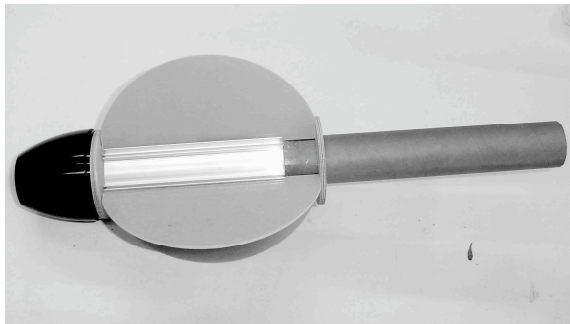


# *Eclipse*



**FEATURING THE NEW GROOVE-LOK FIN CANISTER SYSTEM!**

## **GIANT LEAP ROCKETRY, INC.**

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6061 HIBISCUS DR. BATON ROUGE, LA 70808

[www.giantleaprocketry.com](http://www.giantleaprocketry.com)

Ph 225 054-0325

**THANK YOU AND CONGRATULATIONS ON PURCHASING THIS PRODUCT.**

We at Giant Leap Rocketry, Inc. hope you enjoy this rocket. The **Elipse** is carefully engineered to make it high performance on the one hand, yet efficient to build on the other. We recommend that you take your time, learn and enjoy. It incorporates some very advanced features like the Groove-Lok fin canister system which saves you time and reduces the possibility of fin misalignment, yet allows incredible speeds and force loads - - more than is possible with standard fin lay-ups. The Groove-Lok system is the most advanced fin canister system on the market and features an interlocking load system. Other features of the rocket incorporate the latest technology, like the new aluminum ogive tailcone that forms an integral part of the fin canister assembly. The kit also features an avionics bay for dual deployment, nylon and KEVLAR® cords that are pre-sewn with NOMEX®, the KEVLAR® heat pads, aluminum rail guides, and a 5-to-1 Pinnacle nosecone.

The **Elipse** comes with a 38mm motor mount so that it can be flown on a variety of motors. These can propel it to extremely high altitudes. With the optional SLIMLINE 38/29mm adapter, you can fly this rocket to more moderate altitudes on lower impulse H and I motors. Be certain your center of gravity (CG) is at least 5” or more forward of the center of pressure (CP) when the rocket is fully loaded ready for flight. Because of the small surface area of the fins on the **Elipse**, be sure you establish the correct CG. Add nose weight if necessary. All measurements must be done with a “full-up” rocket (with a loaded motor, recovery components and any electronics). Remember, during launch, the recovery hardware may shift aft, thus shifting the CG to an unstable condition. Be sure to allow for this before flying.

## **Specifications:**

Length: 78"    Center of Pressure (CP)=51” aft from nosecone tip.  
                    Confirm that Center of Gravity (CG) is less than 46” aft of nosecone tip.

Diameter: 3.00” I.D

Dry Wt.: (no motor): 4.8 lbs (please allow for variation in weight due to difference in epoxies and paint thickness). (6.5 lbs. with filamout fiberglass airframe).

Motor mount: 38mm (29mm with optional 38/29mm SLIMLINE motor adapter).

Parachute size: drogue - 18”    main - 48” Single Piece

Recommended 38mm motors:

**Aerotech:** H123, H148, H242, I161, I357, I300, I211, I285, I284, I366, I435, J420, J350, J570

**Pro38:**    H153 I205, I285, J285, J330

Recommended 29 mm motors (Slimline 29/38mm adapter required)

**Aerotech:**H238, H128, H165, H180, H220, H268, I200

# WARNING!!

Flying rockets is potentially dangerous, and you or others can be injured and/or killed by the usage of this product. Property damage can also occur by the usage of this product. In using this product, you agree to comply strictly with all safety codes of the Tripoli Rocketry Association and the National Association of Rocketry, as well as all local, State and Federal laws. By using the product, you agree that Giant Leap Rocketry, Inc. and KB Kits, LLC, will not be held legally or financially responsible for the correct or incorrect usage of this product. If you do not agree with these statements, return the kit in resalable condition to Giant Leap Rocketry for a refund. By using this kit, you agree that you have read, understand and accept these conditions.

**PLEASE READ THE SAFETY CODE AND LIABILITY STATEMENTS AT THE END OF THESE INSTRUCTIONS.**

**NOTE: THIS IS NOT A MODEL ROCKET. BECAUSE OF ITS WEIGHT, IT IS A SERIOUS VIOLATION OF FEDERAL LAW TO FLY THIS ROCKET ANYWHERE EXCEPT AT LAUNCHES SANCTIONED BY THE TRIPOLI ROCKETRY ASSOCIATION OR THE NATIONAL ASSOCIATION OF ROCKETRY WHOSE ORGANIZERS HAVE SECURED AN APPROPRIATE WAIVER FROM THE FEDERAL AVIATION ADMINISTRATION. FAILURE TO DO SO CAN RESULT IN SUBSTANTIAL FINES AND/OR IMPRISONMENT. DO NOT EVEN THINK OF FLYING THIS ROCKET ANYWHERE EXCEPT AT CERTIFIED LAUNCHES.**

**IF YOU HAVE ANY QUESTIONS OR ARE UNCLEAR REGARDING THE ASSEMBLY OR USE OF THIS PRODUCT, PLEASE CALL GIANT LEAP ROCKETRY, INC.**

You are totally responsible for the safe usage of this rocket. Follow all pertinent safety codes and directions at the launch site. Always wear eye protection whenever loading ejection charges of any type and keep spectators away. Make a checklist to help you prepare your rocket properly so as not to overlook an important step during the excitement and stress of pre-flight preparations. If you do not feel ready to fly this or any other rocket, DON'T. Take your time and do it safely and correctly.

