

I-46TH SCALE GEMINI TITAN BUILDERS KIT BT-80

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Additional parts needed to complete the model:

- 2) 30" parachutes
 - 2) Lengths of BT-80 body tube 14" long
 - 1) Length of BT-20 body tube 18" long
 - 2) 18 mm BT-20 motor blocks
 - 2) Lengths of 1/8" or 1/4" shock cord 18" long
- Assorted paint, glue and standard hobby/modeling tools

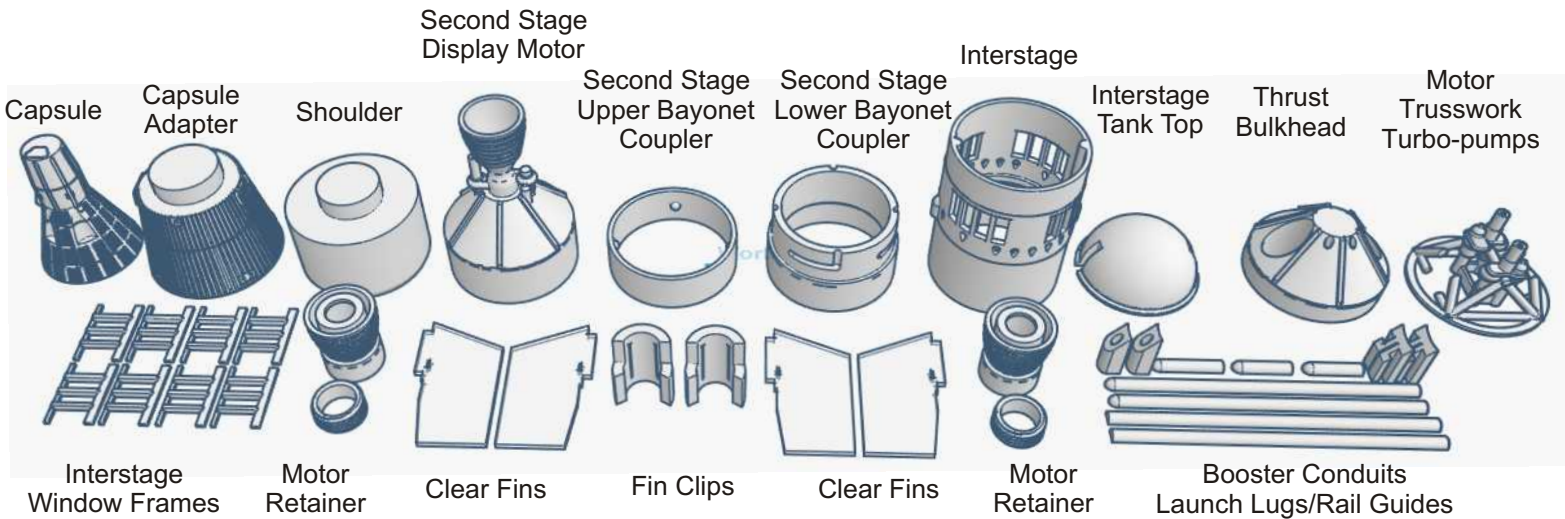


1/46th Scale Gemini Titan Builders Kit

Thank you for purchasing a Boyce Aerospace Hobbies Gemini Titan "Builders Kit". Please review all instructions prior to assembly. Visit us at <http://www.boyceaerospacehobbies.com>

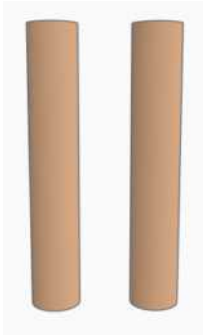
Pre-sand all parts prior to assembly. Use 220 grit sandpaper progressing to 400 grit until all parts are smooth to the touch. Make sure to pre-fit all parts that glue or slide together before you sand shoulders or glue surfaces. Note: Be careful when sanding the interstage window details. Due to the nature of 3D printing they are fragile!

Plastic parts included in this kit:



1

Cut two lengths of BT-20 tubing 95 mm in length.



2

Sand the two motor holes in the motor bulkhead until the BT-20 motor tubes are a nice slide in fit.

Sand to fit
18 mm motor
tubes.



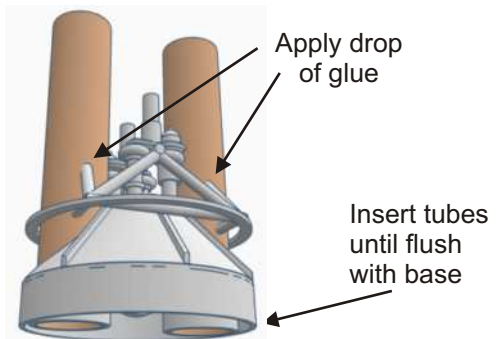
3

Test fit the rocket engine trusswork and turbo-pump assembly into the engine bulkhead. Super glue in place making sure it is fully seated in the holes and level..



4

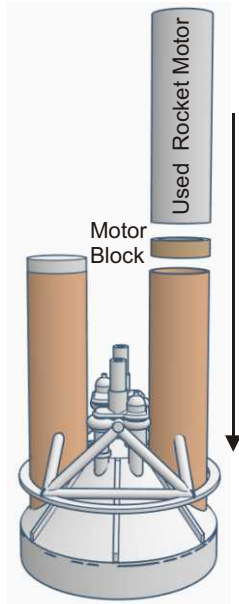
Test fit the twin BT-20 motor tubes into the motor bulkhead and framework. Sand parts until the tubes are a nice slide in fit. Super glue the tubes in place flush with the base of the bulkhead. Add a small drop of super glue at each point where the trusswork touches the motor tubes.



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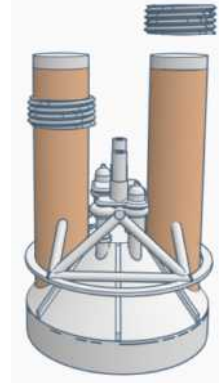
5

Using an old used 18 mm rocket motor install the motor blocks. Draw a line on the motor casing 5 mm from the top edge. Spread glue, inside each tube, about 60 mm down from the top of the tube. Do one tube at a time. Slide the motor block into the top of the tube and push it into place with the spent motor case. Stop at your marked line and quickly pull out the motor casing. Allow to dry then do the second motor tube.



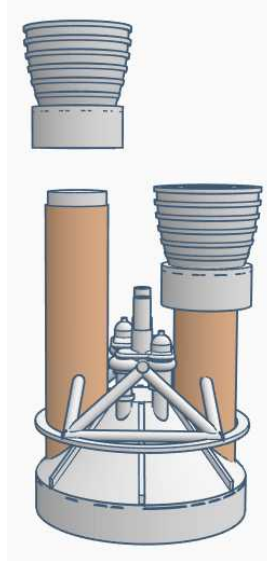
6

Find both male threaded rings from the motor retainers. Test fit them on the two motor tubes. Make sure you have two rocket motors in place as shown. Sand the inside of the rings until you have a nice sliding fit on the tubes.



