1603 S Eastside Loop
Suite 207
Tucson, AZ 85710

Toobish XL Model Rocket Kit Assembly Instructions

C, D, E and F Powered Tube Fin Rocket with Parachute Recovery

The Toobish XL model rocket kit is a simple rocket that assembles with just wood glue and a hobby knife. It's a great second rocket kit, because the fins are easy to attach straight, and with the high drag from 6 tube fins, it flies well on small fields on C motors, but it also flies up to 800 ft on F motors! The matte white finish bonds well to wood glue or white school glue, and accepts decoration using pencils, pens, markers, stickers, or paint.

Specifications

Overall Length	57 cm (22.5 inches)
Airframe Diameter	56 mm (2.2 inches)
Mass	160 grams (5.6 ounces)

Recommended Motors

Motor	Expected Altitude
C11-3	100 ft
D12-3	300 ft
E20-4	500 ft
E30-4	535 ft
F30-4	600 ft
F32-4	700 ft
F20-4	780 ft

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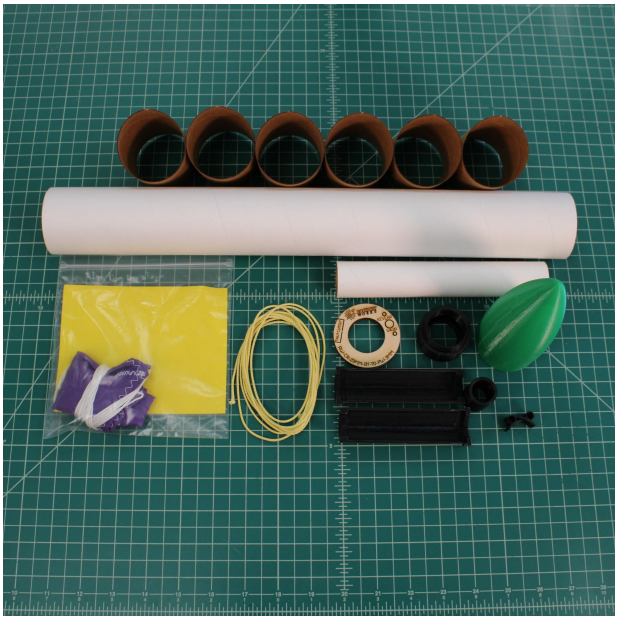
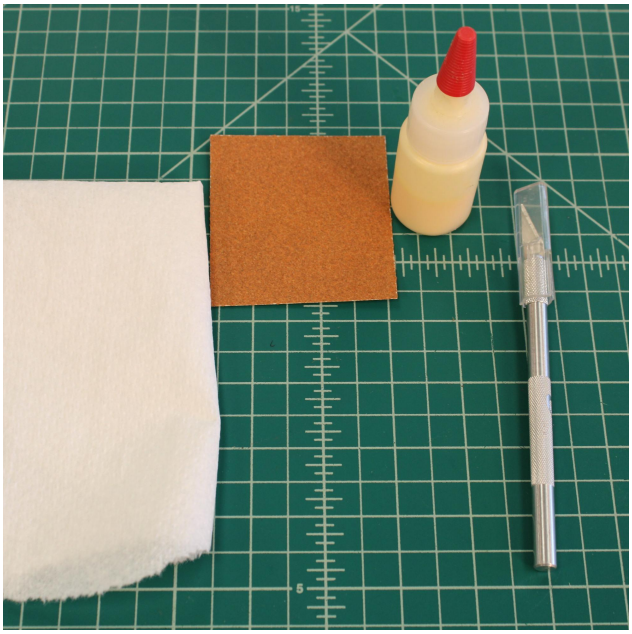
What's in the Bag



- 1 x 17 inch x 56 mm body tube
- 1 x 6 inch x 29mm motor tube
- 1 x plastic ogive nose cone
- 6 x 55 mm tube fins
- 1 x 29 mm 3D printed motor retainer
- 1 x Motor retainer
- 2 x centering rings
- 2 x 3/16 inch 3D printed launch lugs
- 1 x 24-29 mm 3D printed motor adapter
- 1 x 9 foot Kevlar shock cord
- 1 x 15 inch nylon parachute

Tools and supplies you'll need

- Wood or craft glue
- Sandpaper
- Hobby Knife
- Decoration supplies
- Motor, igniter, and recovery wadding



