

# LEMON DROP

Designed by Greg K. Poehlein

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The Lemon Drop is a feather-weight recovery rocket made mostly from cardstock and printed out on your inkjet or laser printer. You can also build the rocket and paint it with spray or brush paints if you so choose.

The Lemon Drop is easy to build and quite durable. And if it should crash or get lost, you can just build another to replace it for the price of a sheet of cardstock, a little ink and a bit of cardboard.

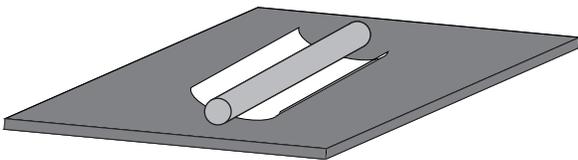
## Parts List

- A 1 1.75" Body Tube
- B 1 .325" Launch Lug
- C 1 13mm Thrust Ring
- D 1 1.5:1 Semi-ogive Nose Cone
- E 3 Fins

The parts listed above are best printed on 110# cardstock. In addition to these parts, you will need one sheet of heavy cardboard such as bristol board. You will also need a hobby knife, cutting mat, metal ruler or straight edge, a scribing tool or empty ball point pen, soft mouse pad, 1/4" dowel rod, white glue, masking tape and clear enamel spray paint.

## Section 1 - Building the Parts

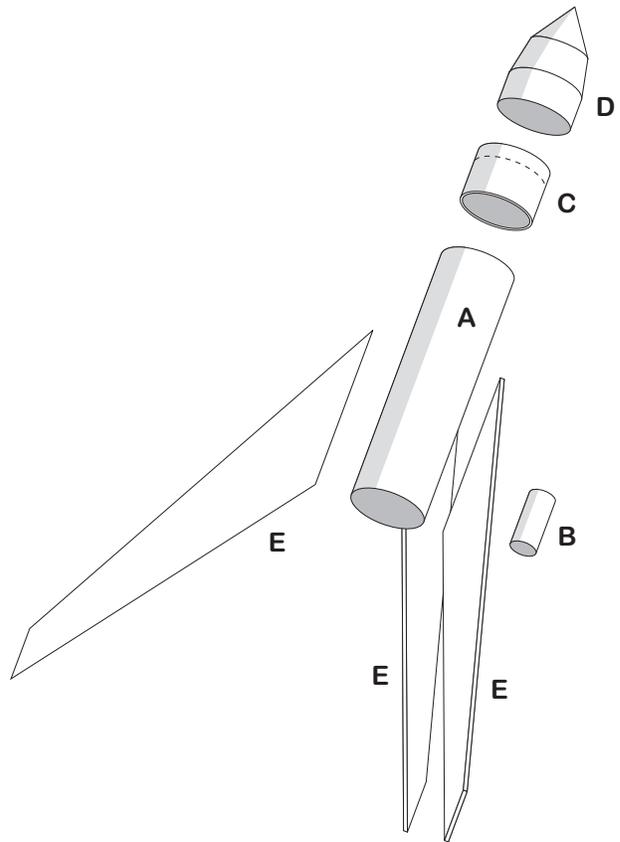
A)



Cut the body tube out of the parts sheet. Note that the body tube has a colored part and a white glue tab marked "G". Cut this off.

Turn the body tube upside down on the mouse pad. Using the dowel like a rolling pin, roll over the body tube while pressing down into the mouse pad. This will give the body tube a smooth curl. Repeat with the glue tab (be sure that you curl it long ways - it should have a bit of a curve to match the body tube).

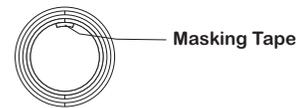
Apply a thin coat of glue to one edge of the body tube and glue the glue tab to this edge. You want to leave about half the tab sticking out. Once this part has dried a bit, apply a thin layer of glue to the opposite edge and glue that edge to the glue tab. Burnish down the tab from the inside. If done correctly, there will be no white showing, and the two edges of the body tube will form a smooth seam. You can wrap the body tube around an expended 13mm motor as you glue it to make this step easier, and to guarantee that the motor will fit. This type of joint is called a butt joint, and will be used again on other parts. Set Body Tube aside to dry.



B)

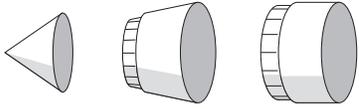
The Launch Lug is built nearly the same way as the body tube. Cut out the launch lug and curl using the dowel and mouse pad. Don't cut the glue tab off. Instead, overlap the opposite edge of the launch lug over the glue tab. This is called a lap joint. Set aside to dry.

C)



The Thrust Ring serves dual duty - both keeping the engine in place as well as acting as a nose cone shoulder. Cut out the four pieces of the Thrust Ring and curl each as with the Launch Lug. Place a small piece of masking tape inside the smallest length piece and form into a short tube, with the masking tape holding the tube in place. Apply a thin layer of glue to the inside of the next longest piece. Glue it in place around the outside of the first tube, making sure that the seam is halfway around the tube from the inside seam. Add the other two layers, again alternating where the seam falls (see the illustration above). Be sure the printed side of the outside layer is showing. Make sure the Thrust Ring fits inside the body tube and set aside to dry.

