



Kit #05029
Skill Level 3

Made In USA



ORION
Rocket Transport To The Future

Orion Parts List

Item #	Item Name	Qty
10091	Engine Mount Tube (AT-24/3.75)	1
10160	Airframe Tube (AT-56/18)	1
13031	Centering Ring (CR-18/24)	1
13035	Centering Ring (CR-24/29)	3
13056	Launch Lug (1/4" X 3")	1
15025	Cardstock Ring Set CR-24/56	1
15537	Orion Fin Sheet	1
19470	Plastic Nose Cone PNC-56A	1
24043	Regular "D" Crimped Engine Hook	1
24044	Crimped "E-size" Engine Hook	1
29101	32"/24" Parachute Pack	1
29520	300# Kevlar® Shock Cord x 8ft	1
31057	Orion Transport Instruction Sheet A	1
31058	Orion Transport Instruction Sheet B	1
31059	Orion Transport Instruction Sheet C	1
37017	Orion Cardstock Pattern Sheet	1
39019	Orion Face Card	1
41027	Orion Decal Sheet	1

Skill Level 3

Average Rocketry Skills Needed

Futuristic space transportation is closer than you think. Not only will you be able to make a trip into space, but you'll have the option of luxury accommodations. That is what the Orion transport is all about; it is a luxury liner for the business traveler.

Just imagine, in only a few more years, you could board a rocket transport to take you to an orbiting space hotel. It will be similar to boarding an airplane, but the ride to space is far more spectacular. You'll see the sky turn from bright blue to a dark black, and more sparkling stars than you could ever imagine.

The Orion Transport is a mid-size rocket that uses D, E and F size rocket engines. But that doesn't mean it is hard to build. With the exception of the cardboard display nozzle on the back end of the rocket, this is an easy model to assemble.

Needed Tools and Materials

- ☐ Hobby Knife with Sharp Blades
- ☐ Ruler
- ☐ Wood Glue (recommended) or White Glue
- ☐ Sand Paper 200 grit, 400grit and Sanding Block
- ☐ Masking Tape
- ☐ Pencil
- ☐ Scissors
- ☐ Paper Towel
- ☐ Wood Dowel

Optional Tools / Finishing Supplies

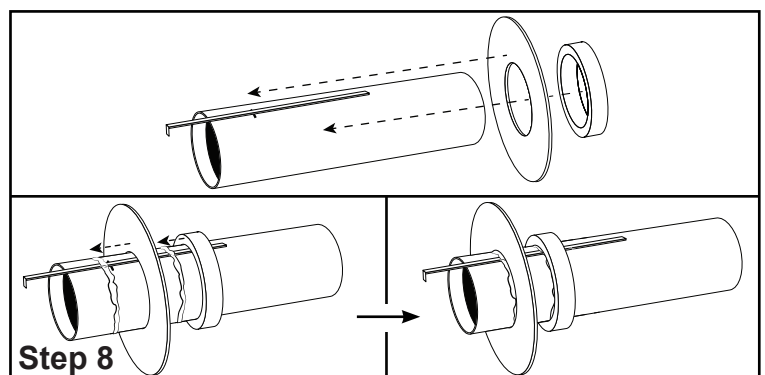
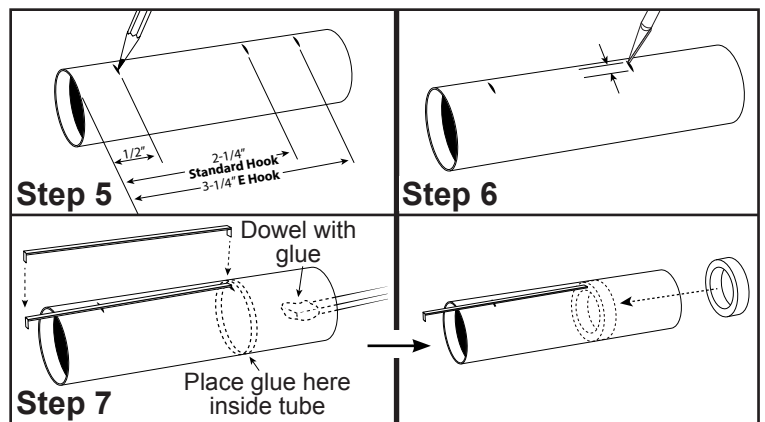
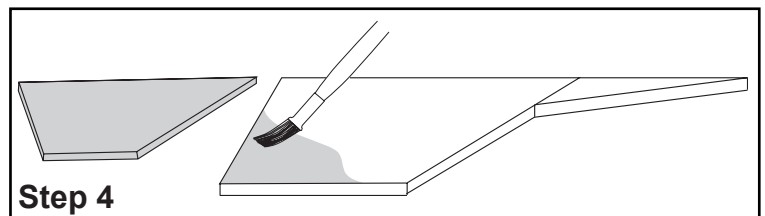
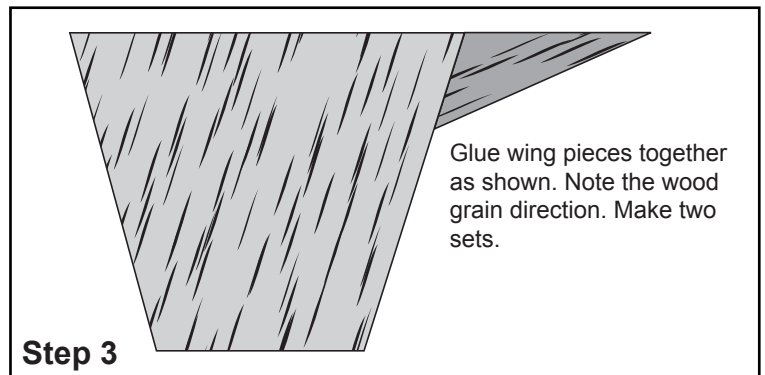
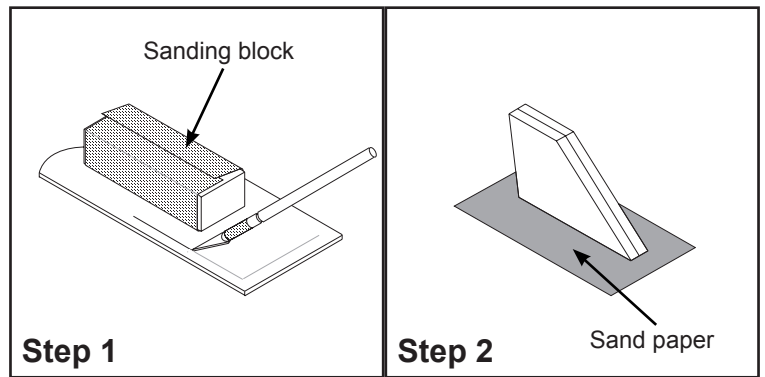
- ☐ 24mm Spent Engine casing to insert engine block
- ☐ Aluminum "angle" to draw lines on the tube
- ☐ Paint Supplies: (Spray Paint, Brushes, etc)
- ☐ Plastic Sheet (to cover the work surface)
- ☐ Safety Glasses (For general protection while building)
- ☐ Super Glue (CyA Adhesive medium viscosity)
- ☐ Wood Sealer/Sanding Sealer