**REMEMBER, THE FUTURE OF THIS HOBBY ALONG WITH THE SAFETY OF THOSE AROUND YOU IS IN YOUR HANDS.**



### Parts included in this kit:

- |   |  |
|---|--|
| Bodytube 36" long (slotted booster section) | Decal                                  |
| Bodytube 24" long (upper section)           | 1 5/8" nylon shockcord 15 feet         |
| Nosecone 3"                                 | 1 KEVLAR® FireBall small               |
| Slimline 75-54mm Tailcone retainer          | 1 1/4" KEVLAR® two-ended shockloop 15' |
| 18" long 38mm motor tube                    | 2 KEVLAR® parachute pads (medium)      |
| 3 fins .093 G-10 fiberglass                 | 18" chute (single piece)               |
| Rail guides: pack of two (3")               | 48" chute (single piece)               |
| 2 3.0" to 38mm Centering rings              | Assembly Instruction booklet           |
| HARDPOINT ANCHOR                            | 3" Avionics Bay                        |
| (w/ eyebolt, nut & washer)                  | 1 eyebolt 1/4X20, washer, nut          |
| 4 quiklinks (1/8")                          | 1 6" long GROOVE-LOK                   |

### Supplies needed by the builder to complete this kit:

6-min or 12 min. epoxy, 30 min or 45 min epoxy, J.B. Weld, mixing cups and mixing stick, masking tape, rubber band, tape measure, pencil, #100 sandpaper, paper towels, Drill with 1/8" and 1/4" bits, Latex gloves, rubbing alcohol, Vaseline (or other petroleum jelly).

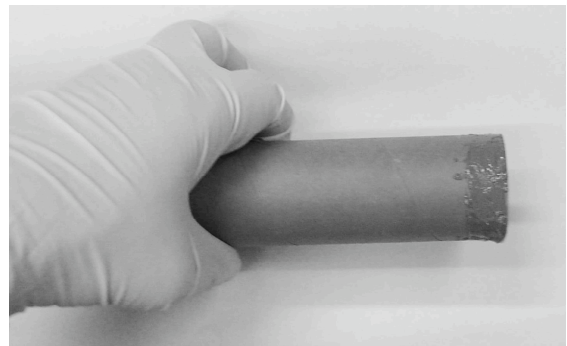
# ASSEMBLY

## Assembling the Fin Canister

### The Tailcone:

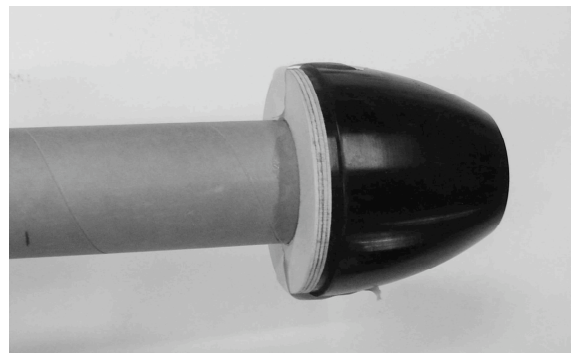
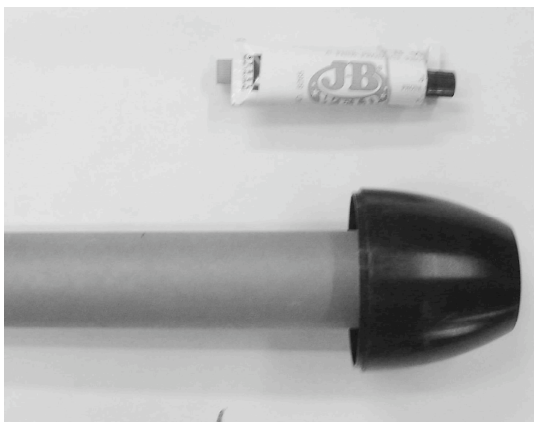
The first step is to attach the tailcone. Because the tailcone retains the motor during the violent phase of ejection, it is absolutely critical that you use an adhesive with a high heat rating like JB Weld. NEVER USE EPOXY to adhere a motor retainer. Retainers get very hot during flight and epoxy is not made to withstand such temperatures as experienced in this application.

Scuff about 10" of the 18" long motortube with some heavy grit sandpaper. On the scuffed end of the motortube, mark a line  $\frac{3}{4}$ " from one end. See Figure below left.



Test fit motortube into the tailcone until it hits the internal stop. Remove tailcone.

Apply JB Weld on the motortube in the  $\frac{3}{4}$ " space between the line and the aft (rear) end of the tube (See Figure above right). Be sure NOT to apply the adhesive to the tailcone - - doing so will cause the adhesive to smear out the rear of the tailcone making it impossible to insert the motorcasing properly. Attach the tailcone. See below left.



Stand the assembly upright. Be sure motortube is seated against the internal stop of the tailcone. Allow the JB Weld to cure.

Test fit the centering ring by sliding it on from the forward (front) end of the motortube all the way down until it butts up against the tailcone. Mark a line on the forward end of the ring (the side away from the tailcone). Then slide the ring forward a few inches, away from the tailcone.

Apply quick-cure epoxy (6 or 12 minute) to the motortube in the area around the line you've just drawn. Then slide the centering ring aft, back down into the epoxy so that it butts up against the tailcone (see Figure above right).

Use masking tape to keep the ring butted against the tailcone. Again, if the tailcone adhesive (JB Weld) is not fully cured check and double check that the motortube is fully butted against the internal ring of the tailcone. Set the motortube upside - - with the tailcone up - - and allow to cure.

