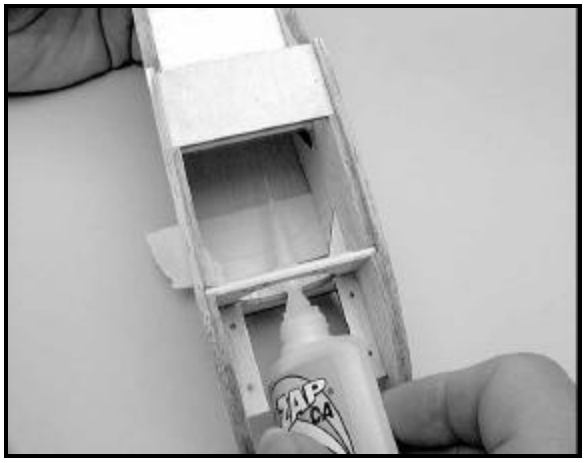
Use masking tape to tape the hatch back in place. Make sure it's lined up perfectly with the fuselage sides and it's centered fore and aft in its cutout.



Tack glue the retaining plate to the hatch...

From the bottom of the fuselage, tack glue the hatch retaining plate to the hatch. ***Don't use a lot of glue or you'll end up gluing the hatch to the fuselage!***

When the glue has set, turn the fuselage over and remove the hatch. ***Note:*** To remove the hatch, you only have to lift it slightly at the rear and then slide the hatch rearward. If you lift the rear of the hatch too high, you'll break the retaining plate free of the hatch.



Glue the retaining plate to the hatch...

Glue the retaining plate to the hatch around its entire perimeter. If the hatch has any bow to it, (it really shouldn't) press the hatch and retaining plate down on your building board before you start to glue. This will flatten out the hatch and the retaining plate will keep it flat.

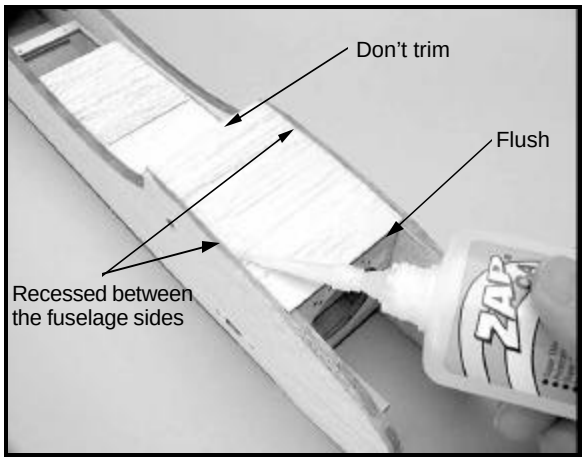
Reinstall the hatch. How did it fit? Use a sanding block if need be to adjust the retaining plate so that the hatch can be installed and removed easily and is centered on the fuselage.

Forward, bottom sheeting...

The forward, bottom fuselage sheeting will fit between the two fuselage sides and it will rest on the edges of the doublers. It should be flush with the face of the firewall and it should extend past the cutout for the leading edge of the wing. Don't trim this excess length until after you've completed the wing.

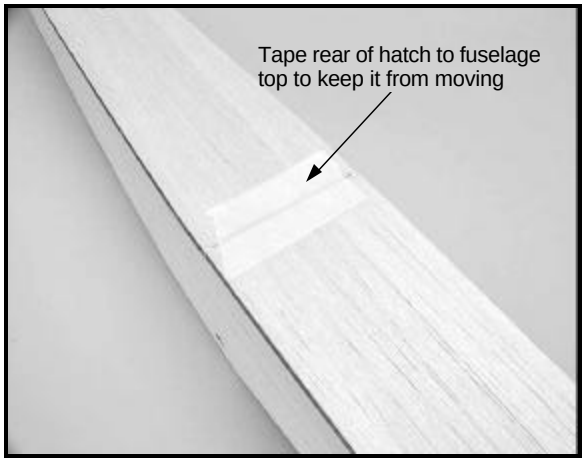
Now you know why you chamfered the bottom edge of the firewall before you glued it into the doubler. If you put the correct angle on the bottom edge of the firewall, it will meet perfectly with the bottom sheeting.