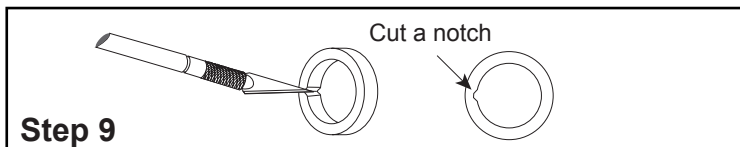
Manufactured in the USA by:
Apogee Components Inc.
Colorado Springs, Colorado, USA
Visit us online at:
www.ApogeeRockets.com

Assembly Steps

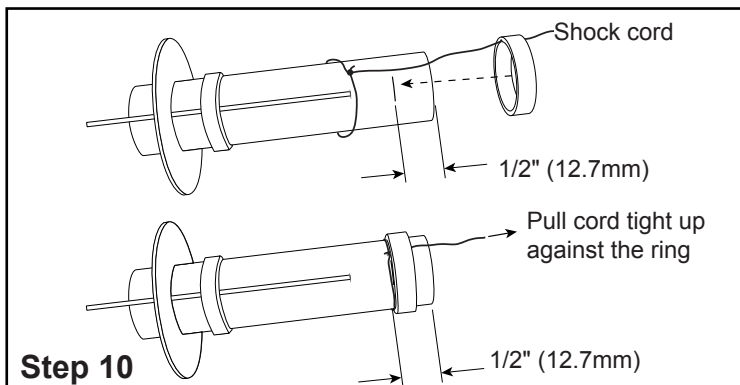
- ❑ 1. Using 400 grit sandpaper, fine sand the wood sheet before removing the pieces. Carefully remove all the parts from the sheet by freeing the edges with a sharp hobby knife.
- ❑ 2. Group the like fins together, and gently sand the edges as shown in the illustration.
- ❑ 3. The main wings of the Orion are made by joining the wooden pieces together as shown. Place the pieces on a sheet of plastic when gluing them together so they don't stick to your work table as they dry. Use wood glue, and perform this step to make the left and right side wings.
- ❑ 4. You can apply sanding sealer to the surfaces of all the tail pieces and wings. Coat both sides at the same time to minimize the chances of warping. Do not allow the sanding sealer to get on the root edge of the parts. This could prevent the pieces from bonding well to the body tube when glued on later. Set them aside to dry completely. When they're dry, sand the sealer smooth until you get a desirable surface finish. You may need to repeat this step several times depending on the level of quality you wish to achieve.
- ❑ 5. **Install your preferred engine hook:**
Regular "D" Engine Hook: Mark the body tube $\frac{1}{2}$ " (13mm) and then $2\frac{1}{4}$ " (57mm) from one end as shown.
E Engine Hook: Mark the body tube $\frac{1}{2}$ " (13mm) and then $3\frac{1}{4}$ " (83mm) from one end as shown.
- ❑ 6. Using a hobby knife, make a $\frac{1}{8}$ " (3mm) long cut in the body tube at the ($2\frac{1}{4}$ " or $3\frac{1}{4}$ ") line you drew in the previous step.
- ❑ 7. Insert the correct engine hook into the slit. Place wood glue on the end of a wooden dowel or Q-Tip and smear glue around the inside of the motor mount tube just ahead of the engine hook. Slide the small green engine block ring inside the motor tube, and press it through the glue and up against the tip of the engine hook.
- ❑ 8. Take one of the large cardstock centering rings and one of the large green centering rings and slide them both over the forward end of the motor mount tube as shown. Apply a bead of wood glue around the engine mount tube at the $\frac{1}{2}$ " (13 mm) mark you made in **Step 5** and then add another bead of glue about $\frac{1}{2}$ " behind the first. Slide both rings into place as shown.



