

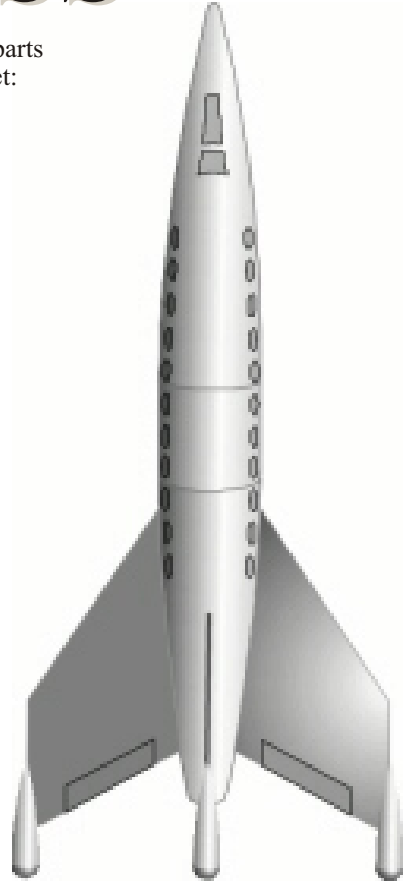
Little LUNAR EXPRESS



The Little Lunar Express kit contains all the parts necessary* to build a flying high power rocket:

- 1) Pre-slotted boattail
- 1) Airframe 5.5" long
- 1) Nose cone
- 2) Main fins
- 2) Stabilizer fins
- 1) Piston ejection kit including:
 - 1) Piston body
 - 1) Piston strap
 - 1) Slotted bulk plate
 - 1) "D" ring
- 1) Parachute
- 1) Motor mount tube (38mm)
- 2) Notched centering ring
- 1) Centering ring
- 1) Ejection tube centering ring (large ID)
- 1) Recovery system tube
- 4) Landing pods
- 4) Landing pads
- 1) Elastic shock cord
- 1) Bulk plate w/ eyebolt, washer, two nuts
- 1) Kwik-Link
- 2) 3/8" launch lugs
- 1) Decal sheet
- 1) Instruction sheet (this one!)

**Epoxy, paint, and motor not included.*



The center of pressure (CP) of this rocket is 25 inches from nose tip. After finishing your rocket, permanently mark the center of pressure on the airframe. Calculations made using RockSim 4.0 program for subsonic flights. After loading the rocket with a motor, make sure that the center of gravity (balancing point) is 4" forward of the center of pressure mark. The center of gravity can be moved forward by adding weight to the nose cone. It is impossible to test every rocket with every motor configuration therefore, if you are unsure about motor selection for any rocket consult the motor manufacturer.

Little LUNAR EXPRESS

Assembly instructions

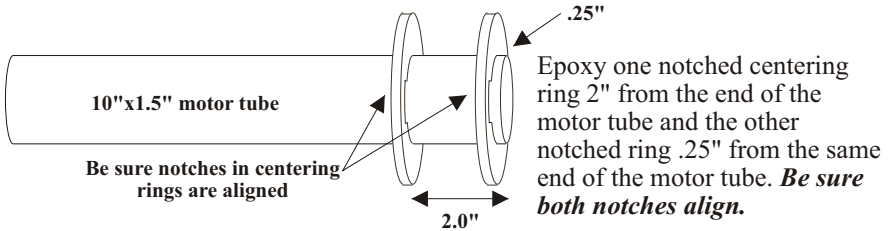
Please read and understand all instructions before continuing!

Stuff you will need:

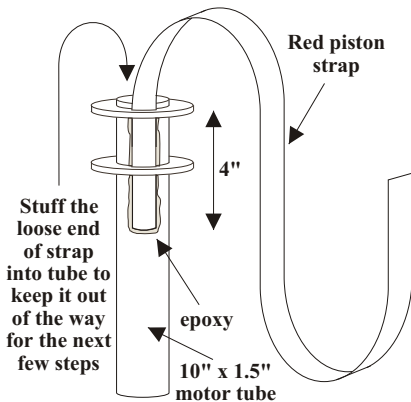
Medium or thick CA (Super Glue)
 One set of either 5 or 15 minute epoxy
 One sheet of each fine and medium sand paper
 Ruler and pencil
 12" x 12" piece of wax paper
 Masking tape

Step 1

NOTE: Be sure to scuff all parts to be bonded using medium sand paper.

