

# SLEDGEHAMMER



## INSTRUCTIONS

GIANT LEAP ROCKETRY, INC. & KBKITS, LLC  
ORIGINAL DESIGN BY BRET SIMPKINS

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# GIANT LEAP ROCKETRY, INC.

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

We at Giant Leap Rocketry, Inc. hope you enjoy building the "Beast of the Fleet". The **Sledgehammer** is an "in your face" kit. It's brawny and demands attention. With features including Giant Leap's exclusive **DYNA-WIND TUBING, TRIAD AV-BAY, FLY-LITE COMPOSITE FINS AND MITERED EDGING**, the **Sledgehammer** can attain over 7,000 feet on either the Aerotech M1315 or Cesaroni M1400 for spectacular level-3 flights. The center of pressure (CP) is 64" from the tip of the nosecone. Be certain your center of gravity (CG) is one to two diameters (7.5" to 15") in front of the center of pressure with 1.5 diameters being ideal. All measurements need to be done with a "full-up" rocket (including motor, recovery components and any electronics).

## **SPECIFICATIONS:**

Length: 90"

Diameter: 7.5"

Dry weight: 28lbs. Full up weight on pad: approximately 48"

Motor mount: 75mm

Recommended parachute sizes:

**Drogue parachute,**

Giant Leap Rocketry TAC-9 Drogue or TAC-1 36"

**Main parachute,**

Giant Leap Rocketry TAC-9B. In addition a Giant Leap Rocketry Parachute Slider is recommended to help reduce the shock of parachute inflation.

Recommended 75mm motors: Aerotech M1297, M1315, M1850 or Cesaroni M1400

## **Sledgehammer, when wimpy isn't good enough.**

# **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. Opening this kit states that you have read, understand and accept these conditions.

**PLEASE READ THE SAFETY CODE AND LIABILITY STATEMENTS AT**

**THE END OF THESE INSTRUCTIONS. IF YOU HAVE ANY QUESTIONS OR ARE UNCLEAR REGARDING THE ASSEMBLY OF 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:**

- One- 7.5" nosecone with two, 1/2" holes bored in the base
- One- 36"x 7.5" Dyna-Wind tube
- One- 30"x 7.5" Dyna-Wind tube
- One- 36"x 3.0" motor mount tube
- One- 75mm threaded Slimline motor retainer set
- One- 16"x 7.5" coupler tube
- One- 7.5" custom wood tailcone
- One- 7.5"x 3.0" centering ring
- Two- 7.5"x 3.0" centering rings with four 5/16" drilled and two 1" extra bored holes
- Two- u-bolts for above centering rings
- Eight- 1/4" nuts for above u-bolts
- Eight- 1/4" washers for above u-bolts
- One- 1/4" Kevlar bridle with three loops to be attached to above u-bolts
- Three- 1/4" composite lower fins
- Twelve- machined and mitered MDF edging pieces for composite lower fins
- Two- 1/4" composite upper wings
- Eight- machined and mitered MDF edging pieces for composite upper wings
- One- extra length of machined and MDF edging
- One- 7.5"x 5" centering ring with three 5/16" holes drilled in perimeter for a-bay
- One- 7.5"x 5" centering ring with three 5/16" chamfered holes drilled in perimeter for av-bay
- One- av-bay mounting ring with three 2.5" bored holes and five 5/16" drilled holes for av-bay
- One- av-bay mounting ring with three 2.5" bored holes, five 5/16" drilled holes and six brass threaded inserts
- Three- 2.5"x 8" phenolic tubes for av-bay pods
- Three- 1/4" x 10.5" all thread for av-bay
- Two- u-bolts for av-bay
- Twenty six- 1/4" hex nuts for av-bay
- Twenty six- 1/4" washers for av-bay
- Three- eyebolts for av-bay
- Three- birch av-bay pod covers with two small drilled holes, one larger drilled Hole and three partial-circular cut-outs along perimeter for av-bay
  
- Three- 'O' rings
- Three- 2.5"x 2.1" centering rings for av-bay
- Six- 2.5"x 1/2" bulkheads with dado slots for av-bay pods

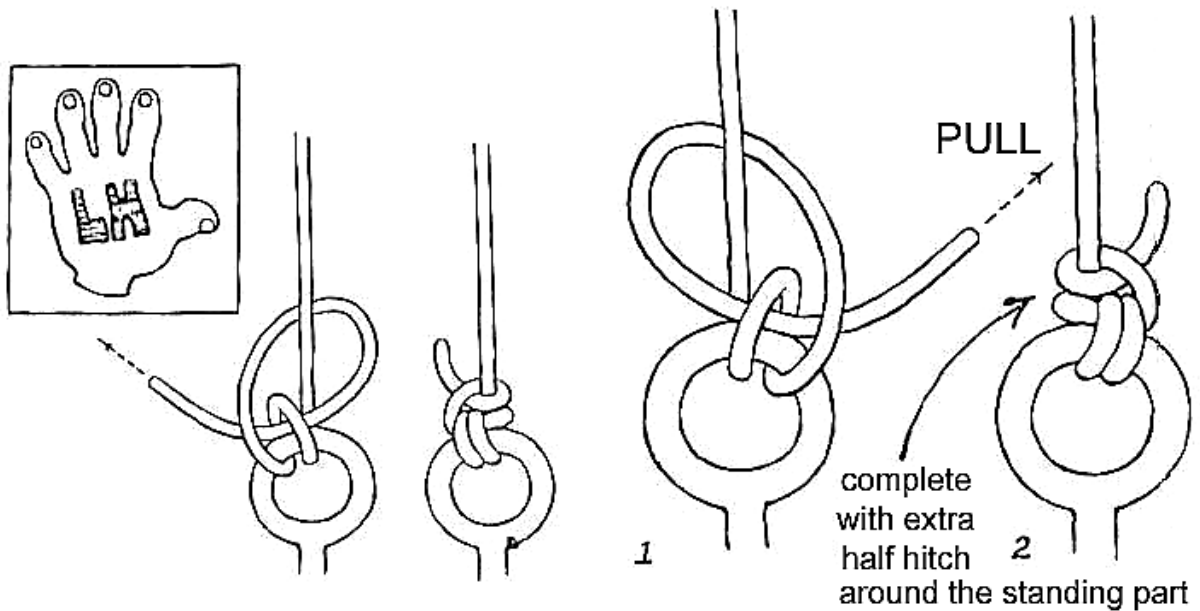
Three- g10 boards, 2.5"x 7" for av-bay pods  
Three- wing nuts for av-bay  
Six- 8/32 x 3/4" machine screws for av-bay  
Six- 8/32 washers for av-bay  
One- 1/2"x 25' Kevlar shock-loop  
One- 1/2"x 15' Kevlar shock-loop  
Two- 1/2"x 44" Kevlar shock-loop  
Five- 5/16" quick links  
Two- extra large Kevlar parachute pads  
One- Sledgehammer decal sets  
Two- sets rail buttons, screws and spacers  
Four- plastic spoons for fin fillets and decal application  
One- sanding dowel stick  
One- set of Sledgehammer instructions

### **SUPPLIES NEEDED BY THE BUILDER TO COMPLETE THE SLEDGEHAMMER**

JB Weld & High-grade adhesive epoxy, Aeropoxy ES6209 recommended  
Four ounce bottle of Polyurethane (example- "Gorilla Glue) adhesive  
Thick and thin CA adhesive  
Wax paper and disposable glue brushes  
Various grits of sandpaper  
Ruler, tape measure, paper towels and masking tape  
Cleaning fluid (acetone, lacquer thinner or rubbing alcohol)  
Drill with 3/32" and 1/4" bits  
Marking pen or pencil and disposable protective gloves  
Fiberglass and/or Carbon Fiber cloth reinforcement material  
Chopped 1/32" fiberglass fibers  
High-Grade Laminating resin, Aeropoxy PR2032 resin and PH3660 hardener recommended  
Small wood sticks or tongue depressors  
Quarter sheet sander and various grits of sandpaper

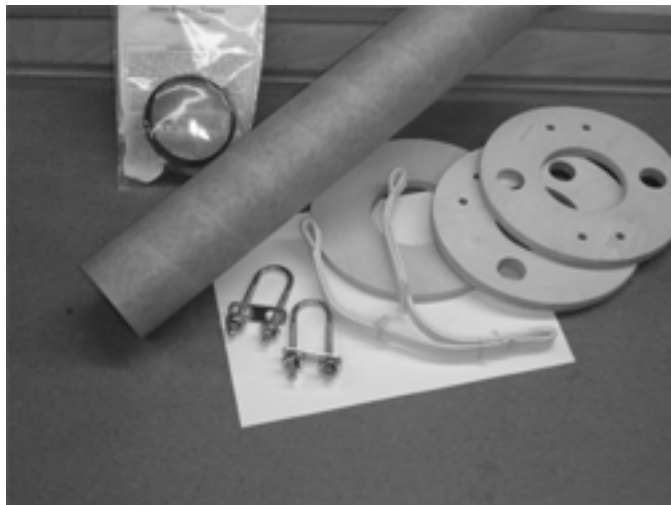
**BEFORE YOU BEGIN**, confirm that all the parts are included in this kit. Also, be certain you have all the supplies needed by the builder to complete the Sledgehammer. **AND FINALLY, YOU MUST READ AND UNDERSTAND THE INSTRUCTIONS ENTIRELY BEFORE BEGINNING. PARTS WILL NOT BE REPLACED IF INCORRECT PROCEDURES ARE USED.**

**NOTE: Please use this knot diagram for reference when required to tie a knot.**



# SLEDGEHAMMER ASSEMBLY INSTRUCTIONS

## ASSEMBLY OF MOTOR MOUNT TUBE



Please locate the following items:

- One- 3.0"x 36" phenolic tube
- One- 75mm Slimline threaded motor retainer set
- One- centering ring 7.5"x 3.0"

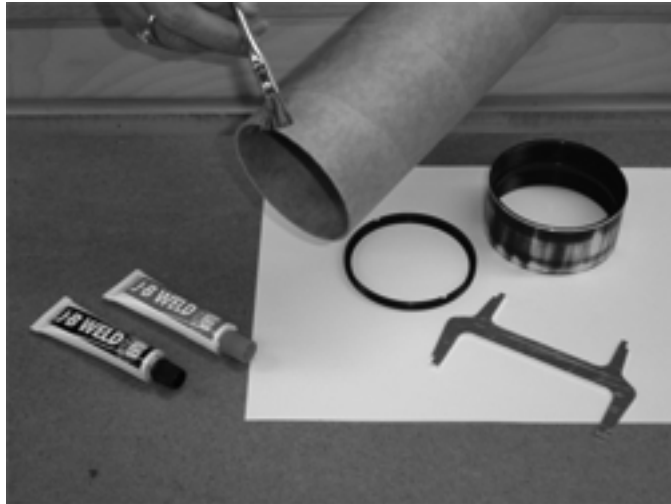
Two- centering rings 7.5"x 3.0" with four 5/16" drilled holes and two 1" bored Holes

Two- u-bolts with four hex nuts and four washers each

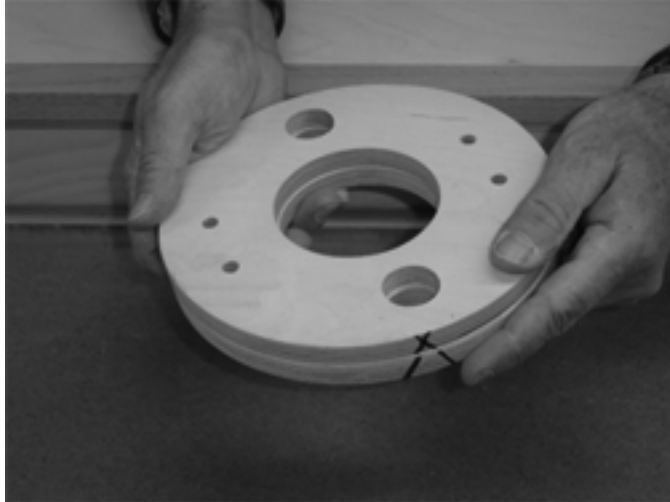
One- 1/2" Kevlar bridle with three sewn loops

**IT IS VERY, VERY IMPORTANT THAT YOU ARE NEAT AND DO NOT ALLOW ANY EPOXY RUNS OR SLOPPINESS ANYWHERE DURING THIS OR ANY OTHER PHASE OF CONSTRUCTION**

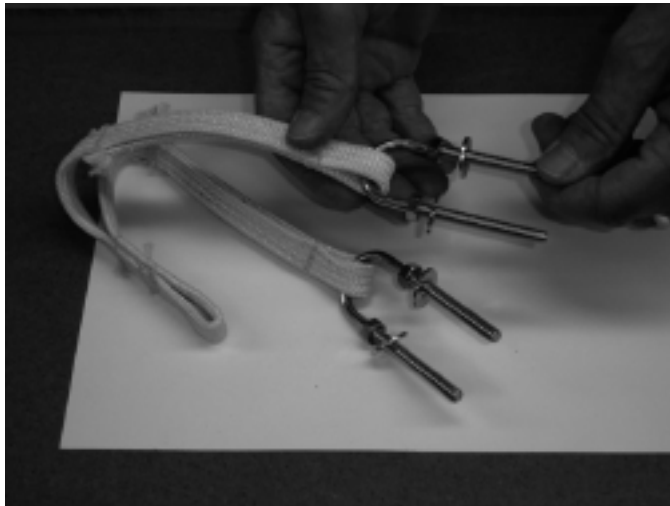
Begin by mounting the 75mm Slimline motor retainer to one end of the 3.0"x 36" phenolic tube as per the enclosed instructions in the Slimline kit. Please use JB Weld for attachment and allow to cure.



