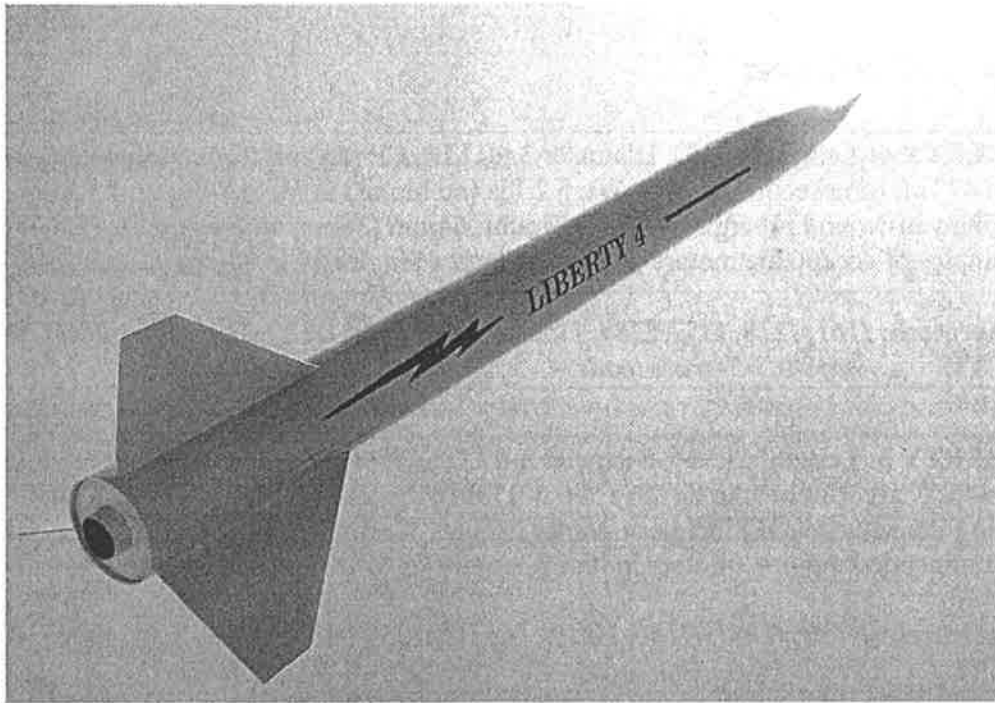


LIBERTY

For Liberty 2, 3 and 4



GIANT LEAP ROCKETRY, INC.

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www.giantleaprocketry.com

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THANK YOU AND CONGRATULATIONS ON PURCHASING THIS PRODUCT.

We at Giant Leap Rocketry, Inc. hope you enjoy this rocket. The **Liberty** 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. The **Liberty** series is another in a long line of high quality kits from Giant Leap Rocketry, Inc.. The kit features, G-10 fins, a nylon (or optional KEVLAR®) recovery cord, a KEVLAR® heat pad, aluminum rail guides, motor retainer, and a 5-to-1 Pinnacle nosecone.

The **Liberty 4** has a 54mm mount, adaptable down to 38mm using the optional 54mm Slimline retainer (to be installed during construction) and the removable Slimline 54 to 38mm adapter. The **Liberty 3** has a 38mm mount, adaptable down to 29mm using the optional 38mm Slimline retainer (to be installed during construction) and the removable Slimline 38 to 29mm adapter. The **Liberty** can be flown on a variety of motors to extremely high altitudes. Be certain your center of gravity (CG) is at least 1.5 body diameters or more forward of the center of pressure (CP) when the rocket is fully loaded ready for flight. For example, if your rocket is 4" in diameter, then the CG should be at least 6" *forward* of the center of pressure. We provide you with the CP distance from the tip of the nosecone. As long the design remains the same, the CP won't change. But the CG depends on the weight

distribution, which can change depending on your motor choice and so on. You can find the distance of the CG by balancing the rocket on your finger. If the CG is too far back, add nose weight. 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. Be sure you stuff the recovery components aft in order to properly check CG. Note: heavier motors shift the CG too far back, requiring you to add nose weight. Be sure to check the CG location prior to launch!!