Flight Safety

Before flying any rocket, you should read, understand, and follow the Model Rocketry Safety Code:

https://www.nar.org/safety-information/model-rocket-safety-code/

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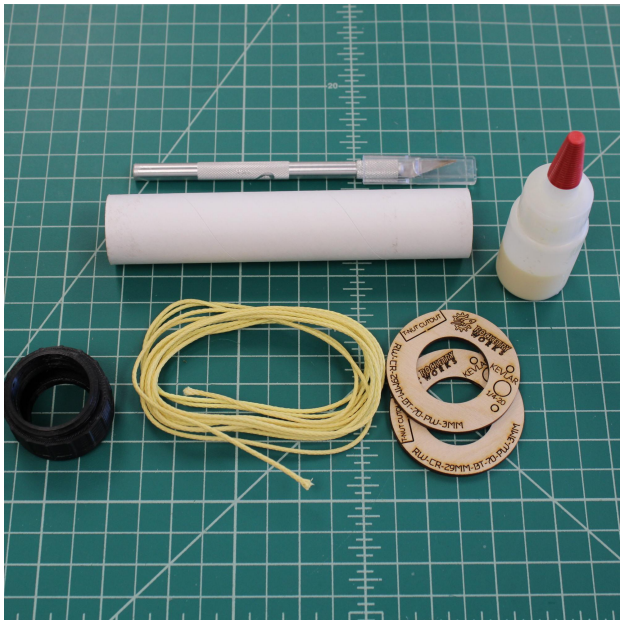
Motor Mount Assembly

For this sub-assembly, you'll need:



- 29mm x 6 inch long motor tube
- 2 centering rings 29 mm - 56 mm
- Yellow Kevlar shock cord
- 3D printed motor retainer
- A hobby knife
- Wood glue

1. Start by poking the small hole cut outs on **one** of the centering rings using a hobby knife. This is now the forward centering ring. Leave the aft centering ring alone.

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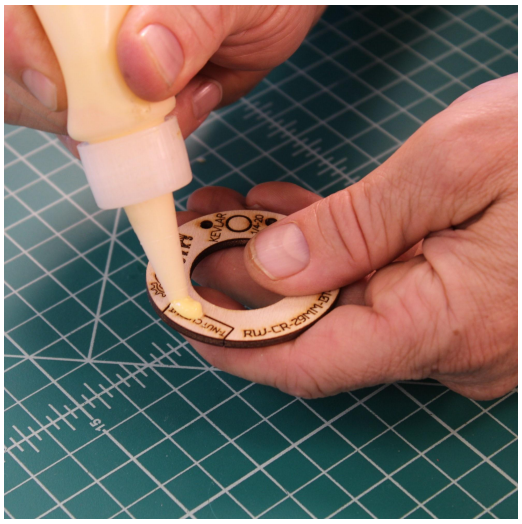

2. Smear glue into the unused cutouts--the T-nut cut out and the ¼-20 bolt hole cutout on the forward centering ring.
   Use your finger to smear glue into the unused cutout grooves.

3. Smear glue in all the cutouts on the aft centering ring.
   Smearing glue into the unused cutouts strengthens the centering rings and prevents ejection gasses from escaping out the back of the rocket.

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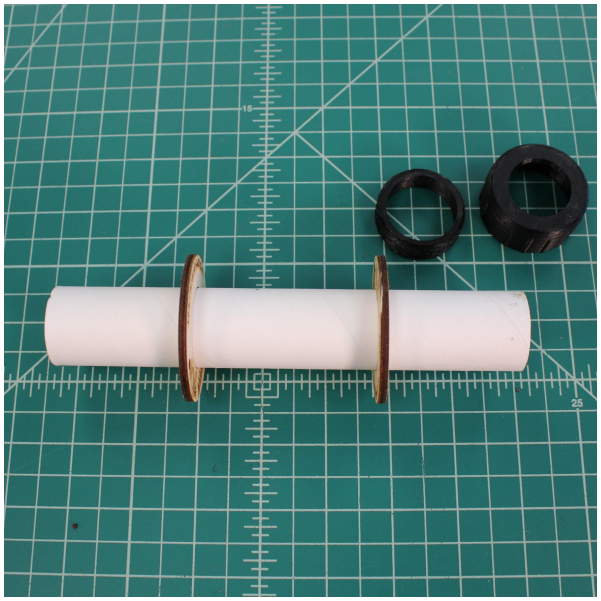

4. Slide the centering rings onto the motor tube, leaving them near the middle of the tube.
   Do not glue them into place yet.
   The centering rings will slide onto the tube easier if you insert the tube into the centering ring from the side with the engraving. The laser cutter leaves a slight bevel on the cut edge that helps the centering ring slide onto the tube.

