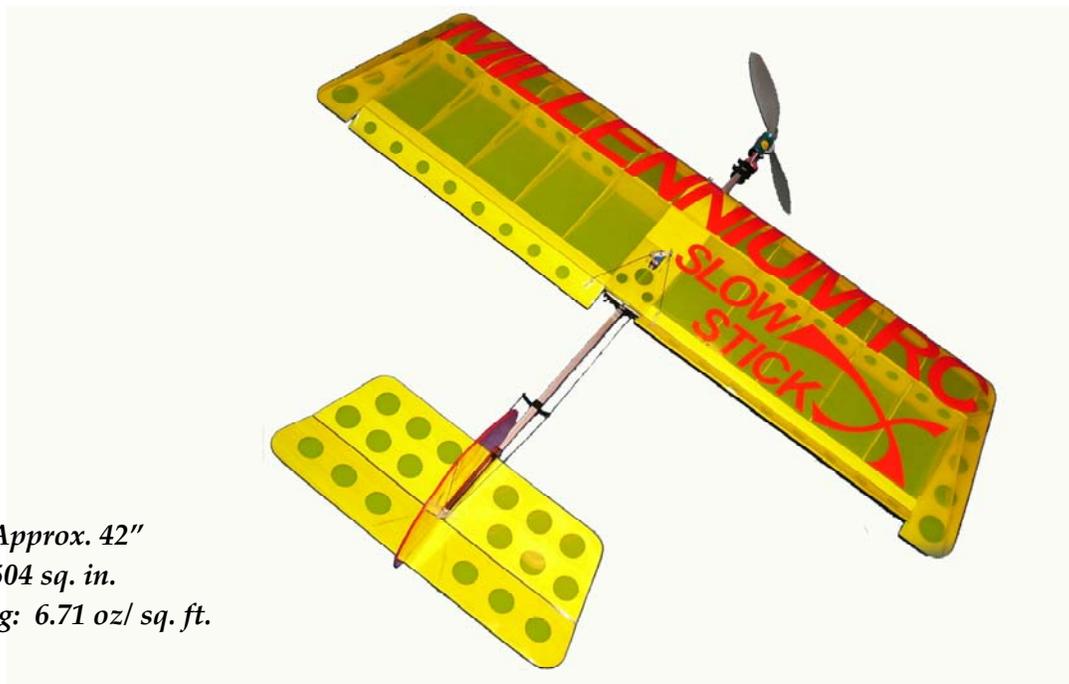


Millennium RC presents... "Short" Build Kit

SLOW STICK



Wing span: Approx. 42"

Wing Area: 504 sq. in.

Wing Loading: 6.71 oz/ sq. ft.

Introduction:

The Slow Stick X "Short" Build Kit is an upgrade to the GWS Slow Stick Electric ARF Park Flyer Airplane Kit™. This kit replaces the original Styrofoam wing and tail surfaces of the Slow Stick to a more robust balsa-constructed design, complete with ailerons and a full symmetrical wing, allowing the Slow Stick to become a fully aerobatic model aircraft. This wing and tail are designed to easily attach to your existing stick fuselage.

Adult supervision recommended for children 15 and under. R/C Airplanes should be flown following safety guidelines provided by the AMA (Academy of Model Aeronautics).

CAUTION: This is not a toy!

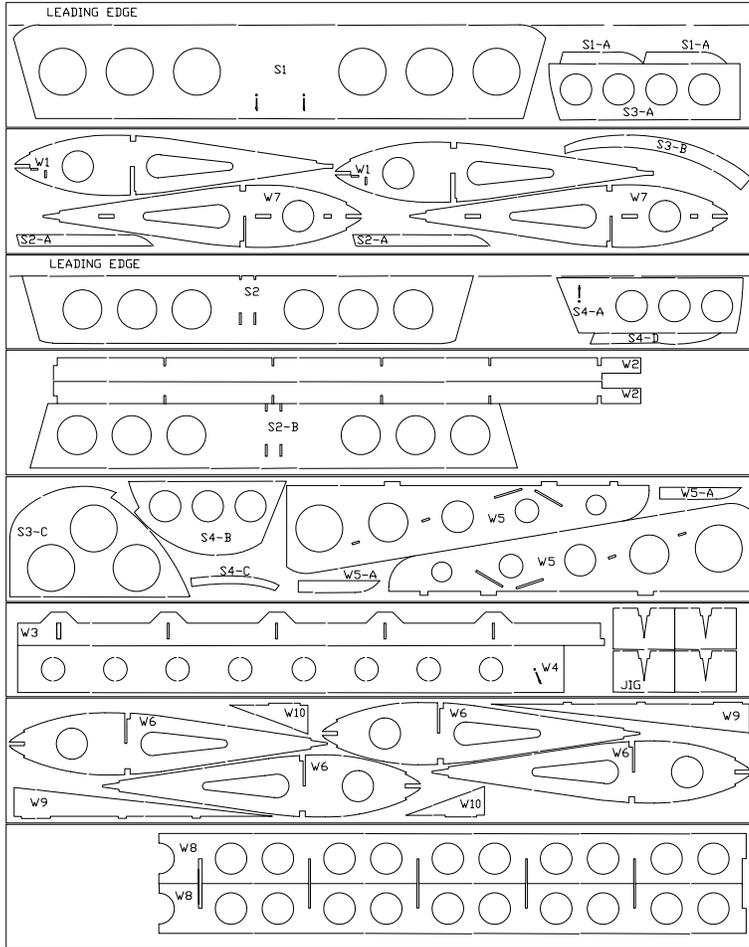
Recommendations:

1. Read through each step before starting assembly.
2. After removing all the pieces from packaging, inspect to make sure there are no broken or missing parts.
3. Check off each completed step to help keep from losing your place.
4. Cover the work table with plastic wrap to protect from glue.

Slow Stick X™ Wing/Tail Build Kit Assembly Instructions Rev. 7

List of Provided “Short Kit” Parts:

All laser-cut balsa and plywood parts needed to complete the wing/tail sections.