### **The Groove-Lok:**

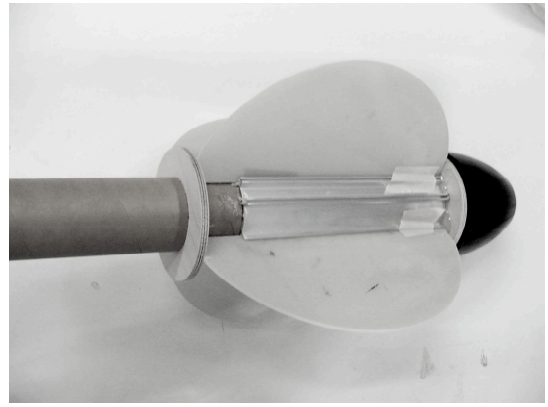
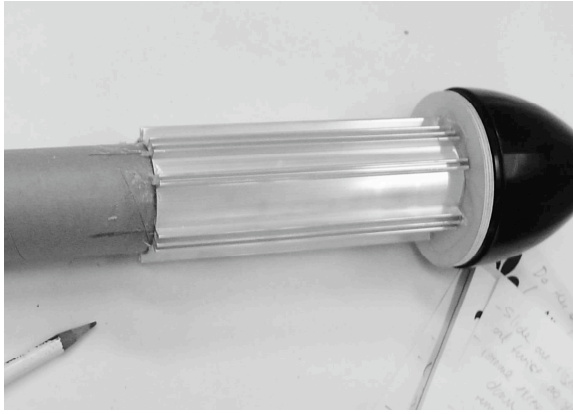
Slide on the Groove-Lok on to the motortube until it butts against the centering ring/tailcone assembly. Make a line on the motortube marking the forward end of the Groove-Lok (see Figure below left). Then remove Groove-Lok and apply quick-cure epoxy to the motortube in the area between the line you've just made and the aft (rear) centering ring (don't apply it to the inside of the Groove-Lok). Don't use too much epoxy otherwise it will smear and drip all over when you slide on the Groove-Lok. It only requires a thin film of epoxy to adhere the Groove-Lok. In fact, avoid putting epoxy within about 1" of the aft ring. The epoxy will naturally spread over that area as you slide on the Groove-Lok.



Slide the Groove-Lok onto the motortube and ROTATE it as you bring it down toward the centering ring. This spreads the epoxy evenly. Wipe off excess adhesive and try not to let it pool into the fin channels of the Groove-Lok. Butt it against the aft centering ring. Stand the assembly up right (tailcone down) and allow to cure. See figure above right.

### **Testing Fitting the Fins and Airframe:**

Make four marks on the motortube that correspond to the fin channels that you are going to use with this particular kit. In our case, you need to reference the four channels that are .093 wide and each 90 degrees apart (see Figure below left).



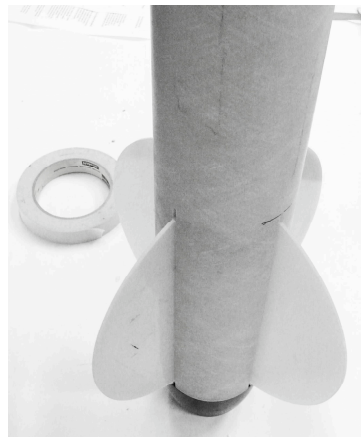
Now you're going to test fit the assembly, so NO epoxy is required yet.

Lightly scuff the tabs on the fins with a medium grit sand paper.

Insert each of the four fins into the appropriate channels of the Groove-Lok. Hold in place with a 1" strip of masking tape on both sides of each fin. Don't apply the tape too high up on the fin. Instead, be sure to keep the tape close to the root of the fin so that the tape does not interfere with airframe when you go to slide it on (See Figure above right).

Slide on the forward ring and butt against the forward end of the fin tabs. Remember, no epoxy yet.

Slide the airframe onto the fin canister assembly to be sure everything fits correctly. Sometimes, very minor variations in slotting may require that you rotate the airframe to better match the slots to the fins. Once you find a satisfactory orientation, mark the airframe relative to the tailcone for reference later. Be sure that the airframe butts against the tailcone. See below.

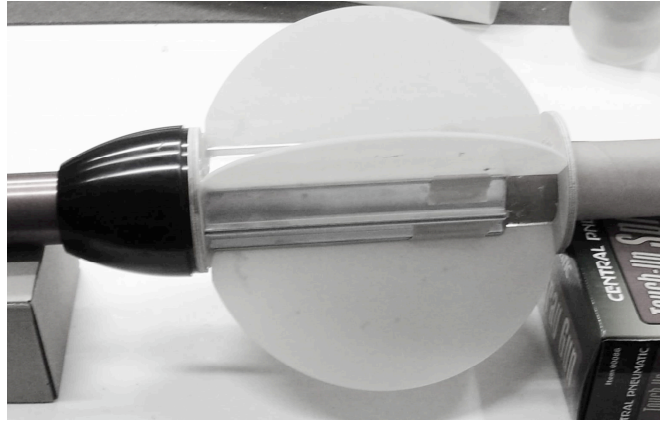
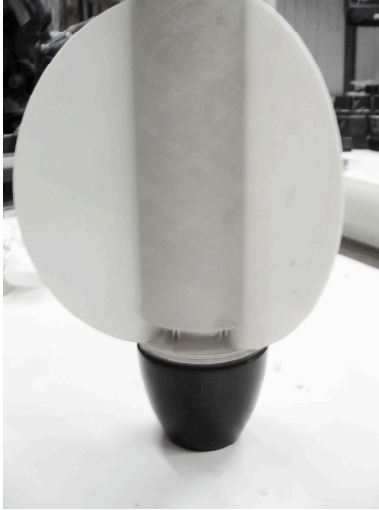


Remove the airframe from the fin canister.

### **Attaching the Fins:**

Then remove one fin and place medium-cure epoxy (30 min) into the channel of the Groove-Lok. Use just enough to fill the channel, but don't epoxy the aft-most 1" of the channel. Put the fin back into the channel and hold in place with the same strips of masking tape. Repeat procedure for the remaining fins. Make sure that no epoxy drips into those areas that are will be in contact with the airframe. You are NOT adhering the airframe yet; you are only using it as a fin alignment guide Now, before the

epoxy cures, slide on the airframe (be sure to rotate airframe and align with your reference mark). This will align the fins. No need to slide the airframe all the way down to the tailcone. Keep it about 1" away (see figure below left). Again, you don't want to adhere the airframe at this stage. As the epoxy on the fins cures, slide the airframe up and down once in a while to be sure that the airframe is not adhering to the fin canister assembly.



As the epoxy cures, occasionally press the fins into the channels to be sure they are fully seated.

*[as this is curing, you may elect to begin assembly of the Avionics Bay. Just be sure to check the fins every few minutes]*

Once the epoxy has cured, remove the airframe. Remove the masking tape holding fins.

