Sonic Mini Monocopter

Simple SONIC PROJECT

About this project:

The Sonic Mini Monocopter is the first in a series of flying monocopters made from easy to find materials. This project is designed to be thrown in the air by hand; then it gently returns to the ground as it auto-rotates like a maple seed. This project includes graphics for five different monocopter designs appealing to boys and girls. Although fun for all ages, younger children may require help hand-launching their monocopters.

Throw this little monocopter in the air and watch it auto-rotate on its way back to Earth . . . super cool!
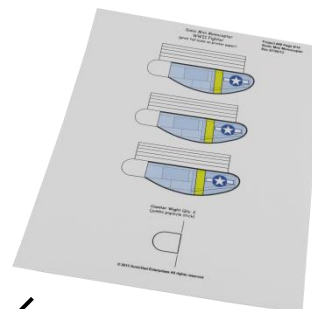
Rev:1/25/14
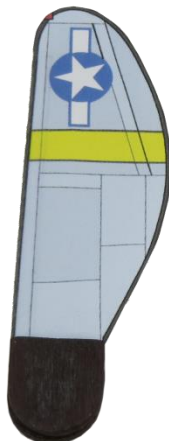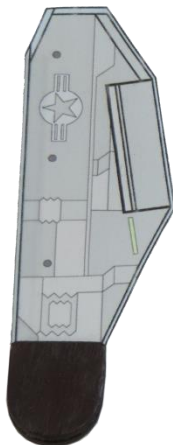
What's it made of?

The Sonic Mini Monocopter wing is made from printer paper, clear tape, and jumbo popsicle stick pieces for the counter weight.
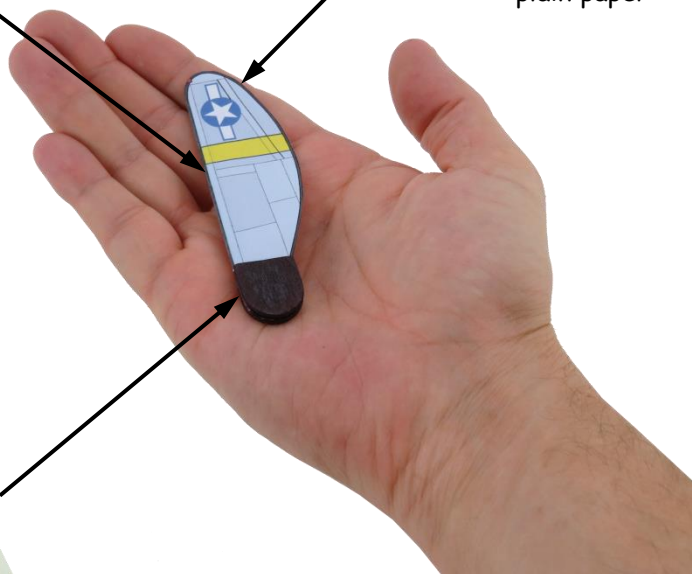
Clear tape

Graphics printed on plain paper

Jumbo craft popsicle sticks

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Project Construction

DIFFICULTY `LEVEL 2` **APPROX TIME** `0.5 HRS` **APPROX COST** `$3.00`

Check out my way cool Sonic Dad gauges for project difficulty, time, and cost. Cost of this project depends on how many items you have on hand. If you purchase all items new, cost will be higher than the approximate cost shown.

SHOPPING LIST

| Quantity	Item needed	Where to find it	See Figure
1 pkg	Jumbo popsicle sticks	Wal-Mart, craft store	Page 2, I, J
1 roll	½" wide clear tape	Wal-Mart, office supply store	Page 2, F, G
As required	Regular printer paper for printing graphics	Wal-Mart, office supply store	Page 2, A, B

SUPPLIES AND TOOLS NEEDED

Item needed	Where to find it
Sharp scissors	Discount retail store, home improvement store
High temp hot glue gun	Discount retail store, home improvement store, craft store
Metal ruler or straight edge	Discount retail store, home improvement store, craft store
150 grit sandpaper	Discount retail store, home improvement store
Heavy duty shears (for cutting popsicle sticks)	Discount retail store, home improvement store
(Optional) black marker	Discount retail store, home improvement store

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Step 1

Choose which one of the five monocopter designs you would like to make from pages 11 through 15. Print the graphic page full-scale on regular printer paper. Use a sharp pair of scissors to roughly cut around one of the three monocopter graphics on the page. Then, carefully cut out the graphic exactly on the cut lines as shown. (fig. A)