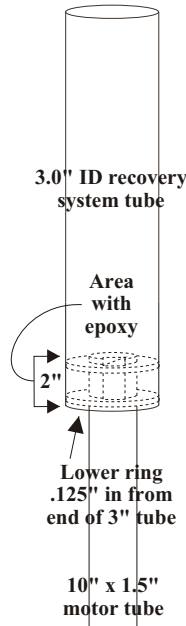


Step 2



Slip one end (approx. 4") of the piston strap (the 3/4" wide one) through the notches of both rings. Epoxy the strap to the outside of the motor mount tube as indicated in the drawing. Use masking tape to hold the strap in place while the epoxy cures. Do not cut the strap. When the epoxy has cured, stuff the free end of the strap into the motor tube to keep it out of the way for the next few steps.

Step 3



Apply a heavy layer of epoxy to the inside of the recovery system tube. The epoxy should start at one end of the tube and extend 2" in. Slide the motor mount assembly from the previous step into the recovery system tube until the lower ring is .125" in from the end. Hold this new assembly vertical until the epoxy cures. **Be sure the recovery tube does not slip down, these dimensions are critical.**

Step 4

The procedures in this step must be accomplished in rapid succession. It is advisable to do a dry run so that you are comfortable with the procedure. If you do not want to be rushed, use a slow setting epoxy.

A) Lay a square of wax paper on a flat surface. Stand the boattail on the wax paper. Apply a very heavy bead of epoxy to the end of the motor tube.

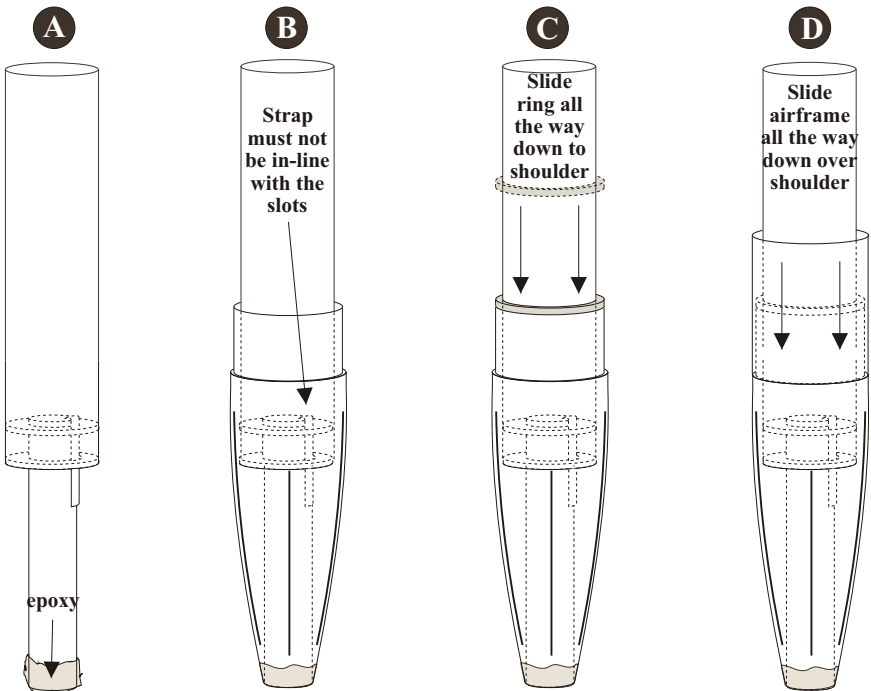
B) Insert the motor tube assembly into the boattail. *Be sure the strap is not in line with a slot in the boattail!*

Do not stop, continue with the rest of the step!

C) Slip the thick centering ring over the recovery tube all the way down to the boattail shoulder. *Do not epoxy this ring in position yet.*

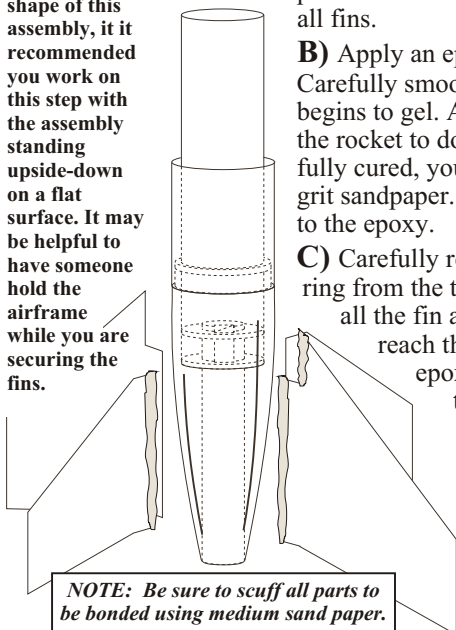
D) Slide the 5.5" long section of airframe over the recovery tube and firmly over the shoulder of the boattail. *Do not epoxy this airframe in position yet.*

Steps 4C and 4D are intended only to properly center the motor/recovery assembly in the boattail and hold it there while the fins are installed. The centering ring and airframe will be removed in a later step to allow you to add epoxy fillets to the fins.



