

# Goblin 10"

## Kit Features:

10" diameter airframe

Stands 69" tall

Fiberglassed body tube

Fiberglass nose cone

Baltic Birch fins

Dual Deployment Ready

98mm motor mount

For I through M impulse

Great for fun flying and Level 1 through Level 3 certification, the Goblin is easy to build and lots of fun to fly.

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## List of Materials:

- (1) 10" Fiberglass nose cone
- (1) 10" Fiberglassed body tube
- (1) Nose cone bulkhead, 7.5" diameter
- (1) 98mm motor tube
- (1) Piston stop tube section (98mm coupler, 2" long)
- (1) Piston tube section (98mm coupler, 4" long)
- (1) Piston bulkhead, 3.75" diameter
- (1) Centering ring, 98mm, Drilled for U-Bolt
- (3) Centering ring, 98mm
- (4) Fins, 3.8" plywood
- (2) Electronics bay plates, 3" by 7" by 1/4" plywood
- (1) Fiberglass tape, 24'
- (3) U-Bolts with backing plates
- (6) 1/4" Washers
- (12) 1/4-20 Nuts
- (2) Rail guides with screws
- (1) Tubular Nylon shock cord, 24'
- (1) Instruction Manual

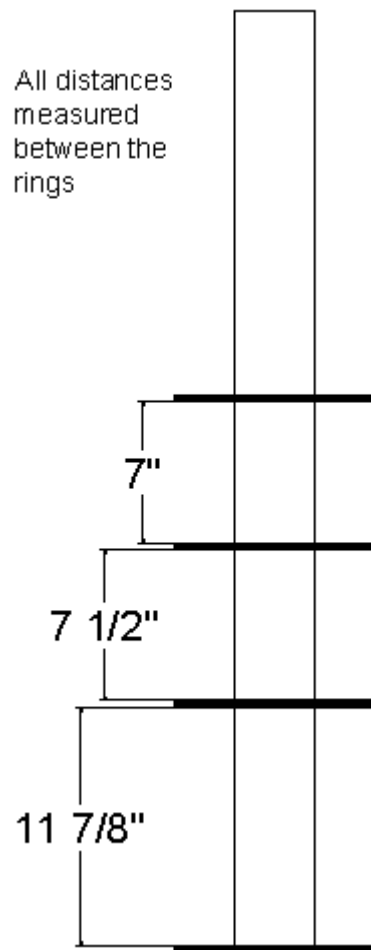
## Construction

*Please read and understand each step. The construction methods used in this kit differ from others in many ways. It is important to follow the instructions to ensure you get the most out of your kit.*

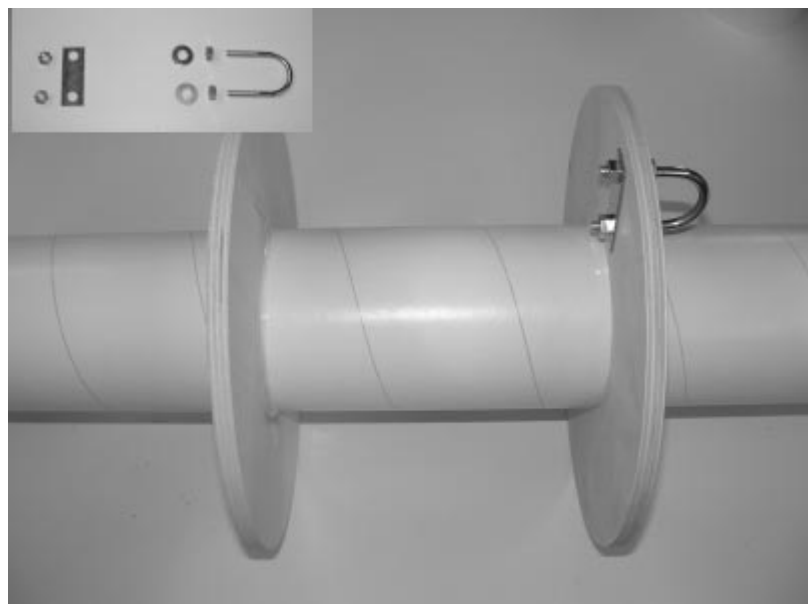
Locate the 98mm motor tube and one of the three undrilled centering rings. Epoxy the motor tube into the ring flush. Make sure the tube is perpendicular to the ring. Allow to cure.