Cut out graphic on cut lines

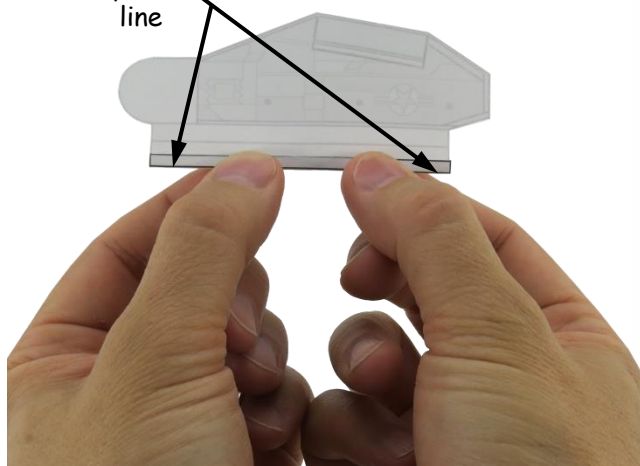**fig. A**

Crease exactly on first fold line
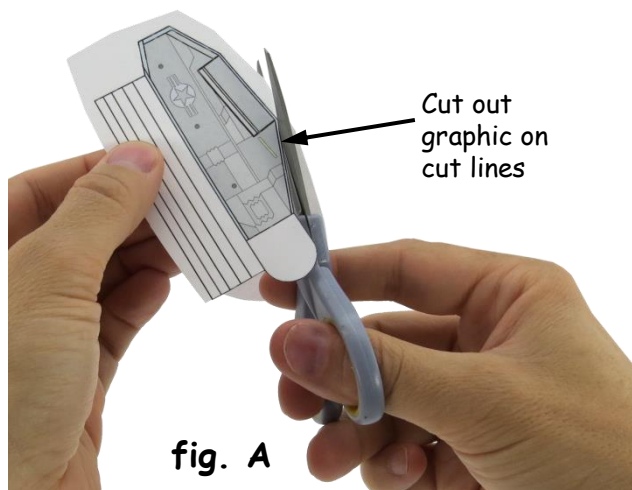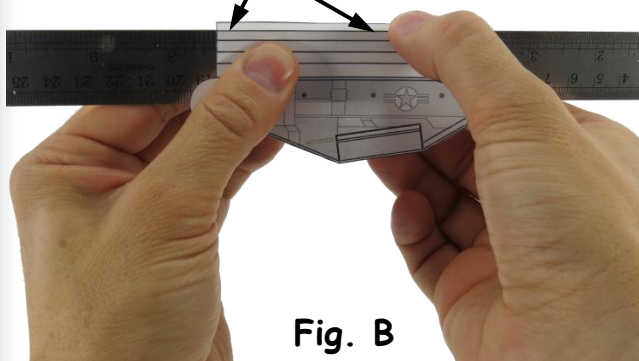
Fig. B

Step 2

Use a metal ruler or straight edge to crease the graphic on the first fold line as shown. Be sure to make the crease exactly on the fold line. (fig. B)

Step 3

Turn the graphic over and make the first fold as shown. Be sure the fold is located exactly on the fold line. Use your fingernails to pinch the fold down tightly all the way along. (fig. C)

Fold over exactly on line

Fig. C

Fold exactly on each line

Fig. D

Step 4

Make each successive fold exactly on the fold line, pinching the folds tightly as before. (fig. D)

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Step 5

Make the final fold as shown. Pinch the fold down tightly all the way along. (fig. E)

Fig. E

Make final fold on line and pinch tightly

Taping the leading edge of the wing down can be a bit tricky, but I know you can do it! Just get it lined up like I show in fig. G. Be carfule not to stretch the tape when you put it on because it will warp the wing. Wing warppage . . . bummer!
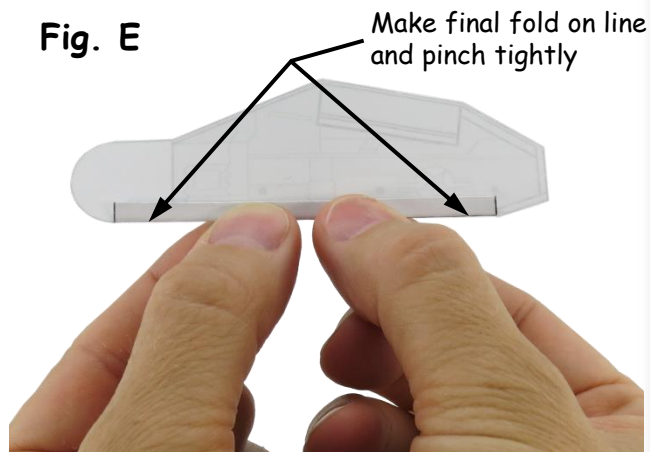
Step 6

Lay your monocopter wing on a clean work surface with the printed side down. Cut a piece of 1/2" wide clear tape the length of the folded leading edge of the wing. Carefully apply the tape over the folded leading edge to secure it down to the wing. (fig. F) Apply the tape with about 3/16" extending below the leading edge as shown. Be careful not to stretch the tape as you apply it, as this will cause the wing to warp. (fig. G)

