



ARCAS Rocket Assembly Instructions



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Parts List:

1. Secant-Ogive fiberglass nose cone
2. G10 coupler bulk plate
3. Pre-slotted fiberglass booster airframe
4. G10 centering rings
5. 38mm motor tube
6. G10 fins
7. Eyebolt, nut, washer set
8. Nylon shock cord
9. ¼" launch lugs
10. Cut letter vinyl decal
11. 9"x9" flameproof parachute protector
12. 30" nylon parachute
13. Aero Pack 38mm motor retainer

Required to Complete:

1. 3-5 minute epoxy
2. 120/220 sand paper
3. Masking tape
4. Alcohol wipes
5. Gloves

Specifications:

Length: 52.5"

Diameter: 2.6"

Weight: 32 oz

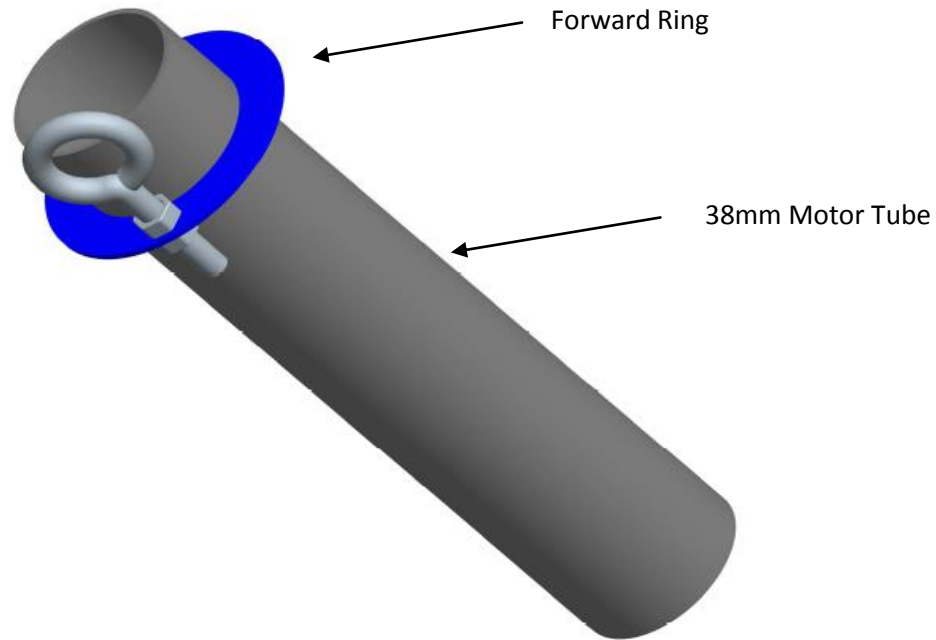
Recovery: 30" nylon parachute

Motor Mount: 38mm

Fins: 4 -1/16" G10

Part 1 – Forward Ring Assembly

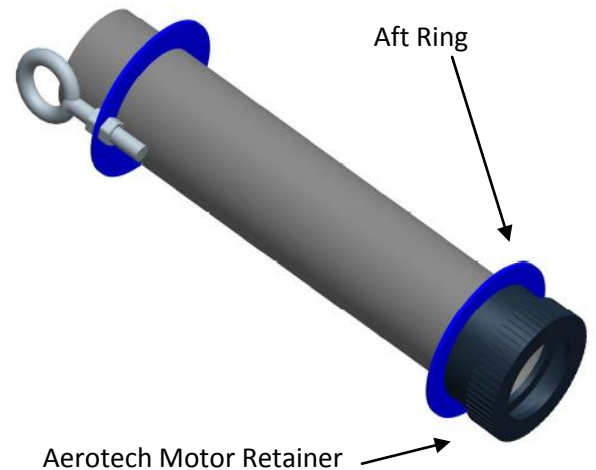
The centering ring with the 1/4" hole for an eyebolt will be the forward ring. Mount the eyebolt using two nuts as shown in the forward ring hole. Test fit the forward ring over the motor mount tube and sand if necessary. Also test fit the forward ring in the body tube and sand if necessary. Sand the surface of the motor tube to increase adhesion strength. Make a mark 1" from the end of the motor tube and slide the forward ring until it aligns with the mark. Apply some epoxy on the motor and to the nuts to ensure they will not come loose later. Set aside and allow epoxy to harden for at least 10 minutes.



