



## Skill Level 4

### Slightly Challenging

The X-15 is a rocket-powered aircraft designed and built in the 1950s and 60s that still holds the record for the fastest manned aircraft. In 1967, the X-15 reached a top speed of Mach 6.7 (4,520 mph). This aircraft type flew a total of 199 flights. It was piloted by a total of 12 individuals, Apollo 11 Commander Neil Armstrong among them. Instead of a runway, the X-15 was dropped from B-52 bomber aircraft traveling at about 500 mph. Then, the X-15 would ignite its rocket engines and begin its free flight. For landing, the pilot would jettison the bottom fin (which would be recovered by a parachute) and lower skids and a front wheel to land on dry lake beds. The data and technological advancements provided by the X-15 program were key to developing our understanding of hypersonic travel and airflow.

**We advise that you NOT use a screw-on retainer on this kit!** The reason is that this rocket is not stable enough to have extra weight in the rear of the rocket. Because of the big wings, the Center-of-Pressure (CP) on this rocket is further forward than a typical rocket of similar size, and is closer to the Center-of-Gravity (CG). You don't want the CG getting behind the CP, or the rocket will go unstable. So keep weight out of the rear end as much as possible in order to keep the CG from drifting to the rear. To hold the rocket engine in, please follow the instructions in this manual that show how to properly tape the motor into the engine mount. It does work fine, and it is very light-weight.



Manufactured in the USA by:  
**Apogee Components Inc.**  
 Colorado Springs, Colorado, USA  
 Visit us online at:  
[www.ApogeeRockets.com](http://www.ApogeeRockets.com)

Kit #05050  
 Skill Level 4

Made In USA



## ROCKET PLANE

**THE WORLD'S FASTEST  
 ROCKET PROPELLED  
 MANNED AIRCRAFT**

### X-15 Parts List

Item #	Item Name	Qty
10208	AT-66/11.49 X-15 Aft Tube	1
10209	AT-66/9"	1
10250	AT-29/7"	1
12199	BT-80 Baffle Pieces (18" Ply Sheet)	1
13044	AC-66 tube coupler	1
13056	1/4" Launch Lug (3" Long)	1
13315	CR-29 (Thick Wall)/66-1/8" Plywood	2
15718	X-15 Balsa Wings LC Fin Sheet	1
15719	X-15 Balsa Elevator LC Fin Sheet	1
19480	PNC-66 (BT-80 Nose Cone)	1
21119	X-15 Vacuum Form Fairing Sheet	1
29093	24" Printed Nylon Parachute	1
29528	300# Kevlar Shock Cord X 10 feet	1
29601	Clay Nose Weight	1
29624	Wood Screw Eye Size 9	1
31239	X-15 Instruction Sheet A	1
31240	X-15 Instruction Sheet B	1
31241	X-15 Instruction Sheet C	1
35577	29mm Display Stand (Cardstock)	1
37040	X-15 Vertical Tail LC Cardstock	1
37041	X-15 Forward Wing Alignment Jig LC Chipboard	1
37042	X-15 Aft Tail Fin Alignment Jig LC Chipboard	1
39040	X-15 Face Card	1
41019	X-15 Airplane Water-Slide Decal Sheet	1
47133	Clear Plastic Bag 10x6x24	1

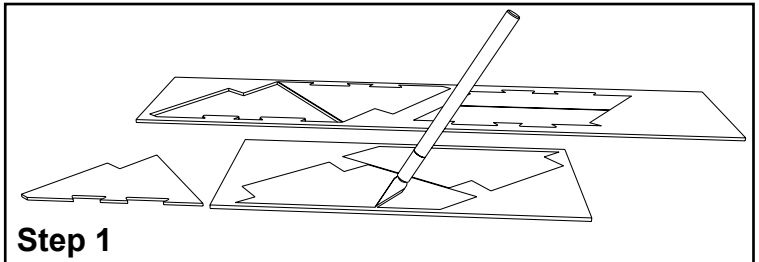
### Needed Tools and Materials

- ☐ 15" long wood dowel (approximately 1/4 to 3/8-inch diameter)
- ☐ Pencil
- ☐ Ruler
- ☐ Scissors
- ☐ Hobby knife
- ☐ Wood glue
- ☐ CyA Adhesive (super glue) - thin viscosity
- ☐ CyA Adhesive (super glue) - thick viscosity
- ☐ Epoxy (to make fin fillets) - we recommend Rocketpoxy
- ☐ Rubber gloves (for working with epoxy)
- ☐ Masking tape
- ☐ Paper towels
- ☐ Bowl of water for applying the water-slide decals
- ☐ Paint supplies (spray paint, brushes, etc.)
- ☐ Wood sealer
- ☐ Sandpaper (180-320 and 400 grit) and sanding block (or Apogee Sanding Tee)
- ☐ Aluminum angle to draw straight lines down the tube

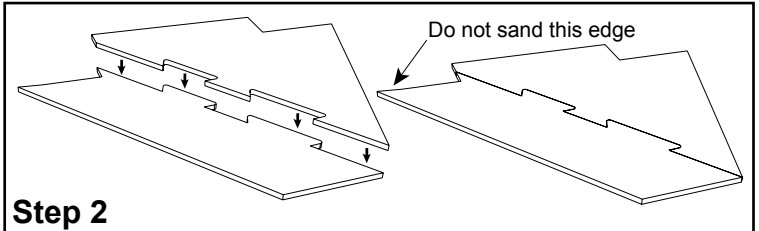
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## X-15 Rocket Plane Assembly

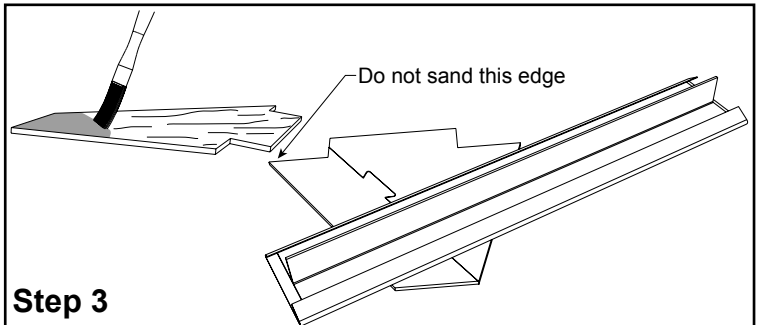
- ☐ 1. Carefully remove all the pieces from the fin sheet by freeing the edges with a sharp hobby knife. Do not sand the edges of the fins until after assembling them.
- ☐ 2. Assemble the main wings of the X-15 by gluing the edges together as shown using wood glue.
- ☐ 3. Sealing the surface of the balsa with sanding sealer makes the surface of the wood consistent and improves the rocket's appearance. Apply the sealer with a paintbrush. When dry, sand it with 400 grit sandpaper with a sanding block or Apogee's Sanding Tee. Repeat the procedure until the balsa grain is filled and the fins look and feel smooth.
- ☐ 4. Using wood glue, attach one of the centering rings on the engine mount tube,  $\frac{1}{2}$ -inch (12mm) from the end of the tube. For reference, this is the "aft centering ring."
- ☐ 5. Using wood glue, attach the other centering ring flush with the forward end of the motor mount tube. Allow the assembly to completely dry.
- ☐ 6. Glue the motor mount tube into the aft body tube (11.49" long) using wood glue; the aft centering ring should be 1-inch (25mm) recessed into the tube. The etched triangles point to the forward end of the body tube. Put glue fillets on all the joints where the rings touch the tube. Allow the glue to dry.