5. Add a bead of glue ½ inch from each end of the motor tube.

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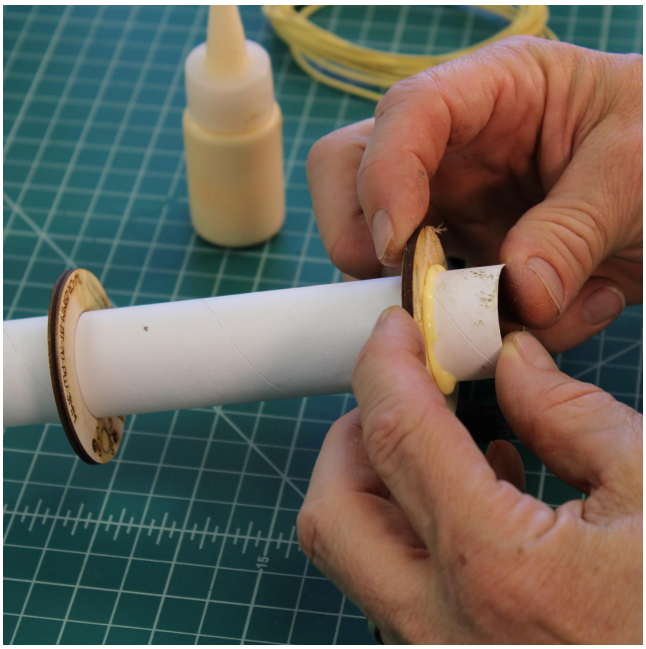

6. Slide each centering ring into the bead of glue. Smear excess glue into the joint between the tube and the centering ring, making a fillet.

7. Apply a bead of glue to the inside joint between the motor tube and each centering ring. Smear the glue into a fillet.

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8. Apply a bead of glue around the aft end of the motor tube.
   The aft end is the end with the centering ring with no holes punched out.
9. Apply glue to the inside of the motor retainer body--the smaller piece--sufficient to fill the small dimples inside the retainer body.
   Note that one end of the retainer body features a lifted rim. Try not to get glue here, but if you do, it wipes off easily. The key is to get a generous, but not excessive coating of glue to fill the pores inside the motor retainer body.

10. With a rotating motion, slide the motor retainer body onto the aft end of the motor tube.
    The twisting motion helps smear the glue between the motor tube and the motor retainer body, ensuring a solid fit.
11. Be sure to remove any excess glue from the inside of the motor tube.
    It's fine to have a thin smear of glue inside the motor tube; it can even lead to a stronger tube. But don't let any globs of glue dry there, because they can prevent the motor from fitting into the tube.
12. Carefully smear any excess glue on the outside of the motor tube into the tube, or onto the aft centering ring.
    Be sure not to leave any glue in the threads of the motor adapter.

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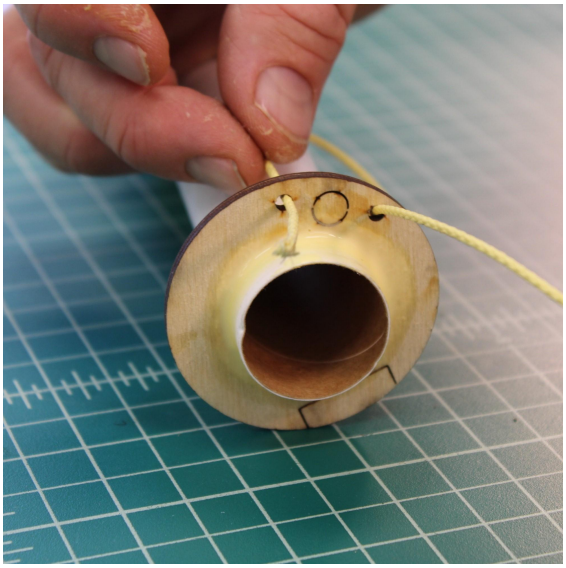
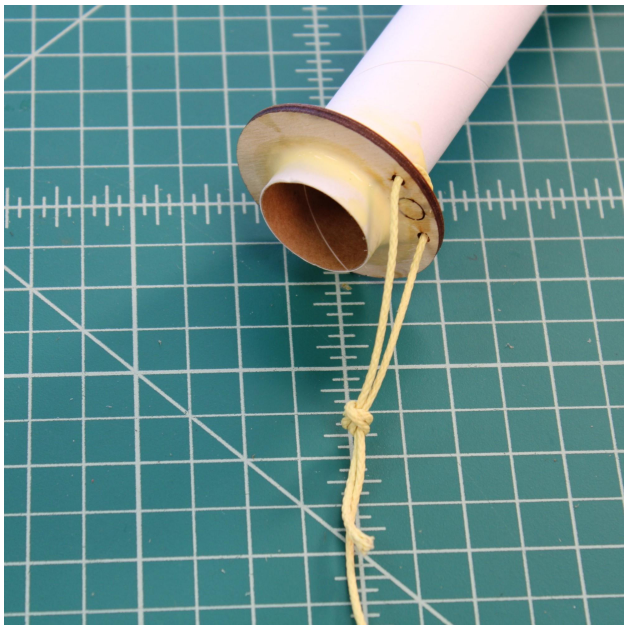