Step 5

NOTE: Considering the shape of this assembly, it is recommended you work on this step with the assembly standing upside-down on a flat surface. It may be helpful to have someone hold the airframe while you are securing the fins.



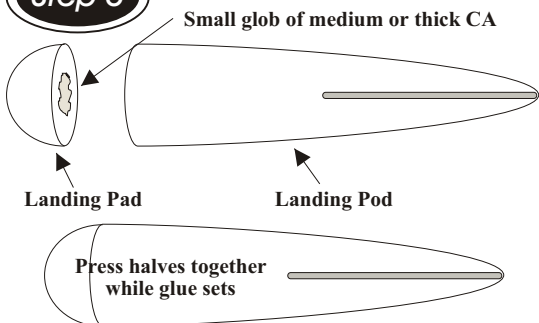
A) Apply a bead of epoxy to the root edge of a fin. Push the fin through the slot in the boattail and against the motor mount tube. Make sure that the fin is perpendicular to the boattail. Use tape to hold the fin in position while the epoxy cures. Repeat this process for all fins.

B) Apply an epoxy fillet to both sides of each fin. Carefully smooth the epoxy with your finger before it begins to gel. Allow the epoxy to set-up before rotating the rocket to do the next set of fins. Once the epoxy has fully cured, you should sand the fillet smooth with 180 grit sandpaper. Sanding will help the primer hold better to the epoxy.

C) Carefully remove the airframe and the centering ring from the top of the boattail. Apply epoxy fillets to all the fin attachment points within the boat tail. To reach the lower fins, pour an ounce or so of epoxy along the inside of the boattail past the recovery tube at two opposite points and immediately hold the assembly horizontal and rotate it in each direction to spread the epoxy over the fin roots.

D) Reinstall the centering ring and airframe, this time using epoxy to make the installation permanent.

Step 6

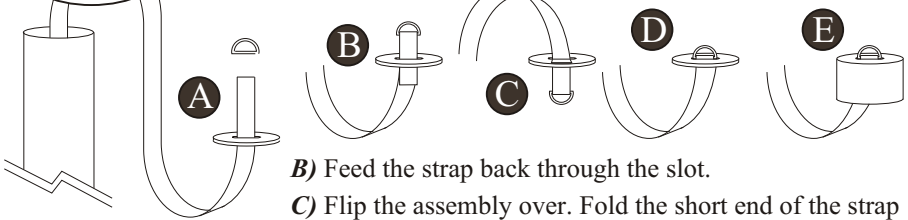


Assemble the landing pods to the landing pads by simply gluing the upper and lower units together using medium or thick CA (super glue). **Be sure the two halves are perfectly aligned, the CA grabs very quickly!**

Attach the pods to the fin tips by half filling the slot with epoxy and pressing it slowly onto the fin tip. As soon as the pod is pressed onto the fin tip, hold the pod in place with one hand and wipe the excess epoxy with a finger of the other hand to form a fillet on each side. Secure with masking tape while the epoxy cures. The first three pods should be mounted to the fins while the rocket assembly is upside-down on a flat surface. The fourth pod should be mounted with the rocket upright on a flat surface so that the assembled rocket does not rock due to very slight vertical misalignment of the fins or pods. Apply pressure to the fin opposite the fourth pod so that the rocket does not fall over while setting the fourth pod.

Step 7

The strap referred to in this step is the strap you installed in the airframe in a previous step.



A) Pull the free end of the strap through the slot in the piston bulk plate. Slip the metal "D" ring over the strap.

B) Feed the strap back through the slot.

C) Flip the assembly over. Fold the short end of the strap flat against the bulkplate and epoxy in place.

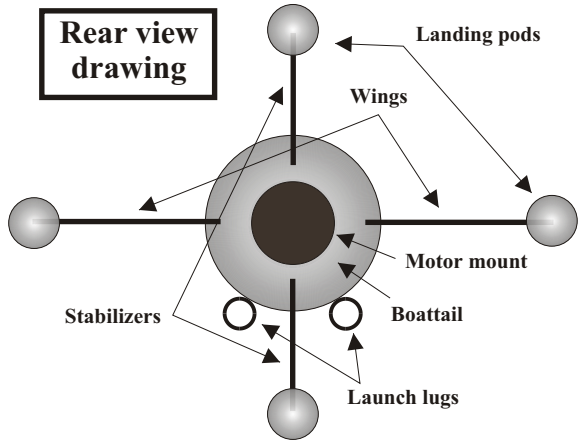
D) When the epoxy has cured, pull the strap until the "D" ring is wedged at the slot. Apply epoxy to the strap at the "D" ring.