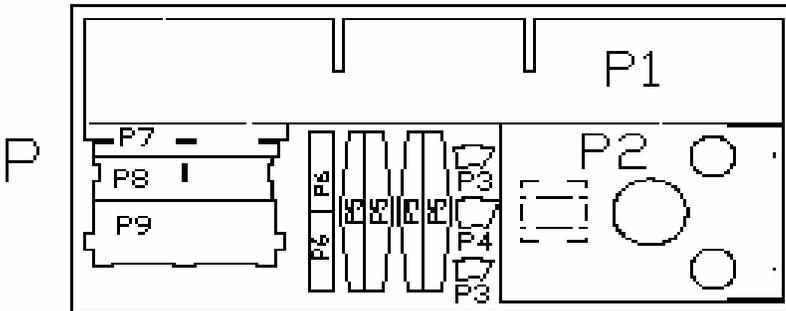


Additional Items Required:

1. GWS Slow Stick Electric ARF Park Flyer Airplane Kit™ (used or new)
2. All tools, equipment and materials recommended in GWS Slow Stick Assembly Instruction Manual
3. One or two mini servos for ailerons and hardware for aileron linkage
4. .047 Piano wire for aileron pushrods
5. 5/32” aluminum tubing for rubber band post extenders
6. Cyanoacrylate or CA Glue (thin and thick)
7. Hobby knife
8. 80-grit and 100-grit sandpaper
9. Sanding block
10. Hinge tape (recommend 3M Scotch™ 3/4” Transparent Tape)
11. Tape measure and/or yardstick
12. Square
13. Razor saw
14. A park-flyer type lightweight plastic covering (Ex: Ultracote Lite™) and any tools recommended in its instructions for application
15. Recommended Motor and speed control (400 style outrunner, 125-200 watts with 20 amp speed control, or equivalent)
16. Battery and Propeller (use what is recommended in instructions for motor)
17. #33 Rubber Bands

The Slow Stick X is also available as a Build Kit Bundle which includes the following additional items at an additional charge:

1. Slow Stick X Decal
2. Aileron push rods
3. #33 Rubber bands
4. Rubber band post extenders
5. Velcro strap to mount battery
6. Foam Tape
7. 2 2-56 x 3/4 sheet metal screws
8. 3 #2 washers
9. Velcro tape
10. Push rods for elevator and rudder
11. 1 2-56 screw and nut
12. 6 #1-3/8 sheet metal screws
13. 2 #2-1/4 sheet metal screws (optional for motor mount)
14. 4 control horns
15. Tail skid or wheel assembly
16. X-Gear carbon fiber landing gear
17. Fuselage and fuselage parts



Disclaimer:

Millennium R/C assumes no responsibility for any accident or injury to persons or damage to property.

IMPORTANT: DO NOT GLUE UNTIL INSTRUCTED TO DO SO!

The top of this wing is identified by the installation of the main spar. The main spar is always installed from the TOP. (Fig. 3)

1. Remove all W parts as well as plywood parts P1, P7 and P9 from sheets. Sand away excess material from break-away. If desired may also sand away any laser burn.
2. Assemble spar crutch (Part W8), Ribs (W1 and W6). (Fig. 1 and 2) NOTE: Because of different wood weights, it is recommended that you divide the two rib sheets (W6) between the two wing halves. This will help to balance the wing.

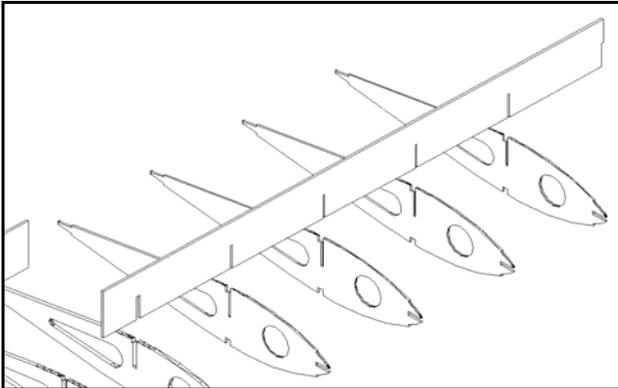


Figure 1

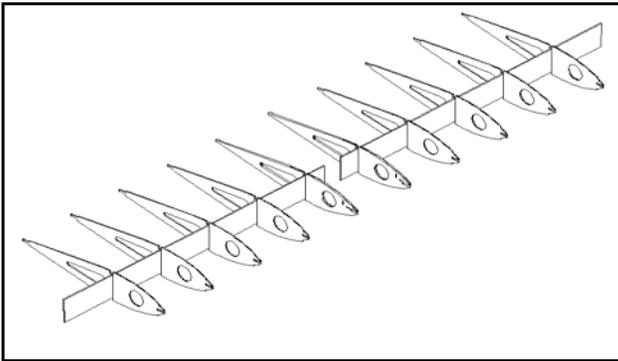


Figure 2

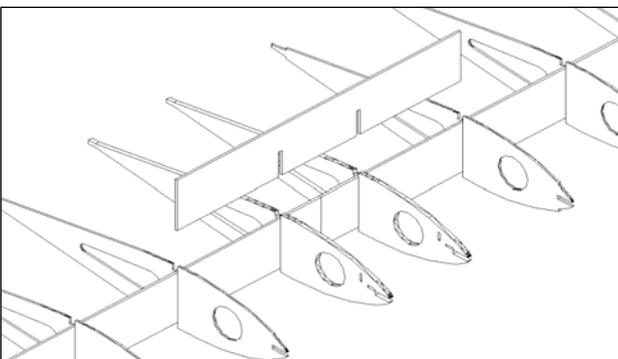


Figure 3

3. Join together the two wing halves with main spar (P1). (Fig. 3) The main spar should be installed on the trailing side of the spar crutch.
4. Join together parts P7 and P9, as in Fig. 4, and install between center ribs B1. (Fig. 5)

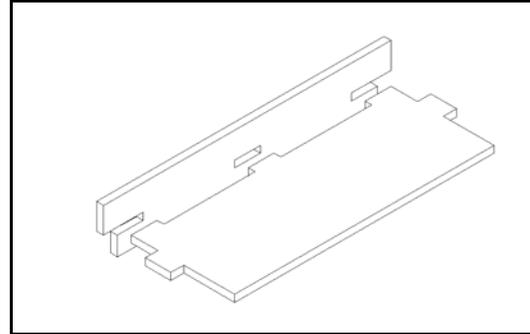


Figure 4

5. Install leading edge B2 (Fig. 5)

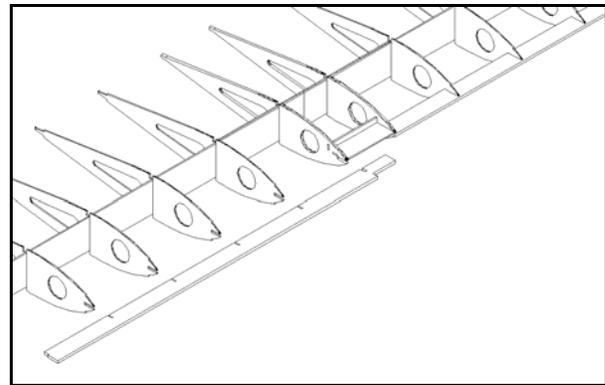


Figure 5

6. Inspect bass wood spars for knots and install spars with knots to the outside edge of the wing. Install 3/16" x 3/16" bass wood spars so that the two pieces meet in the center of the wing (top and bottom). **Again, it's important not to glue until told to do so!** (Fig. 6)