10. Turning to the forward end of the motor mount, insert one end of the shock cord through one of the holes in the centring ring from the exposed end of the motor mount.
11. Loop the end of the shock cord back through the other hole.
    Pull enough shock cord through the centering ring that you can tie a double overhand knot in the shock cord.

12. Tie a double overhand knot into the shock cord.



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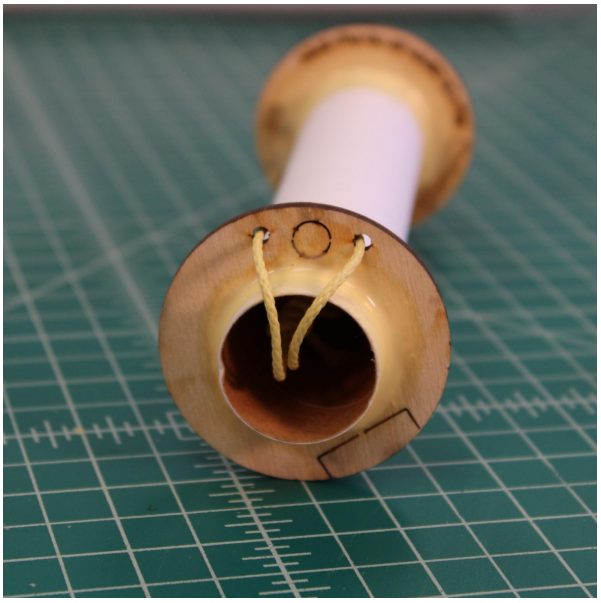
13. Wrap the loose end of the shock cord around your hand, and tuck the shock cord into the motor tube so it's out of the way.



14. When you're done, the motor mount should look like this.

15. Double-check to make sure you don't have any glue inside the motor tube. Glue that dries in here will prevent your motor from fitting inside the motor mount. Use a pencil or a stick to wipe away any excess glue.

16. Set the motor mount aside to dry on its side on the plastic bag.
    Keep an eye out for drips for the first 10 or 15 minutes.

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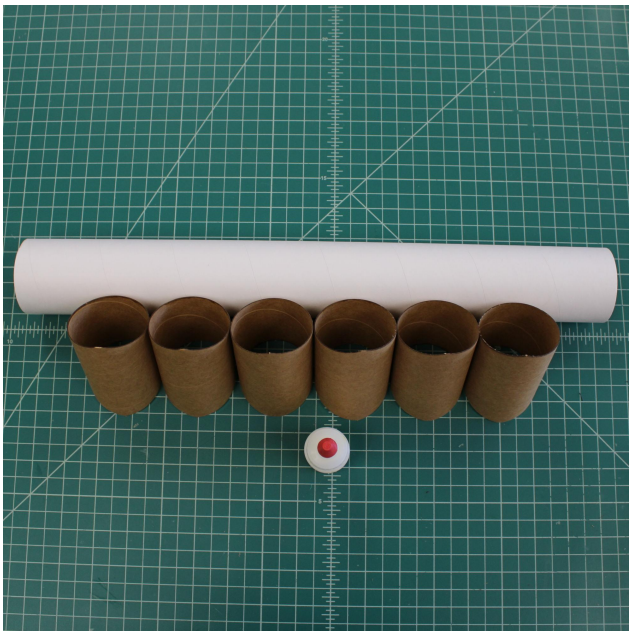
Airframe Assembly

For this sub-assembly, you'll attach the tube fins to the body tube. With your motor mount set aside to dry, collect the parts of your rocket body:



- 1 x 17 inch x 56 mm body tube
- 6 x 55 mm tube fins
- Wood glue

1. Apply 2 dots of glue on ¼ of the distance from each end of a tube fin.
   You don't need a lot of glue, so keep your rocket neat by minimizing the glue you use to attach the fins. This glue is used simply to tack the fins onto the body tube.

