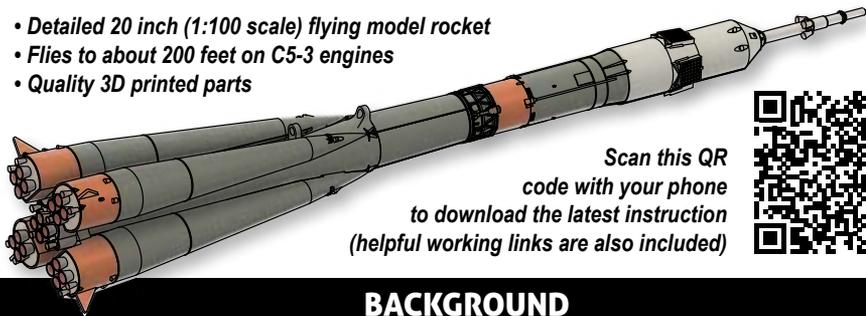


# — SOYUZ FG ROCKET —

- Detailed 20 inch (1:100 scale) flying model rocket
- Flies to about 200 feet on C5-3 engines
- Quality 3D printed parts



Scan this QR code with your phone to download the latest instruction (helpful working links are also included)



## BACKGROUND

With over 1,900 flights since its first crew flight in April 23, 1967, the Soyuz launch vehicle holds the world record for the most flights of any rocket design. From 2011 to 2020, the Soyuz was the only vehicle available for transporting astronauts to the ISS.

## INSTRUCTION MANUAL

This is a complex model that requires attention to detail to build and launch safely. Please read through these instructions carefully. Save or [download](#) this instruction manual for future reference. *Enjoy the build!*

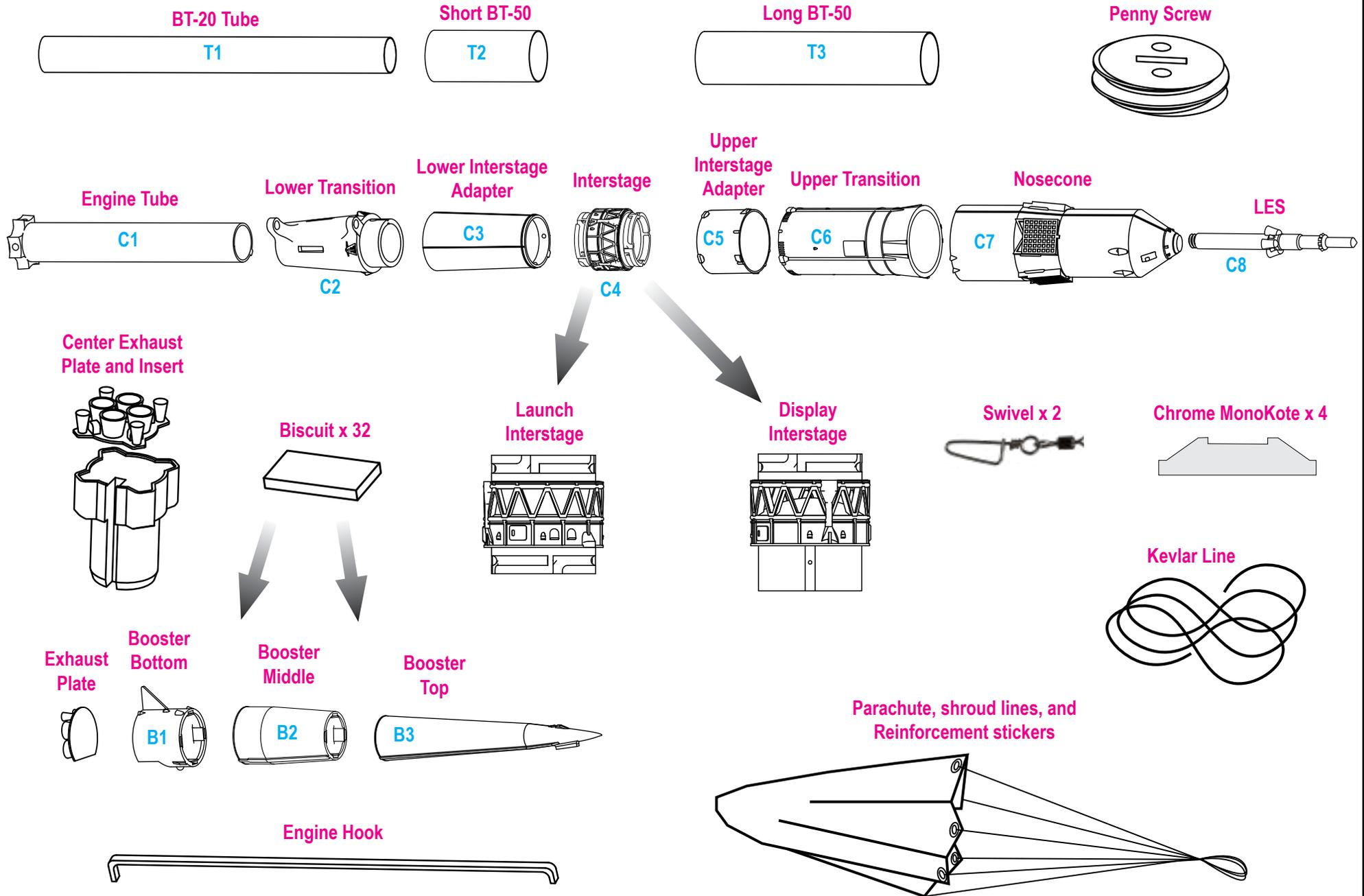
## RECOMMENDED SUPPLIES / TOOLS

- |  |  |
|--|--|
| <input type="checkbox"/> 220 grit sandpaper                  | <input type="checkbox"/> Masking tape                |
| <input type="checkbox"/> 400 grit sandpaper                  | <input type="checkbox"/> Coffee Stirring Sticks      |
| <input type="checkbox"/> Medium CA (cyanoacrylate) glue      | <input type="checkbox"/> Rust-oleum Filler-Primer    |
| <input type="checkbox"/> 5-minute epoxy                      | <input type="checkbox"/> Regular white primer        |
| <input type="checkbox"/> Yellow wood glue                    | <input type="checkbox"/> Gray spray paint            |
| <input type="checkbox"/> Gorilla Clear Grip Contact Adhesive | <input type="checkbox"/> Orange spray paint          |
| <input type="checkbox"/> Ruler                               | <input type="checkbox"/> White spray paint           |
| <input type="checkbox"/> Hobby knife                         | <input type="checkbox"/> Red paint (acrylic), bottle |
| <input type="checkbox"/> Sharp scissors                      | <input type="checkbox"/> Nitrile gloves              |
| <input type="checkbox"/> Tweezers                            | <input type="checkbox"/> Eye protection              |