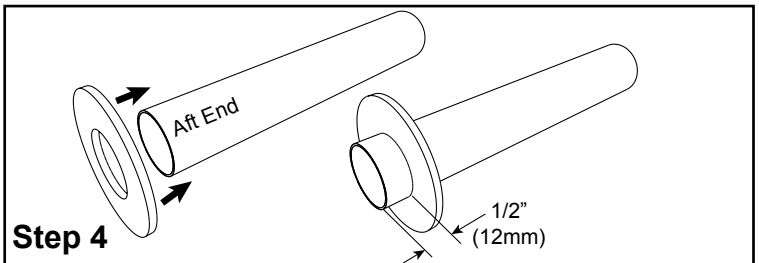
**Step 1**



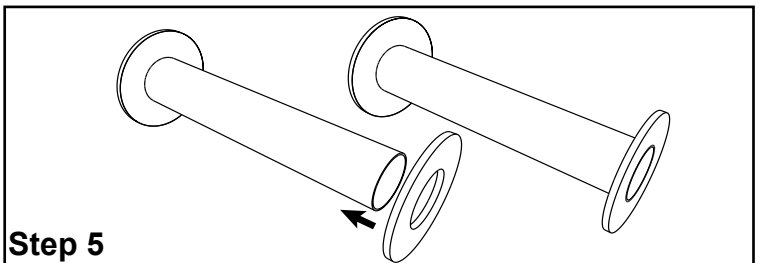
**Step 2**



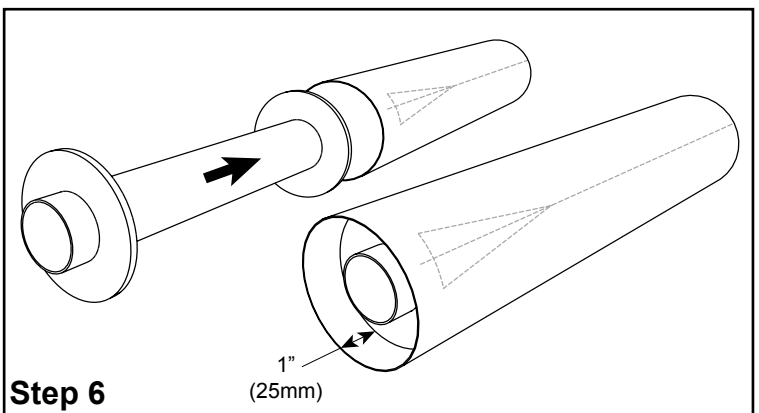
**Step 3**



**Step 4**

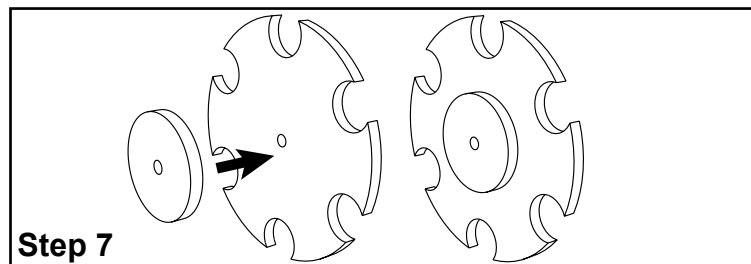


**Step 5**

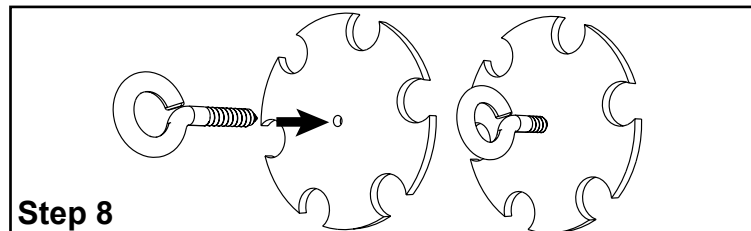


**Step 6**

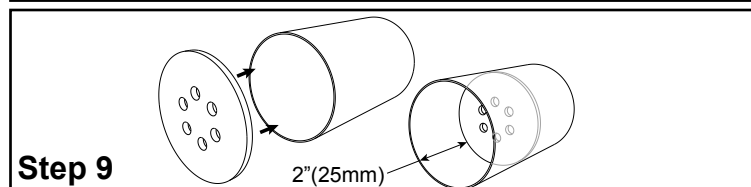
- 7. Remove all the baffle pieces from the plywood sheet. Glue the small doubler-disk to the large disk with the small central hole. Allow the glue to dry completely.



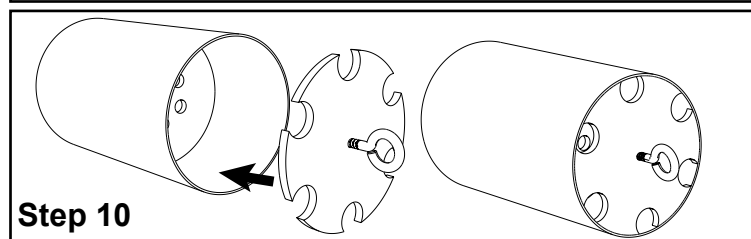
- 8. On the opposite side of the disk, thread the screw eye into the disk. On the doubler back side of the disk, put a dab of glue or epoxy on the threads to lock the screw eye in place.



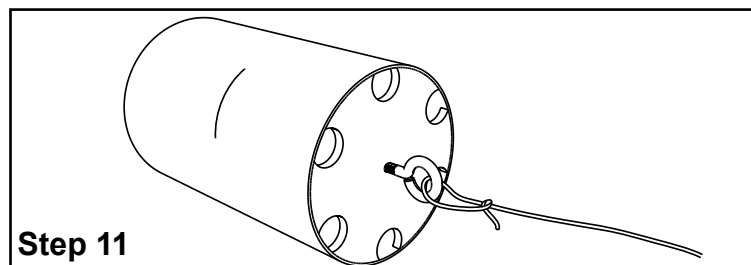
- 9. Glue the aft bulkhead (with the circle of holes in the center) for the baffle into the middle of the coupler using wood glue. Put a fillet of glue around the edge where it touches the tube. Allow the glue to dry.



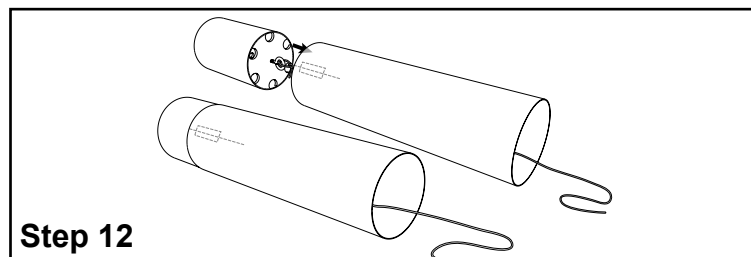
- 10. Glue the forward bulkhead with the screw eye into one end of the red tube coupler, so that the screw eye loop projects outward. Recess it slightly. Put a fillet of glue around the perimeter of the disk.



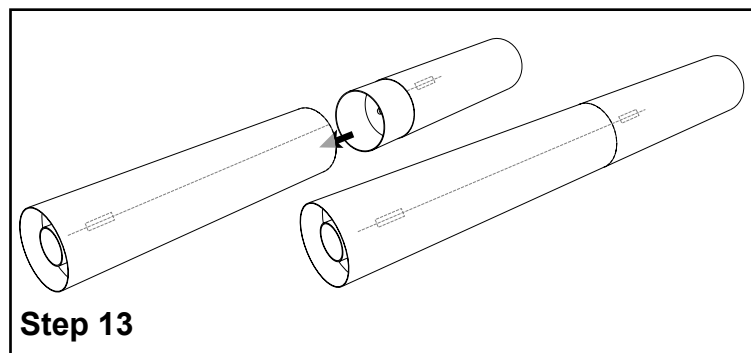
- 11. Mark the approximate middle of the baffle assembly with a pencil. Tie the shock cord to the screw eye. Put a drop of wood glue on the knot to permanently hold it in place.



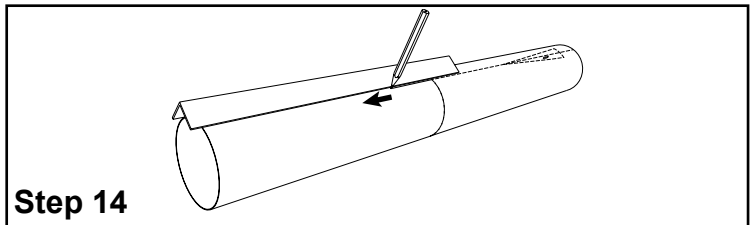
- 12. The baffle is inserted and glued into the end of the remaining 9" long body tube, on the end with the etched rectangle as shown. Allow the shock cord to extend out the forward end of the tube.



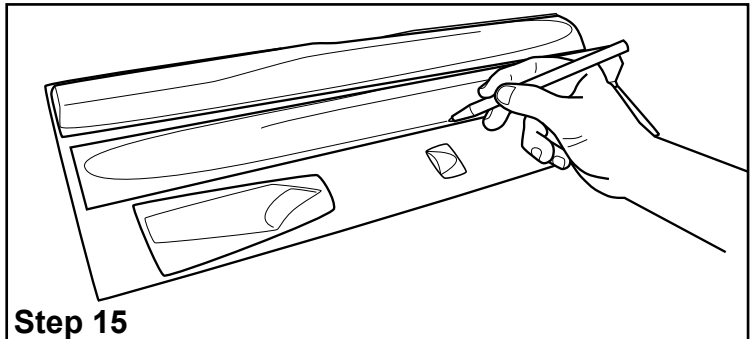
- 13. Join and glue the two tubes together. Make sure the launch lug lines are aligned.