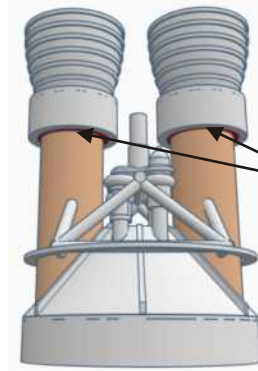
7

Slide the threaded rings off the motor tubes and slide the motor bells in place. Sand the inside of each engine bell until it is a nice slide fit over each motor tube. Make sure that you don't damage the inside threads when you sand. Remove the motor bells from the motor tubes.



8

Thread the retainer parts together fully and slide each motor retainer over a motor tube until the retainer is touching the rocket motor. Make a pencil line on each tube at the bottom of the male threaded ring.



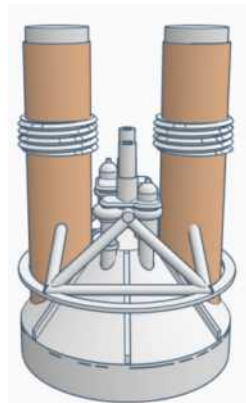
Mark here with a pencil on both motor tubes.

9

Remove the male threaded rings from the motor bells. Slide them on to the motor tubes and glue them in place using the pencil marks to insure they are glued at the correct location.

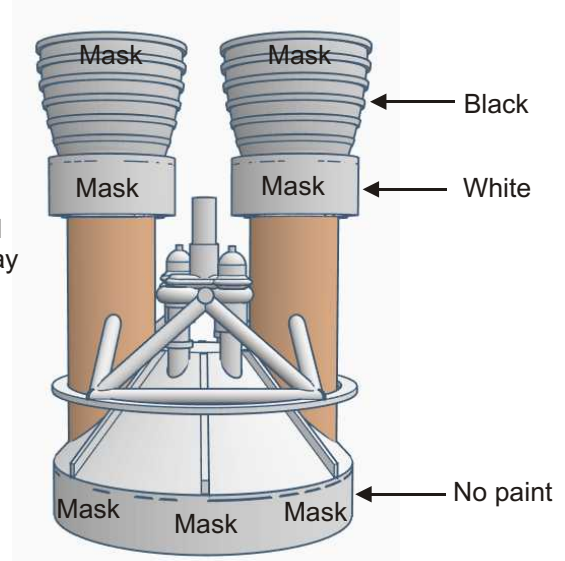
Make sure that no glue gets on the exposed threads!

When the glue is dry, screw the motor retainers in place.



10

Mask off and paint the assembly as shown below.

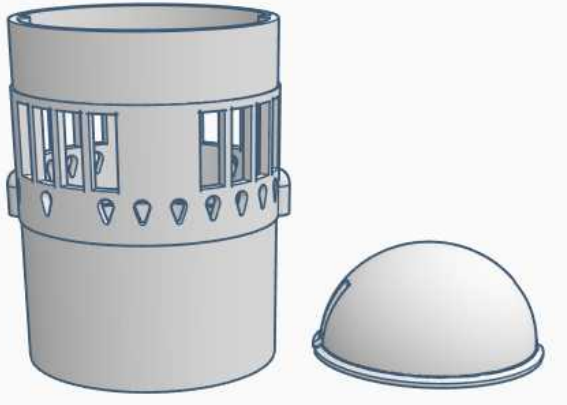


Mask the noted areas then spray the assembly metallic silver. When dry paint the details as shown.

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11

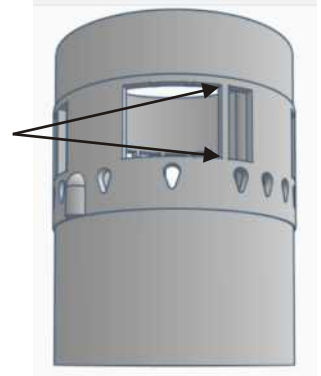
Find the vehicle interstage and the tank dome. Test fit the dome into the bottom of the interstage. Sand to insure a good fit.



13

Unfortunately, the window frames in the interstage are extremely fragile due to the orientation of the printed part. Remove the tank dome and carefully cut out all vertical interstage struts leaving just four large window frames.

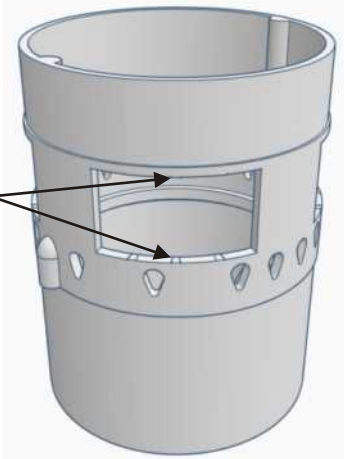
Cut out the three vertical struts at the top and bottom of all four interstage openings.



14

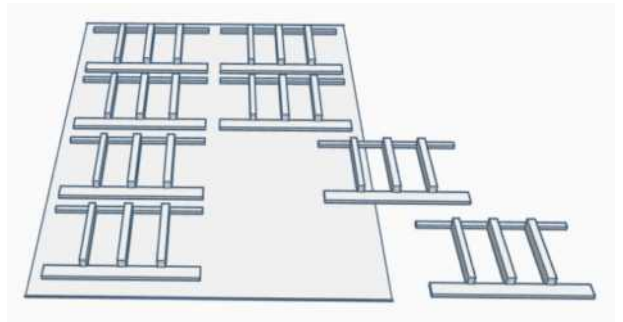
Using an emery board or fine toothed file carefully file each interstage window frame smooth.

File smooth



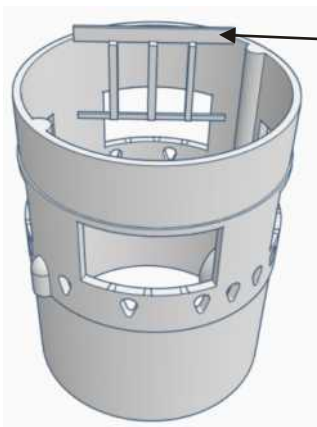
15

Find the interstage window frames in the parts bag. We provide you with two complete sets in case you damage any during installation or flight. Carefully remove four sets by flexing the raft they are printed on. If they are stubborn you can slide an exacto knife under them to help.



16

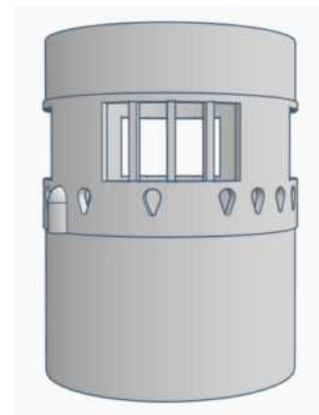
Test fit each window frame section into place from inside the top of the interstage as shown. Sand the top and bottom of the interstage opening until a good fit is obtained.



