



BLUE PHENIX

MID TO HIGH POWER ROCKET KIT featuring ARR'S UNIQUE BLUE TUBE INNOVATION

BUILDING INSTRUCTIONS

Congratulations on your purchase of the Blue Phenix rocket kit! While Blue Tube has the strength and durability for large high performance rocket (HPR) designs, this kit is an excellent introduction to the benefits of Blue Tube – much stronger than paper or flexible phenolic, lighter than fiberglass, far cheaper than carbon fiber, more crash resistant than anything in it's price range. If you are just getting started in HPR, this kit is a great choice for your Level 1 and/or Level 2 certification.

DIAMETER: 3"
LENGTH: 45"
MOTOR MOUNT: 38mm
PARACHUTE: 36" Octagon

HOBBY LINE MOTORS:

- 29mm* Single Use: G-80T, G-77R
- 29mm* RMS: G-71R, G-64W
- 38mm RMS: G-67R, G-61W, G-69N, G-339N Warp 9**

HIGH POWER MOTORS:

- 29mm* RMS: Anything you want!
- 38mm RMS: Anything you want!

* 29mm motors require optional 38mm to 29mm MMT Adapter

** Warp 9 motors are plugged and will require an altimeter or timer for parachute deployment

PROJECTED ALTITUDE: ~ 700' with a G-80 and ~ 1 mile with a J-570W pulling 50 G's to 750mph!

NOTICE TO BUYER: This is NOT a toy! It is NOT RECOMMENDED for use by children under age 18, unless under close adult supervision. High Power Rockets are capable of extreme speeds and altitudes. If not used properly it could cause property damage, personal injury, or death. It MUST be used in accordance with applicable local, state, and federal regulations. By purchasing this kit the buyer agrees that Always Ready Rocketry and Phenix Tube will not be held responsible for any damages occurring through the use of this product and shall be held harmless in any such claims. Contact your local rocket club or the NAR or Tripoli websites for more details on HPR Safety Codes and HPR certification requirements.



BLUE PHENIX PARTS LIST

- 1 – 3" x 30" Blue Tube Airframe
- 1 – 3" 5:1 Conical Fiberglass Nosecone
- 1 – 38mm x 11.5" Motor Tube
- 3 – ¼" Aircraft Plywood Fins
- 1 – 36" Rip Stop Nylon Parachute
- 1 – 12' Tubular Nylon Shock Cord 5/8" Thickness
- 2 – 3" x 38mm Centering Rings
- 1 – 3" Nosecone Bulkhead Plate
- 3 – Quick Links
- 2 – Eye Bolt / Washer Assemblies
- 2 – Rail Buttons
- 1 – Blue Phenix Instruction Manual

REQUIRED ITEMS TO COMPLETE KIT

- 15-Minute Epoxy
- 30-Minute Epoxy
- Epoxy Mixing Sticks & Cups
- Rubbing Alcohol or Acetone (Epoxy Clean Up)
- Sandpaper (100, 150, 220, & 400 Grit)
- Hobby Knife, Drill, Drill Bits, Other Common Tools
- Straight Edge & Pencil/Pen
- High Quality Paint
- Motor Retention (More on this later)
- Recovery System Protection (Kevlar/Nomex Blanket or other recovery wadding.)

OPTIONAL ITEMS FOR KIT

- Milled Fiber (Adds Strength to Epoxy Joints)
- Auto Body Spot Putty (Small Tube)
- Kevlar/Nomex Shock Cord Sleeve

RECOMMENDATIONS

- Read ALL instructions before beginning construction. Familiarity with parts and steps before applying epoxy will greatly reduce frustration later!
- Dry fit EVERYTHING before applying epoxy—another anti-frustration tip!
- Lighter is better. Add enough epoxy for strong joints and fillets but don't go overboard.
- If you are not already an experienced HPR builder, contact your nearest rocketry club to find a mentor. Most HPR enthusiasts are eager to help newcomers.

GETTING STARTED

- **STEP 1:** Remove all parts from the packaging and inspect them. Lay them out as you continue to read these instructions to familiarize yourself with each item and when you will need it. Contact Always Ready Rocketry if you are missing any parts.