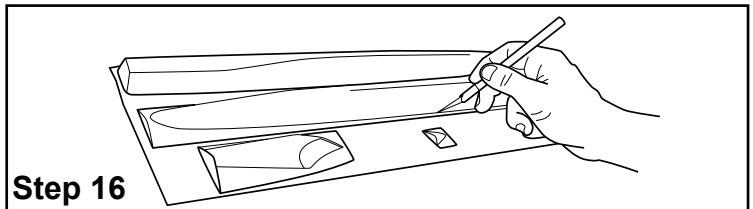
- 14. After the glue has dried on the joined tubes, extend the top line all the way to the end using a pencil and an aluminum angle.



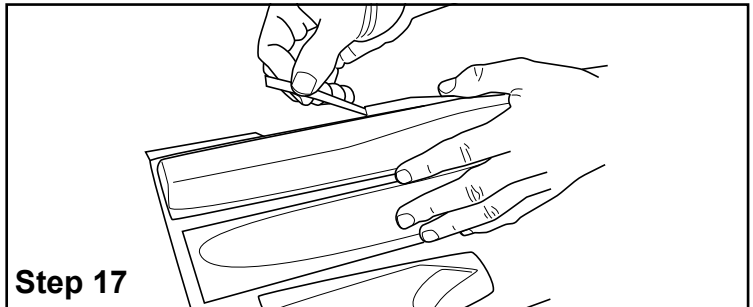
- 15. Using a pencil, mark the edge of each of the vacuum form parts where it meets the curved part. In some areas, the edge is very subtle, which is why we mark them, so it is easier to cut out in the next step. On the ends of the pieces, mark all the way down to the flat surface of the plastic. If you need help, see the step-by-step tutorial videos on the Apogee Components web site: [www.ApogeeRockets.com/Model-Rocket-Kits/Skill-Level-4-Model-Rockets/X-15](http://www.ApogeeRockets.com/Model-Rocket-Kits/Skill-Level-4-Model-Rockets/X-15)



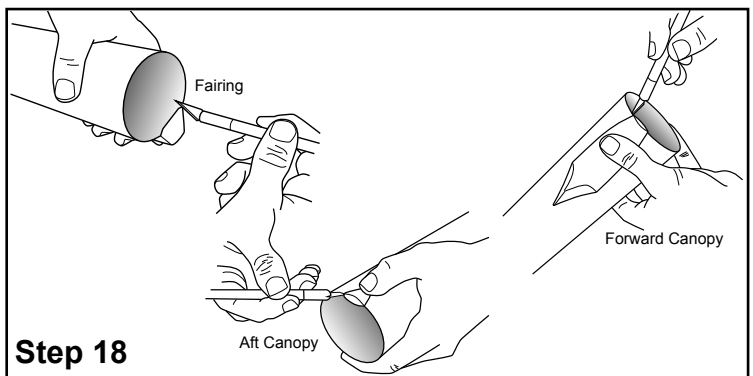
- 16. Using a sharp hobby knife, score the plastic along the pencil line on each vacuum form part. You do NOT need to cut all the way through the plastic. A light scoring is fine.



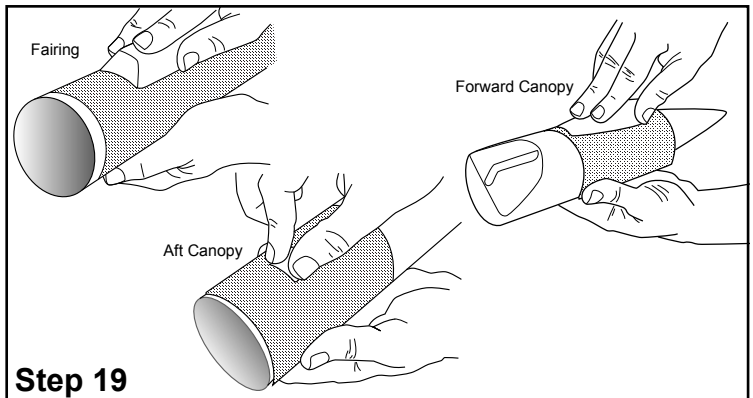
- 17. Bend the edges of the plastic back-and-forth on the score line. This will crack the plastic, and snap it free of the part. Work slowly so as to not damage the plastic.



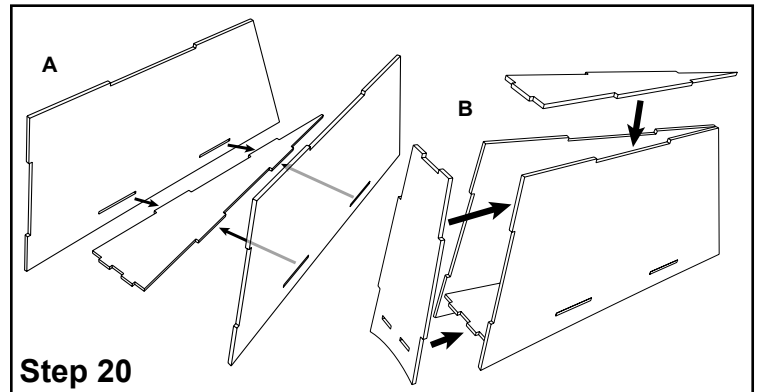
- 18. To trim the ends of the pieces, start by laying them on the tube so the edge of the plastic hangs over the edge. Carefully trim the part of the plastic overhanging the inside edge of the tube with a hobby knife. Work slowly so you don't gouge the inside edge of the tube. Do this trimming technique for all the vacuum form parts. In the next step, you'll sand the edge further.



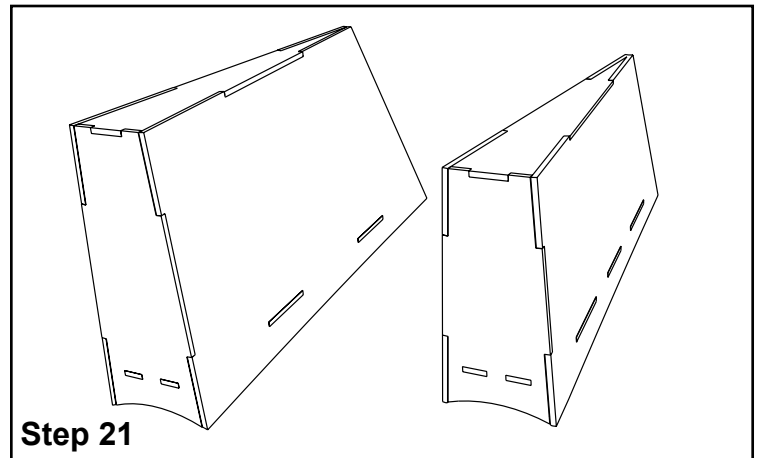
- 19. To sand the edges of the vacuum form plastic parts to match the curvature of the tube, wrap some medium grit sandpaper (between 180 to 320 grit) around the tube. Then carefully rub the plastic parts back and forth on the sandpaper to get an even surface. Don't worry if it is not perfect, as there is enough flex in the plastic parts to conform nicely to the tube once they are glued on. Don't forget to do the little aft canopy section as well as the two side fairings. When sanding the edges of the canopy piece, wrap the sandpaper over the nose cone and use that to shape the edges.



