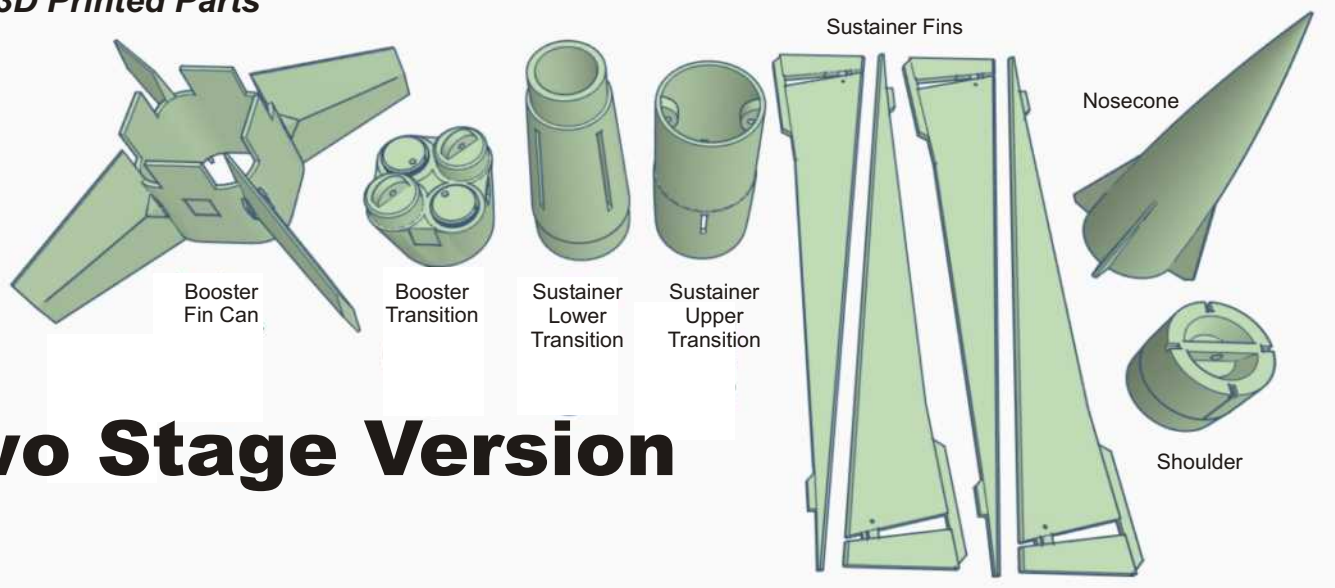


1/14th Scale Nike Hercules Builders Kit

Thank you for purchasing a Boyce Aerospace Hobbies 1/14th scale Nike Hercules kit. Please read these directions fully before you begin. All parts will be referred to in these instructions as labeled in the drawing:

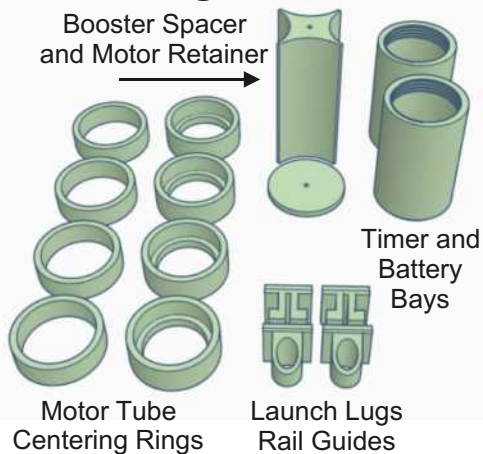
DISCLAIMER - The products sold by Boyce Aerospace Hobbies are intended for display and/or flight with use of explicitly stated model rocket motors. Launching of model rockets may be dangerous; use our products at your own risk. Boyce Aerospace Hobbies is not responsible for any damages or injuries incurred from the use or misuse of our products. Our kits are not intended to be modified or used with motor sizes different than stated. The product should be purchased by an adult and if used by a minor, under the supervision of a parent at all times.

Large 3D Printed Parts

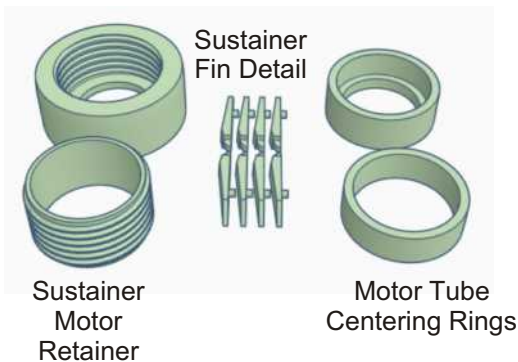


Two Stage Version

Parts Bag #1 - Booster



Parts Bag #2 - Sustainer



Not Shown Above:

- 3) 24" Kevlar cord
- 1) #2 Screw long
- 1) Decal Set
- 1) Sustainer launch lugs/rails

Body Tubes Required:

- 1) BT-70 197 mm long
- 5) 29 mm BTH-52 motor tubes 244 mm long
- 4) 24 mm BT-50 motor tube 65 mm long
- 1) 24 mm BT-50 motor tube 90 mm long

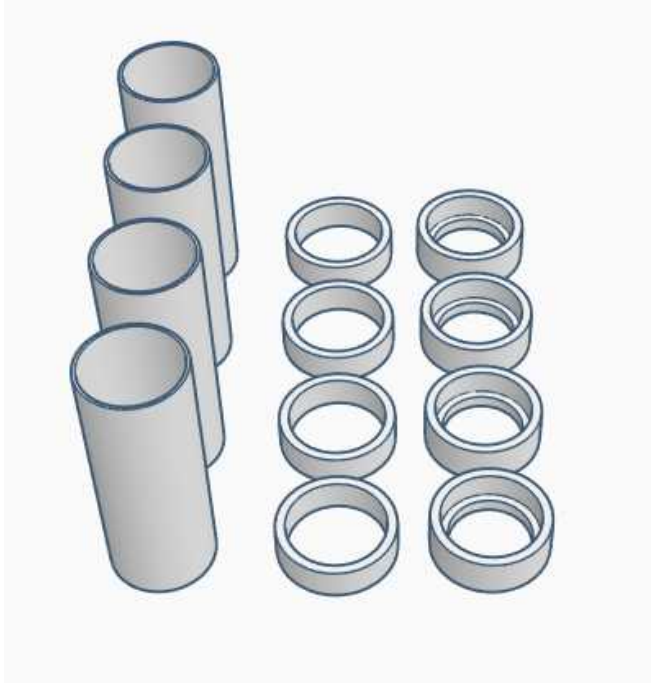
You'll also need the following supplies to complete your Nike Hercules kit:

- 2) 24 inch parachutes (Booster)
- 1) 36 inch parachute (Sustainer)
- 3) 24" pieces of elastic shock cord
- 1) Staging timer (PerfectFlight microTimer2 or miniTimer4)
- 1) Micro battery for timer
- Super glue
- Clay or lead nose weight
- Epoxy
- 220 and 400 grit wet/dry sandpaper
- Gray automotive spray primer
- Semi-gloss white spray paint
- Olive Green spray paint
- Painters tape
- Assorted modeling tools

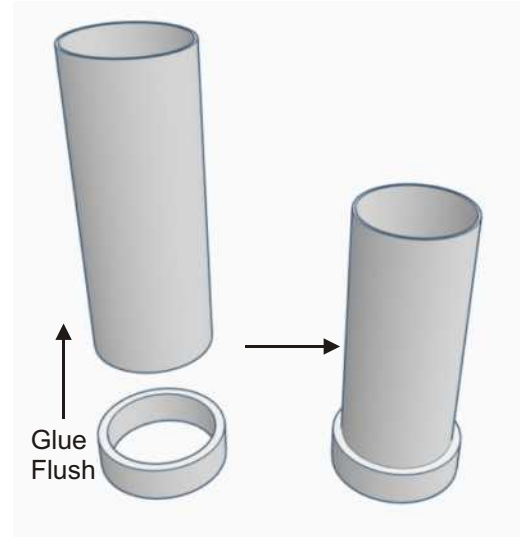
1/14th Scale Nike Hercules Flying Model Rocket

PART ONE: Booster Assembly

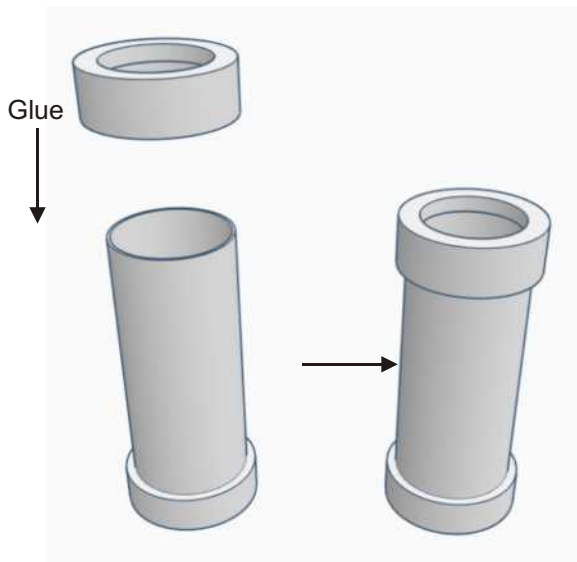
- A)** Gather the four short cut 24mm motor tubes and the 3D printed centering rings from PARTS BAG #1. Check the fit of the rings on the motor tubes and sand if needed.



