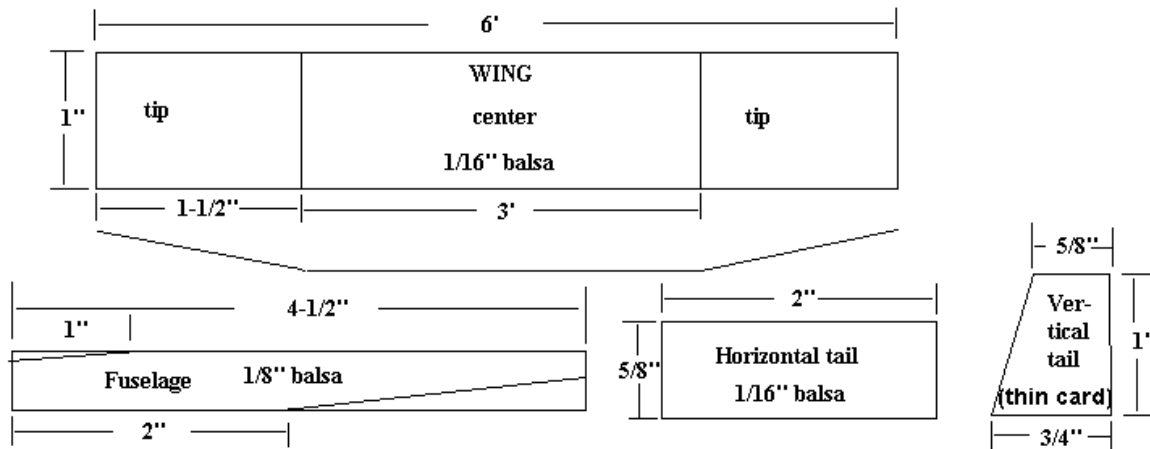


# WHIPPER WHIZ HAND-LAUNCHED GLIDER

## MATERIALS LIST and ASSEMBLY INSTRUCTIONS

The sketch below, which is not full size, shows the parts and gives the dimensions. A ruler can be used to measure where the marks are to be made.



**WING:** Make from 1/16" sheet balsa. Cut 1" x 6" strips, then into two 1-1/2" long pieces and one 3" long piece. Short pieces are the tip sections. Long piece is the center section.

Bevel the ends of the center section 10 degrees. Glue each tip section to the center section at that angle. This "tips up" is called "dihedral" and it stabilizes the glider so it tends to stay level in flight. Use a fuselage blank (see below) to prop up a tip for "dihedral". Work over waxed paper so the glue does not stick to the table or other surface you are working on.

**FUSELAGE:** Make from 1/8" x 3/8" balsa. Cut in pieces 4-1/2" long. Make marks 1" and 2" back from one end which will be the "nose" end. Call this the top side. On the bottom, make a mark 2" from the nose end. On top, taper slightly from the 1" mark toward the nose. On the bottom, mark a line from the 2" mark to 3/16" (half of the 3/8") from the bottom at the tail end. Cut or sand along that line making it flat and straight.

**HORIZONTAL TAIL:** Make from 1/16" light balsa, cutting pieces 5/8" wide and 2" long. This is called the stabilizer or stab. If it had a moving part it would be called the elevator.

**VERTICAL TAIL:** From a thin business card, etc. cut pieces 1" high, 3/4" wide at the bottom and 5/8" wide at the top. If a vertical tail has a moving part, it is called the rudder and the part that does not move is called the fin.

Glue the wing to the top of the fuselage, centered between the 1" marks. The fuselage and wing should be "squared-up" to each other. Viewed from the front end or the top, the assembly should look similar to the letter "T", with the fuselage hanging straight down from the wing.

**Glue the horizontal tail, “squared-up” to the fuselage at its rear end on the bottom. Note the wing is level on top of the fuselage, but the horizontal tail points down in front. This difference in the angle of the two is called “decalage”. Real airplanes have it, too.**

**Glue the vertical tail to one side of the fuselage and against the horizontal tail, so 1/3 or so of it sticks out behind the end of the fuselage. The part that sticks out can be bent to act like a rudder and if done carefully can “trim” the glider to turn right or left or go straight.**

**BALANCING FOR FLIGHT: All airplanes have to be balanced to fly properly. In the case of the Whipper Whiz, it means some weight has to be added to the nose area of the fuselage. You can use a little modeling clay or putty or ask your dentist for some of the lead foil covers from the little X-ray films he uses. One of these folded and wrapped around the nose will come close to properly balancing the glider.**

**If it tends to always dive when tossed, take a little weight off. If it stalls, meaning it swoops up too much and then suddenly dives, add a little. Experiment with different amounts.**

**SMOOTHING UP THE EDGES: An emory board used to smooth fingernails can be used to round off square edges and “streamline” your glider so it moves better through the air. It will go faster, farther and stay up longer. Especially, round off the flat front of the wing and horizontal tail. Wing and tail square corners can be rounded off, too. You can also round off the corners of the fuselage between the wing and tail.**

**FLYING: At first, just gently toss your glider straight forward where it can land on something soft, like grass. Do not point it up, but level or slightly downward. If it wants to turn too much one way and dives in, bend the rudder a little the other way. This is called “trimming” the glider. The secret to good flights is proper balance and trim and learning how to throw it.**

**If you throw right handed, try to trim and balance it to make gentle left turns without diving into the ground. When you get this set, tilt or bank the wing to the right and throw it a bit up and harder. Ideally, it will climb a turn or two to the right until it slows down and the wing goes level. It would then finish the flight with gentle left turns. Do it the other way if you throw left-handed. Experiment with different trim, balance and throwing styles to learn what it can do. If you trim for straight flight and throw it hard, straight and level into the wind, it can do a loop.**

**COMPETITION: Practice to learn how to throw the glider for best flights. Have your friends join in and see who can make the glider stay up the longest and travel the farthest. If you all throw at once, it is easy to see whose glider lands last. If someone has a stopwatch, you can use it to get the time from launch until it lands. To see whose glider goes the farthest, you can count the # of steps it takes to get from where it was tossed to where it landed. You will get the best times over warm areas, like bare ground in the sun, that cause rising air or “thermals”. If in a thermal, your glider will stay up longer and may even go higher than you tossed it. You will get the longest distances by trimming for straight flight and throwing hard with the wind at your back. You might want to give each person several chances when competing.**