



Kit #05041
Skill Level 3

Made In USA



AeroDactyl TS Parts List

Item #	Item Name	Qty
10252	AT-29/5.25 Laser Cut Booster Stage Engine Mount Tube	1
10250	AT-29/7" Sustainer Stage Engine Mount Tube	1
10188	AT-66/18" Laser-Cut Sustainer Tube: 3-Slots	1
10189	AT-66/18" Laser-Cut Booster and Payload tube: 3 Slots	1
12381	CBD-66 Plywood Disk	1
13039	AC-66A (Red) Laser-Cut	1
13044	AC-66A (Red)	1
13035	CR 24/29 (Green)	2
13315	CR 29/2.6"	4
13056	1/4" Launch Lug 3.0"	1
15565	AeroDactyl TS Sustainer Fin Sheet 1/8" Balsa	1
15566	AeroDactyl TS Booster Fin Sheet 1/8" Balsa	1
19480	Nose Cone PNC-66	1
23011	Parachute Rings	8
29117	DynaStar 32" Plastic Parachute	1
29500	Cotton Parachute String	21ft
29506	Kevlar Shock Cord 300#	10ft
29624	Wood Screw Eyelet Size 9	1
31105	AeroDactyl TS Instructions Sheet A 11x17	1
31106	AeroDactyl TS Instructions Sheet B 8.5x11	1
31107	AeroDactyl Fin Template Sheet	1
41012	AeroDactyl Decal	1
39034	AeroDactyl Face Card	1

Skill Level 3

Average Skills Needed

The AeroDactyl TS is a simple-to-build two-stage, payload carrying rocket that was designed around the Estes 29mm diameter rocket engines. These engines are low thrust, and therefore need a low weight rocket for maximum speed performance. With these motors, the rocket leaves a thick smoke trail as it zooms skyward.

The kit features a slotted body tube that allows the laser cut fins to mount perfectly straight on the rocket. This allows the rocket to fly straight and true. It also has a large payload bay, which can be used to fly things like altimeters and other scientific payloads. You'll find that it is a very versatile rocket because it can be used with a variety of rocket motors. You can also fly the model as a single-stage vehicle. With so many options it will never bore you.

Needed Tools and Materials

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

Optional Tools / Finishing Supplies

- ☐ Super Glue (CyA Adhesive medium viscosity)
- ☐ Plastic Sheet (to cover the work surface)
- ☐ Paint Supplies: (Spray Paint, Brushes, etc)
- ☐ Wood Sealer/Sanding Sealer
- ☐ Safety Glasses (For general protection while building)



Mid-Power Rockets
Manufactured in the USA by:

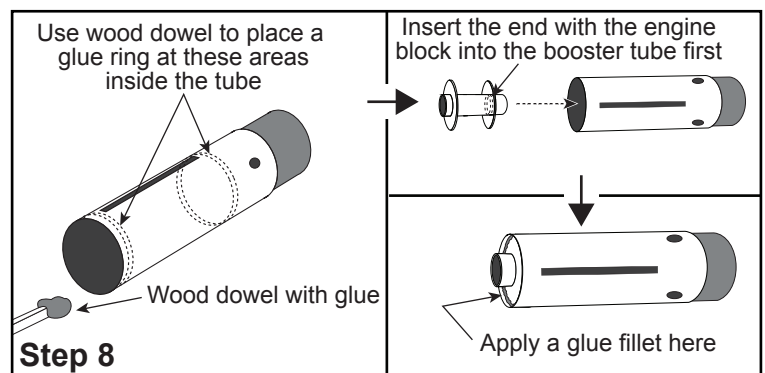
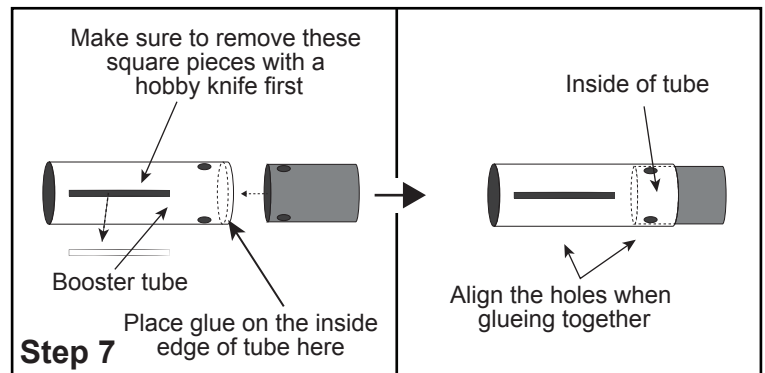
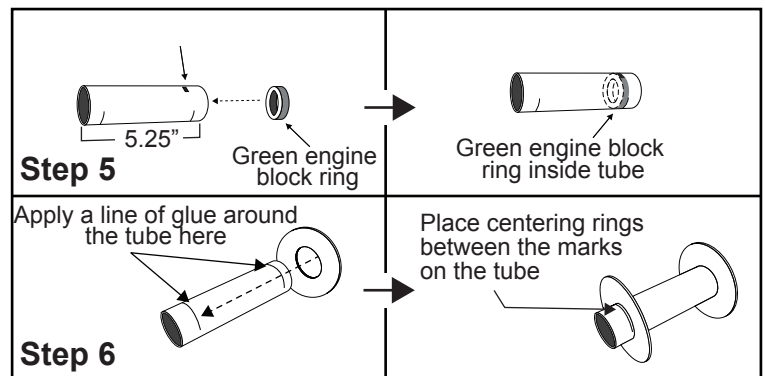
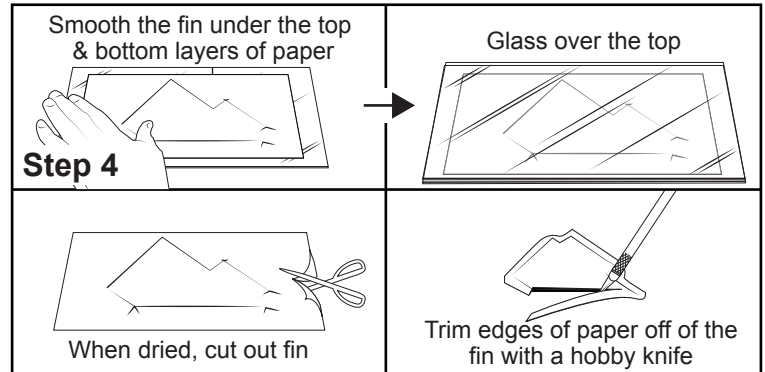
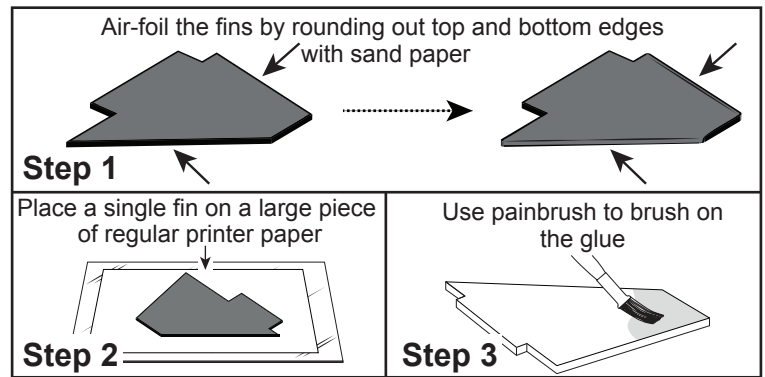
Apogee Components Inc.
Colorado Springs, Colorado, USA

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Assembly Steps

- ❑ 1. **(Optional to reduce drag)** Sand the balsa laser-cut sheets using 200 grit sandpaper. Then remove the fins with a hobby knife and airfoil the front and rear edges.
- ❑ 2. **(Optional for Fin Skins)** *Fin skins are highly recommended to survive a hard landing.* Place a piece of regular paper on top of a smooth surface (wood or glass). Then place a fin on top of the paper.
- ❑ 3. **(Optional Fin Skins)** Mix glue with water in a small cup (the right mixture should be watery enough to avoid leaving brush marks when painting the fin). Use a paintbrush to apply a thin layer of the mixture to one side of the fin. Once complete, flip over the fin (press into the paper you placed in the prior step) and paint the mixture onto the opposite side.
- ❑ 4. **(Optional Fin Skins)** Place a piece of paper over the top of the fin. Press down on the paper to rub out any bumps in the paper to smooth out the surface of the fin. Place wood or glass on top of the paper and then place some books or weight on top and let dry. Once dry, cut out the fin from the paper and trim away the overlap with a hobby knife. Repeat this process for all 6 fins.