Wider edge is positioned at the top.

17

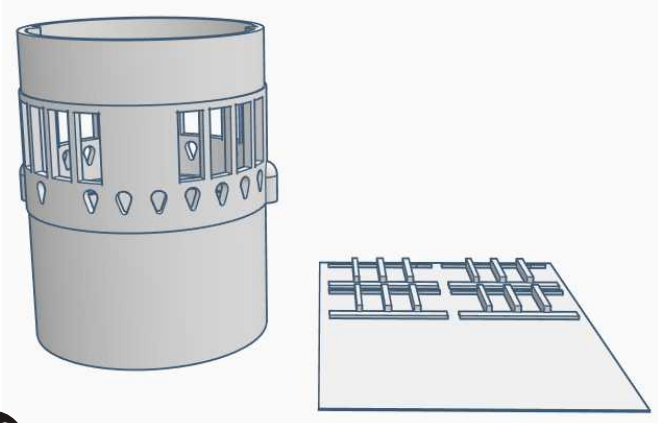
When a good fit has been achieved center the frame in the opening and superglue it in place from the inside of the interstage. Allow the superglue to wick under the top and bottom edges of the frame then wipe the excess glue from the outside of the part.



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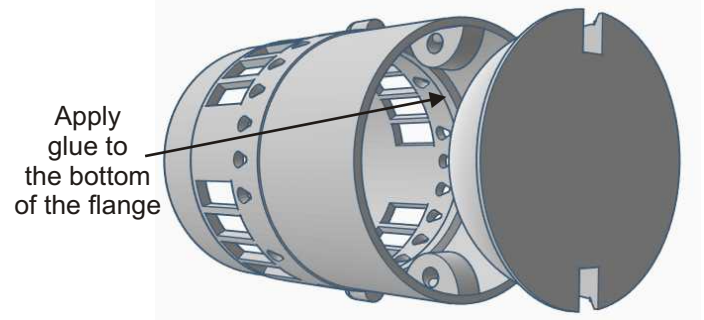
18

Repeat steps 16 and 17 until all window frames are installed. You should have four extra window frames left as spares.



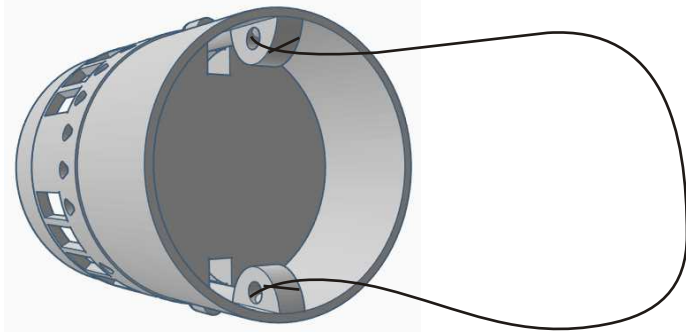
19

Apply a bead of medium CA to the underside of the attachment flange inside the interstage. Slide the tank dome into position from the bottom of the interstage and hold in position until dry.



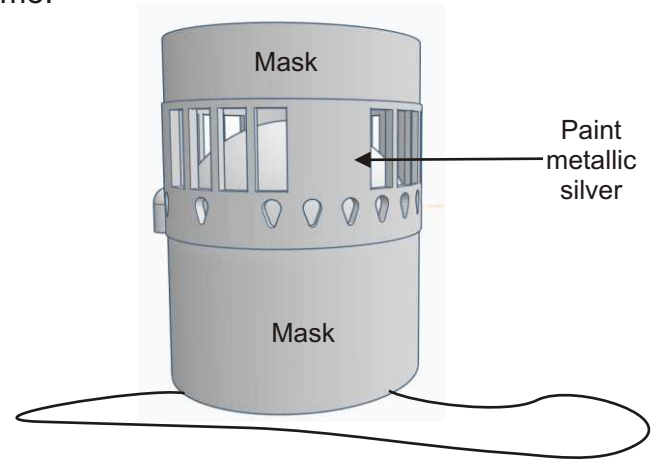
20

Attach a piece of Kevlar cord in a loop to the recovery attachment points. After you tie the cord make sure to place a drop of super glue on each knot to prevent the cord from accidental detachment.



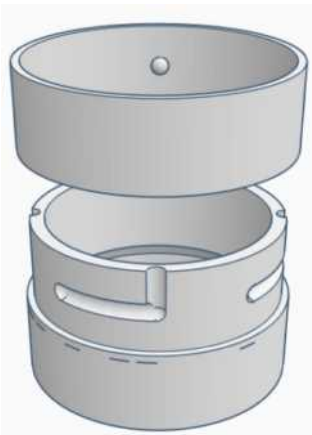
21

Mask off both exterior shoulder areas and paint the interstage metallic silver including the interior walls and tank dome.



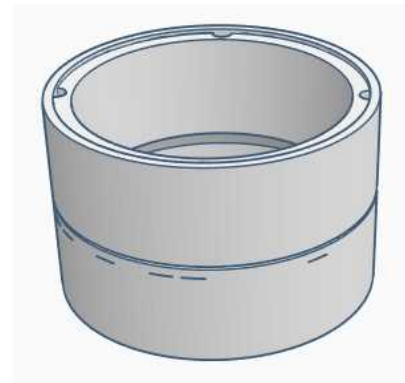
22

Locate the second stage bayonet rings. Put the two parts together then open and close the bayonet halves a few times to loosen the action of the catch.



23

Once the bayonet action is smooth set the parts aside and prepare to cut your BT-80 tubes to length.



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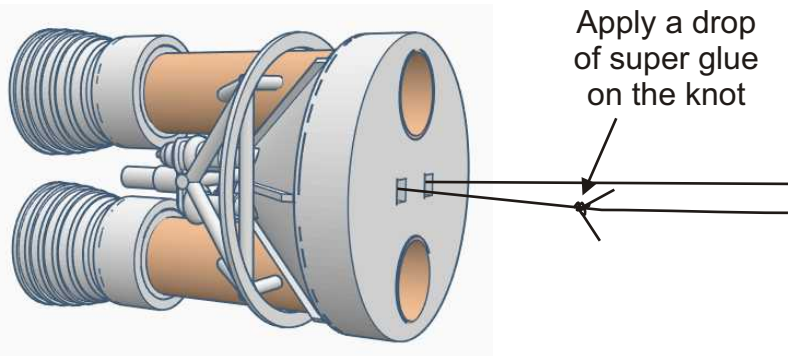
24

Cut three pieces of BT-80 body tube to the following lengths:



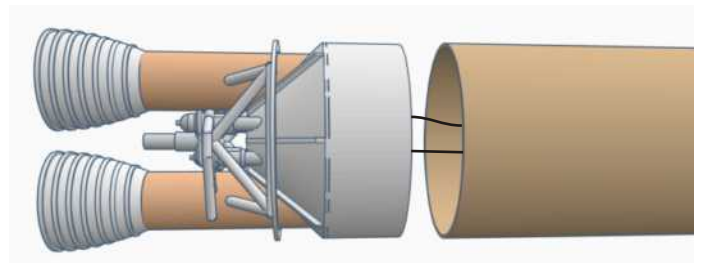
25

Tie the remaining piece of Kevlar through the motor base attachment point. Again apply a drop of super glue to the knot.