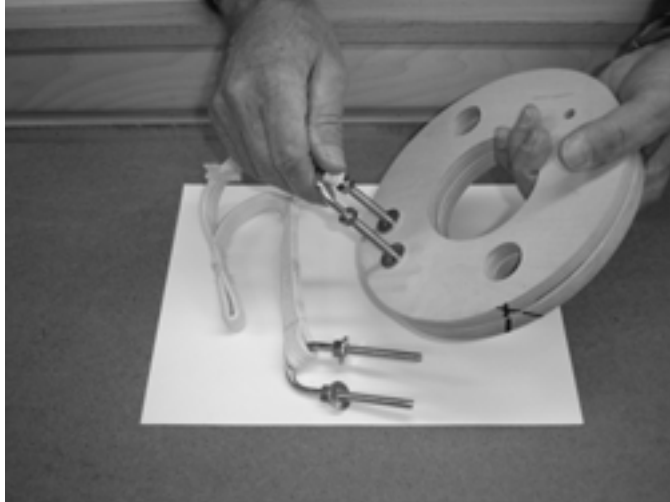
Next, locate the two 7.5"x 3.0" centering rings with four 5/16" and two 1" extra holes, two u-bolts with four each hex nuts and washers and one 1/2" Kevlar bridle with three sewn loops. WITHOUT BONDING THE CENTERING RINGS TOGETHER, begin by locating the "witness" marks on the sides of the centering rings and align them.



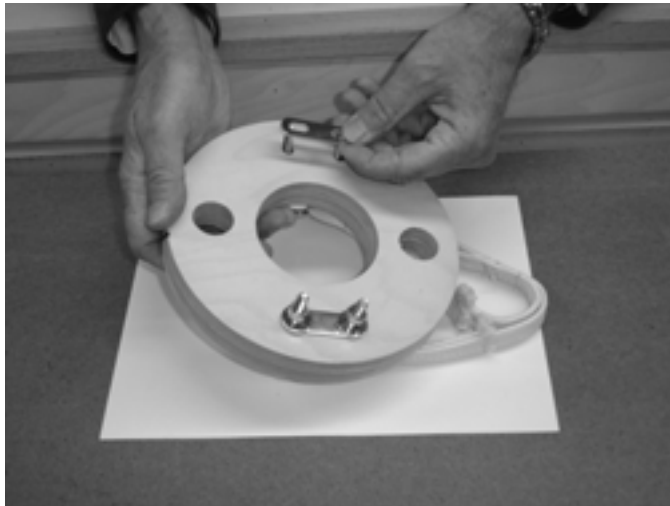
Slide one u-bolt each through both outer loops of the Kevlar bridle (leaving the center loop free).



Next thread onto and run up ONE hex nut and washer on all four legs of both u-bolts; run the nuts to the very top of the threads. Insert both u-bolts into the four 5/16" diameter holes located in the centering rings (keeping the witness marks together) with both u-bolts facing the same direction (and the Kevlar bridle on the same side). Avoid having twists in the Kevlar bridle.

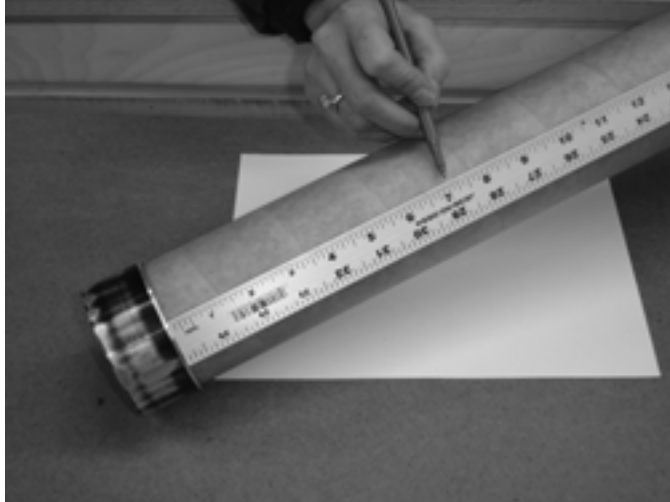


Turn over the centering rings and place one washer and one nut onto each leg of both u-bolts and lightly finger tighten.

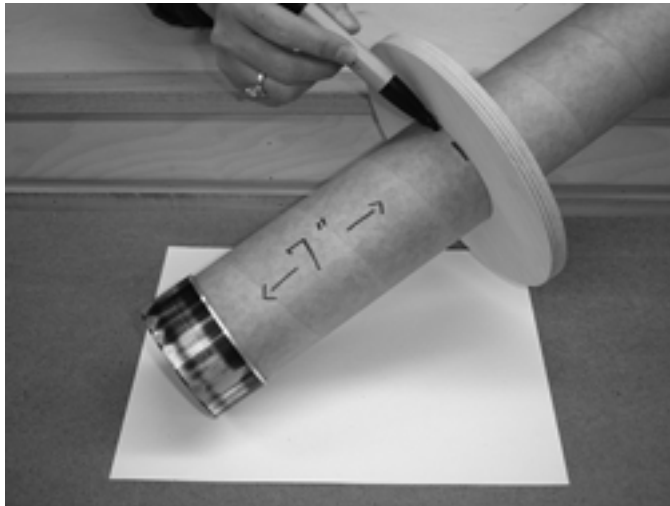


After the motor tube (with attached Slimline) has cured, take and mark the tube **7" ABOVE THE VERY TOP OF THE SLIMLINE BODY** (the top of the Slimline body is pointed towards the end of the motor tube with nothing yet attached).

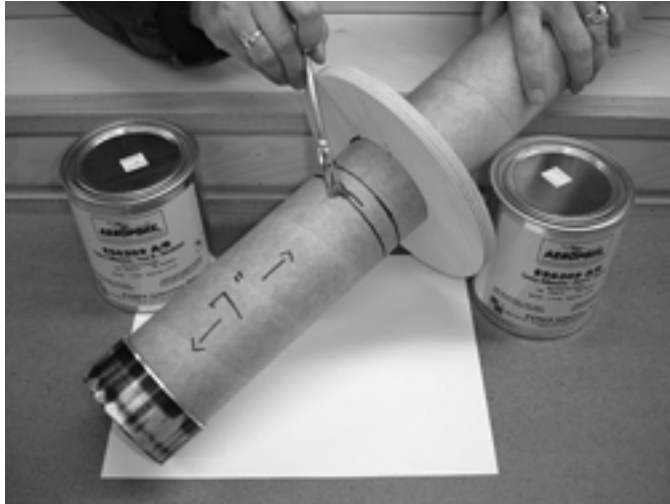




Take the single 7.5"x 3.0 centering ring, NOT THE CENTERING RING ASSEMBLY JUST ASSEMBLED, and slide that single ring onto the tube from the end opposite of the just attached Slimline body. Bring that ring (WITHOUT ANY ADHESIVE YET) down until it sits ABOVE the just made mark on the motor tube. With the centering ring square and perpendicular to the body tube, take a marking pen and make a circular mark on the motor tube on both sides of the centering ring.



Upon completion, temporarily slide the single centering ring several inches back up the tube away from the just marked area. With sand paper, scuff the motor tube in that area to abrade the surface but leaving your marks.



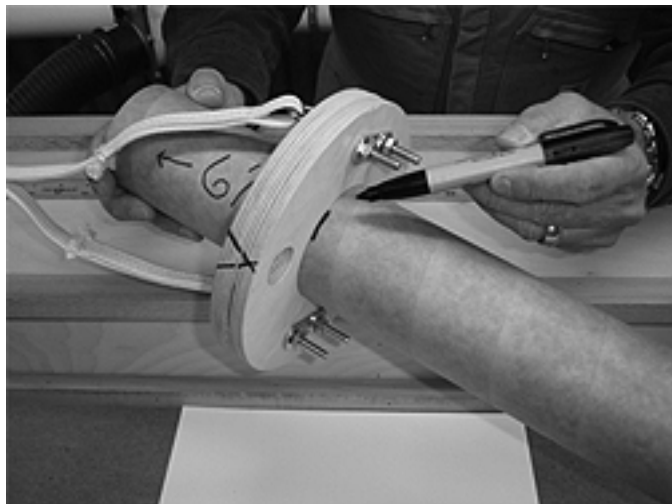
Mix a sufficient amount of adhesive epoxy and apply to the area of the tube just scuffed, within your previously made lines. Apply evenly around the circumference and slide the single centering ring back into the area of epoxy BETWEEN THE TWO PREVIOUSLY MADE LINES. BE CERTAIN THIS CENTERING RING IS "SQUARE" TO THE MOTOR TUBE AND USE TAPE TO HOLD IN POSITION.



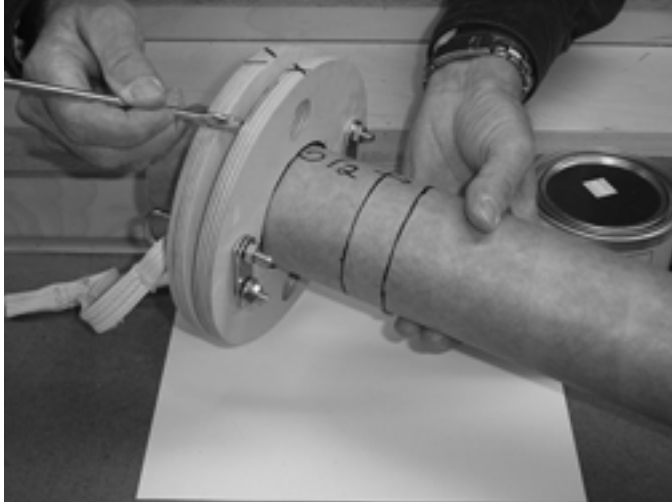
It is recommended you stand the motor tube on end PREVENTING any runs of epoxy down the tube. **ALLOW THIS JOINT TO CURE WITH NO EPOXY RUNS ON THE TUBE OR "FLOW-OUT" ON THE CENTERING RING. FAILURE WILL CAUSE GREAT DIFFICULTY IN FOLLOWING STEPS.** After curing of the above sub-assembly, place a mark on the end of the above motor tube, OPPOSITE the Slimline retainer, 6.5" down from the open end of the tube.



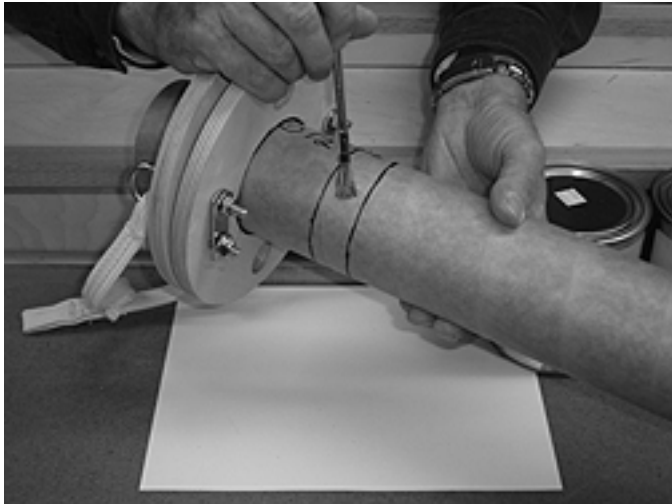
WITHOUT ADHESIVES, locate the 7.5" centering ring assembly with two u-bolts and Kevlar bridle and slide onto the same end of the tube (side with Kevlar bridle facing away from the Slimline end) until the wood of the BOTTOM (facing the Slimline retainer) CENTERING RING IS EVEN WITH THE JUST MADE MARK 6.5" down on the tube.



