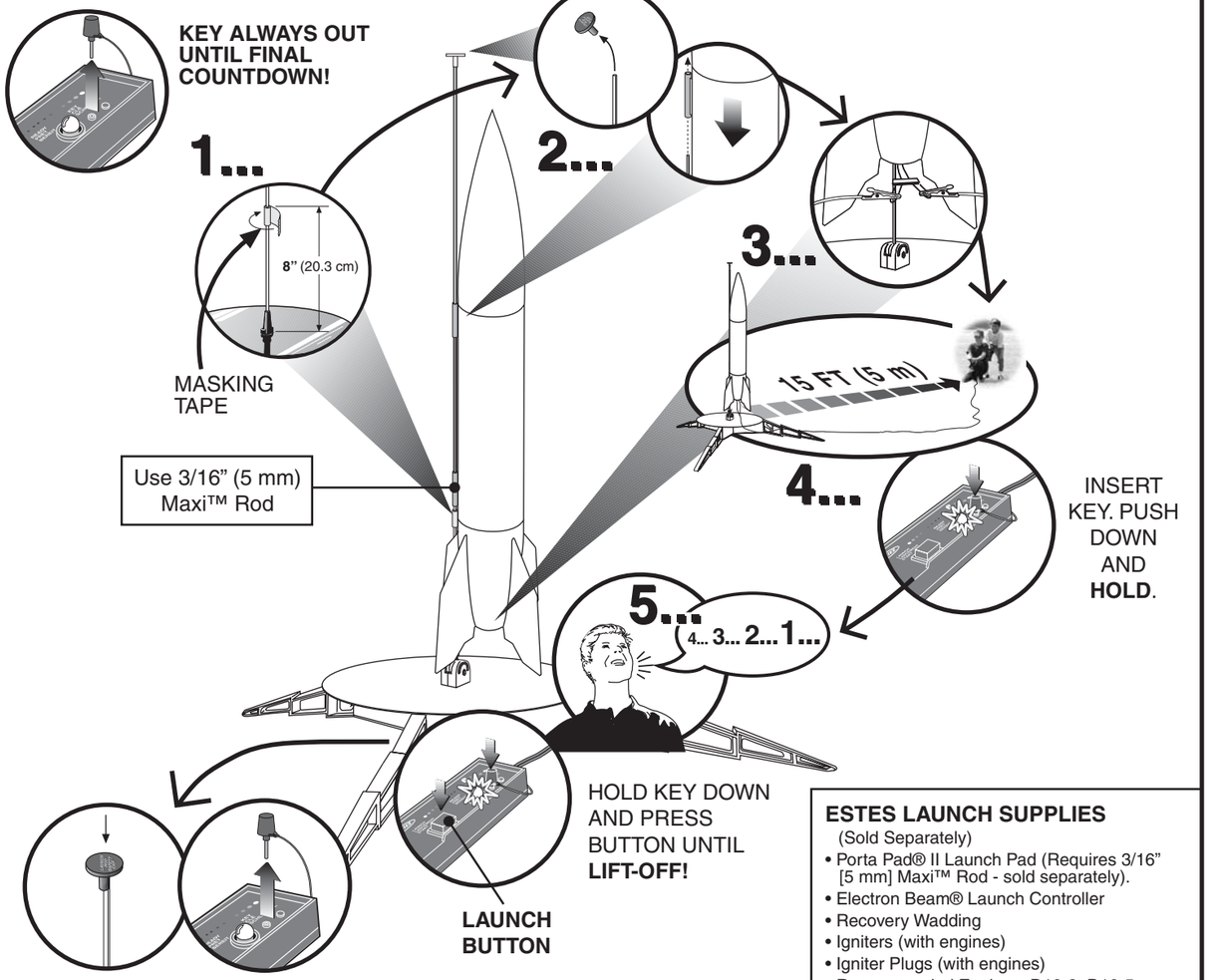
## COUNTDOWN AND LAUNCH




### ESTES LAUNCH SUPPLIES

(Sold Separately)

- Porta Pad® II Launch Pad (Requires 3/16" [5 mm] Maxi™ Rod - sold separately).
- Electron Beam® Launch Controller
- Recovery Wadding
- Igniters (with engines)
- Igniter Plugs (with engines)
- Recommended Engines: D12-3, D12-5

## PRECAUTIONS


### FLYING YOUR ROCKET

Choose a large field (500 ft. [152 m] square) free of dry weeds and brown grass. The larger the launch area, the better the chance of recovering your rocket. Football fields and playgrounds are great. Launch only with little or no wind and good visibility.

Always follow the National Association of Rocketry (**NAR**) Safety Code.