VERY IMPORTANT: Make sure there is not any epoxy on the motor tube that would interfere with the fin tangs later on. Make sure there is not any epoxy in the motor tube that would interfere with the motor case later on.

Part 2 – Aft Ring and Motor Retainer Assembly

The remaining centering ring will be the aft ring. Test fit the aft ring over the motor mount tube and sand if necessary. Also test fit the aft ring in the body tube and sand if necessary. Sand the surface of the motor tube to increase adhesion strength. Slide the aft ring on to and up the motor tube at least 2" (DO NOT EPOXY). Spread some epoxy on the outside of the aft end of the motor tube and slide the motor retainer base all the way onto the motor tube. Slide the aft ring down and against the motor retainer. Apply some epoxy on the forward edge of the aft ring. Set aside and allow epoxy to harden for at least 10 minutes.



Spread some epoxy on the outside of one end of the motor tube and slide the ring (without the hole) until there is approximately 1/2" of motor tube exposed. Make sure the motor tube is cleaned of any epoxy so as not to interfere with the fin tangs later. After the aft ring is dry, Spread some epoxy on the motor tube and slide the forward ring until it aligns with the mark. Set aside and allow epoxy to harden for at least 10 minutes.

VERY IMPORTANT: Make sure there is not any epoxy on the motor tube that would interfere with the fin tangs later on. Also, make sure there is not any epoxy in the motor tube or motor retainer that would interfere with the motor case.

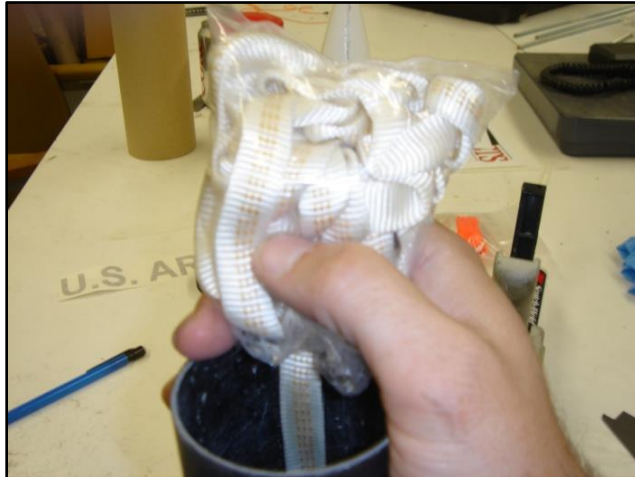
Part 3 – Coupler Bulkplate Assembly

Mount the remaining eyebolt using two nuts in the nose cone bulk plate. Test fit the bulk plate in coupler and sand if necessary. Apply some epoxy over the nuts on the eyebolt so it will not come loose later. Epoxy the bulkplate about a 1/4" into the coupler. Next, apply a fillet of epoxy around the bulk plate and coupler joint. Leave the coupler in an inverted position and allow the epoxy to set.