Construction of Booster Stage Motor Mount

The booster stage is the lowest section of the rocket. It is designed to fall off and tumble back to the ground after the engine burns out during the flight.

- ❑ 5. The **booster stage engine mount tube** is the shorter 29mm tube that is 5.25in (133mm) long, and it has a small rectangular cutout at one end of the tube. Locate one of the green rings (CR 24/29). Using a wood dowel, spread a line of glue inside the tube at the cut-out location. Slide the green ring inside the tube so it is visible through the cut-out window of the tube. Wipe off any glue that oozes out with a paper towel
- ❑ 6. Test fit both large wooden CR 29/2.6" centering rings onto the **motor mount tube**. Sand the inside of the rings if necessary. Now spread a thin line of glue around the inside edge of one of the tube line markings. Then slide one of the rings over the glue and rest it just behind the tube mark. Repeat step for the other centering ring. Clean off excess glue and let dry. Set aside the motor mount for now.
- ❑ 7. Add a ring of glue to the inside forward edge of the **booster tube**. Then take the **red tube coupler** with the holes in it and slide it into the **booster tube**. Take care to align the holes in both tubes. Wipe away any excess glue on the inside and the outside of the tubes.
- ❑ 8. Use a wood dowel to spread two lines of glue inside the **booster tube**; one line of glue on each side of the slots cut in the tube. Now slide the **motor mount** into the **booster tube** (into the end with no coupler). The **motor mount** will stop against the inside end of the coupler, clean off any excess glue. Apply a fillet of glue around the edge of the back ring.

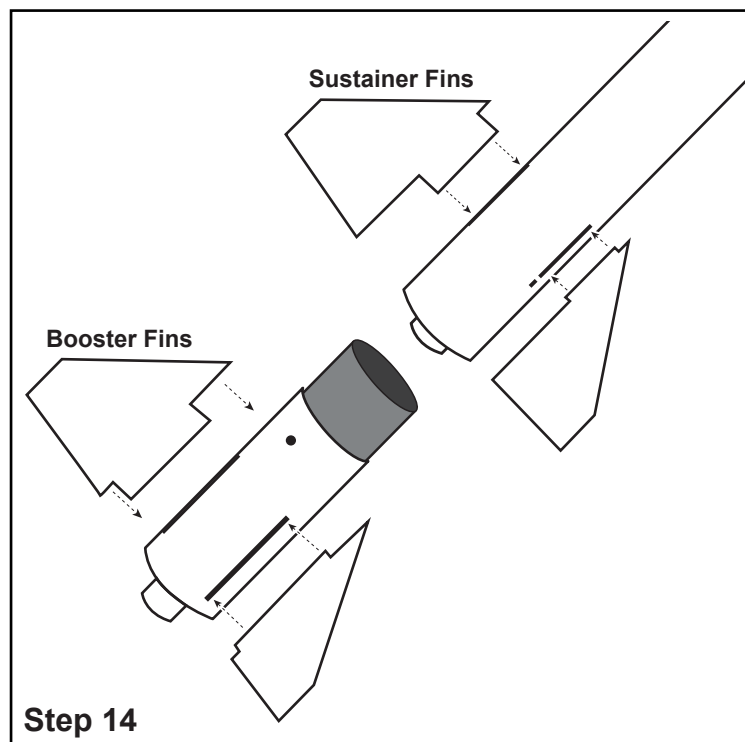
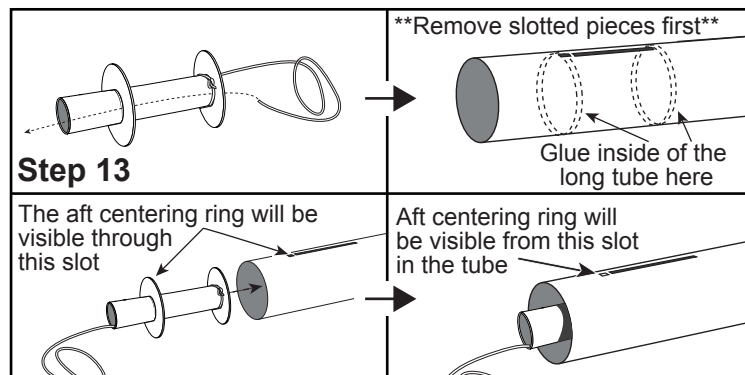
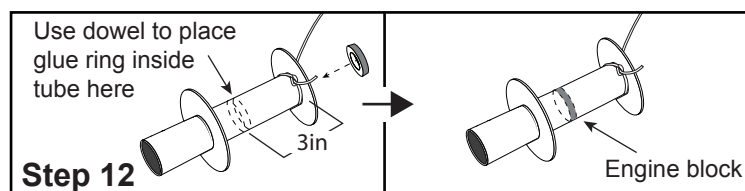
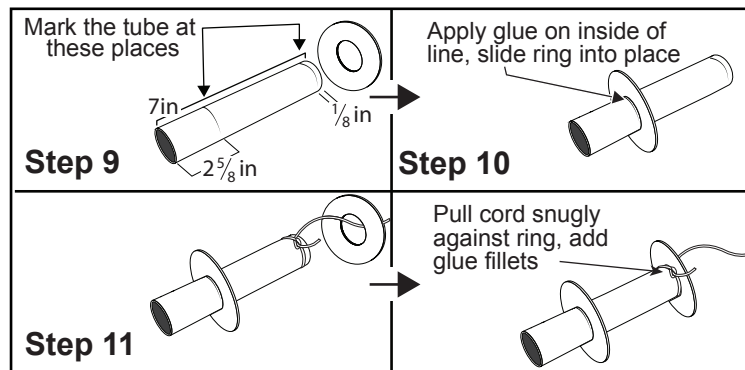
Construction of the Sustainer Motor Mount