### MISFIRES

**TAKE THE KEY OUT OF THE CONTROLLER. WAIT ONE MINUTE BEFORE GOING NEAR THE ROCKET!** Disconnect the igniter clips and remove the engine. Take the plug and igniter out of the engine. If the igniter has burned, it worked but did not ignite the engine because it was not touching the propellant inside the engine. Put a new igniter all the way inside the engine without bending it. Push the plug in place. Repeat the steps under Countdown and Launch.

ANSARI X PRIZE®

### TEAM OVERVIEW Canadian Arrow

The Canadian Arrow team is highly motivated to fulfill the dream of popular space travel using the "don't reinvent the wheel" approach. By making use of the research performed over 60 years ago, this Canadian team plans to bring the V2 rocket back to life, but this time for the benefit of the space tourism industry.

**TEAM SPECIFICATIONS:**
Name: Canadian Arrow. Website: www.canadianarrow.com
Country of Origin: London, Ontario, Canada

**VEHICLE SPECIFICATIONS:**
Name: Canadian Arrow
Length: (1st, 2nd Stage): 54 feet (33.5 feet, 20 feet) Diameter: 5.4 feet. GTOW: 31,000 lbm. Dry Weight: 12,500 lbm. Engines (1st, 2nd Stage): 1,4. Total Thrust: (1st, 2nd Stage): 57,000 lbf, 17,600 lbf. Payload Capacity: 3 passengers (900 lbm). Crew Capsule Environment: Pressurized to atm plus full pressure suits for crew.

**MISSION SPECIFICATIONS:**
Launch Method: Vertical Take-off from ground. Max Accel. Force on Ascent: 5.4g for 3 sec. Max Speed: Mach 4 (2,966 mph). Max. Altitude: 70 miles (113 km). Time in Weightless Conditions: 4 minutes. Landing Method: Ocean splashdown via parachute. Total Flight Duration: ~45 minutes.




ESTES
www.estesrockets.com
ESTES INDUSTRIES
1295 H Street
Penrose, CO 81240
PRINTED IN CHINA

