



Due to the high thrust motors that can be flown in this rocket, epoxy is recommended!

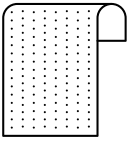
Before beginning construction, read over instructions to become familiar with the proper construction steps. Check Parts List to make sure you have all the parts.

TEST FIT ALL PARTS! Light sanding may be necessary to obtain proper fit.

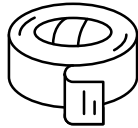
ITEMS YOU WILL NEED TO BUILD THIS KIT



Epoxy – (5, 15 and 30 Minute Recommended)



Fine and Medium Sandpaper



Masking Tape



Pencil and Ruler



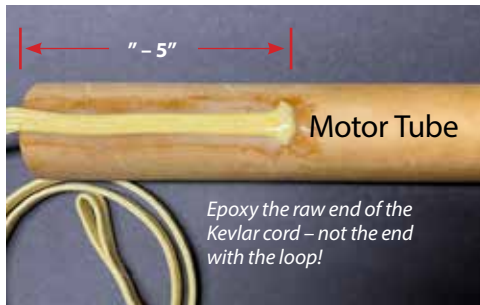
Cyanoacrylate Glue (Superglue)



Paint

Throughout the build, be sure to scuff all parts to be bonded using medium sand paper!

STEP 1 - Kevlar® Strap/Motor Tube Assembly



Lightly scuff the entire motor tube with medium sandpaper to aid in epoxy adhesion.

Epoxy 3" – 5" of the raw end of the Kevlar shock cord to the outside of the motor mount tube. Use masking tape to hold the strap in place while the epoxy cures. Do not cut the strap! When the epoxy has cured, bunch up the remaining shock cord and secure with a rubber band. Stuff the bunched up shock cord into the motor tube to keep it out of the way for the next few steps.

STEP 2 - Nosecone, Boat Tail and Quantum Tube Prep

Clean up the boat tail and nosecone by lightly sanding away any rough edges from the manufacturing process. The fin slots on the boat tail will need very light sanding to clean them up. Once finished with the sanding, use Acetone and wipe down the

nosecone and **boat tail** to remove any remaining mold release agent residue.

Do not use acetone on the Quantum tube!

Then wash the nosecone, boat tail and Quantum tube in warm water with dish detergent, rinse, and set aside to dry.

Parts List

Check your parts before you begin your build!

- Nose Cone
- Pre-slotted Quantum Airframe
- Pre-slotted Boat Tail
- G-10 Fiberglass Main Fins
- G-10 Fiberglass Canard Fins
- Parachute
- Motor Mount Tube
- Alignment Ring
- Notched Centering Ring
- Kevlar® Tether
- Tubular Nylon Shock Cord
- Rail Buttons
- Decal Sheet

LOC PRO Build Tip!

Adding microballoons or microfibers to epoxy will strengthen the bond significantly. Microfibers are useful when creating epoxy fillets or other areas where high strength is needed. Be aware that the addition of microfibers shortens the work time of the epoxy.



STEP 3 - Motor Tube / Boat Tail Pre- Assembly and Test Fitting

**USE NO EPOXY/GLUE IN THESE STEPS!
THIS PROCEDURE IS FOR TEST FITTING
ONLY!**

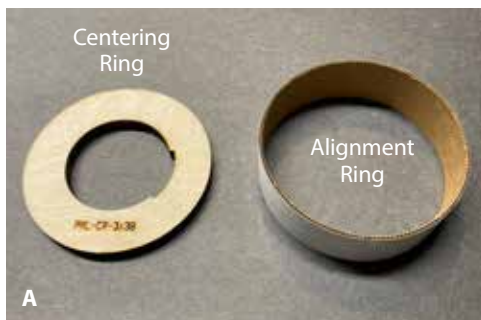
A. The centering ring is shown on the left, while the alignment ring is shown on the right. Once the motor tube/boat tail assembly has been completed, the alignment ring will be discarded.

B. Test fit the centering ring over the motor tube/strap assembly. It may be necessary to lightly sand the inside of the centering ring to get a good, smooth fit. **Do not epoxy the centering ring to the motor tube!**

C. Test fit the motor tube into the boat tail, making sure the motor tube goes all the way to the bottom of the boat tail. Test fit the centering ring, making sure it will slide down the motor tube and touch the top of the boat tail.