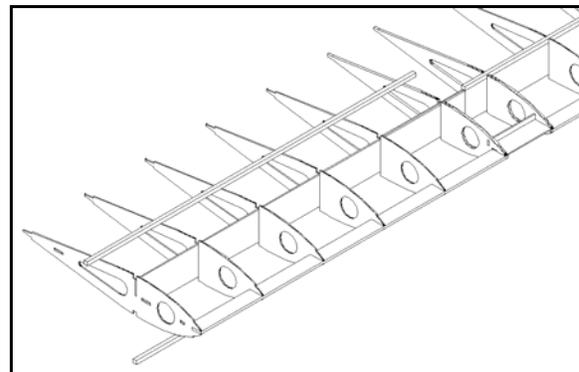


Figure 6

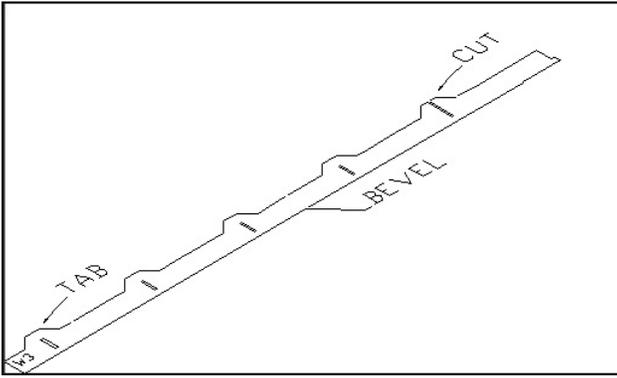


Figure 7

7. Bevel trailing edge crutch before installing. Do not cut tabs until after the trailing edge is beveled. This will keep the part from breaking during beveling process (Fig. 7). Use the provided jig to gauge bevel.

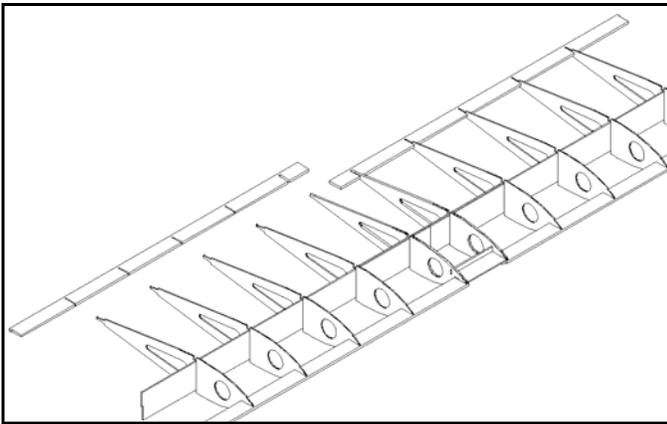


Figure 8

8. Slide the trailing edge crutch pieces onto the ribs (Fig. 8). Note picture does not show tabs on trailing edge.
9. Using thick CA glue, tack glue trailing edge to ribs using provided jig piece to align the trailing edge with the ribs. (Fig. 9) Install end ribs (Parts W7). (See Fig. 13)

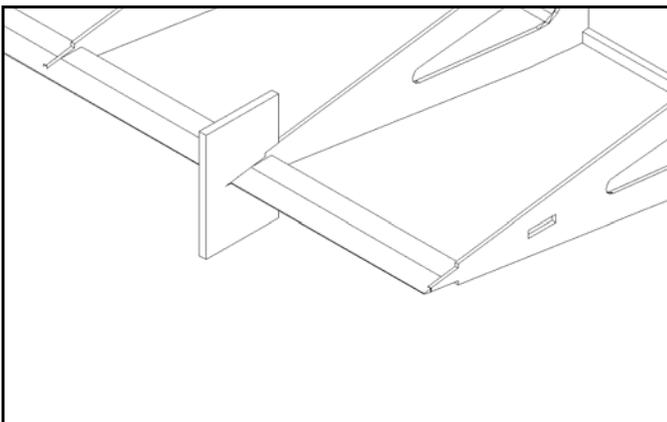


Figure 9

10. Using a square, check the square of ribs to the main spar crutch (Part W8) and begin tack-gluing the ribs to part W8 with thin CA glue. Make sure that 3/16" x 3/16" spars are tightly placed before doing so. It is a good idea to have the wing with the bottom 3/16" x 3/16" spar flat on the table and glue while pushing down on the top 3/16" x 3/16" spar. Once you tack-glue the ribs to part W8 and have verified that the wing is straight, lift the wing off the surface and continue gluing the remaining glue joints with thin CA glue. Be sure to join with a bead of thick CA glue, main spar (Part P1) to 3/16" x 3/16" spars.

From this point on, parts are glued, as installed.

11. Install 9/16" strips on leading edge top and bottom (Fig. 10). Sand square the leading edge so that you have a flat surface flush with Part B2 (Fig. 10) From scrap 1/8" balsa marked "Leading Edge", make two 19" long strips, and glue them to the leading edge. (Fig. 11)

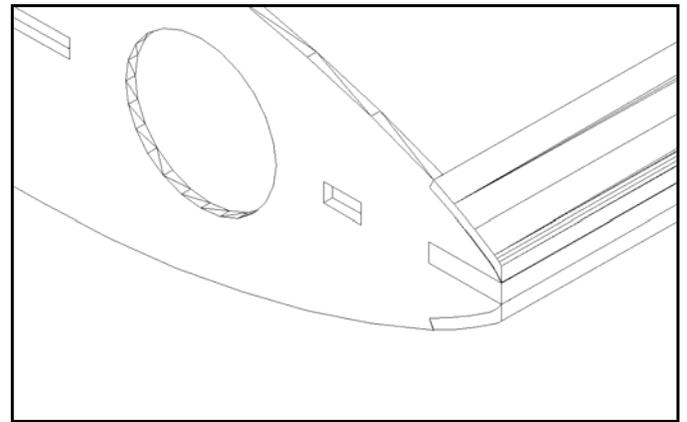


Figure 10

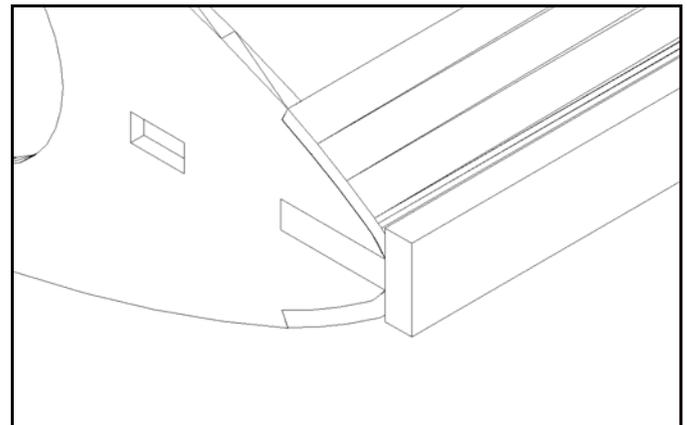


Figure 11

12. Remove part P2 from the plywood sheet, sand off break-aways, and install on top of center ribs. (Fig. 12)

13. Install $\frac{3}{4}$ " x $\frac{1}{16}$ " strips on trailing edge top and bottom (Fig. 13). With an X-acto knife, remove ailerons from trailing edge and set aside.