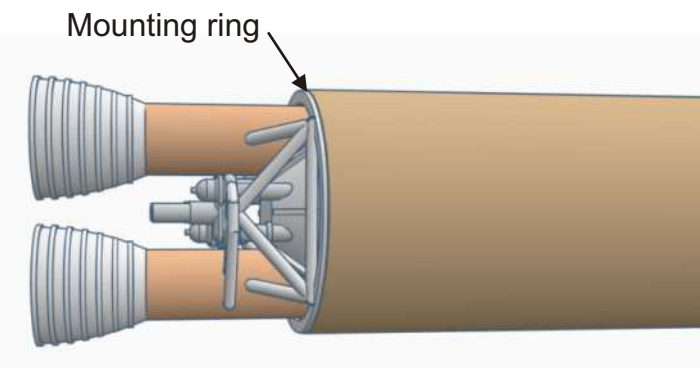
26

Test fit, sand if needed, then glue the 314mm long section of BT-80 body tube as shown.



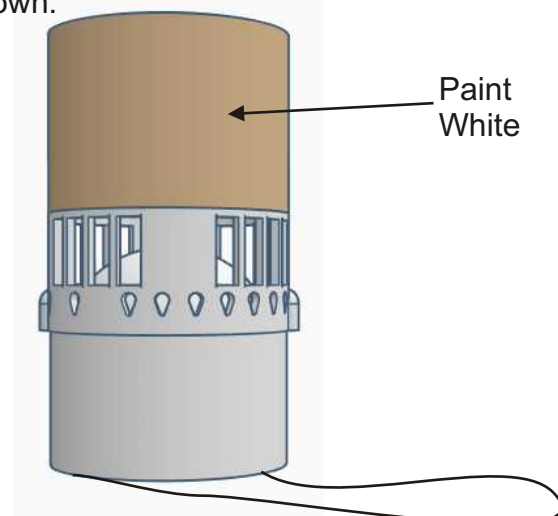
27

The engine assembly should be glued so that the turbo-pump mounting ring is flush against the end of the body tube.



28

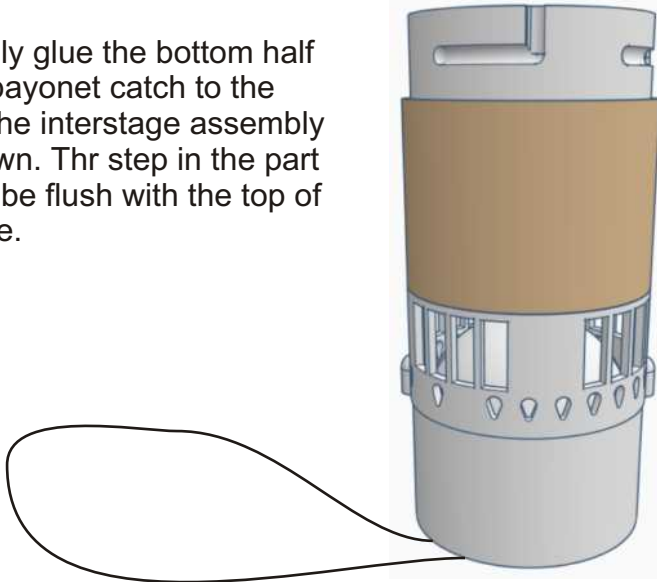
Paint the body tube section semi-gloss white. When dry glue the 49mm long section of BT-80 to the top of the interstage as shown.



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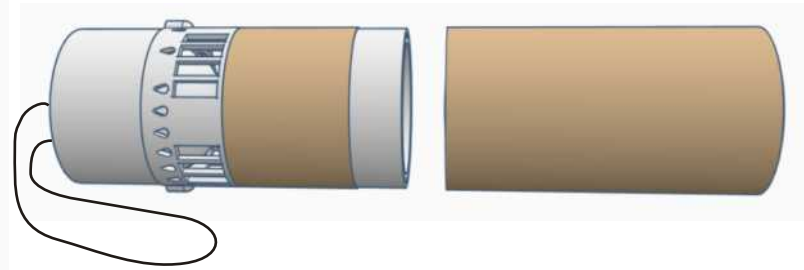
29

Carefully glue the bottom half of the bayonet catch to the top of the interstage assembly as shown. The step in the part should be flush with the top of the tube.



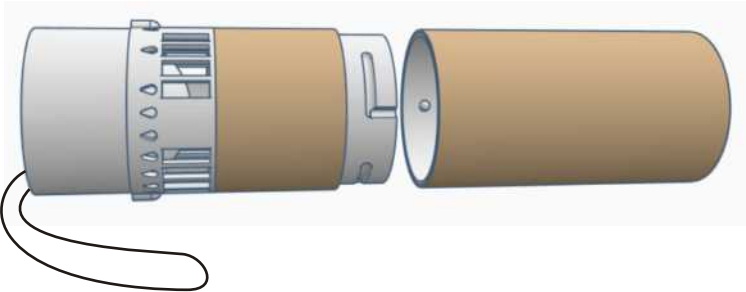
30

When dry, attach the top half of the bayonet catch to the interstage assembly. Test fit the top of the bayonet into the bottom of the second stage 123 mm long tube. Sand if needed for a good fit.



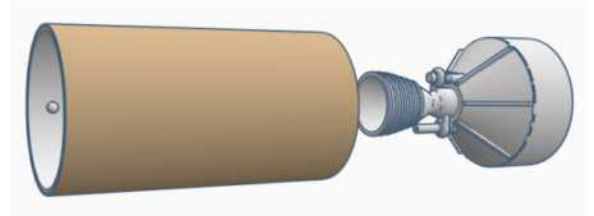
31

Remove the assembly and apply super glue gel in the bottom of the second stage tube. Quickly insert the interstage assembly until the tube ends touch. While applying pressure to the upper bayonet catch through the tube, twist and remove the interstage assembly without moving the upper catch.



32

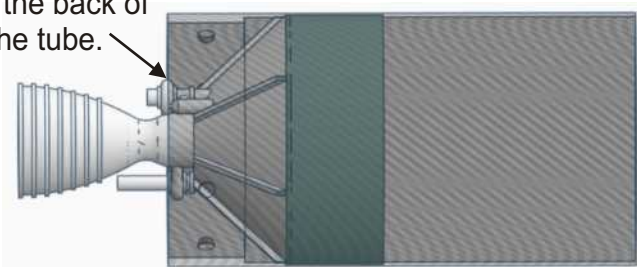
When the upper bayonet catch is dry in the second stage body tube test fit the display motor assembly in the tube. Sand if needed.