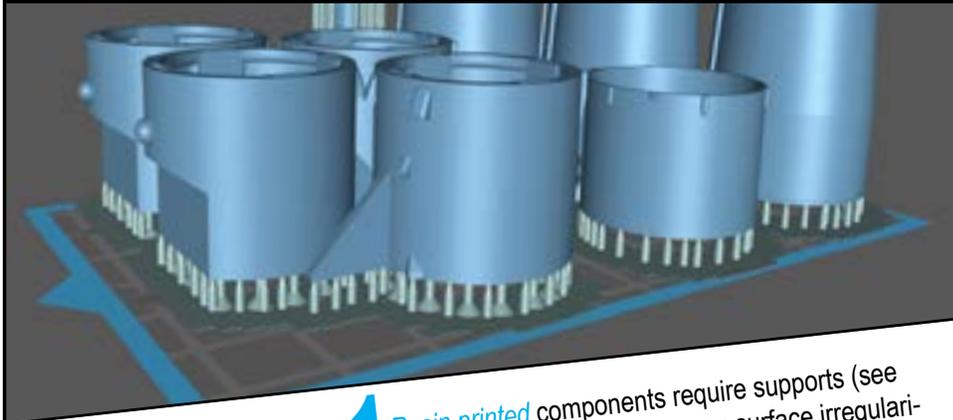
## WARNING AND DISCLAIMER

***This model is not a toy and not for children. Adult supervision required. This kit uses various glues including cyanoacrylates (Superglue), contact adhesive, and epoxy that can be hazardous. Sharp cutting tools are needed for assembly. Eye protection, nitrile gloves, and a well ventilated room are also required. Please follow instructions in this kit and on product labeling.***

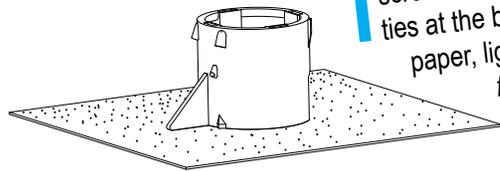
***Buyer assume all risk involved in the construction and use of this kit. Buyer agrees to completely follow these instructions as well as the [NAR Model Rocket Safety Code](#). This kit is only to be used under the NAR Safety code. If the buyer does not understand or agree with these stated terms, simply return this model (unused) within 30 days of purchase for a full refund.***



# PREP AND PAINTING



**1** Resin printed components require supports (see screenshot above). This causes surface irregularities at the base of these parts. Using 400 grit sandpaper, lightly sand these areas smooth. Use a flat surface (like a counter top) to support sandpaper and provide even sanding.

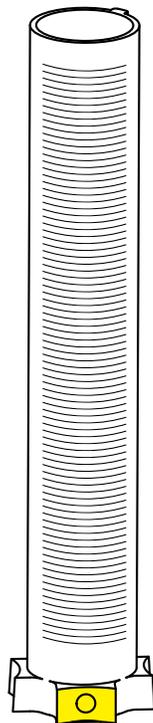


**2** The **LOWER TRANSITION (C2)** and the **ENGINE TUBE (C1)** are FDM printed for weight reduction and heat resistance. This process naturally produces fine layer lines.

Using masking tape, mask off the vertical notches in **C2** and the circular notch/surface on **C1** (see yellow highlighted areas). Then using 220 grit sand paper, sand these parts (working *against* the grain of the layer lines). Spray a coat of Rust-oleum Filler/Primer. After the Filler/Primer has dried, sand again with 220 grit sandpaper removing most of the primer. Spray another coat of filler primer. Sand with 400 grit sandpaper. Finally, spray a coat of regular primer.



C2



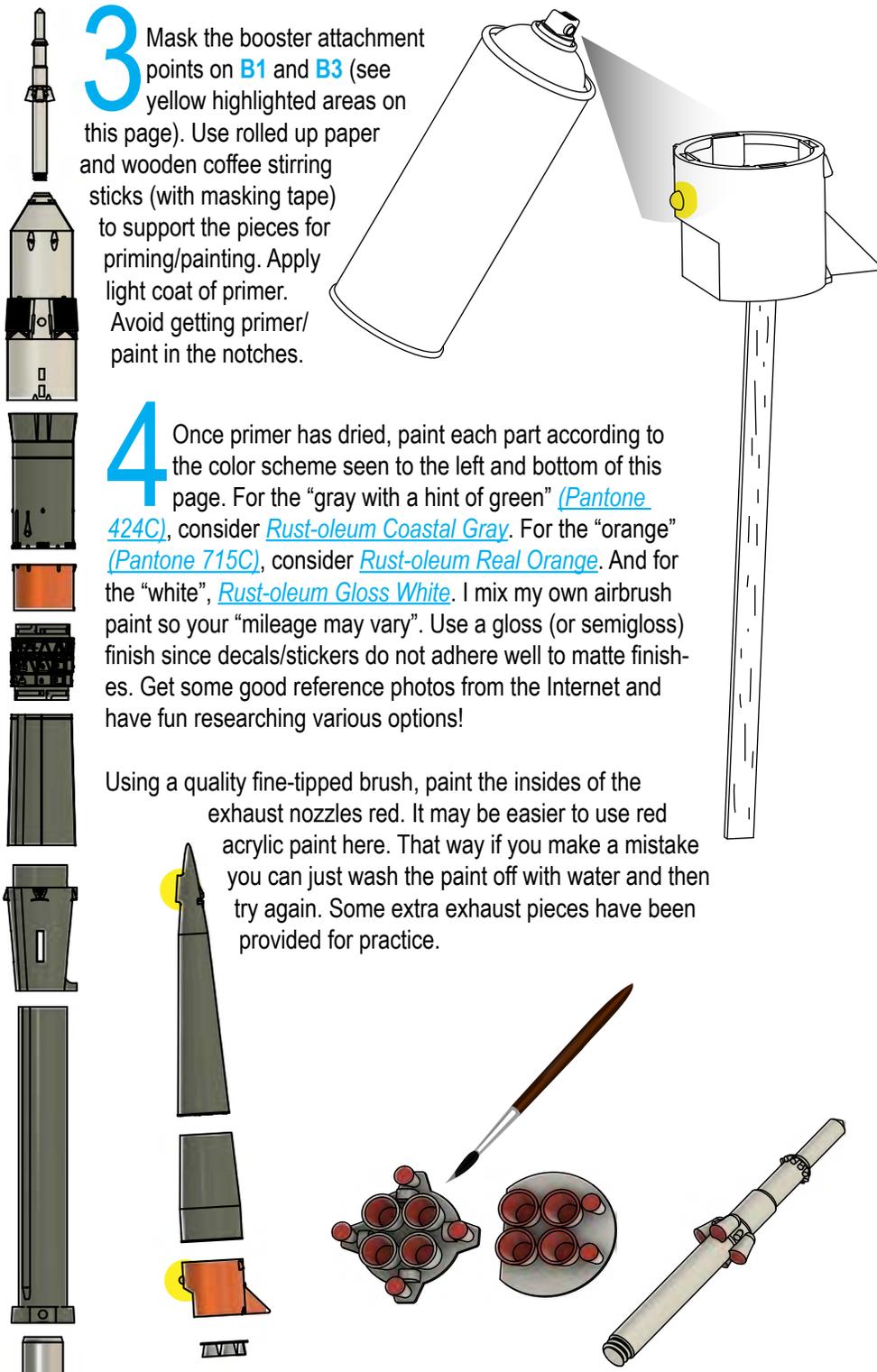
C1

 The resin printed parts do NOT need Filler/Primer, just use a regular primer on these parts.

**3** Mask the booster attachment points on **B1** and **B3** (see yellow highlighted areas on this page). Use rolled up paper and wooden coffee stirring sticks (with masking tape) to support the pieces for priming/painting. Apply light coat of primer. Avoid getting primer/paint in the notches.

