

3" DIAM. SCHOOL 29 MM ROCKET

Flying Model Rocket Assembly Instructions

No Hobby Knife Required!

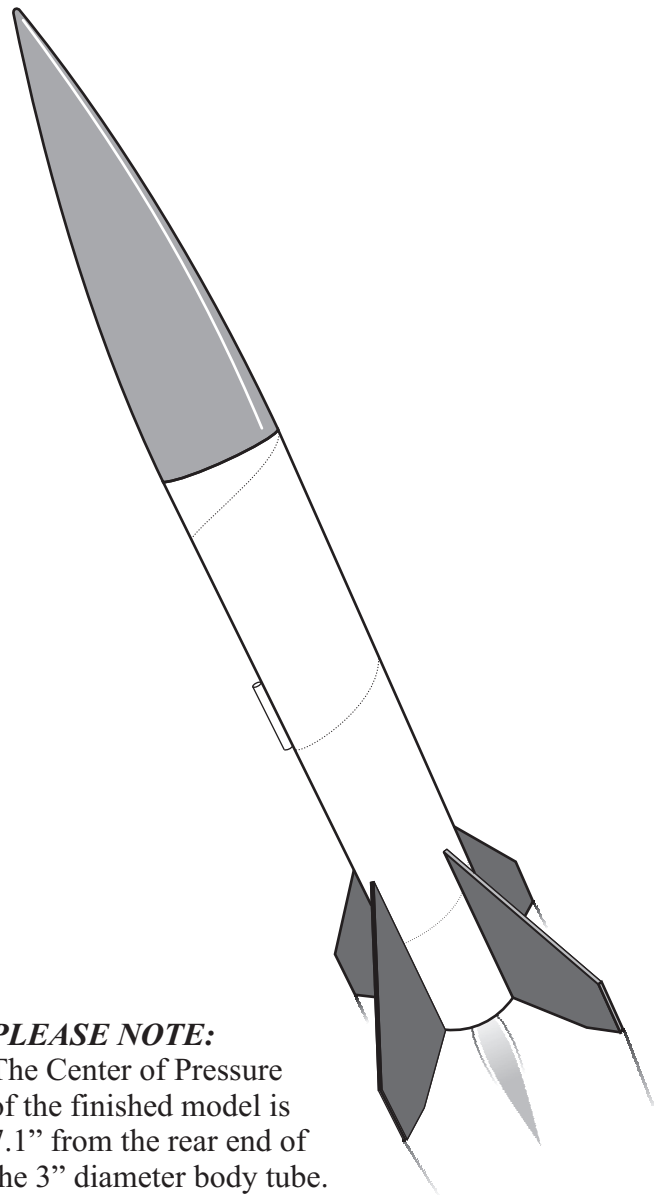
First Flight Engine: TBD



BMS Means
Quality Parts

Balsa Machining Service

3900 S. Winchester
Pahrump, NV 89048
775-537-6232



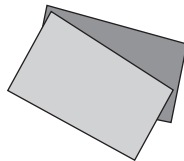
Additional Supplies You'll Need To Complete This Kit:

Pencil

Ruler



White or Yellow Glue
3/4" Wide Masking Tape



Finishing Supplies (Optional)
Sandpaper and Spray Paint

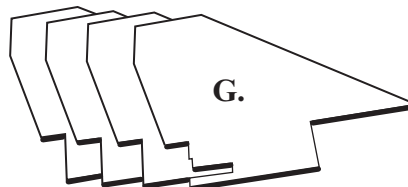
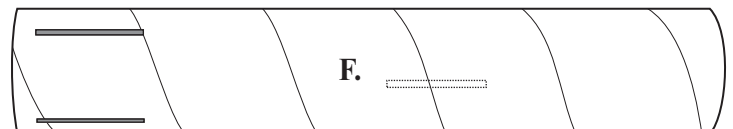
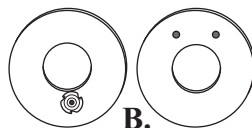
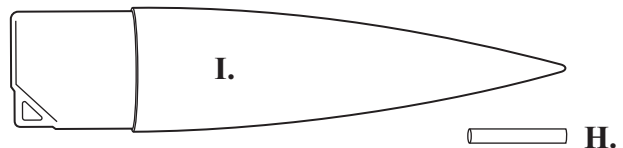
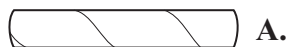
PLEASE NOTE:

The Center of Pressure of the finished model is 7.1" from the rear end of the 3" diameter body tube.