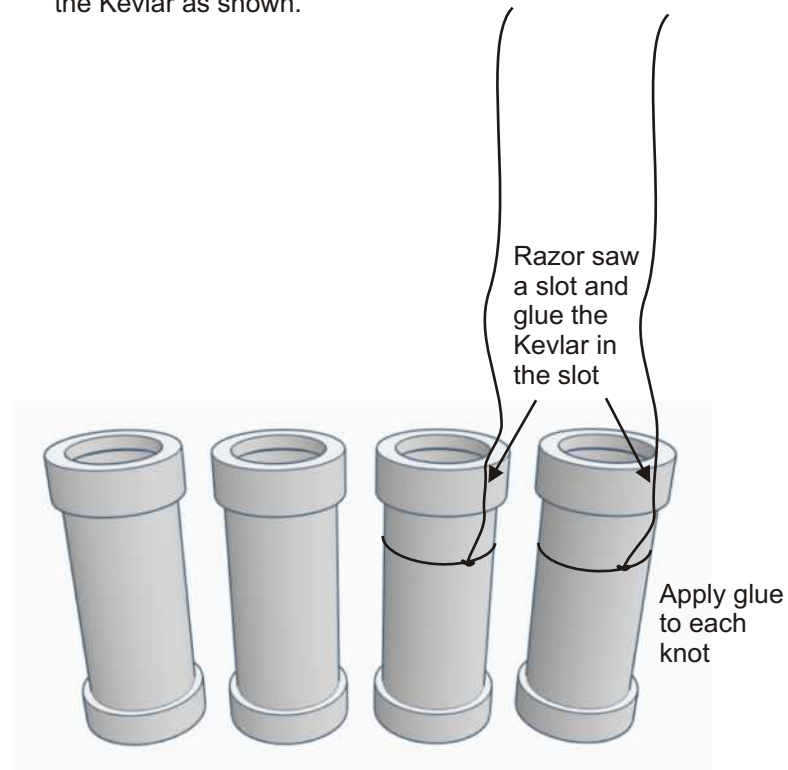
- B)** Super glue a centering ring flush with the base of each motor tube.



- C)** Glue the combination motor block/centering ring to the top of all four tubes.



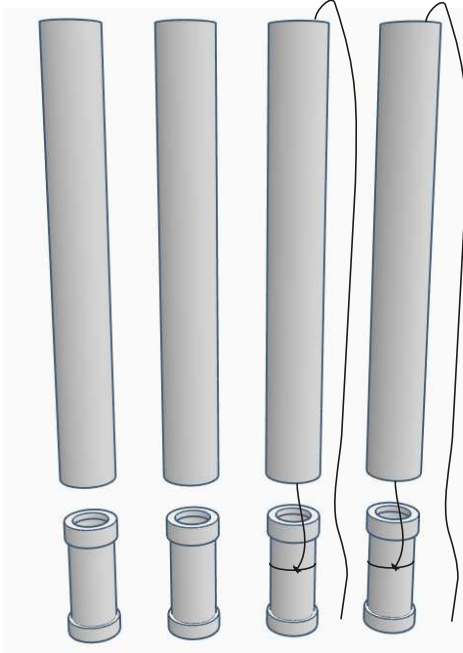
- D)** Tie a length of the Kevlar cord around the motor tube of two of the motor assemblies. Using a hobby saw or knife cut a small channel in the motor block/centering ring and glue the Kevlar as shown.



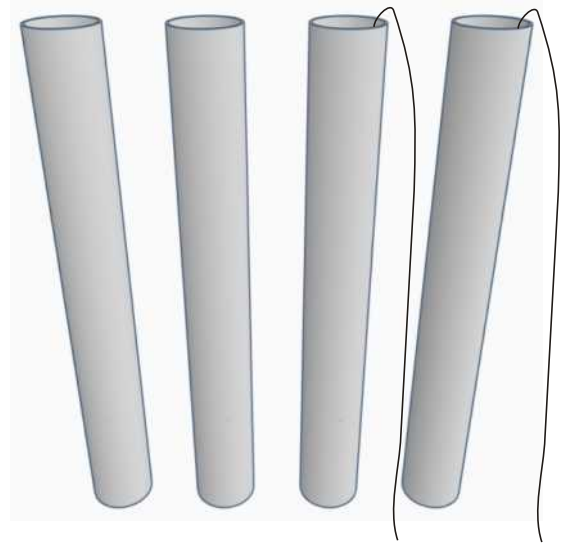
1/14th Scale Nike Hercules Flying Model Rocket

PART ONE: Booster Assembly

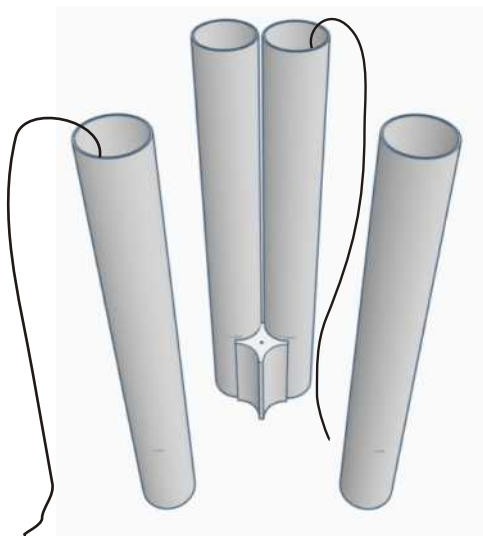
E) Glue a completed motor tube assembly into four of the 29mm tubes (244 mm long). Make sure the motor assemblies are glued flush with the bottom of each 29 mm tube.



F) The four completed booster tubes should look like this.



G) Arrange the four booster tubes as shown in the image below around the booster tube spacer (found in PARTS BAG #1). DO NOT GLUE! Test fit the four tube assembly into the booster fin can. If it is too tight, use sandpaper wrapped around a 29mm tube to sand the four sides of the booster spacer until a good fit is obtained. Now glue all four booster motor tubes flush with the bottom of the spacer (make sure the Kevlar cords are opposite each other as shown). Hold the assembly with rubber bands until the glue is dry. Spray paint the booster motor tubes Army Olive Green.



H) Watch this great video on how to achieve a mirror like finish on 3D printed parts:

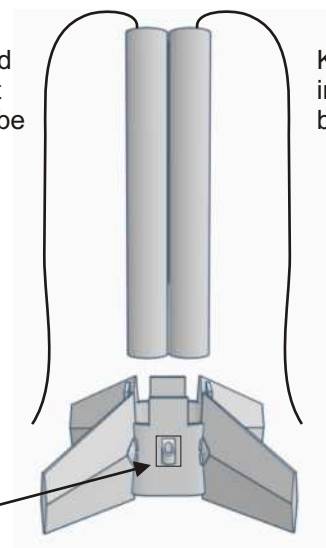
<https://www.youtube.com/watch?v=0vgynnYzo08&t=7s>

Follow the process in the video to finish and spray paint the fin can semi-gloss white. When dry, glue the fin can onto the booster motor tube assembly. Make sure that the tubes are flush with the base of the can (not the fins) and that the Kevlar cords are as shown in the drawing below.