D. Test fit the alignment ring, making sure it fits over the neck of the boat tail and centers over the centering ring.

Make sure you understand Steps A–D completely before proceeding to Step 4 below.



STEP 4 - Motor Tube / Boat Tail Assembly

Make sure you understand above Step 3, A–D completely before proceeding. Note that the only part that gets epoxy in Step 4 is the lower 1.5" of the motor tube!

A. Remove the alignment ring from the boat tail assembly. Then remove the entire motor tube/centering ring assembly from the boat tail. Rough sand/scuff the lower 1.5" of the **INSIDE** of the boat tail.

B. The use of 30 minute epoxy is recommended for this next step. Liberally spread epoxy on the lower 1.5" of the motor tube. **Do not get any epoxy on the centering ring!**

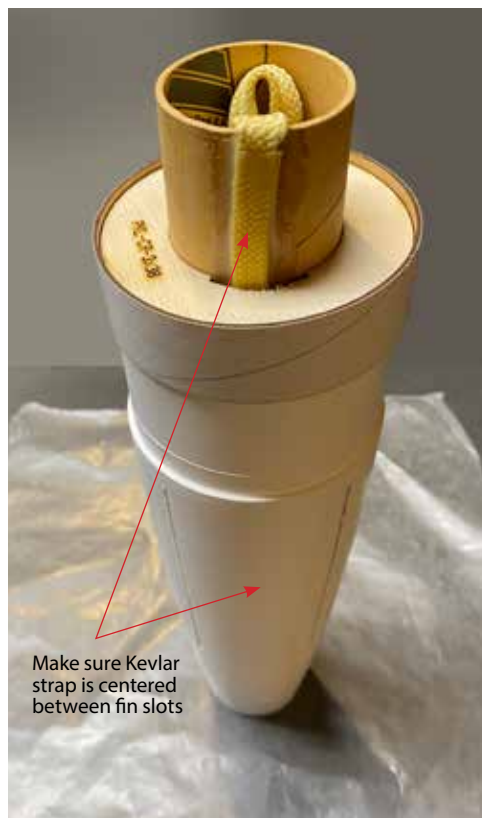
C. Reinsert the motor tube / centering ring assembly back into the boat tail. Be sure:

- The motor tube touches the bottom of the boat tail
- The Kevlar strap is centered between the fin slots so the strap does not interfere with fin insertion
- The centering ring is touching the top of the boat tail neck.

Do not epoxy the centering ring to the top of the boat tail at this time!

D. Do not use epoxy on the alignment ring! Dry fit the alignment ring over the boat tail neck and centering ring, making sure it fits over the neck of the boat tail and centers over the centering ring.

E. Stand the entire assembly on a piece of waxed paper so that any epoxy that escapes will go onto the wax paper. Let the epoxy fully cure. Keep the centering and alignment rings in position for Step 5.



STEP 5 - Lower Fins to Airframe Assembly

A. 5 minute epoxy is recommended to tack the fins to the airframe.

Lightly sand any rough edges of the fins. Scuff all parts to be bonded using medium sandpaper.

Tack the fin in place by applying a bead of 5 minute epoxy to the root edge of a fin. Push the fin through the slot in the boat tail and against the motor mount tube. **Make sure that the fin is perpendicular to the boat tail.** Use tape to hold the fin in position while the epoxy cures.