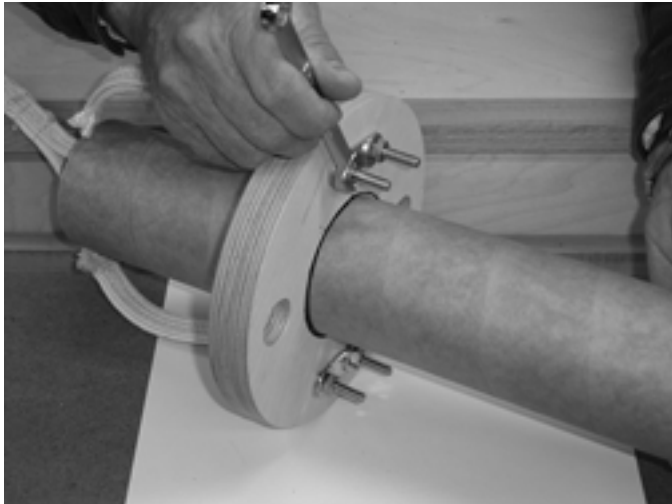
Take your marking pen and make a circular mark on the motor tube circumference to both sides of the just placed (BUT NOT ATTACHED) CENTERING RING ASSEMBLY. Upon completion, slide the above centering ring assembly up but not off of the tube. With sand paper, scuff the area on the motor tube between the just marked areas, but do not remove the marks. Next, loosen (but not remove) the two u-bolts on the above centering ring assembly and separate the two centering rings. Prepare enough (at least 30 minute cure time) epoxy to coat between those two centering rings and between the just made marks on the motor tube. First, spread a thin layer between the two centering rings and bring together BUT ONLY FINGER TIGHTEN THE U-BOLTS.



BEFORE THAT EPOXY HAS TIME TO CURE, place a generous amount of epoxy between the two lines and slide the centering ring assembly (side with Kevlar bridle goes on last) onto the tube between the marks.



Once in position, SECURELY TIGHTEN ALL FOUR NUTS ON BOTH U-BOLTS.



BE CERTAIN THIS ASSEMBLY IS IN POSITION ON THE TUBE, BETWEEN THE MARKS, "SQUARE AND PERPENDICULAR" TO THE MOTOR TUBE.

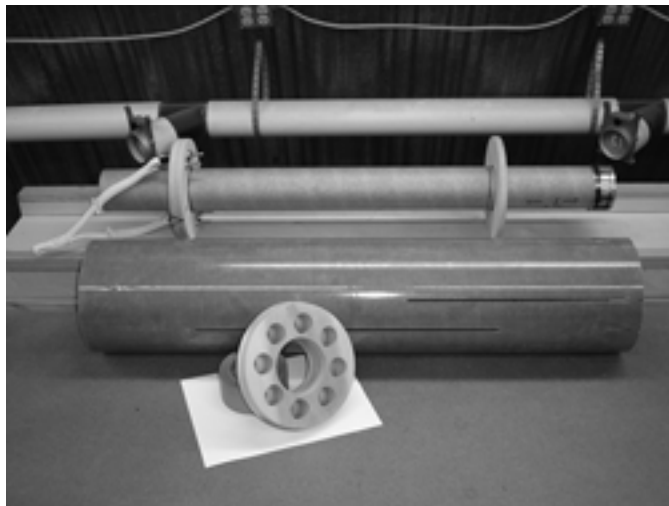
**THIS IS A CRITICAL JOINT** and must be strong. Be certain the centering ring assembly is NO CLOSER than 5.5" to the top end of the motor tube (measuring from the WOOD part of the assembly with the Kevlar bridle).



**ALLOW THIS JOINT TO CURE WITH NO EPOXY RUNS ANYWHERE!** Place a small drop of epoxy on the exposed u-bolt threads. Stand tube on end, Slimline end up, and allow to cure.

After curing, invert the tube, Slimline retainer end down, and apply epoxy fillets to all centering ring/motor tube joints and allow to cure. **REMEMBER, BE NEAT AND DO NOT ALLOW ANY EPOXY RUNS OR SWELLS.**

## **ASSEMBLY OF MOTOR TUBE ASSEMBLY AND SLOTTED AIRFRAME**



Please locate the following items:

One- 7.5"x 36" slotted Dyna-Wind airframe

One- custom wood tailcone

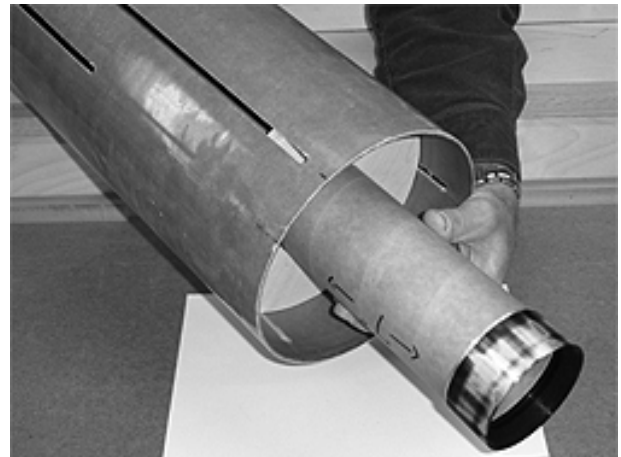
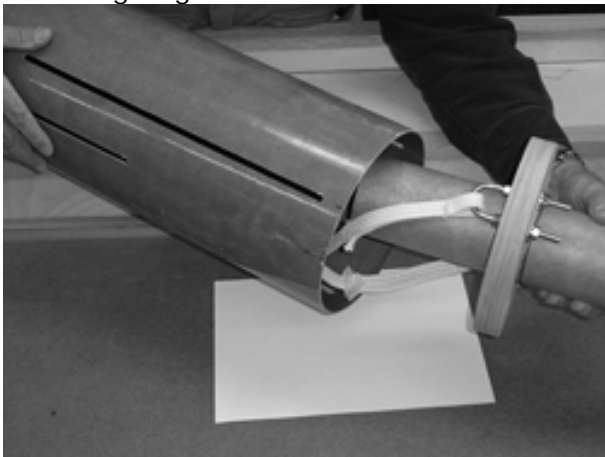
One- assembled motor tube assembly

Begin by noticing the lay-out of fin slots in the Dyna-Wind airframe; THE BOTTOM OF THE AIRFRAME HAS THREE IDENTICAL SLOTS arranged around one end of the airframe. **THIS IS THE BOTTOM END.**

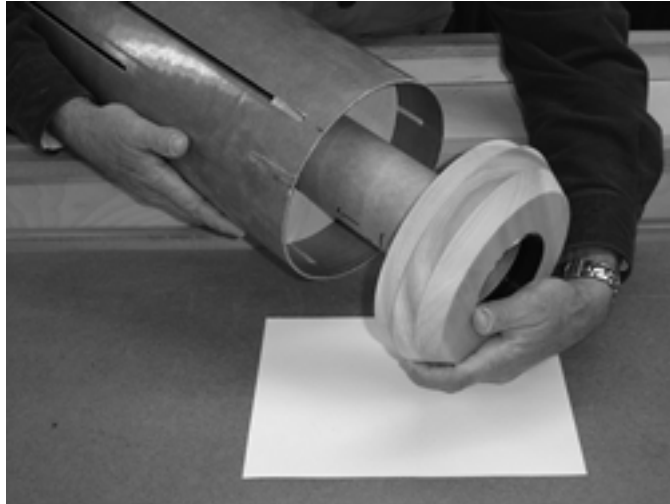


In a later section of these instructions, you will be inserting three identical fins in those slots. Further up the same airframe are two longer slots where later you will be inserting two identical wings. BE AWARE OF THE DIFFERENT POSITIONING AND LENGTH OF THESE FIVE SLOTS.

WITHOUT USING ANY ADHESIVE, you will now "dry-fit" the airframe, motor tube assembly and wood tailcone together. **HANDLE THE SLOTTED DYNA-WIND AIRFRAME CAREFULLY! WITH THE FIVE LONG SLOTS, THIS TUBE IS QUITE FRAGILE UNTIL IT IS STRENGTHENED IN LATER STEPS.** Lay the Dyna-Wind tube horizontal and insert the completed motor tube assembly (Kevlar bridle end of tube first and sand to fit any centering rings if necessary) into the **BOTTOM** end of the airframe, sliding it in until the rear, single centering ring is several inches inside the bottom end of the 7.5" airframe.



Next, slide the wood tailcone over the exposed-attached to motor tube Slimline retainer and stop.

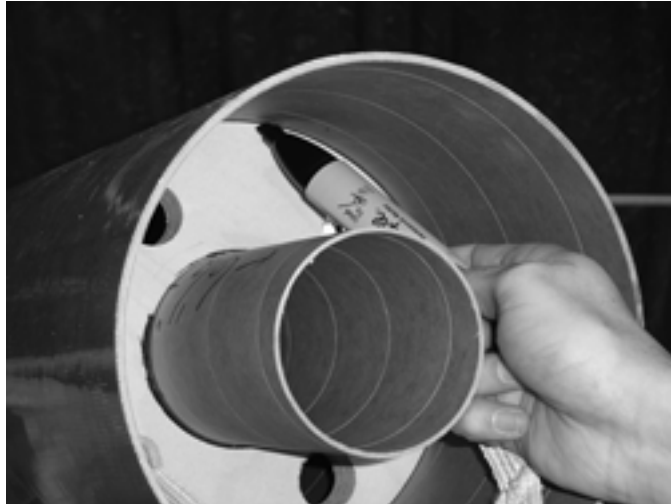


With the flat part of your hand, push both the motor tube and tailcone together further into the slotted 7.5" airframe **STOPPING** when the reduced diameter end of the tailcone has joined inside the bottom of the airframe (cone end of tailcone is still exposed) and **THE VERY BOTTOM OF THE SLIMLINE IS FLUSH WITH THE VERY BOTTOM OF THE TAILCONE.**

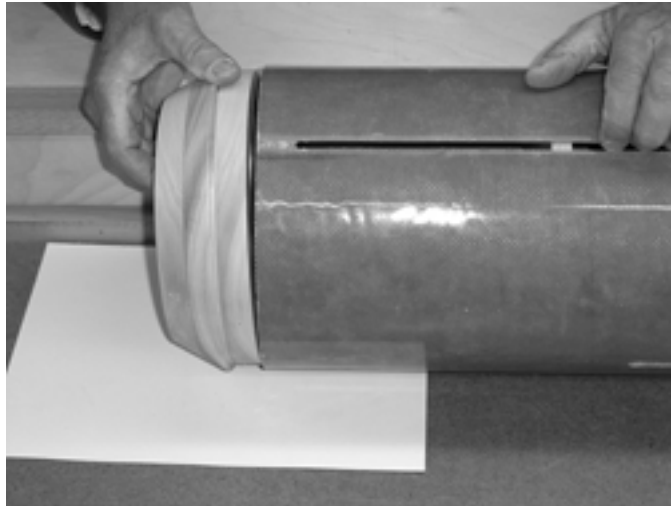


**CAREFULLY**, stand the entire assembly vertical, tailcone end down, **BEING CERTAIN THE TAILCONE IS JOINED INSIDE THE BOTTOM OF THE AIRFRAME AND THE BOTTOM OF THE SLIMLINE IS FLUSH WITH THE BOTTOM OF THE TAILCONE.**

While the "dry-fitted" components are still together and up-right, take a marking pen or pencil and draw a line/circle on the inside of the airframe where the top-most centering ring contacts the interior of the airframe.



Without moving any of the parts, lay the airframe/motor tube assembly/tailcone horizontal again. Confirming that the tailcone has not moved from its correct position and the rear part of the Slimline retainer is still flush with the bottom of the tailcone, gently place one hand on the outside of the airframe where you can see the rear, single centering ring through the three-rear fins slots. **USING ONLY MINIMUM PRESSURE TO HOLD THE MOTOR TUBE ASSEMBLY IN PLACE INSIDE OF THE AIRFRAME**, carefully remove the tailcone from contact with the airframe and Slimline/motor tube assembly and set aside.



With a marking pen or pencil, draw a line/circle on the inside of the airframe where the rear-



most centering ring contacts the interior of the airframe.



After making the "positioning marks", carefully remove the motor tube assembly from the airframe and set-aside. With sandpaper, "scuff" the interior of the airframe just above the rear-most mark/circle and just below the upper most mark/circle.