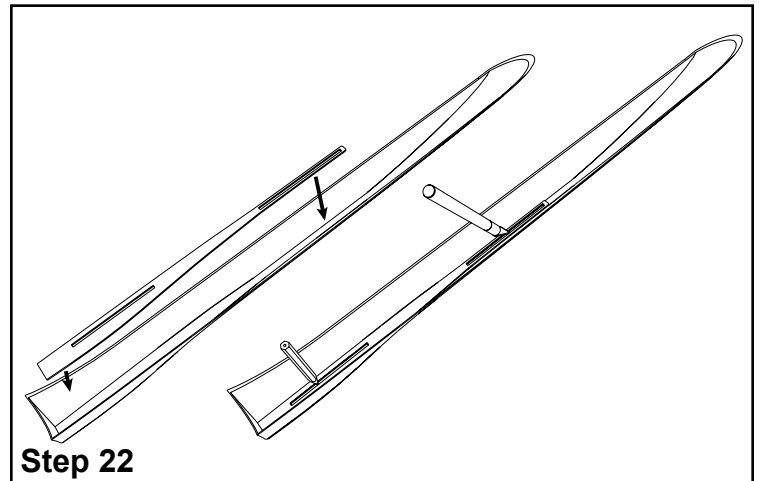
- 20. There are two vertical tails on the X-15 rocket, one for the top of the body, and the other attached to the bottom. On the cardstock sheet, these are designated by the parts that begin with T (top) or B (bottom). Start by removing the pieces T1 through T4 from the cardstock sheet with a hobby knife. Test fit the pieces together as shown. Sand the edges of the little tabs so that you don't have to force the tabs into the slots. When you understand how it fits together, take it apart and apply wood glue during reassembly.



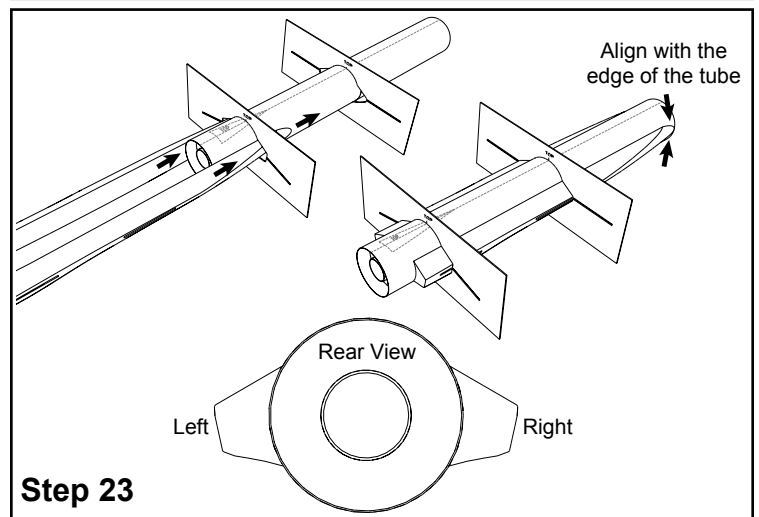
- 21. Repeat the assembly steps for the bottom tail piece. When fully assembled, allow the glue time to dry completely.



- 22. From the cardboard alignment guide sheet (P/N 37041), carefully remove the slotting guide template using a hobby knife by cutting through the small tabs holding it in the sheet. Lay the slotting guide template inside one of the vacuum form fairings. It will only fit one way. Hold it down to the surface of the plastic, and carefully draw the cutting line with a pencil. Then carefully cut out the slots using a sharp hobby knife. Practice on the back slot first, as the front slot is harder because the slot in the guide will want to spread open. Don't worry if it is not perfect, it just needs to be wide enough for the tab on the balsa pieces to slide through the slot. Repeat the process for the other vacuum form fairing by flipping the cardboard alignment sheet over before putting it into the inside of the fairing.



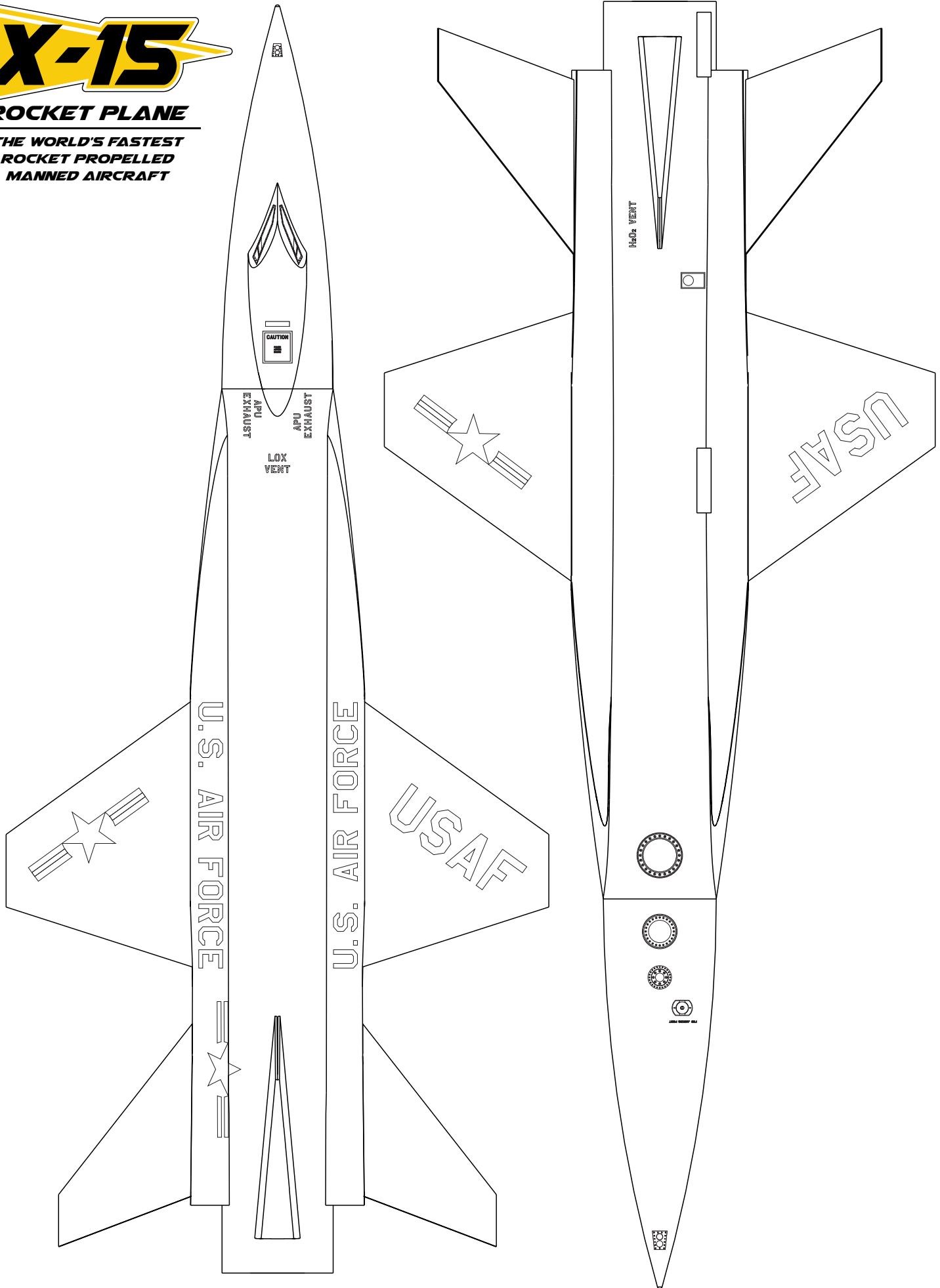
- 23. Slide the two alignment guides onto the body tube. Notice that they are both marked with a "Top" tick-mark. That will be aligned to the line on the top of the body tube. The cardboard alignment guide with the slots perpendicular to the tube will be approximately in the middle of the tube. Then slide both fairings into the cut-outs in the alignment guides. Notice that they are different, one is for the left side, and the other is for the right side. You can tell by looking at the rear of the rocket as shown in the illustration. The fairings are positioned so the forward tip of the fairing is even with the front edge of the body tube. Adjust the position of the cardboard alignment guides as necessary so the fairings are held snugly up against the body tube.