14. Install planking using leftover material from provided $\frac{1}{16}$ " balsa. (Fig. 12)

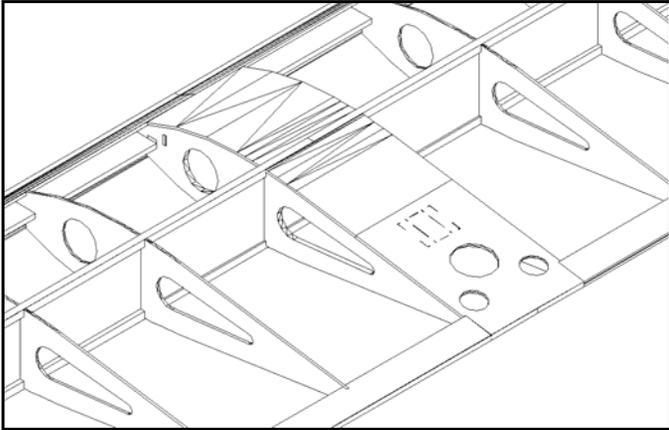


Figure 12

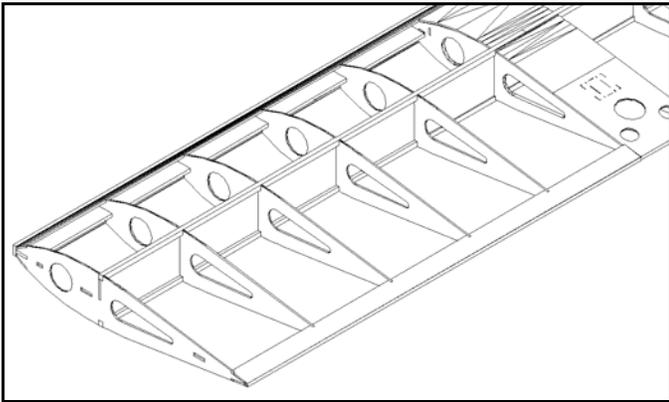


Figure 13

15. Cut excess leading and trailing edges and spar material flush with end ribs. Carve and sand leading edge to rounded shape. (Fig 14)

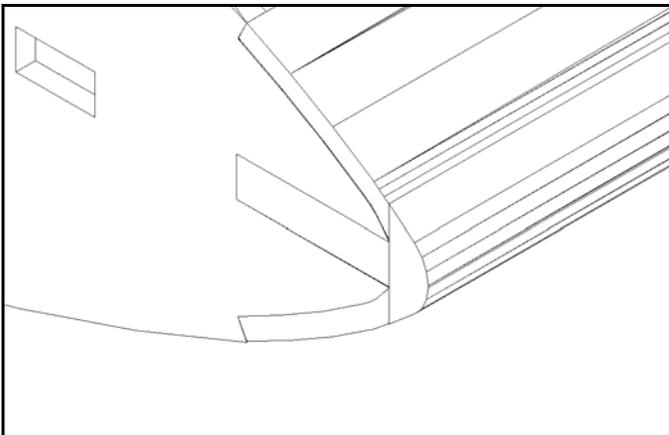


Figure 14

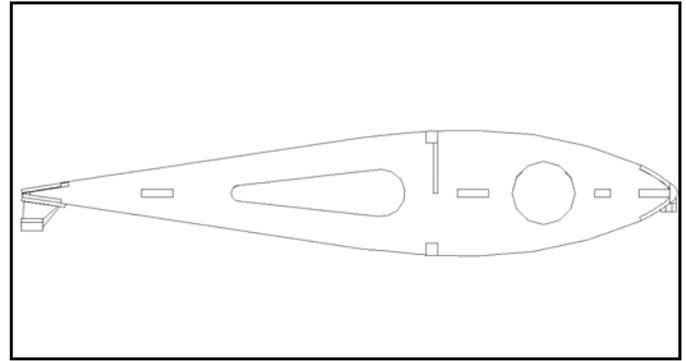


Figure 15

16. Remove parts W5- W5-A and assemble as shown in (Figure 16a) and sand break-aways until smooth. Install wing tips W5, along with braces W9 and W10. (Fig. 16b)

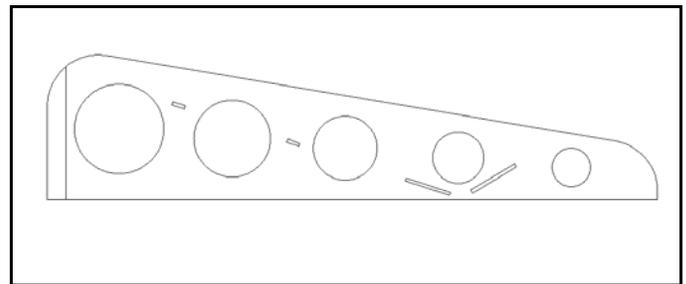


Figure 16a

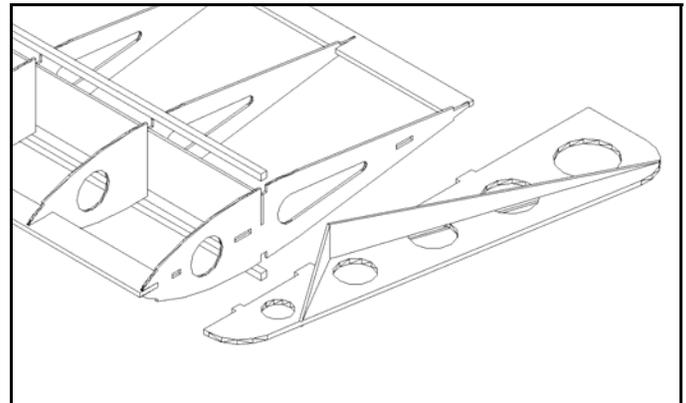


Figure 16b

17. Remove parts P5 from plywood sheet, and sand break-aways smooth. Flip wing over and carve away excess material from bottom of the leading edge between center ribs. Install Part P5 front wing saddle.. (Fig. 17)

18. Remove Parts P3, P4, P6 and P8 and assemble rear wing saddle. (Fig. 18) Create a $\frac{1}{2}$ " notch in the bottom spars for the Slow Stick fuselage to fit. (Also Fig. 18) Main wing assembly is now complete! You may now sand as desired and cover with light covering of choice. When covering, be sure to leave the bottom area between center ribs open.

