

Ingenuity (Mars Helicopter)
¼ Scale Paper Model Instructions

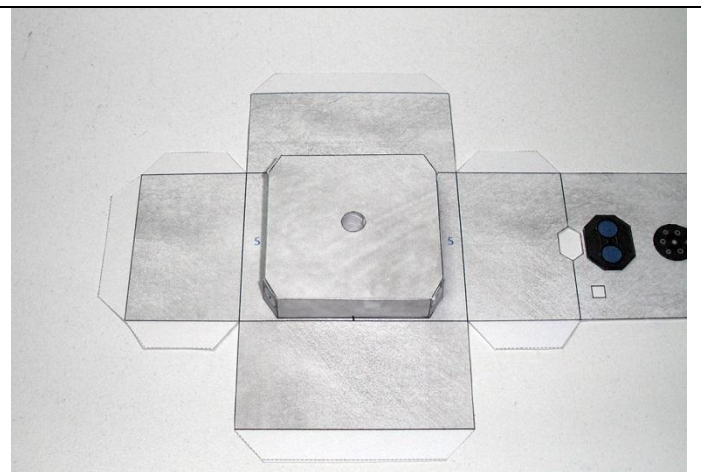
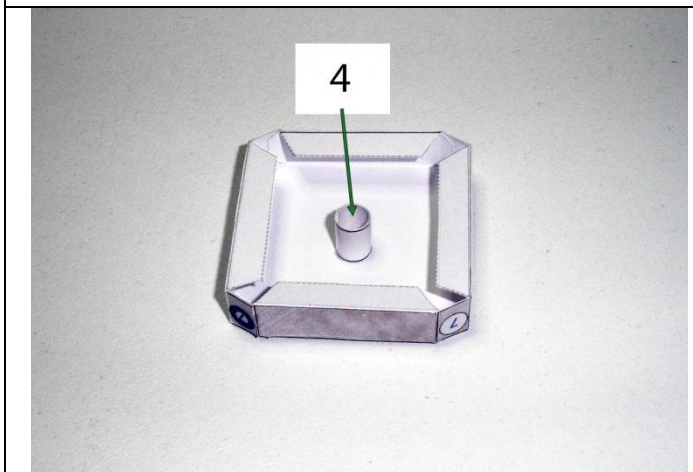
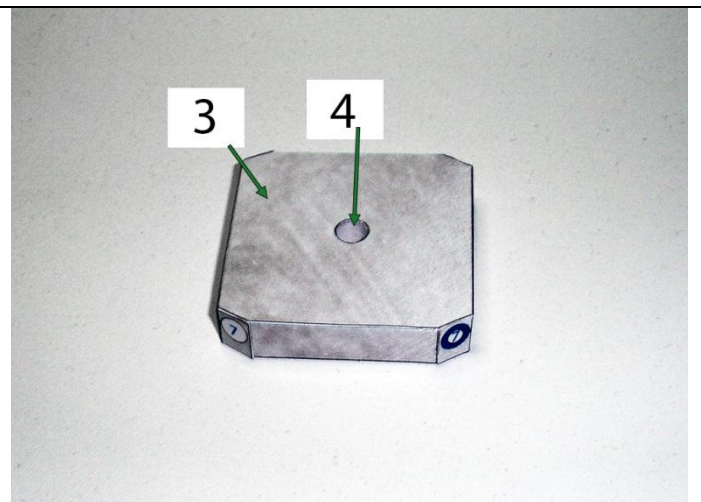
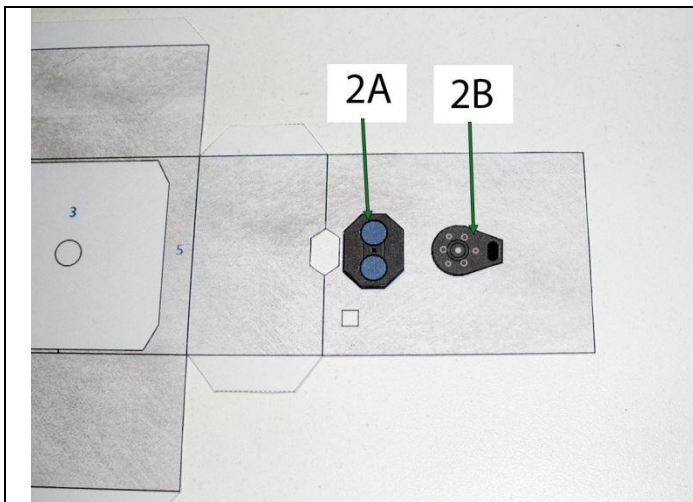
Zach's



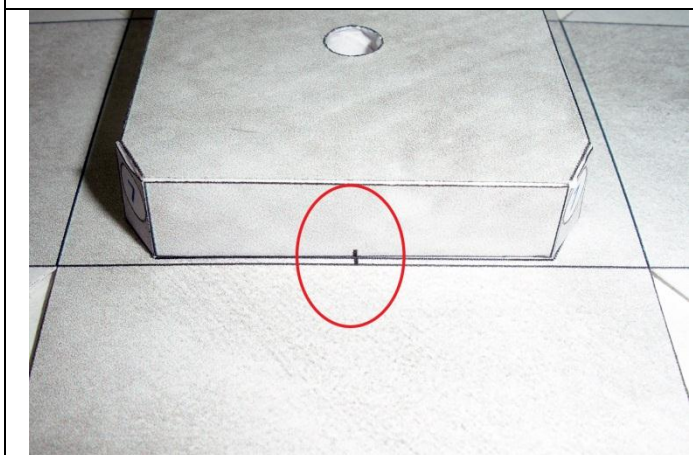
PaperSat Designs
Spacecraft Paper Models