Kevlar cord
in front left
booster tube

Kevlar cord
in rear right
booster tube

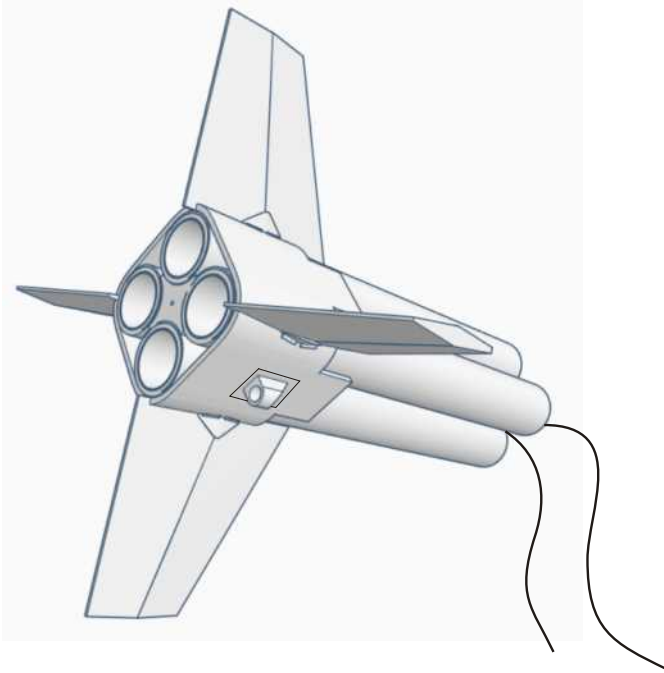
Note: Prior to painting the fin can decide if you will be using the launch lugs or rail guides and glue in place



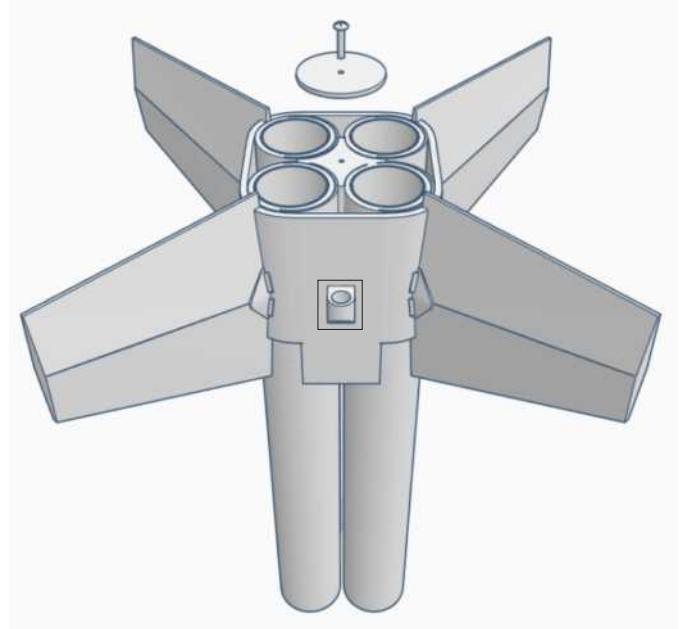
1/14th Scale Nike Hercules Flying Model Rocket

PART ONE: Booster Assembly

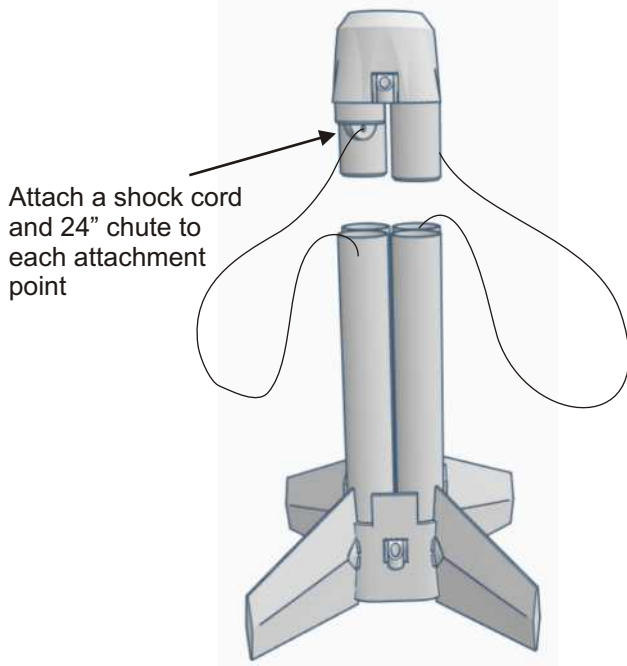
- I) Booster tubes shown glued flush with the base of the fin can. Note that the fins extend slightly past the bottom of the fin can.



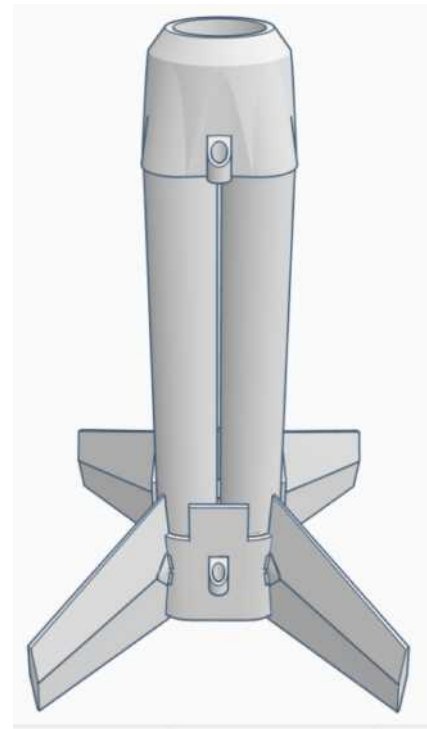
- J) Install the motor retaining ring with the screw provided in Parts Bag #1.



- K) Finish and paint the booster transition semigloss white. Do not paint the shoulders or the screw on electronics bays at the base of the transition. When dry line up the launch lugs or rail guides on the booster transition and the fin can. Tie the Kevlar shock cords to their applicable attachment points on the transition. Attach two lengths of shock cord and two 24 inch chutes to the same attachment points (not included).



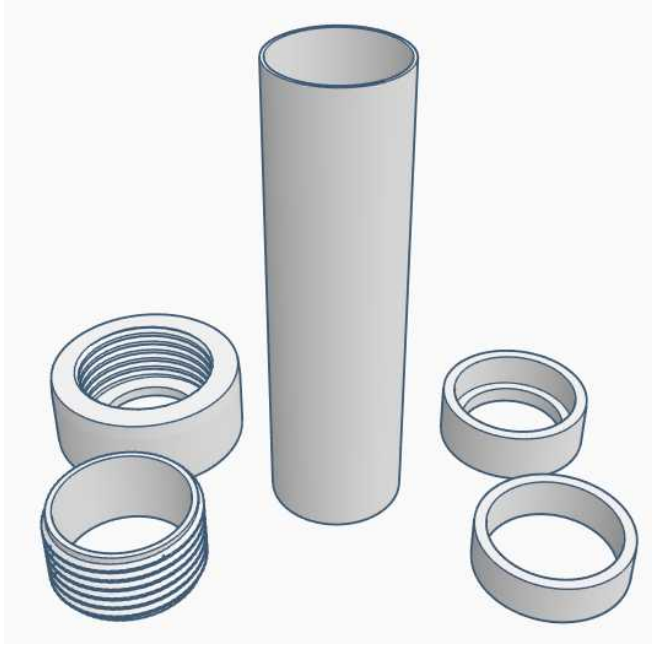
- L) Slide the chutes and Kevlar shock cords into their booster tube and slide the booster transition in place. Your booster is now complete!