**4** Once primer has dried, paint each part according to the color scheme seen to the left and bottom of this page. For the “gray with a hint of green” (Pantone 424C), consider Rust-oleum Coastal Gray. For the “orange” (Pantone 715C), consider Rust-oleum Real Orange. And for the “white”, Rust-oleum Gloss White. I mix my own airbrush paint so your “mileage may vary”. Use a gloss (or semigloss) finish since decals/stickers do not adhere well to matte finishes. Get some good reference photos from the Internet and have fun researching various options!

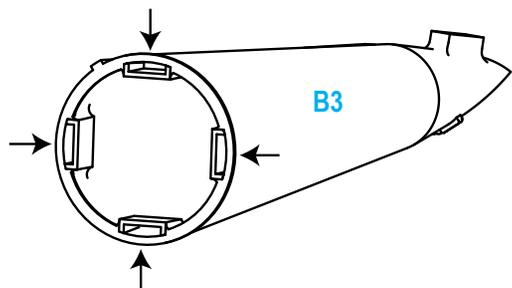
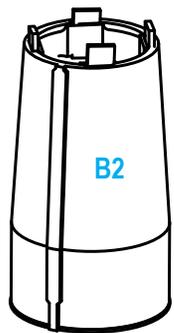
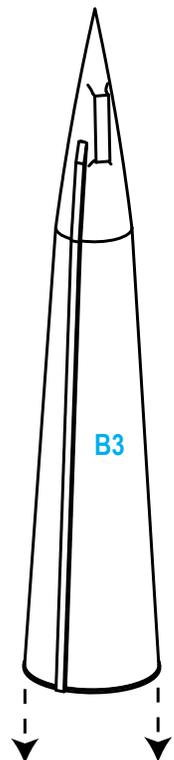
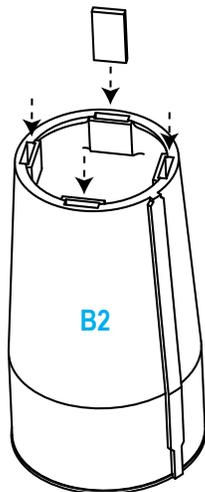
Using a quality fine-tipped brush, paint the insides of the exhaust nozzles red. It may be easier to use red acrylic paint here. That way if you make a mistake you can just wash the paint off with water and then try again. Some extra exhaust pieces have been provided for practice.



# BOOSTER ASSEMBLY

**1** Using CA (cyanoacrylate), glue the **BISCUITS** into the four slots on top of **BOOSTER MIDDLE (B2)**. Before the glue dries, complete steps 2 and 3.

 Apply a small pool of CA to a plastic sandwich bag, Then using a toothpick, apply CA into the slots before inserting the **BISCUITS**.

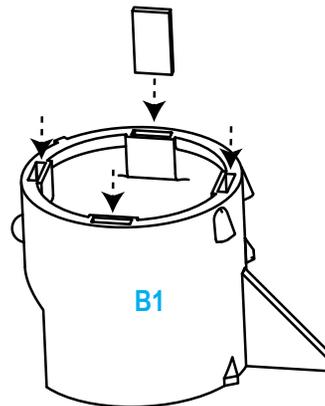


**2** Using a toothpick, apply CA into the slots of **BOOSTER TOP (B3)** and lightly around the edges.

 By applying the glue into the slots instead of on the **BISCUITS**, there is less risk of the glue overflowing and ruining your beautiful paint job!

**3** Before the glue dries, connect the **BOOSTER TOP (B3)** onto **BOOSTER MIDDLE (B2)**. Make sure that the two parts are aligned using the vertical conduit as a guide (see figure above). Allow this assembly to dry. Repeat Steps 1 to 3 for the other three boosters.

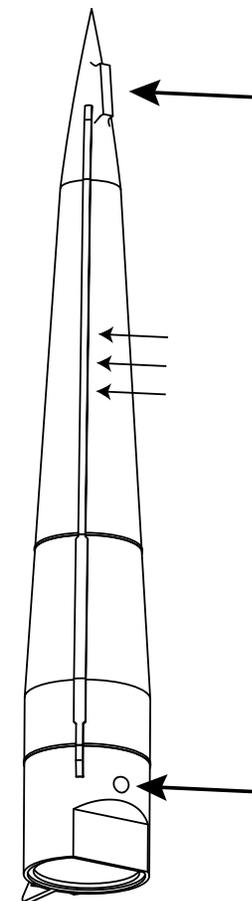
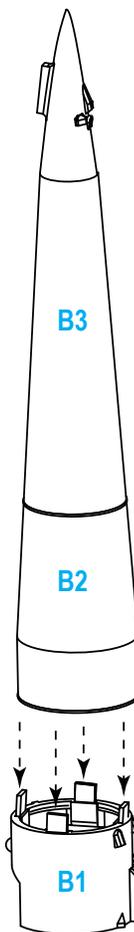
**4** Glue the **BISCUITS** into all four slots on top of **BOOSTER BOTTOM (B1)**. Before CA dries, complete Step 5.



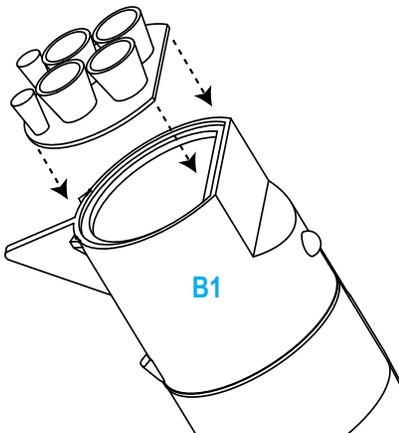
**5** Apply glue to the slots of **B2** and lightly along the edges. Then connect the upper booster assembly to the **BOOSTER BOTTOM (B1)**.

**IMPORTANT:** Make sure that the upper booster attachment point (vertical protrusion) and lower attachments point (circular protrusion) are lined up (see the two large arrows in the left diagram). Also, confirm that the long vertical conduit runs the entire length of the booster (see three small arrows).

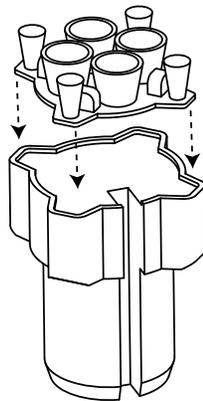
Repeat Steps 4 and 5 for the other three boosters. Allow the booster assemblies to dry.



**6** Glue **BOOSTER EXHAUST PLATE** to **B1**. Repeat for all boosters.

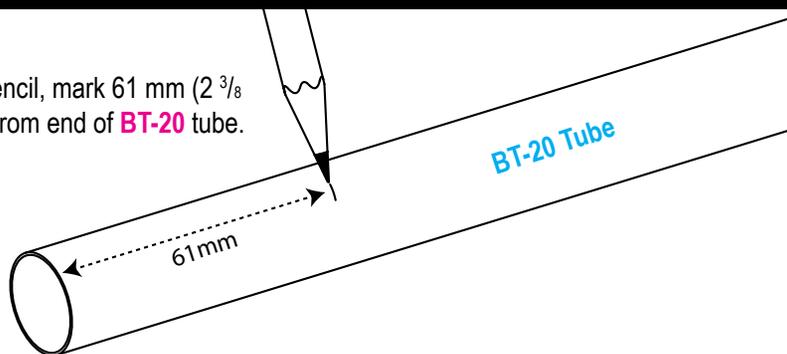


**7** Glue **CENTER EXHAUST PLATE** onto **CENTER INSERT**. Do **NOT** glue this assembly onto Soyuz. Designed to be removable for launch.