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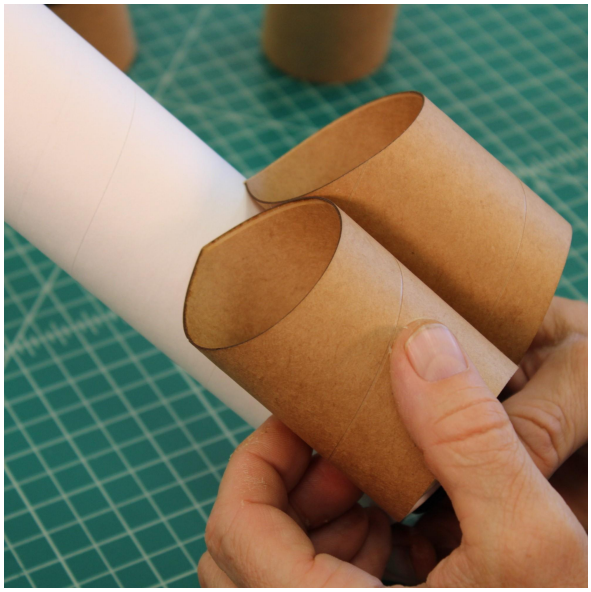
2. Attach the tube fin to the aft end of the body tube.
   You can choose to align the aft tip of the tube fins with the aft end of the body tube, or you can choose to align them a little above the aft end.



3. Repeat steps 1 and 2 for the remaining 5 tube fins, carefully holding the fins in alignment parallel to the body tube until the glue sets up.

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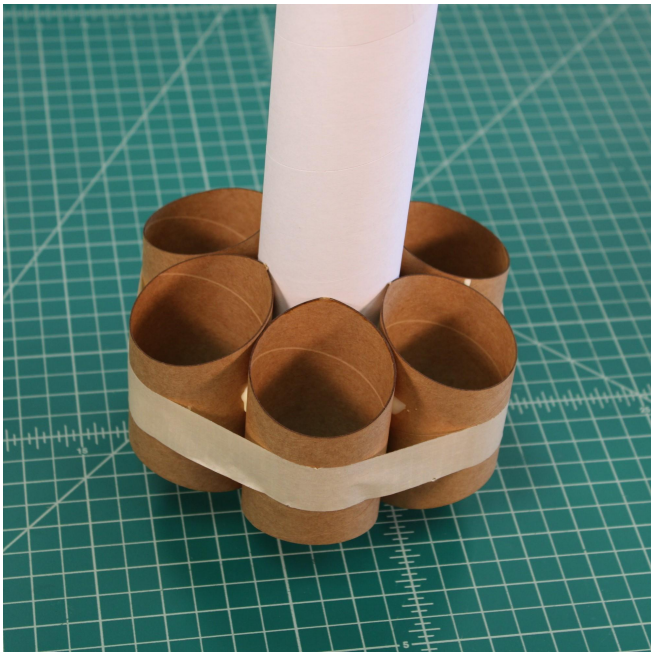
4. Place 2 drops of glue between each of the tube fins, about ¼ of the way from each end.

5. If you find gaps between tube fins, you can wrap a rubber band, or a piece of tape (sticky side out) around the tube fins to squeeze them together while the glue dries. Check for drips while the glue dries, and wipe away any excess.



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Integrating the Motor Mount

When the motor mount is sufficiently dry that the centering rings will not move, you can glue the motor mount into the body tube. This will integrate the two sub-assemblies you worked on separately.

1. Lay a generous bead of glue 2 or 3 inches inside the aft end of the body tube, all the way around the inside of the tube.
   The photo shows more glue than is needed, but you want enough to form a solid bead in front of the forward centering ring.