Specifications:

LIBERTY 4: Length: 68.25", Diameter 3.90 I.D., CP=53" aft from nosecone tip. CG should be less than 47" aft of nosecone tip. Dry Wt: 5.2 lbs (no motor) in Magna-frame; 5.7 lbs in Dyna-Mag; 6.5 lbs in Filament-wound Fiberglass. Motor Mount: 54mm (38mm with adapter). Chute: 48"
Examples of acceptable motors (motors in *italics* require 54 to 38mm adapter):

Aerotech: *I161, I218, I357, I284, I366, J350, J420, J180, J275, J460, J540, K185, K550*
CTI: *Pro38: 3-5-grain loads, Pro 54: 2-6 grain loads*

LIBERTY 3: Length: 51.75", Diameter 3.0 I.D., CP=40.8" aft from nosecone tip. CG should be less than 45.3" aft of nosecone tip. Dry Wt: 3.0 lbs (no motor) in Magna-frame; 3.4 lbs in Dyna-Mag; 4.5 lbs in Filament-wound Fiberglass. Motor Mount: 38mm (29mm with adapter). Chute: 36"
Recommended motors (motors in *italics* require 38 to 29mm adapter):

Aerotech: *H128, H165, H180, H210 I161, I357, I300, I211, I284, I366, I435, J420, J350, J570*
CTI: *Pro29: 4-6-grain loads, Pro 38: 2-6 grain loads*

LIBERTY 2: Length: 47", Diameter 2.1 I.D., CP=38" aft from nosecone tip. CG should be less than 35" aft of nosecone tip. Dry Wt: 2.1 lbs (no motor) in Magna-frame; 2.5 lbs in Dyna-Mag; 3.0 lbs in Filament-wound Fiberglass. Motor Mount: 29mm. Chute: 30"
Recommended motors:

Aerotech: *G79, G75, G104, H128, H165, H180, H210*
CTI: *Pro29: 1-5-grain loads*

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:

- | | |
|--|---|
| 1 Bodytube (slotted) | 2 Centering rings. (3 in the Liberty 4) |
| 1 Pinnacle Nosecone and eyebolt assembly | 1 Decal |
| 1 Motorholder motor retainer | 1 Nylon shockcord |
|(or optional Slimline Retainer) | 1 KEVLAR® parachute pad |
| 1 Motor tube | 1 Parachute |
| 3 fins G-10 fiberglass | 1 Threaded Quick-Link |
| 1 Pack of Rail guides: 2 guides in pack | 1 Assembly Instruction booklet |

Supplies needed by the builder to complete this kit:

30 min epoxy, mixing cups and mixing stick, (J.B. Weld if attaching optional Slimline retainer), CA glue, masking tape, tape measure, sharp pencil, #100 sandpaper, paper towels, Latex gloves.

NOTE: you MUST use epoxy glue with this kit. Other types of adhesives are not suitable and will make the rocket unsafe for flight.

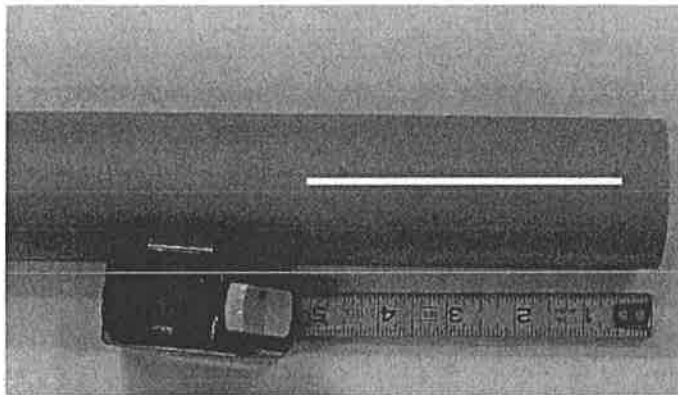
ASSEMBLY

Assembling the Fin Canister

Some terminology first: “Aft” means the back end of the rocket, toward the fins and slots. “Forward” means the front end, toward the nosecone. We recommend that you write “AFT” on the slotted end of the airframe, and “FORWARD” on the other (non-slotted) end of the airframe.