You are now going to permanently assemble the slotted airframe to the motor tube assembly **BUT NOT THE TAILCONE**. BEFORE MIXING ANY EPOXY, PLEASE READ THROUGH THE FOLLOWING DIRECTIONS AND UNDERSTAND THE PROCEDURES PRIOR TO BEGINNING. GIANT LEAP ROCKETRY WILL **NOT** REPLACE PARTS INCORRECTLY JOINED. Be sure you are working on a surface that epoxy will not affect and have newspapers or other protective coverings over your work surface. Also have plenty of paper towels and solvent to clean up excess epoxy. Be aware, you will have some epoxy run out through the three rear slots while it cures. It is unavoidable, but you **MUST BE READY TO WIPE AWAY THAT EPOXY AS IT RUNS TO THE OUTSIDE OF THE AIRFRAME OR INSIDE THE AIRFRAME SLOTS**.

Before mixing epoxy, lay the slotted airframe horizontal on your work surface and insert the motor tube assembly inside (exactly as before) but only half way in.



Be sure the Kevlar bridle is "stuffed" inside the motor tube to keep it out of the way. In addition, apply masking tape to the interior of the Slimline motor retainer to prevent accidental epoxy contact.

Now mix sufficient 30 minute epoxy to join the motor tube assembly to the slotted airframe. Please use a slow cure epoxy so you will not be rushed during this procedure. If your epoxy is particularly "runny", you may wish to add fillers of some type to help keep it in place during the application phase. Fillers can be as simple as torn-apart cotton or cotton balls to 1/32" glass fibers, un-woven strands of fiberglass fibers, Kevlar pulp or micro-balloons.

Apply the mixed 30 minute epoxy with an application stick GENEROUSLY TO THE INSIDE CIRCUMFERENCE IMMEDIATELY **ABOVE** THE BOTTOM CIRCLE DRAWN INSIDE THE SLOTTED AIRFRAME AND IMMEDIATELY **BELOW** THE UPPER CIRCLE DRAWN INSIDE THE AIRFRAME. Continually rotate the airframe so epoxy does not "pool" into one spot.

Without hesitation, push the motor tube assembly further into the airframe until the single rear centering ring is two to three inches inside of the airframe bottom. **STOP AND GO NO FURTHER.** Quickly, **AND WITH NO MORE ADHESIVES**, slide the tailcone over the exposed Slimline retainer and with your hand push both the tailcone and motor tube assembly into the airframe.



**YOU CANNOT, CANNOT, CANNOT ALLOW ANY AMOUNT OF ADHESIVE TO BE ANYWHERE ON THE INSIDE REAR FIVE INCHES OF THE AIRFRAME.**

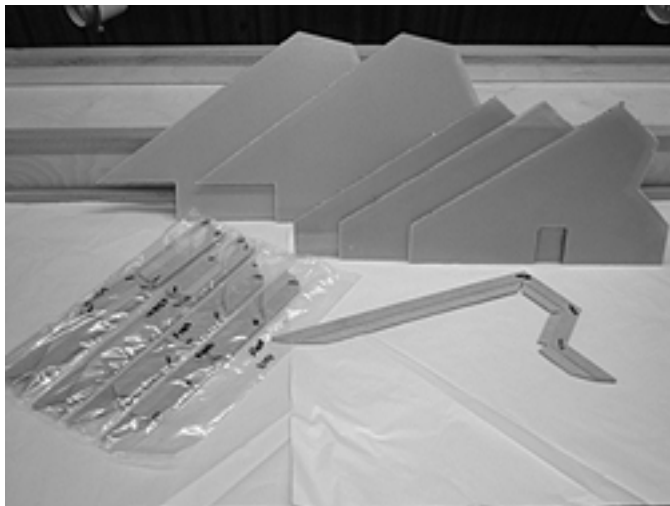
**IMMEDIATELY**, stand the slotted airframe with motor tube assembly and tailcone vertically on the tailcone. CONFIRM THAT THE TAILCONE SHOULDER IS PROPERLY "SEATED" INSIDE THE AIRFRAME BOTTOM AND THAT THE SLIMLINE RETAINER IS FLUSH WITH THE BOTTOM OF THE TAILCONE. CONFIRM THE TAILCONE **HAS NO EPOXY ANYWHERE ON IT.** You must not attach it at this time, BUT IT NEEDS TO STAY IN PLACE TO PROVIDE CORRECT POSITIONING FOR THE MOTOR TUBE VS. SLOTTED AIRFRAME.

**IMMEDIATELY, LOOK THROUGH THE UPPER PART OF THE TWO LONG SLOTS ON THE AIRFRAME. CONFIRM THAT THE LEGS OF THE INTERIOR U-BOLTS DO NOT INTRUDE INTO THE SLOT AREA.**



If the u-bolt legs are in the slot area, carefully rotate the motor tube just enough to move the obstruction. You will be attaching wings through these slots in later steps and this area must remain clear. **IMMEDIATELY CHECK THERE IS ABSOLUTELY NO ADHESIVE OF ANY AMOUNT (EVEN THAT WHICH JOINS THE TOP CENTERING RING ASSEMBLY TO THE INTERIOR OF THE AIRFRAME) ANY HIGHER THAN ¼" ABOVE THE WOOD OF THE TOP CENTERING RING ON THE INTERIOR PART OF THE AIRFRAME.** With paper towels and solvent, wipe any excess epoxy that has migrated to the exterior of the airframe, AND ESPECIALLY THE MOTOR TUBE EXPOSED BENEATH THE SLOTS WHERE THE THREE FINS AND TWO WINGS WILL BE ATTACHED IN LATER STEPS. CONTINUE TO CONFIRM THE TAILCONE REMAINS FREE OF ADHESIVE AND CAN BE REMOVED LATER. Leave the entire assembly vertical until epoxy joining the motor tube-slotted airframe has cured. You will permanently attach the tailcone later, not now.

## **ASSEMBLY OF FLY-LITE COMPOSITE FINS AND EDGING**



Please locate the following items:

Three- small ¼" composite fins

Three- sets of MDF wood machined/mitered edging for above fins  
Two- large ¼" composite wings  
Two- sets of MDF wood machined/mitered edging for above wings  
One- extra section of MDF wood machined edging for use if necessary

To assemble the above components, you will need a 4oz bottle of polyurethane glue (sold under the brand name "Gorilla Glue" and others), wax paper and large items that can be utilized as weight to apply consistent pressure during bonding. Also, if necessary, sand paper for minor adjustments to the wood edging material.

**FLY-LITE COMPOSITE FINS WITH EDGING** is a system approach of making light weight, extremely strong fins out of composite-fiberglass/honeycomb boards with custom machined edging to finish the exposed edges. First, look at the fin and wing material; all the edges that will be exposed (except the root edge which attaches to the motor tube) have had the inner core of honeycomb material partially removed to a depth of approximately ½"; this will be referred to as the "groove" area. Now, refer to the machined/mitered wood edging and notice one side of all pieces is "thinner" than the other side; this will be referred to as the "tongue" area.



So essentially we will be mounting the "tongue" of the edging into the "groove" of the fins and wings. In woodworking this is known simply as a "tongue and groove joint". To fit all the shapes around the perimeters found on the fins and wings, the edging also has specific-mitered ends to either join one piece of edging to the next or blend into the leading or trailing sides of the fins and wings. To make certain the edging pieces are mounted correctly to the fins, there are color matching marks made on each piece showing you the correct order.

Beginning assembly of the fins first, **WITHOUT ADHESIVES**, lay one fin on a large piece of wax paper. Open one package only of edging **FOR FINS** and arrange the pieces around the perimeter of the first fin matching the color marks.

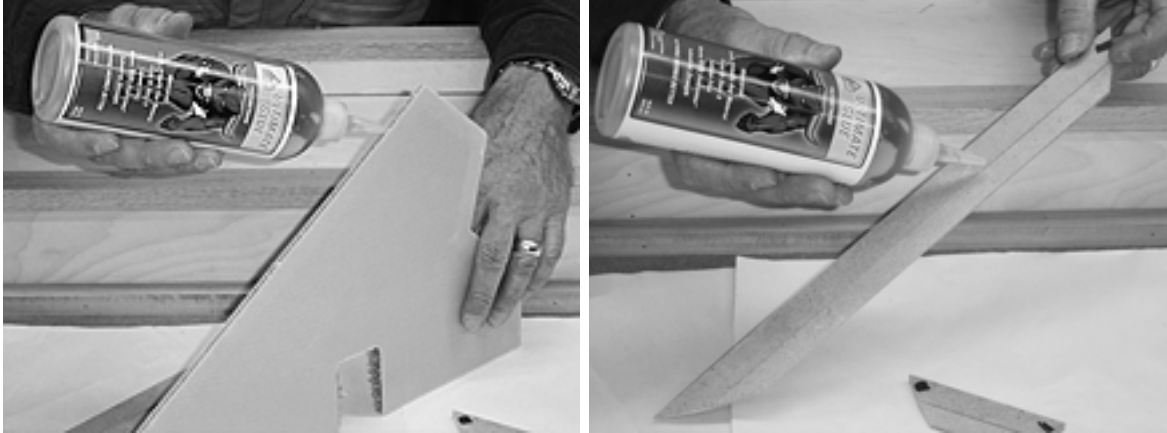


WITHOUT ADHESIVES, gently press each piece, **TONGUE FIRST**, into the correct **GROOVE** of the fin material. It is possible that some additional honeycomb material found in the fins may need to be removed allowing complete insertion of the edging tongue up to the point where the edging regains full thickness. It also may be necessary to adjust each piece side to side or sand slightly for proper fit.



Continue the dry fitting for all three fins. Once satisfied with the "fitment", remove all the edging and arrange around the perimeter of the fins, **WITHOUT COMPROMISING THE CORRECT ORDER.**

It is recommended to learn the fin-edging joining process only one fin is glued up first and allowed to cure. This will allow you to understand the process without the stress of doing all the fins at once. Using **POLYURETHANE GLUE ONLY**, squirt a line of adhesive inside the groove where only one piece of edging will be inserted.



Use a sufficient amount inside this groove and then a thin "bead" on both sides of the tongue of the appropriate edging and insert fully into the appropriate groove. Slide the edging side to side as necessary to position correctly. When satisfied, shoot more glue into the next-in-order groove and on the "a-joining butt" of the previous, just mounted edging and both sides of the tongue of the next piece of edging. Insert that piece fully and adjust side to side in relation to the previously mounted edging. Continue this routine until all four pieces have been mounted around the fin, adjusted side to side as needed and inserted fully. PLEASE REALIZE THAT SOME JOINTS MAY NOT FIT PERFECT ONE TO ANOTHER, THIS IS UN-AVOIDABLE AND WILL BE FIXED IN LATER STEPS. With paper towels and solvent, carefully wipe both sides of the exposed fin and edging to remove excess Polyurethane glue, dry and lay FLAT on a clean sheet of wax paper. CHECK AGAIN ALL EDGING PIECES ARE IN PLACE and lay a second, clean sheet of wax paper on top.



Carefully, without shifting, lay a solid-weighted object on top to provide downward pressure on the curing fin/edging. IT IS VERY IMPORTANT THAT HEAVY DOWNWARD PRESSURE BE APPLIED DURING CURING AS THIS WILL PRODUCE A BETTER, FINAL PRODUCT.



Cure time will vary with the temperature, but it is recommended waiting 3-4 hours before removing the weighted object and wax paper. The first thing you will notice is how the polyurethane glue “foamed” during curing. This is completely normal and desirable. With a utility/box knife, carefully remove or break away the excess surrounding the perimeter of the assembled fin. **DO NOT CUT INTO OR BREAK THE EDGING/FIN.** After fully curing 24 hours, you will be able to take a quarter-sheet electric sander and “clean-up” the perimeter of the edging and **CAREFULLY, CAREFULLY** flat sand both sides of the fin smoothing the glue-foam and edging to the composite fin material. **UNDER NO CIRCUMSTANCE SAND INTO THE FIBERGLASS MATERIAL COVERING ON BOTH SIDES OF THE COMPOSITE FIN MATERIAL. TO DO SO WILL DESTROY THE STRENGTH OF THE COMPOSITE FIN MATERIAL.** The benefits of using Polyurethane glue, even with the clean-up mess, is the foaming helps fill voids left in the edging/fin material joints, the joints between the edging pieces and helps “level” any differences that may exist between the thicknesses of the edging and composite fin material. Also, it is easy to apply this glue using the long spout found on the glue bottle and mixing is not necessary.