2. Insert the forward end of the motor mount (the end without the motor retainer) into the tube, just short of the glue bead inside.
3. Working around the motor mount, place a generous bead of glue inside the aft end of the body tube within ½ inch of the end of the tube, all the way around the tube.
4. Push the motor mount into the body tube the rest of the way, so that both centering rings push their respective beads of glue forward slightly.
   Allow the model to dry upright so that gravity settles the beads of glue against the leading edge of the centering rings.

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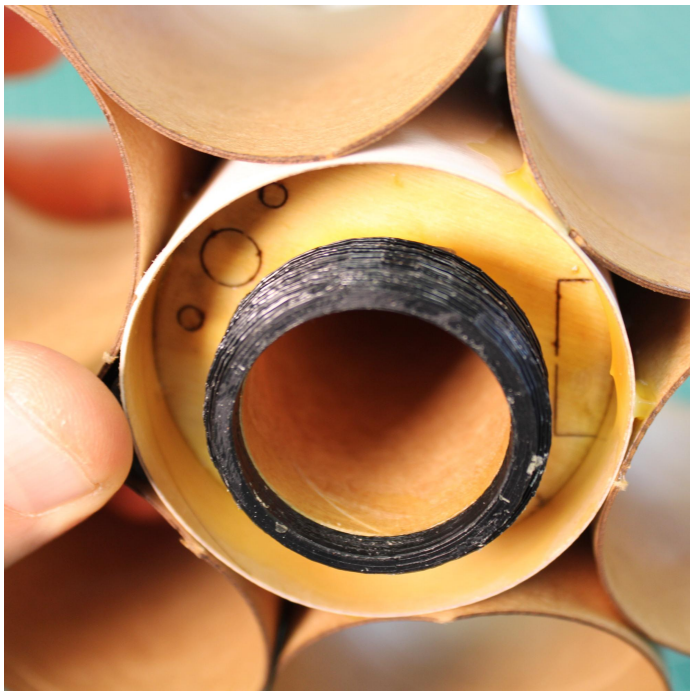
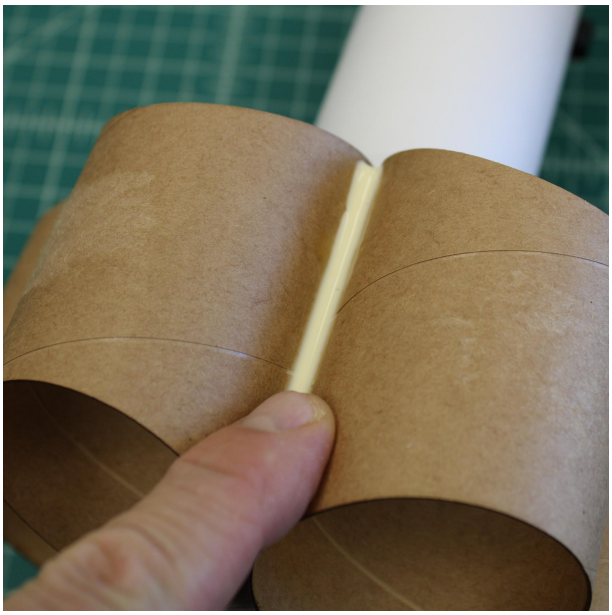


5. After the forward glue beads are dry, apply a fillet of glue between the aft centering ring and the body tube.
   It's a good idea to coat the surface of the aft centering ring to protect it from motor exhaust.
   Just be careful not to get glue into the motor retainer threads.
   Rest the model on its forward end to make sure the aft fillet does not drip.

6. Once the centering ring fillets have dried, you can take some time to apply a smooth fillet between each of the tube fins. This improves the look of the completed rocket.



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Finishing up

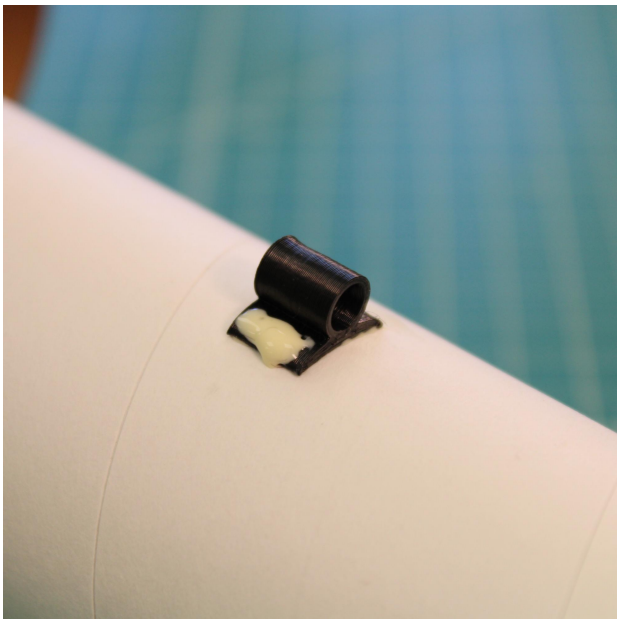
There are just a few steps left in this build: attaching the launch lugs, parachute, and nose cone. Then you're ready to paint your model.