The sustainer stage is the top stage of the rocket.

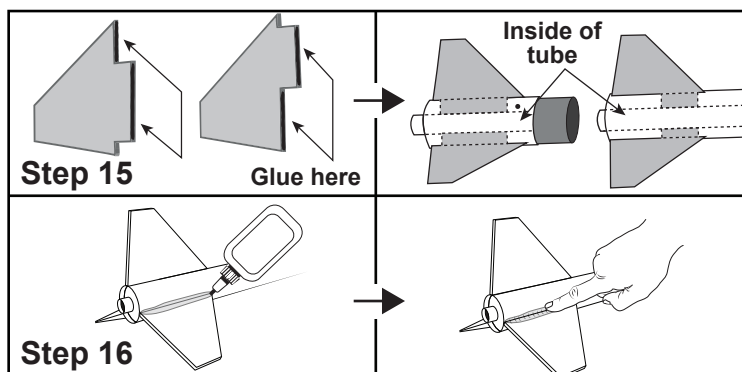
- 9. The **sustainer motor mount tube** is the longer 29mm diameter tube that is 7 inches (178mm) long. Mark the tube with a pencil for the location of the centering rings. One mark should be $2\frac{5}{8}$ " from one end, and the other is $\frac{1}{8}$ " from the opposite end.
- 10. Test fit both large centering rings (29/2.6") onto the **motor mount tube**. Sand the inside to adjust the fit if necessary. Then take one of the rings and place it on the tube. Apply a ring of glue around the $2\frac{5}{8}$ " line marking and slide the ring onto the line.
- 11. Tie one end of the yellow shock cord near the $\frac{1}{8}$ " line you drew in the previous step. Now put a thin line of glue around the tube at the same marking. Before the glue dries, thread the shock cord through the hole in the remaining centering ring. Place the ring on the tube and slide it over the glue. Pull the shock cord tightly against the centering ring. Cover the shock cord with a fillet of glue. Allow the glue time to dry.
- 12. **(Optional Engine Block)** *This step will put an engine block in the motor mount of the sustainer stage. If you plan on using composite motors in this rocket, we suggest you skip this step, because composite motors already have a motor block built into them.* Use a wood dowel to spread glue in the **motor mount**. The band of glue should go approximately 3" (76mm) from the end where the yellow shock cord is attached. Slide the green centering ring into the **motor mount**, until it is centered in the glue. As a check, if you insert an Estes 29mm motor into the tube, the end of the motor should stick out $\frac{1}{2}$ " (12.7mm). Wipe out any excess glue.
- 13. Temporarily pass the shock cord through the **motor mount** and out the rear. This will keep it glue free when gluing it into the **sustainer tube**. Using a wood dowel, apply glue just forward of the fin slots in the **sustainer tube**. Also put a glue ring inside the tube on the other side of the fin slot (just before the end of the tube). There is a small cutout in the **sustainer tube** so you can gauge how far to put the glue. Quickly and smoothly insert the **motor mount** into the aft end of the **sustainer tube**. The edge of the aft wooden centering ring should be centered in the slot just to the rear of the fin cutout. Wipe out any glue inside the back end of the **sustainer tube** quickly. Any excess glue will make it hard to insert the red coupler to join the two stages together. Once the glue is dry, pull the shock cord back through the **motor mount** and out of the front of the **sustainer tube**.