After you have finished the first fin, go back following the previous procedures and complete the two remaining fins and then the two larger wings. It is advisable to sand to shape **ONLY THE LEADING EDGE OF BOTH THE FINS AND WINGS, DO NOT SAND INTO THE COMPOSITE MATERIAL** and leave the remaining edges flat. After shaping the leading edges, **APPLY THIN CA GLUE** TO HARDEN the profile so damage during construction to the soft edging material will be less likely.

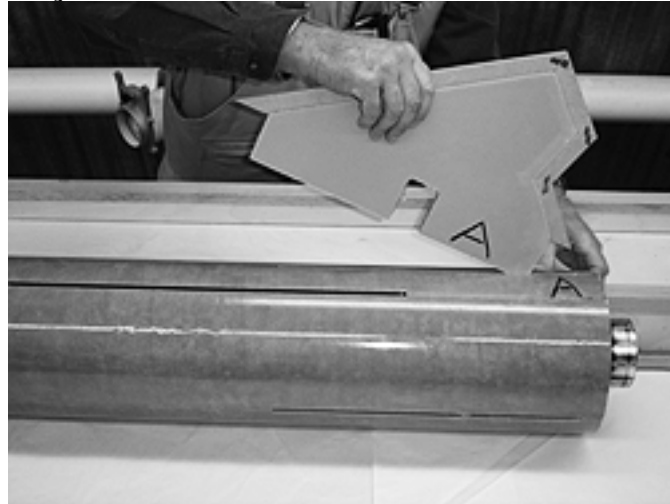
## **ATTACHMENT OF FLY-LITE FINS AND WINGS TO SLOTTED AIRFRAME**

Please locate the following items:

- One- slotted airframe and motor tube assembly
- Three- assembled Fly-Lite lower fins
- Two- assembled Fly-Lite wings

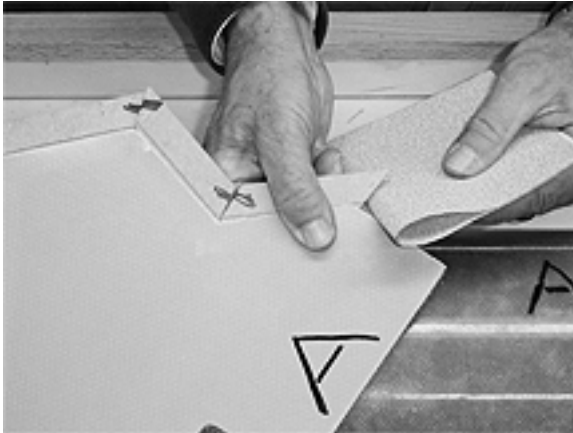
Begin by laying horizontal the slotted airframe assembly. If you have not already done so, remove the un-attached tailcone and set aside. With a marker or pencil, letter each of the

three fins A, B or C and then each of the three, bottom fin slots A, B or C. Retrieve fin A and turn the airframe so slot A is up-right. **WITHOUT ADHESIVES**, insert fin A in slot A, sanding as necessary for COMPLETE insertion.



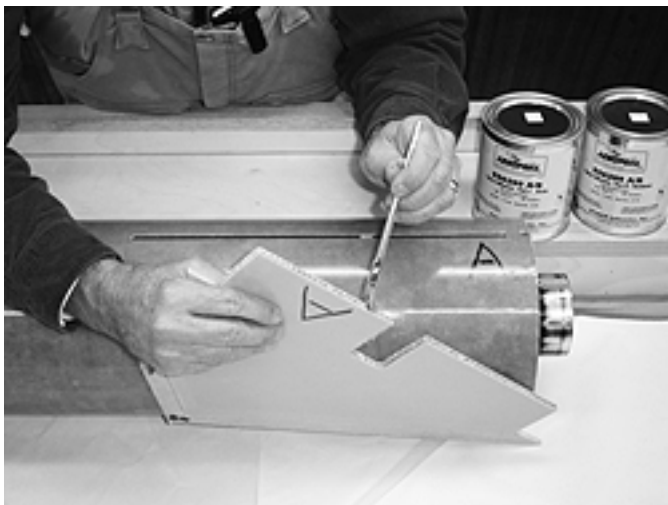
Gently wiggle the fin side-to-side listening for a “brushing” noise as the root edge of the fin rubs against the motor tube. If you do not hear or see that contact being made, notice how both the leading and trailing edging was designed so it extends past the composite fin material to complete the fin shape and come to rest against the exterior of the airframe.

This is CORRECT, but now it will be necessary to sand UP that contact area of edging as required allowing the root edge of the fin to extend deeper into the airframe slot until the root edge comes into contact with the motor tube. Sand as necessary, both front and rear contact areas, checking often until the fin root edge is firmly in contact with the motor tube via the airframe fin slot.

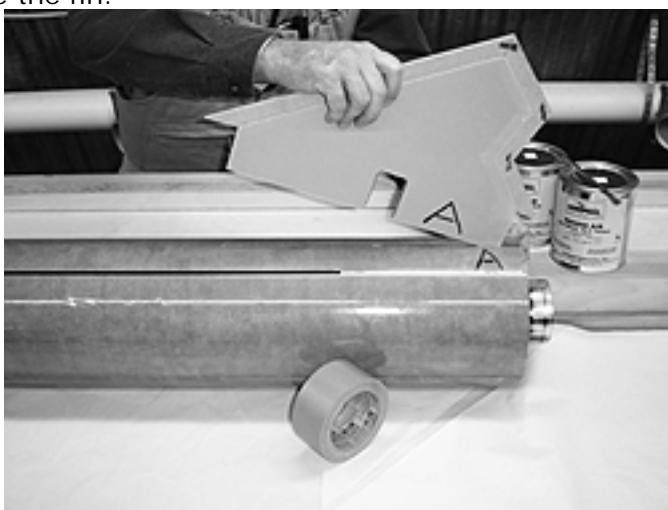


Once you are satisfied, set fin A aside, turn the airframe to slot B and do the same procedure to fin B and finally fin C in slot C. Once you have all three fins “fitted” it is time to attach the fins permanently to the airframe/motor tube assembly. Keeping the airframe horizontal with slot A vertical, mix sufficient epoxy (preferably with Kevlar pulp and fiberglass fibers for filler) and spread the mixture over just the root edge of the fin using for instance a mixing stick to press the epoxy mixture deep into the “honey-comb” of the root edge and with extra along the outside of the root edge.





Insert this A fin into the A slot until the root edge presses against the motor tube and immediately remove the fin.



Inspect the epoxy that was left on the motor tube to confirm you have a complete "footprint" along the length of the root edge. **USING FILLERS WITH EPOXY WILL HELP PREVENT "RUNS" OF EPOXY AROUND THE MOTOR TUBE WHICH WILL CREATE GREAT PROBLEMS DURING ATTACHMENT OF FINS B AND C.**

Continue applying epoxy to the same root edge and pressing against the motor tube allowing "build-up" of epoxy to occur. It will be necessary to scrap excess epoxy from the side of the fin and the fin slot while you are accumulating epoxy on the motor tube. When you are satisfied with the "line" of epoxy on the motor tube, do a final insertion and leave the fin in place, **STRAIGHT AND PERPENDICULAR TO THE AIRFRAME USING MASKING TAPE TO HOLD THE FIN DURING THE CURING TIME.**

After curing has completed, continue attachment of fins B and C using the same method described above. Once this is done, build shaping and strengthening "fillets" along both sides of all three fins. Completing that, it is recommended you now utilize fiberglass, Kevlar or carbon fiber cloth (or combinations) in a "fin tip-to-tip" reinforcement. To determine the size and shape necessary lay a sheet of newspaper over two fins and body tube in between, pressing into position. Crease the edge of the newsprint around both fin perimeters without moving the paper, **BEING SURE TO INCLUDE THE FIN EDGING.**



Remove the paper and cut out the indicated shape to create a cloth reinforcement pattern.



Lay this pattern over your cloth reinforcement(s) of choice and cut out identical pieces to cover all three fin/body tube sides. **IT IS HIGHLY RECOMMENDED YOU CUT THE REINFORCEMENT ONE INCH LARGER ON ALL SIDES OF YOUR PATTERN.** With your epoxy laminating resin of choice, apply the reinforcement to one side at a time and allow curing before doing the next side. **BE AWARE OF ANY EPOXY RUNS AND CLEAN UP IMMEDIATELY. ALSO, BE CERTAIN THE REINFORCEMENT CLOTH IS PRESSED DOWN IN CONTACT WITH ALL SURFACES, ESPECIALLY THE FIN TO BODY TUBE JOINTS WITH NO AIR BUBBLES UNDERNEATH.** Once this is cured, take a utility or box knife and remove the just attached reinforcement from the **TWO SLOTS FOR THE YET TO BE ATTACHED WINGS.**

It is time to now attach the two wings with the slotted airframe/motor tube/ three lower fins assembly. Using the same exact method and procedures as described for fitting the fins and permanent attachment, proceed with the wings. After finishing, continue with fillet construction and composite reinforcements as described above. Staple sandpaper to the 18" dowel and utilize as a "fillet-shaper".

**It is not the intention of Giant Leap Rocketry to explain all facets of epoxy reinforcement. Explanations of composite reinforcement are covered in detail by various authors on the subject. If you have questions specific to reinforcing your Sledgehammer, please contact Giant Leap Rocketry using the information given on the cover page of these instructions.**

After final joining and curing of all the fins and wings with respective reinforcement, it is time to strengthen the interior of the airframe itself. Standing the lower body assembly vertical on the Slimline motor retainer (do not include the tailcone), begin by mixing two ounces of both part A & B expanding foam in a cup, stirring completely and **CAREFULLY POURING INTO BOTH LARGE ACCESS HOLES** LOCATED IN THE TOP CENTERING RING ASSEMBLY NEXT TO THE U-BOLTS.



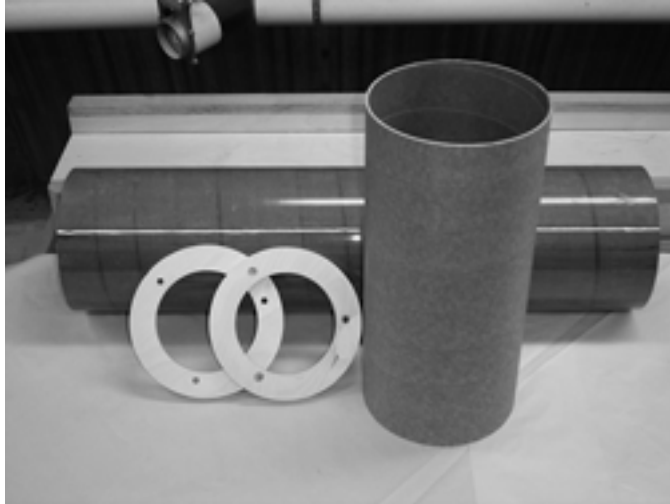
**IMMEDIATELY, WIPE UP WITH SOLVENT ANY SPILLED LIQUID FOAM BEFORE IT BEGINS TO CURE FROM THE TOP OF THE CENTERING RING AND ESPECIALLY FROM THE INTERIOR OF THE UPPER BODY TUBE.** Allowing at least five minutes to elapse so the foam has had sufficient time to cure, inspect the amount of area yet to "fill". Upon that observation, mix additional foam and pour through the same access holes allowing to cure. **UNDER NO CIRCUMSTANCE ALLOW ANY OF THE EXPANDING FOAM TO RISE PAST THE ACCESS HOLES INTO THE AREA ABOVE THE UPPER CENTERING RING OR INSIDE THE MOTOR TUBE.** But it is also necessary that foam completely fills up to the access holes for best strengthening. Once finished, invert assembly so the Slimline motor retainer is pointing upward. It is necessary to pour two-part foam into this recess also, BUT BEFORE STARTING AND USING NO ADHESIVES MOUNT THE STILL UN-ATTACHED TAILCONE and note how far it extends down inside the recess.