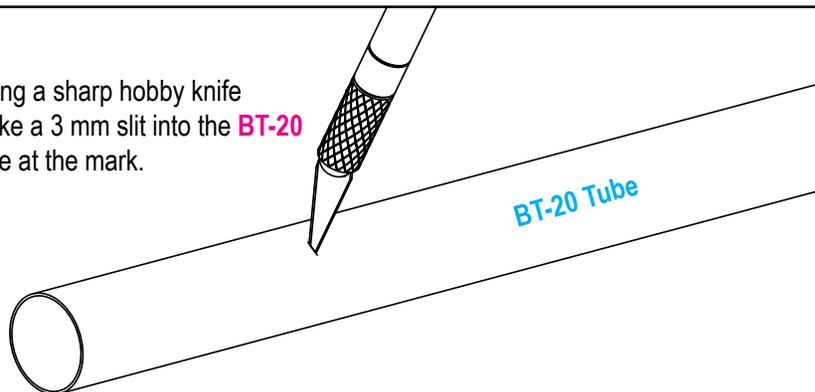
## ENGINE MOUNT ASSEMBLY

**1** Using pencil, mark 61 mm ( $2\frac{3}{8}$  inches) from end of **BT-20** tube.



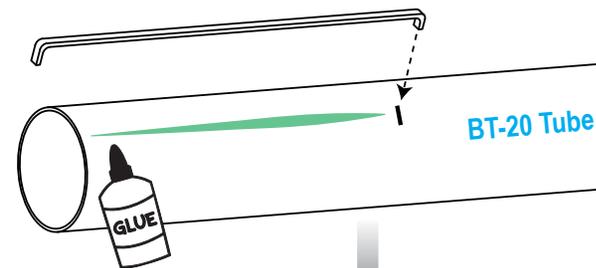
\* If you purchased a static model, you can skip steps 1, 2 and 3.

**2** Using a sharp hobby knife make a 3 mm slit into the **BT-20** tube at the mark.

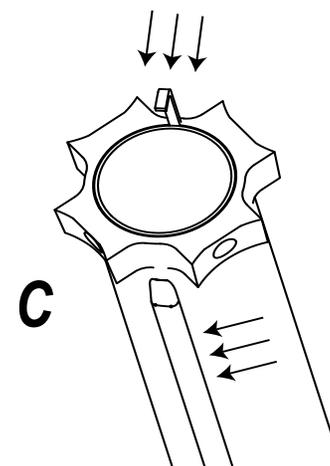
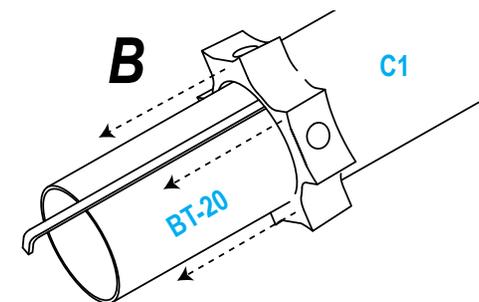
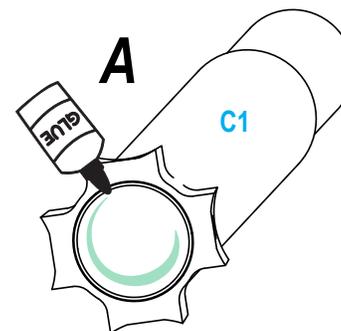
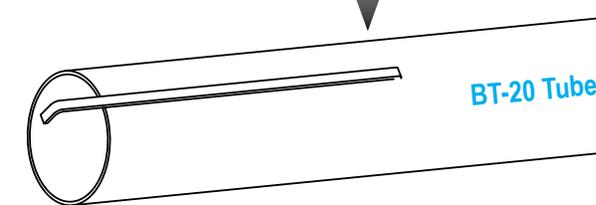


8

**3** Use 220 grit sandpaper to roughen the underside of the **ENGINE HOOK**. Then glue this hook onto the **BT-20** tube threading one side through the slit.



💡 For the following steps, consider using [Gorilla Clear Grip Contact Adhesive](#). If the Contact Adhesive gets on your paint, you can rub it off when it dries.



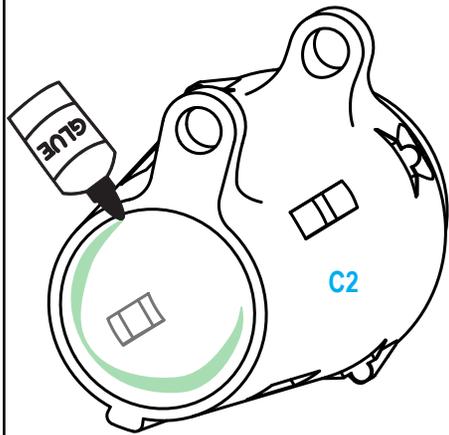
**4** **A.** Apply Contact Adhesive to the inside of the **ENGINE TUBE (C1)**.

**B.** Slide **ENGINE TUBE (C1)** over **BT-20** tube until the **BT-20** is flush with the end of **C1** and the **ENGINE HOOK** is on the *opposite* side from the conduit (see figure C)

**C.** Confirm the placement of **ENGINE HOOK** adjusting as needed. Wipe off any excess glue.

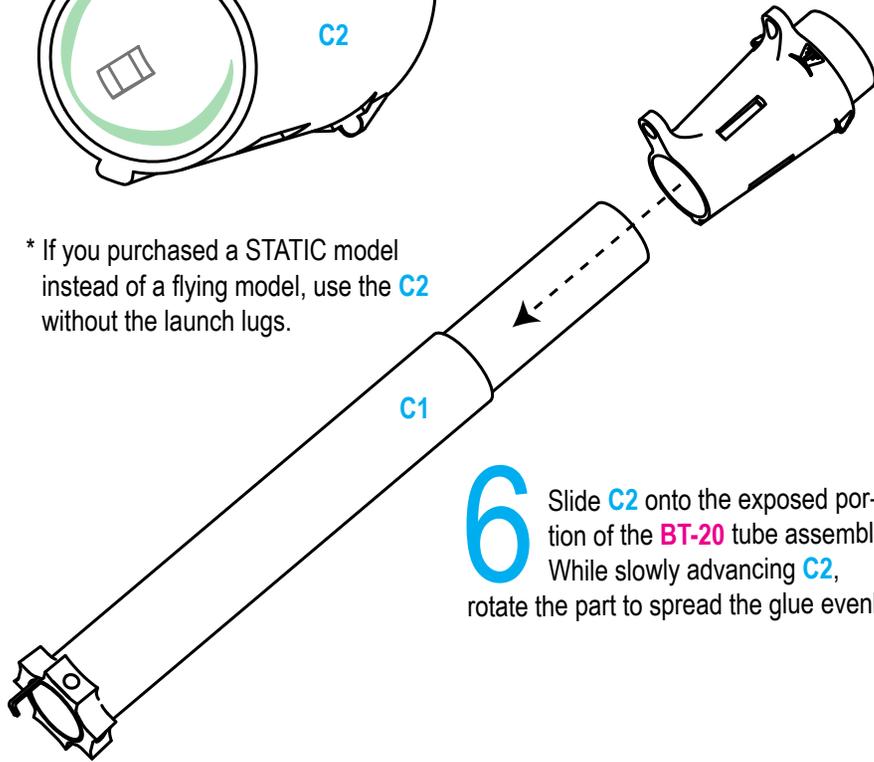
*Continue to next step before glue dries...*