Attaching the fins

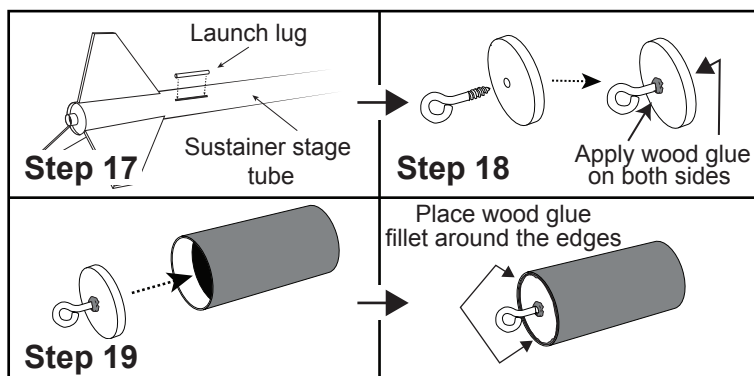
- 14. Note that the tabs on the wooden fins are different lengths, and are in different locations. The **Booster Fins** have wider tabs, and they are closer to the bottom edge of the fin. Whereas the **Sustainer Fins** have smaller tabs and they are closer to the top edge of the fins. Use the diagram to the right to ensure that the fins are glued into the correct body tubes.



- 15. Apply glue to the root edges of one of the fins, including on the base of the tab. To prevent dripping allow the glue to dry slightly for a few minutes until tacky. Then press the fins through the slots in the body tube and rest them firmly against the motor mount inside. Allow them time to dry and then repeat this for the remaining fins. You can temporarily insert the booster stage into the rear of the sustainer stage in order to visually align both sets of fins.

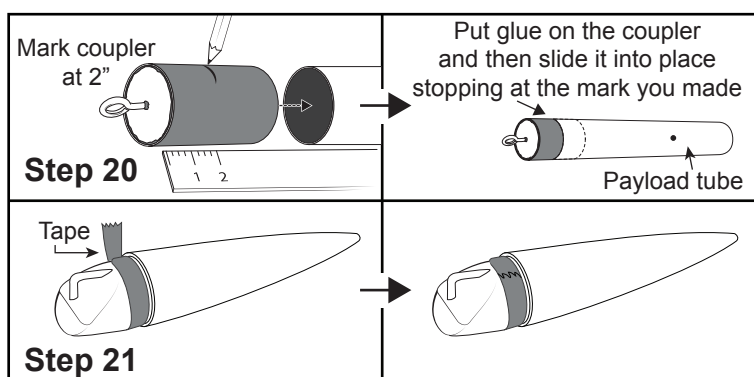


- 16. Strengthen fins with fillets by applying a bead of wood glue to both sides of each fin-body tube joints. Pull your finger along the joints to smooth out and remove the excess glue. Lay the tubes horizontally while the glue dries. Repeat this process for all 6 fins.



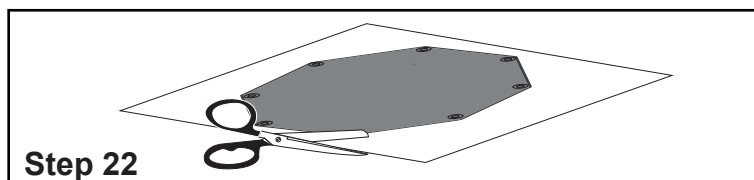
- 17. Attach the launch lug with glue. Position it on the rectangular hole located on the **Sustainer Tube**. After the glue has dried, apply fillets of glue along both sides of the launch lug.