Tape down leading edge

fig. F

Apply tape in this location

Tape should extend below wing edge 3/16"

fig. G

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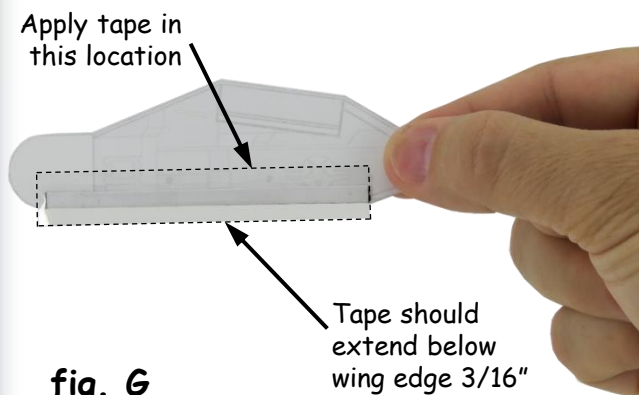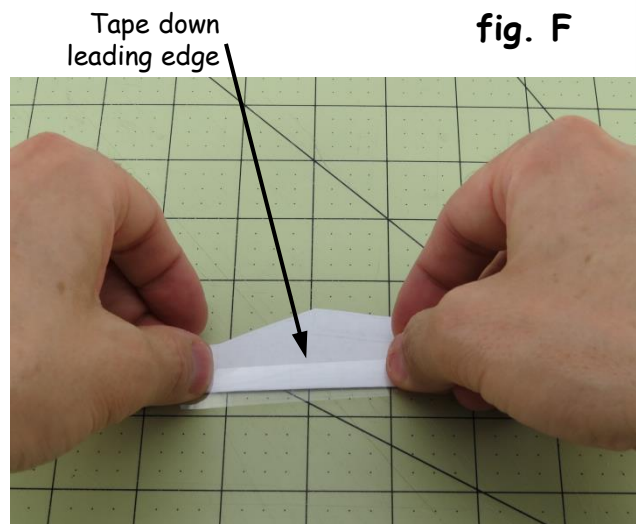
Step 7

Lay the wing with the non-printed side up. Carefully roll the wing upright then over to evenly apply the tape around the leading edge and onto the printed side of the wing. (fig. H)
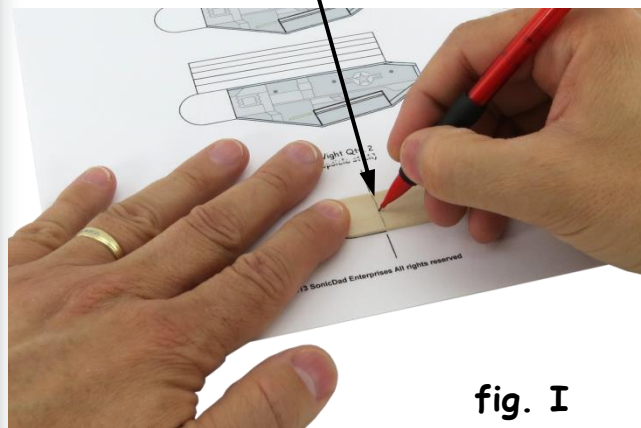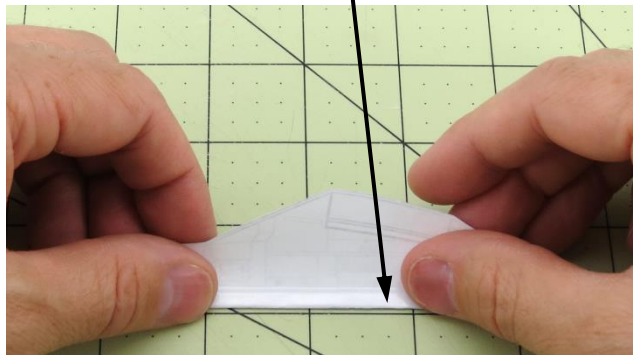
Carefully roll the wing over the edge to apply tape

fig. H

Use cutting template to mark popsicle stick

fig. I

Step 8

Lay a jumbo popsicle stick on top of the cutting template. Mark a cut line for two counter weight pieces. (fig. I)

Step 9

Use heavy duty shears to cut the popsicle stick on the marked cut lines. Cut two counter weight pieces. (fig. J)

Cut on marked line

fig. J

Sand cut edges smooth
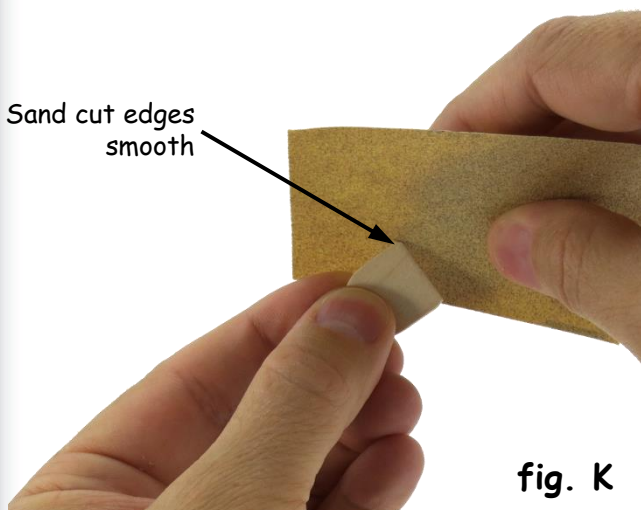
fig. K
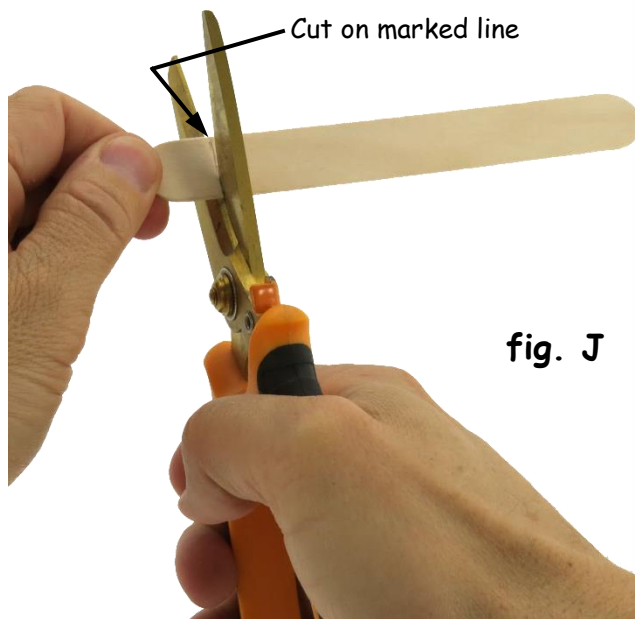
Step 10