D)

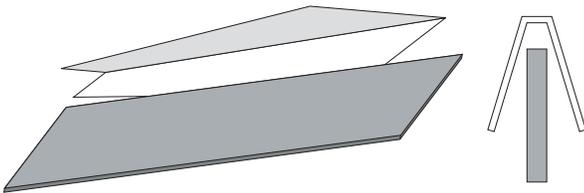


Cut each of the nose cone segments. The first segment, S1, is a simple cone. Do not cut the glue tab off S1 - we will use a lap joint this segment. Curl the cone (face down) around the center point - this was indicated on the cardstock sheet as the tip of the cone. Glue the edge of the cone over the glue tab so no white is showing and set aside for now.

Segment 2 is a transition. Cut the glue tab and finger tab strip from the section and curl it in a slightly curved direction. Make sure the ends will match up. Glue the two ends together with a butt joint using the glue tab, and burnish the glue tab from the inside. Cut each of the fingers along the black lines so this piece forms a strip with fingers sticking up. Curl it in the same curved fashion, and glue into the top (narrow end) of S2 so only the fingers are projecting above the edge. Test fit this in place - you may have to cut one finger off to make it fit, or you may have to add a finger from spare cardstock. Burnish this strip down, and slightly flex the fingers inward. Apply a layer of glue to the inside of S1 and glue the fingers from S2 inside so no white is showing. Burnish the fingers down inside S1 and set aside.

Segment Three is made just like the body tube with a butt joint, so cut the glue tab and finger tab strip from the section, and curl so it makes a short, fat cylinder. Glue the ends together with the glue tab. Curl the finger strip and glue into S3 with fingers exposed just as you did for S2. After burnishing down, glue the front section of the nose onto the fingers as before, making sure no white is showing. Burnish the fingers inside and set the Nose Cone aside to dry.

E)



Finally, cut out each of the fins, and score along the center fold line. This will be the leading edge of each fin. Cut a piece of cardboard a bit bigger than the fin and spread a thin coat of glue on the inside of the fin. Place the fold against a straight edge of the cardboard and smooth the fin down on both sides so the cardboard is sandwiched inside with no space between the fold (leading edge) and the cardboard. Place under a heavy book or weight and let dry. This will keep it from warping.

After dry, carefully trim the excess cardboard from the fin using a hobby knife and straight edge. Check both sides and make sure there is no cardboard showing.

## Section 2 - Assembling the Rocket

1)

Now that the parts are completed, you can build your Lemon Drop just like any other rocket kit. Glue the thrust ring into the nose cone to form its shoulder. Note that the short part goes into the nose, up to the dotted line.

2)

Next, glue the nose cone onto the body tube. Make sure the thrust ring is completely inside and there is now gap between the nose cone and the body tube. Also make sure that the lines on the body tube are at the rear of the rocket.

3)

Now we glue each of the fins in place. Apply a bead of glue to the root edge of each fin and glue on top of the fin glue mark on the body tube. The third fin (the green one) is glued over the seam of the body tube to match up with the other two. Make sure the rear edge of the root is even with the base of the rocket.

Once the fins are dry, apply a glue fillet to the base of both sides of each fin. Use white glue for this as it will dry transparent. Be sure to pop any bubbles that form before they can dry.

4)

Once the fillets are dry on the fins, we can glue the launch lug in place. Apply a bit of glue to the glue edge of the launch lug and glue to the base of one of the yellow fins, on the side opposite the logo.

5)

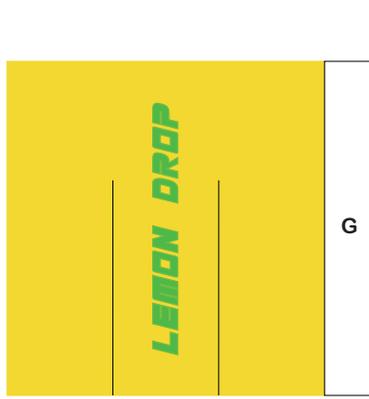
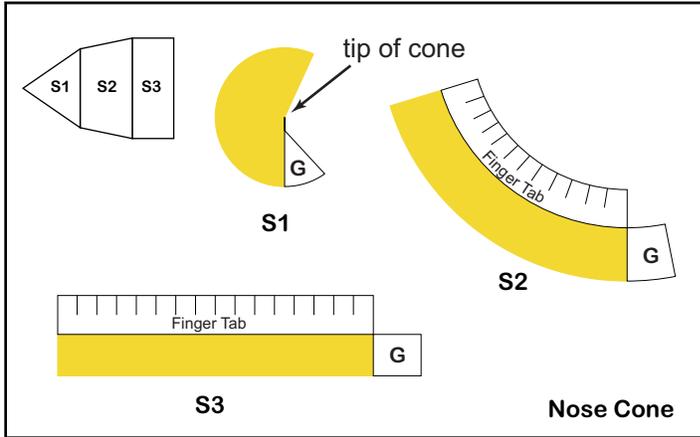
When all the glue is dry, you can give your Lemon Drop two or three light coats of clear coat. This will protect your rocket from moisture (inkjet ink will smear when wet) and make it more durable.

## Section 3 - Prepping for Flight

Because the Lemon Drop is a featherweight rocket, little prep is needed for flight. Recommended motors for the Lemon Drop are Estes 1/4A3-3T, 1/2A3-4T, and the A3-4T. A bit of masking tape might be needed to keep the motor from slipping out, but don't use so much that the motor will stay stuck in the Lemon Drop at ejection.

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Body Tube



Launch Lug

