



# **PREDATOR 10K**

# **PREDATOR JR**

## **HIGH POWER ROCKET KIT**

### **BUILDING INSTRUCTIONS**

Congratulations on your purchase of the Predator series of rocket kits! This kit is designed to prove the mettle of Blue Tube to all who dare explore it! The Predator 10k is a quasi-minimum diameter kit designed for extreme altitude supersonic flight. The Predator Jr. is for those who wish to work their way up to flying their kit on motors as big as the new J510W which uses the new super long 38/1320 case! This kit is for experienced high power rocketry kit builders who have already built and flown a dual deploy rocket and are more than likely already certified in high power.

	<b>P-Jr.</b>	<b>P10k</b>
<b>DIAMETER:</b>	54mm	2.56"
<b>LENGTH:</b>	68"	68"
<b>MOTOR MOUNT:</b>	38mm	54mm
<b>PARACHUTE:</b>	36"	45"
<b>HOBBY LINE MOTORS:</b>	G-64*	N/A
<b>HIGH POWER MOTORS:</b>	H128* to J510W	H180* to Loki L-1500
<b>PROJECTED MAX ALTITUDE:</b>	8000'	15000'

\*Requires motor adapter, not included.

**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.



## 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
- Wood sanding sealer
- Motor Retention (More on this later)
- P-10K – Rasp or Dremel tool with coarse wheel
- Recovery System Protection (Kevlar/Nomex Blanket or other recovery wadding.)
- Expandable foam filler and/or fg cloth & resin (for filling gap between fin can and airframe)

## OPTIONAL ITEMS

- 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.
- **NOTE:** Rough up areas on the motor mount, coupler and airframe that you intend to apply epoxy. This

will allow the adhesive to wick into Blue Tube and bond much better.

## 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. Suggest purchasing the Aero Pack series of motor retention systems. Another possibility when using plugged closure is to use positive motor retention by attaching the eyebolt of the forward closure to the shock cord quick link with a section of steel cable or shock cord.
- **STEP 3: Assemble the Motor Mount.** Epoxy the fin can to one end of the motor mount tube. The beveled end goes to the top and the flat end goes flush to the bottom. If using the Aero Pack adapter, offset the fin can off the bottom by the appropriate amount specified in their installation instructions. Equally space the 3 centering rings on the motor mount tube with the top one being a half inch off the end. Epoxy the two middle rings in their appropriate location. Included is an extra centering ring for the bottom of the fin can. See illustration. Notch the top ring on the inside either with a Dremel or sharp hobby knife to allow the wire loop to pass through and be epoxied in place. Grind as little as possible for a snug fit and also to allow the aluminum ferrule to have a “stop” against the centering ring. The Predator Jr. may not have a wire loop, in that case take one end of the shock cord and pass the cord through the sewn end and place it over the motor mount like a slip knot and grind out enough of the phenolic centering ring so that it can be placed over the shock cord and epoxied in place. **See Fig 1a. Note: the P-Jr's centering rings are a double phenolic ring. Epoxy the small one first, then epoxy the other one over it.**

- **STEP 4: P10K only:** Using a rasp or Dremel tool, grind down the spaces between the fins a bit so that the can slides easily into the airframe.
- **STEP 5: Rail button location measurement.** Measure the distance between the bottom of the fin can to the middle of the top centering ring on the motor tube and save that information for later when we install the rail buttons. **PRO-TIP:** a small beveled block of wood placed right below the top centering ring centered in the space between fins as backing for the rail button would be really good to do. Otherwise you'd have to be dead-on with your drilled hole into the centering ring after the fact.
- **STEP 6: Install MMT/Fin assy.** Dry fit the MMT/Fin can assembly into the pre-slotted airframe tube to confirm proper fitment. (Wire loop assembly only: Make sure you can attach the shock cord with the supplied quick link to the wire loop with it IN the airframe before epoxying). If not, attach the shock cord first before epoxying the mmt/fin can assembly in place. Be generous with the epoxy w/out being messy! Put a generous amount on the fin can. For the centering rings, a neat trick is to OVER APPLY the epoxy to the motor mount just above the centering rings (and of course put some on the centering rings) and insert the fin can/mmt into the airframe and stand it upright so the epoxy runs down to each corresponding centering ring and wicks / bonds it up tight! Rubber band around the base to hold the airframe against the fin can. Set aside to cure.
- **STEP 6a: (Predator Jr.)** Fill gaps between fin slots (overly wide on purpose) with epoxy / expandable foam / fg resin and allow to cure. For the end of the airframe you can have a mild boattail effect by pinching the ends and trimming the extra overlap and epoxying in place before filling the inside gap.
- **STEP 7: Electronics Bay** see attached separate assembly instruction sheet. ARR sells these as a separate line item and it is the same product. Follow your manufacturers recommendation for vent hole size and quantity and key switch installation.
- **STEP 8: Upper assy.** Figure out what method you are going to use to attach your upper tube to the upper portion of the coupler. Blue Tube is rather threadable so 3 small, short wood screws (not