E) Epoxy the bulkplate to the piston body 1/8" from the top. Apply an epoxy fillet to both sides of the bulkplate.

Step 8

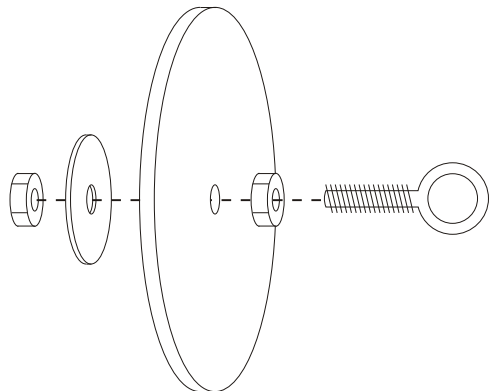
In this kit, two launch lugs are used for aesthetics.

Epoxy the two launch lugs to the airframe (the 5.5" long phenolic tube mounted above the boattail) at the locations indicated in the rearview drawing. Apply an epoxy fillet to both sides of each launch lug.



Step 9

Thread a nut onto the eyebolt as far as it will go. Thread the plywood bulk plate onto the eyebolt until it contacts the nut. Place the washer over the protruding threads of the eyebolt. Thread the other nut tightly against the washer.

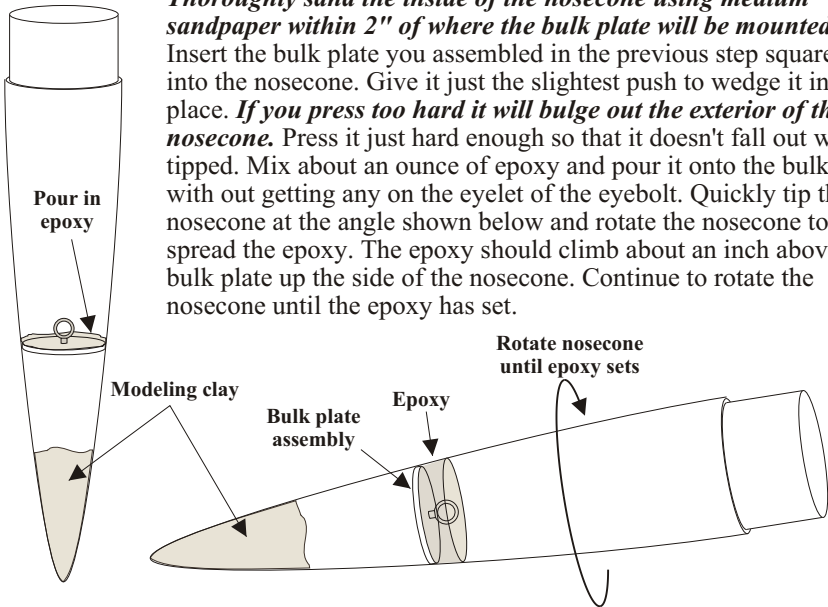


Step 10

Pack the tip of the nosecone with XX ozs. of non-hardening modeling clay for ballast. It's easier to do a little at a time, ramming it in with a dowel or broom stick.

Thoroughly sand the inside of the nosecone using medium sandpaper within 2" of where the bulk plate will be mounted.

Insert the bulk plate you assembled in the previous step squarely into the nosecone. Give it just the slightest push to wedge it in place. **If you press too hard it will bulge out the exterior of the nosecone.** Press it just hard enough so that it doesn't fall out when tipped. Mix about an ounce of epoxy and pour it onto the bulk plate with out getting any on the eyelet of the eyebolt. Quickly tip the nosecone at the angle shown below and rotate the nosecone to spread the epoxy. The epoxy should climb about an inch above the bulk plate up the side of the nosecone. Continue to rotate the nosecone until the epoxy has set.