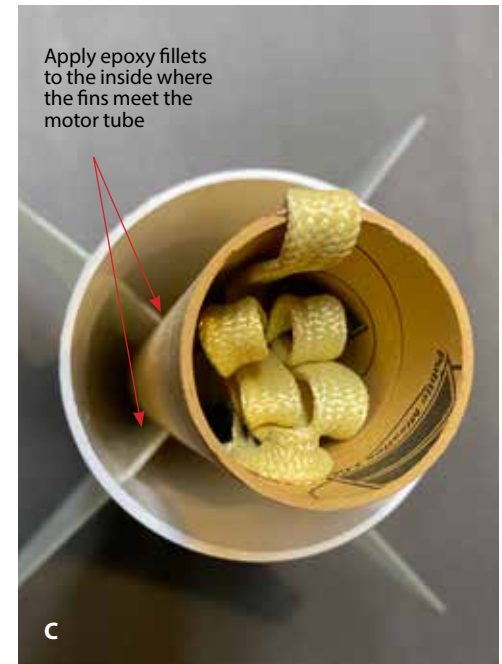
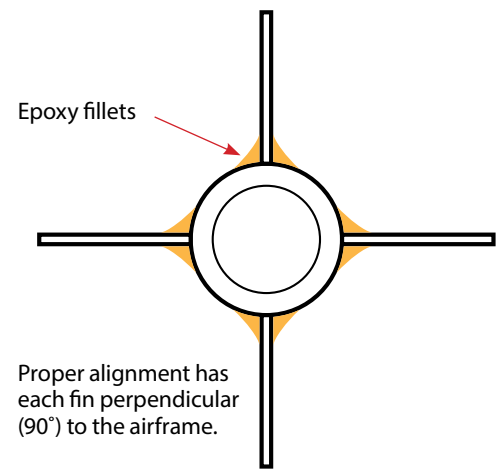
Repeat this process for all fins.

B. 15 or 30 minute epoxy is recommended to make fin fillets.

Once the fins have all been tacked into place, apply an epoxy fillet to both sides of each fin. Carefully smooth the epoxy with your finger before it begins to gel. Allow the epoxy to set-up before rotating the rocket to do the next set of fins. Once the epoxy has fully cured, you should sand the fillet smooth with 180 grit sandpaper. Sanding will help the primer hold better to the epoxy.

C. Carefully remove the alignment ring and the centering ring from the top of the boat tail. Apply epoxy fillets to the fin attachment points within the boat tail. Do not get epoxy into the inside of the motor tube and shockcord!

See Pro Build Tip below for pointers.



LOC PRO Build Tip! Protect your boat tail/fin assembly from epoxy drips!

Applying epoxy to the inside fin /motor tube points can get very messy. Follow the steps below to keep things neat and clean!



1. Using the alignment ring from above, draw a circle of the inside diameter of the alignment ring onto card stock or foam board. Then cut out the circle.



2. Apply tape over the motor tube and the neck of the boat tail as shown. When finished taping, slide the card stock or foam board over the boat tail neck to protect the lower fins.



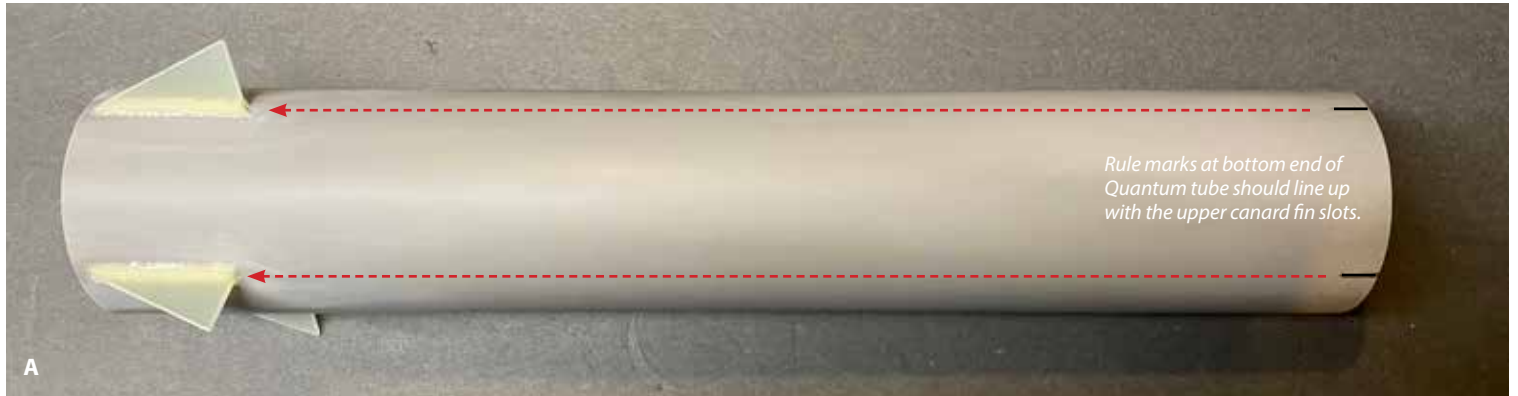
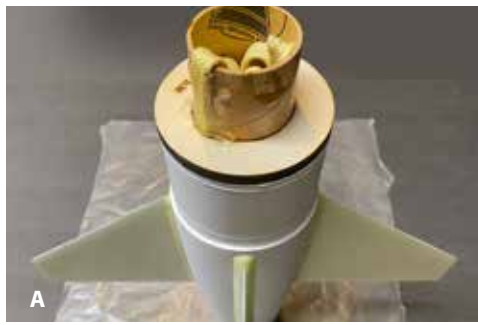
3. Apply epoxy fillets as shown in step C above. The goal is to get epoxy onto the inner fins and motor tube. Don't try to make it pretty, get a good amount of epoxy onto the fins and motor tube. Your tape will protect from epoxy spills.