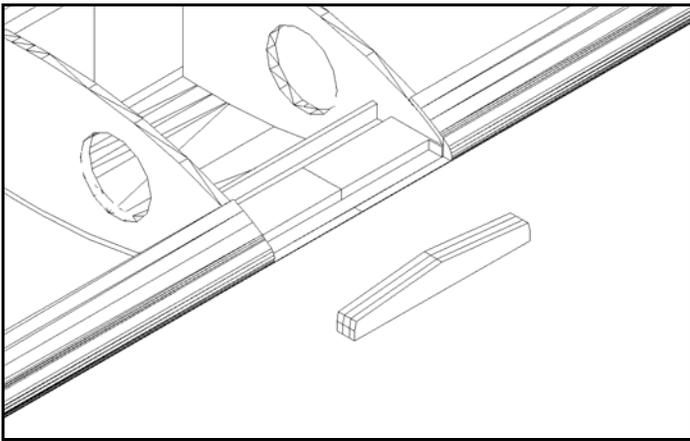


Figure 17

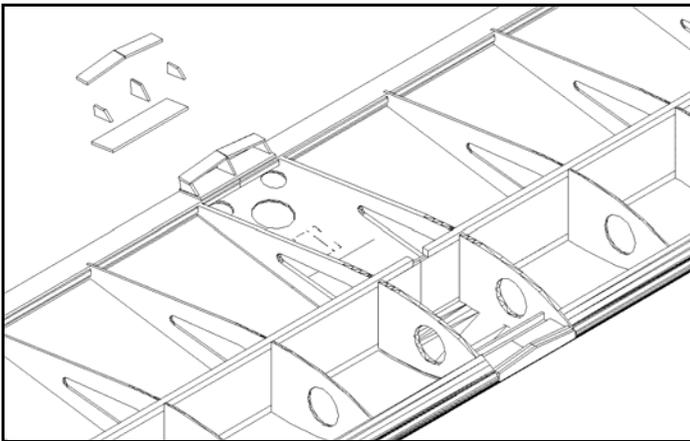


Figure 18

19. Join tail surface pieces as shown in Fig. 19.

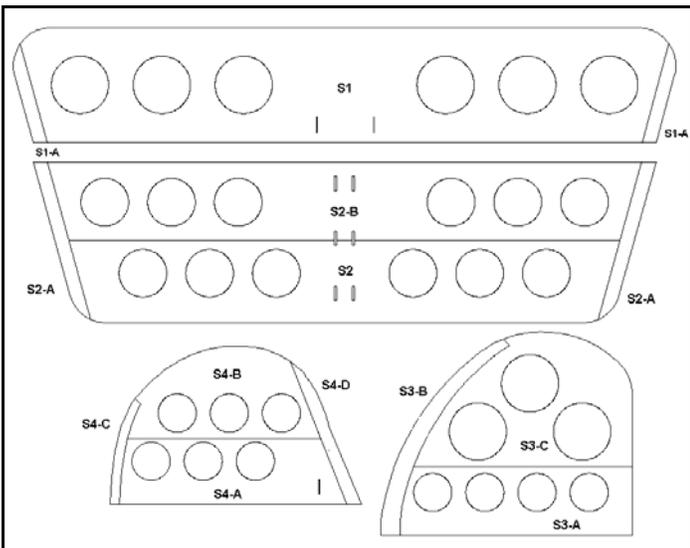


Figure 19

20. Sand all tail surfaces, round all edges, and taper leading edges of all control surfaces, including ailerons. (Fig. 20) Cover with light model covering.

Assembly of the control hinges

Hinges are made from hinge tape or 3M Clear Cellophane Tape. The hinge cross-section is shown in Fig. 20. Hinges are done after covering.

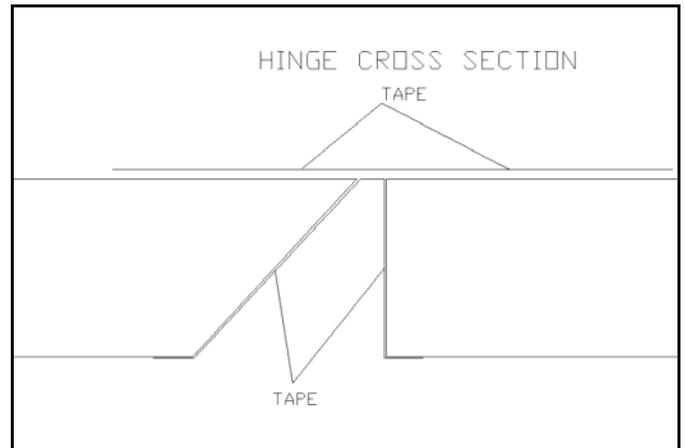


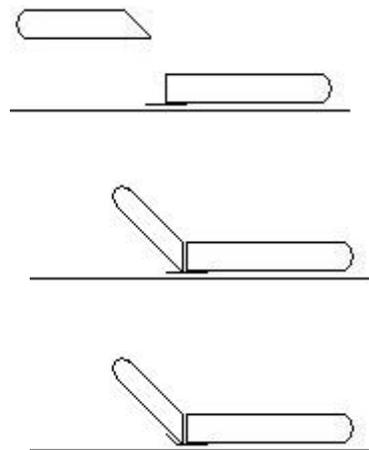
Figure 20

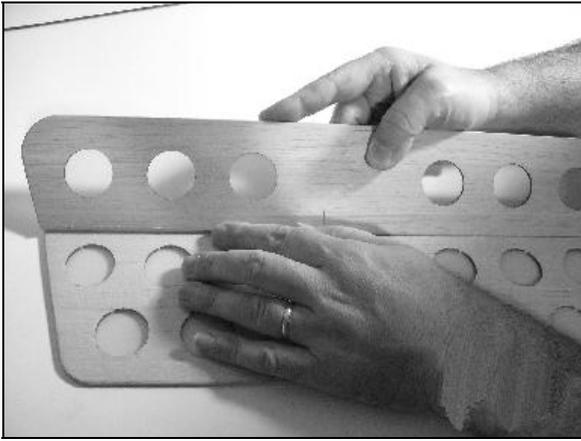
Final Build Kit Assembly

1. Tape a length of Scotch tape™ along the rear trailing edge of the horizontal stabilizer and secure with your finger (either side is fine). Now, flip the stabilizer and place on a work surface. See diagram below:

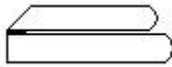


2. Now, take the elevator. You will see that the elevator has a 'beveled' edge. This is important in creating the hinge. Ensure that the beveled edge is pointing up, and while holding at a 45° angle, place up the trailing edge of the horizontal stabilizer and secure the hinge tape to the elevator with your finger. See diagrams below:

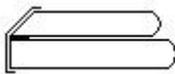




3. Turn the stabilizer assembly over, and carefully fold the elevator back onto the stabilizer.



4. Tape another length of Scotch tape™ along the bottom hinge line and secure with your finger.



5. Fold the elevator back to normal position. Test the hinge by pulling gently on the control surface. Cut off any excess tape overhanging the stabilizer sides.
6. Repeat the steps 1. thru 5 for the rudder.
7. The aileron servo and linkage is mounted as shown in Fig. 21.

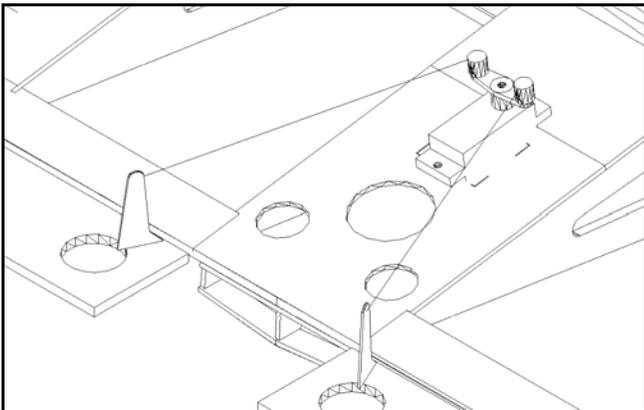


Figure 21

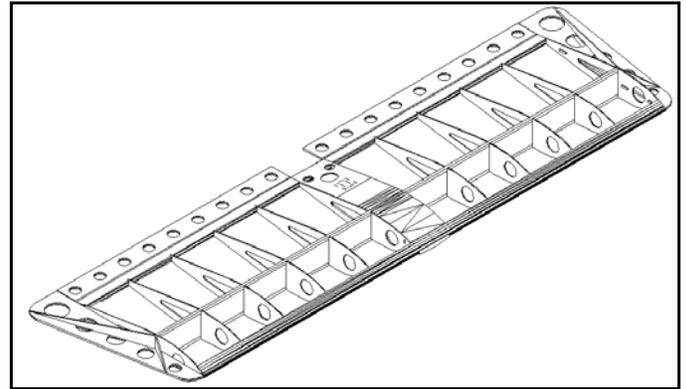


Figure 22

Tail surfaces are installed using a keyed mount (Fig. 23). The vertical and horizontal stabilizers are mounted as illustrated in (Fig. 24).

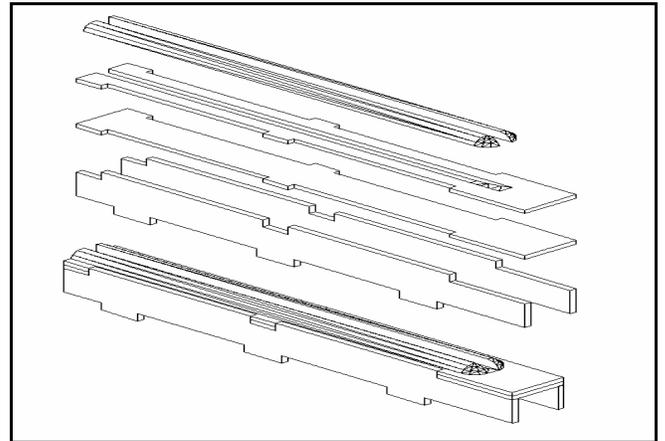
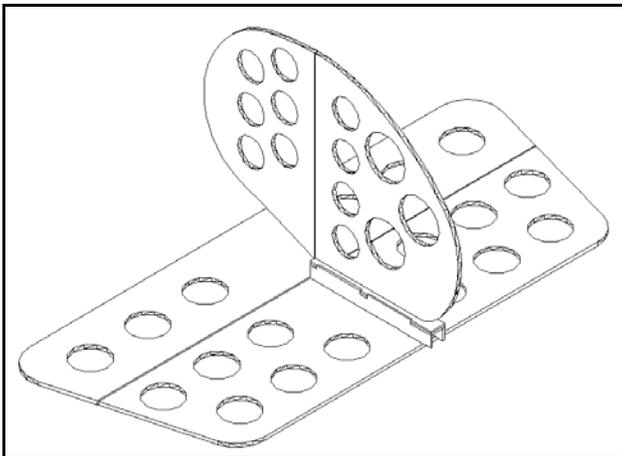
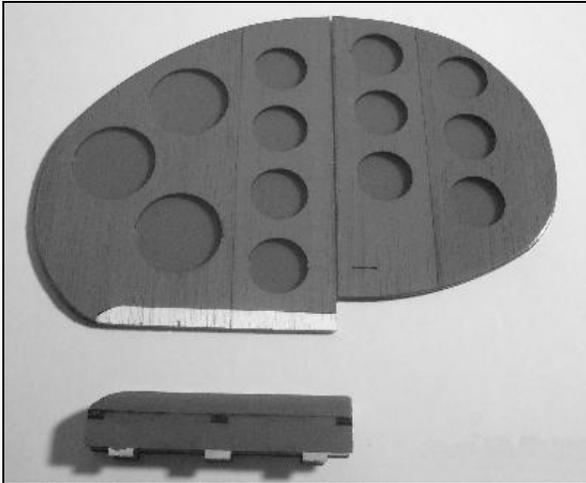