Test fit BOTH centering rings into the airframe and onto the motortube. If the rings are slightly large, sand them to achieve a snug fit. Do not sand to a very loose slip fit.

Measure the distance from the aft end of the main airframe (the back end) to the forward end of one of the fin slots (the top of the slots). Make sure you measure from the aft end of the airframe, NOT the aft-end of the slot. Let's call this the “slot distance”. See below



Add $\frac{1}{2}$ " to the slot distance. Put aside the airframe.

On the *motortube*, pencil in the word “aft” on one end, and the word “forward” on the other. Starting from the aft end of the motortube, locate a pencil mark that is the slot distance + $\frac{1}{2}$ " towards the forward end.

ATTACHING THE FORWARD RING AND SHOCKCORD ON THE LIBERTY 4

Epoxy two rings together to form one thick forward ring, making sure to align the $\frac{1}{4}$ " holes. Attach an eyebolt, washer nut combo in this hole. Epoxy the threads on the eyebolt to prevent it from loosening. This is the forward ring on the Liberty 4.

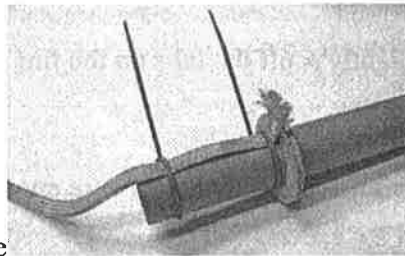
Attach eyebolt to the forward ring, securing it with washer and nut. Tie one end of the shockcord to the eyebolt and secure the note with a few drops of thin CA glue.

ATTACHING THE FORWARD RING AND SHOCKCORD ON THE LIBERTY 2 AND 3

The Liberty 2 and 3 kits use one ring (without an eyebolt) for the forward ring. The forward and aft rings are interchangeable. Follow these steps:

Slide the forward ring onto the forward end of the motortube down to the mark (call this notched ring the "forward" ring). Let the forward ring butt up against the mark, but don't cover the mark or go past it. Just keep the ring up against the forward end of the mark. This is the final location of the forward ring. Tape the ring in place on the aft side of the forward ring. Do **NOT** apply epoxy just yet.

Lay one end of the shockcord on the forward end of the motortube (above the forward ring). Allow the cord to run from the forward end of the motortube to the top of the forward ring. Then allow a small length of the shockcord to bend 90 degrees and lay across the top of the centering ring. Use a tie wrap at the tube/ring connection to secure the shockcord. Use another tie wrap to secure the shockcord at the forward tip of the motortube. Trim off any part of the end of the shockcord that overhangs the outer edge of the forward ring.



Forward side

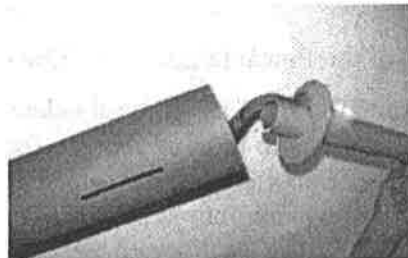
Aft side

Epoxy the forward ring to the motortube and, at the same time, epoxy the shockcord wherever it touches the motortube and ring. Do not get epoxy on the aft side of the forward ring (the side opposite the shockcord). And be sure that the centering ring is square on the motortube and is not cantered at an angle. Allow this to cure.

Mounting the Motortube into the Airframe

The objective in this step is to mount the motortube so that it sticks out $\frac{1}{2}$ " from the aft end of the airframe.

First, test fit the motortube/ring assembly into the airframe. Do this by first inserting the forward end of the motortube into the aft end (the slotted end) of the airframe (don't forget to feed the shockcord through first). Slide the assembly until the forward ring just clears the forward end of the fin slot. If you measured everything correctly, the motortube should be sticking out a $\frac{1}{2}$ " from the aft end of the airframe.



