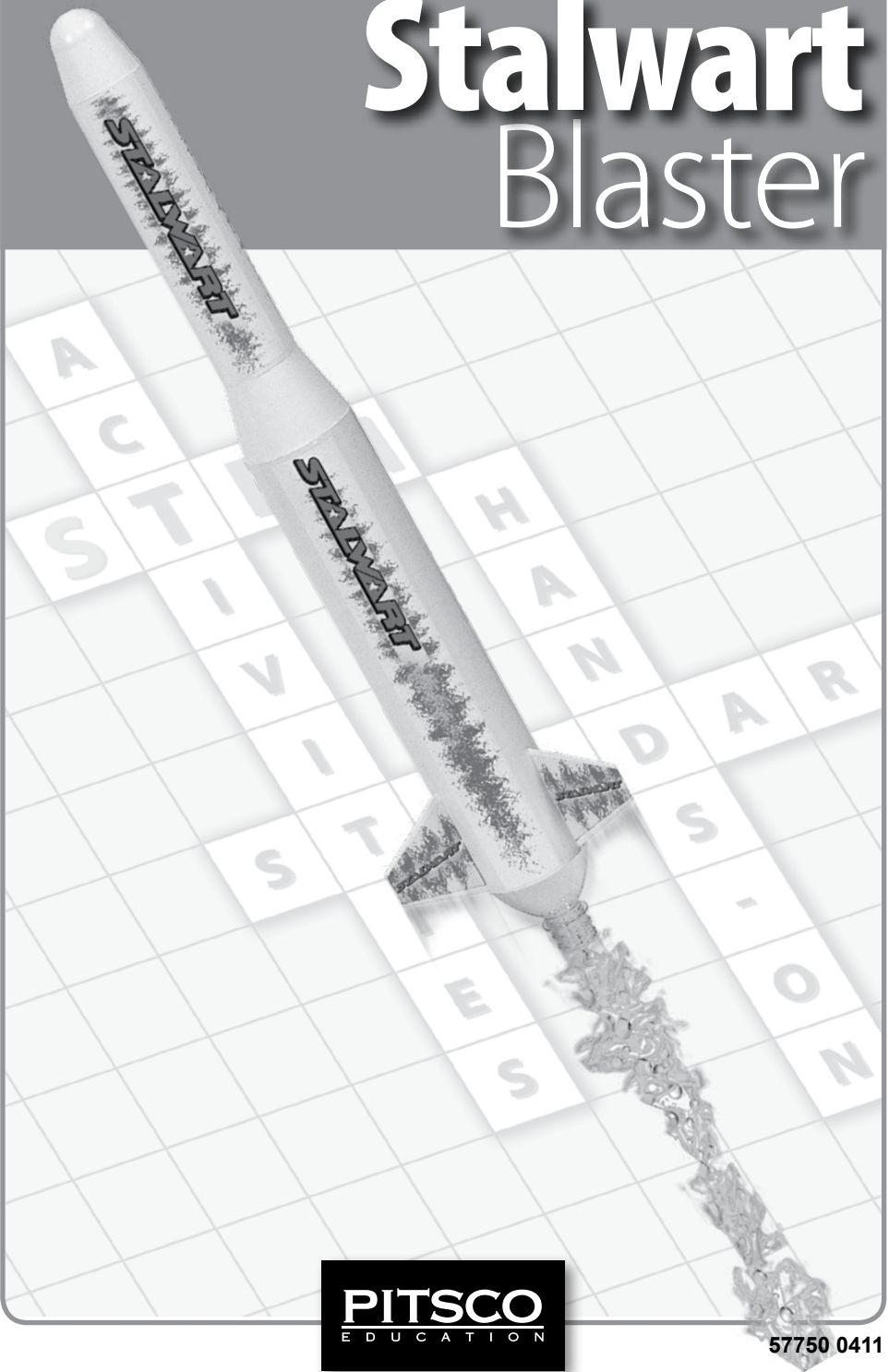


Stalwart Blaster



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EDUCATION

57750 0411

Items Included

- 2 body tubes, 6-1/2" long, 2-7/8" inside diameter

Note: These are referred to throughout these instructions as **BT1** and **BT2**.