**YOU CANNOT HAVE THE TWO PART FOAM RISE UP INTO THE AREA REQUIRED TO MOUNT THE TAILCONE.** Remove the tailcone and mix a minimal amount of two part expanding foam, stir and pour evenly into this area and allow to "foam-up". BE CERTAIN

SUFFICIENT SPACE IS LEFT FOR THE TAILCONE. Once you are satisfied with the foam reinforcement, mix sufficient JB Weld to coat the exterior of the Slimline retainer and epoxy to coat the rear-most interior of the airframe one inch deep and the shoulder of the tailcone which inserts into the airframe. Slip the tailcone into place making certain the end of the tailcone and Slimline retainer are flush and the tailcone shoulder is fully inserted inside the rear of the airframe. CLEAN UP ANY EXCESS EPOXY OR JB WELD AND **CONFIRM NONE HAS MIGRATED INSIDE THE SLIMLINE RETAINER.**

## ASSEMBLY OF COUPLER TO UPPER AIRFRAME



Please locate the following items:

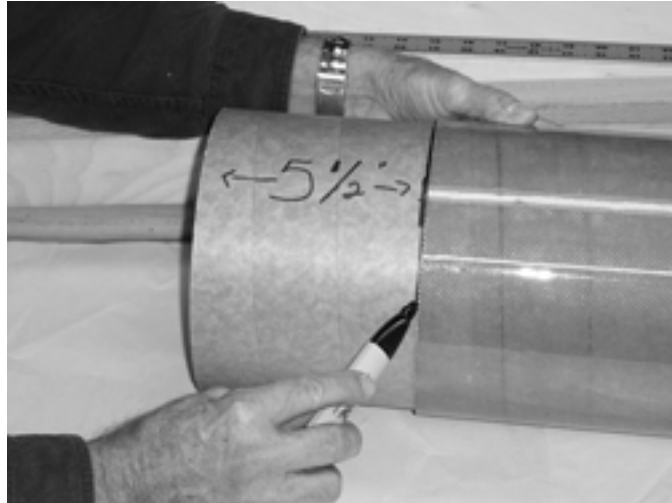
- One- 7.5"x 16" coupler
- One- 7.5"x 30" Dyna-Wind airframe
- One- 7.5"x 5" centering ring with three 5/16" drilled holes
- One- 7.5"x 5" centering ring with three CHAMFERED 5/16" drilled holes

Begin by placing a mark 5.5" from one end of the coupler.

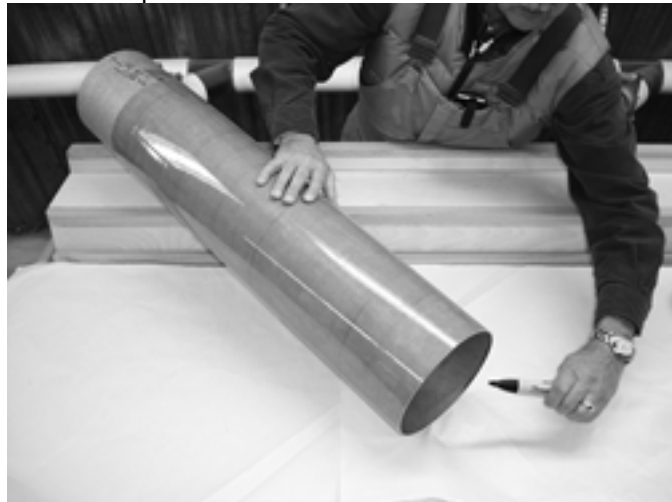


Temporarily (WITHOUT ADHESIVES) slide the coupler into one end of the 7.5"x 30" Dyna-Wind airframe until the mark at 5.5" on the coupler is flush with one end of the airframe.

With your marking pen, draw a line around the circumference of the coupler evenly at the 5.5" mark.



KEEPING THE COUPLER AT EXACTLY THAT POINT, temporarily apply masking tape to hold the coupler in position. With your marking pen AND WITHOUT MOVING THE COUPLER, mark the interior circumference of the Dyna-Wind airframe flush at the opposite end of the coupler, then remove the coupler.



Mix sufficient 30minute epoxy (or longer cure) to apply a thin coat to the 11.5" exterior of the coupler (NOT THE 5.5" AREA) and to the interior of the Dyna-Wind airframe where that 11.5" section of coupler will permanently reside. Using an old credit card or similar material, spread an even coat over these areas. **DO NOT SPREAD EPOXY OVER THE 5.5" SECTION OF COUPLER OR PAST THE 11.5" MARK MADE INSIDE THE 7.5" DYNA-WIND AIRFRAME.**



Slowly insert the epoxied coupler end into the epoxied 7.5" airframe end. USE A TWISTING MOTION as the coupler is inserted slowly into the airframe. HINT: KEEP THE COUPLER/AIRFRAME LEVEL TO SLIGHTLY LOWER WITH THE OPPOSITE END.



You will notice as you insert the coupler up to the marks previously made that excess epoxy will be squeezed out. By keeping the opposite end of the tube slightly lower, excess epoxy will drip forward onto the airframe area up to the point of the 11.5" mark inside of the airframe. **UNDER NO CIRCUMSTANCE ALLOW EPOXY INSIDE OF THE COUPLER. IF ANY FALLS INSIDE, IMMEDIATELY PUSH IT OUT ONTO THE AIRFRAME AND REMOVE THE REMAINDER INSIDE THE COUPLER COMPLETELY WITH LACQUER THINNER OR SIMILAR PRODUCT.** Stop insertion of the coupler when you reach the 5.5" mark on the outside of the coupler (leaving 5.5" of coupler exposed outside of the 7.5" airframe). **IMMEDIATELY CHECK THAT THERE IS NO EPOXY ON THE OUTSIDE OF THE EXPOSED COUPLER AREA.** Lay the combined airframe/coupler level and tape in place with masking tape. QUICKLY, REACH INSIDE THE AIRFRAME AND SPREAD EXCESS EPOXY FROM THE COUPLER INSERTION 1" HIGHER INSIDE THE AIRFRAME **BUT DO NOT ALLOW ANY EPOXY INSIDE OF THE COUPLER.** Take the 7.5"x 5" centering ring with **CHAMFERED HOLES** and insert into the 7.5" airframe from the end opposite the coupler **CHAMFERED HOLE SIDE FIRST** towards the coupler.



Slide the centering ring all the way down into the epoxy already spread inside the airframe until the centering ring is permanently in-place on top of and flush, in contact with the coupler. **DO NOT MOVE THE COUPLER. IMMEDIATELY CHECK THAT THERE IS NO EPOXY INSIDE OF THE COUPLER NEXT TO THE JUST MOUNTED CENTERING RING. BE CERTAIN! THE CENTERING RING MUST BE CLEAN, FLUSH AND IN CONTACT WITH THE COUPLER. ALSO, BE CERTAIN THE THREE CHAMFERED HOLES ARE CLEAN AND FREE OF EPOXY.** Take the second centering ring and insert the same way as the first.

Be sure there is sufficient remaining epoxy that the second centering ring is locked in contact with the first centering ring. **MAKE SURE THERE IS EPOXY SPREAD ON THE TWO FACING SURFACES OF THE CENTERING RINGS. BE CERTAIN THE THREE 5/16" HOLES DRILLED IN THE TWO CENTERING RINGS LINE UP EXACTLY. CHECK AGAIN THERE IS NO EXCESS EPOXY INSIDE OF THE COUPLER AND NONE INSIDE THE THREE 5/16" CENTERING RING HOLES.** Finally, be certain only 5.5" of coupler extends outside of the airframe AND THERE IS NO EXCESS EPOXY INSIDE OR OUTSIDE THE COUPLER OR IN THE THREE 5/16" HOLES DRILLED IN THE CENTERING RINGS. ALSO CHECK THAT THE THREE 5/16" HOLES LINE UP EXACTLY.

## **ASSEMBLY OF THE TRIAD AVIONICS BAY**



Please locate the following items:

Three- 'o' rings

One- av-bay mounting ring with three 2.5" bored holes, five 5/16" drilled holes and six brass threaded inserts

One- av-bay mounting ring with three 2.5" bored holes and five 5/16" drilled holes

Three- 2.5" x 8" phenolic tubes

Three- 1/4" x 10.5" all-thread

Two- 1/4"x 20 u-bolts

Twenty six- 1/4"x 20 hex nuts

Twenty six- 1/4" washers

Three- 1/4" eyebolts

Three- birch av-bay pod covers, each with two small drilled holes, one 1/4" drilled hole and three partial-circular cut-outs along perimeter

Three- 2.5"x 2.1" centering rings

Six- 2.5"x 1/2" bulkheads with dado slots

Three- g10 boards, 2.5"x 7"

Three- 1/4"x 20 wing nuts

Six- 8/32 x 3/4" machine screws

Six- 8/32 washers

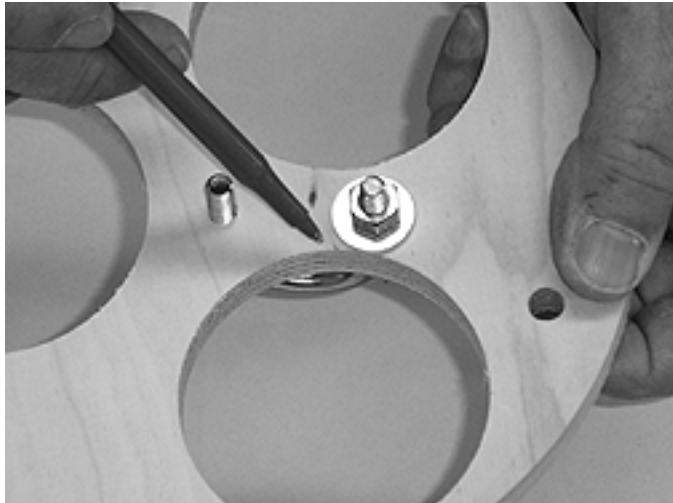
## **ASSEMBLED TRIAD AVIONICS BAY**



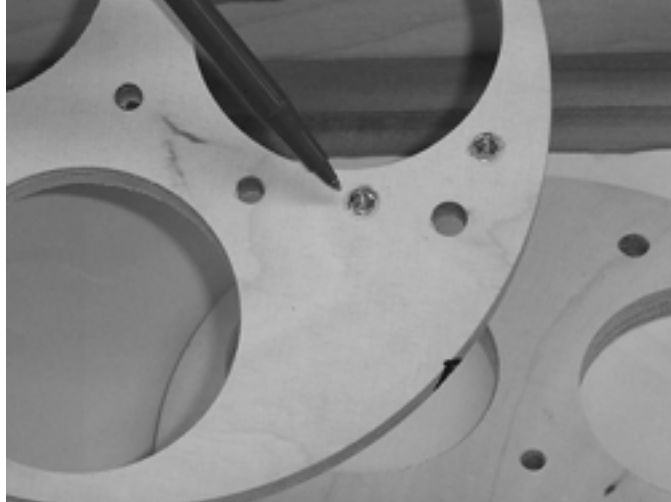


PLEASE READ THIS SECTION OF INSTRUCTIONS COMPLETELY PRIOR TO BEGINNING. IN ADDITION, DRY-FIT ALL PARTS (**WITHOUT ADHESIVE**) BEFORE FINAL ASSEMBLY IS HIGHLY RECOMMENDED.

Before beginning, as you attach any of the hardware (u-bolts, all-thread, etc.) be certain that no washer in particular will overlap into any adjacent opening. FAILURE TO AVOID THIS WILL PREVENT ASSEMBLY OF LATER PARTS.



First, locate the two av-bay mounting rings with three 2.5" holes in each, two u-bolts and eight 1/4" nuts with washers. Notice one of the av-bay mounting rings has six brass-threaded inserts; that mounting ring is the "top" of the completed Triad bay with the side showing six brass inserts closest to the surface to be considered the "out" side of that mounting ring.



Begin by putting one nut first and then one washer on each "leg" of the two u-bolts, running the nuts and washers to the very top. With both av-bay mounting rings temporarily placed together, match witness marks on the edges. **KEEP THOSE MARKS ALIGNED THROUGH-OUT THIS ASSEMBLY.**



Insert one u-bolt (with attached nuts and washers) leg through the center 5/16" hole and the second leg through the adjacent 5/16" hole (approximately 1.38" from the first). **BE CERTAIN THE "U" OF THE U-BOLT IS ON THE "OUTSIDE" OF BOTH MOUNTING RINGS IN RESPECT TO THE ABOVE LOCATED EDGE WITNESS MARKS.** After insertion, thread washers first then nuts on all four exposed "legs" on the "inside" of the mounting rings. Tighten securely with either a drop of Loc-Tite, CA glue or epoxy to prevent loosening at a later date.