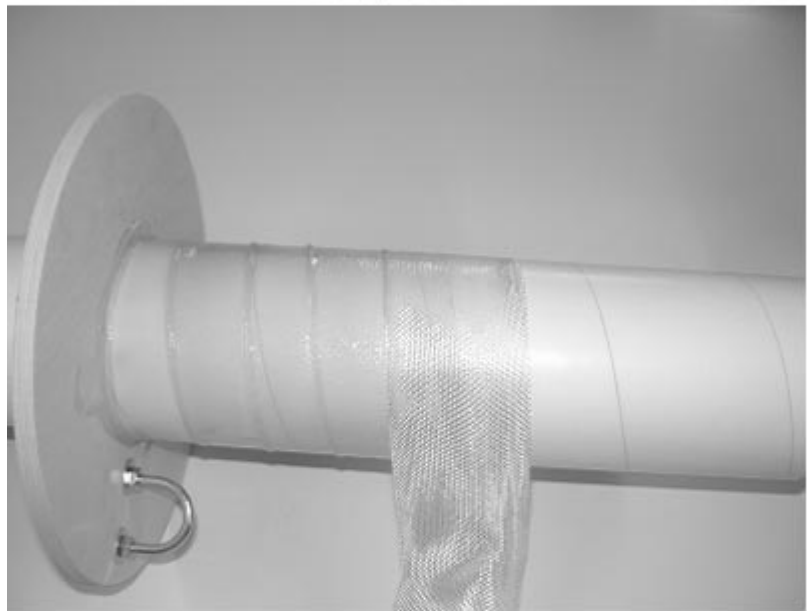
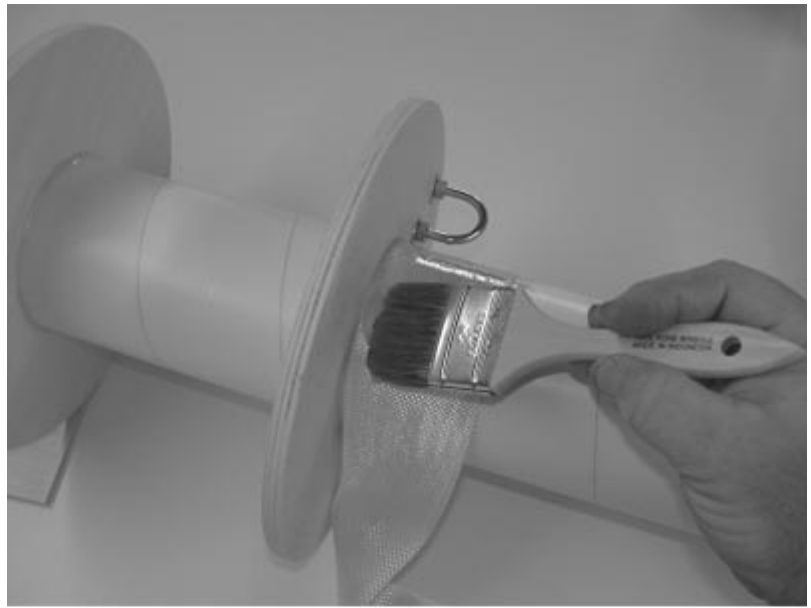
Position the remaining centering rings on the motor tube as shown. The upper centering ring is the one that is drilled for a U-Bolt. Take care to get the rings in the right position and perpendicular to the motor tube. This is critical the fins, rail guides, and electronics bay all depend on the rings being in the right position. Epoxy the rings into place, ONE AT A TIME, allowing the assembly to cure before proceeding onto the next ring.



