



ALL FIBERGLASS

Patriot

Specifications

- Length: 71"
- Diameter 5.5"
- Weight: 17 lbs
- Motor Mount: 54mm
- Fins: 4 - 1/8" G10
- CP: 42.5" from nose tip

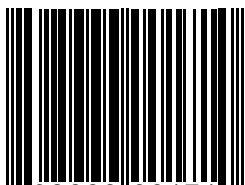
Parts List

- (1) Filament Wound Nose Cone w/ Metal Tip
- (1) Nose Cone Coupler
- (1) Pre-slotted main body tube (30")
- (1) Payload section body tube (20")
- (2) Centering rings
- (1) Coupler (10")
- (4) Bulkheads (2 coupler, 2 airframe)
- (1) 54mm Motor tube (12")
- (4) 1/8" G10 fins
- (3) Forged Eyebolts, washers and nuts (1/4-20)
- (1) U-bolts, (1) U-bolt plate, (4) U-bolt nuts
- (7) Nuts and (7) Washers
- (2) Threaded Rods (12")

You'll need these items to complete this kit

- Epoxy
- Rail Buttons
- Filler and Paint
- Zap or CA Super Glue
- Motor Retainer
- 60/80 Sandpaper
- Pencil

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Please make sure you read all directions and understand how to assemble your model before you start construction. It is also a good idea to test fit each part before assembly.

Fiberglass parts still contain small amounts of mold release and other materials on the surface that will inhibit adhesives and/or paint. It is important to clean each part prior to assembly with a solution of 1 part rubbing alcohol, 3 parts water and a drop of dish washing soap. **IMPORTANT:** do not sand any parts until after you have cleaned them - you will embed the materials you are trying to clean making it difficult to clean.

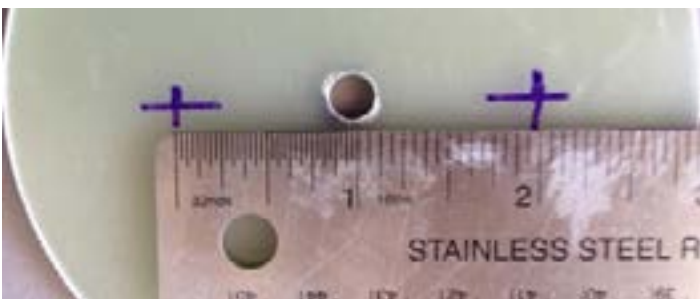
Some G10 parts may have holding tabs left over from the CNC machine. These small tabs will need to be sanded off before assembly.

Use only a high quality epoxy like Aeropoxy or West System to bond parts together. You can use a colloidal silica filler like West System 404 or 406 to thicken epoxy when making fillets. When using a filler for fillets a consistency like peanut butter or syrup is best. For extra strength you can add 1/16" or 1/32" milled glass fiber.

IMPORTANT: Before assembling any part with epoxy, rough up the surface to be epoxied using 60-80 sandpaper. The scratches in the fiberglass surface will give the epoxy something to grab onto. Epoxy will not soak into the fiberglass like wood or cardboard - epoxy will not grip very well to fiberglass without this rough surface. You can use Zap or CA glue to tack parts into place before you apply epoxy.



□ Step 1 - Mark one of the bulkplates as shown.



□ Step 2 - Stack 2 large bulkplates and 1 smaller bulkplate and temporarily secure the plates with a single eyebolt to hold them together. Drill through all 3 bulkplates at the points you just marked with a 1/4" drill bit. You can also drill a single 1/8" hole for the ematch wires.



□ Step 3 - Separate the bulkplates and then glue one of the large bulkplates to the smaller bulkplate while aligning the holes. Make sure the bulkplates are centered so that they will go into the end of the coupler and not interfere with the body tube. You can secure with an eyebolt, nut and washer while these dry. While the epoxy is setting, take the single large bulkplate (the other smaller bulkplate is for the nose cone to be used later on) and trap the two 14" threaded rods using 2 nuts and two washers each as shown. Use thread lock to make sure these don't come undone later.



□ Step 4 - DO NOT EPOXY OR USE THREAD LOCK FOR THIS STEP. Place the bulkplate with the threaded rods on one end of the long coupler. Place the other two bulkplate set on the other end of the coupler and secure using a nut and washer on each threaded rods. The larger bulkplate should seat against the coupler edge with the smaller bulkplate going inside the coupler. Check to make sure the single bulkplate is centered on the other end of the coupler.