- Body tube, 8" long, 2" outside diameter
- Bottle block, 2-7/8" outside diameter, 3/8" wide
- Splice ring, 2-5/8" inside diameter, 1" wide
- Alignment ring, 2" inside diameter, 1/2" wide
- In small plastic bag:
 - Bellows nozzle
 - Plastic restrictor
 - Plastic washer
 - Piece of adhesive-backed felt
 - Self-adhesive hole reinforcements
- Plastic sprue with attached:
 - Nose cone
 - Transition cone
 - Bellows cup
 - 2 white plastic plugs (one spare)
- Sheet of coated fin material, 3" x 12"
- Fin pattern sheet
- Make-your-own fin aligner on heavy cardstock
- Wind speed flap and deployment disk on die-punched heavy paper
- Bellows
- Silicone tube, 5-1/2" long
- Parachute
- Cotton shroud line
- Elastic shock cord
- 20-ounce plastic bottle
- Decals

Tools and Materials Needed

- Scissors
- Ruler
- Clothespins
- Masking tape
- Transparent tape
- Hole punch (optional)
- Leather punch (optional)
- White glue such as Pitsco HD Bond II
- Cool-melt glue and glue gun
- Paint
- Rocket launcher

Before assembling your bottle rocket, take a look at Figure 1. It identifies the various parts included in your rocket kit and shows where they will go. Throughout the assembly process, refer to this diagram to make sure you are placing components in their correct positions.