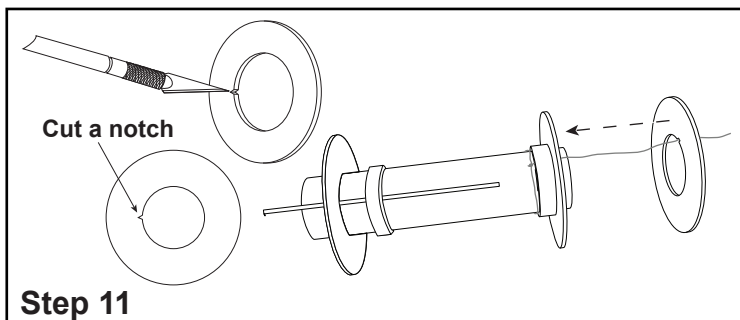
- 9. Grab the other green centering ring and cut a small notch on the inside with a hobby knife.



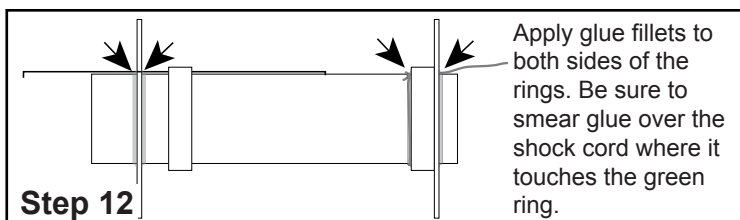
- 10. Mark a pencil line on the front of the engine mount tube 1/2" (12mm) from the end; in the E engine hook case, that will be directly in front of the engine hook slot. Tie the yellow Kevlar® shock cord around the front end of the engine mount tube. Slide the green ring over the shock cord and onto the tube. The shock cord should fit into the notch on the inside of the ring. Pull the cord tight up against the ring. Glue the ring in place, so that the edge lines up with the pencil mark as shown.



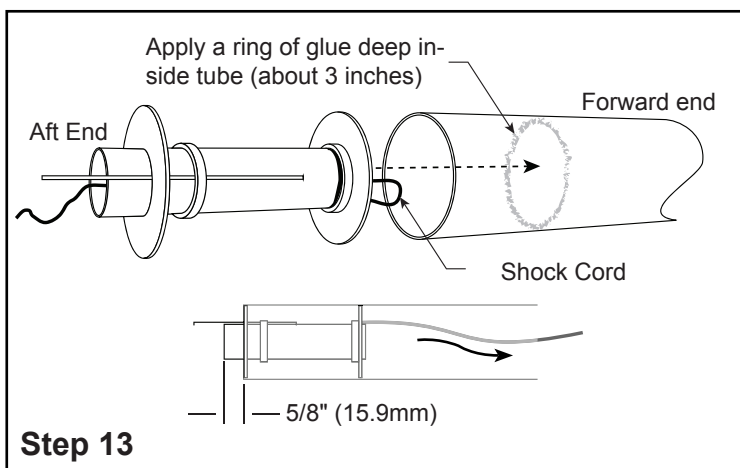
- 11. Cut a notch in the inside of the remaining card-stock centering ring with your hobby knife. Slide this ring over the shock cord, and glue it against the front green ring on the engine mount tube. The shock cord should nest inside the notch so the ring fits easily over the tube.



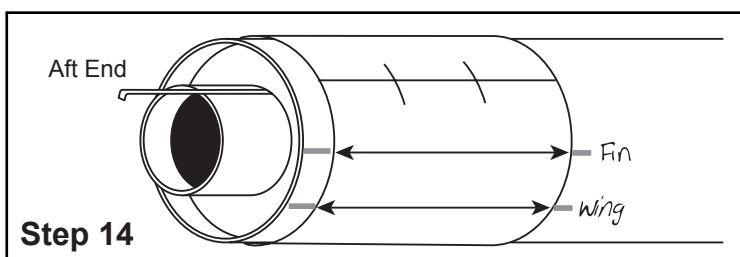
- 12. After the glue on the engine mount is dry, put a fillet of glue on each side of both of the centering rings. These rings take a lot of stress at engine ejection, and you must make sure to have a good glue bond. When the glue is dry, test fit the assembly into the large body tube. Sand the edges if the fit is tight.



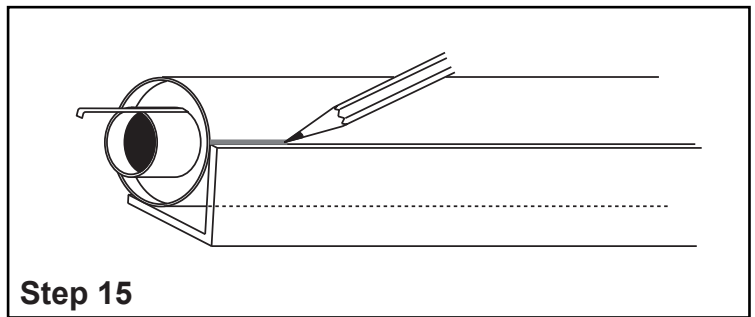
- 13. Reverse the direction of the shock cord so that it comes out of the aft end of the engine mount tube as shown. Apply wood glue about 3" inside one of the body tubes using a scrap piece of wood or a dowel. Immediately insert the engine mount assembly into the body tube, and push with one FAST and SMOOTH motion until the aft end of the engine mount tube sticks out about 5/8" (15.9 mm) as shown. Apply additional wood glue to the exposed centering ring/body tube. Wipe away excess glue with your finger. You can now feed the shock cord back through the body tube.