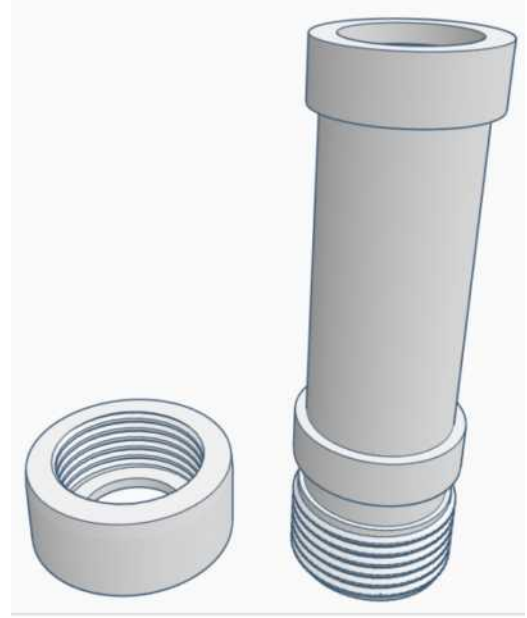
1/14th Scale Nike Hercules Flying Model Rocket

PART TWO: Sustainer Assembly

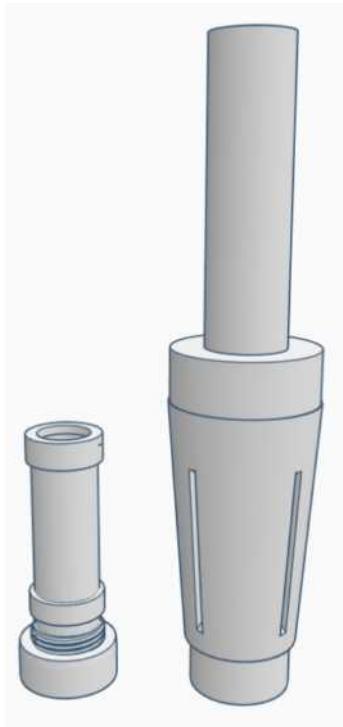
- A)** From Parts Bag #2 find the 24mm to 29mm centering ring and centering ring with motor block. Also locate the 24mm screw on motor retainer parts. Finally, get your 24mm motor tube (3.53" long).



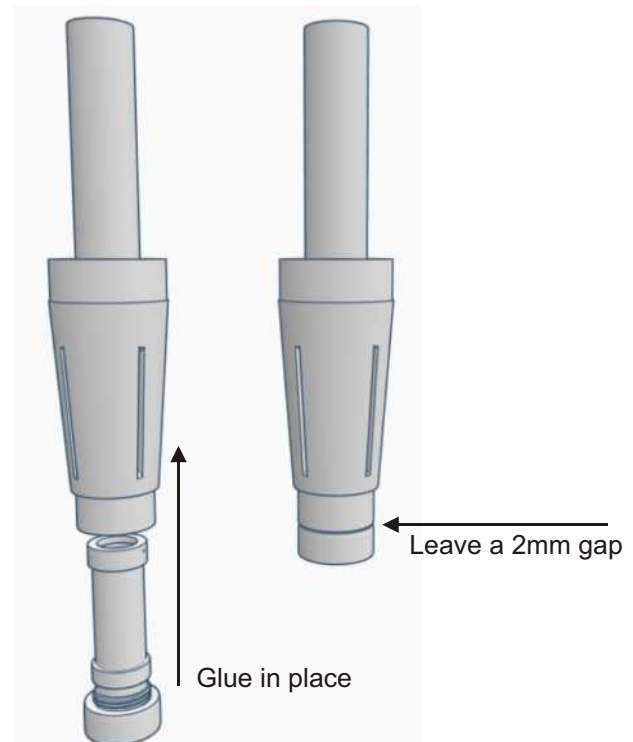
- B)** Super glue the male threaded portion of the motor retainer flush with the base of the motor tube. When dry glue the centering ring (without the motor block) about 5 mm above the top of the threaded part. Finally glue the centering ring with the built in motor block to the top of the assembly.



- C)** When the assembly is dry slide a long 24mm motor into the motor mount and screw on the retainer. Locate the sustainer boat tail and sand the inner hole (use a dowel with 220 grit sandpaper wrapped around it) until one of the 29mm motor tubes is a nice slide fit into the boat tail. Glue the 29mm motor tube in place flush with the base of the boat tail.



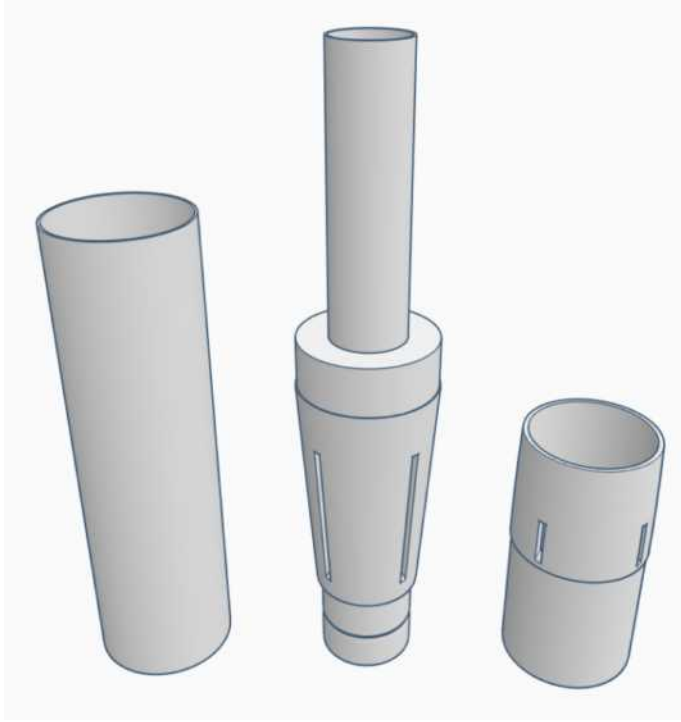
- D)** Glue the completed 24mm motor tube assembly into the sustainer boat tail. Leave a small 2mm gap between the base of the boat tail and the top of the screwed on motor retainer. Allow to dry then remove the motor.



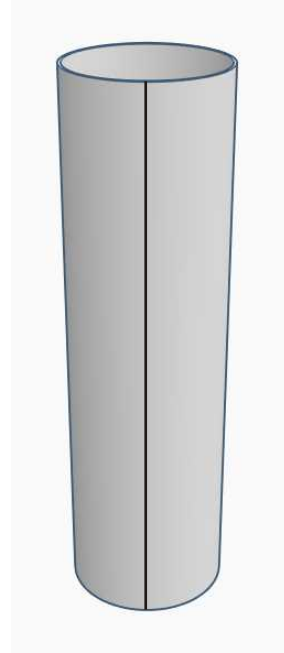
1/14th Scale Nike Hercules Flying Model Rocket

PART TWO: Sustainer Assembly

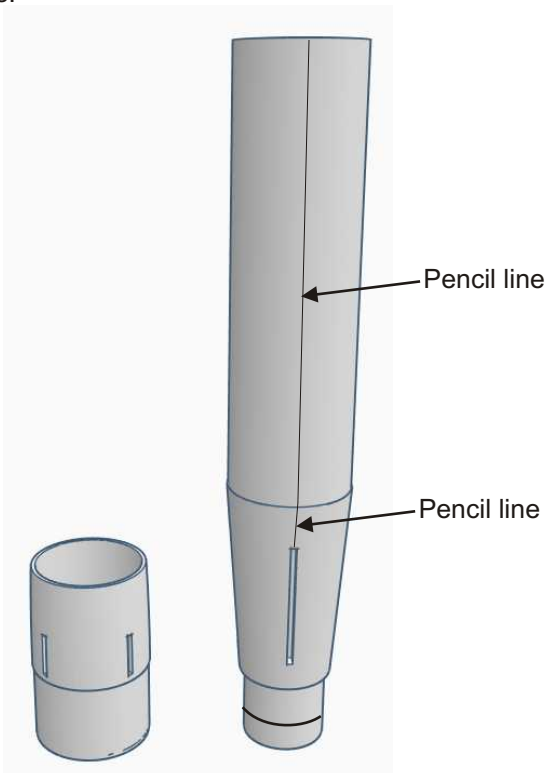
E) Find the BT-70 and the sustainer upper transition.



F) Using a door molding draw a pencil line the full length of the BT-70 as shown.



G) Using a straight edge draw another pencil line from the top of one of the boat tail fin slots to the top of the boat tail. Glue the BT-70 onto the top of the boat tail lining up the pencil lines.