33

Carefully glue the second stage motor assembly into the tube as shown in the cutaway image below. Note that the part must be glued so that the outer turbo-pump is even with the back of the tube. **If you glue the display motor against the bayonet ring the lower bayonet ring will not fit correctly!**

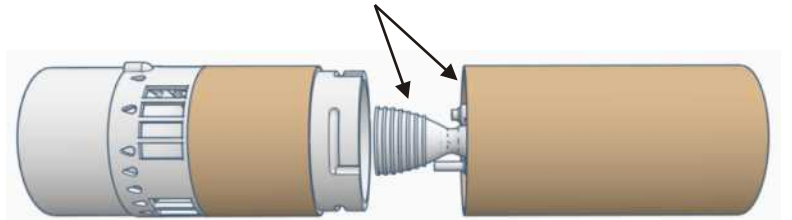
This turbo-pump must be even with the back of the tube.



34

Allow the second stage tube and display motor to dry then spray paint the second stage motor assembly and the inside of the rear of the tube with an aluminum paint.

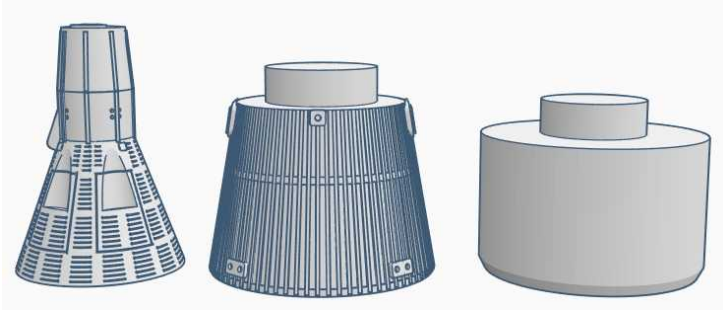
Spray the engine bell and rear end of the tube bright aluminum



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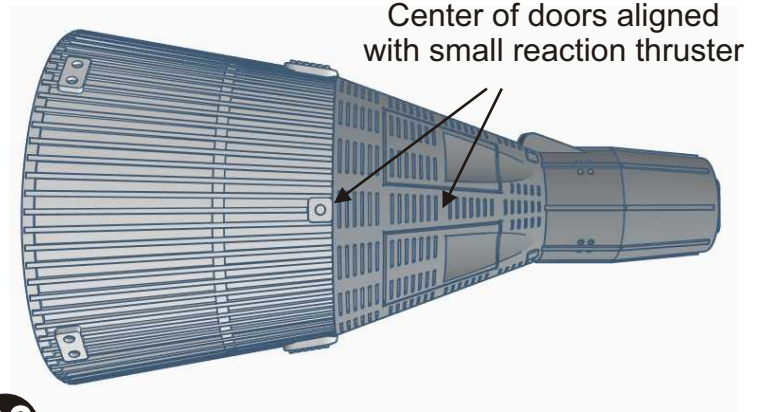
35

Locate the three parts of the Gemini capsule. Sand and prime the parts as needed (test fit the shoulder and sand if needed but do not prime or paint the shoulder). Paint the capsule black and the capsule adapter white.



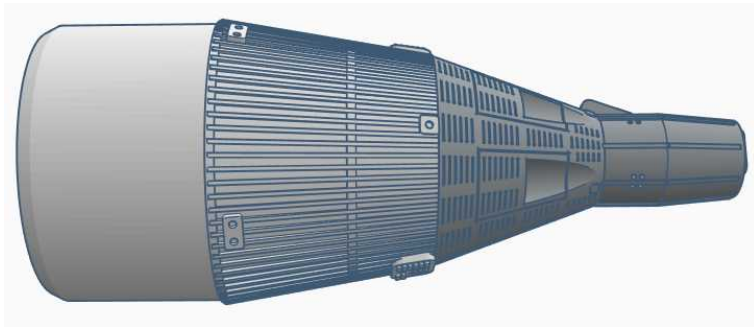
36

When dry test fit and glue the capsule to the capsule adapter in the orientation shown below.



37

Test fit **but do not glue** the capsule shoulder to the capsule assembly.



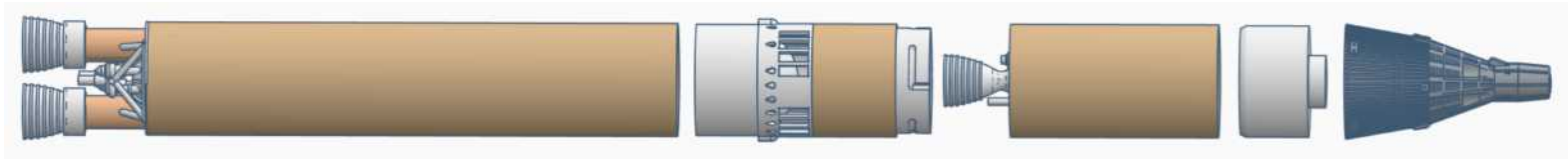
38

Slide the capsule assembly on top of the second stage body tube **but do not glue!**



39

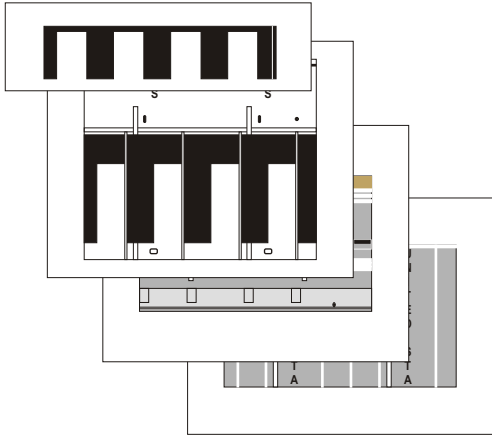
You have now completed the major subassemblies of the model as shown layed out below. Now we'll move on to the intallation of the body wraps.



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40

Using a sharp exacto knife and a steel ruler carefully cut out the body wrap decals.