**10 MINUTES OF
PREP TIME SAVES
HOURS OF CLEANING
AND SANDING!**

4. When the epoxy has cured, remove the foam board and tape. No epoxy clean up needed!

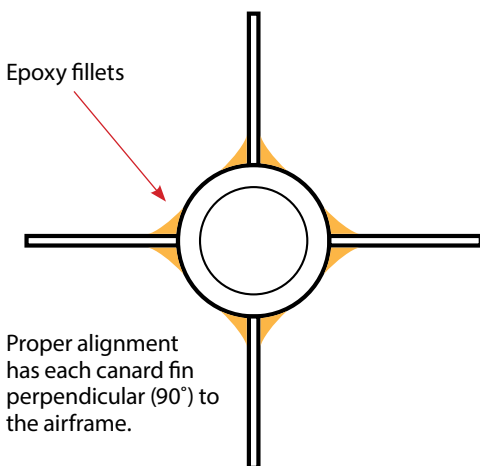
STEP 6 - Centering Ring Installation

- A.** Apply a bead of epoxy near the top of the motor tube and slide the centering ring back into position over the motor tube.
- B.** Turn the entire assembly upside-down so that the epoxy pools at the underside of the centering ring. Allow the epoxy to cure.



STEP 7 - Upper Canard Fin Assembly

- A.** Using a long straightedge, make a mark at the bottom of the Quantum tube that aligns with the upper canard fin slots. This will be an assembly aid when you get to Step 8...

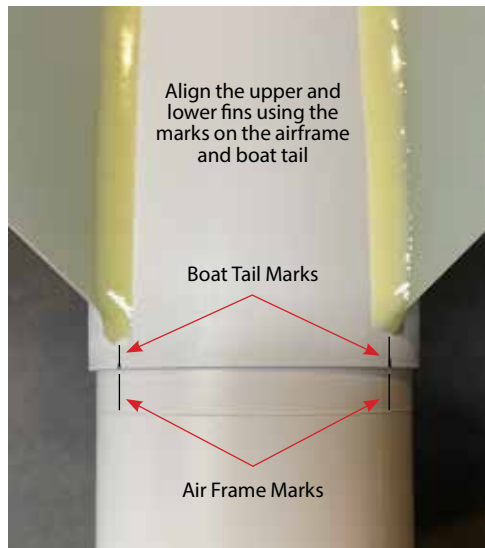


- B.** The canard slots are through the airframe. Insert the nosecone and press fit the canard fins into place. The slots are very tight! Once the four canard fins are in place, remove the nosecone. The canards will stay in place and have proper alignment.

Next, tack the canard fins in place using cyanoacrylate glue (super glue). Use the super glue sparingly; the purpose is to just tack the fins so they stay in alignment, 90° to the airframe.

- C.** Now use the provided Mylar™ to wrap the inside diameter of the Quantum tube behind the canard slots. Use 15 or 30 minute epoxy to fillet the canard fins on the outside where the fins meet the airframe. Allow the epoxy to cure. Remove the Mylar™ wrap and test fit the nose cone. If needed, sand the inside diameter for a smooth fit

NOTE: the 2.2" Bull Puppy has tabbed canard fins and the Mylar step is not needed. Just align, tack, and fillet!