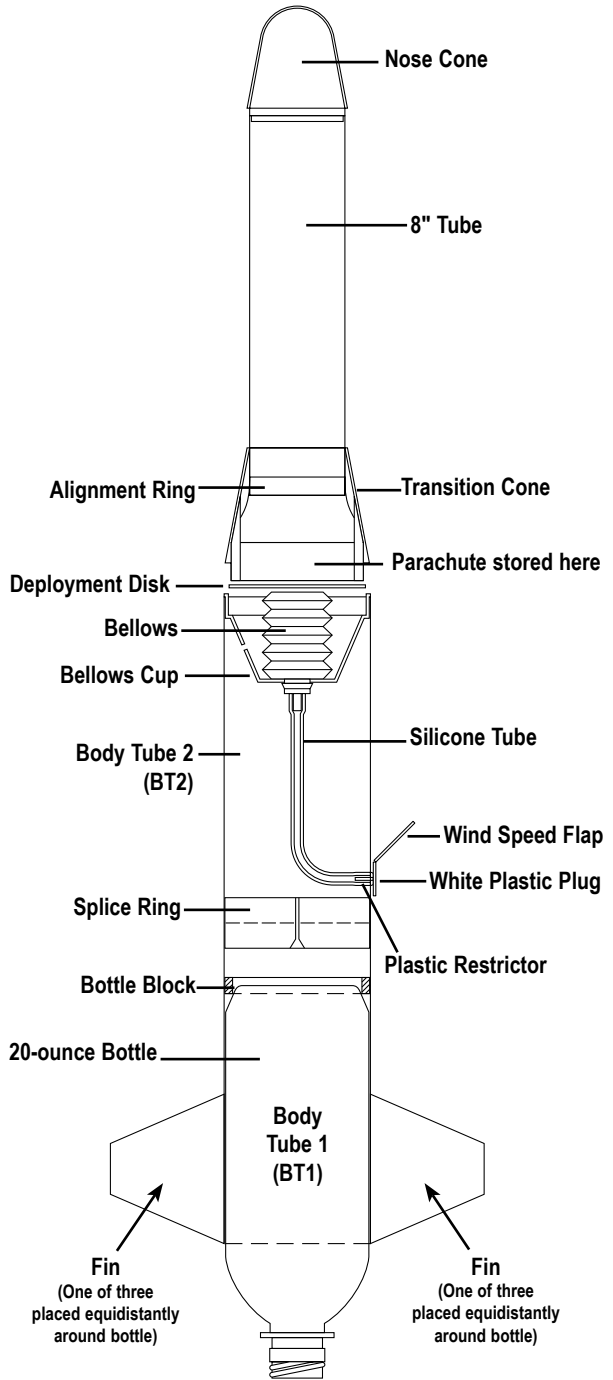


Figure 1

Transparent view of the Stalwart

Construct the Bellows Assembly

1. Push the nozzle into the bellows until you hear a snap.
2. Remove the bellows from the plastic sprue. Insert the bellows into the bellows cup so that the nozzle protrudes through the opening in the narrow end of the cup.
3. Glue the bellows cup to the bellows by sealing the juncture with a bead of white or cool-melt glue (Figure 2).
4. Set the bellows assembly aside until the glue dries. The glue forms a retaining ring that keeps the bellows in place during launch.

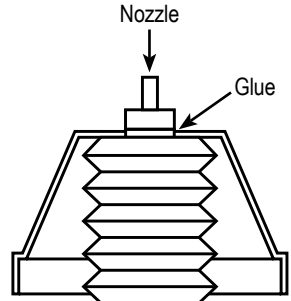


Figure 2

Prepare the Wind Speed Flap

1. Punch the wind speed flap out of the die-punched piece of heavy paper.
2. Bend the flap approximately 45° along the dotted line. The paper will break underneath but remain attached on the top.
3. Fill the break in the paper with adhesive and set the flap aside to dry.

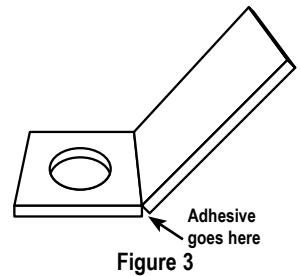


Figure 3

Prepare Body Tube 1 (BT1)

1. Gather one of the 6-1/2" body tubes, the bottle block, and the 20-ounce plastic bottle.
2. Push the bottle block ring several inches into one end of the tube. Push the bottle, bottom first, into the other end of the tube, until it makes contact with the ring.
3. Continue pushing the bottle until the bottle block is 1-1/8" from the end of the tube. With a pencil, draw a line to mark the position of the ring (Figure 4).
4. Pull the bottle out about 2" so it is out of your way. Push the bottle block up toward the bottle. Apply a bead of glue at the top of the line drawn in Step 3 (Figure 5) and smear the glue upward a bit into the tube. Be careful not

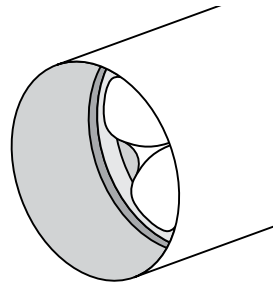


Figure 4

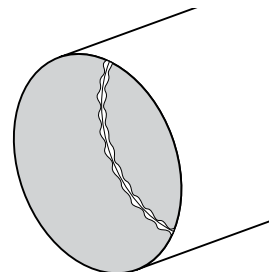


Figure 5

to get any glue on the tube below the line. Push the bottle back into the tube up to the point where the bottle begins to taper and the bottle block is once again aligned with the drawn line. Set the tube aside and allow the glue to dry.

Make the Splice Ring

1. Cut a 1/4" piece out of the splice ring.
2. Lay it flat on a table and, using the ruler, draw a line down the middle.
3. Notch two facing corners at 45° angles (Figure 6).

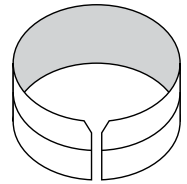


Figure 6

Prepare Body Tube 2 (BT2)

1. Locate the second 6-1/2" body tube. Using a leather punch or the point of the scissors, punch a small hole (approximately 3/16" in diameter) 3/4" from one end (Figure 7).
2. Apply and spread a bead of white glue along the inside edge of the tube closest to the hole (Figure 8).
3. Position the splice ring, notches up, inside the tube so that the line you drew is even with the top of the tube (Figure 9). Take care not to get any glue on the part of the splice ring that sticks up out of the tube.
Note: It does not matter where the punched hole is in relationship to the notches in the splice ring.
4. Hold the assembly together with clothespins (Figure 10) until the adhesive dries.