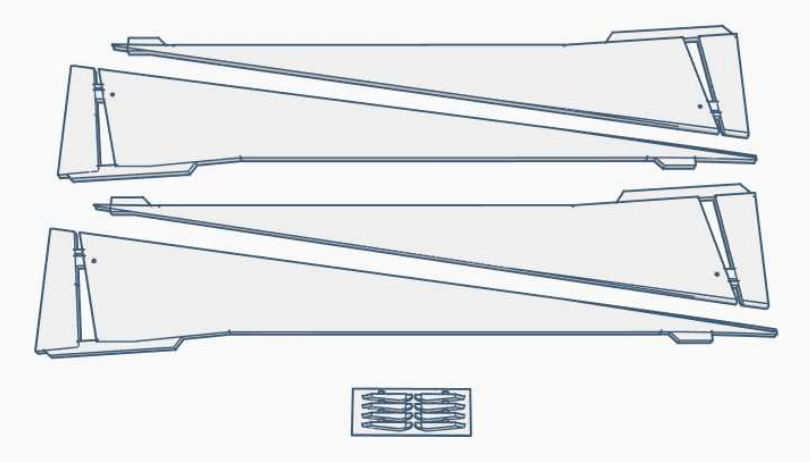
H) Tie a 24 inch piece of Kevlar to the two recovery system attachment points. Drop super glue on each knot. Glue the upper sustainer transition to the top of the BT-70 boat tail lining up one of the slots with the pencil lines drawn on the BT-70.



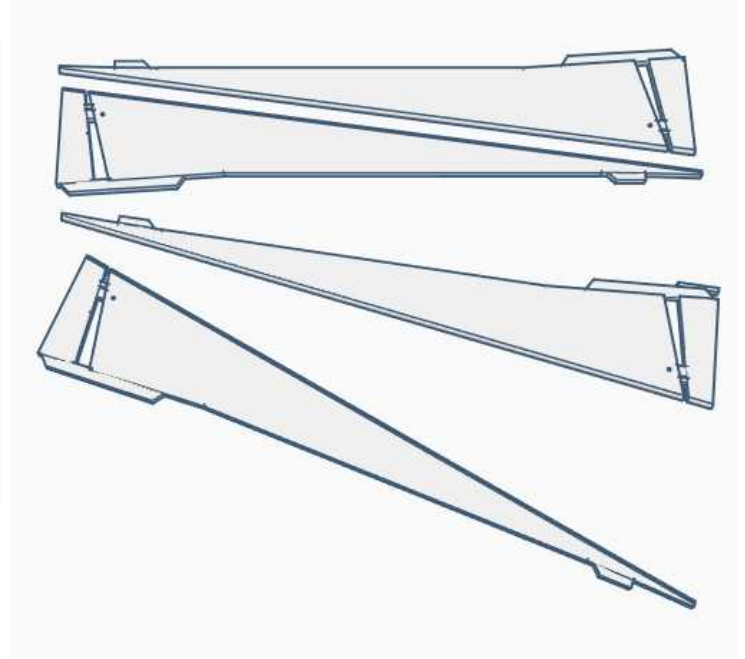
1/14th Scale Nike Hercules Flying Model Rocket

PART TWO: Sustainer Assembly

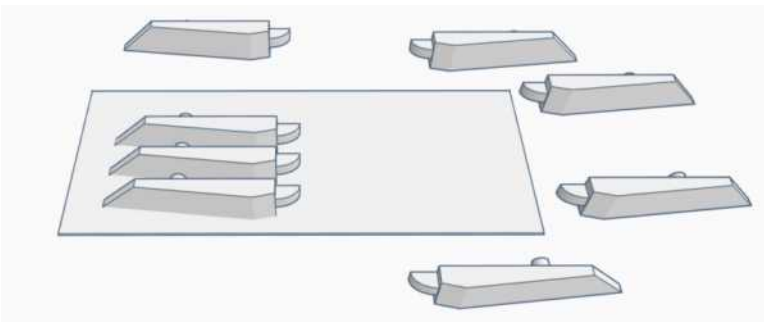
I) Find the four upper fins and the “raft” with the fin detail parts on it (the raft is in PARTS BAG #2).



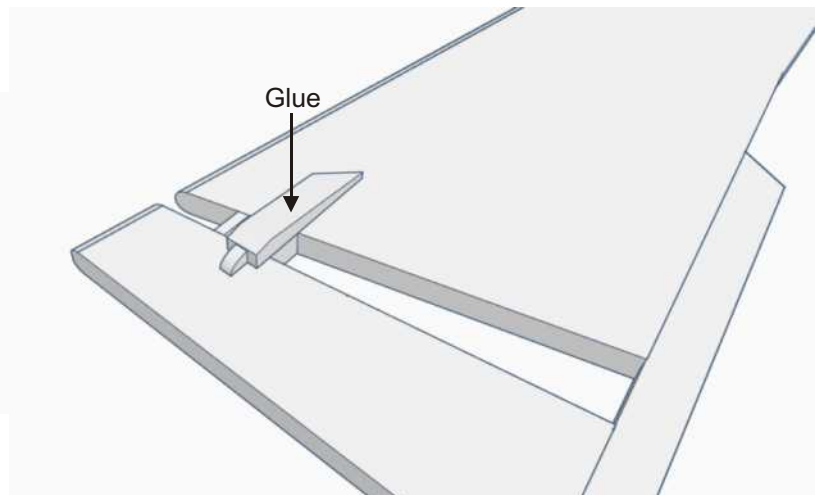
J) Sand the front and back sides of each fin in preparation for paint.



K) Carefully bend/flex the raft to pop off the detail parts. If some of the parts decide to be stubborn slide a hobby knife blade under them to remove.



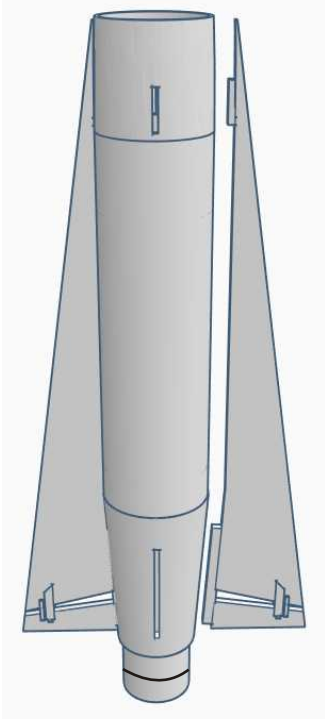
L) Glue each fin hinge detail piece to the fins as shown.



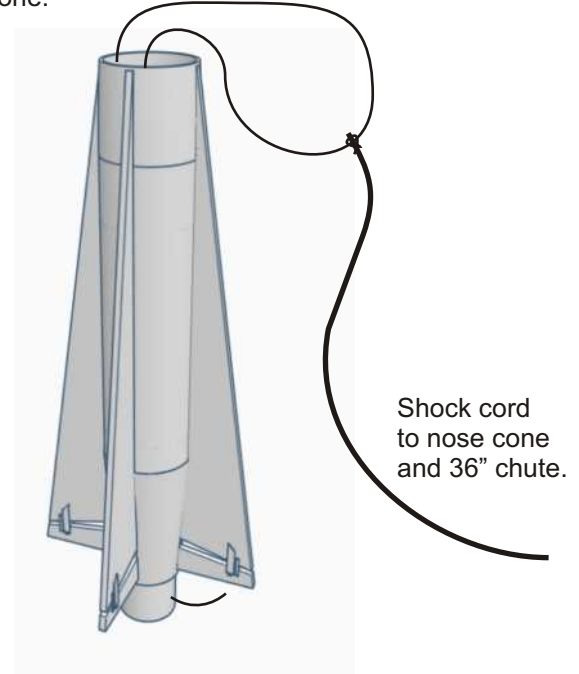
1/14th Scale Nike Hercules Flying Model Rocket

PART TWO: Sustainer Assembly

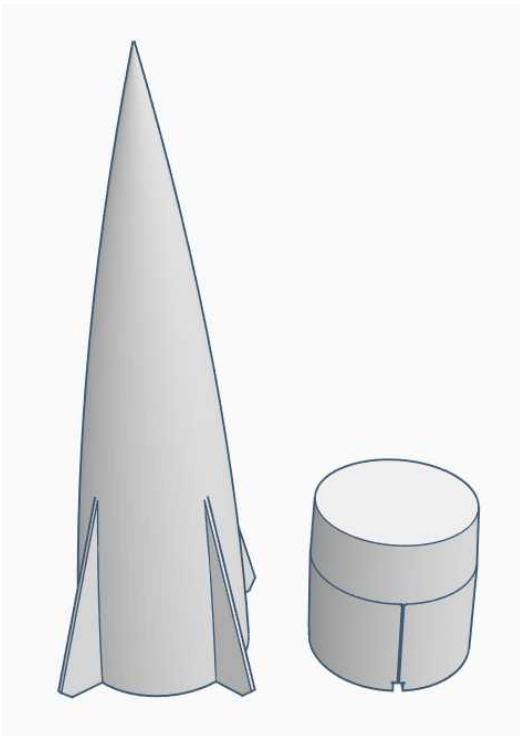
- M)** Test fit the fins and sand as needed for a good fit. Note Kevlar cord is rolled up and inside the sustainer upper transition.