- 18. Apply glue to the threads of the metal screw eye, and screw it into the plywood bulkhead. Do not twist it in past the threads on the screw eye. Apply glue to both sides of the bulkhead where it exits the hole.



- 19. Glue the bulkhead into the **red tube coupler** (without the holes). Recess it slightly into the end of the tube. When the glue has dried, put a fillet of glue on both sides of the bulkhead.

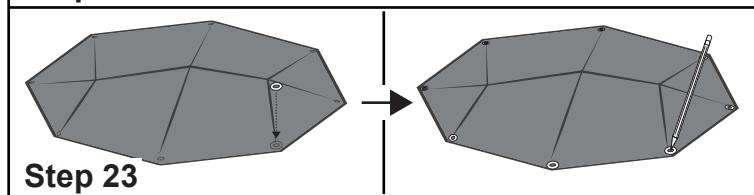
- 20. Draw a line 2" (51mm) from the end of the coupler (with the bulkhead) with a pencil as shown. Smear a small amount of glue on the inside edge of the payload tube. With one quick and smooth motion, slide the tube coupler into the body tube until the pencil line is just inside the tube. Wipe off any excess glue that oozes out. Be sure the tubes are aligned straight with each other.



- 21. Apply masking tape to the outside of the shoulder of the nose cone to achieve a tight fit into the payload tube.

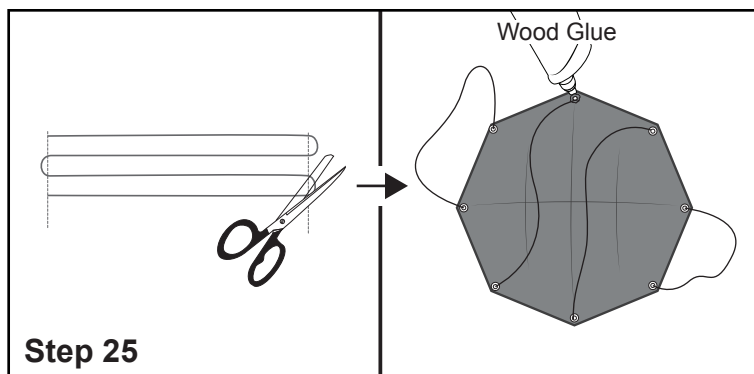
Parachute Assembly

- 22. Cut out the plastic parachute with a pair of scissors.



- 23. Place the ring tabs over the circles on each of the points of the parachute, as shown in the illustration. Next, poke holes in the center of the rings with a sharpened pencil.

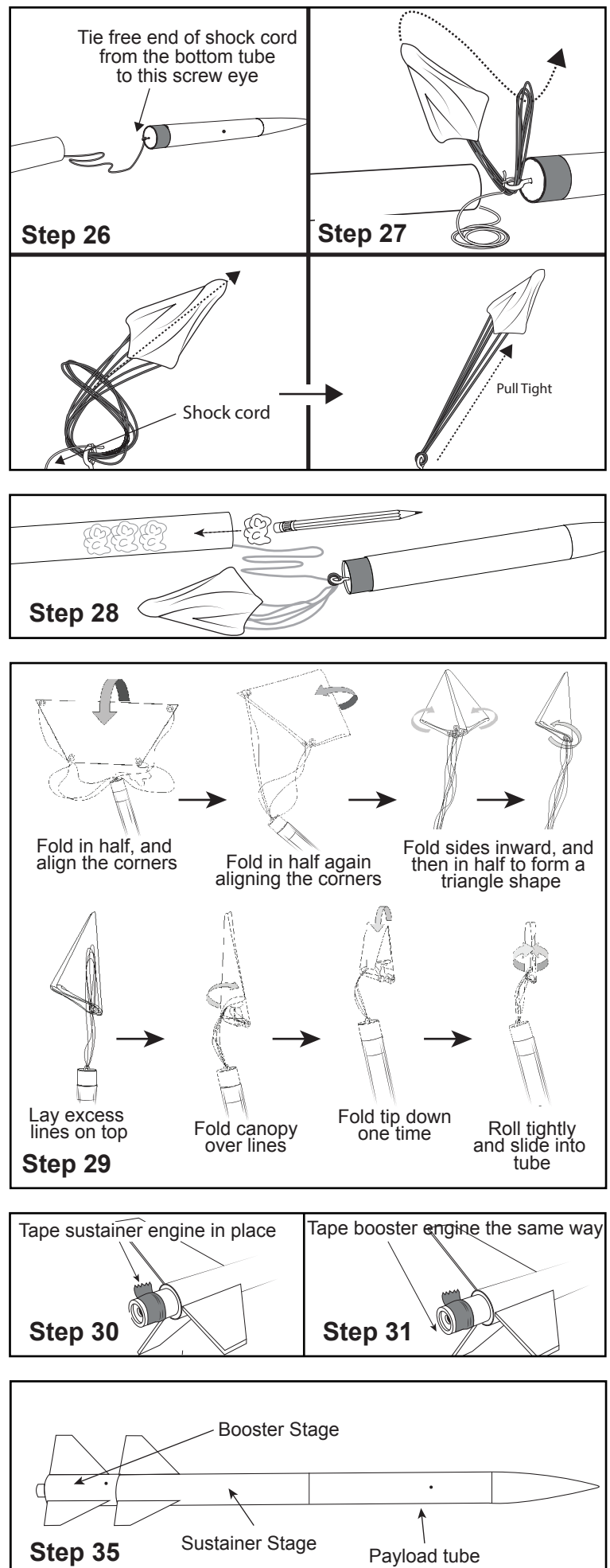
- 24. Find the shroud line and cut the string into four equal lengths and tie them through the ring holes as shown. Put a little bit of glue on the knots to secure them in place. Allow the glue to dry.