Canadian Arrow

# CANADIAN ARROW #2188

**FLYING MODEL ROCKET KIT INSTRUCTIONS**

*KEEP FOR FUTURE REFERENCE*

ANSARI X PRIZE®

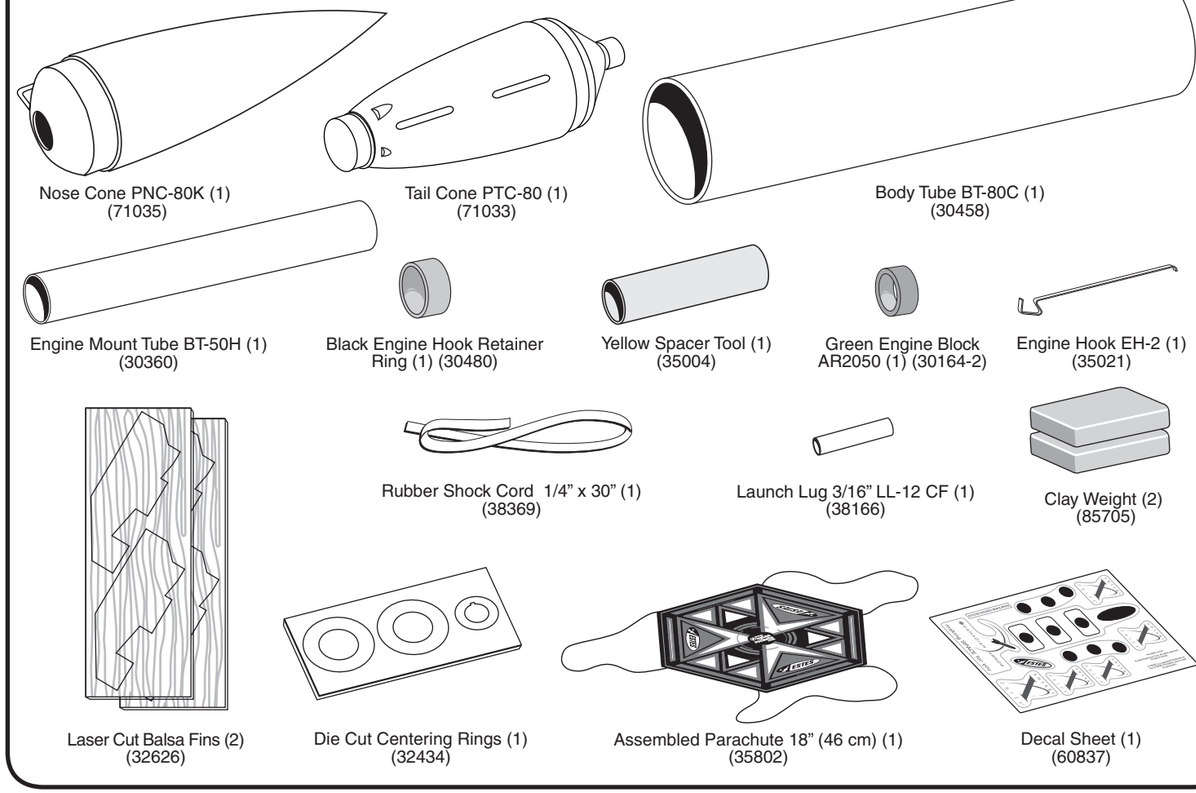


**ASSEMBLY TIP:** Read all instructions before beginning work on your model. Make sure you have all parts and supplies.

**TEST FIT ALL PARTS TOGETHER BEFORE APPLYING ANY GLUE!**
If any parts don't fit properly, sand as required for precision assembly.

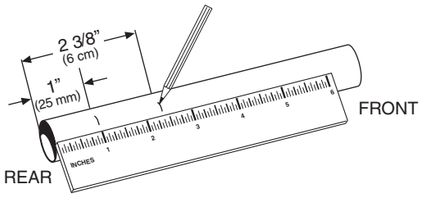
## PARTS

Locate the parts shown below and lay them out on the table in front of you. DO NOT USE THIS DRAWING TO ASSEMBLE YOUR ROCKET.