supplied) 120 degrees apart to keep the upper from separating from the ejection charge should be just fine. Some people friction fit with tape around the coupler and that's ok but it'll get gummy after a number of flights. Get your screw and holes drilled, check alignment, etc. and attach your shock cord to the upper nav bay, pack your chute away, attach to the nose cone (epoxy the eyebolt to the nosecone and pack it all in. That's it! You'll repack / install your chute protector (not supplied) later when you're ready to fly but for now we're just doing this to complete this step.

- **STEP 9: Summary:** At this point you should basically have a completed rocket minus cosmetics to the fin can, paint and rail buttons.

## APPLY FIN FILLETS

- **STEP 10: External Fin Fillets.** Apply fillets to the joints between the fins and the airframe. Mix up some slow setting epoxy w/ some filler (optional) to thicken up and fill in the gaps evenly and attractively. 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 11:** At this point you should have a nice pretty rocket ready to paint. We'll install the rail buttons now but you can unscrew them and remove them later before you paint. Install the rail buttons spaced evenly between two fins. For added strength we will install the rail buttons taking advantage of the bottom fin can and top centering ring. Take the measurement you took earlier in step 6 and measure from the bottom and mark where that is. Use a laser pointer or a long ruler to mark a straight line from

the bottom of the fin can to the measured mark. Mark the bottom hole and make sure both marks are straight up and down the rocket. Sight line it as well too, just to make sure! Drill a 9/64" hole 1/4" 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 AND PAYLOAD BAY

- **STEP 12:** If you haven't already done this and I haven't already told you, epoxy the eyebolt into the threaded hole in the nose cone. Friction fit the nose cone w/ tape to insure a snug fit but not so tight that it won't pop off with the ejection charge.

## PREPARE CHUTE

- **STEP 13:** 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 14:** 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

- **STEP 15: Seal airframe.** (Mandatory) Use a good quality sanding sealer everywhere on the airframe. 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 for a seamless finish. This will seal the airframe and act as a vapor barrier against humidity.

- **STEP 16: 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 17: 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 18: 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 19: 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 20:** Attach the parachute to the loop in the shock cord with a quick link.
- **STEP 21:** Attach the shock cord to the bottom of the payload bay bulkhead. **Optional:** rocket can be flown without the payload bay. Attach the shock cord to the nose cone instead and leave the payload bay out of it. Important: if you are flying with the payload bay, be sure to friction fit the nosecone **TIGHTLY** to the upper payload bay tube so it does not get lost during recovery.
- **STEP 22: 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 23: 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.** Pack the middle shock cord and use a very small drogue (optional, not supplied) if necessary.
- **STEP 24:** 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 25: THE MOST IMPORTANT STEP.** Prep your dual deploy flight as you normally would. Suggest using a lower thrust engine for a “shake down” flight. Use the appropriate amount of black powder for your ejection charges based on your experience. Ask someone if you are not sure!!
- This is where our journey together ends! Time to put your construction skills to the test. Good luck with your Predator—we really hope you like it and enjoy many successful launches—and recoveries!!

For questions contact Always Ready Rocketry.  
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Fig 1a.