With the airframe upside down, epoxy the ring/motortube assembly in position inside the airframe. For now, drip epoxy on the aft side of the ring, where it meets the airframe. Do not drip epoxy on the motortube. Use a long stick if necessary. Do not add epoxy on the forward side of the ring just yet.

IMPORTANT: Before the assembly cures, insert the other ring (the AFT ring) just barely into the aft end of motortube and airframe. Do not adhere the aft ring now. For now you just slide on the aft ring far enough to allow you to center the motortube in the airframe while the epoxy on the forward ring is curing.

Once the epoxy on the forward ring has cured, flip the airframe right side up and drip more epoxy on the forward side of the forward ring where it meets the airframe. Try and keep the shockcord out of the way during this step.

Testing Fitting the Fins and Airframe:

Test fit the fins into the slots into the airframe. Be sure that the fins slide in all the way and touch the motortube. Be No epoxy yet.

Remove the fins and lightly scuff the tabs on the fins with a medium grit sand paper.

Attaching the Fins:

Work with one fin at a time. Using medium cure epoxy (30 minute) adhere the fin tabs onto the motortube.

Once the epoxy on one fin has cured, repeat the step with the other fins.

After all fins are attached, reinforce the fin connection to the motortube and to the airframe with more epoxy and, if you wish, with strips of fiberglass reinforcement. It is important that the fins are attached firmly. Don' skimp during this step.

Now it is time to epoxy the aft ring in place. BUT, if you are using the MOTORHOLDER retention system, do not adhere the aft ring until you first complete the steps outlined in the instructions enclosed with the MOTORHOLDER.

On the other hand, if you are using a SLIMLINE retention system, go ahead and adhere the aft centering ring now with epoxy. Then once the epoxy on the aft ring has fully cured, attach the SLIMLINE retainer as per the instructions enclosed with the retainer (the Slimline itself requires JB WELD for attachment).

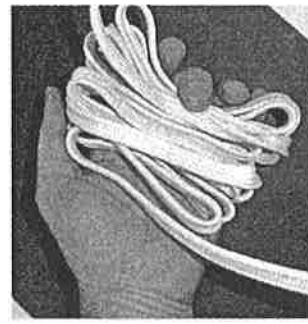
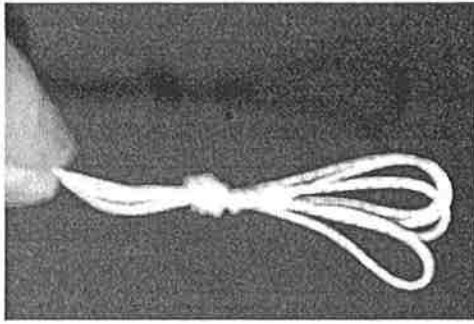
Once the fins and aft centering ring are adhered (and the glue has cured), add a fillet of glue on the outside joint between the fins and the airframe. TIP: smooth the fillets with a plastic spoon.

Recovery System

Thread the eyebolt onto the base of the Pinnacle nosecone. Use epoxy to secure the connection.

Next, slide the KEVLAR® pad onto the free end of the shockcord that. Let the pad slide freely around. The pads never get anchored permanently to the line. Tie the free end of the shockcord onto the threaded connector - - the Quicklink. Dap a very small amount of CA (Crazyglue) on the knot to be sure it holds. **Caution:** CA glues will adhere your skin instantly.

Knot the chute lines into a small loop at the end. Attach the loop to the Quicklink. Do not glue this.