Use 150 grit sandpaper to sand the cut edges smooth. (fig. K)

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Step 11

Optional: To improve the appearance of your monocopter, mark the edges of both counter weight pieces with a black permanent marker as shown. The sides of the counter weights will be marked in another step. (fig. L)

Mark the edges of both counter weights

fig. L

Marking the edges and sides of your counter weights is optional, but I think it makes the monocopter look much better. If you are going to build it, why not make it look as good as you can, right?
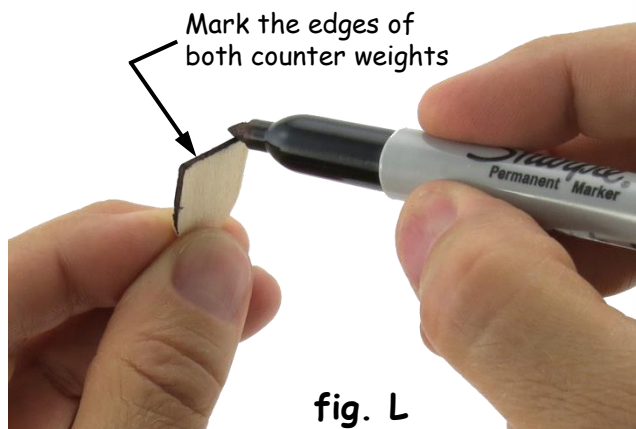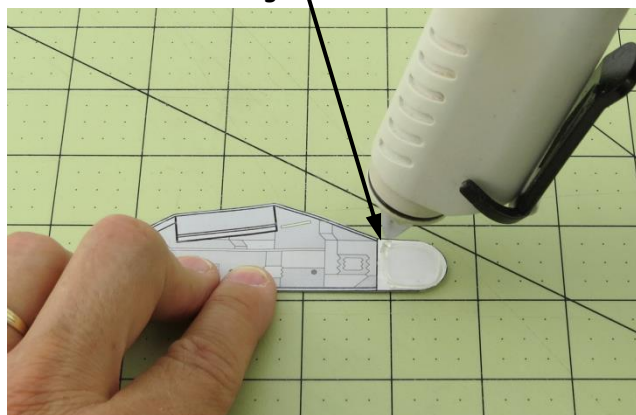
Step 12

Apply a thin bead of high temp hot glue around the inside of the counter weight location lines as shown. Be sure to only apply a thin bead of glue to avoid adding too much weight. (fig. M)

Apply thin bead of glue around inside edge

fig. M

Attach counterweight

fig. N
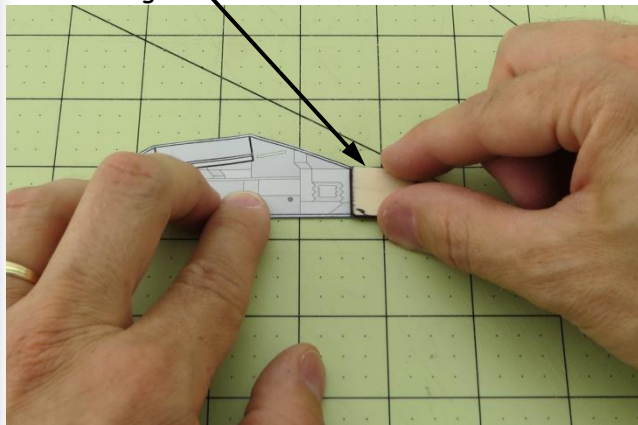
Step 13

Working quickly while the glue is still hot, attach one of the counter weights to the wing. Align the counter weight with the outside of the graphic as shown. Attach the second counter weight to the opposite side. (fig. N)

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Step 14

Mark the outside surfaces of both counterweights with a black permanent marker as shown. (fig. O)