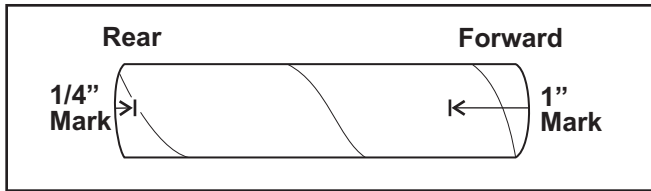
Inventory all parts and acquire any missing ones.

You should have:

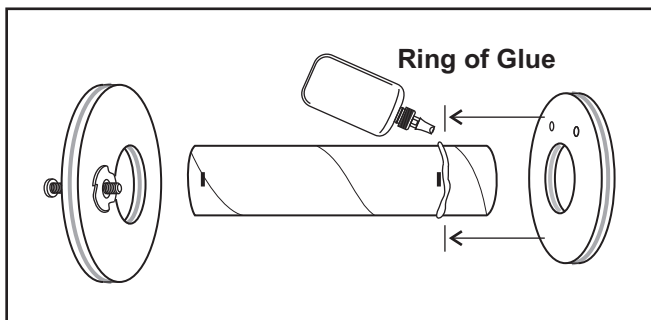
- A. Engine Mount Tube**
- B. Centering Rings, 2**
- C. Screw, 1**
- D. Engine Clip, 1**
- E. Kevlar® Shock Cord**
- F. Body Tube**
- G. Four Fins**
- H. Launch Lug**
- I. Plastic Nose Cone**



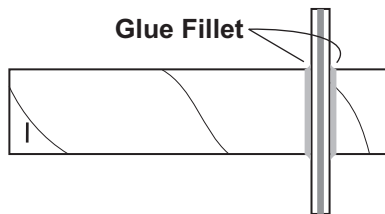
Step 1. Locate the **engine mount tube**. With a pencil, mark the tube at 1/4" from the rear edge and 1" down from the forward edge.



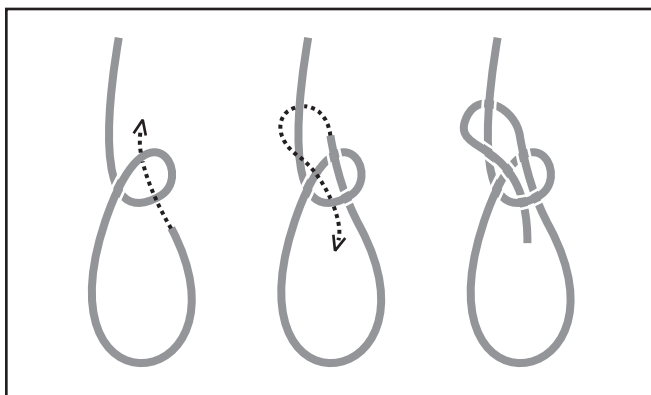
Step 2. Note: Only the **upper centering ring** (with two holes) is glued onto the **engine mount tube** at this time. Apply a ring of glue right above the 1" mark on the forward end of the **engine mount tube**. Slide the **upper centering ring** into the glue ring and stop at the 1" mark. Wipe off the excess glue and let dry.



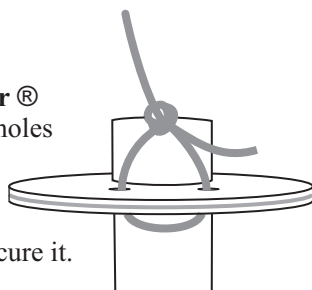
Step 3. Apply glue fillets to both sides of the **upper centering ring joint**. Smooth out excess glue with a fingertip.



Step 4. Study how to tie the **Bowline Knot** shown below. It will be used four times in the construction of this rocket.