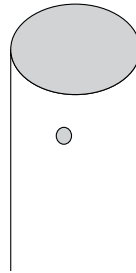


Figure 7

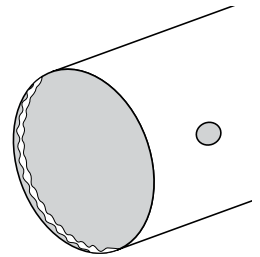


Figure 8

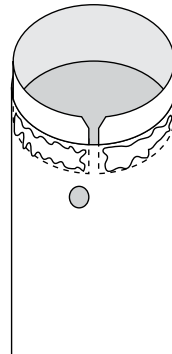


Figure 9

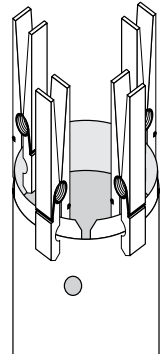


Figure 10

Make the Fin Alignment Guide

A make-it-yourself fin alignment guide is provided with the kit. Using the guide will assure that your rocket's fins are properly positioned for optimal in-flight performance.

1. Locate the fin alignment guide sheet and cut out the parts. After cutting, you will have three T-shaped "handles," a long measuring strip that is used to align the handles, and three short strips that will form a platform at the bottom of the guide.
2. Crease each handle down the middle along the dotted line. Fold the tabs upward along the dotted lines. Tape the sides together in the middle. (Leave about 1" open at the end.) Then, tape each handle together on the bottom (Figure 11).
3. Place the long strip on a flat surface. Note the three alignment marks along the strip. Select one of the handles and, pinching the tabs together, center them over one of the marks (Figure 12). Tape the tabs to the strip. Repeat for the other two handles.
4. Remove the bottle from BT1. Hold BT1 so that the positioning ring is up. Wrap the strip snugly around the body tube and tape the ends securely together. Take care not to tape the strip to the tube.
5. Locate the three platform pieces. If you have not already done so, cut notches where indicated on each of the pieces. Bend the tabs on the ends of each platform piece upward along the dotted lines.
6. Assemble the platform pieces into a triangle by taping the tabbed ends together (Figure 13). Make sure the notches on each piece face the same direction.

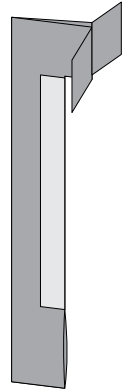


Figure 11

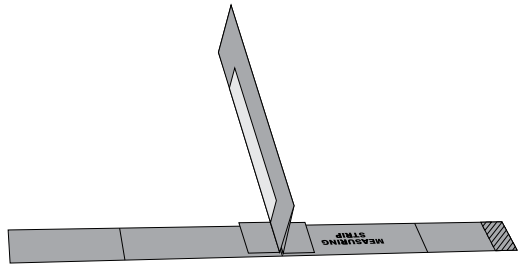


Figure 12

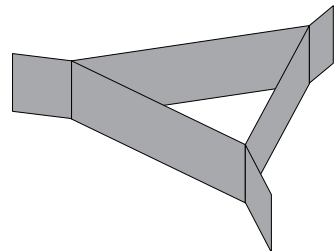


Figure 13

7. Slide the tabbed ends of the platform pieces, notches up, into the free ends of the handles. (It may be necessary to slide the body tube up a bit out of your way.)
8. Slide the body tube into the notches (Figure 14). You are now ready to attach the fins.

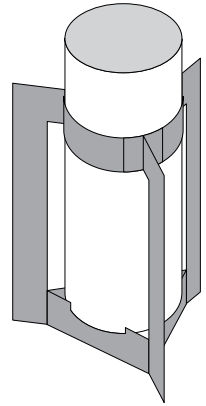


Figure 14

Attaching the Fins Without Using the Fin Aligner

If you do not wish to construct a fin aligner, you may attach the fins to BT1 with cool-melt glue. Use the following method to assure the fins are properly aligned.