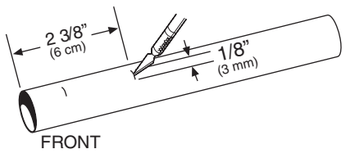



## SUPPLIES In addition to the parts included in the kit you will also need:

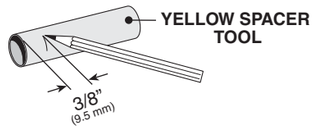
# 1. ASSEMBLE ENGINE MOUNT



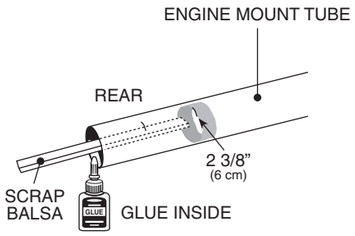

**A.** Measure and mark Engine Mount Tube.



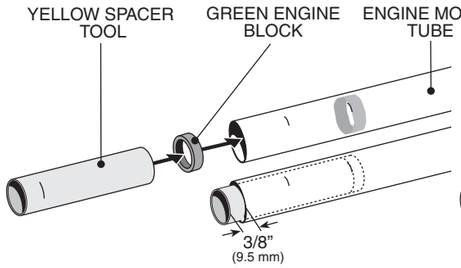

**B.** Cut 1/8" (3 mm) slit at 2 3/8" (6 cm) mark.



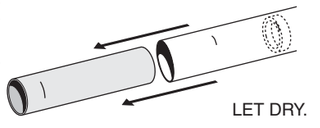

**C.** Mark Yellow Spacer Tool 3/8" (9.5 mm) from end.



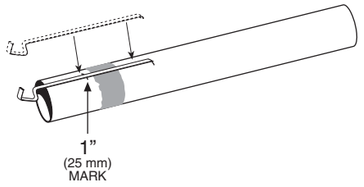

**D.** Use scrap balsa to smear glue 2 3/8" (6 cm) inside Engine Mount Tube.



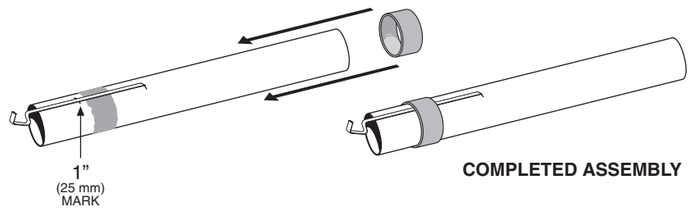

**E.** Use Engine Spacer Tool to push Engine Block into Engine Mount Tube up to mark.




**F.** Remove Spacer Tool immediately.

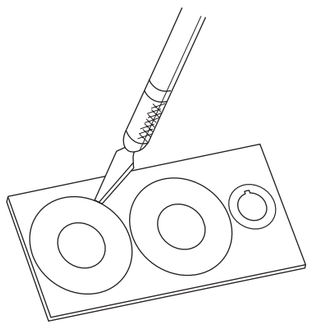



**G.** Apply glue around tube just ahead of the 1" (25 mm) mark. Insert Engine Hook into slit, as shown.

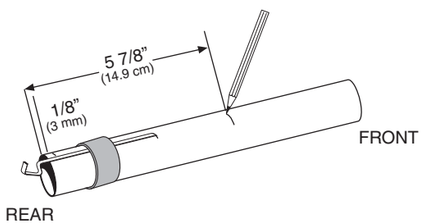



**H.** Slide Engine Hook Retainer Ring onto Engine Mount Tube up to 1" (25 mm) mark. Let dry.

# 2. ATTACH CENTERING RINGS



**A.** Using a modeling knife, carefully remove rings from Centering Ring card.

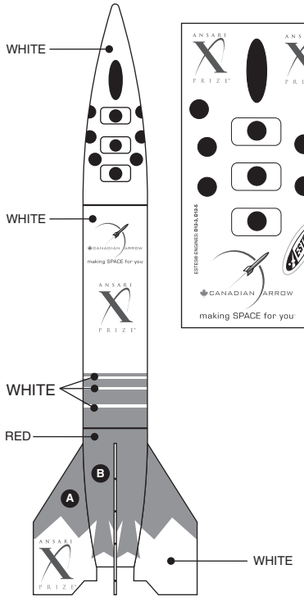



**B.** Mark Engine Mount Tube at 1/8" (3 mm) and 5 7/8" (14.9 cm) from rear.



# 11. FINISHING YOUR ROCKET

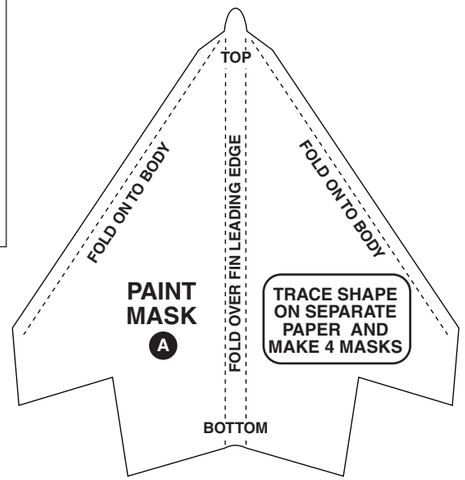
**A.** First spray rocket with white primer. Do not get primer or paint inside Engine Mount. Let dry and sand. Repeat until rocket is smooth. FOLLOW THE PAINT SCHEME ON THE PACKAGE.

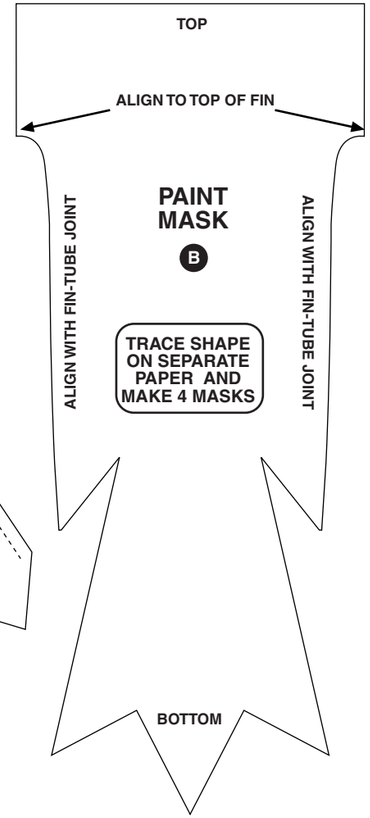






**B.** Trace or photocopy Paint Masks A and B onto separate sheets of paper. Do not cut out originals.



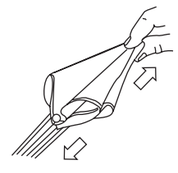




**C.** When paint is dry, peel decals one at a time from backing sheet and apply where shown. Rub down to remove bubbles.

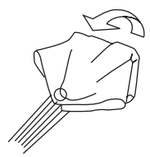
OPTIONAL: Spray a clear coat on entire rocket after paint dries and after decal placement.

## PREPARE PARACHUTE FOR FLIGHT

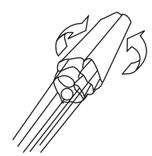

**A.** Insert 6-8 squares of loosely crumpled recovery wadding into rocket.



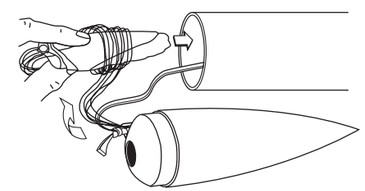
**B.** Spike Parachute.



**C.** Fold.



**D.** Roll.



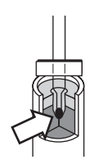
**E.** Wrap lines loosely. Insert 'Chute, Shock Cord and Nose Cone into Body Tube.

