

The DennyDart MarkII



The DennyDart MarkII is a balsa stick & tissue model airplane that is suitable for 12 yr olds and up. It is an easy to build and fly rubber powered model that can be flown either indoor (school gym) or outdoors in calm conditions. It will fly many hundreds of feet so a large open space is needed. As a razor blade is needed, adult supervision is recommended.

Instructions	
Tools required	Materials
Razor blade (single edge) or model knife	1/16 in. x 1/8. in by 36 in. balsa strip (3)
Several straight pins	A plastic propeller (7 in) and plastic bushing
Wood glue (Duco or household cement recommended)	1/8 in. x 1/8. in by 36 in. balsa strip (or a 1/8" x 3/8" x 12" piece of balsa)
A glue stick to assemble sticks to paper	8 to 10 inch loop of 3/32 or 1/8 inch wide rubber band
flat surface to work on that can be pinned	small rubber bands (orthodontic) Note: masking tape may be used
A small piece of fine sandpaper	Copy of plan printed on light paper

The paper of the plan sheet may shrink in hot weather and warp the wing (which is bad) so I suggest that you wad it up into a tight ball, then flatten it out and smooth it with a clothes iron set to "cotton", this will break the paper fibers and make it a little stretchy so it won't warp. Carefully cut the two parts of the wing plan from the sheet, trim off the excess at the wing center, leave about 1/4 inch overlap and glue together being careful to keep the front and back spar (stick) lines straight in line. Place the plan sheet pieces, both for the wings and also for the fin and stabilizer on the building board so that the lettering is on the under side.

Carefully lay out and cut the 1/16 x 1/8 sticks so they will fit between the lines on the edges of the wing and tail outlines. Starting with the longest sticks on the wing, lay a stick on a flat surface, carefully wipe the glue stick from the middle outward each way on the side that will be glued to the paper, then put it in place and smooth it down with your fingertip. If you don't have a glue stick, carefully wipe a very thin layer of glue on the stick with your fingertip. The best way I've found to make the stick to stick glue joints is to put several drops of the wood glue on an old plastic bottle top, then dip the end of the stick that is to be glued into the puddle. Carefully place the glued end against the other stick - do not leave any gaps. NOTE: do not glue the dihedral break points (marked x & y) at this time.

After all sticks are glued in place. let things set up (dry) for a bit, then using the razor blade very carefully, cut around the outside of each part of the wings and tail to free them from the plan.

To build the motorstick, cut one each 12, 10 1/2 and 9 in. piece from the 1/8 sq stick. The leftover 5 in. will be used to mount the wings later. Wipe a light coat of wood glue on one side of the 10 in. strip and assemble it to the 12 in. piece being careful to keep one end even, smooth the two together so they make good contact all the way. Do the same thing with the 9 in. stick. Let this assembly dry thoroughly. Cut the taper on this stick as shown on the plan starting at 5 in. from the end to the lower edge of the 1/8 sq stick at the end, be careful to keep the cut square, at 90 degrees from the side of the glued up motor stick. This taper (angle) is very important to the models flying ability, it causes the stabilizer (tail) to be a negative angle to the wing (this is called decalage and is needed to make the model stable in flight.

To finish the wing lay the center section upside down on something 1 1/2 inches thick, pin the wingtips down so that the tip is 1 1/2 inches below the center section and carefully glue the "X" and "Y" (4) joints - Let this joint dry. Put a drop of glue on the wing spars at the arrowhead marks and place the 5 inch piece of 1/8 square so that equal lengths stick out each edge of the wing. When dry remove the pins, take up the wing assembly and carefully sand a taper on each end of the 1/8 square so that it comes to a sharp point. Note: when assembled, the left wing is longer.

To assemble the tail, put the stabilizer paper down (sticks up) on the board, put some glue on the middle strip and carefully put the tapered part of the motor stick down making sure that it contacts both front and rear of stab. Use something square, like a small clamp to hold the motor stick at 90 degrees to the stab and at the correct angle (the nose end will be up off the table about 1/2 in, then glue the rudder to the top of the stick, making sure that it is square and straight.

Carefully sand the front of the motor stick until it is a snug fit inside the plastic propeller bearing, push a straight pin into the bottom of the motor stick just in front of the stabilizer (rear motor hook). Put a drop of glue around this pin to strengthen the balsa, you may want to put a few wraps of thread around the stick there also. Assemble the propeller, Carefully tie a square knot at the ends of the rubber strip (wet it with saliva before pulling tight) and hook motor between hooks and find balance point by resting stick on side of pencil and moving it back and forth until you find where it stays level. Mark an x on the motor stick at this point..

To assemble the model, take off the propeller ass'y, put the two small rubber bands on the stick, one just ahead of the rear peg, one just behind the propeller bushing. I recommend that each band be put on with a double loop, this will hold the wing more solidly. Place the wing mounting stick (1/8 sq) flat on the top of the motor stick with the cg letters (on the wing) in line with the x and slide the bands over the ends of the stick to hold the wing in place. (You can use a bit of masking tape here if bands are not available) Looking from the front, the wing and stabilizer should be parallel, if not, carefully sand the bottom of the wing mounting stick until they are.

Hook up the rubber band, lubricate it first with a little baby oil or silicon lube, the model is ready to fly. Wind the propeller (clockwise from front) about 50 turns, hold the model at shoulder height and level, let go of prop and give a gentle push as you let go. The model should fly in a slight right turn and at a smooth angle. If it swoops up and then drops, move the wing back a little (only about 1/8), if it dives down move the wing forward the same amount. When it is flying smooth and level, keep increasing the turns wound in, you should be able to get up to 800 safely without breaking the rubber. By removing the plastic nose piece from the stick and stretching the rubber to about 3 times its normal length as it is wound, you can put in more turns safely.

As you put in more turns, if the model stands on its tail at first, carefully twist the plastic bushing so the propeller points slightly to the right, this will make the model climb in a right hand spiral. If the circle is too large, put a tiny bit of clay on the right wing tip. If you do this you will have to move the wing forward a little to correct for the extra turn causing the model to nose down.

Enjoy your model, if you want to build bigger and better models, many kits are available, but take a word of advice, do not try to build a scale model of a real airplane for your second try. Look for a beginners stick and tissue design.