□ Step 5 - Mark the coupler 5.5" from the end with the double bulkplate that didn't have thread lock on the nuts. This will be the exposed part of the coupler. The single bulkplate with thread lock will be the covered part of the coupler that will go inside the payload section. Test fit the coupler inside the shorter payload tube and sand the single bulkplate if necessary.



- ❑ Step 6 - Spread some epoxy on the inside of the end of the payload tube and slide the coupler into the payload tube up to the mark made in the previous step. Keep the double bulkplate attached to the coupler in order to hold the single bulkplate on the inside end of the coupler in place until the epoxy sets. Keep the payload tube with the open end facing up so the epoxy doesn't run down the tube and interfere with the nose cone shoulder later.
- ❑ Step 7 - Drill and mount the U-Bolt to one of the centering rings. Put 2 nuts on the U-Bolt first, place the U-Bolt onto the centering ring followed by the mounting plate and 2 nuts. Secure the nuts with epoxy so they do not come loose later.



- ❑ Step 8 - Sand the outside of the motor tube to rough up the surface for the epoxy to stick to.



- ❑ Step 9 - Mark the motor tube 1/2" from one end of the motor tube. Epoxy the centering ring, with the U-Bolt you just mounted, at the mark. Make sure you have the U-Bolt facing up - this will be the forward centering ring. **IMPORTANT:** make sure the motor tube is clean of epoxy because the fin roots will need a clean surface to attach to.



- ❑ Step 10 - Sand the body tube for at least 1/2" around the fin slots inside and outside to rough the surface for the fin fillets. Also sand where the centering ring will attach in front of the fin slots on the inside. You can wrap sand paper around a large dowel to help sand the inside of the body tube.



- ❑ Step 11 - Test fit each of the fins in the fin slots and file the slots to make sure you have a snug but smooth fit. Also sand the sides of the fin tangs so the entire tang plus at least 1/2" of the exposed fin above the body tube is roughed up so epoxy will stick to the fin. You can clean any residue from the machining process using acetone. It is a good idea to number your fins and slots to remember which fin fits best in what slot.
- ❑ Step 12 - Test fit the aft centering ring on the motor tube and inside the body tube. Sand for a snug but easy fit. Wrap the aft centering ring in plastic wrap for the next step. **IMPORTANT:** you will not be gluing the aft ring on yet, only using it to align the motor tube.
- ❑ Step 13 - Test fit the motor tube assembly inside the body tube to ensure a smooth fit. The centering ring with the U-Bolt should go in first. When you are satisfied with the fit, spread epoxy on the inside of the body tube above the fin slots and slide the motor tube in until the centering ring clears the fin slot. Make sure any fillet on the forward centering ring is clear of the slot so the fin root can seat against the motor tube. The aft end of the motor tube should extend 1" aft of the fin slot if you are going to use a retainer that goes onto the motor tube. **IMPORTANT:** do not use epoxy on the aft centering ring yet. Insert the aft centering ring inside the aft end of the rocket to make sure the aft end of the motor tube remains centered while the epoxy sets.
- ❑ Step 14 - Apply an epoxy fillet on the forward side of the forward centering ring where it meets the body tube.



- ❑ Step 15 - Use a door jamb to mark half way between two fins on the slotted main body tube. This line will be used later to align the rail buttons.



- ❑ Step 16 - With the aft centering ring temporarily still in place, tack each of the fins in place using CA on the root edge of the fin. Make sure each fin seats properly to the motor tube before applying CA. Readjust your slot if needed. Also CA along the body tube/fin joint to keep the fin from sliding when you remove the aft centering ring later. **IMPORTANT:** make sure you do not accidentally glue the aft centering ring in place. Remove the aft centering ring after the glue sets.