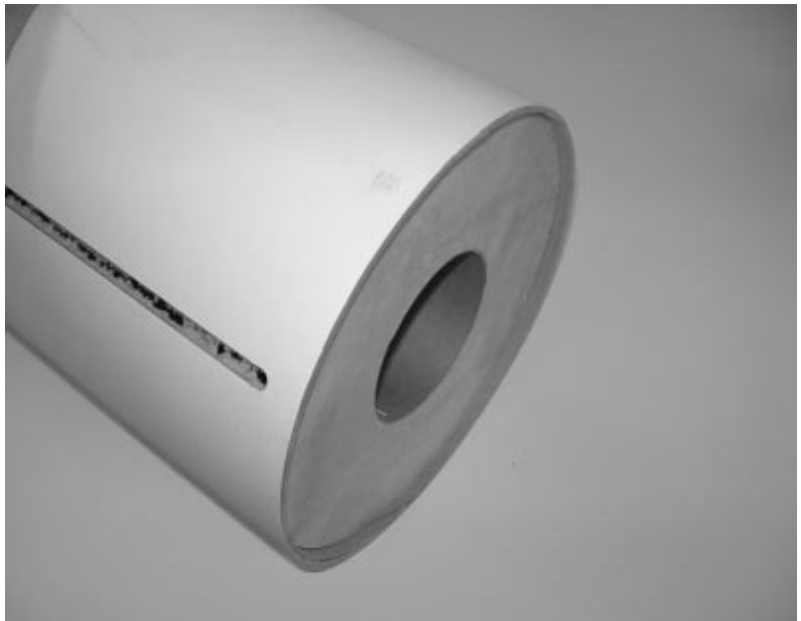
Mount the U-bolt to the upper centering ring as shown, using the hardware shown in the inset picture. Secure the threads with thread lock or epoxy.



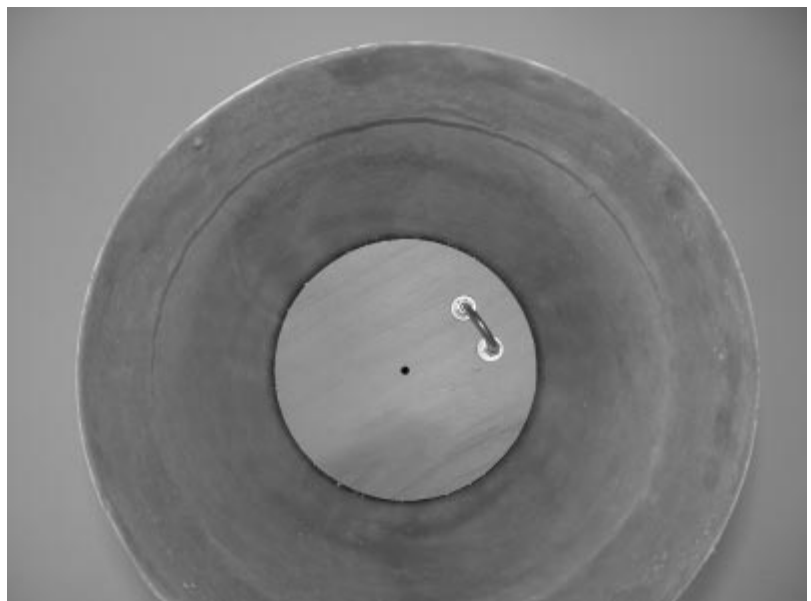
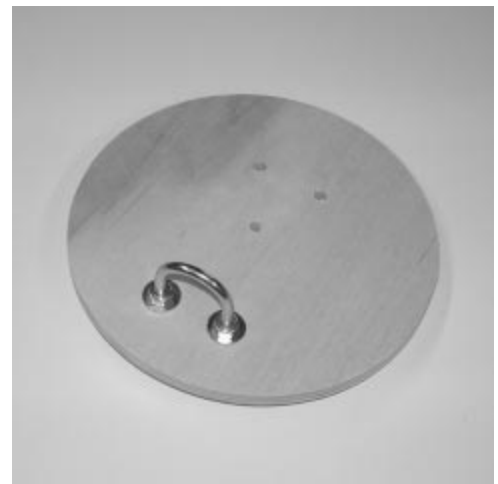
This next step is optional, but recommended. Fiberglassing the upper section of motor tube gives it a lot more strength. If you elect to not fiberglass the tube, please take care not to kink or dent the motor tube, this may prevent the main chute from deploying. Take the fiberglass tape provided and using a disposable paint brush apply the fiberglass to the upper section of motor tube. Apply the tape in a spiral fashion, painting epoxy or polyester resin on it as you go. Make sure you get all the air bubbles out from under the tape. **TAKE CARE NOT TO GET ANY RESIN INSIDE THE MOTOR TUBE.** Stand the assembly vertically and allow to cure. After the resin has cured, trim the excess glass from the end of the motor tube. You may trim up to 1/2" from the end of the motor tube if necessary, but the more you remove, the less area you will have for your main parachute.