9

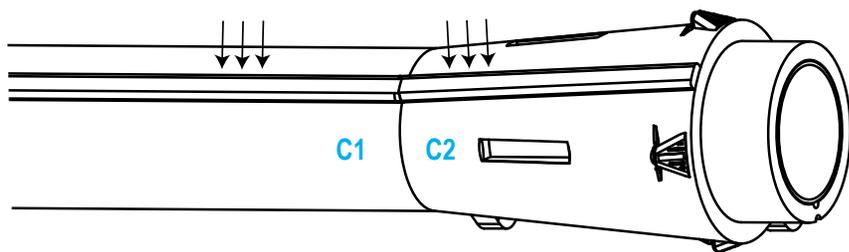


**5** Apply glue to inside of **LOWER TRANSITION (C2)**.

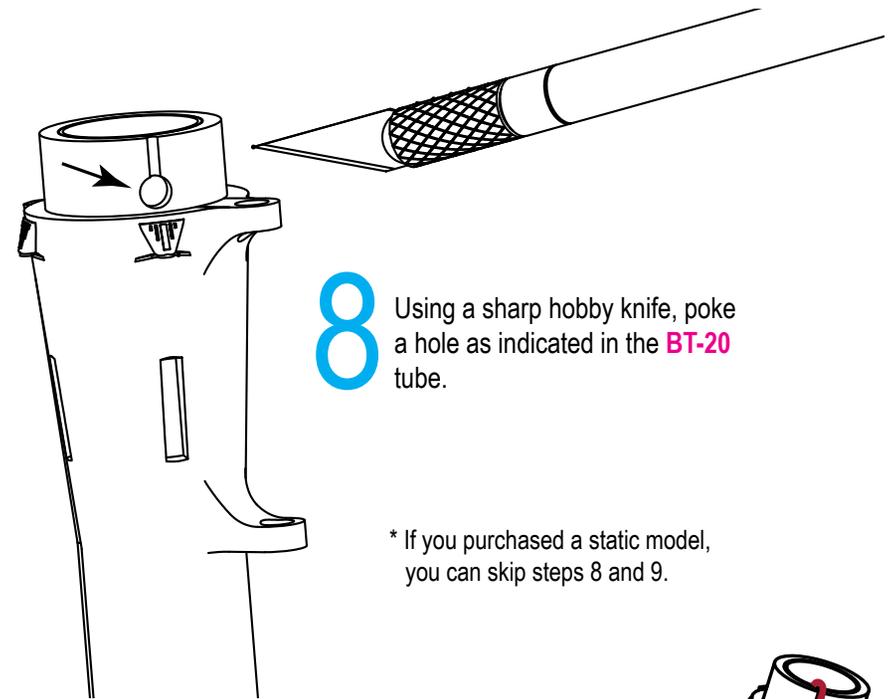
\* If you purchased a STATIC model instead of a flying model, use the **C2** without the launch lugs.



**6** Slide **C2** onto the exposed portion of the **BT-20** tube assembly. While slowly advancing **C2**, rotate the part to spread the glue evenly.

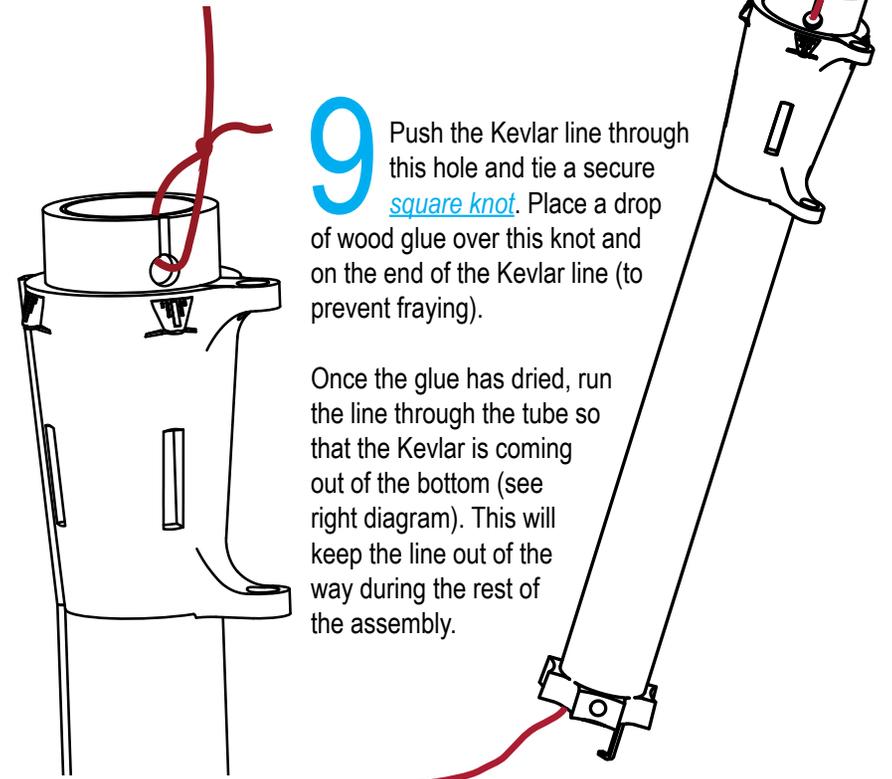


**7** Confirm alignment of **C2** using the conduit. Allow this Lower Engine Assembly to dry.



**8** Using a sharp hobby knife, poke a hole as indicated in the **BT-20** tube.

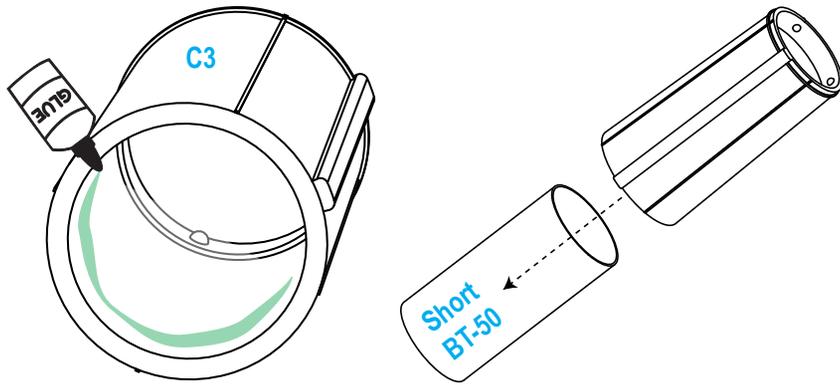
\* If you purchased a static model, you can skip steps 8 and 9.



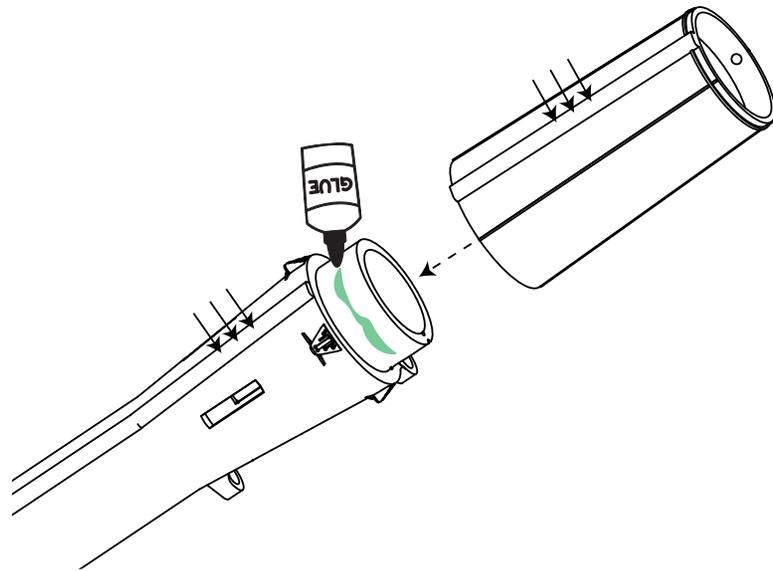
**9** Push the Kevlar line through this hole and tie a secure square knot. Place a drop of wood glue over this knot and on the end of the Kevlar line (to prevent fraying).