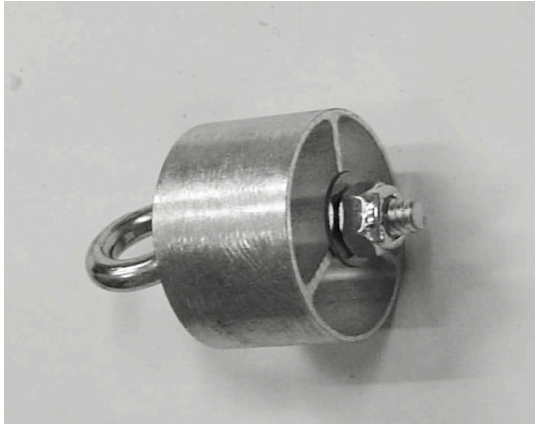
Lay the fin canister assembly horizontally in such a way that no weight is placed on the fins (See Figure above right). You do not want to lose the fin alignment. Apply more quick-set epoxy to the fin/Groove-Lok joint. At the same time, adhere the forward centering ring to the motortube and to the fins. Keep the epoxy within 1/2" or less from the base of the fin, otherwise it will interfere with the slots when you slide the airframe on later. Allow to cure.

### **Hardpoint Anchor:**

Assemble the Hardpoint Anchor as per the instructions. Be sure to use JB Weld! This anchor is blasted by the searing heat of ejection and so epoxy is unsuitable for this application. Do NOT use epoxy for this.

Insert an eyebolt from one end and secure it from the other end with a lock-nut and washer. Be sure to use the nylon lock nut because this anchor is inaccessible once the rocket is built. See below left.





Scuff the Hardpoint. Then apply JB around its circumference (Do not apply adhesive to the inside of the motortube or it may drip down). Insert the hardpoint into the forward end of the motortube. Fully insert and then insert an additional  $\frac{1}{4}$ ". In other words, leave a  $\frac{1}{4}$ " space between the top of the Hardpoint and the top of the motortube. Place a generous bead of JB Weld around this  $\frac{1}{4}$ " space. Be sure no adhesive drips down into the motortube, past the Hardpoint (see Figure above right).

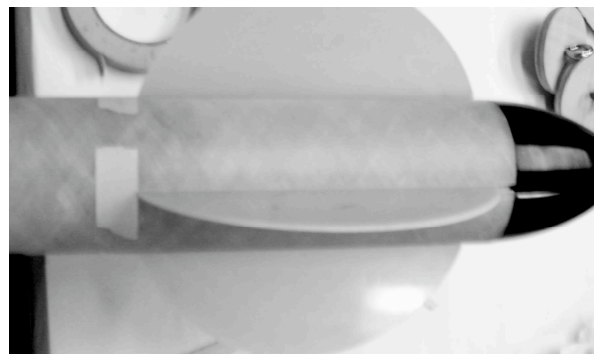
### **The Fireball**

The Fireball is tied to the eyebolt on the Hardpoint anchor. Tie it such that when stretched, the top  $\frac{1}{3}$ " of the ball sticks out past the top of the airframe. The distance from top of the Hardpoint to the top  $\frac{1}{3}$ " mark on the ball (when stretched) is about 19 or 20". This measurement varies slightly, so you need to figure this for your own application. It may take several attempts. Once you are satisfied with the installation, drop some thin CA glue to lock the tied knot on the eyebolt. This is important because, again, this area is not accessible after the kit is complete (see Figure above right).

### **Final Assembly of Booster:**

Now it's time to epoxy the fin canister to the airframe. Medium set epoxy (30 min) is recommended for this procedure.

Apply a ring of tape around the tailcone as per Figure below left. Apply some Vaseline or similar product on the tailcone in the area between the tape and the forward edge of the tailcone. This protects the tailcone from drips of epoxy.



Slide the airframe back onto the fin canister (rotate to align your reference mark). If the slots are slightly longer than your fins, cover the open slots with a small bit of masking tape at the forward end (see Figure above right).

Now remove airframe. Using a long thin stick, apply a ring of epoxy around the inside of the airframe at the top of the slots (see Figure below left).



Keeping the airframe in this orientation (slots upward), slide on the fin canister assembly - - but not all the way. Leave about a 1" gap between the airframe and the tailcone (see Figure above right). Using a stick, drip epoxy down the joint where the fin meets the inside of the airframe. Drip additional epoxy on the inside lip of the airframe where it contacts the tailcone and rear centering ring. Use plenty of epoxy for this step.

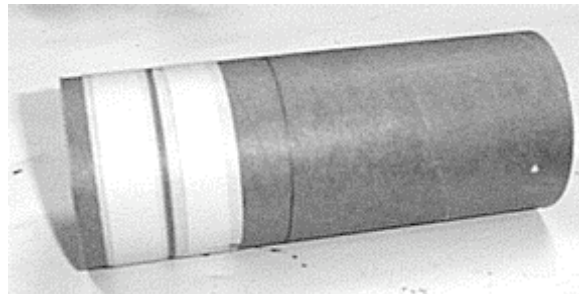
Now slide the fin canister all the way until the tailcone seats on the rear edge of the airframe. Immediately flip the assembly so that the tailcone is downward. This allows the epoxy to flow into the forward ring and the aft ring.

There will be a small slot opening between the bottom of the fins and the tailcone. Cover this with a small strip of tape. This prevents messy drippings and fills the gaps for later finishing. Congratulations; you've completed the fin canister assembly using the advanced Groove-Lok system!

### **Avionics Bay**

Build the Avionics Bay according to the instructions that are enclosed with the bay. Upon completion, remove all parts from the coupler for the next step.

On the 8" long coupler, mark a line 3" from the end you will glue into the upper body tube. If the coupler has a loose fit, use tape if necessary for a tight, centered fit. See figure below.