Color with marker on both sides

Touch-up edge with marker
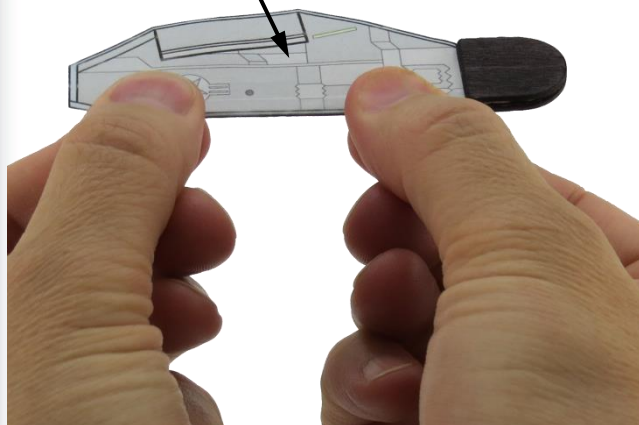
fig. P

fig. O
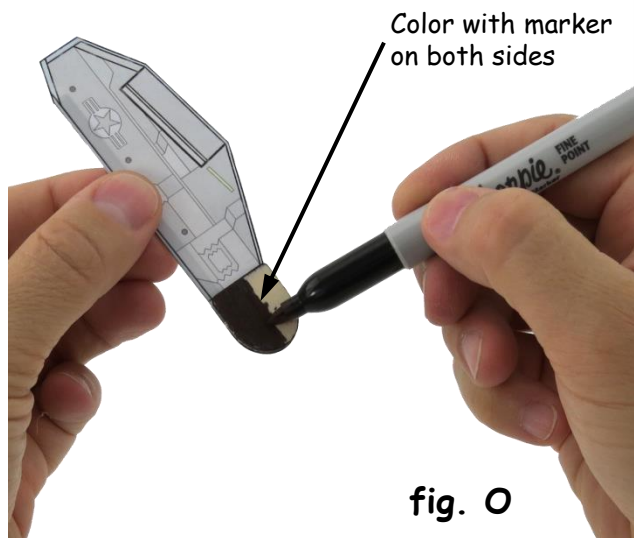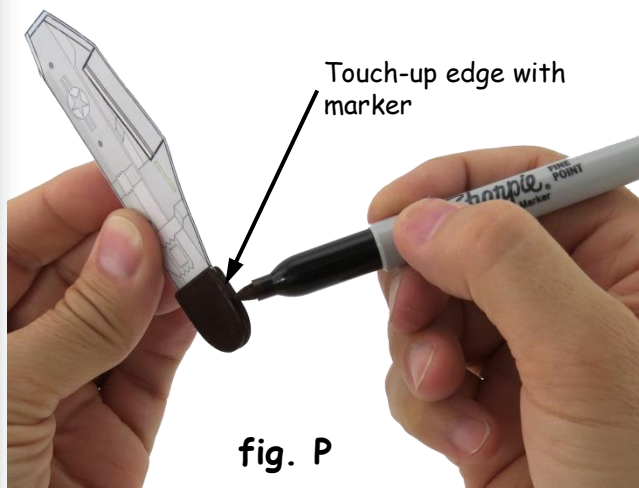
Step 15

Touch-up the edges of the counter weights as shown. (fig. P)

Step 16

Check the flatness of your monocopter wing. Use your finger to straighten it if necessary. (fig. Q)

Straighten wing if necessary

fig. Q

Congratulations!
Your Mini Monocopter
is finished

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Flying Your Sonic Mini Monocopter

Holding Method 1: If you are launching in a room with high ceilings or outside, then use this method. Hold your monocopter like this with the leading edge of the wing up, and the counter weight pointing down. I will show you how to throw it on the next page.

Holding Method 2: If you are launching in a room with low ceilings, then use this method. Hold your monocopter like this with the trailing edge of the wing up, and the counter weight pointing down. I will show you how to throw it on the next page.

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Launching: To launch your monocopter, just rotate you wrist upward as you move your arm in an upward throwing motion. The idea is to throw the monocopter up in the air with the counter weight at the top like this. Holding method 1 will give you the highest flight before the monocopter begins to auto-rotate and descend back to the ground.