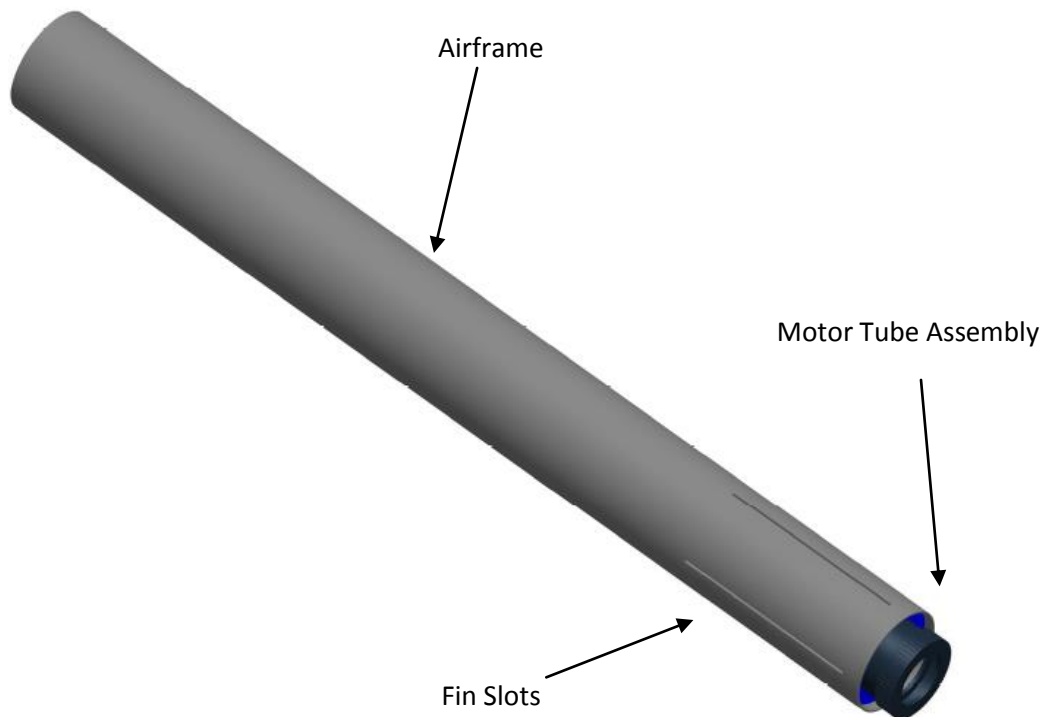


Part 4 – Motor Tube Assembly

Wrap the shock chord into a small bundle and stuff it inside the motor tube for this next step. Test fit the motor tube assembly into the body tube to ensure a snug fit. Sand the centering rings if necessary.



When satisfied with the fit, spread some epoxy on the inside of the body tube and slide the forward centering ring of the motor assembly into the body tube. Make sure the motor assembly is facing the right way! Spread some more epoxy on the inside edge of the body tube before sliding the rear centering ring into the body tube. Continue sliding the assembly inside the body tube until the aft ring of the motor tube is $\frac{1}{8}$ " to $\frac{1}{4}$ " inside the aft end of the body tube. Set the assembly aside and allow the epoxy to cure for at least 15 minutes.

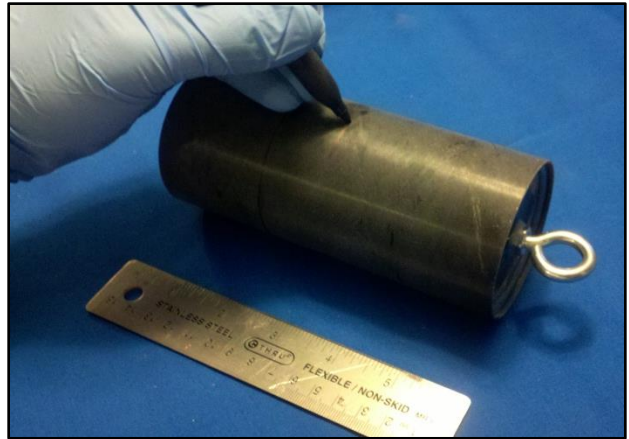


Part 5 – Payload Airframe and Coupler Assembly

Use some of the sand paper to score about half the length of the coupler starting at the open end. Also, use the sand paper to score the surface about three inches on the inside of the payload airframe. Wipe off these surfaces using the alcohol wipes. Mark the coupler at the midpoint with a marker. The open end of the coupler will be epoxied into the payload airframe section up to that mark.