Items Required

- Measuring strip from the fin aligner sheet
- Permanent marker
- Cool-melt glue and glue gun

1. Cut out the measuring strip from the fin aligner sheet. With the bottle block end down, wrap the strip around the middle of the tube. Hold or tape it in place.
2. Using a permanent marker, indicate the location for each fin by making a dot on the tube above each line on the measuring strip (Figure A). Then remove the measuring strip.
3. To make straight, vertical lines for fin placement, align the marks on the tube against a door frame as shown in Figure B. Using the permanent marker, draw a line straight up the tube.
4. Dab cool-melt glue on the longest horizontal edge of one of the fins and press it against the line. Repeat for the other two fins.
5. When the glue is dry, anchor the fins to the tube by running a bead of cool-melt glue along each side of the fins (Figure C). Set the tube aside until the glue dries thoroughly.



Figure A

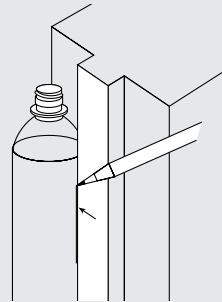


Figure B

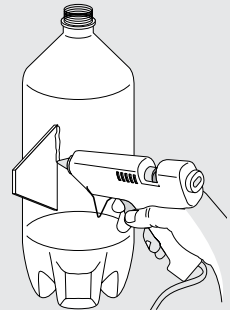


Figure C

Attach the Fins

1. Cut out a fin pattern from the fin pattern sheet. Trace the pattern three times onto the fin material. Then, cut out the fins.
2. Apply a bead of white glue to the perpendicular edge of one of the fins.
3. Place the fin, glued edge toward the tube, against the right or left side of one of the handles and press it into the tube (Figure 14). Hold it against the tube for a moment then secure it with a clothespin.
4. Repeat for the other two fins. Allow the adhesive to dry overnight.

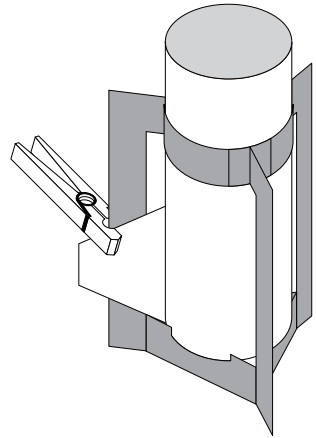


Figure 15

- Note:** Follow the same procedure for the remaining fins as you did for the first. If you positioned the first fin against the right side of the first handle, then the remaining fins should be positioned against the right side of the remaining handles. This helps to assure that all fins are equidistant.
5. When the adhesive is dry, remove the clothespins. Remove the fin aligner from the body tube by detaching the platform and sliding the fin aligner upward off the tube.

Decorate

Paint and add decals to the body tubes, fins, and plastic nose cone. Allow paint to dry before working again with these items.

Assemble the Parachute

1. Locate the Pitsco parachute, shroud line string, and the six hole reinforcements.
2. Using scissors, carefully cut along the dotted lines on the Pitsco parachute.
3. Peel the hole reinforcements from the backing paper and place them in each of the small circles in the corners of the parachute.
4. Using a hole punch or the point of the scissors, punch a hole in the center of each circle.
5. Cut six 14" lengths of shroud line.
6. Tie a shroud line in each of the six reinforced holes.
7. Tie the ends of the shroud lines together in a knot.

Assemble the Ejection System

1. Gather the silicone tube, shock cord, plastic washer, bellows cup assembly, white plastic plug, plastic restrictor, and BT2.
2. Slip the silicone tube onto the bellows nozzle.
3. Tie the washer to one end of the elastic shock cord. Poke the other end of the shock cord through the hole in the side of the bellows cup. Pull the cord through the cup until the washer rests against the hole on the outside of the bellows cup (Figure 16).
4. Remove the clothespins from BT2 and insert the bellows assembly into the end of the tube that is opposite of the punched hole.
5. Slip the plastic restrictor into the white plastic plug, tapered end out (Figure 17) to form the plug assembly.
6. Insert the plug assembly into the hole that you punched in the tube. The white plug should be visible outside the tube.
7. While grasping the body tube and holding the plug in place with your thumb, reach inside the body tube and slide the silicone tube all the way onto the restrictor. The silicone tube should fit snugly and touch the body tube.
8. Stack the tubes by inserting the splice ring end of BT2 into the stop ring end of BT1 (Figure 18). Tape the tubes together with transparent tape.