Glue the bottom sheeting in place.



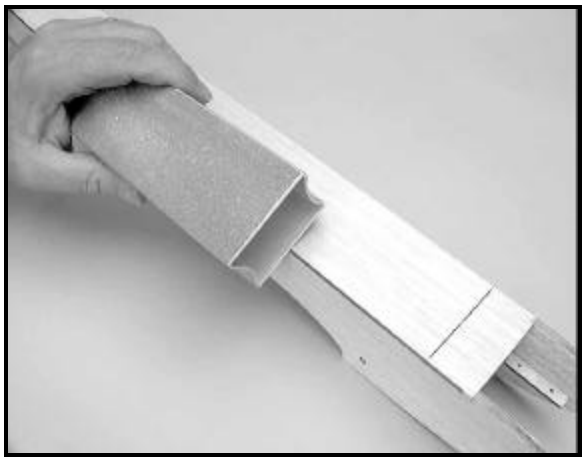
Secure the hatch...

Before sanding the fuselage's top sheeting and hatch, tape the rear of the hatch to the rear sheeting to prevent it from shifting sideways when you're sanding its edge.



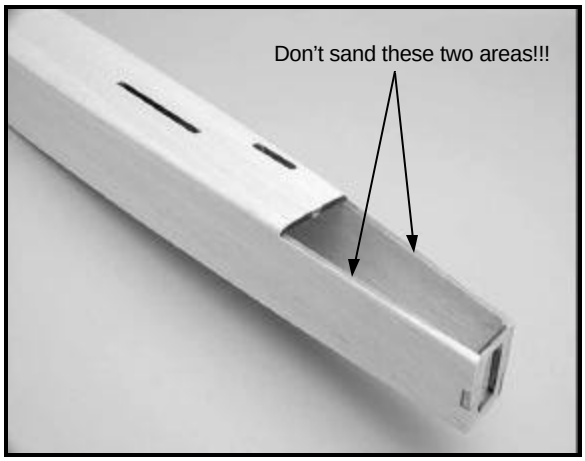
Sand the top sheeting and hatch...

Use a sanding block to sand the top sheeting and hatch. First, sand the sides of the fuselage to make the curve of the top sheeting and hatch match perfectly the curve of the fuselage sides. Then, round over the corners and sand the top of the fuselage. ***But, before you do, see the next step!!!***



Don't sand the stab mounting area...

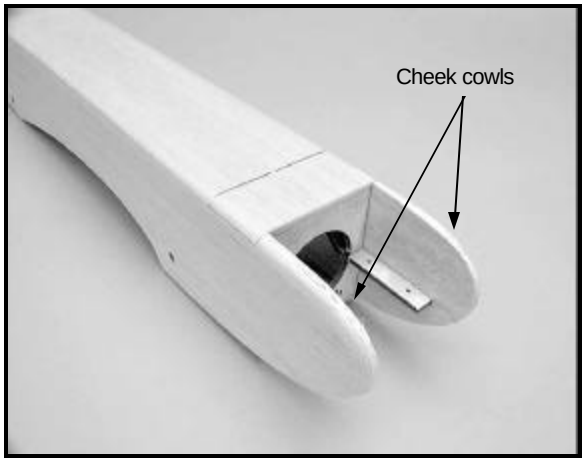
Sand the fuselage top and hatch but don't sand the area of the fuselage where the horizontal stabilizer will be mounted!