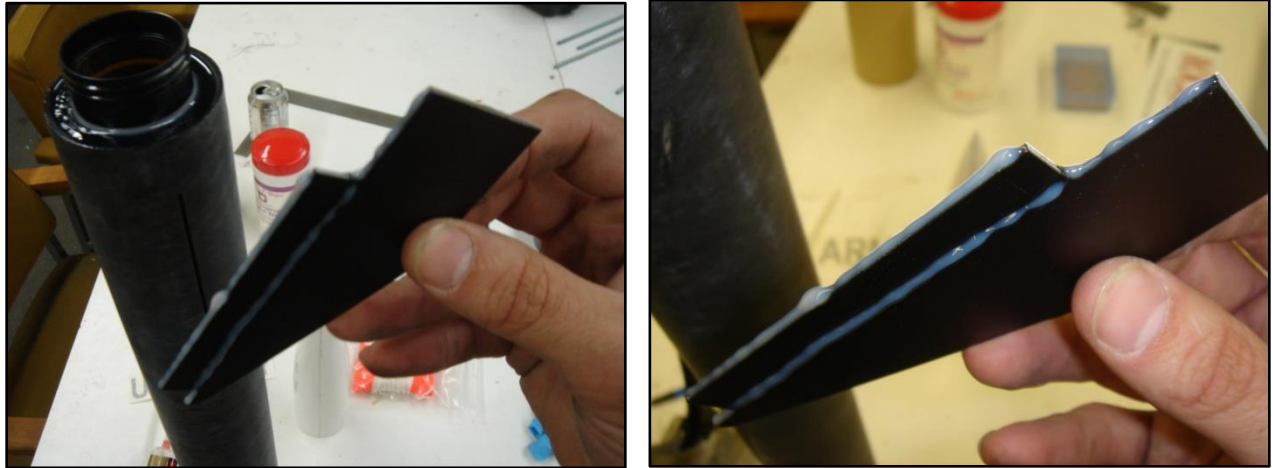
Apply about an inch wide band of epoxy to the outside of the coupler starting at the open end. Slowly work the coupler into the payload airframe twisting the coupler along the way. The epoxy will begin to squeeze up the coupler and may begin to collect around the end of the payload airframe. Try to work this excess epoxy into the bond.

Once the coupler is worked into the airframe up to the marked line, clean up the excess epoxy around the bond. This will improve the fit of the payload section into the booster airframe later. Epoxy is easier to wipe off than sand off. Set the payload section aside to cure.

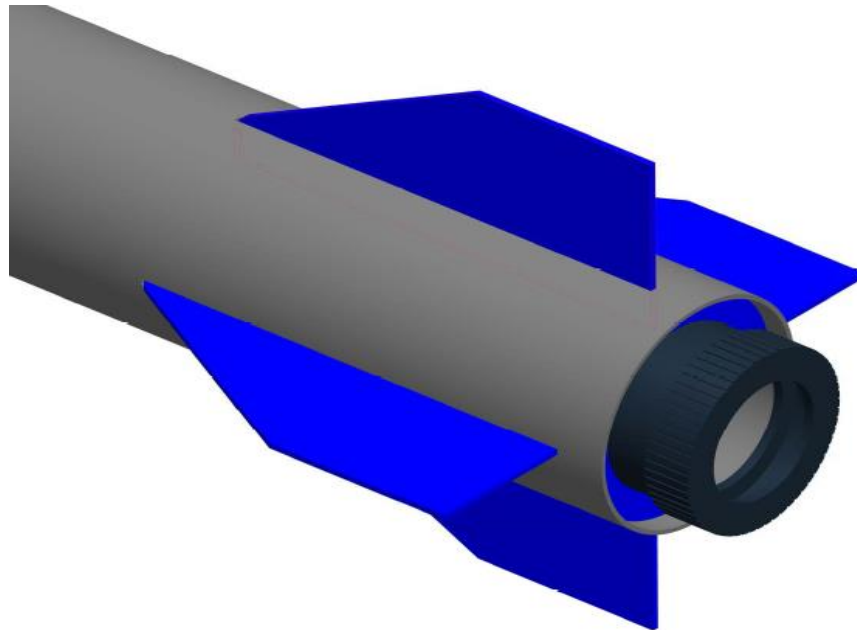


Part 6 – Fin Installation and Alignment

Test fit each of the fins into the pre cut fin slots. The fin should seat firmly against the motor tube - sand each fin if necessary. When satisfied with the fit, apply some epoxy to the end of the fin tang that will contact the motor tube. Also, spread a thin layer of epoxy on each side of the fin tang. Slide the fin into place and check the alignment.