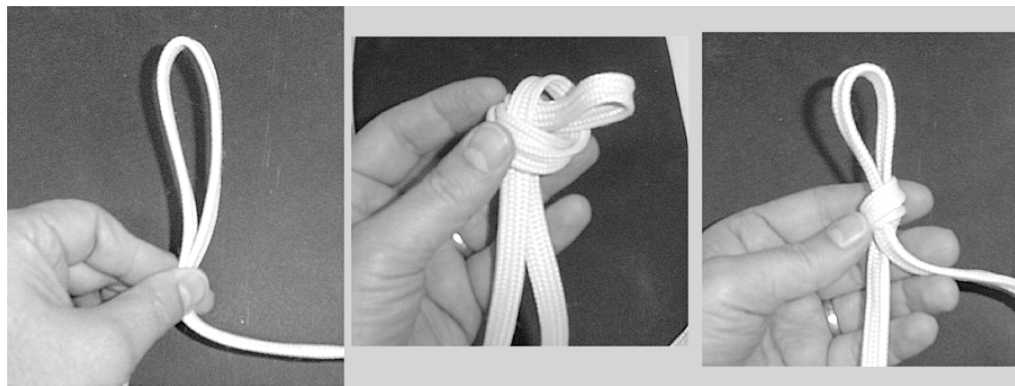
Apply epoxy to the coupler, NOT to the airframe. Keep the inside of the airframe clear of epoxy because you will be sliding the forward bulkhead freely in and out for flight prep. Clean up any epoxy that is oozing out onto the exposed surface of the coupler with rubbing alcohol if necessary.

Upon completion of the Avionics Bay, attach an eyebolt into the base of the Pinnacle nosecone to attach the shockcord. You can thread the eyebolt through the plastic base for a secure attachment. For extra strength, you can cut a hole through the side of the shoulder in order to reach in and secure the eyebolt with a nut and washer. Alternatively, instead of using an eyebolt, you can open a small hole in one of the wings at the base of the cone and attach the shockcord with a quick-link.

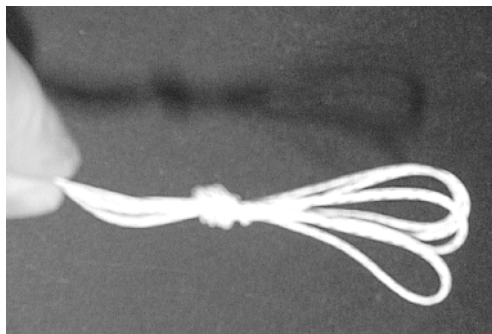
## **Recovery System**

**(NOTE: ATTACH THE NYLON SHOCKCORD TO THE FIREBALL IN THE BOOSTER SECTION, AND USE THE KEVLAR CORD IN THE UPPER SECTION).**

Starting with the drogue recovery system, slide the KEVLAR® pad onto the exposed end of the shockcord that is attached to the booster. Let it slide freely around. The pads never get anchored permanently to the line. Make a knot in the shockcord about 12” away from exposed end. This will be the mounting point for the drogue chute.

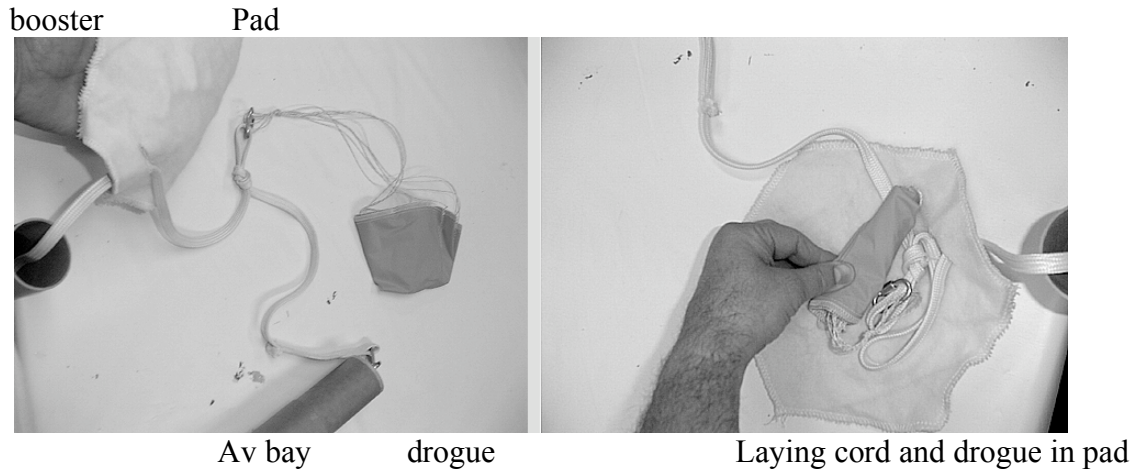


Knot the lines on the 18” drogue so that there is a small loop at the end. Attach to the knot on the shockcord using a quiklink (below left).

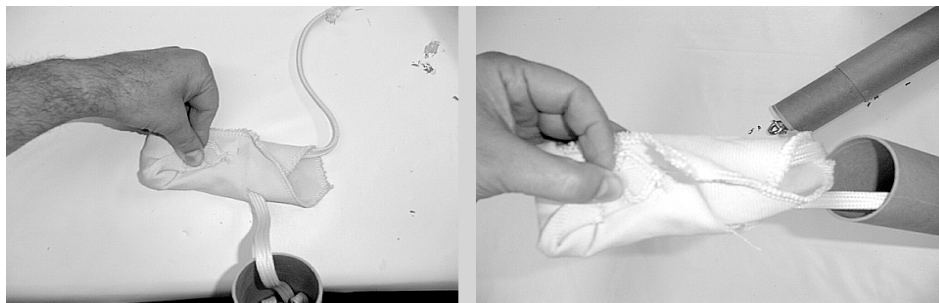


Starting with the cord just sticking out of the booster, accordion the cord in 4” lengths in your hand, stopping about 18” from the knot in the cord where the drogue is attached (above right). Accordion folding is better than winding the shockcord because there is less chance of tangling. The recovery components will be in the following order: booster, accordioned shockcord, pad, knot/drogue, upper section/avionics bay.

Insert the accordion folds into the booster section. Then, on the forward side of the protector (toward the avionic bay) lay some shockcord into the KEVLAR® protector, then lay the chute in there too.