## PREPARE ENGINE

**⚠ WARNING: FLAMMABLE**

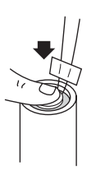
To avoid serious injury, read instructions & NAR Safety Code included with engines.
**PREPARE YOUR ENGINE ONLY WHEN YOU ARE OUTSIDE AT THE LAUNCH SITE PREPARING TO LAUNCH!**
If you do not use your prepared engine, remove the igniter before storing your engine.

**A.** Separate Igniter and Plug.

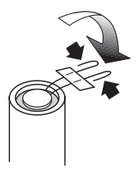


**B.** Tip must touch propellant!

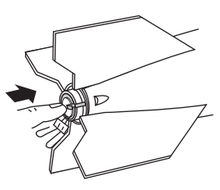
**C.**



**D.**

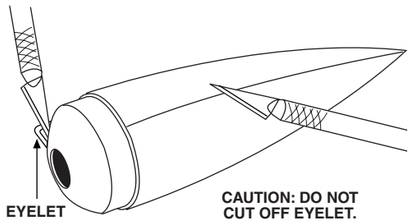


**E.**

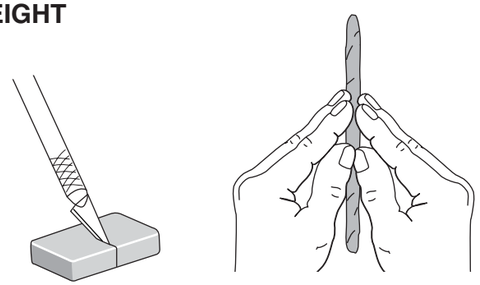


**F.** Insert Engine

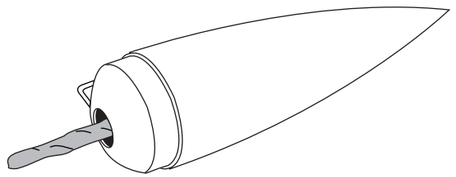
## 8. PREPARE NOSE CONE AND INSTALL NOSE WEIGHT



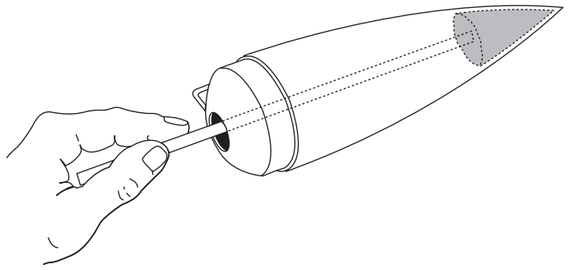

**A.** Using a modeling knife, remove excess flash from Nose Cone and eyelet.



**B.** Cut clay in half and roll into two “snakes”.



**C.** Insert clay “snakes” into Nose Cone, one at a time.

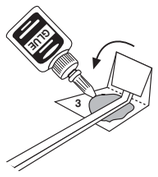


**D.** Pack clay “snakes” tightly into tip of Nose Cone using a scrap piece of balsa or a pencil. Use ALL of the clay.

## 9. INSTALL SHOCK CORD MOUNT

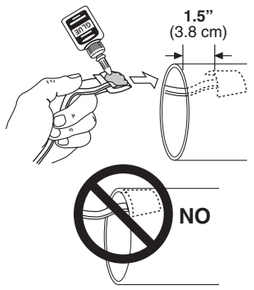
**A.** Cut out Shock Cord Mount.


**B.** Apply glue. Fold forward.

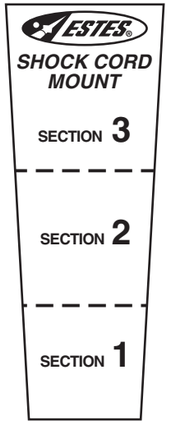



**C.** Apply glue. Fold forward.

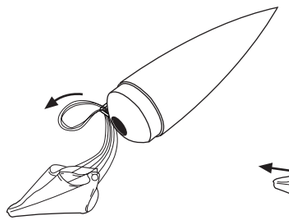
**D.** Squeeze tightly and hold for one minute.