STEP 8 - Boat Tail to Airframe Assembly

- Make 4 small marks where the fins line up to the boat tail neck.
- Test fit the boat tail assembly into the bottom end of the main airframe. Sand the centering ring to fit if necessary.
- Apply a heavy layer of epoxy to the inside circumference of the main airframe at the bottom end. Push the tail section into the main airframe as shown. Align the upper and lower fins using the marks on the airframe and boat tail. Stand the assembly upright and allow to cure.

STEP 9 - Rail Guides / Launch Lugs

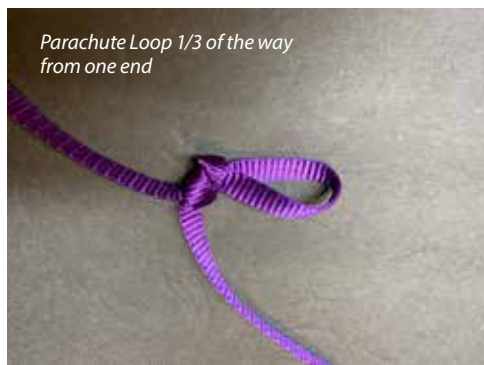
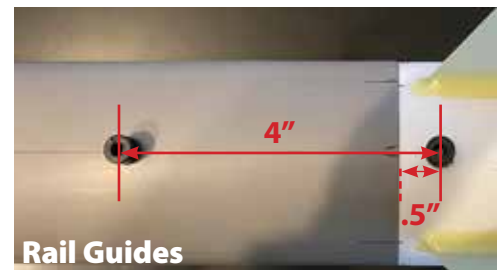
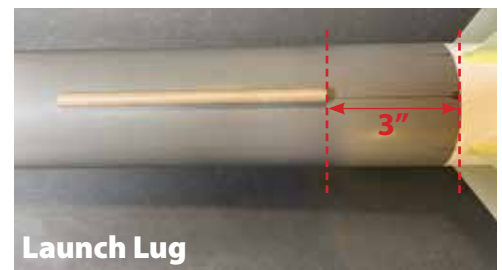
Identify launch system to be utilized. Some choose to install launch lug (not included) on one side and rails on the opposite, 180°. Your choice!

Launch Lug (not included)

Epoxy the launch lug as shown into position, 3" up from the bottom of the main airframe. Be sure the lug is not in line with the fins! Allow to cure. Once cured, add epoxy fillets to where the lug meets the airframe.

Rail Guides

- Install the AFT rail guides into the boat tail first with provided screws. Drill a small hole 1/2" behind where the boat tail and quantum tube meet, centered between fin set. Drill a second hole 4" forward of the aft rail guide.
- Drop a small amount of epoxy in drilled holes, thread the rail guides and screws in the holes, rotate rocket 180 degrees and let cure.



STEP 10 - Parachute / Recovery System Assembly

Make a parachute loop in the shock cord 1/3 of the way from one end. Tie the **long** end of the shock cord onto the yellow Kevlar® shock cord. Attach the **short** end of the shock cord onto the nose cone.

Optional Nose Cone Attachment

You can attach an eye bolt to the nose cone to make securing the shock cord easier. This

also would allow you to use a Quick Link to attach the shock cord to the eye bolt.

Make sure that your eye bolt to nose cone attachment is secure enough to withstand the ejection charge!



STEP 11 - Parachute Attachment

Gather the parachute shroud lines and make a knot close to the end. Use the Quick link to attach the parachute to the shock cord parachute loop.

STEP 12 - Paint / Finish

Seal fins and launch lug with sanding sealer using a brush. Sand lightly between coats to fill pores and obtain a smooth finish. Lightly sand plastic nose cone with fine sandpaper to remove molding seam line. At this time, remove any plastic flash that was molded into the nose cone eyelet. When you are satisfied with the smooth sanded finish of your model, it is ready to prime and paint.



PREFLIGHT

Sim Your Rocket!

This rocket is recommended for mid and high power rocket motors. Depending on your flying field and finished weight, this is a very versatile kit. The Rocksim® file is available on the Bull Puppy product page on our website.

Always check stability to ensure stable flight; the Center of Gravity (CG) must be forward of the Center of Pressure (CP) in flight ready condition.