Attaching the Launch Lugs

1. Apply a solid coat of glue to the underside of a launch lug foot so the entire foot is covered, but not dripping.

2. Position the launch lug on the body tube between two of the tube fins.
   Make sure glue bubbles up through the holes in the foot, making a secure attachment to the tube.

3. Repeat steps 1 and 2 for the forward launch lug, approximately 9 inches from the forward end of the body tube, positioning the lug in line with the aft launch lug.
   Check the alignment of the lugs by sighting from one to the other. If necessary, use a 3/16 inch launch rod to make sure the lugs are properly aligned.



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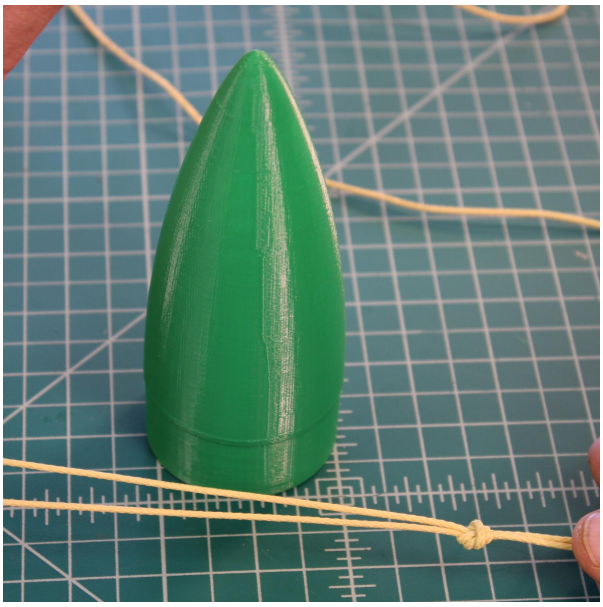
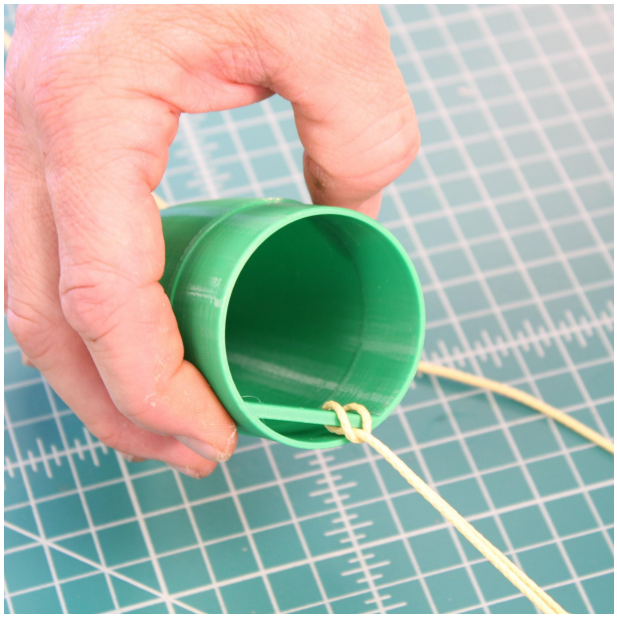
Attach the Nose Cone and Parachute