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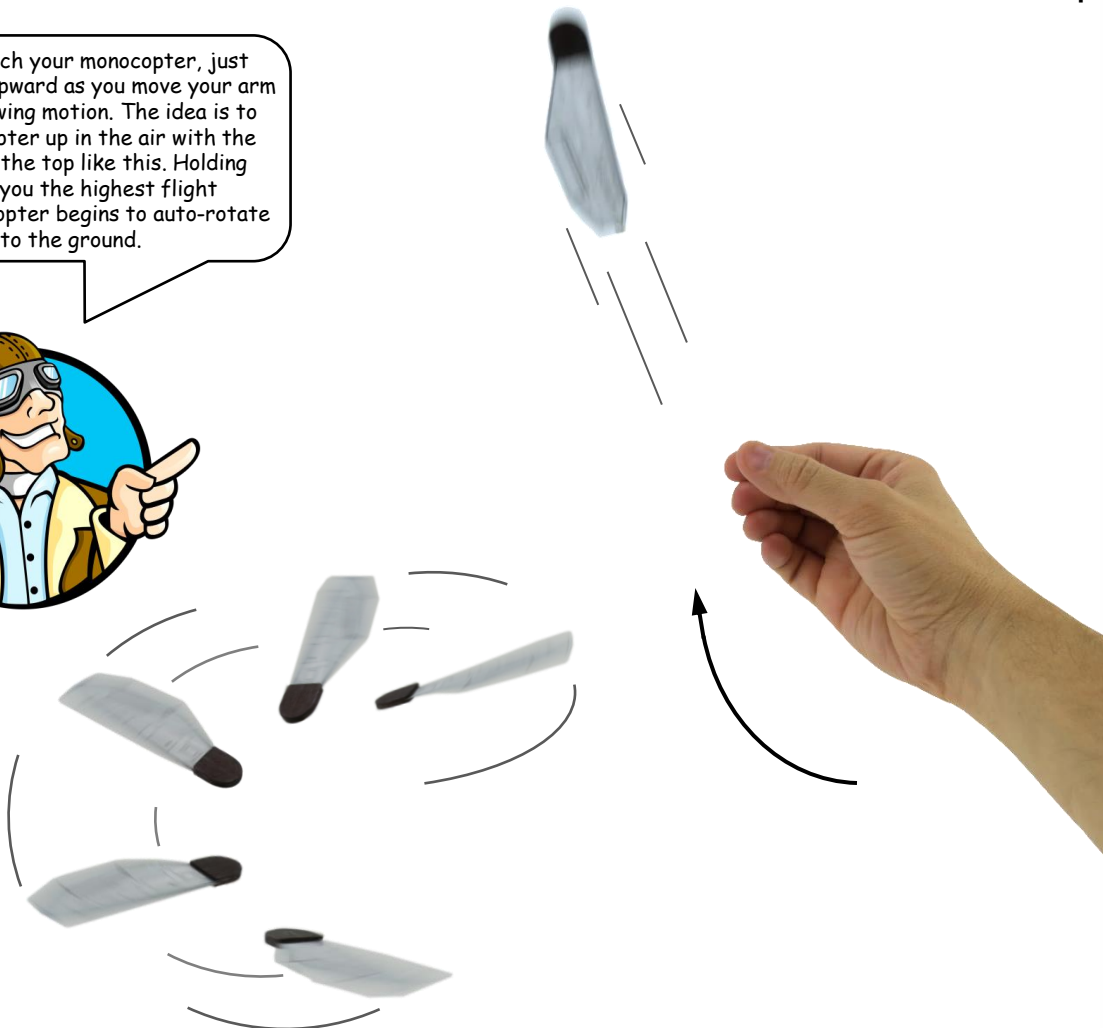
Try this: Once you get the hang of throwing your monocopter from the ground, try flying from an elevated surface. You can get even longer flights when you throw your monocopter using the same technique as you use on the ground, but standing at a second story railing or from a tree house or some other safe elevated surface. See what fun monocopter launching zones you can come up with . . . Cool!