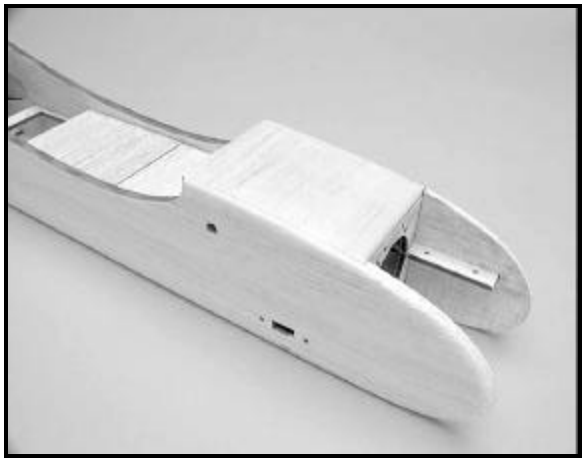


Sand the cheek cowls to shape...

Don't be afraid to remove material with your sanding block. There's plenty of "meat" in the X250's fuselage so don't be afraid to give the fuselage a nice curve.

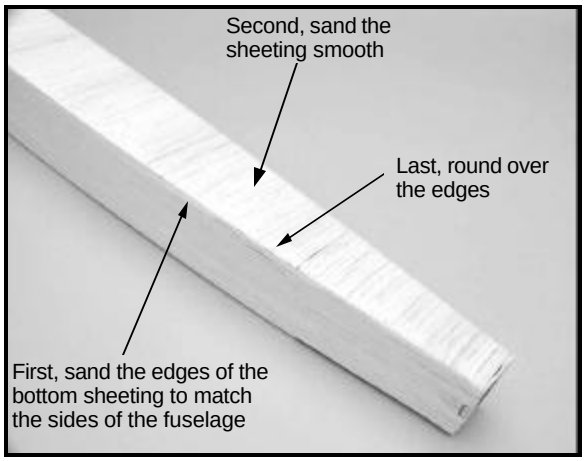
Round off the cheek cowls and fair them smoothly into the fuselage top sheeting and hatch.





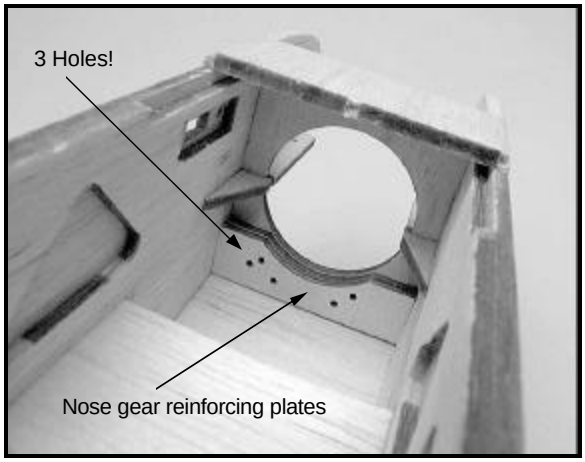
Sand the rear bottom sheeting...

Just as you did on the top of the fuselage, first sand the sides of the fuselage so that the bottom rear sheeting is flush with the sides of the fuselage. Then, sand the bottom sheeting itself to remove any excess glue on the surface of the sheeting. Finally, round over the edges to give the fuselage a nice appearance.



Nose gear reinforcing plates...

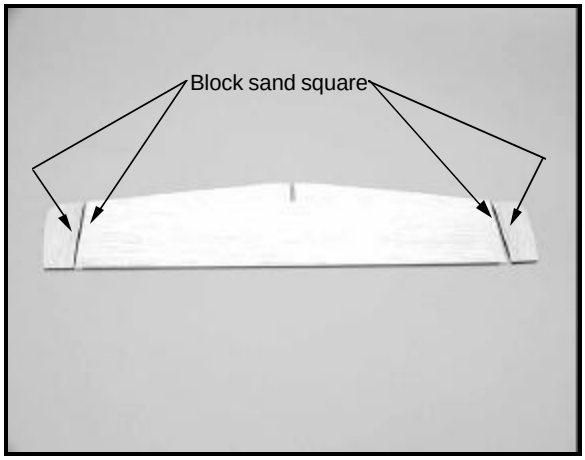
Line up the two nose gear reinforcing plates behind the lower portion of the firewall. Make sure the 3 holes are on the left. Pass a landing gear leg through the holes in the firewall and reinforcing plates to make sure they all line up. When you're happy with the fit and alignment, glue the plates to each other, the firewall, the fuselage sides, and the fuselage bottom sheeting, all at one time. In a hard landing, we want the landing gear to bend rather than bust anything up in the fuselage. These reinforcing plates tie everything together.