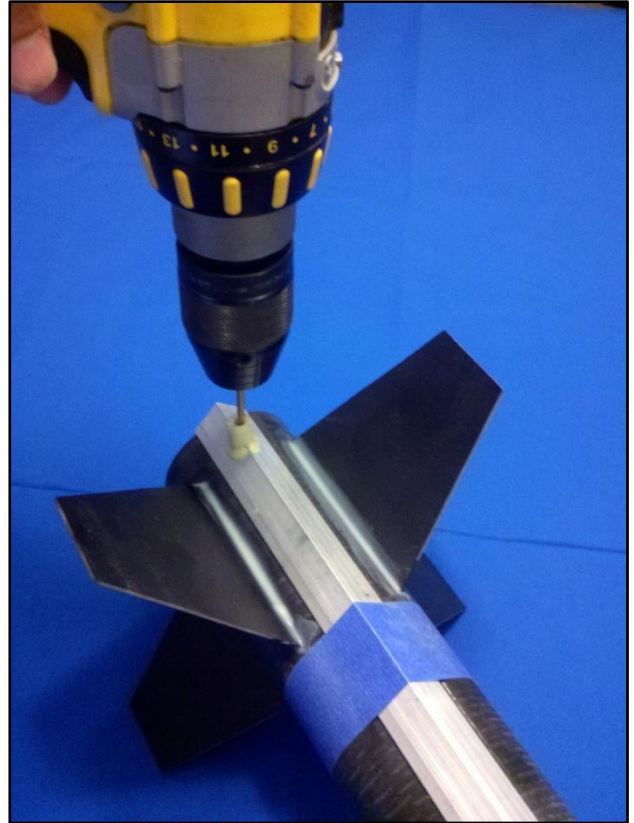


Continue rechecking the fin alignment until it is certain the epoxy has set. Clean any excess epoxy from around the fin joint. Repeat for the remaining fins. Next, apply epoxy fillets to both sides of each fin by applying a thin bead of epoxy at the fin-body tube joining. Carefully smooth the epoxy fillets with your finger before the epoxy sets. Allow each fillet to set before rotating the airframe for the next fillet.