- 14. Cut out the tube marking guide. Wrap the guide around the aft end of the large white body tube and tape the ends of the marking guide together. On the body tube mark a small line at each of the arrow points and label as indicated on the marking guide and then remove.

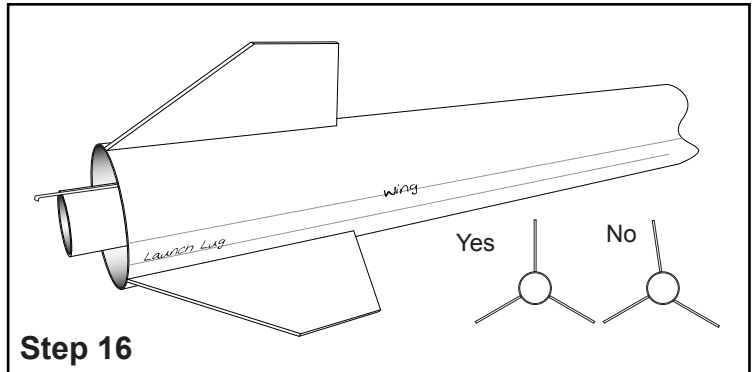


- ☐ 15. Using a metal angle tool (a door frame will work, but it is not recommended on large diameter tubes), draw a pencil line down the outside of the body tube at each pencil mark. Label the launch lug line so you don't glue a fin in the wrong position.



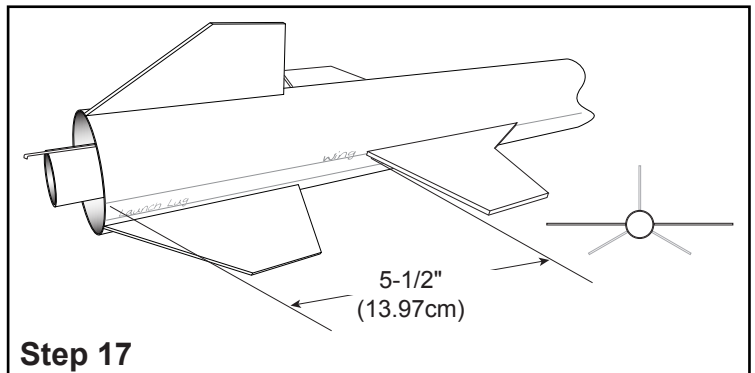
Step 15

- ☐ 16. Apply a very thin layer of glue to the root edge of one of the large fins. Allow the glue to dry slightly for five minutes, and then attach it along one of the lines on the body tube, as shown in the illustration. Each fin is attached so that it is flush with the end of the tube. Make sure the fin is straight along the tube. Allow the fin to dry before proceeding with the next fin. Repeat this step two more times as you attach the other two fins.



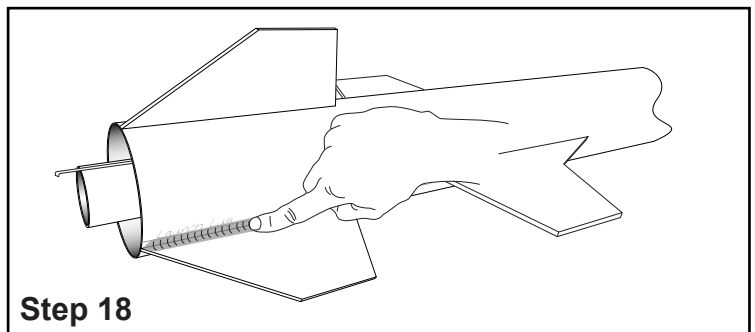
Step 16

- ☐ 17. The main wings are attached in the same way as the fins in the previous step. They are attached along the lines marked in step 15. Glue them into position, 5-1/2" (13.97 cm) from the aft end of the tube. Repeat this step as you attach the other wing. Allow the glue to dry before proceeding with the next assembly step.



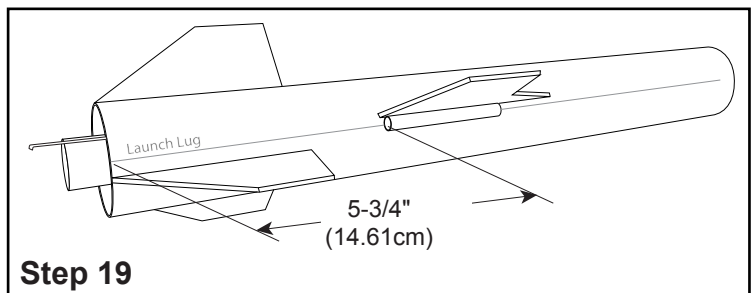
Step 17

- ☐ 18. Apply a bead of wood glue to both sides of each fin-body tube joint. Pull your finger along the joint to smooth out and remove the excess glue. Lay the tube horizontally while the glue dries.