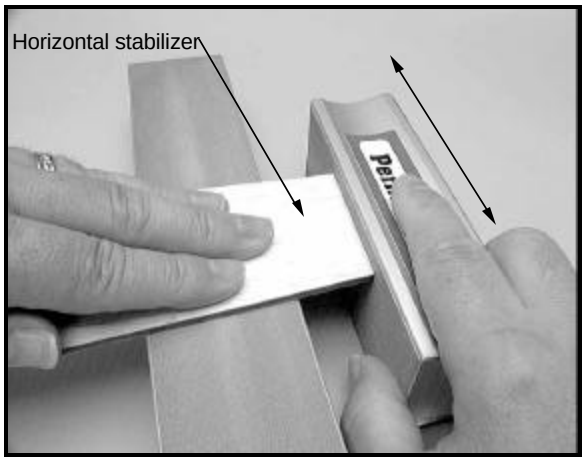


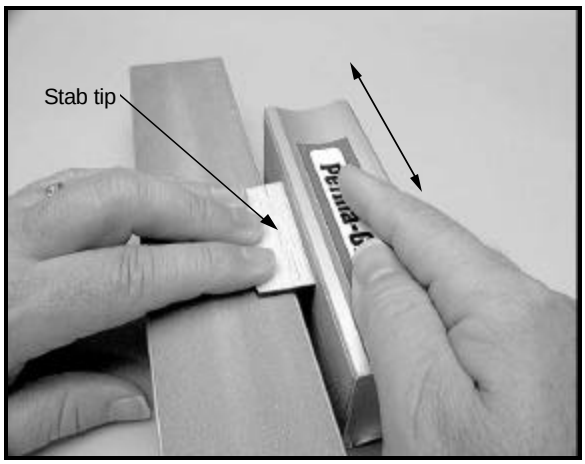
Horizontal and vertical stabilizers...

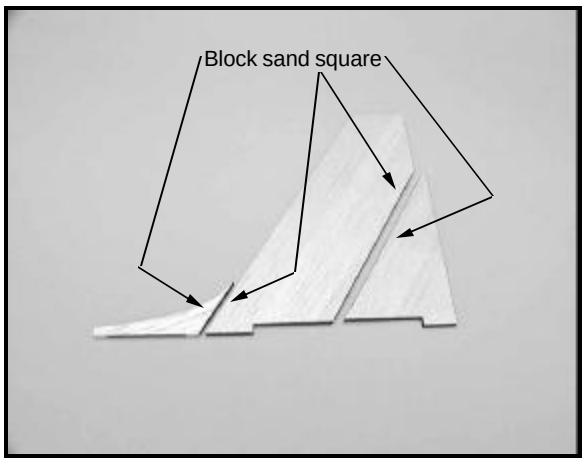
Laser cutting will usually leave a slight angle on the edges of parts. For a good glue joint, you'll want to square the edges of the horizontal and vertical stabilizer parts where they meet each other. Use a sanding block and only remove enough material so that the honey color is removed from the edge of the part. This way, you've sanded away any angle on the edge and made it square without removing more material than necessary.

When you've finished the horizontal stabilizer, do the same for the parts that make up the vertical stabilizer.