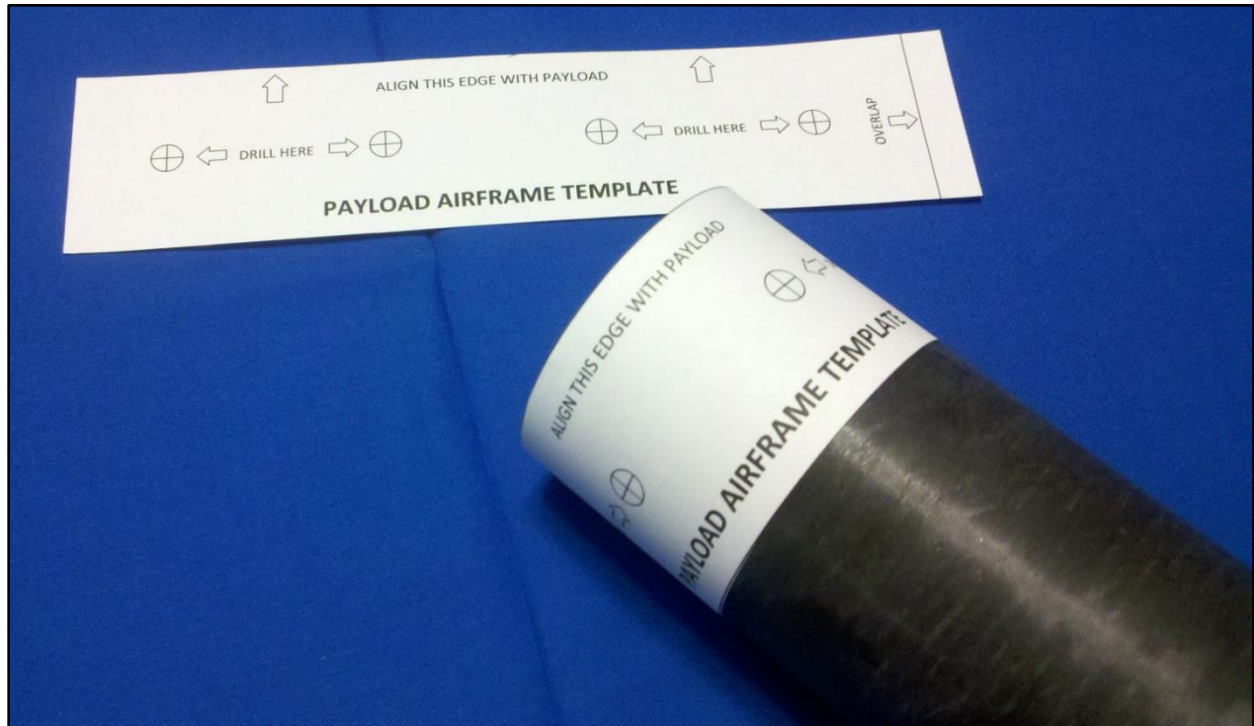
Part 7 – Rail Buttons

Use the rail button jig provided to drill the holes for the rail buttons. The angled aluminum will align itself when laid flush on the airframe. Tape the jig in place with some masking tape. Drill the forward and aft rail button screw holes with the designated size drill bit. Small rail buttons usually use a #8 size machine screw. Use the masking tape to tape the jig along one side of the rocket. Make sure that one end of the jig is flush against the bottom of the rocket. Drill the holes and remove the jig. Apply a small amount of epoxy on the hole and screw in the rail button. Once the rail button is fully seated, use an alcohol wipe to clean off any excess epoxy before it hardens.



Part 8 – Nosecone Rivets

Place the nosecone onto the forward end of the payload airframe. Wrap the **Rivet Template** around the forward end of the payload airframe. The clocking of the template does not particularly matter on this project because the rivets have such a low profile.



Use the drill and one of the rocket cradles to carefully drill the four holes marked on the drill template. The drill should pass through both the airframe and the nosecone coupler. Once the holes are drilled, the nosecone will most likely only line up one way with the airframe holes.

Rivets are usually used one time. Four rivets have been supplied. Hold off on installing them until you are certain it will not be necessary to get back into the payload section.



Part 9 – Connect the Recovery System

Tie an over hand knot at the end of the shock cord.

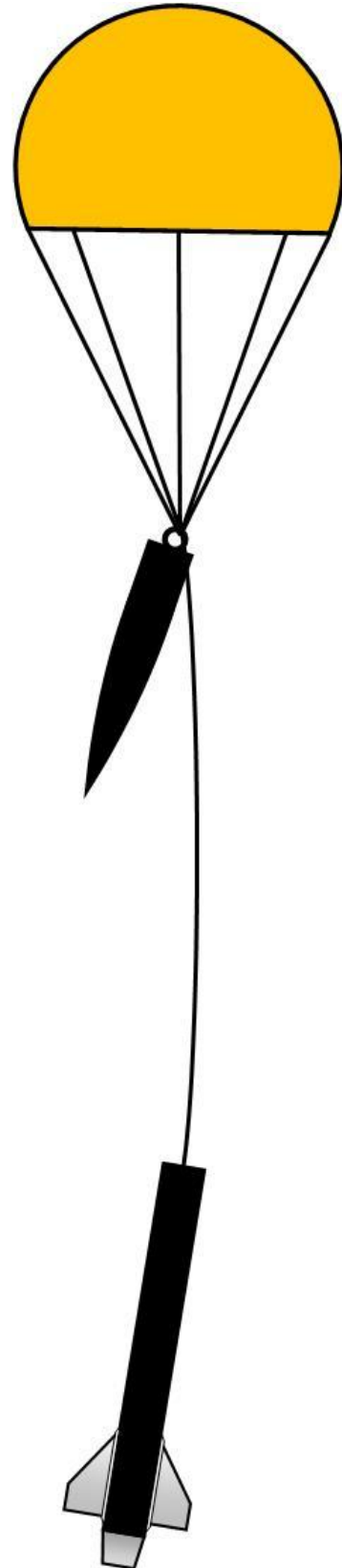


Collect all the support lines of the parachute so that they are even. Tie the collection of support lines in a knot leaving a large enough loop at the end for the quick link to hook to.



Using the supplied quick link, link together items in this order:

- the payload eye bolt
- the knot at the end of the shock chord
- The parachute protector
- The knot tied at the end of the parachute support lines



Part 10 – Assemble the Motor

Remove the motor reload from the packaging and inspect. Verify that the paper disk covering the ejection charge does not look tampered and that the nozzle looks clean and unobstructed. Place the yellow cover onto the nozzle of the motor reload. Insert the reload into the case and securely screw together. Present to the certifying official to verify complete assembly before proceeding at this time. Remove the motor retainer cap, insert the motor, and securely reinstall the motor retainer cap. Hold on to the igniter.



Part 11 – Prepare the Recovery System

First, place a hand full of “dog barf” into the rocket. Begin placing the shock cord into the rocket. Fold several lengths like shown in the photo and laying them inside the rocket on top of the “dog barf”.