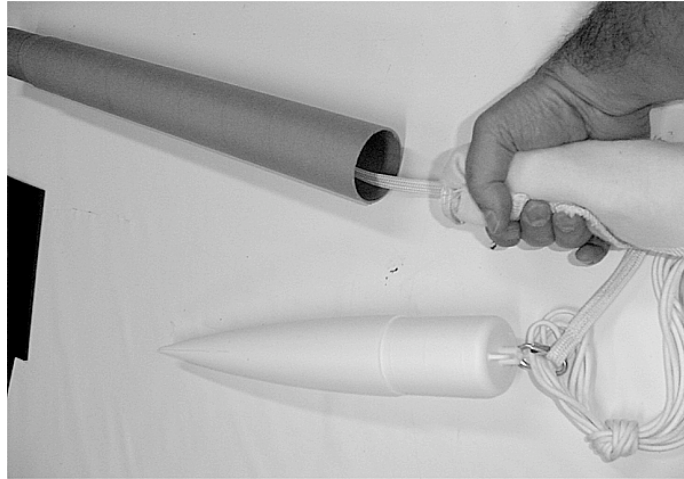


Fold as shown and insert into booster. Attach exposed end of shockcord to avionics bay eyebolt with a quiklink.. Now slide booster and upper section together. The drogue system is now packed.



Note: Booster and upper section at time of flight should fit such that when the rocket is held upright by the upper section, the booster should just begin to slide off. Adjust with tape on launch day if necessary.

Moving to the main recovery system, as with the drogue, make a knot and loop in the shroud lines of the main chute. Then attach main chute and shockcord to eyebolt in the nosecone with a quiklink. Fold main recovery system into upper section in a similar manner as the drogue system. Then insert nosecone. The nosecone fit at time of flight should be such that when the rocket is held up by the nosecone, the rocket should just begin to slide off the nosecone.

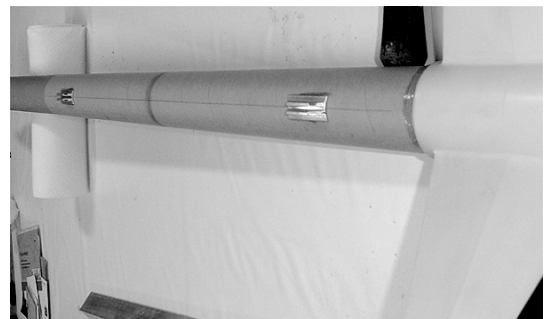
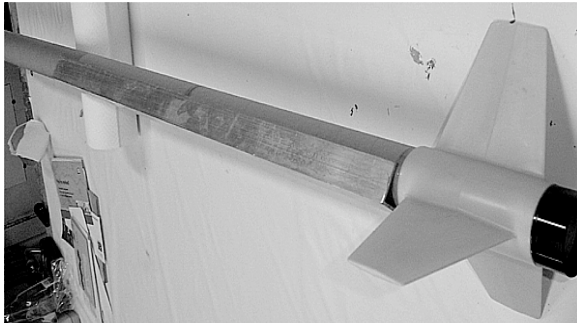


NOTE: This rocket can be used in a **single-deployment mode**, where the main chute deploys at apogee, and there is no drogue. In this configuration, you must install the main chute in the drogue compartment. You must also secure the nosecone for flight using our plastic rivets for a tight friction fit, or some other method so that the nosecone does not come off during ejection. In this configuration, the main is deployed with either motor ejection or with electronics in the avionics bay. Remember, with motor ejection, the heat comes from the aft end of the rocket, while with avionics deployment, it comes from the forward section. So you must position the heat pad such that it protects the main chute from scorching.

## Attaching the Rail Guides

**Installation shown for Firestorm 54, but application is the same for the your kit.**

The rail guides get attached only to the booster section of the rocket. Begin by marking a line along the length of the booster section. Angle aluminum (1" by 1") is particularly helpful because when laid on a tube, it allows one to mark a straight line (below left). You may want to make it a permanent part of your rocket toolbox. Make sure that the line is between two of the fins, otherwise the fins will interfere with the rail.



Measuring from base of the rocket to base of guide, place one guide about 11" up from the aft end of the rocket and the other about 32". Then trace each guide on the airframe. Remove guides.

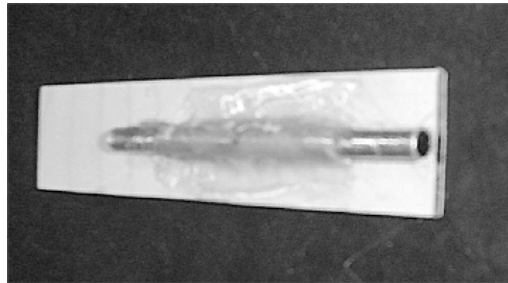
Sand the attachment points on the airframe as well as the rail guides for good adhesion. Mix J.B.Weld and attach rail guides (above right). While curing, check them periodically to ensure that they have not

moved. Sight down the tube to check for good alignment. (Do not use the double-sided tape enclosed with the rail guides).

## **Electronics and the Internal Configuration of the Avionics Bay**

The exact configuration of the avionics bay will depend mainly on your particular altimeter. They come in different sizes and you must follow the manufactures recommendations for installation. IF YOUR ELECTRONICS CAN ATTACH SAFELY TO THE ENCLOSED MOUNTING BOARD, THEN FOLLOW THESE GENERAL RECOMMENDATIONS:

Attach the brass tube (or tubes) to the enclosed mounting board using epoxy and some fiberglass cloth.



Attach your altimeter to the mounting board in the manner specified by the manufacturer.

**DO THE NEXT STEPS WITHOUT BLACK POWDER CHARGES IN ORDER TO FAMILIARIZE YOURSELF WITH THE PREPERATION METHOD. USE ONLY BLACK POWDER OUT IN THE FLYING FIELD WHILE WEARING EYE AND HAND PROTECTION! BLACK POWDER IS VERY DANGEROUS!**

Attach main electric match and charge to the forward (upper) side of the bulkhead assembly. Feed wires through the 1/8" hole in bulkhead and be sure the wires are at least 12" long. Attach main recovery cord to eyebolt using quiklink. Then slide the forward bulkhead assembly and charge wires down the upper airframe until the allthread and wires poke out the aft end of the avionics bay.