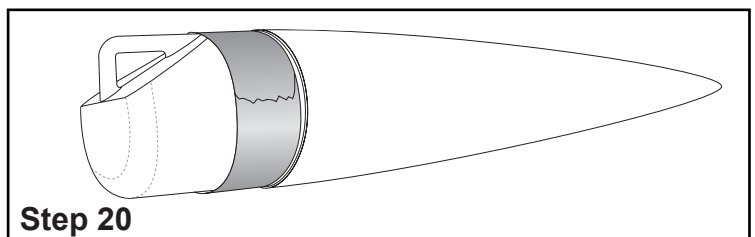
Step 18

- ☐ 19. Using wood glue, attach the launch lug to the tube on the pencil line; position it 5-3/4 inches (14.61 cm) from the end of the tube nearest the fins. Allow the glue to dry.



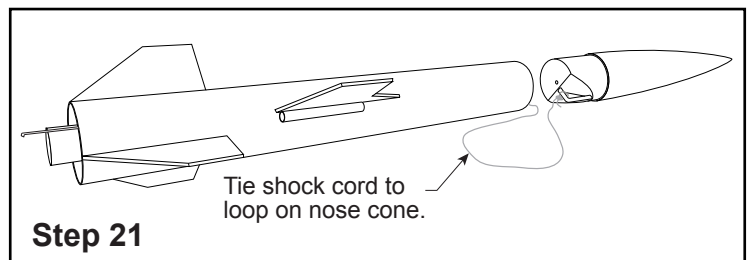
Step 19

- ☐ 20. Test fit the nose cone onto the front end of the rocket. You may need to apply two or three layers of masking tape to make the fit snug. When applying the masking tape, leave a slight gap between the edge of the nose portion and the edge of the tape.

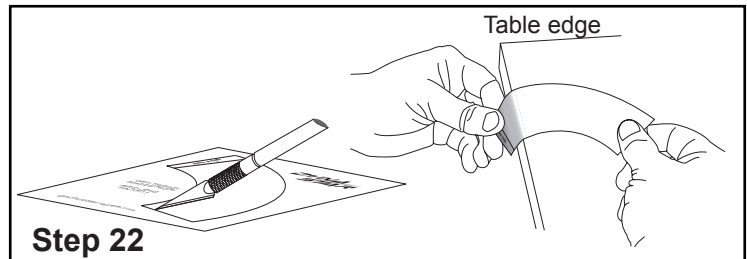


Step 20

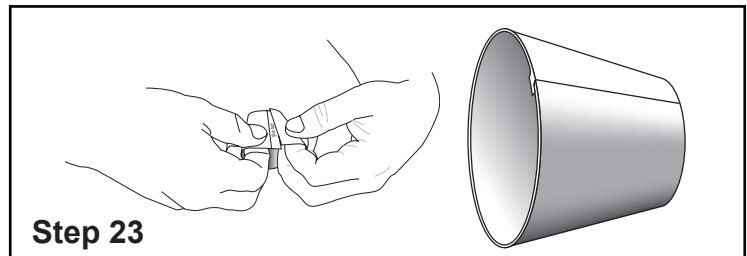
- ☐ 21. Tie the loose end of the shock cord to the loop on the base of the nose cone using two overhand knots. Apply a little bit of wood glue onto the knot to keep it from coming untied.



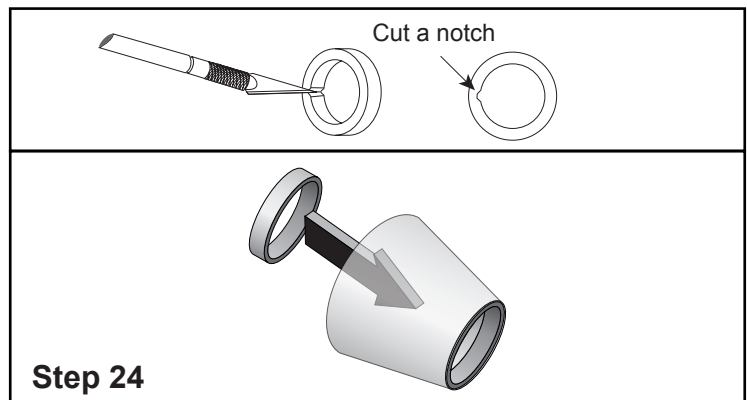
- ☐ 22. Cut out the display nozzle from the cardboard pattern sheet using a sharp hobby knife. Carefully curl it by pulling it over the sharp edge of a table-top. Be careful not to crease it while sliding it over the edge.



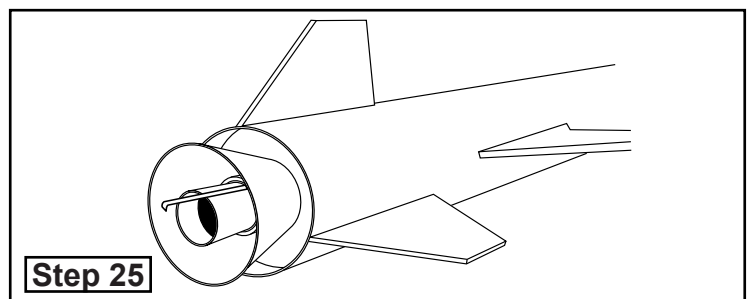
- ☐ 23. Apply a small amount of wood glue to the glue tab on the nozzle, and assemble the pattern into a conical shape.