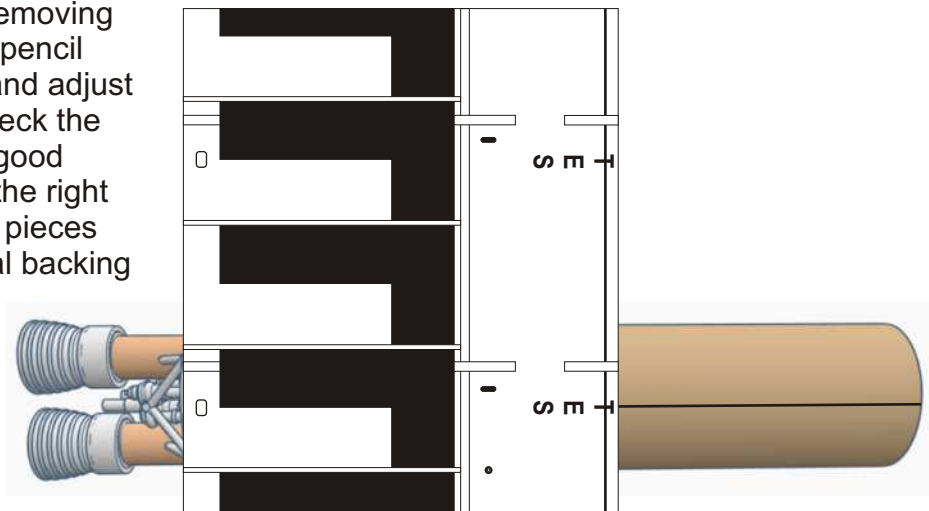
41

Using a piece of angled aluminum or a door jamb draw a straight pencil line up the center of the motors on the body tube as shown.



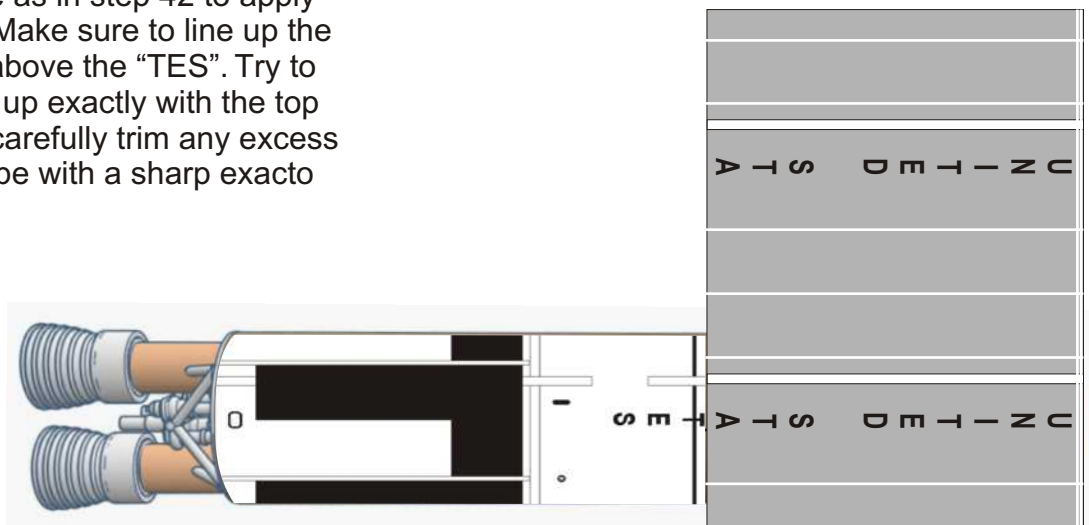
42

Start with the lower first stage wrap. Before removing the backing line up the "TES" letters with the pencil center line. Wrap the decal around the tube and adjust the wrap until the ends meet up correctly. Check the "TES" letters again for alignment and if all is good mark the body tube at the top and bottom of the right edge of the wrap either with a pencil or small pieces of masking tape. Peel back a 1/2" of the decal backing from the right edge of the wrap. Carefully line up the bottom edge of the decal and the right edge along your marks. When satisfied with the initial placement peel the rest of the backing off and slowly work the wrap around the tube eliminating bubbles as you go.



43

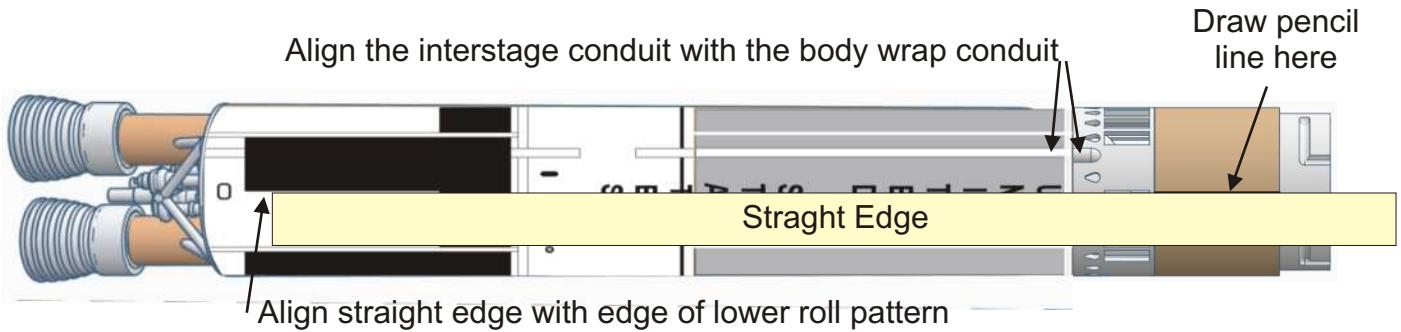
Follow the exact same procedure as in step 42 to apply the upper first stage body wrap. Make sure to line up the "UNITED STA" lettering directly above the "TES". Try to get the bottom of the wrap to but up exactly with the top of the bottom wrap. When done carefully trim any excess decal from the top edge of the tube with a sharp exacto blade.



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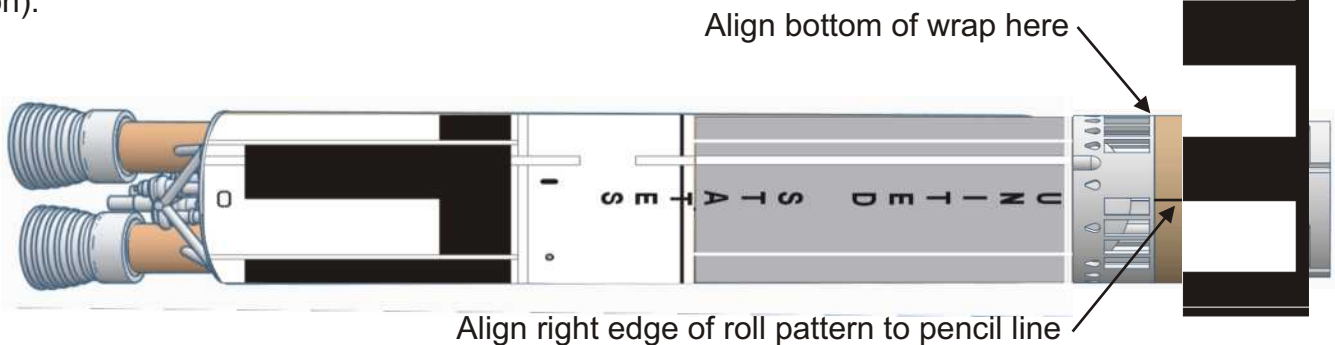
44

Install the interstage and line up the top of the body conduit that is 3D printed on the side of the interstage with the markings for the body conduits on the body wraps. Note that by rotating the interstage 180 degrees the conduit tops may line up better with the wrap. While holding this position use a straight edge to draw a line on the interstage tube that is parallel with the right edge of the center section of the lower black roll pattern. This line will be used to align the upper roll pattern with the lower roll pattern.