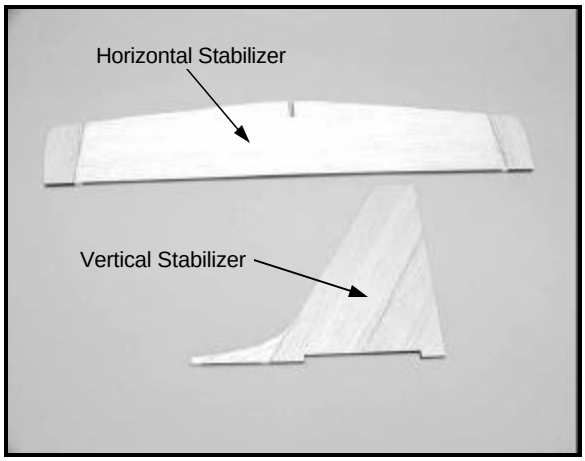






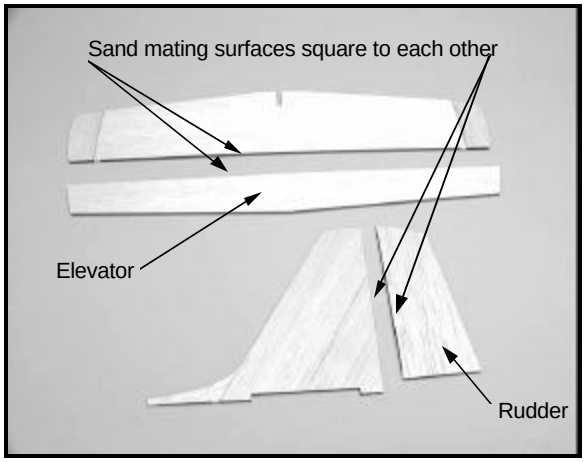
Glue the parts together...

When you're happy with the fit of the parts, glue the tips to the horizontal stabilizer. Do the same for the three parts that make up the vertical stabilizer.



Prepare the rudder and elevator...

The rudder and elevator will be shaped next. First, you'll want to sand the mating surfaces, where the elevator meets the horizontal stabilizer and the rudder meets the vertical stabilizer, square with your sanding block. Don't sand the outer edges yet.

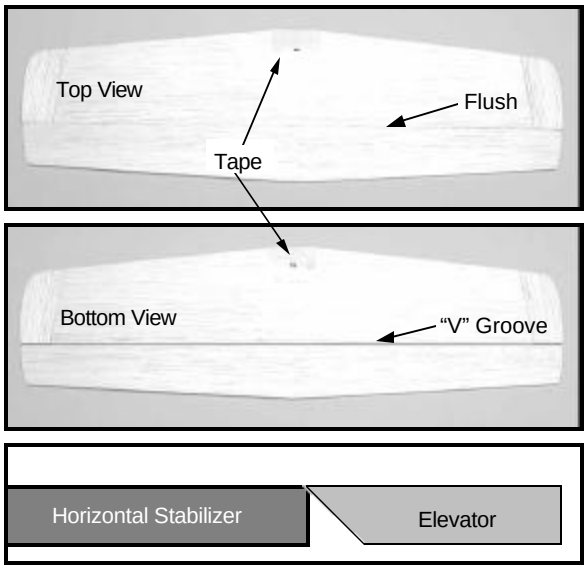


Horizontal stabilizer/elevator...

The rear edge of the horizontal stabilizer will be left square. The front edge of the elevator will be sanded back at a 30° angle so that looking at the top of the horizontal stabilizer the two are flush up against each other. Viewed from the bottom, you can see that the angle sanded into the leading edge of the elevator forms a "V" groove where the two meet.

Note that you should add a piece of tape to the center of the horizontal stabilizer's leading edge so that this area will be left square when the rest of the stab is sanded and its outer edges are rounded over. The tape should be as wide as the width of the top fuselage sheeting where it meets the horizontal stabilizer.

At this point, round off the edges of the horizontal stabilizer and taper the elevator's cross section so it's only about 1/16" thick along its trailing edge. Round off the elevator's tips too.



Vertical stabilizer/rudder...

Next, you'll do the same thing to the vertical stabilizer as you did the horizontal stabilizer. In this case, the two will meet flush on the right side of the vertical stabilizer and there will be a groove on the left side of the rudder.

Taper the rudder as you did the elevator and don't round off the bottom edges of the vertical stabilizer or rudder.

Don't glue the horizontal stabilizer or vertical stabilizer to the fuselage until after the fuselage is covered.