Locate the three 2.5" x 8" phenolic tubes. Permanently epoxy into the av-bay mounting ring with the six brass-threaded inserts all three tubes **KEEPING THE ENDS FLUSH WITH THE OUTSIDE (LOOPED SIDE OF U-BOLT) OF THE MOUNTING RING.**



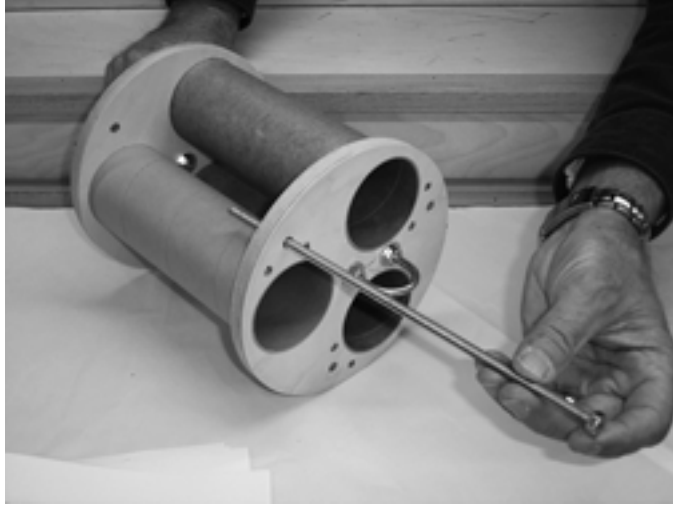
**IT IS CRITICAL THAT ALL THREE TUBES ARE FLUSH/SQUARE ON THE ENDS AND STRAIGHT WITH ONE ANOTHER AND THE U-BOLT FACING OUT. DO NOT ALLOW ANY EPOXY TO MIGRATE INSIDE THE TUBES.** Set aside to cure with tubes vertical.

After curing has completed, slide the second av-bay mounting ring, matching the "witness" marks in line with both top and bottom mounting rings, "LOOPED" SIDE OF U-BOLT FACING TO THE OUTSIDE, over the three exposed 2.5" tubes and epoxy into place **STOPPING WITH ALL THREE TUBES FLUSH-EVEN WITH THE OUTSIDE OF THE AV-BAY MOUNTING RING. IT IS CRITICAL THAT ALL THREE TUBES ARE FLUSH/SQUARE ON THE ENDS AND STRAIGHT WITH ONE ANOTHER WITH THE U-BOLT FACING OUT. DO NOT ALLOW ANY EPOXY TO MIGRATE INSIDE THE TUBES.** Set aside to cure.

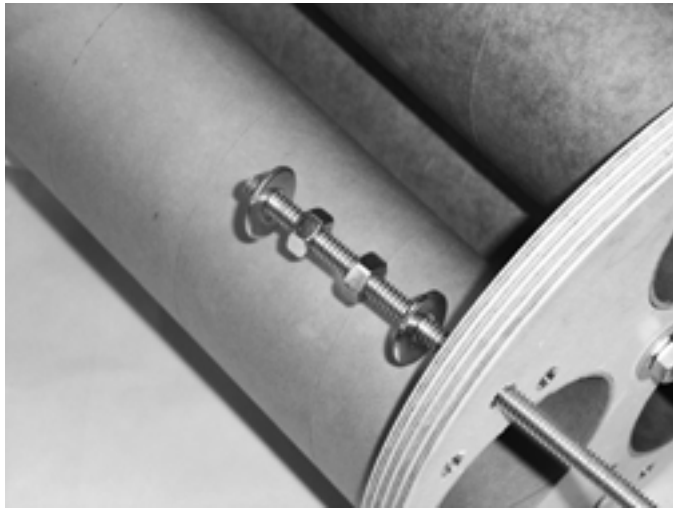


Locate the three all-threads, twelve  $\frac{1}{4}$ " hex nuts and nine washers. Thread **ONE NUT ONLY FLUSH AND STOP** on one end of all three all-threads. **DO NOT PLACE A WASHER IN CONTACT WITH THAT NUT.**

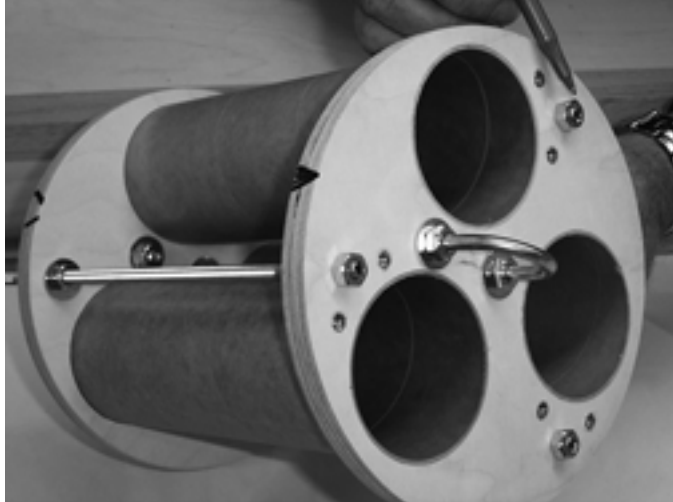
Thread the opposite end of each all-thread through the three, outer  $\frac{5}{16}$  holes drilled in the outside perimeter of the upper av-bay mounting ring (THE ONE WITH THE SIX BRASS-THREADED INSERTS) until approximately two inches is protruding through the opposite side of the same av-bay ring.



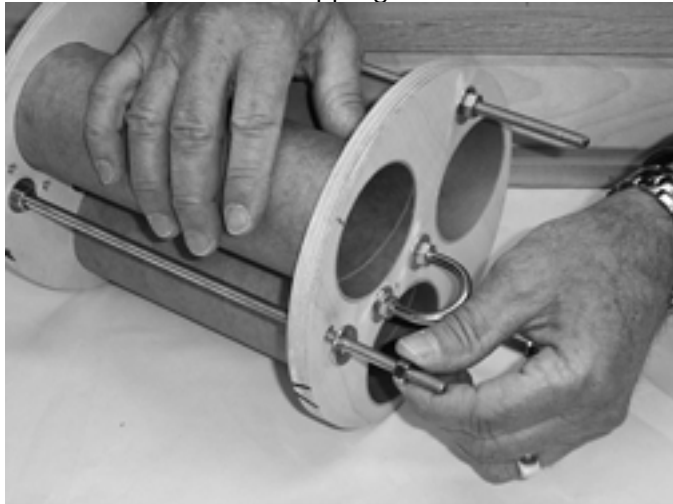
Next thread first a washer and a nut AND THEN A SECOND NUT AND WASHER **IN THAT ORDER** onto all three all threads.



Without tightening any nuts or washers, continue insertion of the three all-threads through the first-top av-bay mounting ring and then through the three opposite 5/16" holes located **EXACTLY ACROSS** in the second-bottom av-bay mounting ring. Spin (or "run-up") all the nuts and washers that reside between the two av-bay mounting rings allowing all three all-threads **WITH NUTS ONLY FLUSH ON THE ENDS** to stop in contact with the "outside" of the top av-bay mounting ring.



Before going further, thread first a washer and then a nut onto the three exposed ends located on the "outside" of the bottom av-bay mounting ring. **DO NOT TIGHTEN** as you are only preventing the all-threads from slipping out for now.



You will now begin to tighten all nuts and washers on all three all-threads **IN THIS ORDER:**

- a. Confirm that the **NUT ONLY IS FLUSH** with the end of the all-thread located on the **OUTSIDE OF THE TOP AV-BAY MOUNTING RING**.
  
- b. Run up the washer and nut **ONLY** to the **BOTTOM-INSIDE** av-bay mounting ring that has the brass, threaded inserts. Utilizing Loctite, CA glue or a drop of epoxy, place a drop onto the threads where this nut will reside. Using wrenches, tighten the "INSIDE" nut against the "OUTSIDE" nut **STILL KEEPING THE ALL-THREAD FLUSH WITH THE TOP OF THE NUT LOCATED ON THE "OUTSIDE" OF THE TOP AV-BAY MOUNTING RING**.



- c. **WITHOUT TIGHTENING**, run-up both washers and nuts on the opposite end of the just mentioned all-thread around both sides of the bottom av-bay mounting ring.
- d. Placing a drop of Loctite or equivalent on both sides of the all-thread closest to the bottom av-bay mounting ring, "finger-tighten" the nuts on both sides. Utilizing wrenches, **TIGHTEN BOTH NUTS ONLY ON THIS ALL-THREAD SIMULTANEOUSLY**.



- e. Follow the above procedure with the other two all-threads

**NEVER-EVER TIGHTEN ONE NUT ONLY. TO DO SO WILL TAKE THE ENTIRE AV-BAY OUT OF ALIGNMENT AND RISK BREAKING THE EPOXY JOINTS CONTENECTING THE 2.5" PHENOLIC TUBES TO THE AV-BAY MOUNTING RINGS. ONLY TIGHTEN NUTS IN**

**PAIRS ON OPPOSITE SIDES OF THE SAME AV-BAY MOUNTING RING TO PREVENT BREAKAGE.**

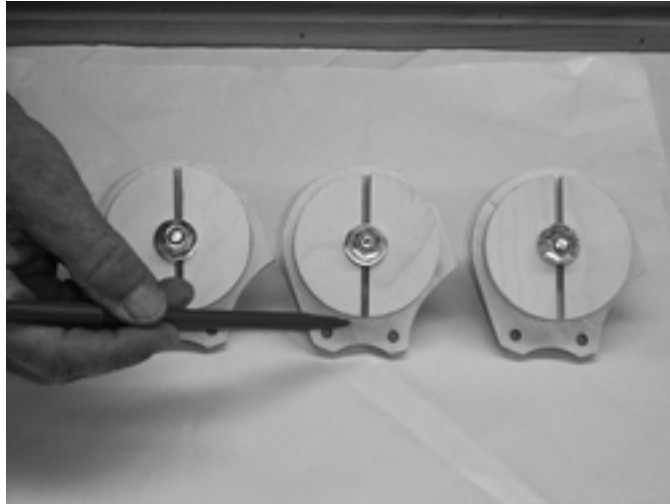
Gather the following items: three eyebolts, six nuts and six washers, three av-bay pod covers with sculpted edges, six 2.5"x 1/2" bulkheads with dado slots and three 2.5" x 7" g10 boards with one notched end each. Begin by threading one nut and washer in that order onto each eyebolt and run-up until it stops.



Insert that eyebolt through first the sculpted pod cover and then through the 2.5"x1/2" bulkhead leaving the dado slot in that bulkhead **FACING OUT**. Thread a second washer first and then nut onto the exposed end of the eyebolt **FINGER-TIGHT ONLY**.



Referring to the following photograph, notice the position of the dado slot to the pod cover. **IT IS HIGHLY RECOMMEND THAT ALL THREE POD COVER ASSEMBLIES ARE BUILT IN THIS MANNER.**



WITHOUT ANY ADHESIVES, drop all three pod cover assemblies into position on the av-bay where the brass-threaded inserts are visible. **TURNING ALL POD COVERS AS NECESSARY, CONFIRM THAT THE TWO SMALL HOLES DRILLED IN THE POD COVERS LINE UP WITH THE MATCHING BRASS-THREADED INSERTS LOCATED IN THE OUTSIDE OF THE TOP AV-BAY MOUNTING RING.**



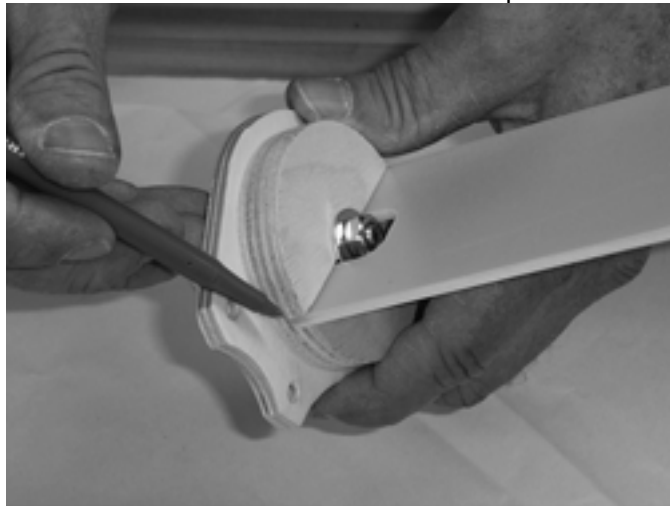
If they do not, it will be necessary to disassemble the pod cover assembly and FLIP the pod cover over so it will. REMEMBER TO KEEP THE BULKHEAD WITH DADO SLOT AND THE POD COVER ARRANGED AS SHOWN ABOVE TO POSITION THE DADO SLOT PROPERLY. Once you are satisfied, loosen the outside nut to allow a small gap between the pod cover and bulkhead with dado slot. Squirt a small amount of THICK CA GLUE around the perimeter of the bulkhead and the pod cover.