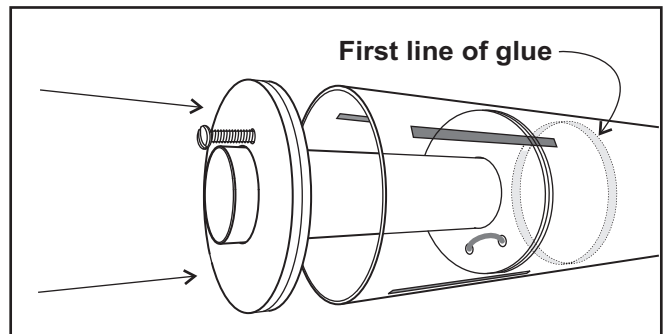
Step 5. Tie the yellow **Kevlar® shock cord** through the two holes in the **upper centering ring** using the **Bowline knot**. Tighten the cord and apply a drop of glue to the knot to secure it.



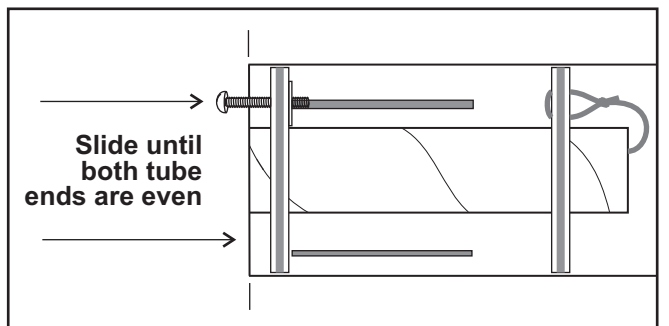
Step 6. Roll the **Kevlar line** into a small coil and stuff it into the upper end of the **engine mount tube**.

Step 7. You will now be installing the **engine mount assembly** and you need to work quickly so the glue does not dry before you have completely installed it. Study the entire assembly before applying any glue.

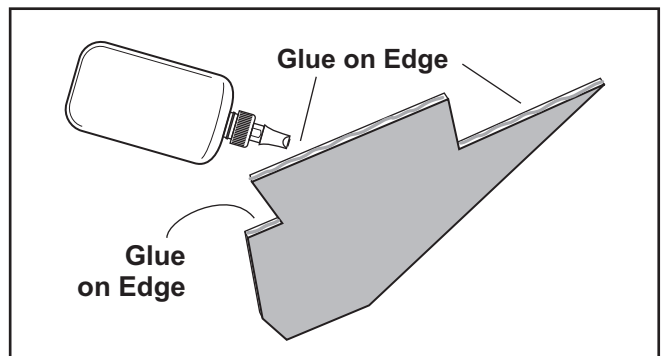
Step 8. Turn the screw into the **T-nut hole** in the **rear centering ring**. Leave about 1/2" of the screw extended out the back. The screw will be used as a handle to align and later remove the rear ring. Slide the rear centering ring over the end of the engine mount tube up to the 1/4" mark. Don't glue the rear ring on yet. It is used to insure the mount is glued in straight. Using a dowel, apply a bead of wood glue inside the **body tube** 1" above the **laser cut slots**.

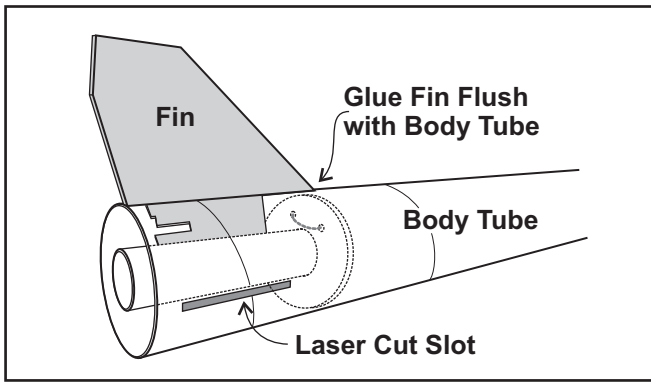


Step 9. Push the **engine mount assembly** inside the **body tube** until the **engine mount tube** is even with the end of the **body tube**. Wipe any glue out of the slots. Be sure that the rear **centering ring** is below the slots.