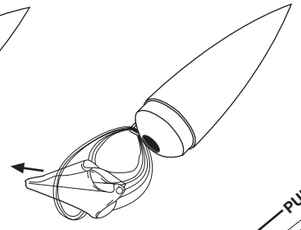

**E.** Glue mount 1.5” (3.8 cm) inside upper Body Tube. Hold until glue sets. Let dry.



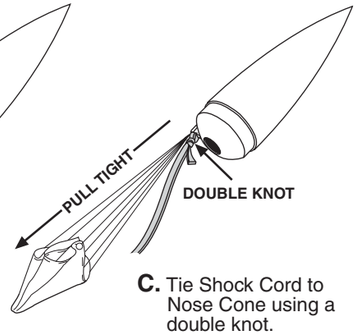

## 10. ATTACH PARACHUTE AND SHOCK CORD



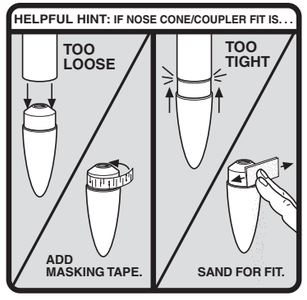
**A.** Pass shroud lines through eyelet.



**B.** Pass Parachute through loop.

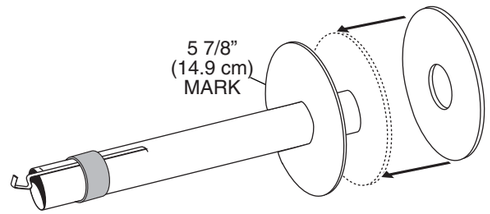



**C.** Tie Shock Cord to Nose Cone using a double knot.

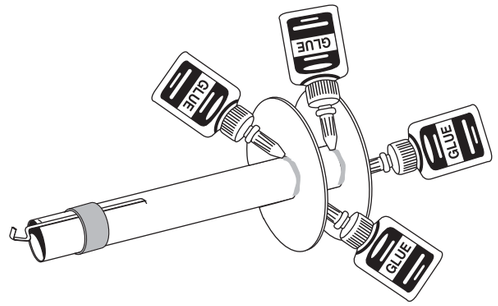




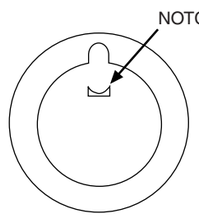

## 2. ATTACH CENTERING RINGS (CONT.)



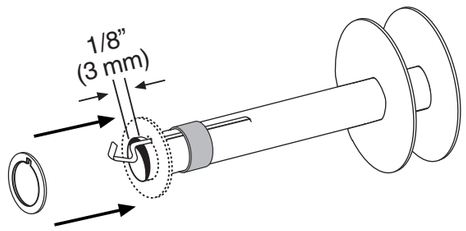

**C.** Slide one large Ring onto Tube, down to 5 7/8” (14.9 cm) mark. Slide other large Ring onto end of tube.




**D.** Apply glue fillets to both sides of each ring. Let dry completely.



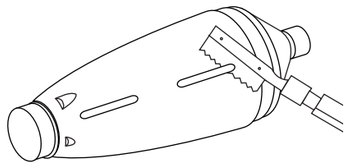

**E.** Trim out notch of small Ring and discard.



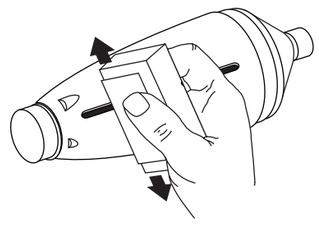

**F.** Slide notched Ring over Engine Hook 1/8” (3 mm) from end of Engine Tube.


**G.** Apply glue fillet to both sides of ring. Let dry completely.

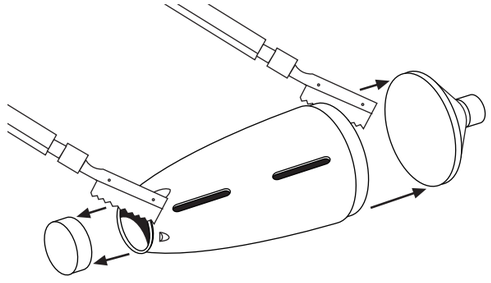
## 3. PREPARE TAIL CONE



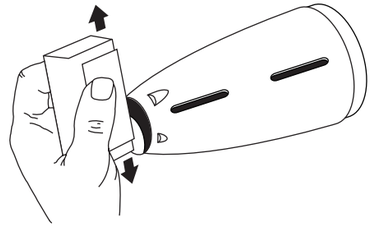
**A.** Using a razor saw, carefully remove the nibs that cover the slots for the Fins.