Once the glue has dried, run the line through the tube so that the Kevlar is coming out of the bottom (see right diagram). This will keep the line out of the way during the rest of the assembly.

## LOWER BODY ASSEMBLY

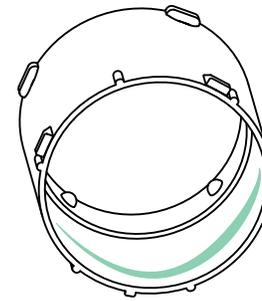


- 1 Apply glue to the inside bottom of the **LOWER INTERSTAGE ADAPTER (C3)**. Slide **C3** over **SHORT BT-50** tube. Rotate **C3** while slowly advancing to spread glue evenly. Avoid getting glue on the *upper* portion of **C3** which houses the twist-lock mechanism. Wipe off any excess glue and allow to dry.

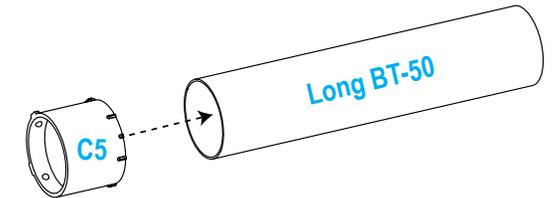


- 2 Apply epoxy around the rim of the lower assembly. Then slide the **LOWER INTERSTAGE ADAPTER (C3)** over rim while twisting to spread the glue. Once seated, make sure the conduits (see arrows) are lined up.

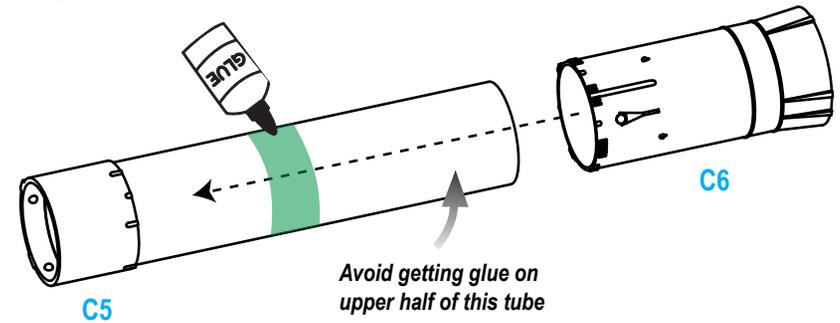
## UPPER BODY ASSEMBLY



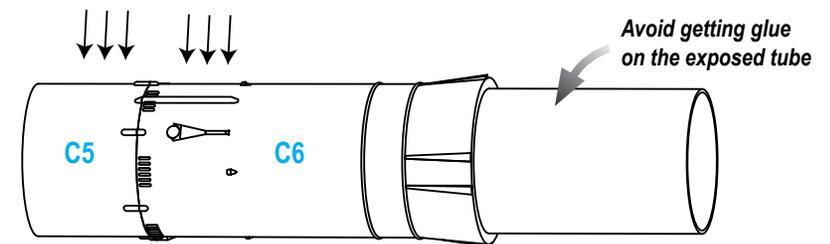
- 1 Do a dry fit. Apply thin amount of glue to the inside of the **UPPER INTERSTAGE ADAPTER (C5)**. Slide **C5** over **LONG BT-50** tube. Avoid getting glue on the twist-lock mechanism inside **C5**.



- 2 Do NOT get glue on the upper portion of the **LONG BT-50** tube (the **NOSE-CONE** slides over this part). Using the diagram below as reference, apply a very *small* and *thin* amount of glue (just enough to tack **C6** down). Slide **C6** over **LONG BT-50** (spreading the glue by twisting while slowly advancing) until **C6** sits against **C5**.



- 3 Before glue sets, make sure all the various conduits line up correctly between **C5** and **C6** (see below). Allow this Upper Body Assembly to dry.

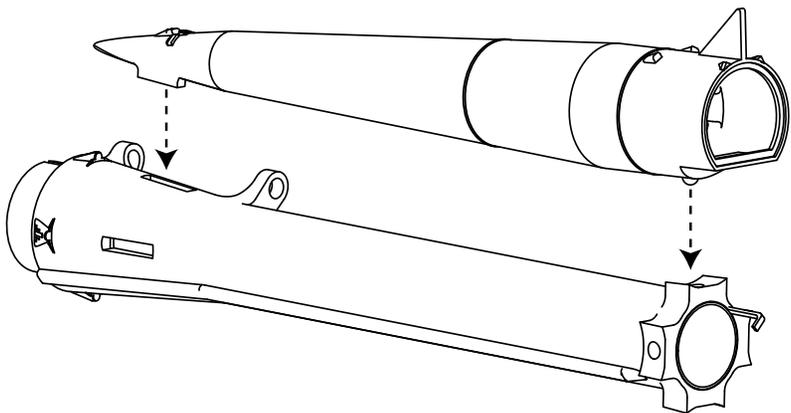


## ATTACHING BOOSTERS TO MAIN BODY

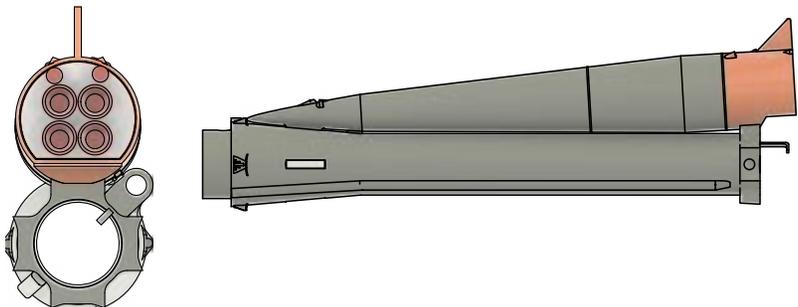
- 1** Glue does not adhere well to painted surfaces. Using a small file or other tools, remove any masking tape, paint, and primer from the upper and lower support notches/surfaces. Also remove any paint from the booster attachment points.