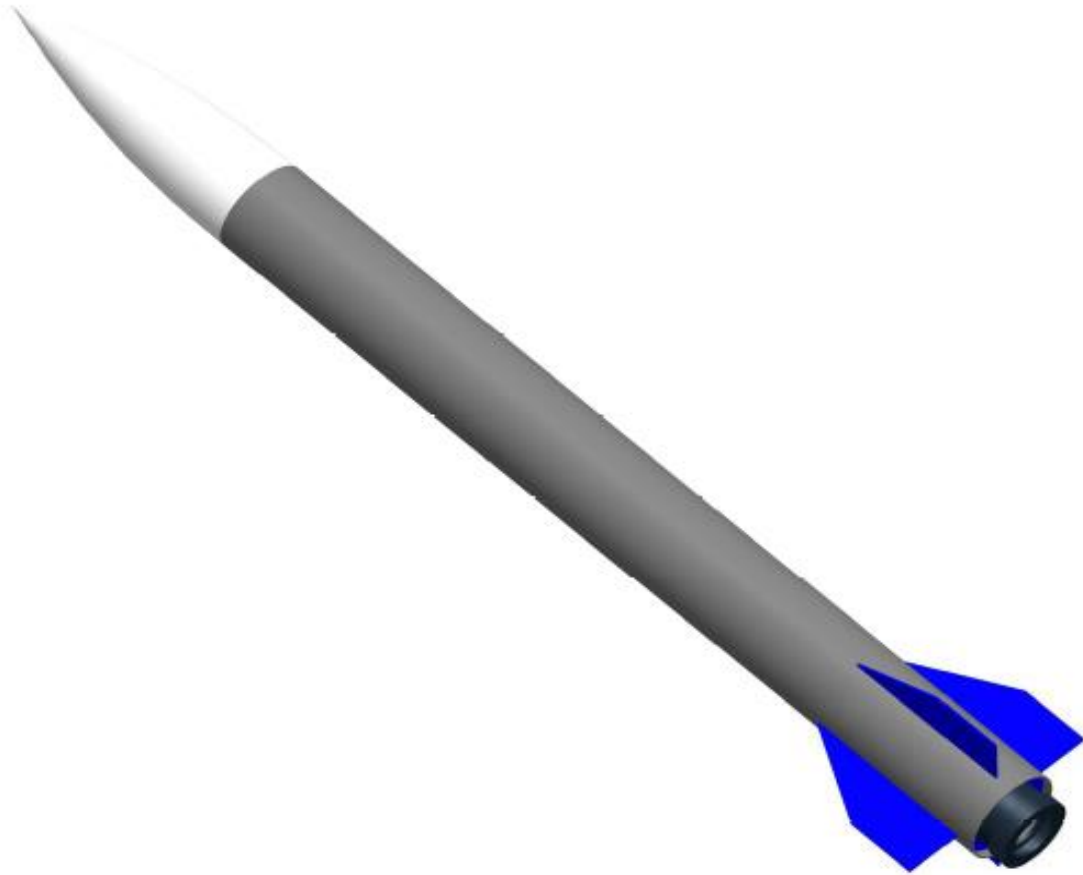


Loosely wrap the folded parachute into the parachute protector. The parachute folding directions are in the recovery section of this workbook. Place the parachute inside of the rocket with the stitched loop facing the top.



Part 12 – Flying Your Rocket

Attach the end of the shock cord and the parachute to the payload section's eyebolt. The chute protector can also be attached to the shock cord just below the nose cone. When packing the chute, wrap the chute protector around the chute with the opening in the chute protector facing forward. Always make sure the chute is well protected as the hot ejection motor gasses will melt the nylon chute.



IMPORTANT: Always use positive motor retention to secure the motor in the motor tube. Failure to use motor retention may allow the motor to be ejected during the ejection charge instead of the parachute, making for a dangerous ballistic reentry.

IMPORTANT: Always remember to check the balance point and ensure the CG is forward of the recommended CG point.

IMPORTANT: Always follow the NAR safety code and remember that rockets are not toys and can be dangerous if not prepared and used properly. If you are a beginner, it is a good idea to fly with a club or other groups of experienced rocketeers until you have gained some experience.