Sonic Mini Monocopter
Stealth
(print full scale on printer paper)
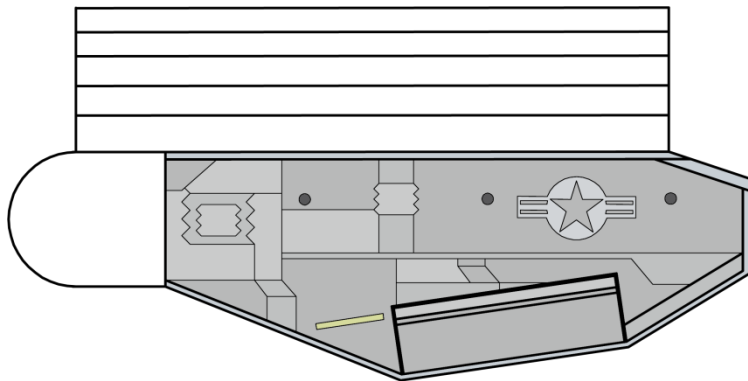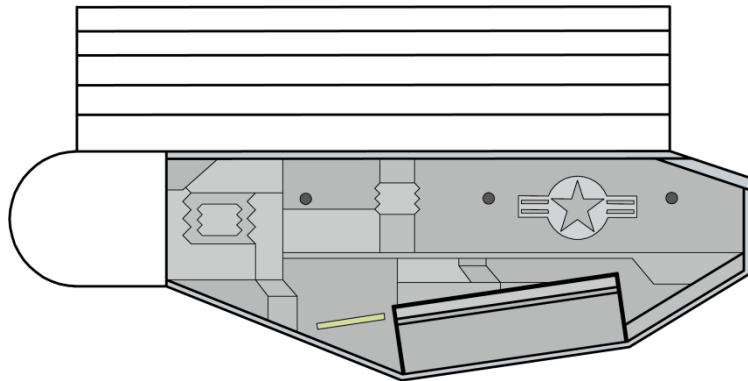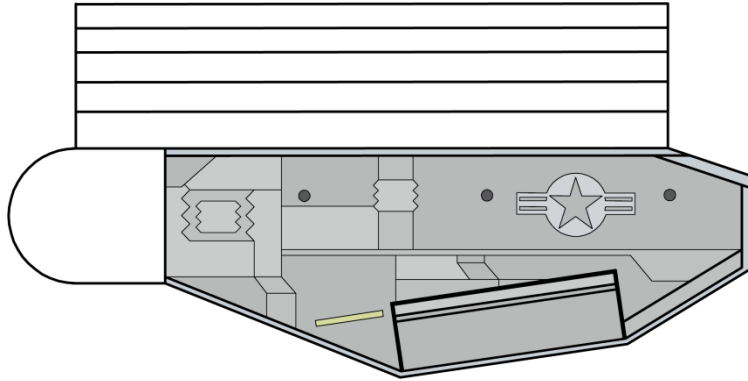
Counter Weight Qty. 2
(jumbo popsicle stick)
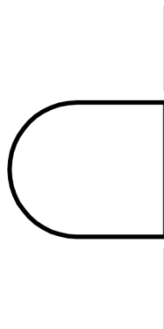
Sonic Mini Monocopter
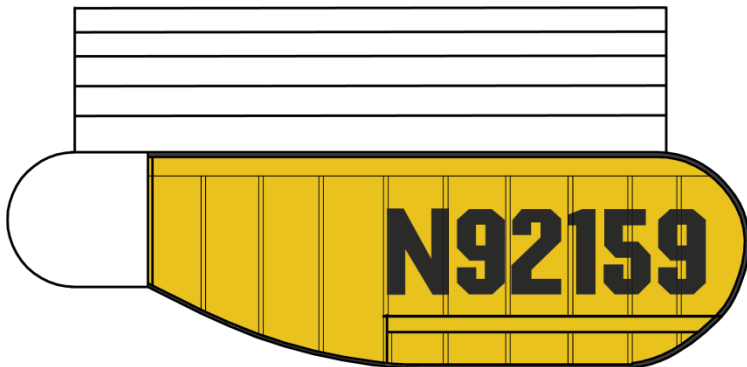## WWII Fighter
(print full scale on printer paper)
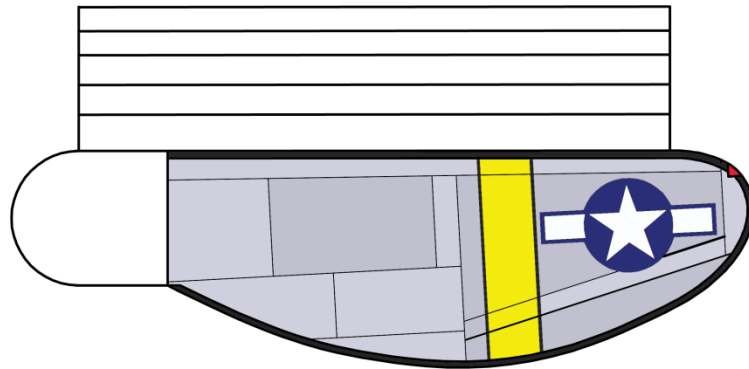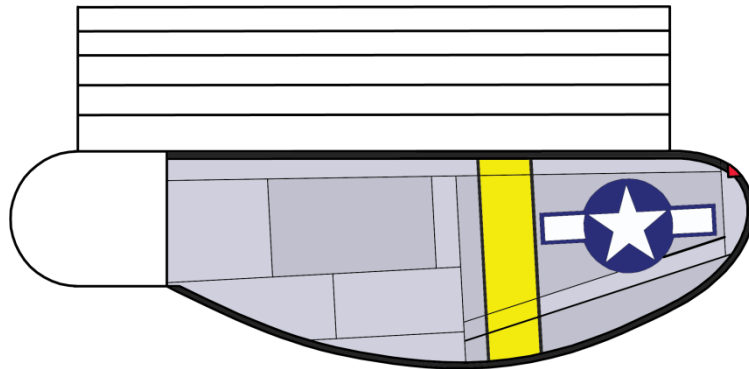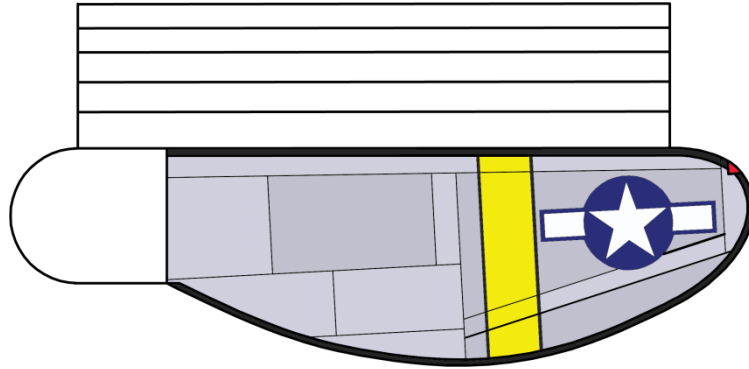
Counter Weight Qty. 2
(jumbo popsicle stick)
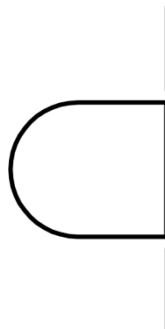
Sonic Mini Monocopter
Cub