- ☐ 24. Grab the large green centering ring and cut a small notch on the inside with a hobby knife. CR-24/29 into the simulated nozzle. Make sure it is centered straight in the nozzle pattern and flush with the front edge. Once positioned, glue it in place using wood glue.

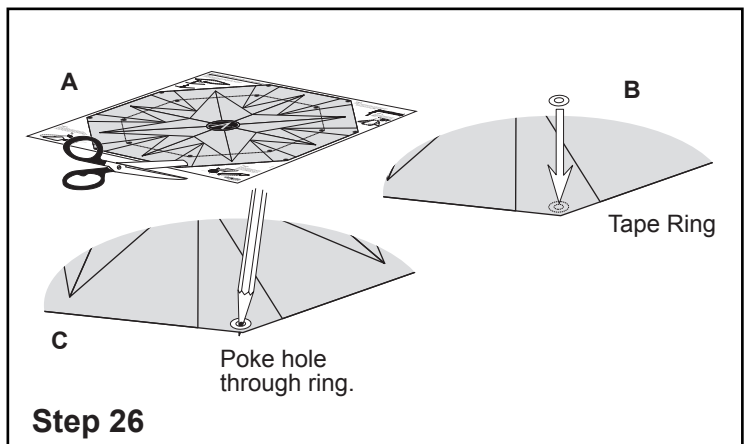


- ☐ 25. Test the fit of the simulated nozzle by sliding it over the exposed portion of the engine mount tube on the back of the rocket. It may be necessary to sand the inside edge of the centering ring to make it fit over the tube. Then glue it in place, so the centering ring touches the aft centering ring. Use wood glue for this step. Also, smear a thin coat of glue over both the inside and outside of the nozzle to give it more strength, and to protect it from the heat of the rocket engine.

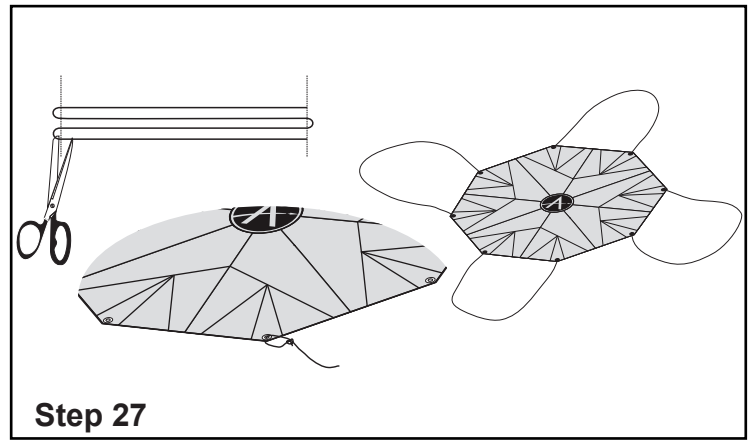


Parachute Assembly

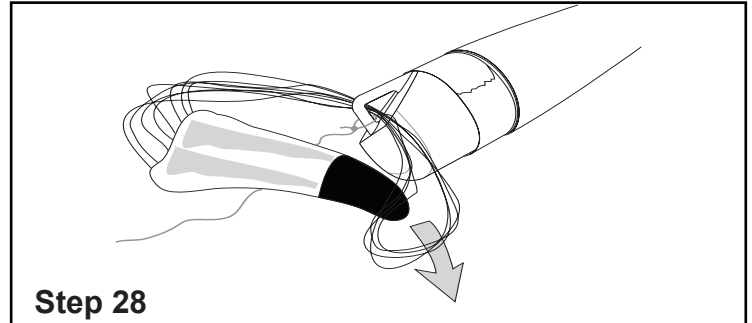
- ☐ 26. Carefully cut out the parachute canopy along the 32" dashed lines. Place one reinforcement ring on each of the marked corners. Take a sharp pencil or hobby knife and poke a hole through the plastic in the center of each ring.



- 27. Fold the shroud line in half, and cut at the fold to make equal lengths; cut each piece in half again to make a total of four lines of equal length. Pull each parachute line end through a parachute reinforcement ring and tie using two overhand knots. Repeat for all the corners as shown.



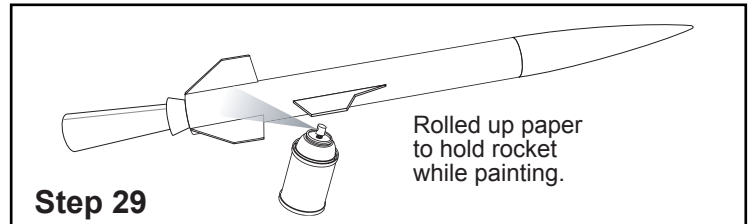
- 28. Holding the parachute at the center of its top, pull the lines together to even up the ends. Thread the 4 looped lines through the loop at the base of the nose cone. Take the top of the parachute and pull it through all 4 string loops at the same time and then pull to tighten the knot. This securely attaches the parachute to the rocket.