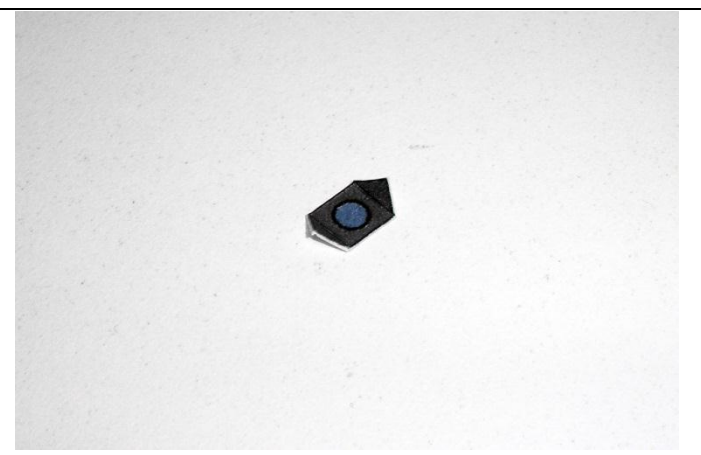
Model with rotors that you can rotate.



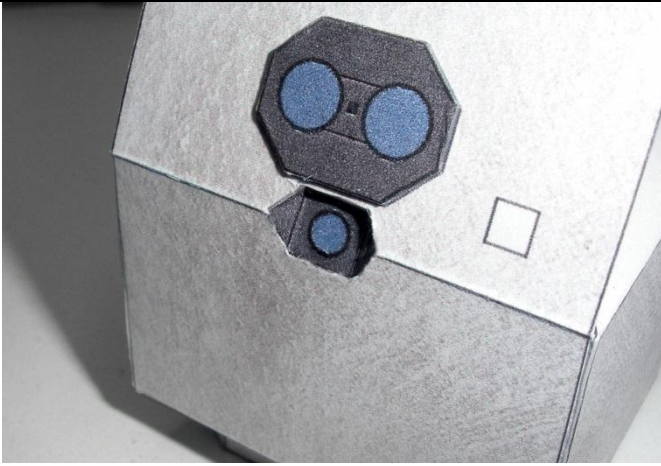
Add glue to the glue tabs on 3 and glue onto the circle on part 1 and glue part 3 as shown.



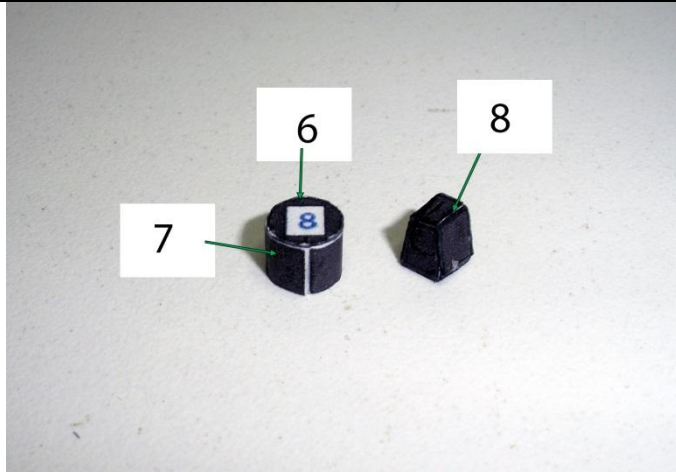
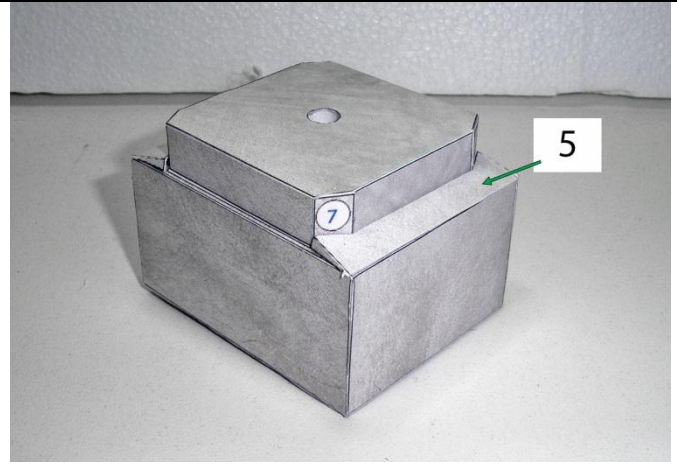
Match to two markers.