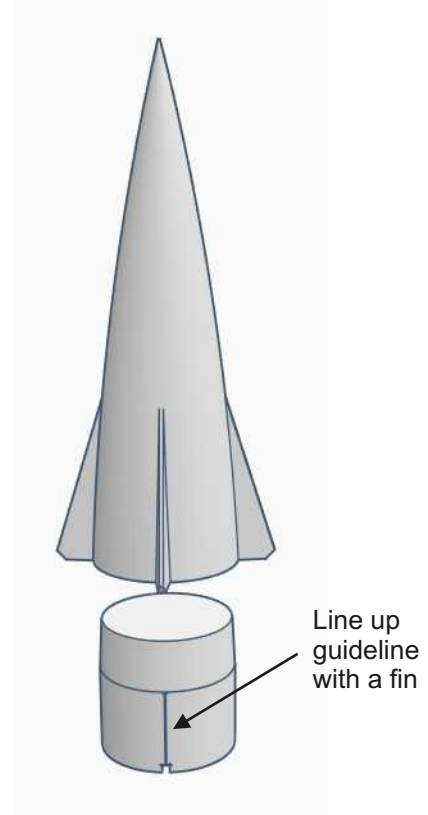
- N)** Super glue all four fins in place. Once the glue has dried apply small fillets to the root of each fin using super glue gel. When dry complete final sanding/primering of the sustainer. Then add a length of shock cord and a 36" chute to the center of the Kevlar loop and attach it to the base of the nose cone.



- O)** Sand the nose cone shoulder until it is a good slide in fit with the top of the sustainer. The notches in the base of the shoulder engage the upper fin tabs in order to keep the nose cone fins aligned with the airframe fins. Sand and primer the nosecone



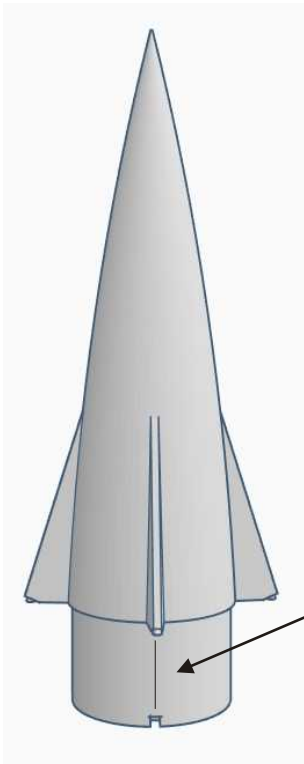
- P)** **DO NOT GLUE** the shoulder to the nose cone. It will be glued after nose weight is added to the model to insure stability. For now just insert the shoulder into the cone tightly.



1/14th Scale Nike Hercules Flying Model Rocket

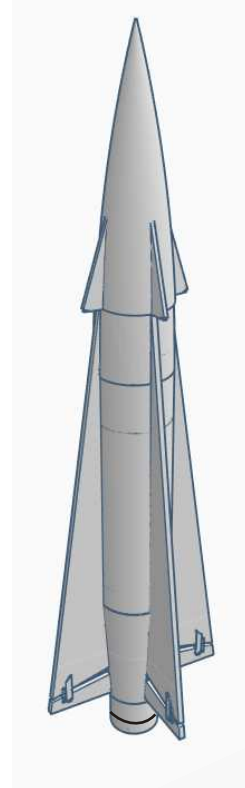
PART TWO: Sustainer Assembly

Q) Nose cone parts aligned and pressed together. **DO NOT GLUE UNTIL NOSE WEIGHT IS ADDED!**

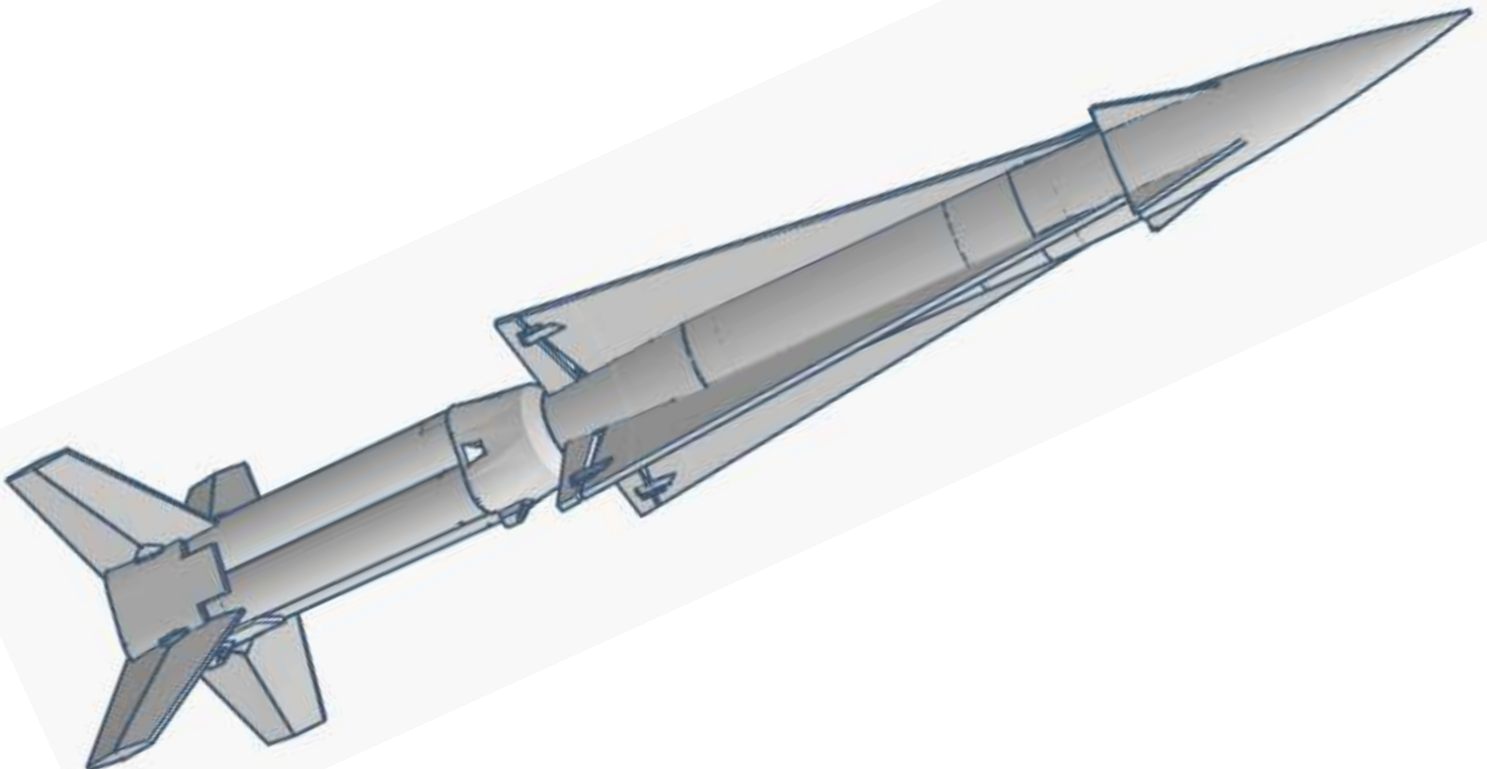


Pencil alignment mark

R) Complete final sanding/primering and paint the completed sustainer semigloss white.