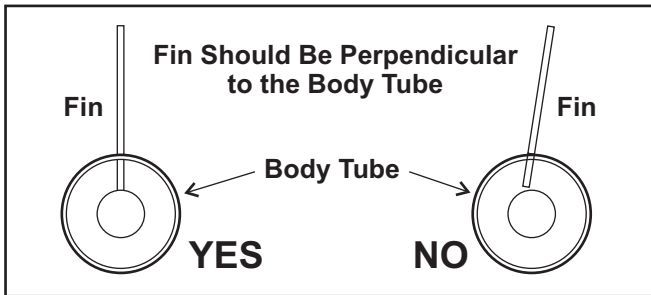


Step 10. After the glue dries on the **forward centering ring**, slide off the **rear centering ring** using the **screw head** as a handle. Apply a thin strip of glue, no wider than about 1/2 the width of the **fin**, on the root edge and sides of the tab on the **fin**.

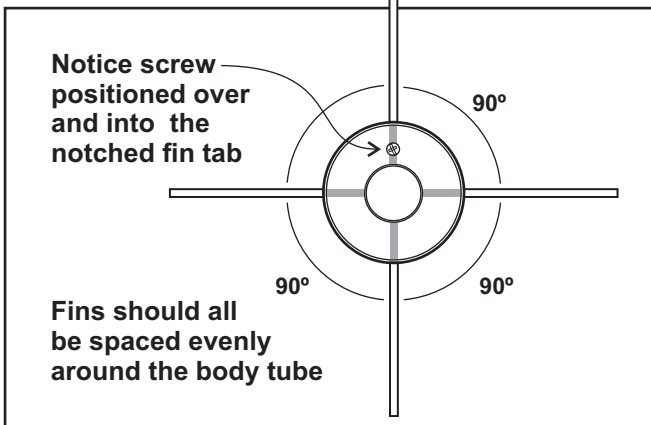




Step 11. Place the glued edge of the **fin** in one of the **laser cut slots**. The **fin** tang should contact the engine mount tube and the rear of the fin is flush with the end of the **body tube**.

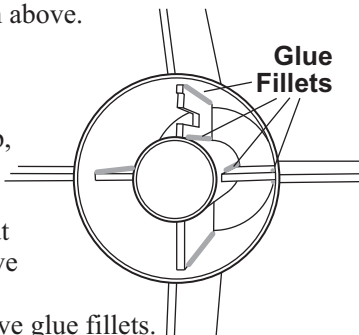


Step 12. Hold the **fin** firmly on for at least one minute and do not bump or move it. The **fin** should be perpendicular to the **body tube** as shown below. Hold the **body tube** horizontally with the **fin** sitting up and wait a minute before continuing.



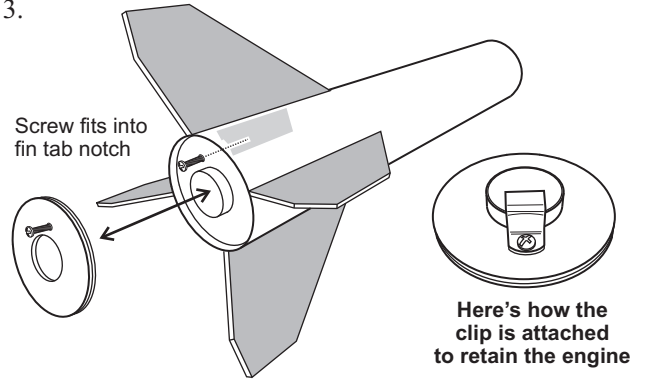
Step 13. Repeat Step 11 for the next three **fin**s. Allow time between installations so the glue dries well enough to hold the **fin**s. When all four **fin**s are on correctly, they should look like the diagram above. Adjust them as needed.

Step 14. With the tail end up, drip some wood glue down the inside glue joints. A dowel can help smooth out the internal fillets and remove excess glue.