45

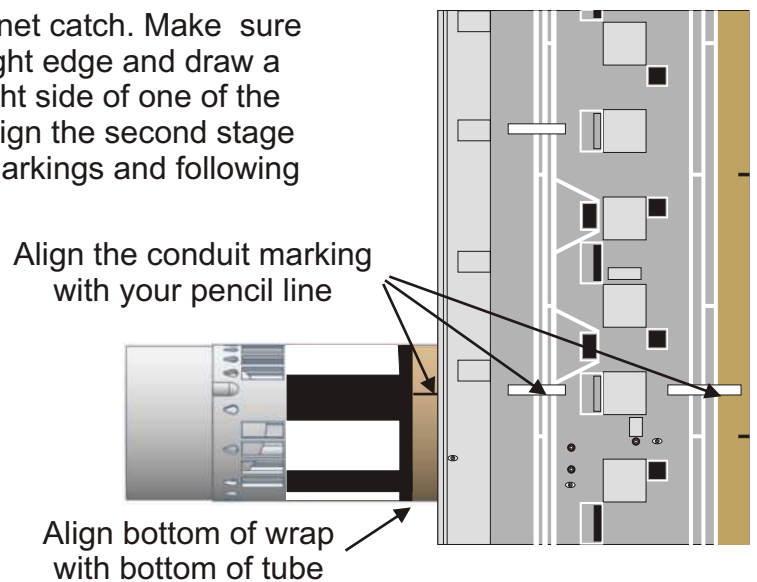
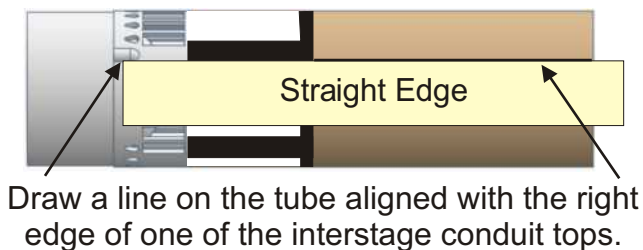
Again using the procedure described in step 42 install the upper roll pattern body wrap decal. Align the bottom of the decal with the bottom of the section of tube and align the right edge of the second from the left roll pattern with your pencil line (this aligns the roll patterns and keeps all body wrap overlay seams in the same position).



46

Clear coat all body wraps when installation is complete with non-yellowing acrylic spay!

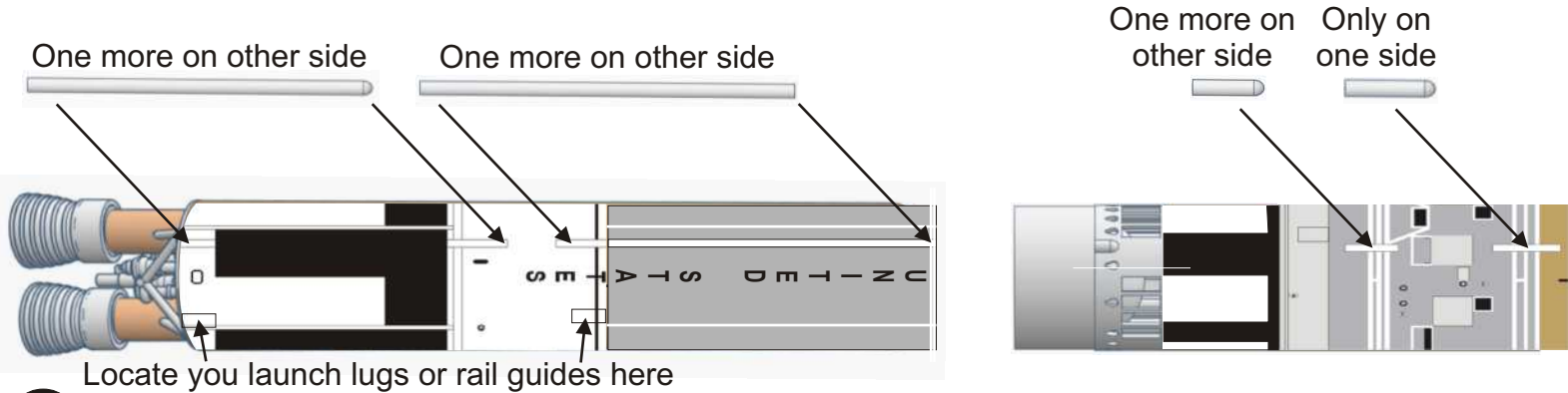
Attach the interstage to the second stage via the bayonet catch. Make sure that the catch is turned and fully engaged. Use a straight edge and draw a line on the second stage tube aligned with from the right side of one of the interstage conduit tops. Use the drawn pencil line to align the second stage body wrap along the right side of the double conduit markings and following the procedure in step 42 to attach the warp.



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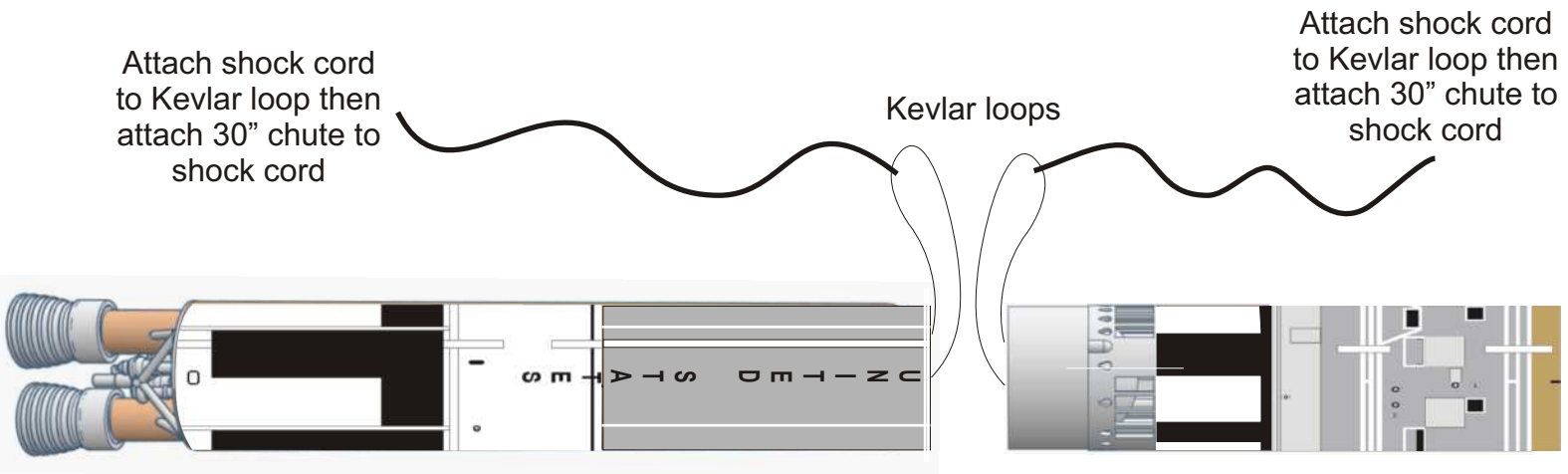
47

Remove all conduit parts from the conduit raft. Sand, primer, mask and paint so that they can be attached in the positions shown. The conduits paint scheme should match the background body wrap location. Prior to attachment of the conduits and launch lugs (or rail guides) use a straight pin to poke holes along the glue points for additional strength.