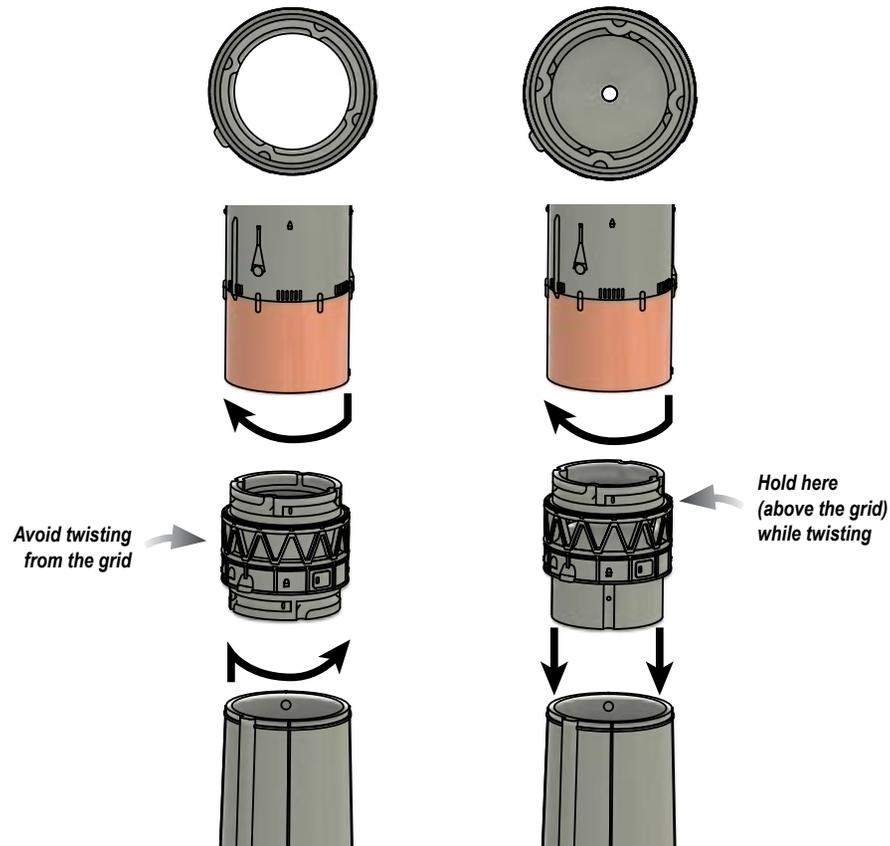
- 2** Before gluing on the boosters, perform a dry fit confirm alignment. Support the Engine Mount Assembly so that the notches are facing up (I used books). Then use epoxy to glue the booster onto the Engine Mount Assembly.



- 3** Before the epoxy cures, confirm the alignment of the booster. Allow the epoxy to cure thoroughly. Attach the remaining boosters making sure to dry fit and confirm alignment each time.



## READ CAREFULLY BEFORE INSTALLING INTERSTAGE



LAUNCH INTERSTAGE

DISPLAY INTERSTAGE

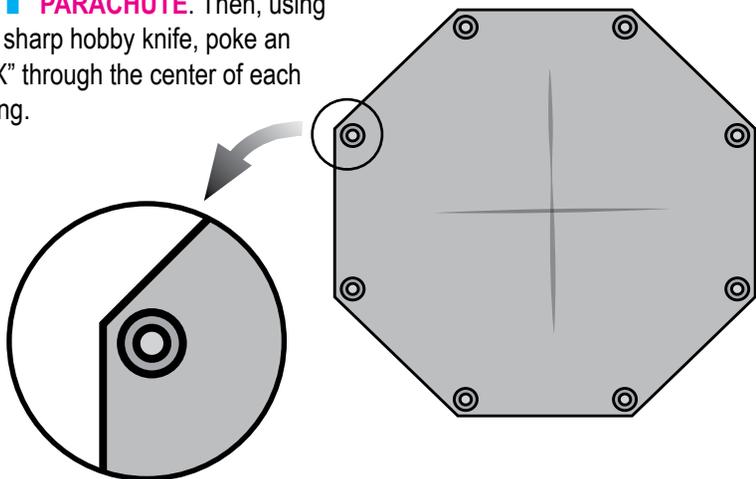
Do NOT glue the **INTERSTAGES (C4)**. They are designed to be removable and interchangeable. There are TWO separate interstage: one for **launch** and another for **display**.

ONLY use the **LAUNCH INTERSTAGE** (left) during your rocket launches. Notice that this interstage is hollow to allow hot ejection gases to pass. Both the upper and lower parts of this interstage use a "twist lock" mechanism. Make sure the parts are **fully seated** before twisting. Avoid twisting by the center grids. Note that the twist-lock mechanism is designed with very tight tolerances. This will loosen some with use.

The **DISPLAY INTERSTAGE** (right) is used for display only. **Do NOT attempt to launch the Soyuz with this interstage.** The upper portion uses a "twist lock" mechanism. When twisting, make sure to hold the part **ABOVE** the grid to limit shear forces on the delicate grids. The lower portion just slides in place. *When holding the rocket, make sure to support it from below this part to prevent the lower assembly from sliding out and falling to the ground!*

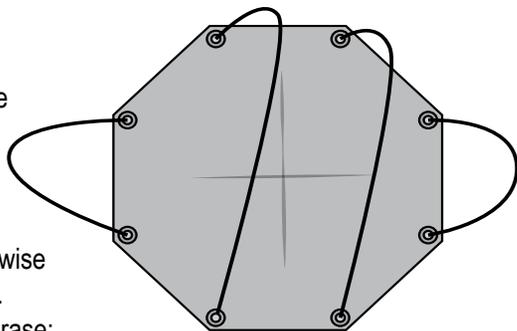
## FINAL ASSEMBLY

- 1** Apply reinforcement rings to each corner of the **PARACHUTE**. Then, using a sharp hobby knife, poke an "X" through the center of each ring.

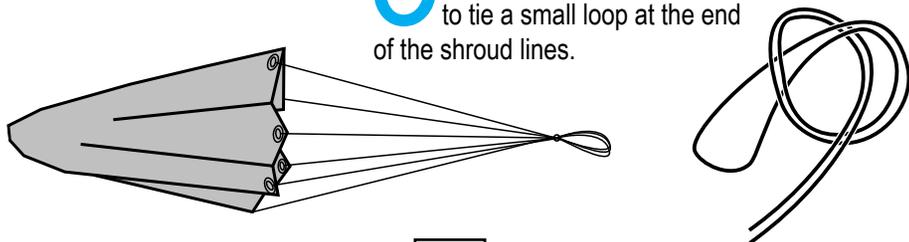


- 2** Tie the shroud lines to the reinforcement rings using a **square knot**. Tie the lines to parachute using the pattern to the right.