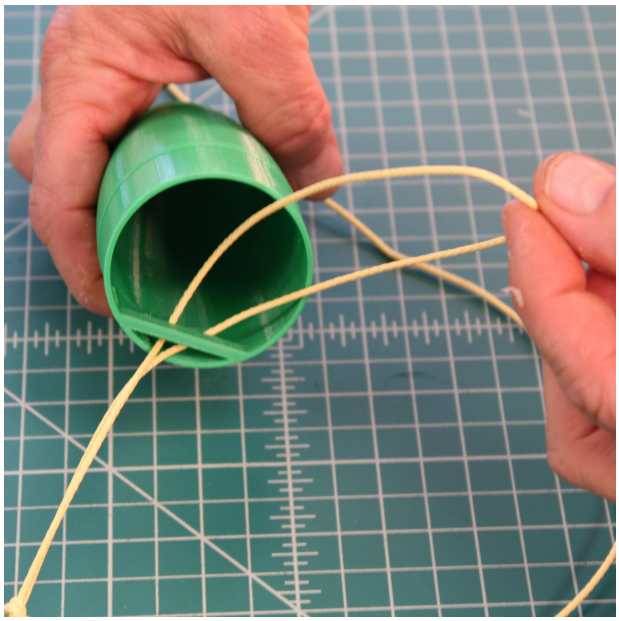
You're now done gluing this rocket, but you still need to attach the nose cone and streamer.



1. Shake the model gently to dislodge the shock cord from the motor tube, until it falls out the forward end of the body tube.
2. Fold the loose end of the shock cord about 6 inches from the end of the shock cord.
3. Tie a double overhand knot to make a loop at the end of the shock cord.

4. Slide the shock cord loop through the shock cord anchor at the nose cone shoulder.





4. Pull the loop over the nose cone and snug the shock cord around the shock cord anchor.

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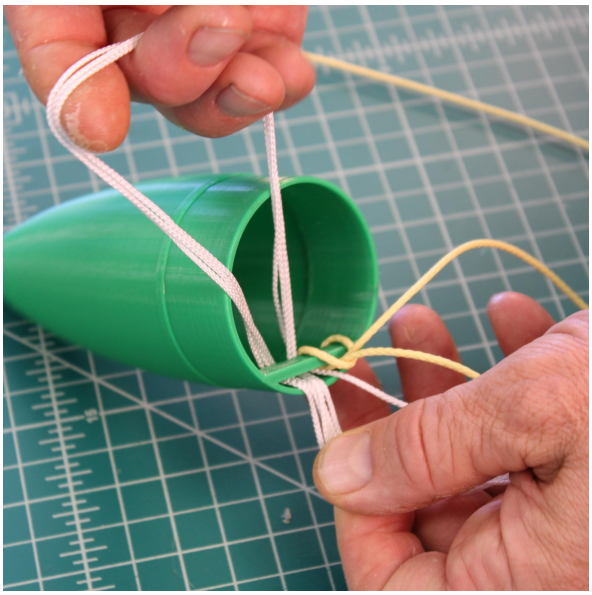
5. Bundle the parachute shroud lines so they form superimposed loops, acting like a single loop.
6. Pass the shroud line loop through the anchor at the nose cone shoulder.
7. Pass the nose cone through the shroud line loop, and snug the shroud lines onto the nose cone anchor.



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Decorate Your Rocket!

This is your rocket, so you can decorate it any way you want! Pencils, pens, markers, stickers, or paint all stick well to the white tubes. But you should write your name or initials somewhere on the rocket.

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Prepare for Flight

1. Insert 9 or 10 squares of recovery wadding, or about 3 inches of dog barf wadding into the forward end of the body tube, leaving the wadding loosely packed, so it takes up the full width of the tube without packing tightly.

2. Fold the parachute into a pie shape, then fold the shroud lines into the middle. Fold the parachute around the shroud lines to keep them from tangling.

3. Insert the shock cord and parachute into the body tube, making sure that they slide freely inside the tube.

4. Insert the nose cone shoulder into the body tube, making sure that the nose cone rotates freely and that neither the shock cord nor shroud lines are pinched between the nose cone and the body tube.

5. Being careful not to let the nose cone fall out of the front end of the rocket, turn the rocket nose end down, with the motor mount pointing up.

6. Insert the motor into the motor mount with the nozzle end facing up, away from the rocket.
   Use the included 3D printed motor adapter to fly a 24mm motor in the 29mm motor tube. This adapter works with all known motor types, including Estes black powder motors and Aerotech or Cesaroni composite motors. You can use the motor adapter spacer to fly a short motor like a D12-3 or E30-4.

7. Screw the motor retainer cap onto the motor retainer body, securing the motor in the motor mount.

8. Insert an igniter, tip down, into the motor nozzle, and insert the plastic cap or use tape to secure the igniter in the nozzle.

9. Follow the launch safety procedures outlined in the Model Rocketry Safety Code to launch your rocket.
   https://www.nar.org/safety-information/model-rocket-safety-code/