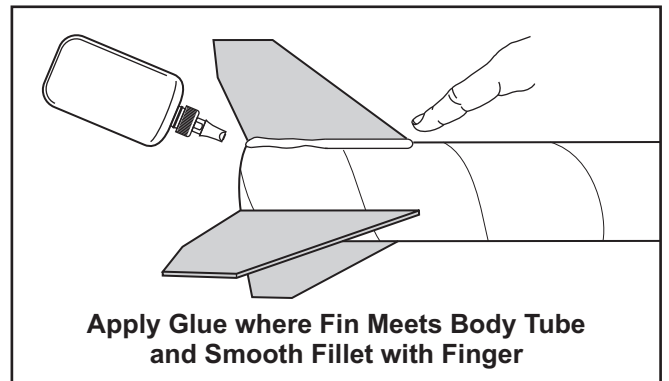
Be sure all internal joints have glue fillets.

Step 15. When the internal fillets are dry, dry fit the **rear centering ring** onto the **engine mount tube**. Be sure the **screw** is positioned in the fin notch as shown above Step 13.

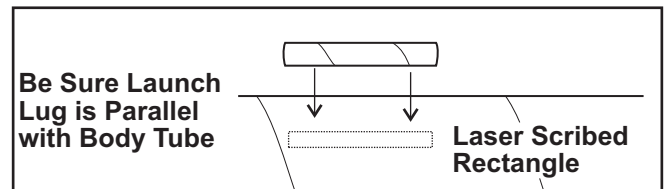


Apply glue to the rear of the **fin tangs** inside the rocket body. Slide the **rear ring** into the body tube until it stops against the glued fin tang edges. Let dry. Apply a **glue fillet** around the **body tube** and **centering ring** joints.

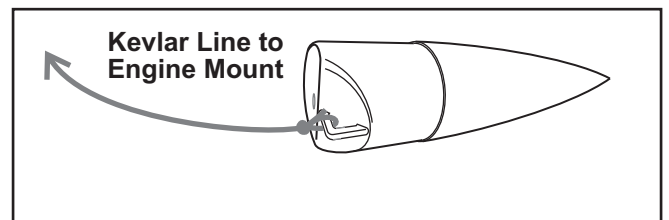
Step 16. Place a thin **fillet** (strip) of glue on each **fin** where it meets the **body tube**. Use your finger to smooth **fillet**. Wipe glue off of finger with damp cloth or paper towel.



Step 17. Place a thin strip of glue on one side of the **launch lug** and place it on the **laser scribed rectangle** on the **body tube**. When it is placed correctly, the **launch lug** will be parallel with the **body tube** as shown.



Step 18. Feed the **Kevlar® shock cord** through the **body tube** and out the top end. Tie the **Kevlar** line to the **nose cone base loop** with a **Bowline knot**.

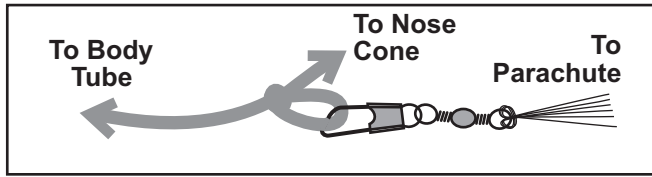


NATIONAL ASSOCIATION OF ROCKETRY MODEL ROCKET SAFETY CODE

Approved August 2012, www.nar.org

Step 19. Make a loose knot midpoint on the kevlar line as shown in the illustration below.

Step 20. Attach your parachute to a snap swivel as shown in the illustration below.



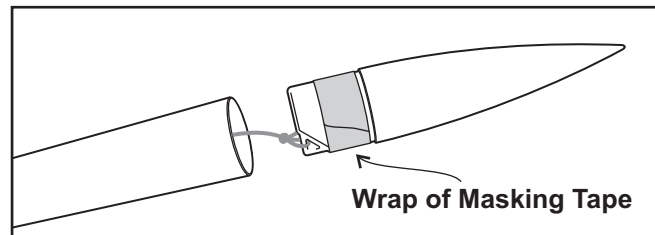
Step 21. Attach snap swivel to loose knot as shown then tighten knot.