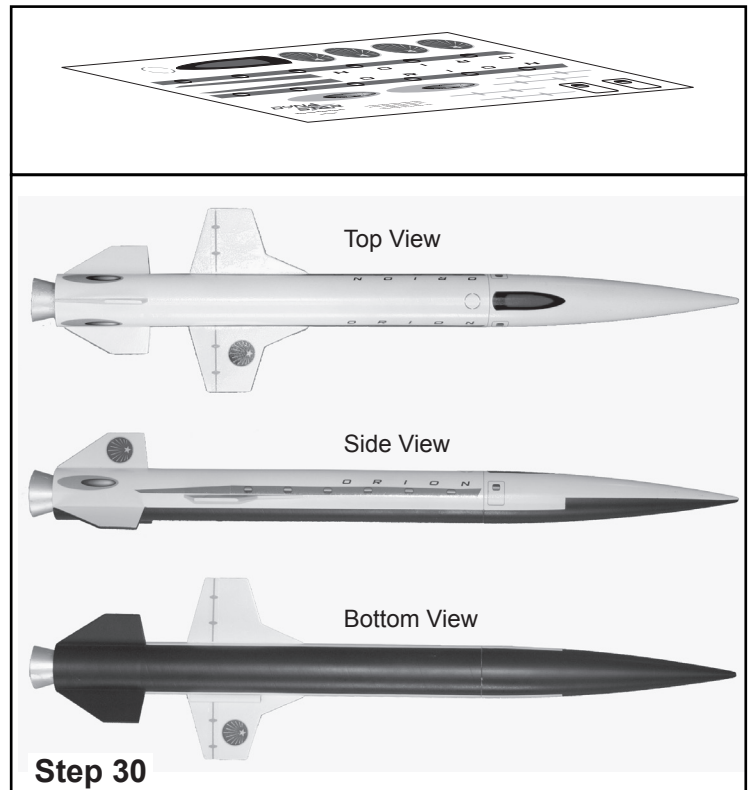
Painting the Orion Transport Rocket

Be sure all the glue has completely dried before you paint your Orion transport model rocket kit.

- 29. Roll a piece of paper and insert it into the aft end of the body tube so you can hold the model while painting it. For best results, paint the model with primer before using the final paint colors. Follow the directions on the paint can, and always paint outdoors with the wind against your back. Start by painting the entire rocket white. When the paint has dried for 24 hours, mask off, and paint the underside black, as shown. The nozzle is painted silver.



- 30. Before applying the decals, let the paint harden at least 24 hours. The decals are somewhat stretchy, so be careful applying them. We recommend removing each one from the paper backing and then dipping them in soapy water to lubricate them so they will slide around and can be repositioned easily. Keep them wet by occasionally dripping some soapy water on them if they start to grab the rocket too quickly. When the decal is in the right location, press down firmly, and squeegee out any water underneath. When the decal dries, it will be permanently fixed. The soapy water will not affect the adhesion of the glue on the back of the vinyl decal. Use the pictures on this page for decal placement.



- 31. Congratulations! Your Orion Transport Rocket kit is now complete.

Launch Supplies Needed

To launch your rocket you will need the following supplies:

- A model rocket launching system.
- Flame resistant recovery wadding.
- Recommended 24mm Diameter Rocket Engines, see the motor matrix below.

Motor	Manufacturer	Est. Altitude	
		Ft	m
D12-3	Estes	450	137
D22-4	Quest	535	163
E12-4	Estes	745	227
E20-4	Aerotech	899	274
E30-4	Aerotech	961	293
F44-4	Aerotech	970	296

Rocket Preflight

- ☐ A. Loosely crumple and insert 8 sheets of recovery wadding into the body tube.
- ☐ B. Carefully fold the parachute and insert it into the tube with the shock cord. Then install the payload section into place.
- ☐ C. Fully insert the motor into the motor mount tube hooking it into place with the engine hook.
- ☐ D. Insert and secure the engine igniter as directed