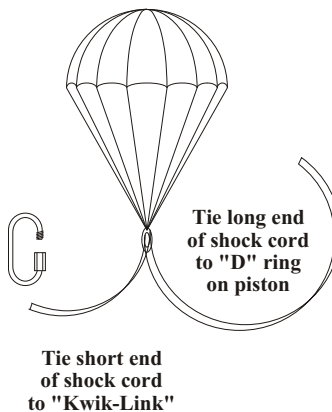


Step 11

NOTE:

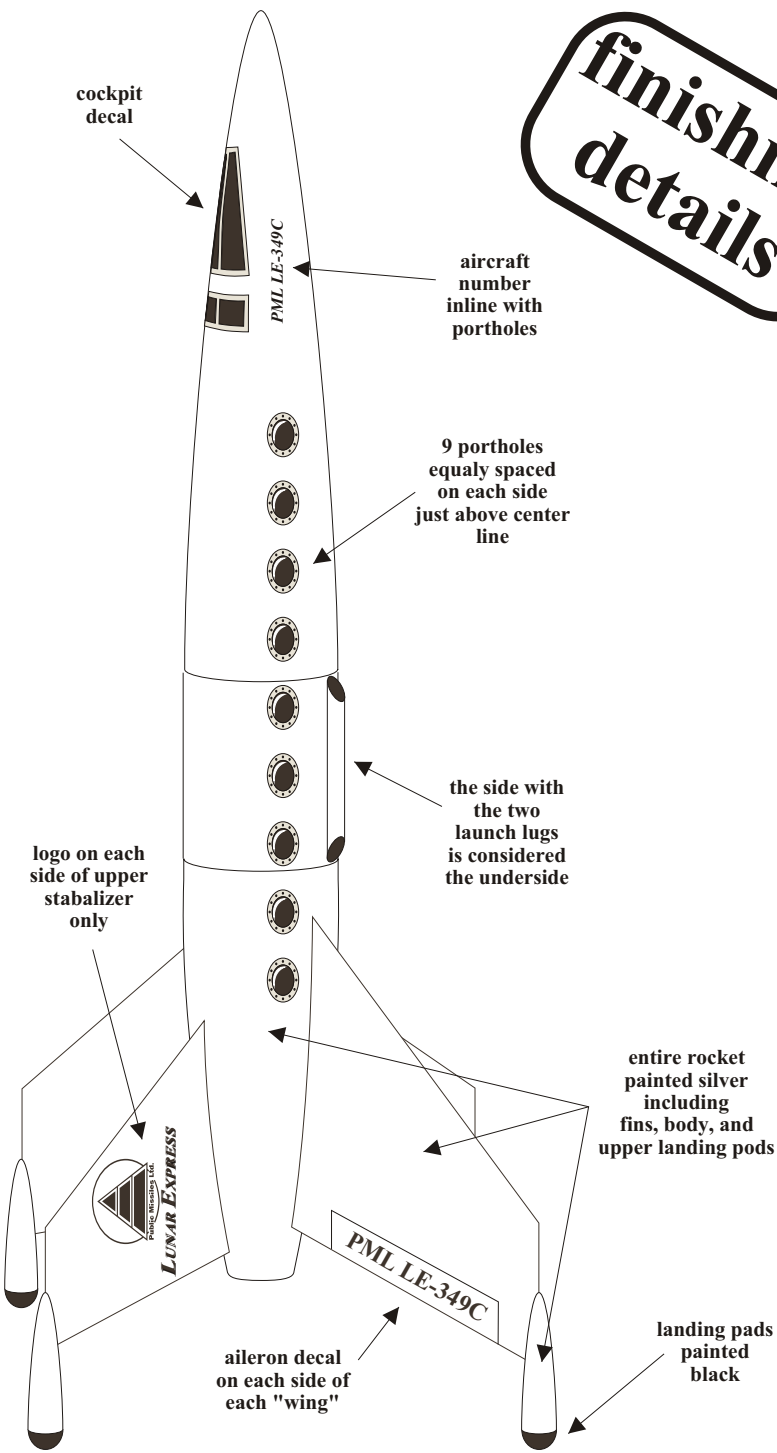
When tying the shock cord to the parachute, the "D" ring, and the "Kwik-Link", loop the shock cord through twice then tie a double overhand knot. Pull the knot tight and leave a 2-3 inch trailer.

Measure off the mid point of each parachute shroud line and mark it with a pen. Gather all the shroud lines making sure they are not twisted or tangled. Keep all the marks on the shroud lines together. Tie the lines together using a simple overhand knot leaving a small loop where all the marks meet. Tie the parachute to the elastic shock cord 1/3 of the way from one end. Tie the long end of the shock cord to the "D" ring on the piston. Tie the short end of the shock cord to the "Kwik-Link".



Reach into the nosecone and attach the "Kwik-Link" to the eyebolt. Slide the piston into the rocket followed by the short end of shock cord, then the parachute, then the long end of shock cord. Place the nose cone atop the rocket. It should fit just tight enough to allow you to lift the rocket by the nose cone without it slipping off. Wrap masking tape around the shoulder of the nose cone for a tighter fit if necessary.

finishing details



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