Step 22. Place at least 3” of recovery wadding into body tube and lightly tamp down to the area immediately above the motor mount.

Step 23. Pack the **parachute** and slide it into the top of the **body tube**. Put the remainder of the **shock cord** in the **body tube** and carefully push the **nose cone** in the tube. Avoid pinching the **shock cord** between the **nose cone** and the **body tube**.

Step 24. Verify that the glue holding the **fins** and **launch lug** on is dry.

Select a color and spray paint the rocket. After the paint is dry, make sure the **nose cone** will pull out of the **body tube** relatively easy. If it is too loose, add a wrap of masking tape around the shoulder.

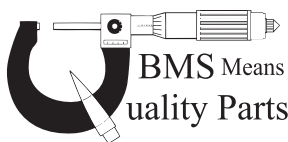


Step 25. Obey and follow the **N.A.R Model Rocket Safety Code** and have fun, but most of all be safe when launching and recovering your rocket.

1. **MATERIALS.** I will use only lightweight, non-metal parts for the nose, body, and fins of my rocket.
2. **MOTORS.** I will use only certified, commercially-made model rocket motors, and will not tamper with these motors or use them for any purposes except those recommended by the manufacturer.
3. **IGNITION SYSTEM.** I will launch my rockets with an electrical launch system and electrical motor igniters. My launch system will have a safety interlock in series with the launch switch, and will use a launch switch that returns to the “off” position when released.
4. **MISFIRES.** If my rocket does not launch when I press the button of my electrical launch system, I will remove the launcher’s safety interlock or disconnect its battery, and will wait 60 seconds after the last launch attempt before allowing anyone to approach the rocket.
5. **LAUNCH SAFETY.** I will use a countdown before launch, and will ensure that everyone is paying attention and is a safe distance of at least 15 feet away when I launch rockets with D motors or smaller, and 30 feet when I launch larger rockets. If I am uncertain about the safety or stability of an untested rocket, I will check the stability before flight and will fly it only after warning spectators and clearing them away to a safe distance. When conducting a simultaneous launch of more than ten rockets I will observe a safe distance of 1.5 times the maximum expected altitude of any launched rocket.
6. **LAUNCHER.** I will launch my rocket from a launch rod, tower, or rail that is pointed to within 30 degrees of the vertical to ensure that the rocket flies nearly straight up, and I will use a blast deflector to prevent the motor’s exhaust from hitting the ground. To prevent accidental eye injury, I will place launchers so that the end of the launch rod is above eye level or will cap the end of the rod when it is not in use.
7. **SIZE.** My model rocket will not weigh more than 1,500 grams (53 ounces) at liftoff and will not contain more than 125 grams (4.4 ounces) of propellant or 320 N-sec (71.9 pound-seconds) of total impulse.
8. **FLIGHT SAFETY.** I will not launch my rocket at targets, into clouds, or near airplanes, and will not put any flammable or explosive payload in my rocket.
9. **LAUNCH SITE.** I will launch my rocket outdoors, in an open area at least as large as shown in the accompanying table, and in safe weather conditions with wind speeds no greater than 20 miles per hour. I will ensure that there is no dry grass close to the launch pad, and that the launch site does not present risk of grass fires.
10. **RECOVERY SYSTEM.** I will use a recovery system such as a streamer or parachute in my rocket so that it returns safely and undamaged and can be flown again, and I will use only flame-resistant or fireproof recovery system wadding in my rocket.
11. **RECOVERY SAFETY.** I will not attempt to recover my rocket from power lines, tall trees, or other dangerous places.

LAUNCH SITE DIMENSIONS

Installed Total Impulse (N-sec)	Equivalent Motor Type	Minimum Site Dimensions (ft)
0.00 - 1.25	1/4A, 1/2A	50
1.26 - 2.50	A	100
2.51 - 5.00	B	200
5.01 - 10.00	C	400
10.01 - 20.00	D	500
20.01 - 40.00	E	1,000
40.01 - 80.00	F	1,000
80.01 - 160.00	G	1,000
161.01 - 320.00	Two Gs	1,500



Balsa Machining Service
3900 S. Winchester
Pahrump, NV 89048
775-537-6232