- Step 17 - It is a good idea to use masking tape to seal the outside of all the fin/body tube joints for this step in case there are any gaps where epoxy can leak through. Mix some epoxy and use milled glass to make a thick syrup like consistency. Pour the mixture down each fin line between the motor tube and body tube. Use a dowel and spread epoxy forming a fillet on all fin to motor tube joints and internal fin to body tube joints. Make sure you get a good fillet on the entire fin because this is the main strength point of the fin joint. Failure to get a good solid strong joint at this point can lead to a fin separation in flight. You can use plastic syringes here if you want to help place the epoxy accurately. **IMPORTANT:** make sure you keep the motor tube clean aft of the fin where the aft centering ring will go.



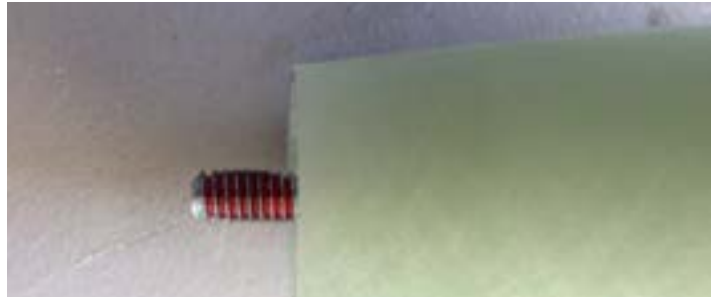
- Step 18 - Use the same epoxy consistency to form fillets on the outside fin/body tube joint.



- Step 19 - Test fit the aft centering ring. Epoxy the aft centering ring in place. Follow the manufacturer's directions and attach the motor retainer at this point.
- Step 20 - Sand the outside end of the shorter coupler and the inside of the nose cone where the coupler and nose cone parts will bond together. Also sand the inside of the opposite side of the coupler where the bulkplate will be bonded.



- Step 21 - Use lock-tite on the nose cone tip to make sure it does not come loose during transportation.



- Step 22 - Pack the chutes and assemble the rocket. Insert the largest motor that you intend to fly (or simulate the weight with an appropriate substitute) and ensure that the CG is at least 1 body diameter in front of the estimated CP point specified on the first page. The estimated CP should be measured from the tip of the nose cone. If the CG is too far back, add weight inside the nose cone by pouring lead shot into the nose cone and adding some epoxy. **IMPORTANT: Make sure you rough up the inside of the nose cone to give the epoxy something to grip on to. The smooth surface of the filament wound nose cone may not hold the epoxy during a high G liftoff.**

IMPORTANT: Proper CG is critical to the stability of this model. This model will require some ballast in the nose - the amount will depend on how you build and the size motor you use to fly. Do not fly without balancing this model properly as a dangerous unstable flight will result.

- Step 23 - Mount the eyebolt with a nut and washer to the remaining small bulkplate and secure with epoxy so it will not come apart later.



- Step 24 - Epoxy the bulkplate into the end of the coupler where you sanded the inside. Leave about 3/8" for a fillet. After the epoxy sets, apply a fillet around the inside edge.



- Step 25 - Drill a 1/8" vent hole in the bulkplate to let the air out while you epoxy the coupler into the nose cone base. Epoxy the coupler into the base of the nose cone and make sure you leave at least 5.5" of the coupler exposed. Also ensure you get epoxy on the whole area where the coupler and nose cone will contact to ensure a good bond. It is best to put epoxy inside the nose cone and not the outside of the coupler. Make sure you have a clean coupler so as to not interfere with the payload body tube later.
- Step 26 - At this point you can attach the rail buttons (not included).
- Step 27 - Drill a 1/8" vent hole just forward of the forward centering ring. Also drill a second vent hole in the payload tube above the coupler.
- Step 28 - Rig the recovery system with your choice of shock cord.
- Step 29 - Your model is now ready to paint and fly.

Now go have some fun!

Flying Your Model

IMPORTANT: always use positive motor retention to secure the motor. Failure to use motor retention will cause the motor to be ejected instead of the parachute making for a dangerous ballistic reentry.

IMPORTANT: Proper CG is critical to the stability of this model. This model may require some ballast in the nose - the amount will depend on how you build and the size motor you use to fly. Do not fly without balancing this model properly as a dangerous unstable flight will result.

IMPORTANT: Always follow the NAR safety code and remember that rockets are not toys and can be dangerous if not prepared and used properly. If you are a beginner, it is a good idea to fly with a club or other group of experienced rocketeers until you have gained some experience.

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IMPORTANT: Please contact us via phone or email if you have any questions about constructing or flying your model.



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