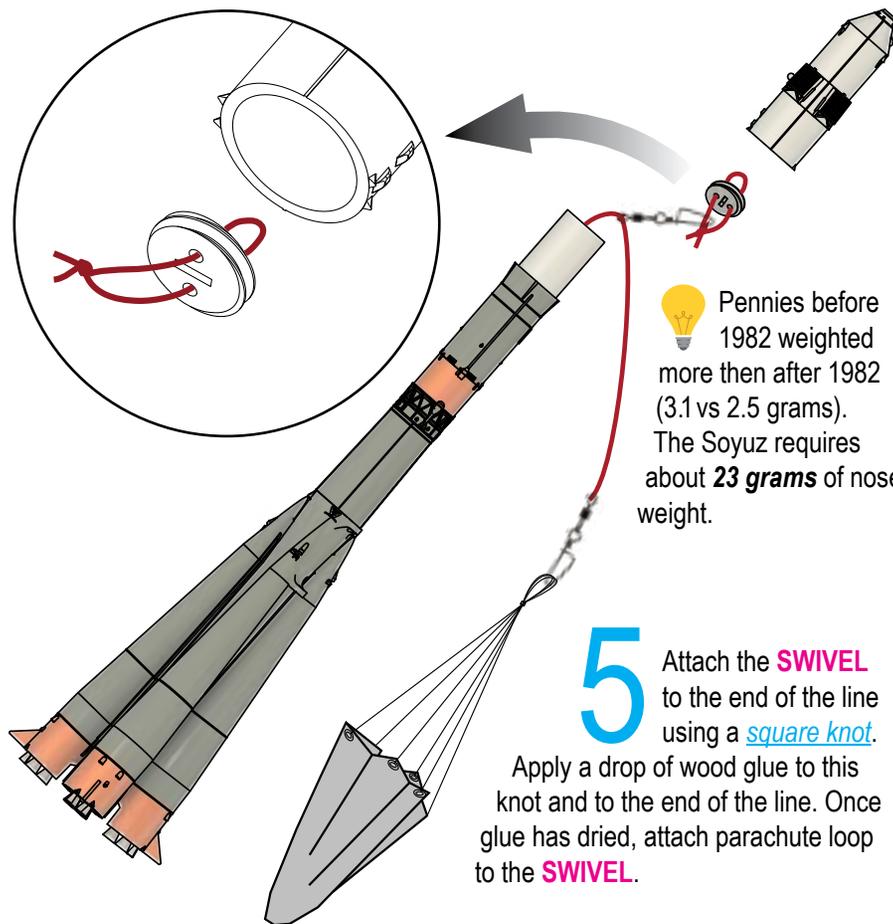
💡 It's important to make a **TRUE** square knot. Otherwise the lines will eventually slip out. Make sure to tie it using this phrase: "Right over left. Then, left over right."



- 3** Find the center of the lines, then use an **overhand knot** to tie a small loop at the end of the shroud lines.



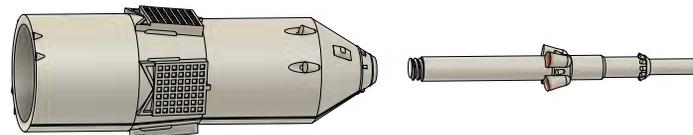
- 4** Cut off a piece of kevlar and tie a loop on the **PENNY SCREW** using a square knot. Place wood glue on knot and ends of kevlar. About midway on the main Kevlar line secure the swivel using an **overhand knot**. Attach swivel to loop. Add 8 old U.S. pennies (dated before 1982) into the slot in the **NOSECONE (C7)**. Then, using a screwdriver, attach the **PENNY SCREW** inside the **NOSECONE**. Tighten just until pennies are secure. Do not over-tighten.



💡 Pennies before 1982 weighted more than after 1982 (3.1 vs 2.5 grams). The Soyuz requires about **23 grams** of nose weight.

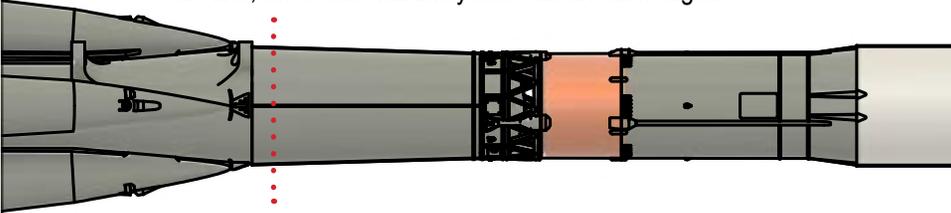
- 5** Attach the **SWIVEL** to the end of the line using a **square knot**. Apply a drop of wood glue to this knot and to the end of the line. Once glue has dried, attach parachute loop to the **SWIVEL**.

- 6** The **LES (C8)** simply screws into the **NOSECONE (C7)**. Do NOT glue.

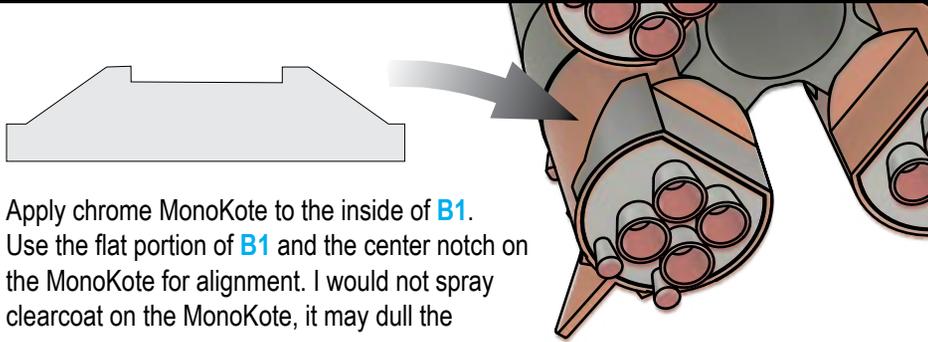


## ADJUSTING THE CENTER OF GRAVITY

To find the center of gravity (CG), locate the balancing point WITH the C5-3 engine and parachute installed. The recommended CG is on (or to the RIGHT of) the dotted line. Add pennies to the nose to adjust the CG as needed. If the CG is to the left of this line, the rocket will likely have an unstable flight.



## APPLYING CHROME MONOKOTE



Apply chrome MonoKote to the inside of **B1**. Use the flat portion of **B1** and the center notch on the MonoKote for alignment. I would not spray clearcoat on the MonoKote, it may dull the

## WHERE ARE THE DECALS?

Because most of the markings on the Soyuz are from trademark logos, I am not able to provide these decals with the Soyuz kit. But it is not hard to [make your own decals](#) at home! And if you do a Google image search for "[Soyuz decals](#)", you can get various options to spark your creativity. [Ye Olde Rocket Forum](#) also has some interesting discussions and artwork that modelers have created.

## FINAL THOUGHTS

- I just want to say a huge THANK YOU to Steve Nightingale! I sent him a late prototype of the Soyuz. His encouragement, expert modeling skills, and feedback were extremely helpful in getting this difficult (and stalled) model ready for production. Please read Steve's build log on the Really Koo Stuff blog, He has some amazing tips and photos. He is a true artist! THANKS AGAIN STEVE!
- Finally, thank YOU for your support of this small business! It helps to support my love of designing cool (or Koo) new things!

## LAUNCH CHECKLIST

<input type="checkbox"/>		Remove the <b>DISPLAY INTERSTAGE</b> and install the <b>LAUNCH INTERSTAGE</b> (hollow inside). <i>Installation of the incorrect interstage will result in a catastrophic launch failure.</i>
<input type="checkbox"/>		Unscrew and remove the <b>LES</b> before launch (although I have launched the Soyuz successfully with the LES attached, it is safer to remove it).
<input type="checkbox"/>		Add fireproof <a href="#">recovery wadding</a> .
<input type="checkbox"/>		Fold the parachute in half (lining up the shroud lines).  Fold in quarters (again lining up the lines).  Fold in eighths vertically. Lines should line up neatly.  Fold tip down and bundle up sides. Loosely <b>roll the parachute</b> to bind up the lines (do not twist line onto parachute) and insert parachute into the main tube. The fit should be relatively loose.
<input type="checkbox"/>		ONLY use <a href="#">Estes C5-3</a> model rocket engines! The fit may be tight. Use a needle nose plier to open the engine hook to insert engine.
<input type="checkbox"/>		Adjust the CG as needed by adding more pennies to the nosecone. See "Adjusting the Center of Gravity" on the previous page.
<input type="checkbox"/>		Launch only in calm winds (less than 5 MPH). Follow the <a href="#">NAR Safety Code</a> .

***ReallyKooStuff.com***