MOTOR MOUNT ASSEMBLY

- **STEP 2: Motor Retention.** As mentioned in the REQUIRED ITEMS TO COMPLETE KIT section, you will need something to ensure your motor does not eject itself from the motor mount when trying to deploy the parachute. There are many ways to ensure positive motor retention—and they commonly include modification of the aft centering ring/thrust ring. Make any such modifications now, if necessary.
- **STEP 3: Assemble the 38mm Motor Mount.** Locate one of the centering rings and the 38mm motor tube. Apply a small amount of 15-minute epoxy to one end of the motor tube—right at the end. Slide the aft centering ring on the motor tube with a twisting motion to ensure even distribution of the epoxy. Slide the ring only far enough for the aft surface to remain flush with the end of the motor tube. Use a clean rag and the alcohol/acetone to clean up any excess epoxy. Stand the motor tube upright and allow the epoxy to dry. **DO NOT** epoxy the forward centering ring at this time. **PRO-TIP:** It is important to NOT leave a lot of epoxy on the inside joints at this step. You need a clean "square" joint with the motor tube when attaching the fins.

BEVEL FINIS

- **STEP 4:** Locate the three fins. The fins should be rounded smooth on all edges EXCEPT the Root Edge (Fin Tab). This can easily be done by hand with 100 grit sandpaper. Electric sanders or Dremel tools can be used, but be very careful to not sand away too much of the fin.

BUILD FIN CAN ASSEMBLY

- **STEP 5:** When the aft centering ring is completely cured and the fins have been beveled you can begin the fin can assembly. Slide the front centering ring onto the motor tube—DO NOT EPOXY—hold in place with masking tape on the forward edge if necessary. Set the ring very close to the front edge of the motor tube. Slide the motor tube assembly into the rear of the airframe (where the fin slots are cut.) Make sure the forward centering ring is in front of the fin slots and make sure the aft centering ring is flush with the rear of the airframe.
- **STEP 6: Cut Aft Fin Slot Tabs.** Very carefully cut the small tabs at the aft end of the fin slots with a hobby knife or razor saw. This should leave the fin slots as a smooth, straight line from the forward edge all the way to the end of the airframe. **PRO-TOP:** Blue Tube is very tough—use a very sharp blade and be very careful.
- **STEP 7: Attach Fins.** Position the airframe horizontally with one fin slot pointing straight up. Apply a thin layer of 15-minute epoxy to the root edge of the first fin. Insert the fin into the slot until the root edge contacts the motor tube. Use just enough epoxy to “tack” the fin in place and be careful to not get epoxy on the slots or elsewhere on the airframe. Hold the fin in place until the epoxy sets ensuring it is perfectly perpendicular to the airframe. Set the assembly aside, fin pointing straight up, until the epoxy cures. REPEAT this procedure for the other two fins—only after each preceding fin has cured. **PRO-TIP:** It is very easy to create a simple cardboard cut-out “Fin Alignment Guide”. Create this ahead of time using the airframe diameter and fin slots to draw the pattern on your cardboard and cut out using a hobby knife. Test the fit and alignment during your dry fit checks.
- **STEP 8: Remove Fin Can Assembly.** After the epoxy has cured on all three fins, use a hobby knife to cut the airframe tabs that are behind each fin—where the aft ring is flush with the airframe. Blue Tube is tough!! Use a sharp blade and be careful! Do not cut away any more than is needed to slide the fin can out. Gently slide the fin can out of the airframe.
- If it is stuck you probably got a little epoxy on one (or more) of the fin slots. Use the hobby knife to carefully separate the fins from the airframe.
- **STEP 9: Attach Shock Cord Eye Bolt.** After the fin can assembly is removed, slide the forward centering ring off the motor tube. (This is the ring you DID NOT epoxy in place earlier!) Drill a ¼” hole in the ring and attach the shock cord eye bolt hardware (the one with the small washers). Add a little epoxy to the threads to ensure the nut does not come loose in the future.
- **STEP 10: Attach Front Centering Ring.** Spread a ring of 15-minute epoxy around the forward edge of the motor tube and on the forward edge of the fin tabs—all three. Be careful to apply epoxy ONLY to the forward edge of the fin tab where it will meet the forward centering ring. Slide the forward centering down onto the motor tube with a twisting motion to ensure even distribution of the epoxy. Continue until it stops against the top root edges of the fins leaving the shock cord eye bolt aligned evenly between two fins. Stand the tube upright and apply an epoxy fillet to the top of the ring where it joins the motor tube. Apply an epoxy fillet to the top of the aft centering ring at the same time. Set the assembly aside until the epoxy cures. When dry, invert and apply another fillet to the inside of the FORWARD CENTERING RING ONLY. Since the aft ring will be flush with the rear of the airframe you don’t want a lot of epoxy here. **PRO-TIPS:** Prior to applying epoxy, use masking tape around the outer edge of the centering ring to create a “wall” to prevent excess epoxy from running over the edges—and create a nice fillet around the motor tube. If you have modified the aft centering ring for your motor retention, **be careful** to not let any epoxy interfere with that system.
- **STEP 11: Fillet the Fin Can Assembly.** Position the fin can assembly on its side with one fin pointing straight down and the other two fins pointing up at equal angles. Apply fillets to the edge of each fin where it meets the motor tube—you can do the fillets for the two fins angled upwards at the same time. Let the epoxy cure before rotating the fin can

for the next set of fillets. **PRO-TIP:** Add milled fiber to the epoxy mix for increased fillet strength.