Part 2



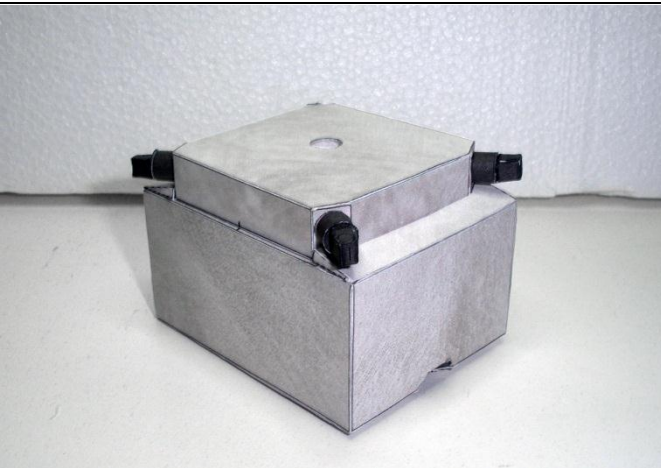
Glue from the inside, then close into a box.



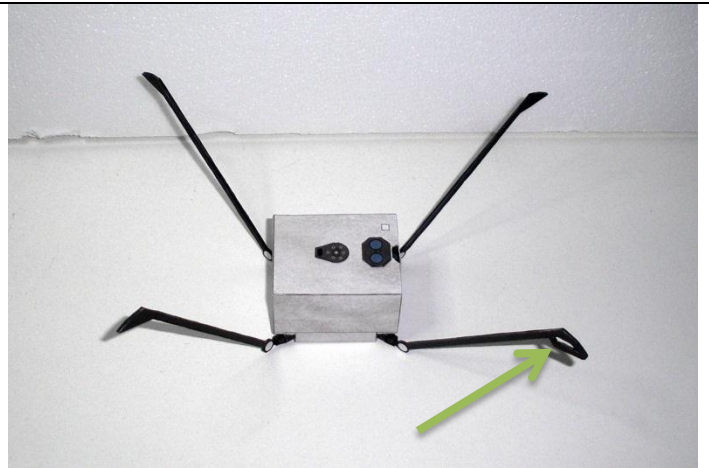
Match marker on 6 to the seem on 7.



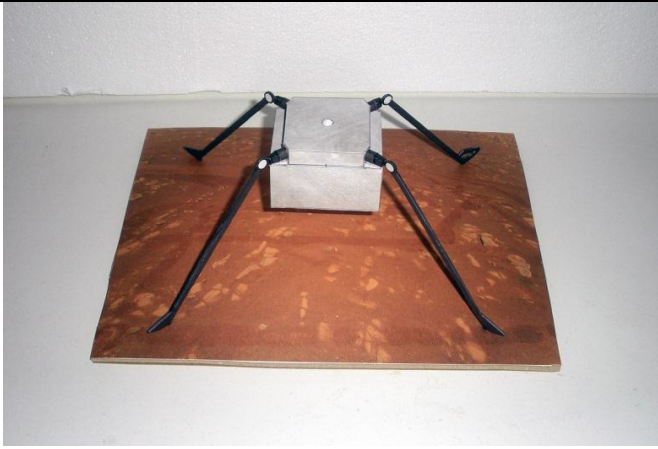
Match marker on 8 to the marker on 6.
Make four of these.



Glue onto the circles marked "7".
Important: Glue parts 6 -8 with the blue line onto the blue circle.

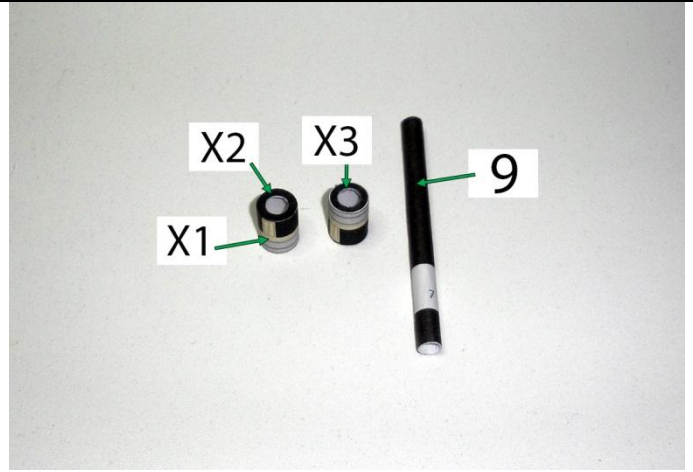


Glue the legs (Part 11) onto the lines on parts 8.
Important: Glue the leg with the open loop (Part 10-green Arrow) onto the leg support with the blue line.



Glue the photo from page 8 to thick cardboard or foamboard.
Glue the legs onto the four dots as shown. This is needed so that the model can stand up without collapsing.

Special note: The photo is the actual photo of the surface of Mars taken by Ingenuity during its first historic flight.



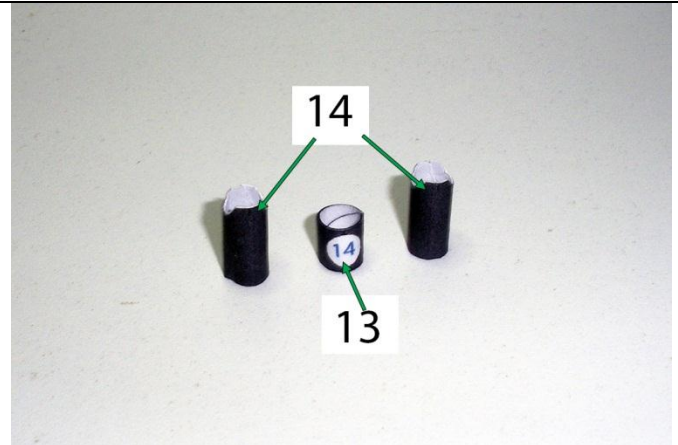
After rolling 9 to a tube, roll some cardstock and insert it into part 9 to give much needed strength.