**B.** Sand away excess plastic lip flush with surface.

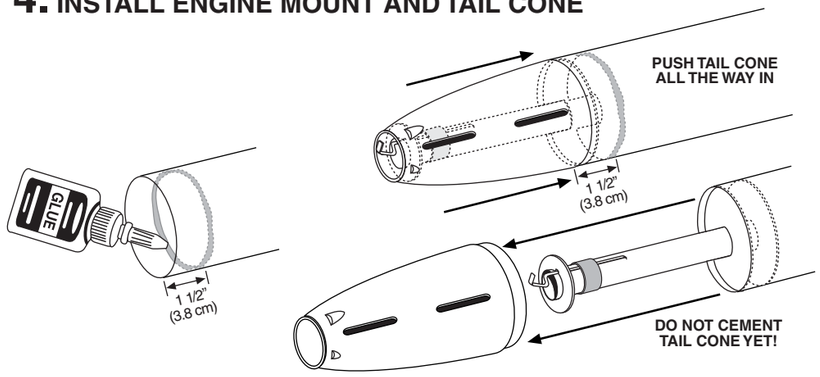


**C.** Using a razor saw, carefully cut off ends as shown and discard.



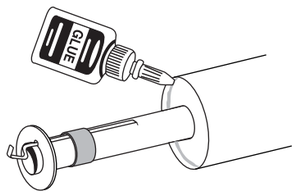
**D.** Sand excess plastic lip away with sanding block.

## 4. INSTALL ENGINE MOUNT AND TAIL CONE

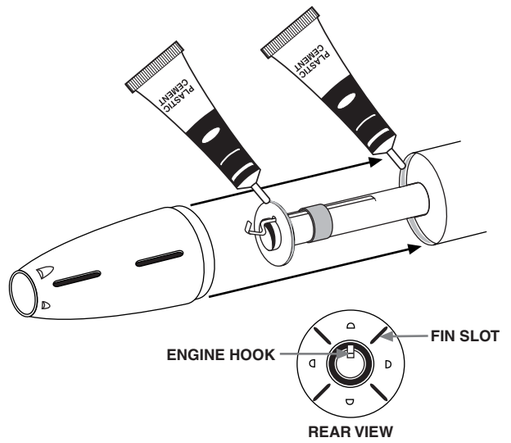



**A.** Apply glue inside Body Tube at 1 1/2" (3.8 cm).

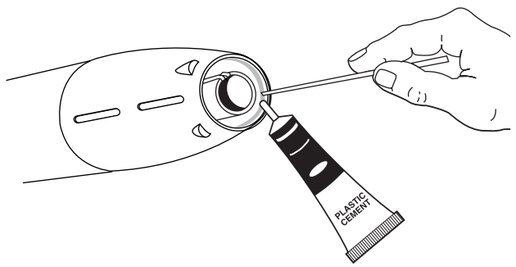
**B.** Use the Tail Cone to insert and position the Engine Mount assembly to correct position. Remove Tail Cone immediately. Let dry.




**C.** After Engine Mount assembly has dried, apply a glue fillet around Ring and Body Tube joint. Let dry.

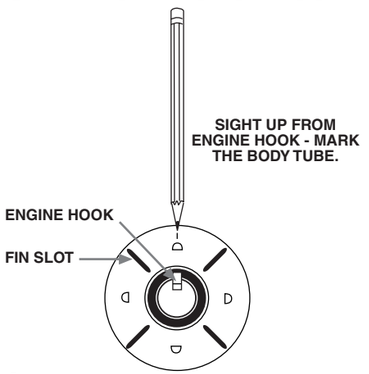



**D.** Apply tube type plastic cement to the inside edge of Body Tube and around Centering Ring edge. Slide Tail Cone into Body Tube. Turn Tail Cone to position Engine Hook between Fin Slots.

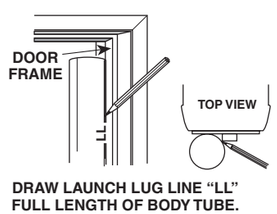



**E.** Using a scrap piece of balsa, apply a fillet of tube type plastic cement to the inside Ring/Tail Cone joint. Let dry completely.