- **STEP 12: Attach Shock Cord to Fin Can.** It is important to do this step **NOW**. With a 3" airframe (or any diameter longer than about 18 inches) it will be impossible to reach into the airframe to attach the shock cord with the fin can installed. Attach the loop at one end of the shock cord to one of the quick links and then attach the quick link to the eye bolt. Ensure the quick link is closed tightly!
- **STEP 13: Install Fin Can.** (You did STEP 12—right?) Once the fin can fillets have cured, dry fit the fin can inside the airframe. If your alignment was done carefully and nothing slipped out of place, it should fit nicely. Ensure the assembly slides all the way into the airframe and leaves the aft centering ring aligned flush with the rear of the airframe. When the fit is confirmed slide the fin can back out. Use a dowel to apply a ring of 30-minute epoxy to the inside of the airframe just in front of the forward end of the fin slots. Don't use so much epoxy that it runs and drips all over the inside of the airframe. Slide the fin can about half way into the airframe. Apply another ring of epoxy into the rear of the airframe—where the aft centering ring will sit. Again, not so much that it runs and drips. Slide the fin can all the way into the airframe. Leave the aft centering ring flush with the rear of the airframe. Stand the airframe upright—allowing the epoxy to flow down onto the top of the centering rings. **PRO-TIP:** Use tie-wraps, heavy rubber bands, or a small bungee cord around the aft end of the airframe to hold it tight while the epoxy cures.

APPLY EXTERNAL FIN FILLETS

- **STEP 14: External Fin Fillets.** Following the same process as in STEP 11, apply fillets to the joints between the fins and the airframe. Since these fillets will be seen, use a bit more caution here to get nice clean/even fillets. Have a rag handy with the rubbing alcohol or acetone to quickly clean up any excess epoxy. Wearing latex or nitrile gloves you can use a finger to help smooth the fillets. Use some spot putty, or allow some epoxy to fill the small gaps

at the end of the fin slots where you cut off the tabs.

PRO-TIPS: Again, add some milled fiber to the epoxy mix for added strength. Use masking tape to create "walls" to keep the epoxy where you want it.

ATTACH RAIL BUTTONS

- **STEP 15:** Install the rail buttons spaced evenly between two fins. For added strength we will install the rail buttons taking advantage of the forward and aft centering rings. Mark two holes along the airframe between two fins—one at 3/16" from the rear of the airframe and one at 11 3/16" from the rear of the airframe. Use a straight edge and sight along the length of the airframe to ensure the rail buttons are in line with each other and straight along the airframe. Look carefully—the holes should be aligned just behind the training fin edge and just ahead of the leading fin edge. The rear button screw will not be directly in the center-edge of the aft centering ring—that's OK. Keep the edge of the button flush with the rear of the rocket. Drill a 9/64" hole ¼" deep in both spots. Add a small amount of 15-minute epoxy and screw the rail buttons in place. DO NOT over-tighten the screws. Make them snug and let the epoxy do the rest.

NOSE CONE BULKHEAD PLATE

- **STEP 16:** Install the second eye bolt assembly (with the large washers) in the center of the nose cone bulkhead plate. Apply a small amount of epoxy to the eye bolt threads to prevent loosening in the future. Each fiberglass nose cone is unique—the inside of each one will have a slightly different rough texture. Dry fit the bulkhead plate with the eye bolt facing out. It should fit approximately ¾" deep in the shoulder of the nose cone. If necessary, lightly sand the inside of the nose cone and/or the bulkhead plate to get a good fit. When you are happy with the fit, apply a ring of 30-minute epoxy to the inside edge of the nose cone. Slide the nose cone bulkhead plate into place keeping the face of the plate perpendicular to the wall of the nose cone. Once properly seated—with the eye bolt point straight up—set the nose cone upright. This will

allow the epoxy to flow down around the bulkhead plate. Once cured, invert the nose cone and apply 30-minute epoxy to the inside of the nose cone where it meets the bulkhead plate. Set aside to cure. **PRO-TIP:** Be careful to NOT remove too much material from the inside of the nose cone. You don't want to sand it so thin that it cracks. Better to sand a bit more off the wooden bulkhead plate than to sand too much off the inside of the nose cone.