(print full scale on printer paper)
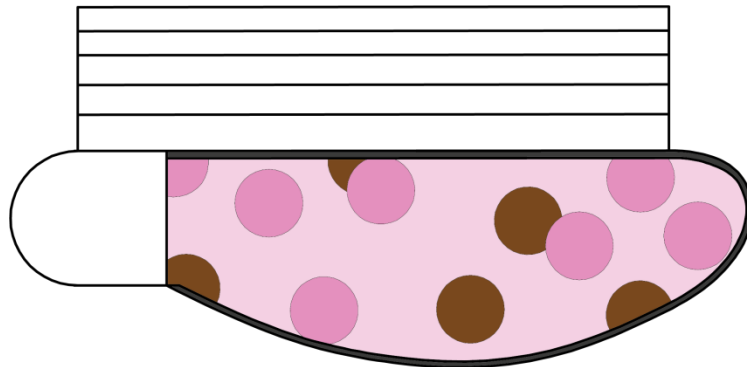
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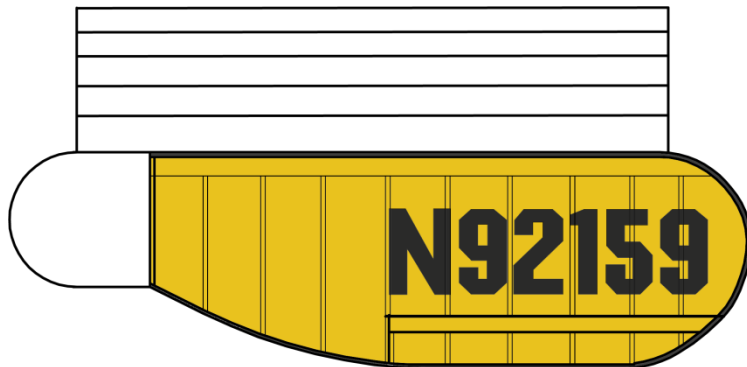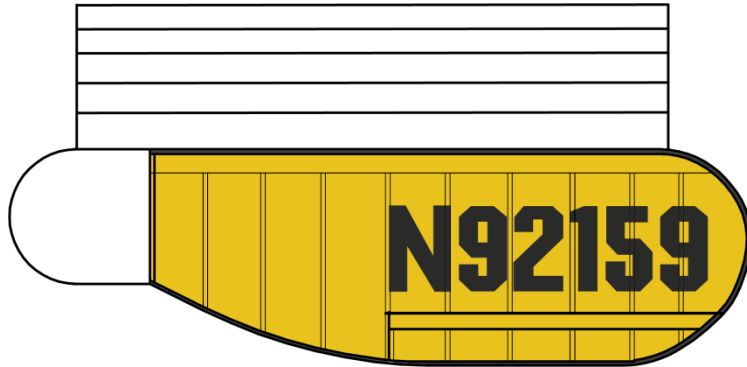
Counter Wight Qty. 2
(jumbo popsicle stick)
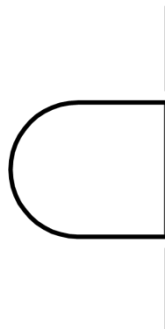
Sonic Mini Monocopter
Polka-Dot
(print full scale on printer paper)
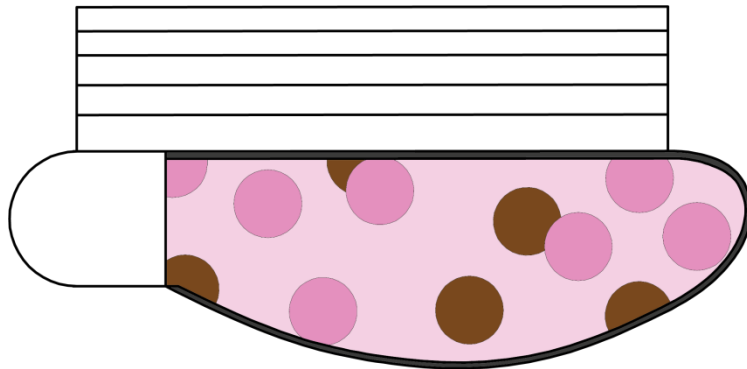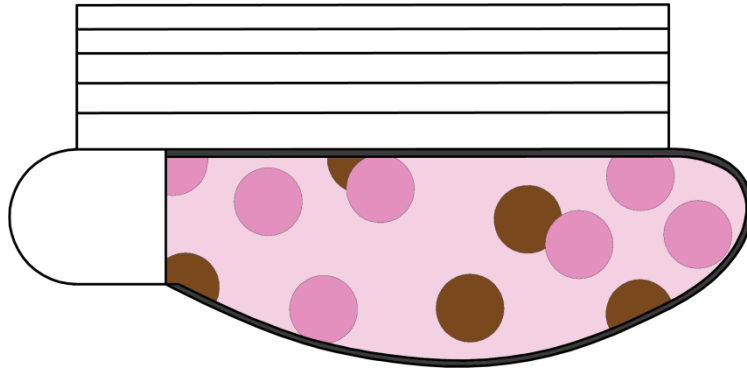
Counter Wight Qty. 2
(jumbo popsicle stick)
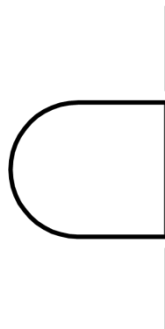
Sonic Mini Monocopter
Daisy
(print full scale on printer paper)

Counter Wight Qty. 2
(jumbo popsicle stick)