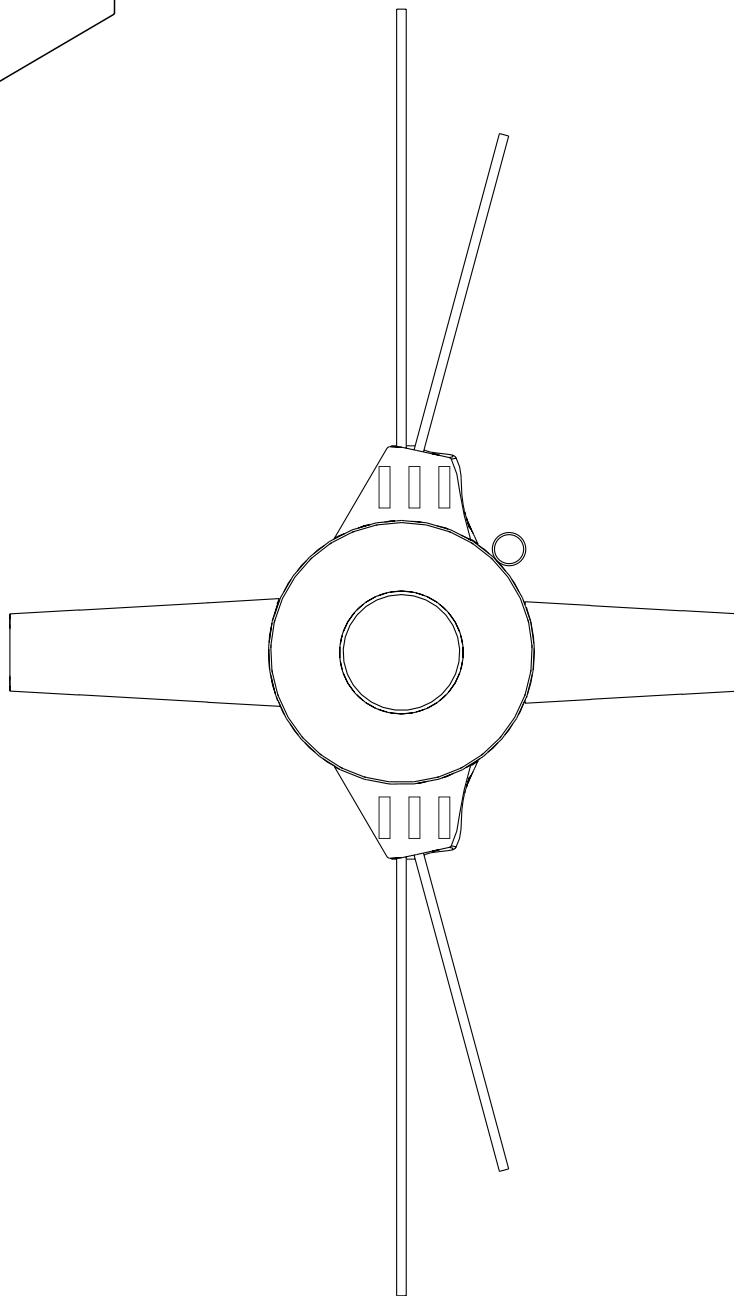
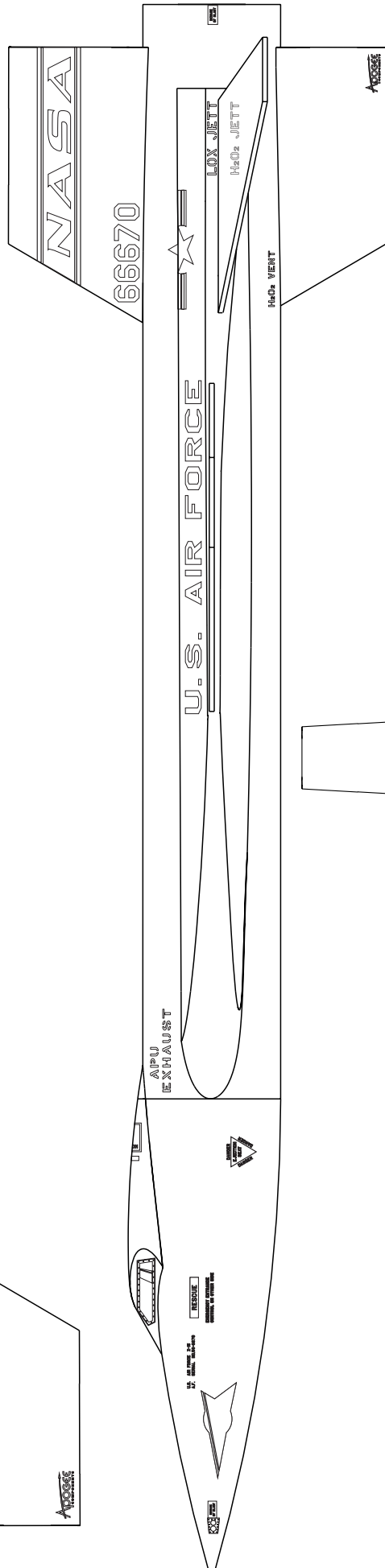
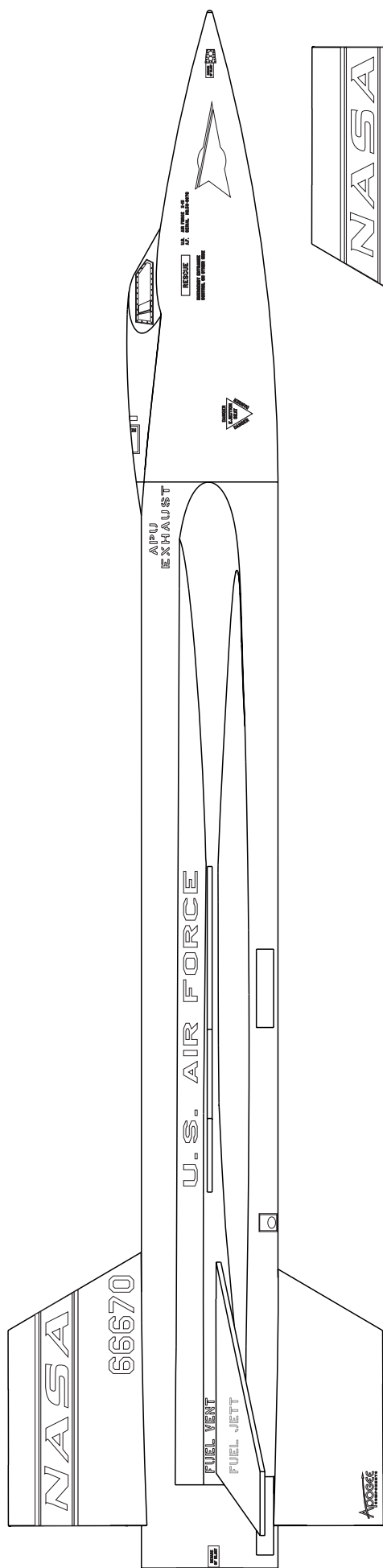




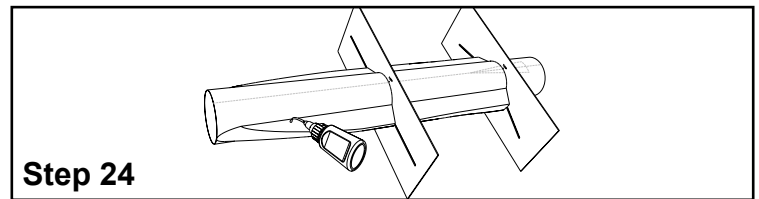
## ROCKET PLANE

THE WORLD'S FASTEST  
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MANNED AIRCRAFT

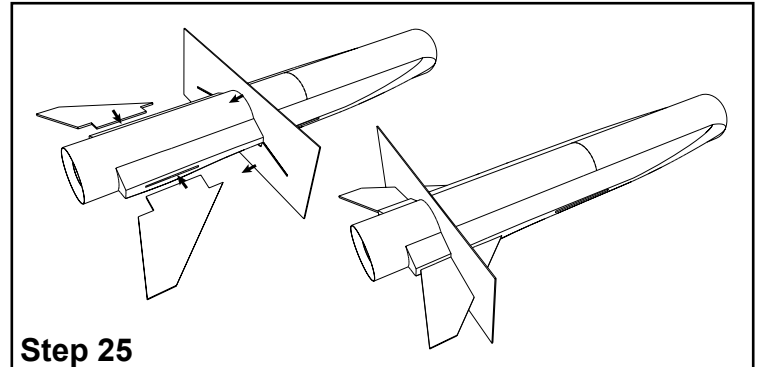




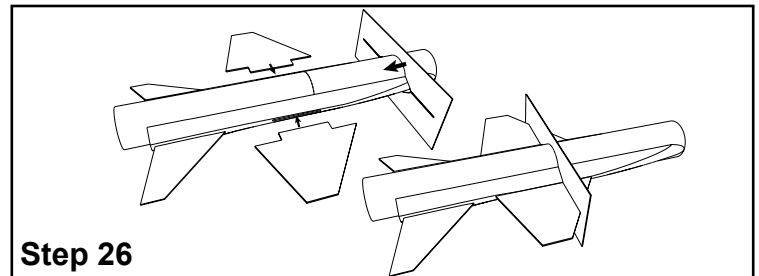
- 24. Double check the position of the fairings before gluing them down using thin CyA adhesive (super glue). Use the glue sparingly, or it will run on you. Adjust the position of the cardboard alignment guides during the gluing process to avoid accidentally gluing them to the tube. Remove the front alignment guide for the next step.
  