- ❑ 25. The rocket should be painted now to avoid getting paint on the shock cord or **payload bay**. Once the paint is dry you can add the provided decals. Feel free to use your own design or match the design on the packaging.
- ❑ 26. Tie the free end of the yellow shock cord to the screw eye on the base of the **payload bay**. Put a little bit of glue on the knot to secure it in place. Allow the glue to dry.
- ❑ 27. Attach the parachute to the screw eye on the forward red tube coupler, using the following method: Hold the parachute at the center of its top, pull the lines together to even up the ends. Thread the loop lines through the screw eye on the payload section. Now take the top of the parachute and pull it through all the string loops. Then pull on the top of the canopy to tighten the knot. This securely attaches the parachute to the rocket.

Prepping your rocket for flight

- ❑ 28. Loosely crumple and insert 6 to 8 sheets of recovery wadding into the body tube. (**Not included with this kit**)
- ❑ 29. Fold parachute according to the diagram on the right. Slide the parachute into the tube behind the recovery wadding. Then slide the **payload bay** into the main body tube.
- ❑ 30. Insert a **sustainer engine** in the **sustainer stage**. Hold it into place by wrapping tape over the exposed tube and the portion of the engine that sticks out the back end of the **sustainer stage**.
- ❑ 31. Insert a **booster engine** into the **booster stage** the same as you did with the sustainer engine by taping it into place.
- ❑ 32. Slide the booster stage into the back of the sustainer stage.
- ❑ 33. Insert and secure the engine igniter as directed on the package the engines came with. You only need to put an igniter in the booster stage motor. The sustainer motor is ignited by the booster motor during flight.
- ❑ 34. At this point, the assembly of the rocket is complete and ready for flight. Follow the countdown and launch procedures on the back of this page.



Countdown and launch procedure

- ☐ 1. 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.
- ☐ 2. Remove the safety key from the launch controller
- ☐ 3. Slide the launch lugs onto the launch rail/rod to place the rocket on the pad. Test how smoothly the rocket goes up and down the rail/rod. The rocket should slide freely over the rail/rod.
- ☐ 4. Attach the micro-clips to the igniter. The clips must not touch the other or the metal blast deflector.
- ☐ 5. Stand back from your rocket as far as the launch wire allows (at least 9.14 meters - 30 feet)
- ☐ 6. Insert the safety key to arm the launch system. The light (or buzzer) on the controller should come on.
- ☐ 7. Give a loud countdown 5 ... 4 ... 3 ... 2 ... 1 ... LAUNCH!
- ☐ 8. 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 insert 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.