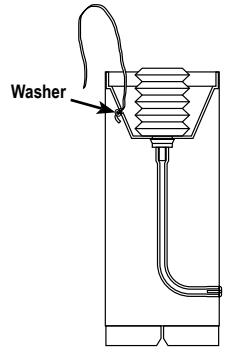


Figure 16

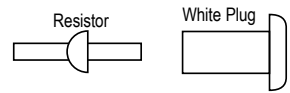


Figure 17

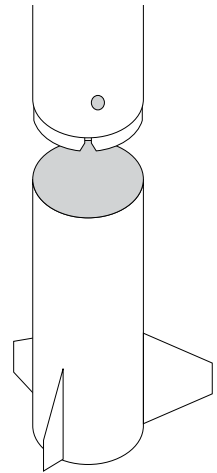


Figure 18

Prepare the Eight-Inch Tube

1. Locate the alignment ring and the 8" tube. Remove the transition cone from the plastic sprue.
2. Smear white glue on the inside surface of the alignment ring. Slide the ring onto one end of the tube so that it is flush with the edge of the tube (Figure 19).

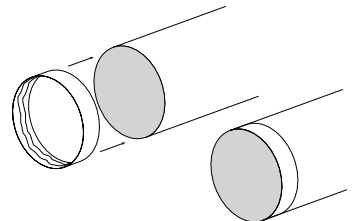


Figure 19

3. Draw a line around the tube 1/4" above the alignment ring (Figure 20).

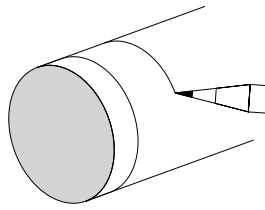


Figure 20

4. Slide the transition cone down the tube until its top edge is even with the line.

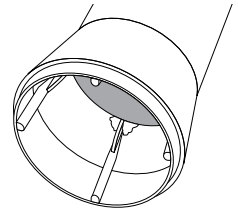
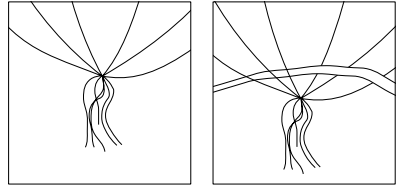


Figure 21

5. Spot glue the webs inside the transition cone to the tube with cool-melt glue (Figure 21).

Anchor the Shock Cord

1. Gently pull up on the shock cord to remove any slack. Pass the shock cord through the parachute shroud lines (Figure 22). Tie and knot the shock cord to the shroud lines about 1-1/2" from the top of the tube.



2. Cut two 1-1/2" pieces of masking tape. Center one piece on the shock cord about 3/4" from the free end (Figure 23).

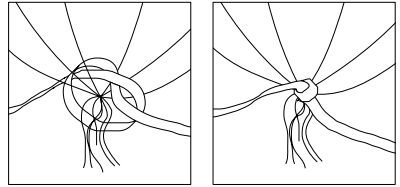


Figure 22

3. Fold the 3/4" free end of the shock cord back over the nonsticky side of the masking tape. Tape the shock cord down with the other piece tape. This forms the shock cord anchor.