- 25. Test fit the rear fins into the slots. Sand the root edge of the balsa fin tab if necessary to get it to seat against the tube. Slide the rear alignment template backwards over the front edge of the fins as shown. When everything is adjusted so that it fits, remove the fin and apply thick superglue to the root edge of the tab and the portion of the fin that touches the plastic fairing. Repeat with the other fin. Leave the cardboard alignment guide in place until the glue is dry. Then remove it before starting the next step.
  
- 26. Attach the middle fins the same way as you glued on the rear fins, this time using the cardboard alignment guide with the perpendicular slots for the wings.
  
- 27. Attach the top vertical tail (the larger of the two wedges created previously) onto the body tube using wood glue. It is positioned on the etched triangle on the top of the tube.
  
- 28. Attach the bottom vertical tail onto the body tube using wood glue. It is positioned on the etched triangle on the bottom of the tube.
  
- 29. Cut the launch lug in half using a hobby knife. Attach the two pieces of the launch lug to the tube using wood glue. Each is centered in an etched rectangle on the bottom side of the body tube. Make sure the launch lug tubes are straight along the tube. Allow the glue some time to dry.



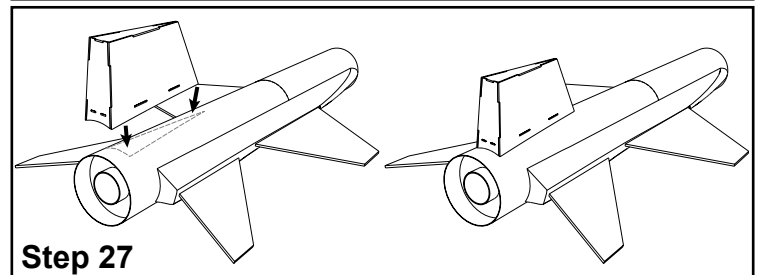
**Step 24**



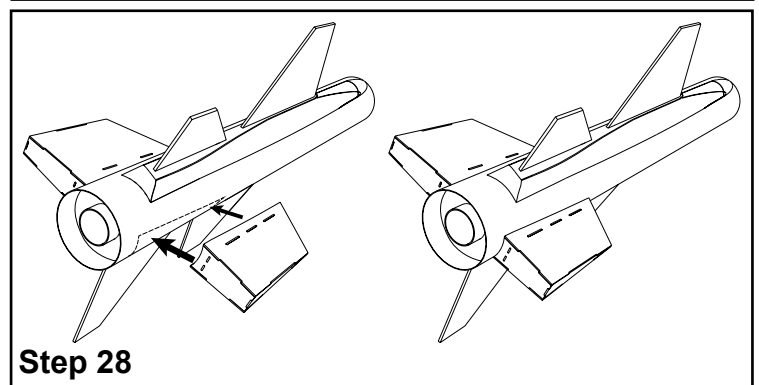
**Step 25**



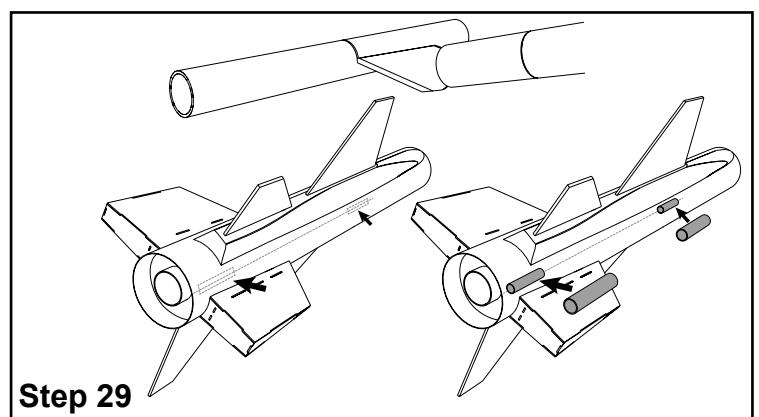
**Step 26**



**Step 27**



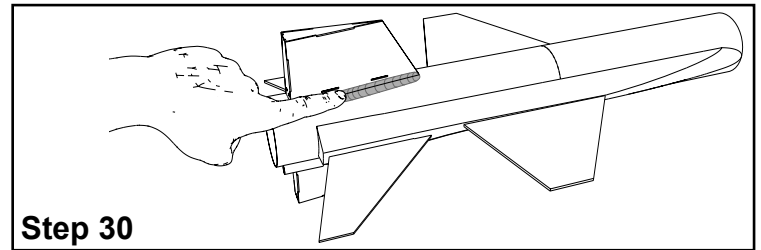
**Step 28**



**Step 29**

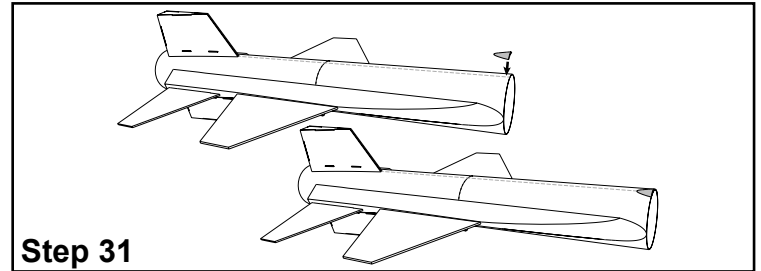


- 30. Put wood glue fillets along the edges of the two pieces of the launch lug and the cardboard vertical tail pieces. For making fillets on the wings and the balsa tail pieces, use epoxy. We recommend the RocketPoxy brand because it doesn't run easily and fills gaps better. With a rubber-gloved finger, smooth out the epoxy and remove the excess by sliding your finger along the joint. Lay the rocket in a horizontal position while the adhesives dry.



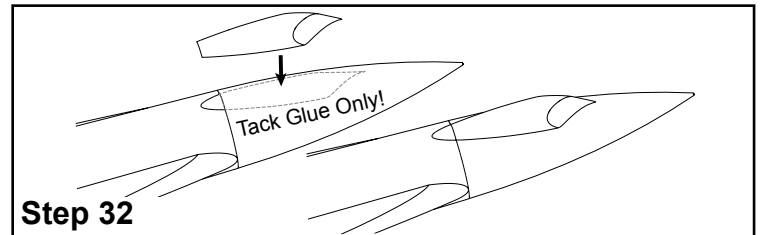
**Step 30**

- 31. Using thick superglue, attach the rear portion of the canopy to the front of the body tube, centered on the pencil line drawn in step 14. It is positioned so it is flush with the edge of the tube.



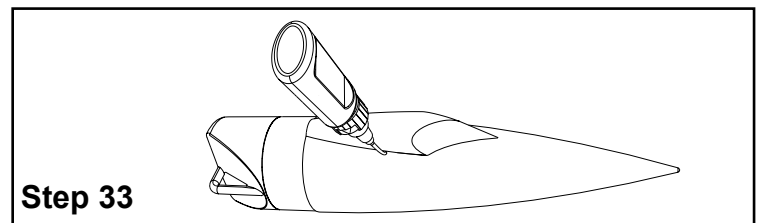
**Step 31**

- 32. Temporarily insert the nose cone into the body tube. Position the forward part of the cockpit canopy on the nose, so that it butts up against the portion of the canopy glued onto the tube. Tack glue it into place using thick superglue. Remove the nose from the tube as quickly as possible to avoid gluing it into the tube.



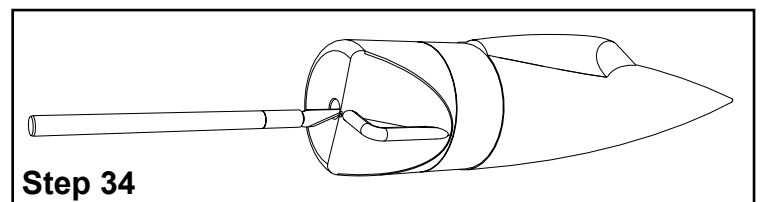
**Step 32**

- 33. Secure the canopy permanently to the nose cone using thin CyA adhesive. Make sure to do this with the nose cone free of the tube to avoid gluing the nose into the tube. Use the glue sparingly to prevent runs of glue on the nose cone.