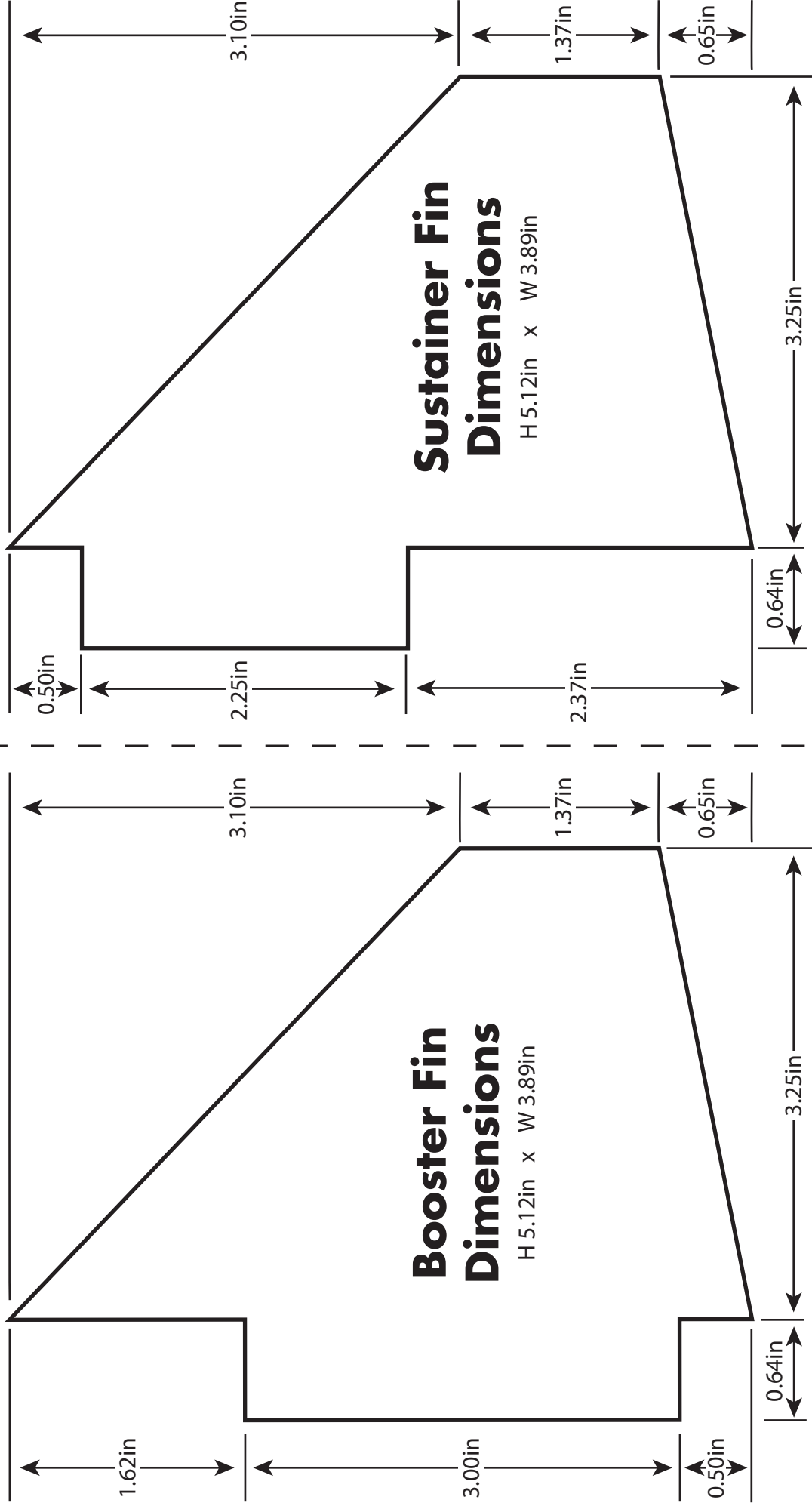
*National Association of Rocketry

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

Need parts or Accessories to go along with this kit?

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: Perfectflite Firefly PerfectFlite APRA Altimeter PerfectFlite Pnut Altimeter 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
Launch Pads	https://www.apogeerockets.com/Launch_Pads
Recovery Wadding	https://www.apogeerockets.com/Building_Supplies/Parachutes_Recovery_Equipment/Disposable_Wadding



AeroDactyl TS Fin Template

Use these templates to make replacements, in case you break one off.

Use 1/8" (3mm) thick balsa wood.



Mid-Power Rockets

Check the scale of your print by using 1" line above for reference