Figure 23

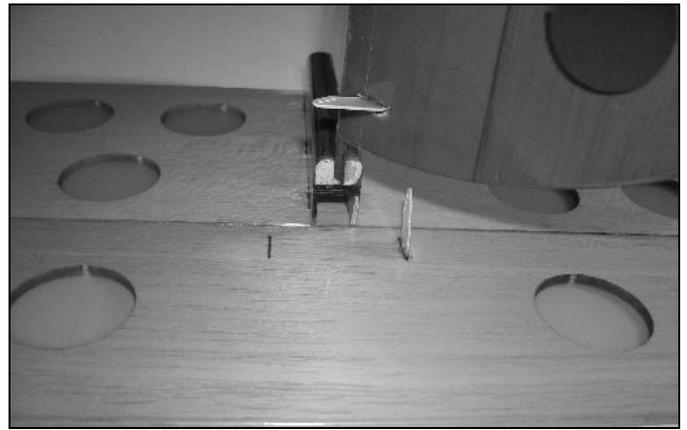
8. Flip the wing over so top is up. Cut out hole for servo in center of wing. Using a sharp hobby knife or razor, cut through the covering and score the break-a-way on both sides until the square comes out easily.
9. Install the servo, adjusting the size of the opening as needed, with a hobby knife. Drill tiny holes through servo mounts and mount the servo using servo-manufacturer provided screws.
10. Using a hobby knife or rotary tool, clean covering out of control horn slots on ailerons. Glue the control horns into the slots using thick CA glue.
11. Insert the Z-bend end of the aileron push rod into the control horn. With the servo control arm disconnected from the servo, slide the two aileron control rods into the two EZ links. Line up the ailerons so that they are in neutral position, then tighten the screws on the EZ links. Cut excess wire. **Wing is complete!**

Assembly of the Tail Section

1. Cut away covering from slots on the vertical and horizontal stabilizer for mounting the tail section mount. Line the tail section mount with the bottom edge of the vertical stabilizer and trace the edge with a marker. **It is important to note that the sloped side of the tail section mount should point forwards, towards the front of the airplane.** Cut the plastic covering just inside this area so that the balsa wood there will glue on better. Be careful not to cut into the balsa. Test-fit the two pieces. They should fit snugly.

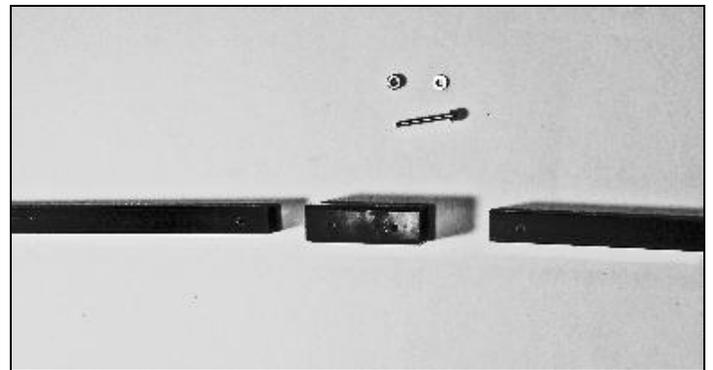


2. Attach the tail mount to the horizontal stabilizer using thin CA glue, being careful to check it is square.
3. Choose which side of the rudder and elevator you want to put the control horn on (either works fine). Insert control horn into pre-cut slots in opposite sides of rudder and elevator, using thin CA glue to secure. NOTE: GWS control horns also work in these slots.

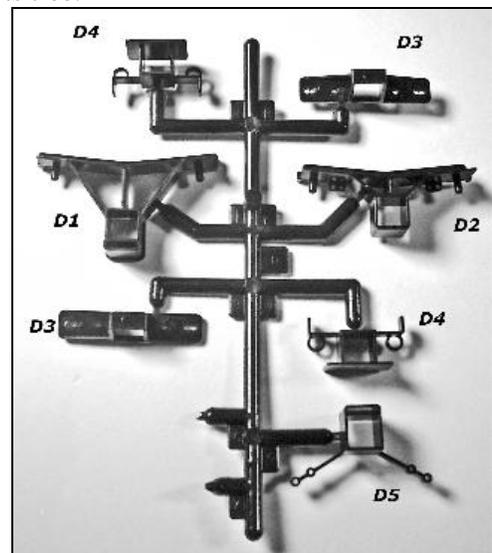


Fuselage Assembly (not included in "short kit")

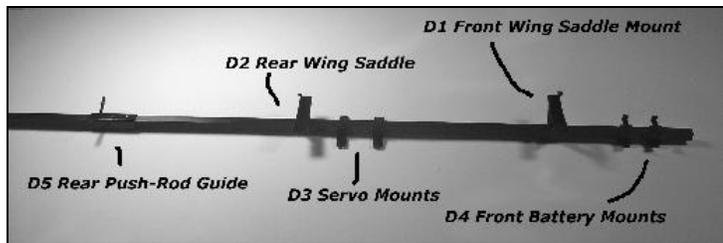
1. Use CA glue to attach fuselage joiner to one end of the shorter fuselage stick (tail end).
2. Slide one end of the longer fuselage stick into the joiner and attach with provided screw. Cut excess off end of screw and file down sharp edges. See image below:



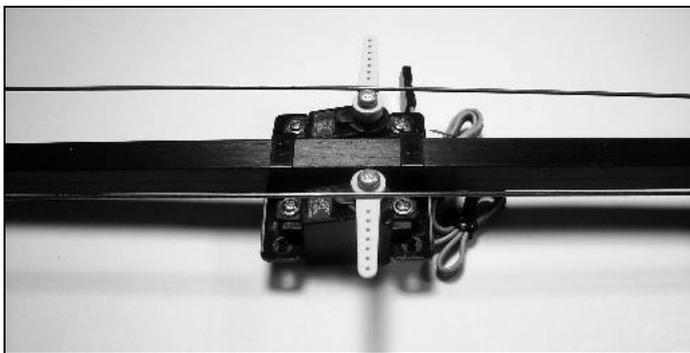
4. Use the existing GWS parts from your GWS Slow Stick™ or familiarize yourself with the GWS 'D' parts tree.



- Using a hobby knife or diagonal cutters, remove parts from black plastic tree "D". Slide part #D5 (push rod guide) onto the tail end of the fuselage. Then slide part #D2 (rear wing saddle mount) onto the front end of the fuselage, approximately 15 1/2" down the stick. DO NOT SCREW IN YET.
- Slide the two part #D3's (servo mounts) down about an inch from the rear wing saddle mount. Now slide the front wing saddle mount, part #D1 approximately 5 1/2" down from the front.
- Slide the two battery mounts, parts D4, onto the fuselage, approximately 3" and 1 1/2" from the front. DO NOT glue or screw in any of these plastic parts yet, as they are in temporary positions. See diagram below:



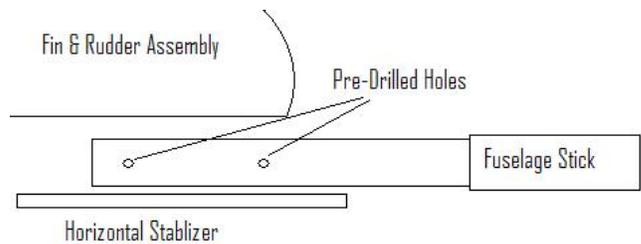
- Feed the long wire push rod through the push rod guide and through the guide holes in the rear wing saddle, so that the "Z-bend" is at the tail section. Repeat on both sides.
- Install the servos, as per servo manufacturer instructions, using servo manufacturer-provided hardware. DO NOT SCREW any of the parts in yet. See picture below:



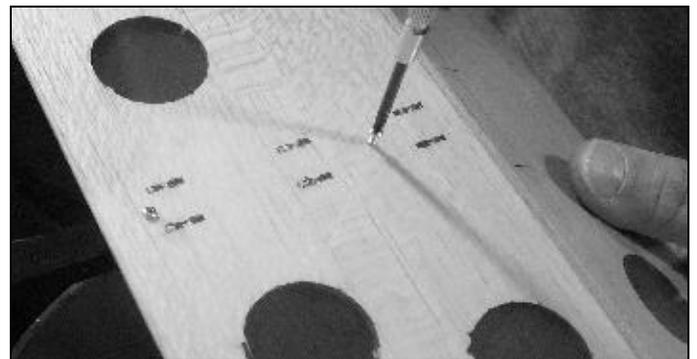
Final Assembly

- Attach the "Z-bend" end of the long control rods into the middle hole of each one of the tail section control horns. Feed the control rods through the rod guides on the fuselage and then slide the tail section on to the fuselage. See diagram below:

- NOTE! THE FUSELAGE TAIL SECTION COMES WITH HOLES PREDRILLED! ALIGN THESE HOLES AT 90° TO THE TAIL PLANE, AS THESE ARE NOT USED IN CONSTRUCTION.



- Drill two small holes on the bottom center of the horizontal stabilizer. Use the #2 3/8 screws to fasten the fuselage to the tail assembly. Holes should be about 1/2" from leading edge of the horizontal stabilizer and 1 1/4" from the trailing edge of the horizontal stabilizer. Do not damage the wood when tightening.

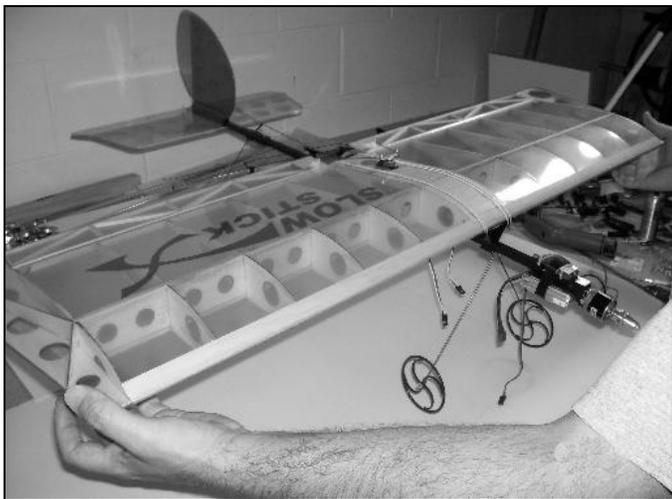


Balancing & final fuselage assembly

Balancing the aircraft: The center of gravity for this wing is the main spar. Do NOT add weight to balance the aircraft. It is important that the black plastic GWS wing mounts be movable at this point. Install all hardware, including your battery and move the wing forward or aft until the aircraft is balanced.

In order to balance this model, a 'dry' assembly of the fuselage is performed. The model is then balanced and finally secured with CA glue. Follow the steps below to balance the model and finish assembly.

1. Temporarily mount motor, radio gear, battery and other hardware as per manufacturer instructions to prepare the plane to be balanced. If using X-Gear, tape them into place temporarily. Do not mount landing gear until told to do so. (Front wing saddle needs to be movable during balancing procedure) Attach speed control to top of front battery mounts, using rubber bands.
2. Start out with the front wing saddle approximately 5 inches from the front of the fuselage stick. Attach wing to wing saddle with rubber bands. **AFTER THE WING HAS BEEN SECURED WITH BANDS, CHECK THE ALIGNMENT OF THE HORIZONTAL STABILIZER TO THE MAIN WING. THIS IS VERY IMPORTANT IN THE FINAL FLYING RESULT OF THIS AIRPLANE.**
3. Attach battery and speed control with provided Velcro strap to the front most end of the fuselage.
4. Adjust components as you attempt to balance plane without moving wing back first. Wing should be within 5 to 6" from the front of the stick. Hold plane at wing's spar to balance. Balance point can be pushed back as desired.



5. Once balanced, without moving any of the black parts, VERY CAREFULLY remove the wing.
6. Drill a small hole with a #56 drill into the rear wing saddle. Use one of the screws from the fuselage kit to permanently mount to the fuselage stick.

7. NOTE: If using X-Gear, may attach after plane is balanced, following instructions in kit. Then double-check balance.
8. Attach rudder and elevator linkage to the servos.
9. *Installing Rubber Band Post Extenders:* One minor design flaw in the original Slow Stick is that the rubber band posts are too short. Using 5/32 aluminum tubing, cut 4 3/8" long pieces. (These are included in the build kit bundle upgrade). Use thick CA glue and glue them to the existing rubber band posts of the original Slow Stick wing saddles. Make sure you do not leave sharp edges that can cut the rubber bands. I like to fill the tube with thick CA and leave a bead at the top of the tube. If you do not have a tubing cutter, you can use an Exacto knife in a rolling action to cut the tubing.
10. Re-attach wing to airplane and set control throws to maximum. NOTE: Aileron differential is built into this design.

Main Wing Decal (not included in "short kit")

1. Cut excess material from decal before removing the backing.
2. Remove the protective backing to expose the adhesive.
3. Add about 3 drops of dish soap to 2 pints of clean water. Put it in a spray bottle and spray the back of the decal.
4. Slide the decal into position and squeegee the excess water from under the decal.
5. Allow the decal to dry overnight.

First flight: Be sure all controls are set correctly. Take-off should be at half throttle with recommended power plant. Climb to a higher altitude and adjust trims as needed. When landing, be sure to land softly, as the original GWS landing gear is not extremely rigid. You should find that this aircraft has a very low stall rate and is capable of most acrobatics. Enjoy!

Enjoy Your New Millennium R/C Slow Stick X!

If you should find a part missing or damaged, or have any questions about assembly, please contact us at the address below:

Millennium R/C
12859 Lower River Blvd. Orlando, FL 32828
Phone: 407-208-9745
Fax: 866-799-2372
E-mail: Service@millenniumrc.com