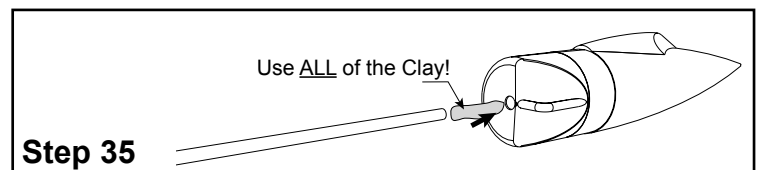
**Step 33**

- 34. Using a hobby knife, scrape around the small hole on the rear of the nose cone to enlarge the hole. It should be big enough to allow a wood dowel to be inserted into it.



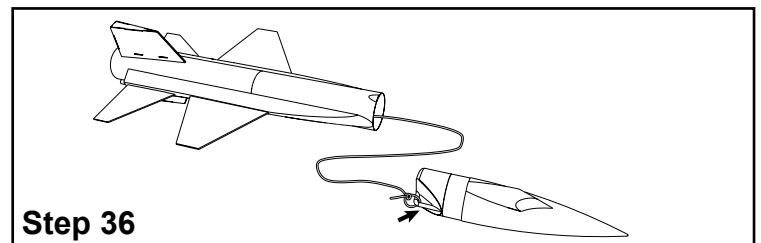
**Step 34**

- 35. The entire clay stick is used as nose weight. Break off pieces, roll them into a snake so they can be inserted into the hole in the rear of the nose cone. Then press the clay into the tip of the nose cone using a long wood dowel. Repeat this process until all the clay has been pressed into the tip of the nose cone.



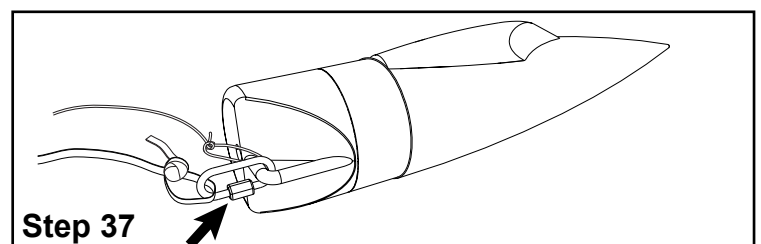
**Step 35**

- 36. Tie the free end of the yellow shock cord to the loop on the base of the shoulder of the nose cone. Put a little wood glue on the knot to make it permanent.



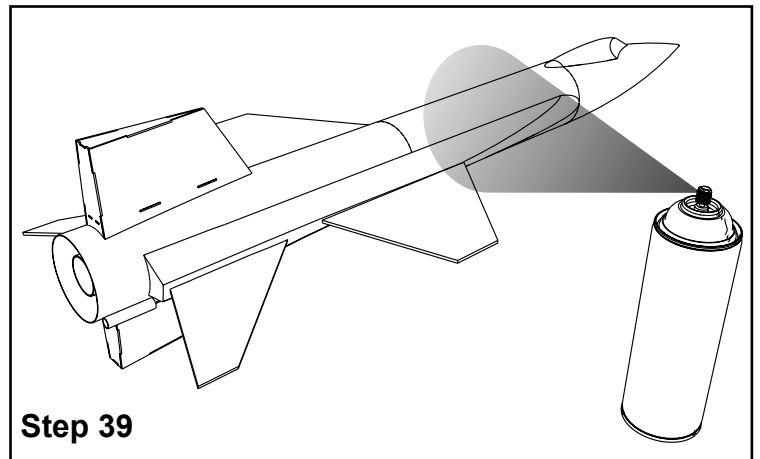
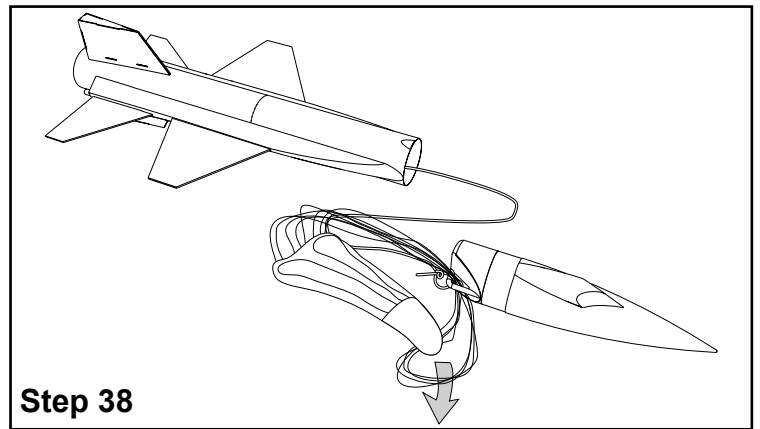
**Step 36**

- 37. Tie the free end of the rubber shock cord to the metal quick link. Attach the quick link to the loop on the base of the nose cone. After a launch, you can detach the quick link to untangle the shock cords (if necessary).



**Step 37**

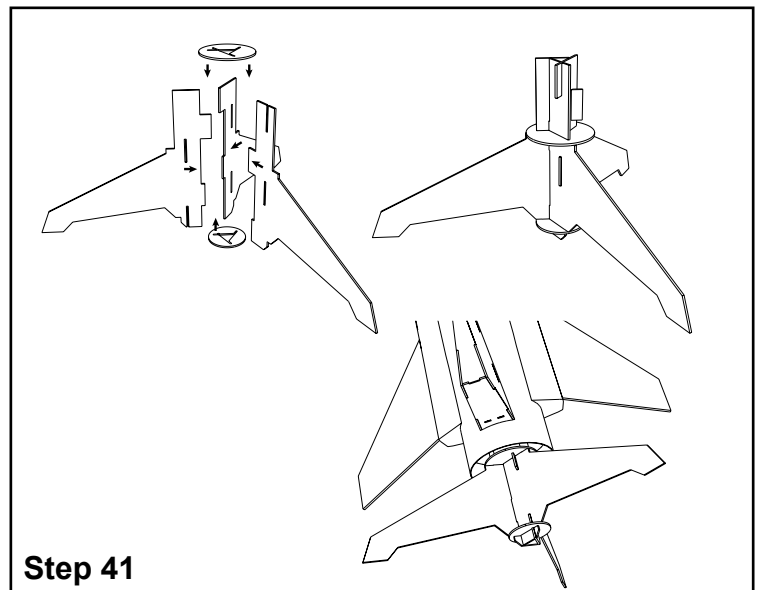
- ❑ 38. Holding the parachute at the center of its top, pull the lines together to even up the ends. Thread the three looped lines through the plastic loop at the base of the nose cone. Take the top of the parachute and pull it through all three string loops at the same time and then pull to tighten the knot. This securely attaches the parachute to the rocket.
- ❑ 39. When all the glue has completely dried, you can paint your completed X-15 rocket gloss black. Allow the paint to harden fully before applying the water-transfer decals.
- ❑ 40. Apply the decals in the positions shown on pg 6-7. Cut around each decal piece with a knife or scissors. Cut as close to the edges as possible. Soak the decal in a bowl of warm water for 60 seconds. Position the decal on the rocket, and then slide the paper backer out from under the decal. Blot up excess water. Repeat with the other decals on the rocket. After the decals are dried, give the rocket a coat of clear matte (dull) finish to protect the decals. Spray the clear coat lightly, as it could damage your decals.



## Display Stand Assembly

- ❑ 41. Remove the display stand pieces from the laser-cut sheet. Assemble the three leg pieces together. The tabs all have to engage in the slots at the same time. The smaller disk is inserted on the bottom central part of the stand as shown. You may have to flip the disk over if it doesn't go on easily. Run a thin bead of wood glue along all the joints between the pieces. When the glue is dry, the stand can be painted and the X-15 rocket can be placed on it.

Congratulations! Your X-15 rocket is now complete.