When finished, push both pieces together, **LINING UP THE DADO SLOT IN CORRECT POSITION**, and tighten the outside nut with Loctite or equivalent. **IMMEDIATELY WIPE AWAY ANY ADHESIVE FROM THE OUTSIDE OF THE POD COVER ASSEMBLY.** Continue this procedure with the remaining pod cover assemblies. After curing, check the fit of the pod cover assembly in position with the main av-bay assembly. If necessary, sand the edges of the bulkhead until it fits properly inside the av-bay pod.

Now locate the three remaining 2.5"x 1/2" bulkheads with dado slots and the three av-bay g10 fiberglass boards. **WITHOUT ADHESIVES, INSERT THE AV-BAY BOARD, NOTCHED END, INTO THE JUST COMPLETED POD COVER ASSEMBLY DADO SLOT** to confirm "fitment" and that the board "width" does not extend past the outside of the bulkhead.



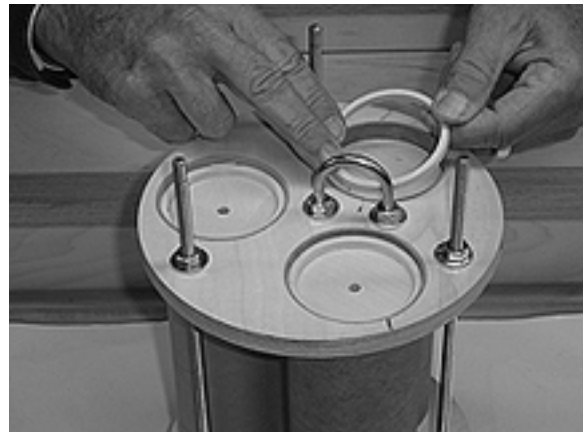
Without removing the av-bay board from the pod cover assembly **AND STILL USING NO ADHESIVES**, slip the opposite end of the board into the dado slot of one of the remaining 2.5"x 1/2" bulkheads, confirming "fitment" and that the board "width" does not extend past the outside of the bulkhead.



Once you are satisfied with the "dry-fit", mix sufficient epoxy to apply in the dado slot of POD COVER ASSEMBLY AND THE NOTCHED END OF THE AV-BAY BOARD and join together. Wipe away any excess epoxy and confirm that the av-bay board does not extend outside of the dado slot. **REMEMBER, WIPE AWAY ANY EXCESS EPOXY.** Once assembled, stand on end and allow to cure.

Once cured, take the above part and mix sufficient epoxy to coat the opposite end of the av-bay board and the dado slot of the 2.5" bulkhead. Join these parts together **CONFIRMING THE BOARD IS CENTERED IN THE DADO SLOT AND ALL EXCESS EPOXY IS WIPED AWAY.** Set aside and allow to cure. Follow the above procedures and assemble the two remaining av-bay pod inserts.

With all the av-bay pod inserts assembled and inserted **FULLY** inside the Triad av-bay frame, turn the entire av-bay assembly so the bottom side (with exposed all-thread ends) is vertical and (USE NO ADHESIVE) insert one 'o' ring (not shown) and one 2.5" x 2.1" centering ring inside each 2.5" pod opening.



Push each centering ring and 'o' ring in until it comes in contact with the bottom of the removable pod insert. **BE CERTAIN THE POD INSERTS HAVE NOT BEEN PUSHED OUT OF THE POD CONTAINERS!**



After checking "fitment", remove all three pod inserts and 'o' rings leaving the centering rings UN-MOVED. CAREFULLY, with THIN CA glue, wick the adhesive around the three centering rings **BEING CERTAIN THE ADHESIVE HAS NOT MIGRATED AWAY FROM THAT LOCATION**. Leave open and allow curing prior to replacement of the 'o' rings and pod inserts.



Finally invert the entire Triad av-bay assembly and insert the remaining six 8/32 machine screws and washers through the holes located in the pod covers, thread into the brass inserts located directly beneath.



The **TRIAD AV-BAY** is now complete. This entire unit is designed and built to be removable from inside of the already completed upper airframe/coupler. **NEVER, NEVER, NEVER EVER GLUE OR EPOXY THIS UNIT PERMANENTLY INSIDE THE SLEDGEHAMMER. TO DO SO RUINS ONE OF THE MAIN DESIGN FEATURES, THE ABILITY TO REMOVE, SERVICE AND PREPARE YOUR ELECTRONICS AND EJECTION CHARGES OUTSIDE OF THE ROCKET FOR EASE OF ASSEMBLY.** To demonstrate the ease of attachment to the rocket, first stand the assembled Triad av-bay on the floor with the three bare all-thread ends pointing up. Slide one of the remaining washers on each of the all-threads. Holding the upper airframe vertical (coupler end down), lower the airframe down over the av-bay assembly until the coupler is touching the floor. Now reach down through the top of the airframe grasping the exposed u-bolt, pulling the entire unit upwards. It will be necessary to rotate the entire unit until the all-threads line up with the drilled holes located with the already attached centering rings located at the top of the coupler. When aligned, continue pulling the unit into place with the all-thread ends sliding through the above mentioned holes and pulling until it stops. Next put one washer and one wing-nut over each exposed all-thread end and run-up until snug. Your **TRIAD AV-BAY** is now completed and in position for use.

It is recommended that with a marker, you "key" the correct position of the av-bay to the interior centering attachment rings to make future positioning easier. Removal of the **TRIAD AV-BAY** is just as simple, remove the three wing-nuts and washers and push the entire unit back out and lift off the airframe.

## **EJECTION CHARGE INSTALLATION**

The Sledgehammer utilizes dual deployment ejection separating the rocket above the booster section for drogue deployment with the main parachute deploying between the upper airframe and nosecone. Ejection charges(s) will be mounted inside the recovery sections between the lower part of the Triad av-bay and drogue parachute/recovery harnesses and between the upper part of the Triad av-bay and the main parachute/recovery harnesses. It will be necessary to drill small openings through the various Triad pod caps to allow "pass-through" of wires to whatever electronics you install in the pods. Be certain you use some kind of putty (Sticky Tack) to seal these openings to prevent ejection gases from corroding and damaging your electronics.

It is recommended the flyer utilize two separate high quality altimeters for redundancy. Each altimeter would control one each separate ejection charges to the drogue section and one each separate ejection charge to the main parachute section. For initial, ground testing purposes, a 1.5 gram black powder charge may be utilized for each ejection container in the drogue section and a 2-3 gram black powder charge is utilized for each ejection container in the main parachute section. **BE ABSOLUTELY CERTAIN THESE CHARGES ARE PACKED AND SEPARATED TO PREVENT ONE CHARGE FROM BLOWING THE SECOND CHARGE SIMULTAINOUSLY.** Pack cellulose insulation around and between all charge units. **FINALLY, YOU MUST GROUND TEST BOTH DROGUE AND MAIN PARACHUTE DEPLOYMENT CHARGES WITH PARACHUTES MOUNTED TO CONFIRM A COMPLETE DEPLOYMENT.** With your rocket 7,000 feet or so up in the air, it is a poor time to discover that your charges or packing procedures were not correct.

## RAIL BUTTON INSTALLATION

The Sledgehammer utilizes rail buttons in two recommended locations, WITH THE FIRST MOUNTED INTO THE TAILCONE INTERIOR "SHOULDER" ALREADY EPOXIED INSIDE THE BOTTOM OF THE AIRFRAME and then 6 INCHES DOWN FROM THE VERY TOP OF THE SLOTTED BOOSTER AIRFRAME INTO THE INTERIOR UPPER CENTERING RING ASSEMBLY (please check your installation for the exact placement of the centering ring assembly). Drill 3/32" holes for attachment, NO MORE THAN 1/2" DEEP into the exposed centering rings and tailcone shoulder. **BE CERTAIN THESE TWO MOUNTINGS ARE STRAIGHT IN LINE WITH THE LENGTH OF THE ROCKETRY AIRFRAME.** These rail buttons may look small, but they are quite sufficient for the task and fit a standard 1" x 1" launch rail. Utilizing the included hardware, insert a bolt/screw through the rail button and if necessary the nylon washer standoff. For even greater strength, place a drop of epoxy in the opening and push into the drilled hole with a toothpick or the like. Immediately screw the rail button assembly into position and repeat for the second button.

## JOINING OF SUB-ASSEMBLIES



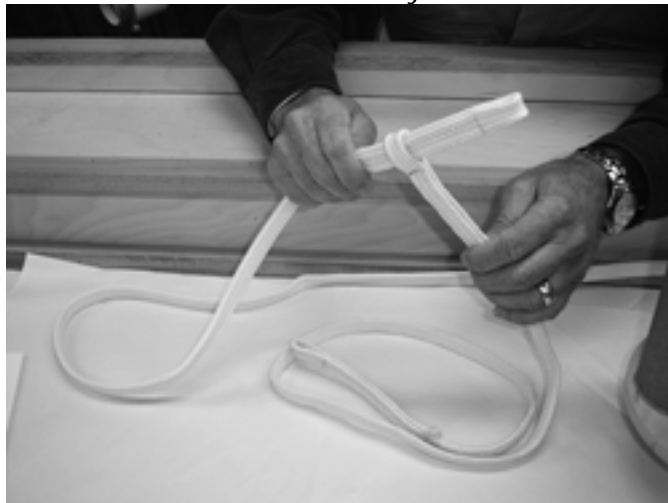
Please locate the following items:

- One- nose cone
- One- upper airframe
- One- un-attached Triad av-bay
- One- lower booster assembly
- One- 1/2" x 25' Tubular Kevlar Shock Loop
- One- 1/2" x 15' Tubular Kevlar Shock Loop
- Two- 1/2" x 44" Kevlar Shock Loops
- Two- extra large Kevlar Chute pads
- Five- 5/16" quick links

Begin by first attaching one end of the 1/2" x 25' Kevlar shock loop to the u-bolt located on the TOP of the Triad av-bay (the side with the small 8/32 screws and washers) via a 5/16" quick link.



Thread the opposite loop first through one "looped end" of the short (44") Kevlar Shock Loop and tie into place over that short shock-loop with one simple overhand knot approximately FIVE FEET from the Triad av-bay.



Mount a second 5/16" quick link to the free end of the 44" shock cord.



Next, slip a Kevlar chute pad over the still loose end (of the 25' shock-cord) and finally attach via a third 5/16" quick link to the Kevlar bridle located in the top of the lower booster section.



By putting the longer of the two included shock loops between the booster section and what will eventually be the upper airframe, you are insuring that during drogue descent, both sections of your Sledgehammer will be separated sufficiently to help prevent uncontrolled contact with resulting damage.

Now attach one end of the 1/2" x 15' Kevlar shock loop to the opposite u-bolt located on the other side of the Triad av-bay via a 5/16" quick link.



Slide the second Kevlar chute pad over the opposite shock cord end.

Thread one end of the second-short 44" Kevlar shock cord over the still loose end of the 15' Kevlar shock loop and tie a simple, over-hand knot securing it into place approximately THREE FEET from the still un-attached end of the 15' Kevlar shock cord. On the remaining loose end of the 44" shock loop, attach the fifth 5/16" quick link.

Finally, thread the still loose 15' Kevlar shock cord loop first through the coupler side of the upper airframe and out the top.

Pull the Triad av-bay (three exposed all-thread ends first) and lock into position with washers and wing nuts.



Holding the same shock cord end, thread it through one of the 1/2" drilled holes in the base of the nosecone and out the other drilled hole, threading it back upon itself as shown in the photograph.





PLEASE DO NOT UTILIZE THE ATTACHMENT LUGS MOLDED INTO THE BASE OF THE NOSECONE. Often, those attachments cannot handle the strain and will break free of the rocket "assembly" during ejection.

## **SLEDGEHAMMER DECAL ATTACHMENT**

After all construction, sanding, painting and finishing of your Sledgehammer, it is time to mount the decal. DO NOT separate the layers of the decal at this time. Determine the position you desire for decal placement and tape either the top or bottom edge of the decal to your Sledgehammer creating a "hinge". Lift the end of the decal opposite of the "hinge" and fold back. Carefully and slowly peel back the bottom waxy paper while holding the remaining decal section off the surface of the rocket airframe. Discard the waxy paper.

Very slowly, lower decal at the hinge point following the natural positioning caused by the hinge. Slowly, lightly press the center out of each character as it comes in contact with the rocket until the entire carrier of the characters is in place on your rocket. If any air bubbles remain under the decal, use one of the clean plastic spoons to press any defects out from under the carrier.

### **Safety Code and Liability 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. Remember, with lack of care, rocketry can be dangerous. By purchasing our materials you agree to the above conditions, and agree 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 shall be 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.