48

Attach shock cords and chutes as shown:



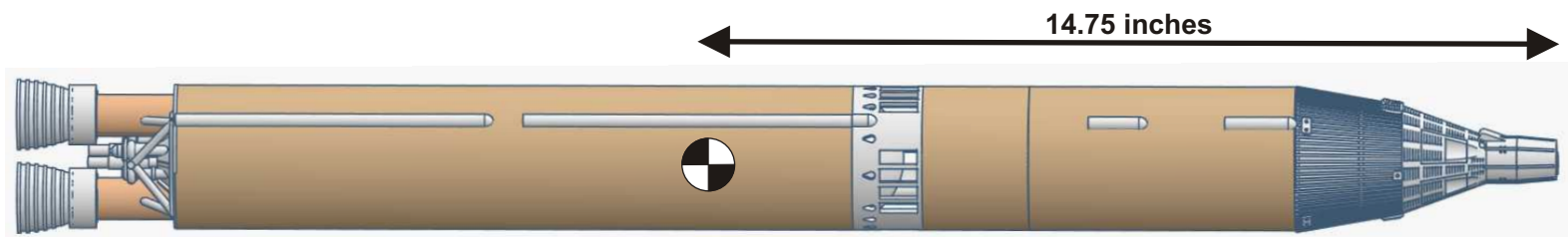
49

IMPORTANT!

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Put two Estes C6-7 rocket motors in the model, add recovery wadding and both chutes. Check the balance point of the model (CG or center of gravity). It should be very close to balancing at the recommended CG point. If the model balances behind the required CG add clay to the space in the base of the Gemini capsule where the shoulder attaches until the CG is correct. Glue the shoulder in place then when dry glue the capsule in place as shown (note the capsules windows should be parallel to the plane of the motors).



Failure to adjust the models C.G. to the position shown will result in a unstable flight that could injure someone, damage personal property and damage or destroy your model.

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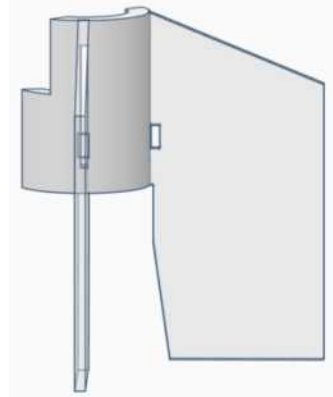
50

Locate the clear fins and the 3D printed fin clips. Sand the outside of the clips then prime and paint silver so that match the motor assembly.



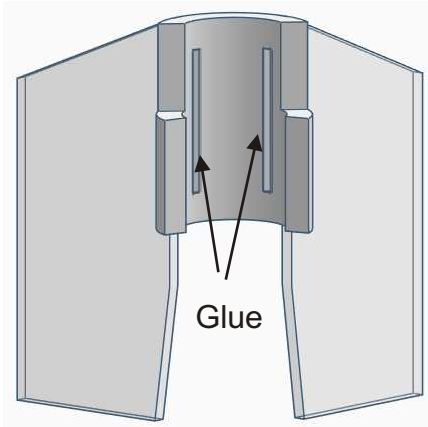
51

When dry, test fit the fins into the slots in the clips. File the slots if needed with an emery board.



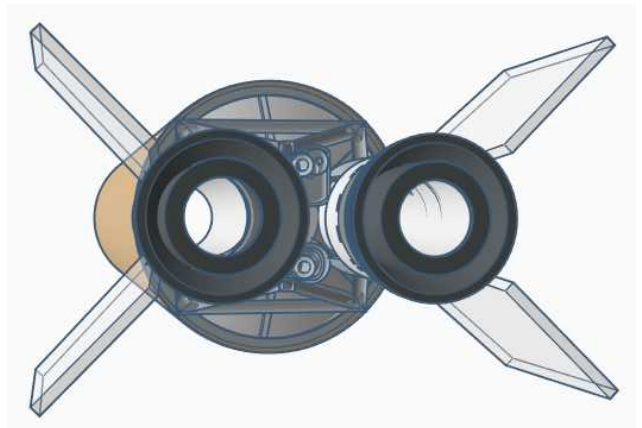
52

With the fins in place use super glue from the back side of the clips to wick into the slots and secure the fins.



53

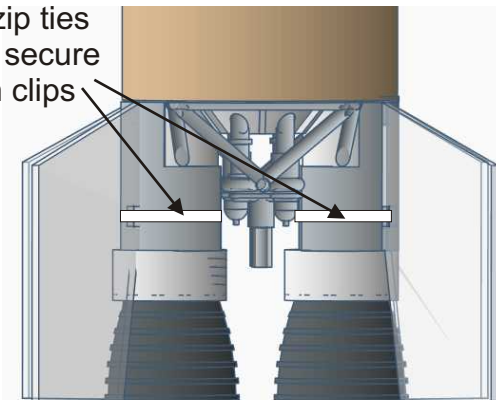
When the glue is dry test fit the clips in place. Make sure you first insert two motors in place in order to prevent the motor tubes from collapse.



54

When used during flight use small zip ties to secure the clips in place on the motor tubes as shown. The zip ties pass through the small square holes in the fins.

Small zip ties used to secure the fin clips



Flight Recommendations:

- 1) Use small zip ties to attach the fin clips.
- 2) Make sure your ignition system can reliably ignite a cluster of two motors.
- 3) After placing recovery wadding in the booster pack the second stage chute below the first stage chute to insure both chutes eject.
- 4) Only use a 3/16 inch rod or 1 inch rail.

Recommended Motors

2 x Estes Super C5-3	(Altitude - 298 feet)
2 x Quest Q-Jet C12-4	(Altitude - 335 feet)
2 x Quest Q-Jet D16-6	(Altitude - 455 feet)
2 x AeroTech single use D10-5	(Altitude - 769 feet)

Please follow all NAR and locale regulations and fly safe!

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