Attach the other electric match and charge (for drogue) to the lower end of aft bulkhead and feed the wires through 1/8" hole. These will eventually feed to the inside of the avionics bay. Secure both main charge and drogue charge wires to correct attachment points on altimeter. Then slide altimeter and mounting board assembly onto the allthread in the avionics bay, and secure with nut. You may need a rod or a length of broom handle down the upper section airframe to keep the upper bulkhead in place while you're doing this.

Secure the aft bulkhead onto the avionics bay and tighten. Install recovery system as per previous instructions. Be sure to attach the booster shockcord to the aft eyebolt using a quiklink.

### ***Additional Notes on Avionics Bay***

The avionics bay will need to be vented for pressure equalization. The manufactures recommendations for altimeter venting supersede our recommendations. However, one method is to drill a 1/2" hole through the upper bodytube into the avionics bay. This hole allows for pressure equalization, and also provides a convenient access to switch on and off the altimeter with a small screwdriver. In order to

use this method, you must mount a switch on the mounting board that can be accessed through the vent hole.

### ***Finishing Recommendations***

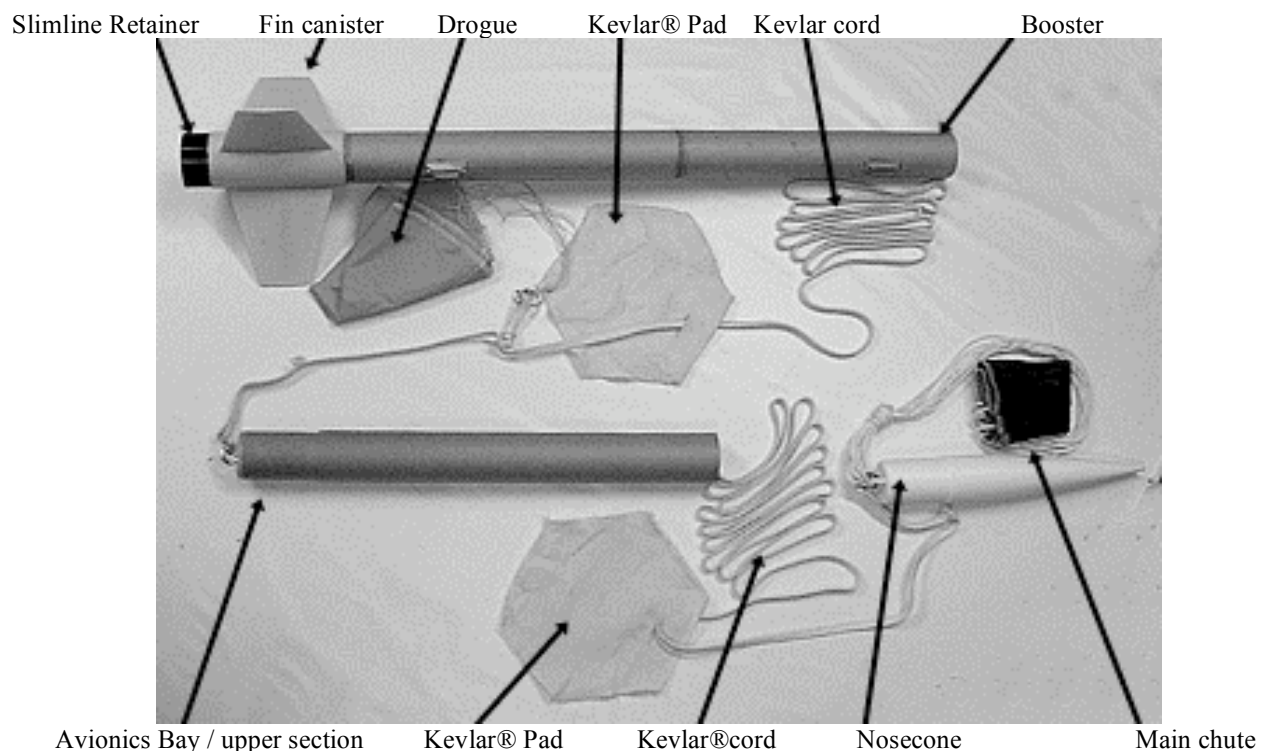
With fiberglass tubing, lightly sand rocket with 240-400 grit paper, prime and sand. With phenolic tubing, prime with extra thick filler spray primer. Then fill spiral grooves with spot putty (available from auto parts stores). Sand, and repeat priming as often as necessary. With laminated phenolic, just prime and sand as necessary to smooth out veil texture. Paint with a good quality paint like Krylon. Attach the decal only when paint is fully cured.

### ***Vent Holes in Airframe - - IMPORTANT!***

Because the air pressure is reduced at high altitudes, you will need to relieve the internal pressure in both the recovery compartments (drogue and main), otherwise the airframe sections will slip apart during ascent. So, drill one 1/8" hole about 16" back from the tip of the nosecone, and another similar hole about 5" back from the top of the booster airframe. These holes are absolutely necessary for safe flight. A little smaller (3/32") is fine, but do not make them any bigger than 1/8" or you will reduce the effectiveness of the ejection charge.

### **Fully constructed rocket, with the layout of the components shown.**

Picture shows Firestorm 54, but configuration is the same for your kit.