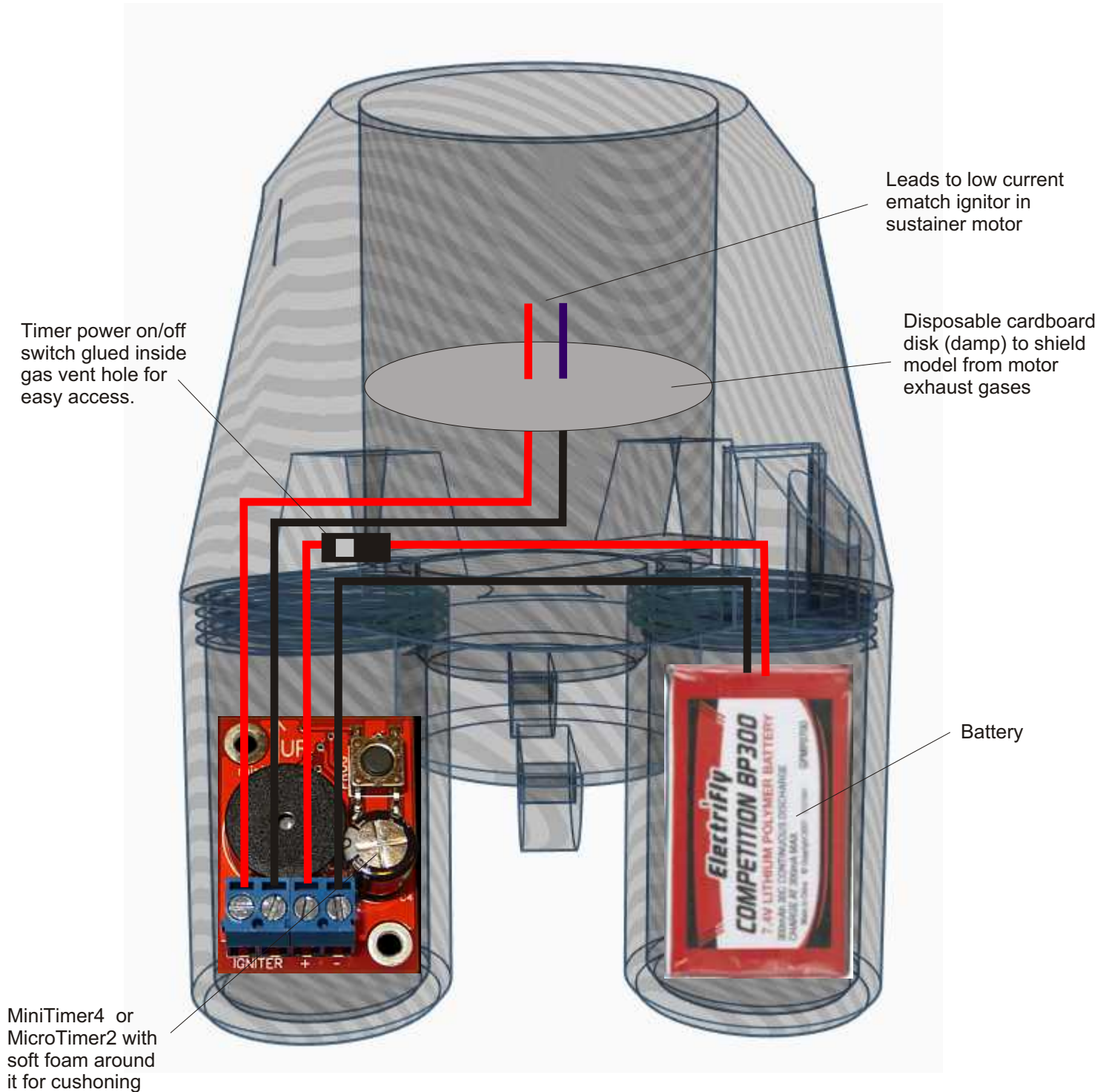
S) It's ok to slide the two stages together (sand for a smooth fit) and admire your work for a few minutes, but we still have more work to do before we can fly this bird!



1/14th Scale Nike Hercules Flying Model Rocket

PART THREE: Electronics Setup Cutaway Drawing

The cutaway drawing below shows the suggested electronics setup for two stage flight operation. One of the screw on canisters holds the staging timer while the opposite cannister holds the batteries.

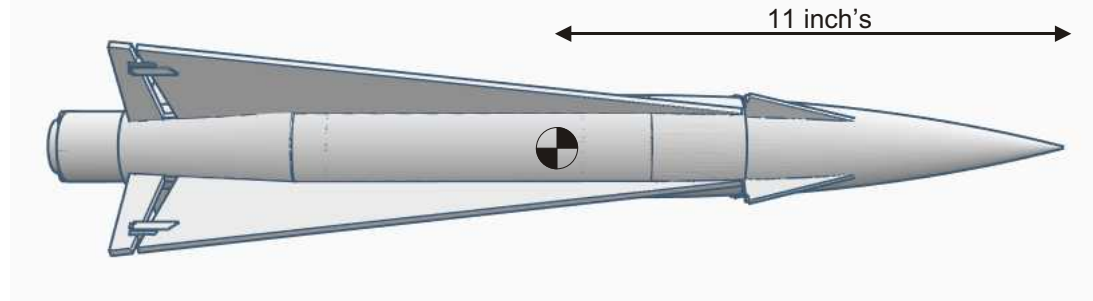


1/14th Scale Nike Hercules Flying Model Rocket

PART FOUR: Pre Flight Prep (CRITICAL)

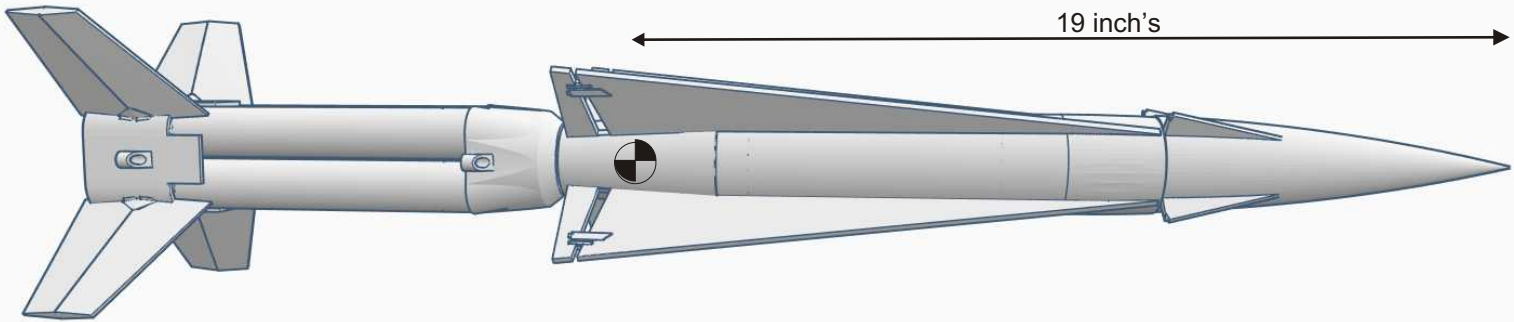
The model must be balanced as both a single upper stage model and as a combined model. Place all motors, parachutes, recovery wadding, and electronics in the model as shown below (this page). Then follow the weight and balance instructions.

With the largest motor you intend to fly installed, electronics and battery, and parachute (36" recommended), add nose weight until model's CG is as shown.



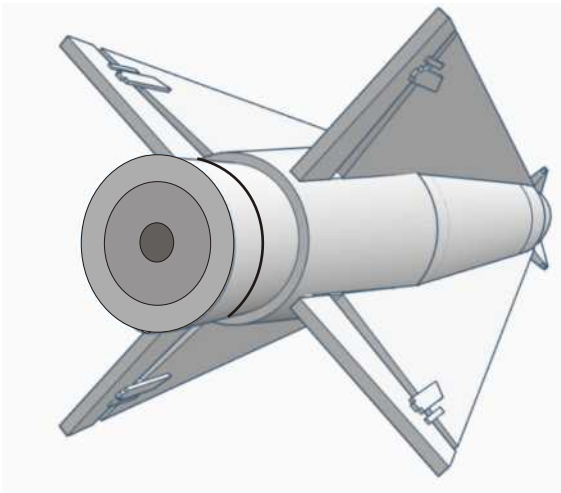
Slide sustainer on booster in fully loaded condition. Install four D12-3 motors and chutes in booster. Add nose weight if vehicle CG is not forward of the position shown. If already forward you are good to go!

Note: The best nose weight is clay packed into the tip of the nose cone (use a dowel stick to pack the clay).. Once you reach your balance points for the upper stage and the combined stages mix up some 5 minute epoxy and pour it over the clay to secure it in place.