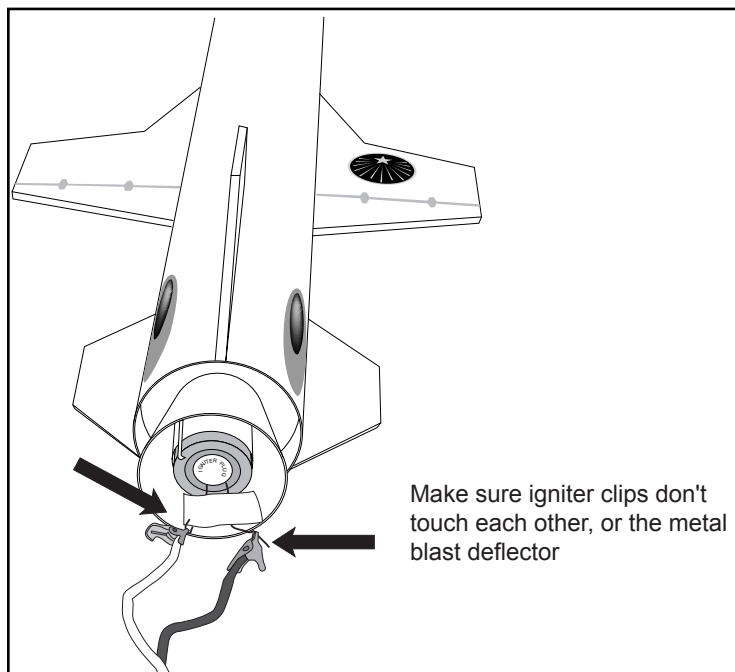
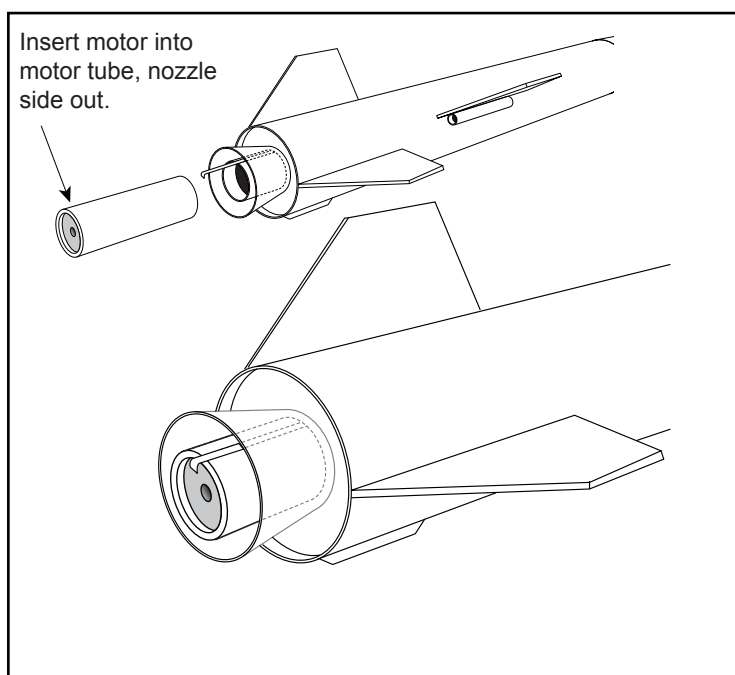
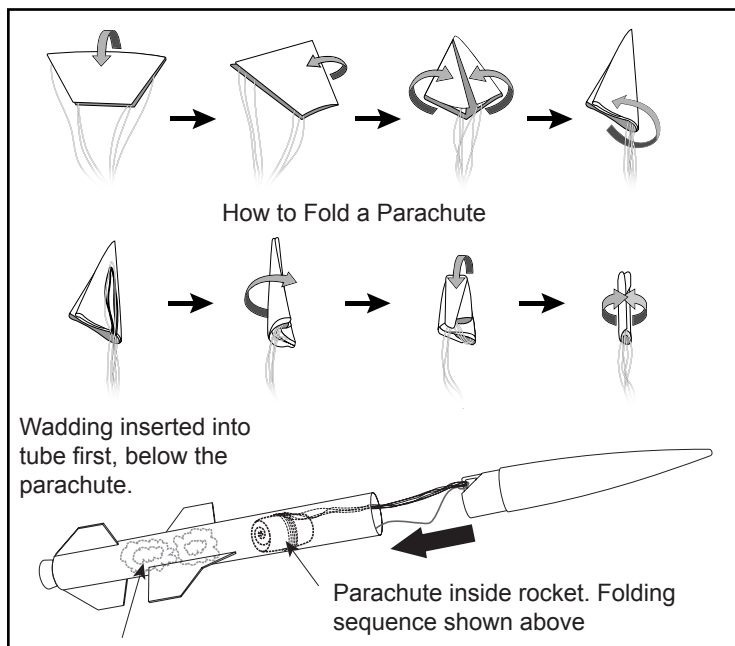
Countdown and Launch Procedure

Fly your rocket on a large field that isn't near any power lines, trees, or low flying aircraft. The larger the field, the greater your chances of recovering your rocket. The launch area around the pad must be free of dry weeds and brown grass. Launch only during calm weather with very little or no wind and good visibility. Always use a launch pad that includes a blast deflector.

10. Remove the safety key from the launch controller
9. Slide the launch lug over the launch rod to place the rocket on the pad. The rocket should slide freely over the rod.
8. Attach the micro-clips to the igniter. The clips must not touch each other or the metal blast deflector.
7. Stand back from your rocket as far as the launch wire allows (at least 5 meters - 15 feet).
6. Insert the safety key to arm the launch system. The light (or buzzer) on the controller should come on.

Give a loud countdown 5 ... 4 ... 3 ... 2 ... 1 ...
LAUNCH!

Push and hold the button until the engine ignites. Then remove the safety key and place the safety cap on the launch rod.



Misfire Procedure

Occasionally the igniter will burn, but the motor will fail to ignite. If this happens, the cause is that the pyrogen on the igniter was not in contact with the engines propellant. When an ignition failure occurs, remove the safety key from the launch controller and wait 60 seconds before approaching the rocket. Remove the old igniter from the engine and install a new one. Make sure that the igniter is inserted fully into the engine and touches the propellant. Secure the igniter as directed on the engine package and repeat the countdown and launch procedure. Always follow the NATIONAL ASSOCIATION OF ROCKETRY Model Rocket Safety Code when launching model rockets.

Go online and order at www.ApogeeRockets.com or call us and order at **719-535-9335**. We're available M-F: 9:00am-5:00pm MST

Recommended items:	Weblink
Altimeter options: Jolly Logic Altimeters: One, Two, or Three	https://www.apogeerockets.com/Electronics_Payloads/Altimeters
Rocket Engines	https://www.apogeerockets.com/Rocket_Motors
Launch Controllers	https://www.apogeerockets.com/Launch_Controllers
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Mid-Power Model Rockets

ORION Transport Fin Templates

Use these templates to make replacement fins, in case you break one off. Use 1/8" (3mm) thick basswood sheet.