Test fit part 9 into the hole at top of the body, should have a tight fit.

The formers (Parts X3) fits inside bottom (grey area) on parts X1. X2 is glued on the other end of X1.



Slide and glue onto the white area on 9 labeled "X1" with the grey area towards the bottom.



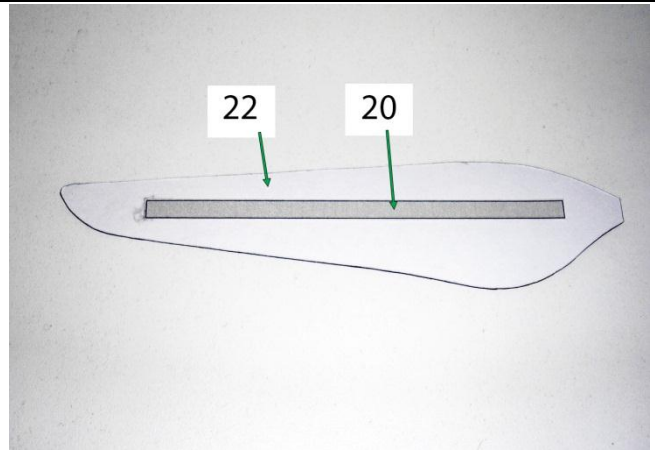
Make two of these



Make sure they are straight

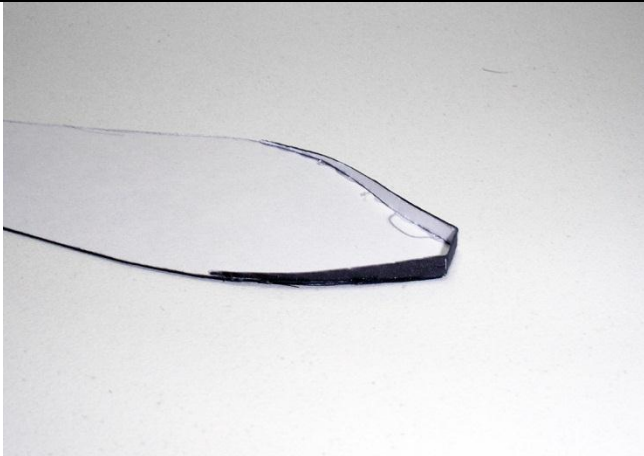


Add some glue inside where 14 attaches to 13 to add strength to hold the rotors in place.

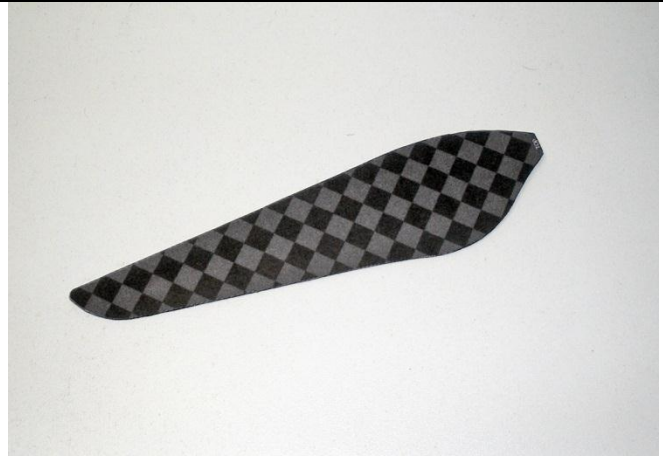


Bottom Rotors...

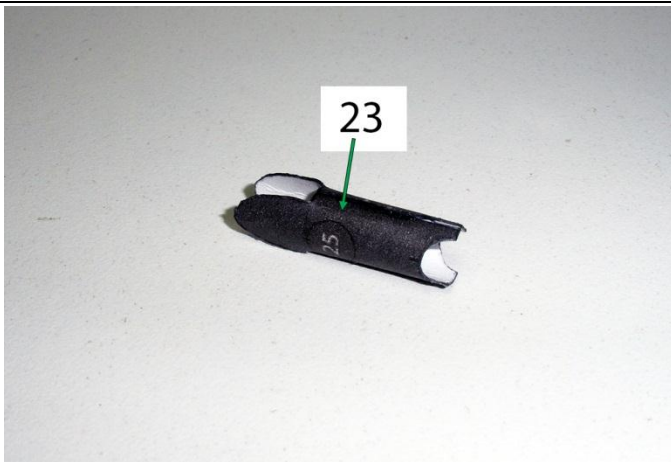
Super glue is recommended because it dries stiffer than other glues.