Bull Puppy 2.2 Specs

Height: 27.75"
Diameter: 2.2"
Weight: 20 oz.

Bull Puppy 3.1 Specs

Height: 39"
Diameter: 3.1"
Weight: 32 oz.

Select a motor for first flight. When using 29mm motors in the 3.1" Bull Puppy, it is necessary to use LOC's motor mount adapter [MMA-3](#), for 29mm motors (not included in kit). Because of all the different motor combinations available (with varying motor lengths), this kit uses no motor blocks. Instead, wrap 1 1/2" wide masking tape around the nozzle end of each motor to a diameter equal to that of the motor mount tube. This will keep the motor from pushing forward upon ignition. Friction fit the motor in place by wrapping masking tape around the motor in two places for a snug fit in the motor mount tube. This will prevent the motor from ejecting rearward upon activation of the ejection charge. Remember to use enough recovery wadding to protect the chute and shock cord from the hot ejection gases .

Always follow motor manufacturer's instructions for motor use and ignition, and launch this vehicle on calm, windless days to insure safe recovery.



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Model Rocket Safety Code

Materials – I will use only lightweight, non-metal parts for the nose, body, and fins of my rocket.

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.

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.

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.

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.

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.

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.

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.

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.

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.

Recovery Safety – I will not attempt to recover my rocket from power lines, tall trees, or other dangerous places.

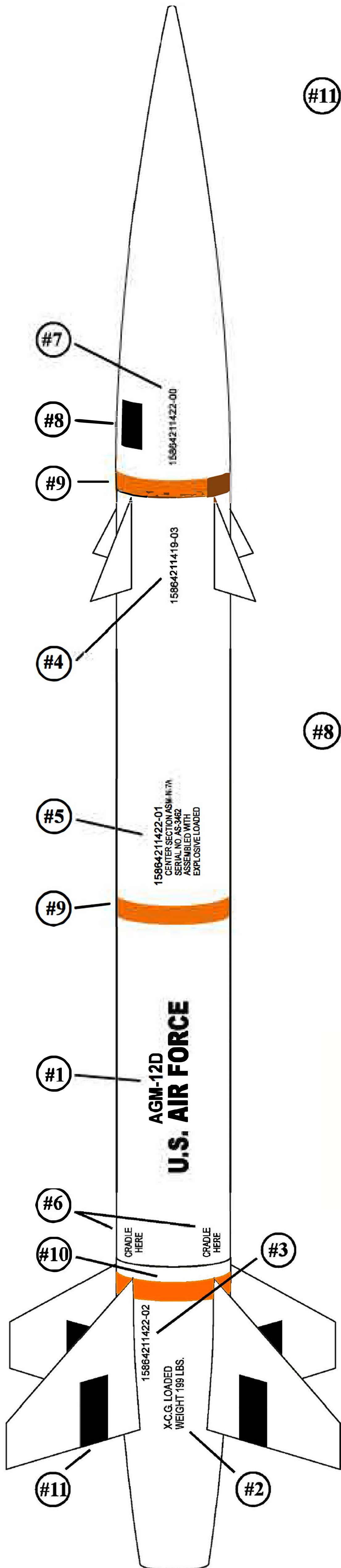
Launch Site Dimensions

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'
160.01 – 320.00	Two G's	1,500'

Schools, Clubs and Other Groups

Loc Precision Multi-Packs are available for this and other Loc Precision Rocket kits. Call or email us for multi-pack pricing.





#1 **AGM-12D**
U.S. AIR FORCE

AGM-12D
U.S. AIR FORCE

X-C.G. LOADED
WEIGHT 199 LBS.

X-C.G. LOADED
WEIGHT 199 LBS.

15864211422-02

15864211422-02

15864211419-03

15864211419-03

15864211422-01
CENTER SECTION ASM-N-7A
SERIAL NO. AS-3462
ASSEMBLED WITH
EXPLOSIVE LOADED

CRADLE
HERE

CRADLE
HERE

15864211422-01
CENTER SECTION ASM-N-7A
SERIAL NO. AS-3462
ASSEMBLED WITH
EXPLOSIVE LOADED



15864211422-00

15864211422-00

**Entire rocket is
white.**