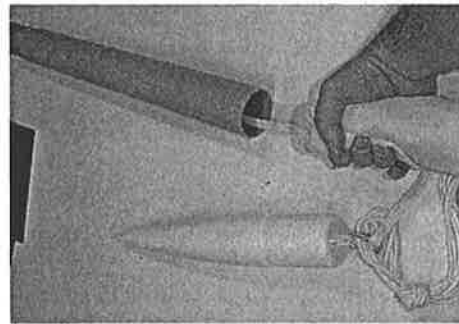
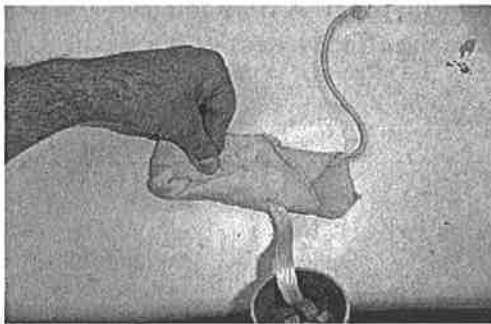


Starting with the cord coming out of the airframe, accordion the cord in 4" lengths in your hand, working your way up to the nosecone, stopping about 24" from the Quicklink (above right). Accordion folding is better than winding the shockcord because there is less chance of tangling. The recovery components are in order from aft to forward: airframe, folded shockcord, pad, parachute, Quicklink.

Insert the accordion folds into the airframe. Then lay some shockcord into the KEVLAR® protector, then lay the chute in the pad too.



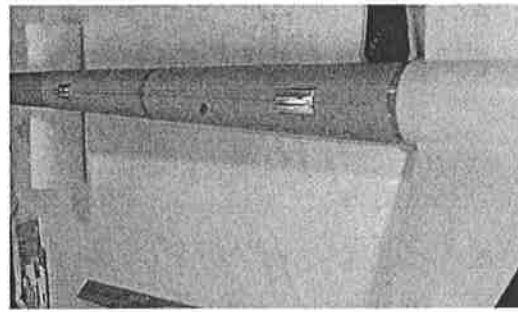
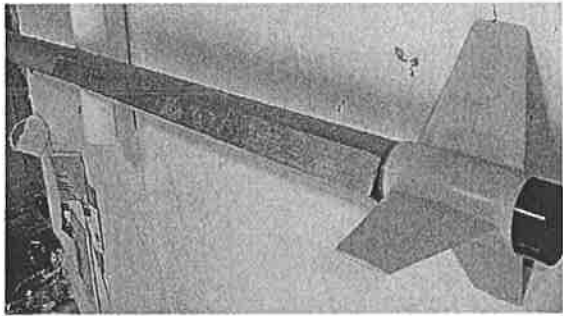
Fold and insert into airframe. Attach Quicklink to nosecone eyebolt. Slide nosecone onto airframe.



The nosecone should be snug but not tight onto the airframe. If too loose, use masking tape on the shoulder of the nosecone to snug the fit. Remember, the chute is deployed when HOT gases from motor ejection expand in the airframe, popping the nosecone off. You must position the heat pad so that it protects the chute from scorching.

Attaching the Rail Guides (Firestorm 54 shown, but application is the same for the your kit).

If you have a rocket with two sections of airframe, the rail guides get attached only to the booster section of the rocket. Begin by marking a line along the length of the airframe 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 or epoxy and attach rail guides (above right). While curing, sight down the tube to check for good alignment. (Do not use the double-sided tape enclosed with the rail guides).

Finishing Recommendations

With fiberglass or dynawind tubing, lightly sand rocket with 240-400 grit paper, prime and sand. With phenolic or Mach-line 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. Paint with a good quality paint like Krylon. Attach the decal only after the 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 (if you have a rocket with two sections of airframe) 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.

Safety Code and Waiver: Giant Leap Rocketry, Inc. and KB Kits, LLC (herein referred to as Giant Leap Rocketry) has exercised reasonable care in the design and construction of our products and carefully inspects every product prior to shipment. However, since Giant Leap Rocketry cannot control the use of our products or information provided once sold, we cannot and do not warrant the products or information included herewith or the performance or results obtained by using our products or information. Our products and information are provided "AS IS". Giant Leap Rocketry, Inc. makes no warranties of any kind, either expressed or implied, including but not limited to, non-infringement of third party rights, merchantability, or fitness for a particular purpose with respect to the product and any related published materials. To the extent you use or implement our products or information in your own setting, you do so at your own risk. In no event will Giant Leap Rocketry, Inc. be liable to you for any damages arising from your use or, your inability 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/>> 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>>. 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>>. 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.