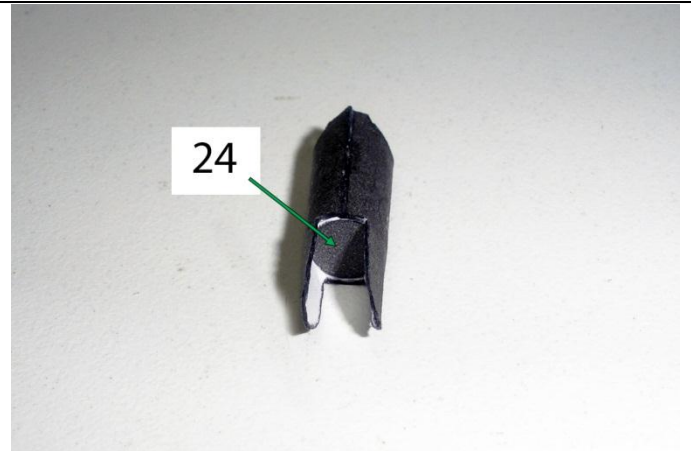
Part 21 – Glue the long tabs along the inside edge of part 21 as shown.



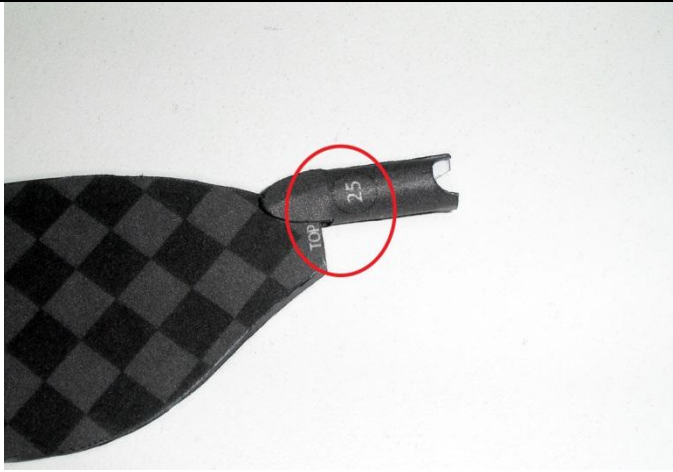
Glue 22 to the other side.



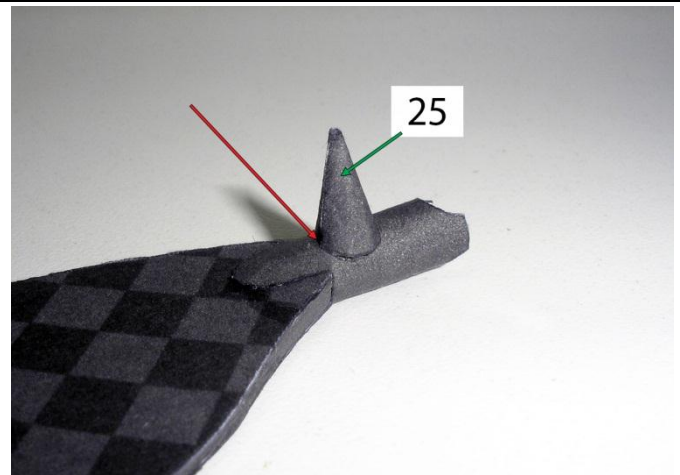
Make two of these.



24 is glued to inside edge at the two tabs as shown.



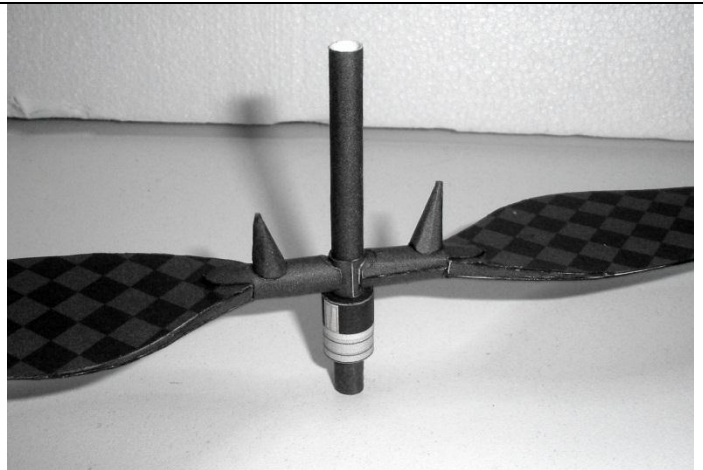
Glue onto end of parts 20 – 22, match the circle with “25” to the side labeled “Top”.



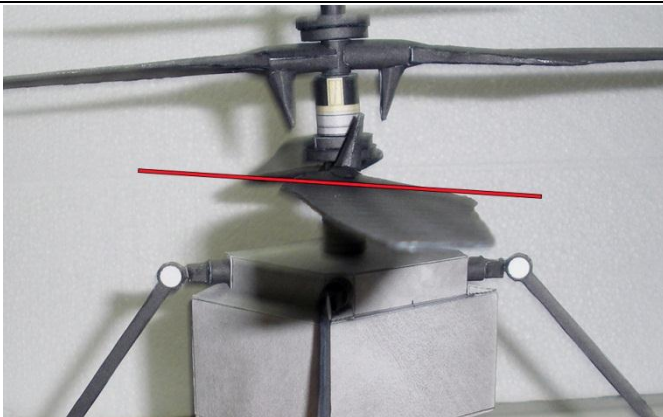
Glue on the circle labeled “25”.
Match the seem on 25 to the marker on 23 (red arrow).