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to use our products or information, including any lost or damaged property, or other incidental or consequential damages, even if Giant Leap Rocketry, Inc. has been advised of the possibility of such damages, or for any claim by another party. Lack of care can be dangerous. By purchasing our materials you agree to the above conditions & to use our products at your own risk. You must abide by the following safety guidelines: (for more info, see [www.tripoli.org](http://www.tripoli.org) <<http://www.tripoli.org>> The following is a condensed version of the NAR/TRA HIGH POWER SAFETY CODE. The complete code can be found in the handbooks of the organizations. 1. Only a person who is a certified flyer shall operate or fly a high power rocket. 2. Must comply with United States Code 1348, "Airspace Control and Facilities", Federal Aviation Act of 1958 and other applicable federal, state, and local laws, rules, regulations, statutes, and ordinances. 3. A person shall fly a high power rocket only if it has been inspected and approved for flight by a Safety Monitor for compliance with the applicable provisions of this code. 4. Motors. 4.1 Use only certified commercially made rocket motors. 4.2 Do not dismantle, reload, or alter a disposable or expendable high power rocket motor, not alter the components of a reloadable high power rocket motor or use the contents of a reloadable rocket motor reloading kit for a purpose other than that specified by the manufacture in the rocket motor or reloading kit instructions. 5. A high power rocket shall be constructed to withstand the operating stresses and retain structural integrity under conditions expected or known to be encountered in flight. 6. A high power rocket vehicle intended to be propelled by one or more high power solid propellant rocket motor(s) shall be constructed using lightweight materials such as paper, wood, plastic, fiberglass, or, when necessary, ductile metal so that the rocket conforms to the other requirements of this code. 7. A person intending to operate a high power rocket shall determine its stability before flight, providing documentation of the location of the center of pressure and center of gravity of the high power rocket to the Safety Monitor, if requested. 8. Weight and Power Limits.. 8.1 Ensure that the rocket weighs less than the rocket motor manufacturer's recommended maximum liftoff weight for the rocket motor(s) used for the flight. During pre-flight inspection, The Safety Monitor may request documentary proof of compliance. 8.2 Do not install a rocket motor or combination of rocket motors that will produce more than 40,960 newton-seconds of total impulse (4.448 newtons equals 1.0 pound). 9. Recovery. 9.1 Fly a high power rocket only if it contains a recovery system that will return all parts of it safely to the ground so that it may be flown again. 9.2 Install only flame resistant recovery wadding if wadding is required by the design of the rocket. 9.3 Do not attempt to catch a high power rocket as it approaches the ground. 9.4 Do not attempt to retrieve a high power rocket from a place that is hazardous to people. 10. Payloads. 10.1 Do not install or incorporate in a high power rocket a payload that is intended to be flammable, explosive, or cause harm. 10.2 Do not fly a vertebrate animal in a high power rocket. 11. Launching Devices 11.1 Launch from a stable device that provides rigid guidance until the rocket has reached a speed adequate to ensure a safe flight path. 11.2 Incorporate a jet deflector device if necessary to prevent the rocket motor exhaust from impinging directly on flammable materials. 11.3 A launching device shall not be capable of launching a rocket at an angle more than 20 degrees from vertical. 11.4 Place the end of the launch rod or rail above eye level or cap it to prevent accidental eye injury. Store the launch rod or rail so it is capped, cased, or left in a condition where it cannot cause injury. 12. Ignition Systems. 12.1 Use an ignition system that is remotely controlled, electrically operated, and contains a launching switch that will return to "off" when released. 12.2 The ignition system shall contain a removable safety interlock device in series with the launch switch. 12.3 The launch system and igniter combination shall be designed, installed, and operated so the liftoff of the rocket shall occur within three (3) seconds of actuation of the launch system. If the rocket is propelled by a cluster of rocket motors designed to be ignited simultaneously, install an ignition scheme that has either been previously tested or has a demonstrated capability of igniting all rocket motors intended for launch ignition within one second following ignition system activation. 12.4 Install an ignition device in a high power rocket motor only at the launch site and at the last practical moment before the rocket is placed on the launcher. 13. Launch Site. 13.1 Launch a high power rocket only in an outdoor area where tall trees, power lines, and buildings will not present a hazard to the safe flight operation of a high power rocket in the opinion of the Safety Monitor. 13.2 Do not locate a launcher closer to the edge of the flying field (launch site) than one-half the radius of the minimum launch site dimension stated in Table 1. 13.3 The flying field (launch site) shall be at least as large for a given impulse as stated Table 1 of the Tripoli safety code. See [www.tripoli.org](http://www.tripoli.org) <<http://www.tripoli.org>>. 14. Launcher Location 14.1 Locate the launcher more than 1,500 feet from any occupied building. 14.2 Ensure that the ground for a radius of 10 feet around the launcher is clear of brown grass, dry weeds, or other easy-to-burn materials that could be ignited during launch by the exhaust of the rocket motor. 15. Safe Distances 15.1 No person shall be closer to the launch of a high power rocket than the person actually launching the rocket and those authorized by the Safety Monitor. 15.2 All spectators shall remain within an area determined by the Safety Monitor and behind the Safety Monitor and the person launching the rocket. 15.3 A person shall not be closer to the launch of a high power rocket than the applicable minimum safe distance set forth in Table 2 of the Tripoli Safety code. See [www.tripoli.org](http://www.tripoli.org) <<http://www.tripoli.org>>. 16. Launch Operations. 16.1 Do not ignite and launch a high power rocket horizontally, at a target, or so the rocket's flight path goes into clouds or beyond the boundaries of the flying field (launch site). 16.2 Do not launch a high power rocket if the surface wind at the launcher is more than twenty (20) miles per hour. 16.3 Do not operate a high power rocket in a manner that is hazardous to aircraft. 17. Launch Control. 17.1 Launch a high power rocket only with the immediate knowledge, permission, and attention of the Safety Monitor. 17.2 All persons in the launching, spectator, and parking areas during a countdown and launch shall be standing and facing the launcher if requested to do so by the Safety Monitor. 17.3 Precede the launch with a five (5) second countdown audible throughout the launching, spectator, and parking areas. This countdown is given by the person launching the rocket, the Safety Monitor, or other flying site operating personnel. 17.4 Do not approach a high power rocket that has misfired until the safety inter-lock has been removed or the battery has been disconnected from the ignition system, one minute has passed, and the Safety Monitor has given permission for only a single person to approach the misfired rocket to inspect it. I understand and will at all times conduct myself with the understanding that the above stated risks and safety procedures; (a) are not necessarily all of the risks. (b) that even by observing the above procedures there remain RISKS OF INJURY OR DEATH from HIGH POWER ROCKETRY. (c) that the utmost in attention and prudence must be exercised at all times. By purchasing this product(s) from Giant Leap Rocketry, Inc., you agree to: (1) Assume all of the risks, damages, injury, or even death. (2) Assume the obligation to exercise the utmost care in pursuit of my activities at this event. (3) that you must be over 18 years old (for motor purchase and use). Giant Leap Rocketry cannot be held responsible for the failure of participants to abide by safety codes, rules, regulations, etc. By using the products, you agree to abide by these conditions.