PREPARE PARACHUTE

- **STEP 17:** Use an Improved Clinch Knot to attach the ends of the parachute shroud lines to a quick link. You only need to use 2 or 3 turns in the knot for a secure attachment (some guides show 5 or 6 turns.) Carefully trim any excess length at the end of the shroud lines and apply some epoxy to the knot to keep it secure.
- **STEP 18:** Make a simple over-hand loop in the shock cord approximately 4' behind the loose end. This is where you will attach the parachute quick link. The key here is to position this loop such that when the nose cone and airframe are dangling from the parachute and shock cord during decent they do not bang against each other. Move the position of the loop up or down on the shock cord to get the right placement.

FINISHING

- **NOTES:** The following steps are just the basics and a few suggestions. Depending on your experience, skill, and personal desires you may want to put more (or less) effort into the final finish.
- **STEP 19: Seal Fins.** Use a good quality sanding sealer on the fins. Brush on a coat—let it dry—sand smooth with 220 grit sandpaper. Two coats are normally sufficient. If you have any larger dings or dents, use a little bit of the auto body spot putty.
- **STEP 20: Fill Airframe Seams.** Blue Tube has exceptionally narrow/shallow gaps—in many cases the primer and color coats will fill the gaps. To get a really smooth finish, use (sparingly) auto body spot putty on the seams—let it dry—sand smooth with 220 grit sandpaper.

- **STEP 21: Sand Fillets.** Lightly sand the fin fillets with 220 grit sandpaper. Blue Tube accepts paint very well without sanding. If you have encountered any light dings along the way, fill with the spot putty and sand with 220 grit sandpaper.
- **STEP 22: Sand Nose Cone.** You will find flashing from the nose cone mold. This is usually easy to remove with 220 grit sandpaper. Use heavier grit only for excessive flashing. Sand the entire nose cone with 220 grit sandpaper.
- **STEP 23: Final Finishing.** Wipe the model clean using a tack cloth. Apply a base primer coat and final paint according to your desires.
- **PRO-TIPS:**
 - Several light coats are better than a single heavy “wet” coat.
 - Lightly sand with 400 grit sandpaper between coats. If the preceding coat already feels very smooth just a light buffing with a clean cotton rag might remove the really minor imperfections.
 - Two primer coats are normally sufficient.
 - Use primer and colors from the same manufacturer. Krylon works very well for most rocketry applications.
 - Let the final primer coat dry for 24 hours before applying color coats.
 - Use painter's blue masking tape and newspaper to mask of areas as needed during painting.
 - DO NOT paint the shoulder of the nose cone. Use painter's masking tape if necessary to protect this area during painting.
 - After the final color coat let the entire rocket dry for at least 24 hours.

RECOVERY ATTACHMENT

- **STEP 24:** Attach the parachute to the loop in the shock cord with a quick link.
- **STEP 25:** Attach the shock cord to the nose cone with the final quick link.
- **STEP 26: Test the Set-up.** Lay all the attached components out on the ground (on a blanket). Ensure that the parachute is positioned between the airframe and the nose cone such that they will not

bang together during recovery. Move the loop if necessary.

- **STEP 27: Pack the Parachute.** Lay the parachute out flat—folded in half. Fold in half again—and again. Gently roll the parachute from the tip/dome towards the shroud lines. Gently wrap the shroud lines around the parachute. **DO NOT ALLOW THE SHROUD LINES TO TANGLE WITH THE PARACHUTE OR SHOCK CORD.**
- **STEP 28:** Gently fold the shock cord below the parachute and insert it into the airframe. Slide the parachute in on top, followed by the remaining shock cord. Finally, install the nose cone. Ensure the nose cone has a snug, but not overly tight fit. **PRO-TIP:** If the nose cone is too tight the only solution is to sand the shoulder until you have an acceptable fit. If it is too loose, try a layer of blue painter’s masking tape. Sometimes just a strip or two will provide the desired snug fit.
- **NOTES:** If you have added any components to your recovery system (Kevlar/Nomex blankets, shock cord sleeves, swivels, etc.), install them as directed. Use of such items may slightly alter the steps provided above. With the use of the quick links it should be easy to quickly add to, or modify your recovery set-up.

TIME TO FLY

- **STEP 29: THE MOST IMPORTANT STEP.** If this is your first Mid or High Power flight . . . get help from an experienced rocketeer!! If you have any doubts about your construction, how to load a motor, how to pack the parachute . . . ask someone at the launch site. We can guarantee you will find someone willing to help—maybe even more help that you really want!
- **PRO-TIPS:**
 - Use a lower thrust engine for your first flight.
 - Don’t forget your parachute protection.
 - Read and follow RMS directions very carefully.
 - Find a local club—always more fun to launch with a few friends.
- This is where our journey together ends! Time to put your construction skills to the test. Good luck with your Blue Phenix—we really hope you like it and enjoy many successful launches—and recoveries!!