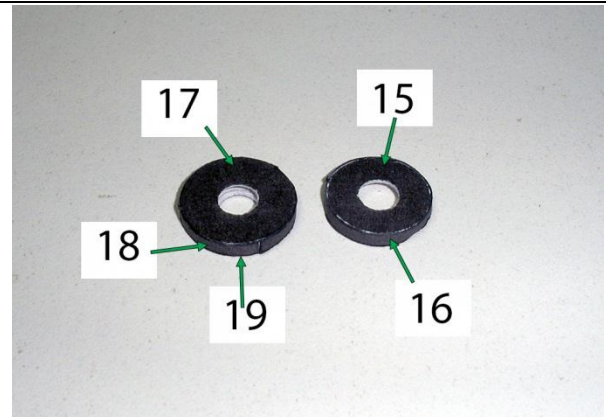
Slide onto parts 13 – 14 you made earlier, both cones points upwards.



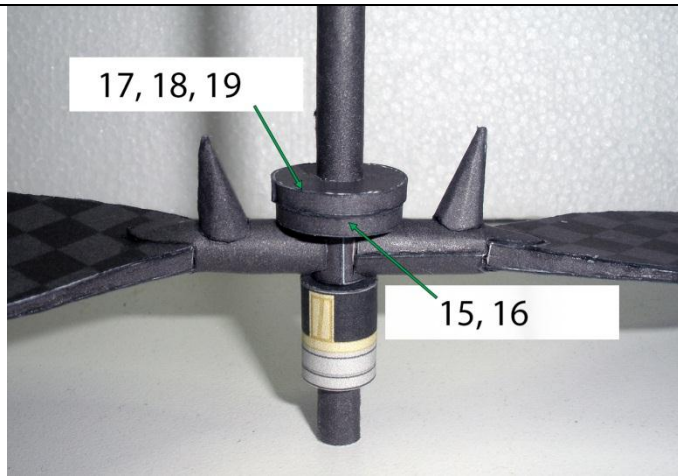
Slide this onto the shaft (part 9) with the cones pointing UP.
Note: Don't glue, the rotors should be able to rotate.



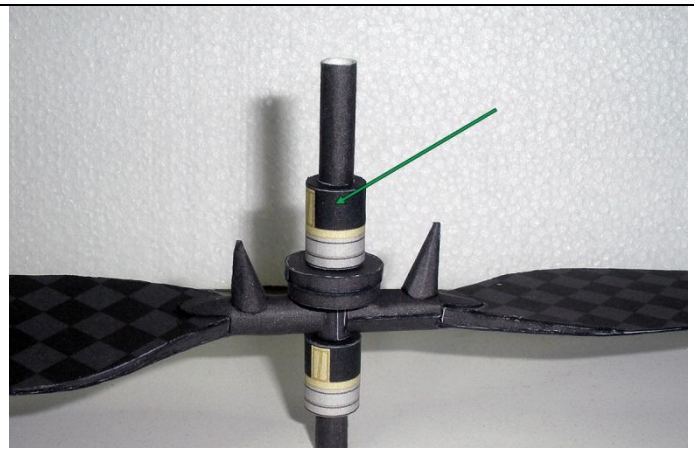
Should have a slight angle as shown. Bottom rotors are done.



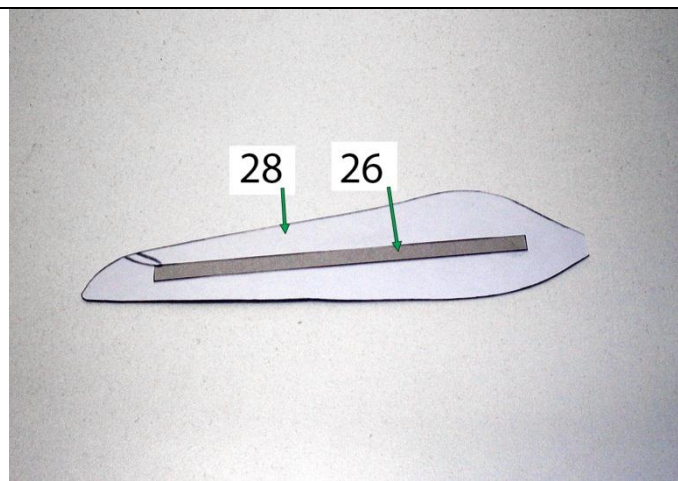
Parts 15 fits inside of 16 with the color outside.
Parts 19 fits inside of 18 with the color outside, 17 is glued to otherside of 18.
Make two of each.



Slide 15-16 (smaller disc) onto the shaft about ½ mm from the bottom rotors and glue in place. Glue 17-19 on top of 15-16 as shown.