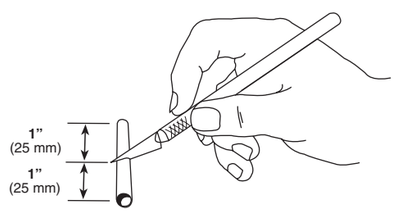
## 5. ATTACH LAUNCH LUG




**A.** Place a pencil mark on the body tube in line with the Engine Hook.



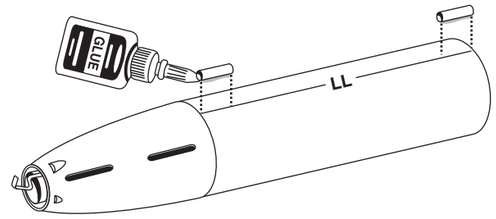

**B.** Using a door jamb, extend the mark the entire length of Body Tube.



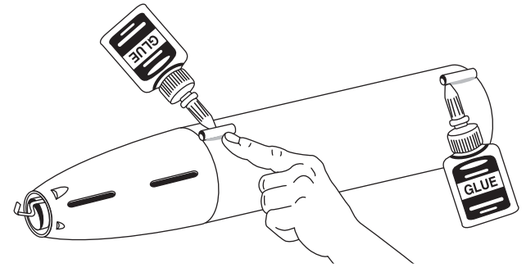

**C.** Cut Launch Lug into two equal parts.



## 5. ATTACH LAUNCH LUG (CONT.)

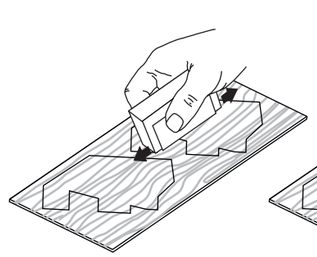



**D.** Apply glue to Launch Lug, attach on "LL" line as shown. Be sure to center Launch Lugs on "LL" line so that they are in alignment with each other. Let dry completely.

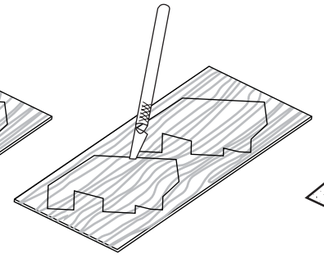



**E.** Apply glue fillets to each side of Launch Lug, smooth out with finger. Let dry completely.

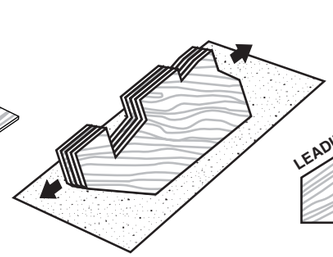
## 6. PREPARE FINS



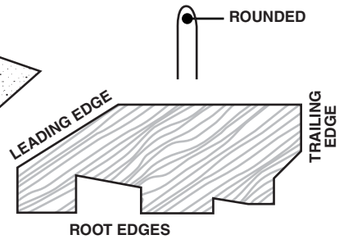
**A.** Using fine sandpaper, sand both sides of laser cut Fin Sheet.



**B.** Using a modeling knife, carefully remove Fins.

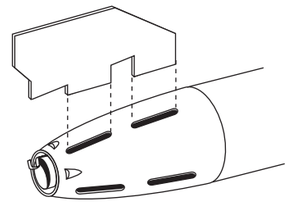


**C.** Stack Fins and sand edges square.

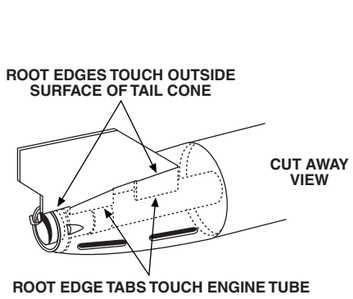



**D.** Sand leading edge of Fins to a slightly round shape. Keep other edges square.

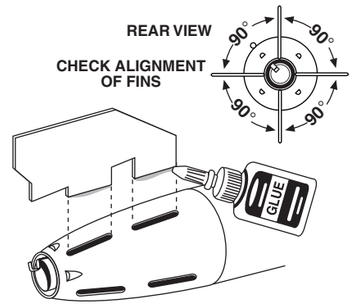
## 7. INSTALL FINS



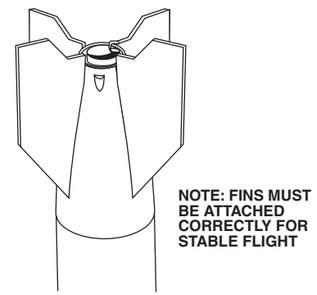
**A.** Test fit Fins in Slots.



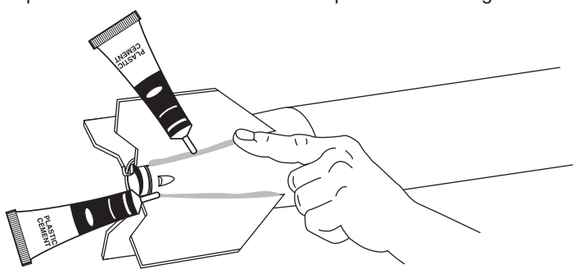

**B.** Sand Fins as needed for a good fit. Do not sand too much off. Test fit again. Repeat as needed.




**C.** Apply glue to Fin tabs and push into slots until Fin is seated flush to Tail Cone. Repeat for remaining Fins. Let dry.




**D.** Stand rocket upright as shown, until glue dries completely.




**E.** Apply tube type plastic cement fillets to Fin/Tail Cone joints. Smooth out with finger. Continue until all four Fins are complete. Let dry completely.