4. Press the sticky side of the shock cord anchor to the inside of the plastic transition cone (Figure 24).

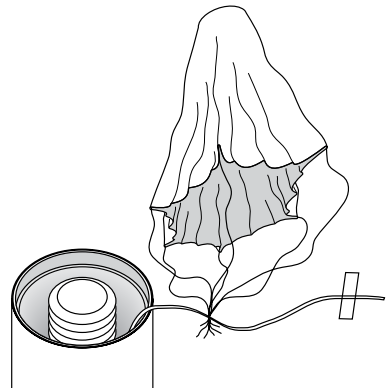


Figure 23

5. Locate the piece of adhesive-backed felt. Cut it into three 1/2" x 1/4" pieces.

6. Peel the backing off the pieces and fold them equidistantly over the lip of the transition cone (Figure 25).

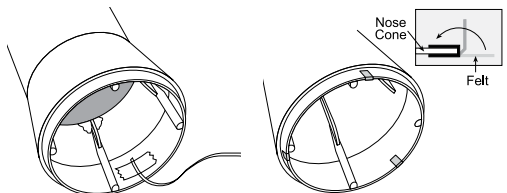


Figure 24

Figure 25

Get Ready to Launch!

1. Punch the deployment disk out of the die-punched heavy paper. Cut a notch in the disk (Figure 26). Slip the notch onto the shock cord just below the knot (Figure 27).

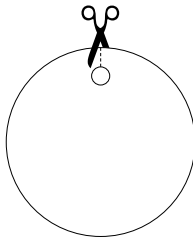


Figure 26

2. Locate the wind speed flap. Put a piece of transparent tape over the hole in the flap (Figure 28). The tape should be no wider than the flap itself.
3. Put 8 to 10 ounces of water in the bottle and place the bottle on the launcher.
4. Slide the stacked tubes onto the bottle.

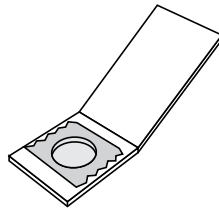


Figure 28

5. While pushing and holding the bellows down, press the sticky side of the hole in the wind speed flap to the white plastic plug located on the side of BT2 (Figure 29). The tape should hold the flap in place and the bellows should remain depressed.

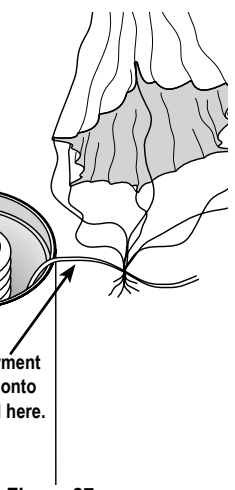


Figure 27

6. Position the deployment disk securely on top of the bellows cup (Figure 30).
7. Fold the parachute and place it on top of the disk.

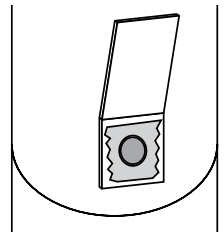


Figure 29

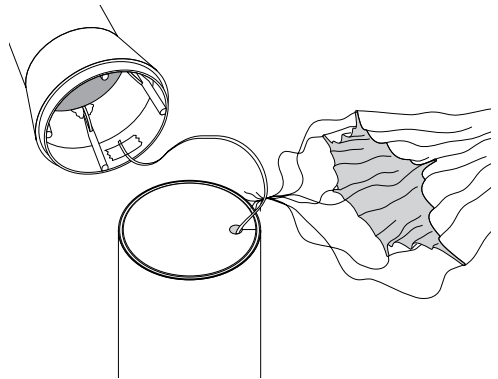


Figure 30

Note: Folding the parachute correctly is critical to the safe return of your rocket! Fold it end-over-end lengthwise, then end-over-end widthwise so the material forms a small square. Then, wind the shroud lines tightly around the folded parachute.

8. Stack the plastic transition cone and 8" tube on top of the rocket (Figure 31).
9. Remove the nose cone from the plastic sprue. Place it on top of the 8" tube.

Launch

Pump up the launcher (recommended maximum PSI is 80 pounds) and fire the rocket. See the instructions that accompanied your launcher for details.

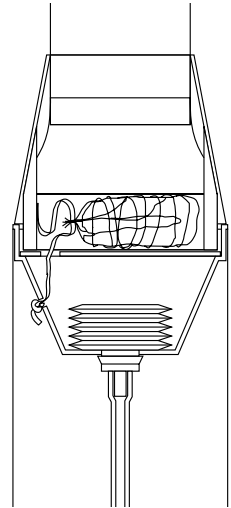


Figure 31

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