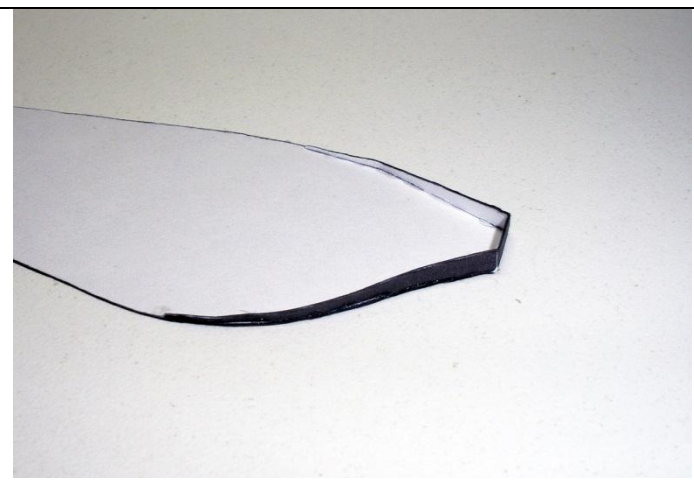


Glue the other parts X1 – X3 about ½ mm from 17-19 and glue in place, match the yellow rectangle with the yellow rectangle on the other parts X1 – X3.



Top Rotors...

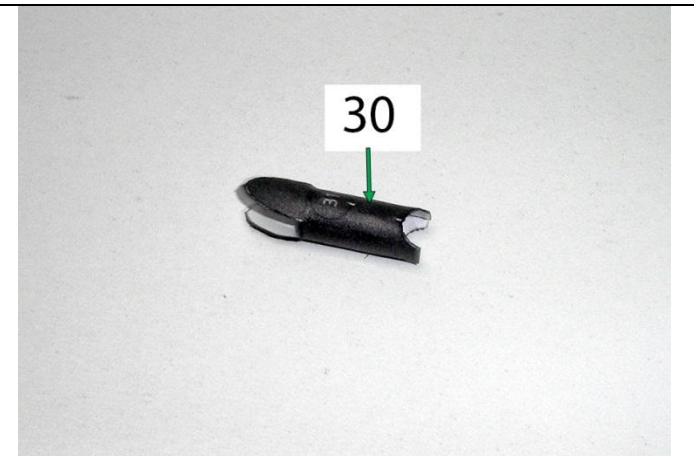
Super glue is recommended because it dries stiffer than other glues.



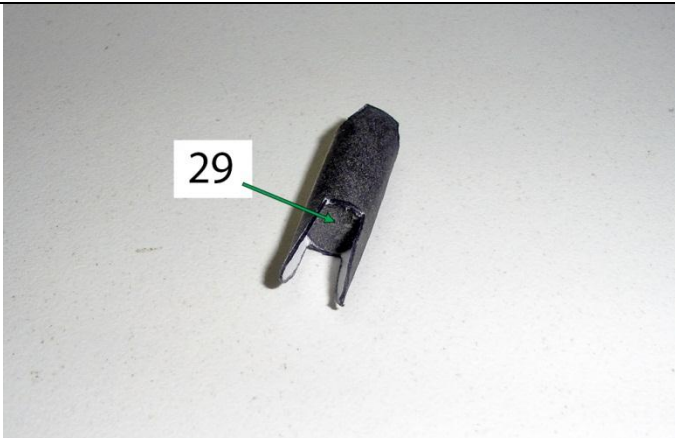
Part 27 – Glue the long tabs along the inside edge of part 21 as shown.



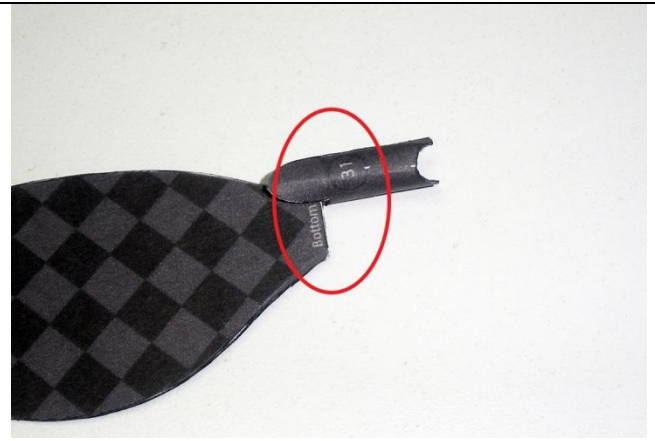
Glue 28 to the other side.



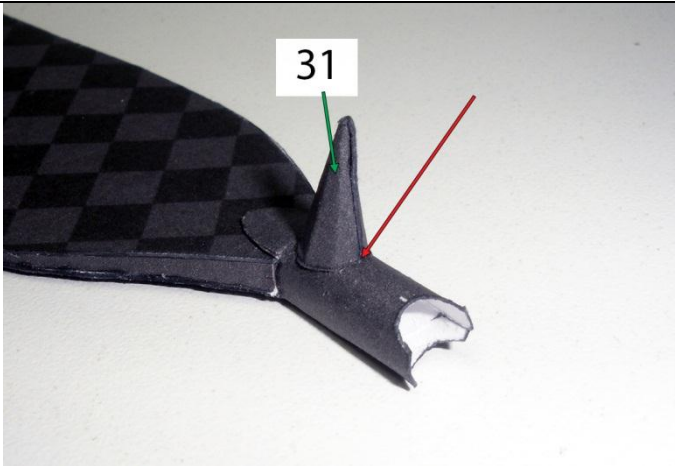
Make two of these.