## Launch Supplies Needed

To launch your rocket you will need the following:

- A model rocket launch pad a 1/4-inch (6mm) launch rod and 12v controller
- Several recommended 29mm Rocket Engines for the X-15 are listed in the motor chart.\*

Go to our website for a broader motor selection for this kit at [www.ApogeeRockets.com/Model-Rocket-Kits/Skill-Level-4-Model-Rockets/X-15#motors](http://www.ApogeeRockets.com/Model-Rocket-Kits/Skill-Level-4-Model-Rockets/X-15#motors)

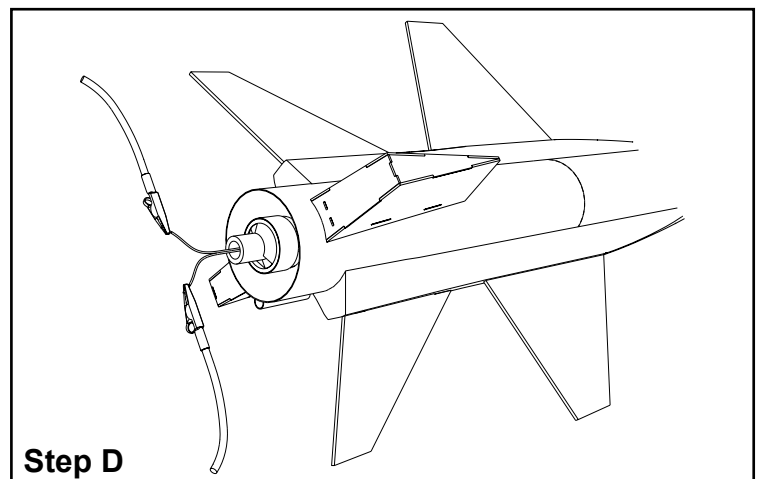
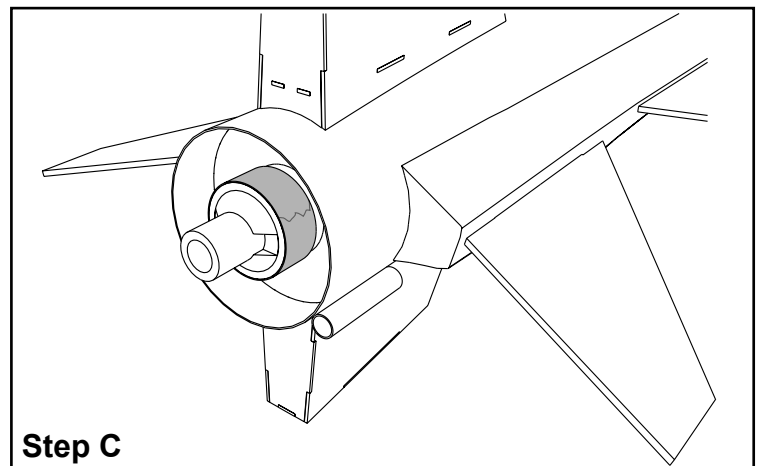
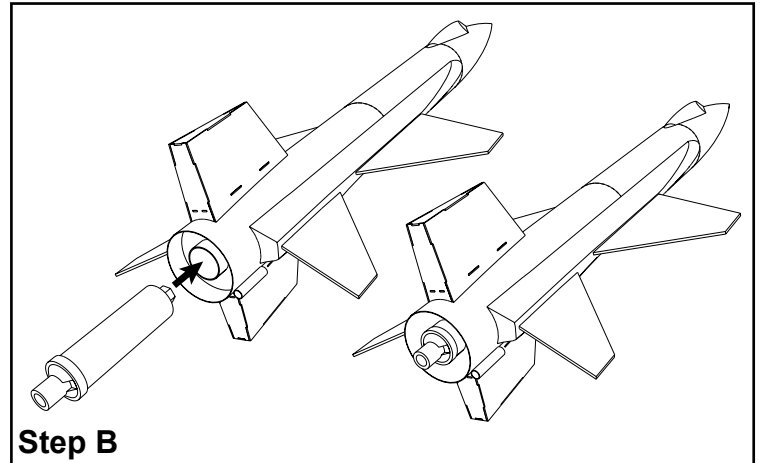
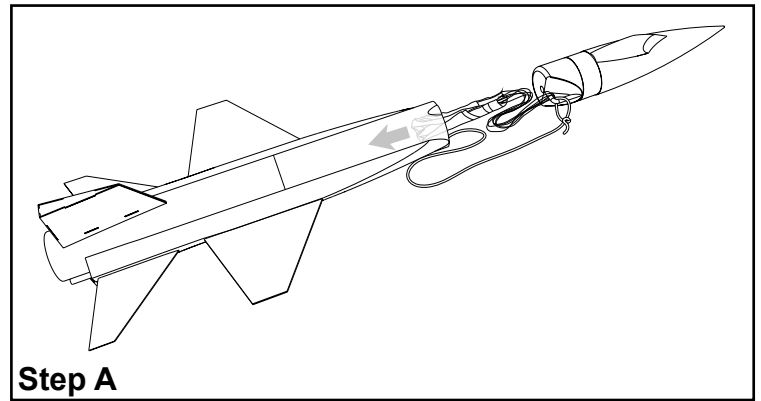
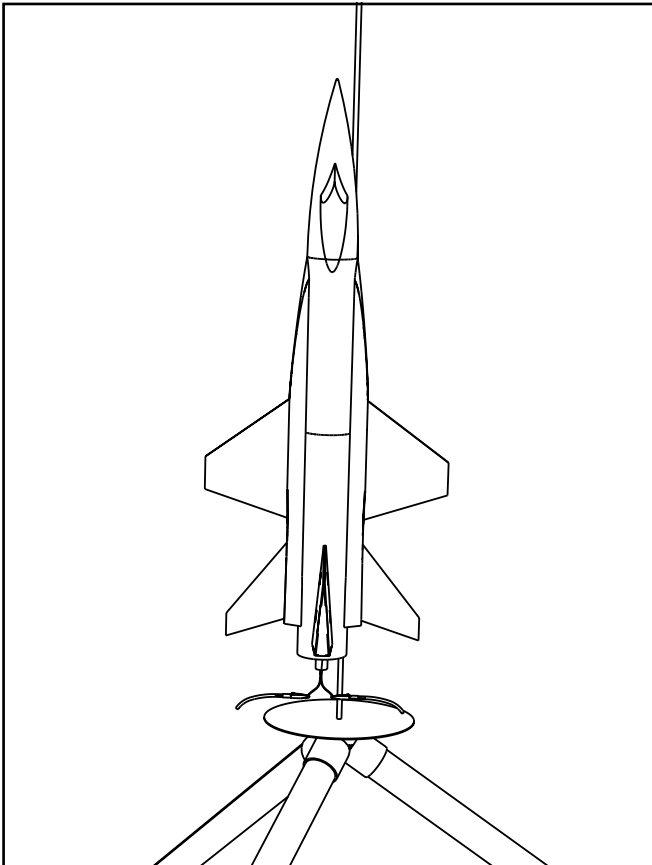
### Recommended Rocket Motors (Not Included)

Motor	Manufacturer	Estimated Altitude
F26FJ-6	AeroTech	1260 ft
F50T-6	AeroTech	1485 ft
F67W-6	AeroTech	1334 ft
G79W-10	AeroTech	2322 ft

## Rocket Preflight

- ☐ A. Recovery wadding is not required on this kit due to the ejection baffle. Slide the folded parachute into the tube. Then slide the shock cord and nose cone into the body tube. Align the canopy on the nose with the rear canopy on the tube.
- ☐ B. When you are ready to launch your rocket, slide the rocket motor into the engine mount tube. The thrust ring on the back of the motor will butt up against the tube, preventing it from sliding too far in.
- ☐ C. Wrap a layer of masking tape over the end of the motor tube and the thrust ring on the rear of the rocket motor. Press it down firmly on both pieces. **IMPORTANT NOTE:** Because this rocket is sensitive to excess weight in the back end of the rocket, we don't recommend a separate motor retainer be glued onto the rear of the engine mount tube. Use the tape method shown here to secure the motor into the rocket. It works fine.
- ☐ D. Insert and secure the engine igniters as directed on the package the engines came with.

At this point, the assembly of the rocket is complete and ready for flight. Continue to follow the countdown and launch procedures.



## Countdown and Launch Procedure

- ☐ Fly your rocket on a large field that is far from 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.
- ☐ 10. Remove the safety key from the launch controller.
- ☐ 9. Slide the rail buttons over the launch rail to place the rocket on the pad. The rocket should slide freely in the rail channel.
- ☐ 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 for G motors, or 12 meters - 40 feet for high power).
- ☐ 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 NAR\* Model Rocket Safety Code when launching model rockets.

\*National Association of Rocketry \*\*Kevlar® is a brand name of E.I. DuPont for their selection of aramid fibers. Only DuPont makes Kevlar®.

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## Need parts or Accessories to go along with this kit?

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