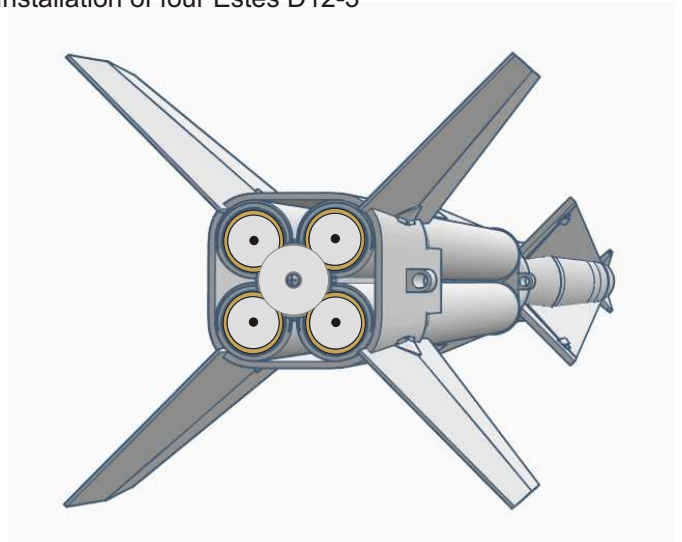


Note: After adding nose weight, the nose cone shoulder can be glued in place. Also by gluing the optional sustainer launch lugs or rail guides in place the sustainer can be flown as a single stage model.

A) Installation of Estes E9-4



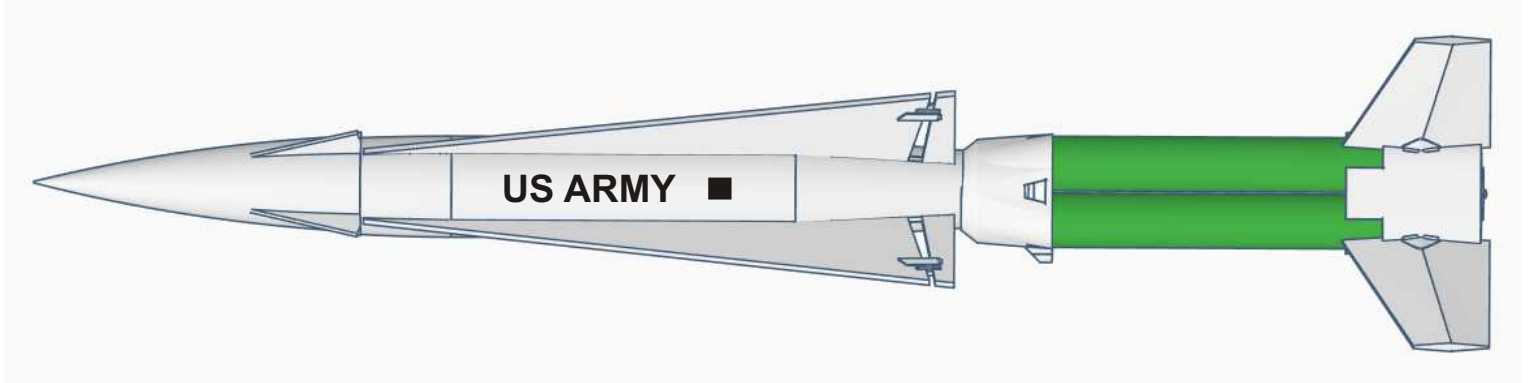
B) Installation of four Estes D12-3



1/14th Scale Nike Hercules Flying Model Rocket

PART FIVE: Finishing Your Nike Hercules

Adhere your vinyl decals on both sides of the sustainer as shown. To make installation easy use a clean spray bottle filled with water and add two drops of liquid dish washing soap. Shake. Lightly mist the area where the decal will be placed. Peel the paper backing off the decal and position on the model. The soap in the water mist



Three different paint scheme variants shown in one picture. We prefer the Nike Hercules laying on its side!



1/14th Scale Nike Hercules Flying Model Rocket

PART SIX: Flying Your Nike Hercules

- 1) Mount 4 Estes D12-3 rocket motors in the booster. Secure with retaining disk and screw.
- 2) Place recovery wadding in all four motor tubes.
- 3) Fold and pack two 24 inch paracutes into the tube with Kevlar shock cords.
- 4) Place booster transition in place making sure the launch lugs or rail guides are on the same side of the vehicle.
- 5) Mount a Estes E9-4 or D12-3 with a spacer into the upper stage. Secure with the motor retention ring.
- 6) Place recovery wadding in sustainer.
- 7) Pack 36" chute into sustainer.
- 8) Place the nose cone on the model making sure the cone is seated into the transition and aligned.
- 9) Remove the booster transition.
- 10) Remove the battery from the electronics bay.
- 11) Obtain a small electric match. The leads will need to be at least 6" long. Insert and tape into sustainer motor.
- 12) Attach the leads to your electronic staging system after running them through the holes in your damp cardboard disk.
- 13) Make sure your power switch is in the off position.
- 14) Attach and secure your battery.
- 15) Slide the booster transition into place.
- 16) Carefully slide the sustainer onto the booster and align the fins.
- 17) Slide the model onto the launch rod or rail.
- 18) Attach your preferred cluster ignition system. We highly recommend using a PVC Spider ignition system as described in a great article on Meatball Rocketry's website: <http://meatballrocketry.com/pvc-spider/> The PVC Spider will make igniting all four motors almost a guarantee, which is important due to the weight of the completed model.
- 19) **Power on your staging electronics.**
- 20) Count down and launch!

Recommended Motors:

Boosters - 4) D12-5
Sustainer - 1) E9-4

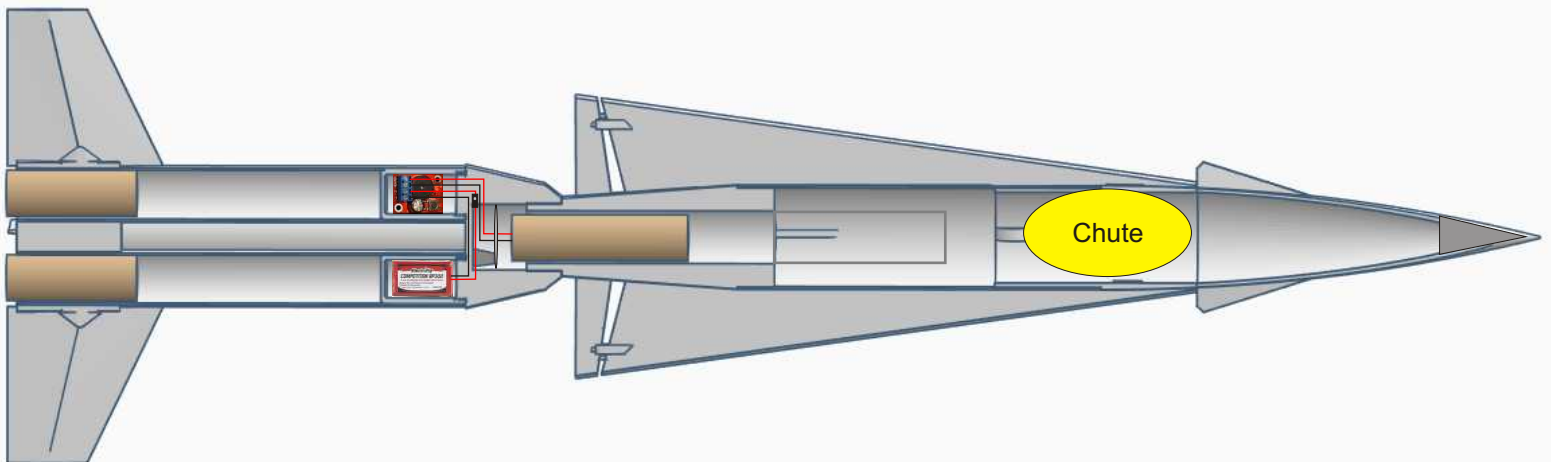
Performance:

Booster apogee - 658 feet
Sustainer apogee - 1138 feet

Staging timer settings:

Set delay to 1.5 seconds

Cut away view of staging electronics:



Use a software program such as ROCKSIM to model the rocket's flight once the model is balanced and weighed. Use the results to determine the proper motor delays to use.

Please follow all local laws and the NAR Model Rocketry Safety Code when flying this model. Fly safe and have fun!