29 is glued to inside edge at the two tabs as shown.



Glue onto end of parts 27 – 28, match the circle with “31” to the side labeled “Bottom”.



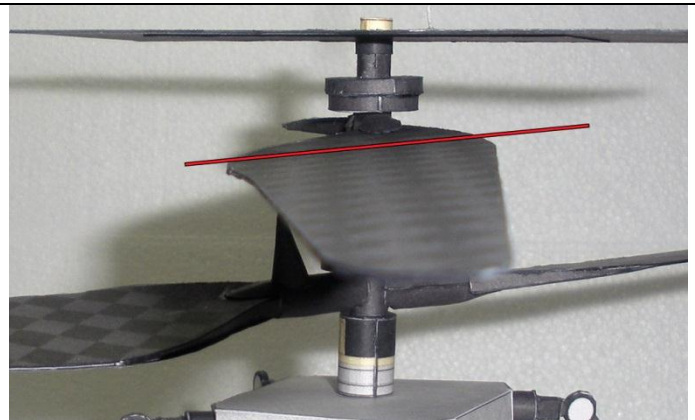
Glue on the circle labeled “31”.
Match the seem on 31 to the marker on 30 (red arrow).



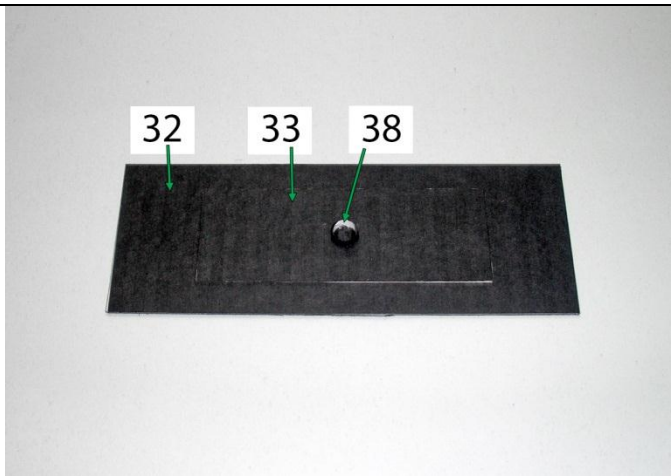
Slide onto parts 13 – 14 you made earlier, both cones points upwards.



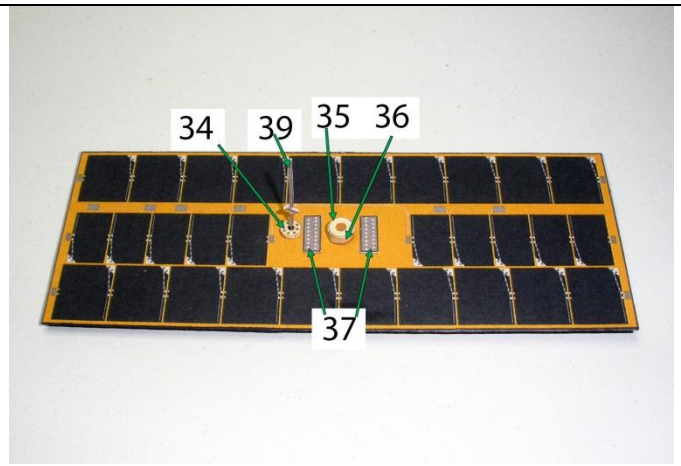
Slide onto the shaft with the cones pointing Down but don't glue, you want the rotors to be able to rotate.
Glue the other parts 15 – 19 on top around ½ mm from the top rotors.



Top rotors should have a slight angle as shown.
Top rotors are done.



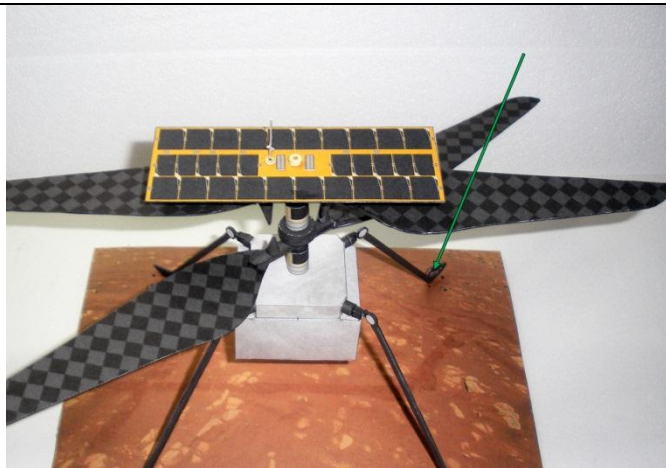
Glue 32 (solar panels) back-to-back. 38 is rolled to a ring.



Glue these in place as shown. Poke a pin hole on 34 to help hold the antenna (part 39) in place.



Glue on top of the shaft using the ring (part 38).



Carefully slide the shaft into the hole at top of the body. Note the alignment of the solar panel with the body and the leg with the loop at the end (Green arrow). Should look like the above photo.

If your model looks like this (and it flies), your model is done.