Slide the motor mount assembly into the body tube. Seat the lower centering ring flush with the end of the tube. After test-fitting the assembly, remove it and epoxy it into place. You will not be able to get a lot of epoxy on the middle two rings, do not be concerned, there is plenty of strength with the upper and lower rings epoxied securely. Stand the assembly upright while the epoxy cures.



Mount the U-Bolt and hardware to the nose cone bulkhead. Secure the threads with thread lock or epoxy. Seat the nose cone bulkhead into the nose cone and tack it in using a few small drops of epoxy. **DO NOT PUSH THE BULKHEAD INTO THE NOSE CONE, THIS WILL DEFORM THE NOSE CONE.** You are not gluing it into place permanently at this time as you need to test the nose cone onto the body tube to ensure the motor tube does not hit the nose cone bulkhead.



Test fit the nose cone onto the body tube, it should seat all the way. If it does not, The glue joining on the upper centering ring may be too thick. If the nose cone does not seat to the shoulder, trim the edge of the nose cone until you get a good seat.

If you followed the dimensions carefully, there should be about 1/4" clearance for both the shoulder and the motor tube.

If you have a good fit, remove the nose cone and securely epoxy the nose cone bulkhead into place. Use epoxy thickened with micro-balloons or left-over glass tape to make sure you get a good bond.

Take the piston stop tube (98mm coupler 2" long) and slide it into the upper section of the motor tube. You want this ring to sit appx. 17 1/2 inches into the motor tube. This will give you enough clearance for a 98-10240 casing to fit in the rocket.



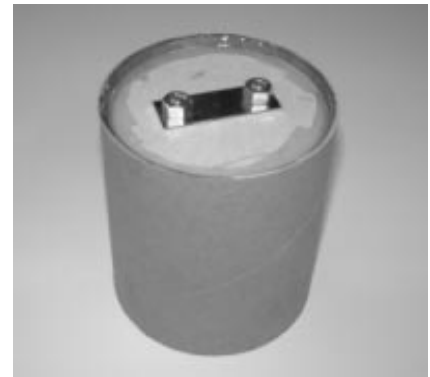
Position the piston bulkhead 1/4" in from the end of the piston tube (98mm coupler, 4" long). Epoxy the piston bulkhead into the piston tube. The bulkhead is loose so it will not deform the piston tube. Use a generous amount of epoxy here, applying it to both sides.



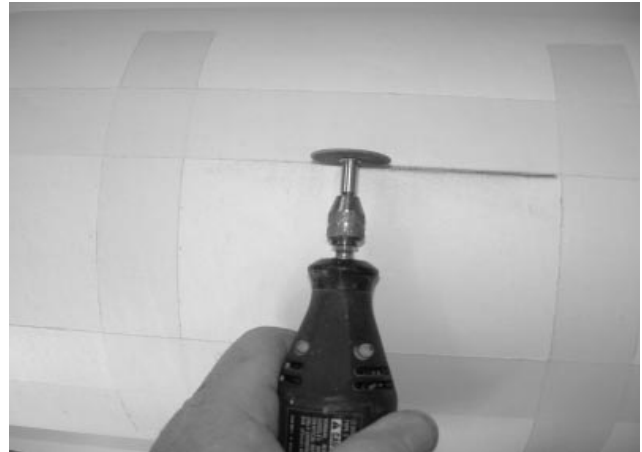
Here is the epoxy being applied to the bottom of the piston. Make a thick fillet of epoxy. Allow to cure completely.



Install the U-Bolt hardware into the piston as shown. Secure the threads with thread lock or epoxy.



Mark the location of the electronics access hatch on the body tube. Where you orientate the hatch around the rocket is not critical, but try not to line it up with the U-bolt in the upper bulkhead. The top of the hatch must be located just below the upper centering ring, and the hatch should be exactly seven inches tall and approx. three inches wide.



Test fit the two electronics bay plates into the electronics bay, keeping the plates perpendicular to the motor tube. The electronics get mounted onto these plates after the rocket is completed. You will need to sand the corners of the plates to allow for the epoxy used to secure the centering rings.



Drill a 3/16" hole in the upper section of the electronics bay, into the motor tube. This hole should go through both the motor tube and the piston stop tube. This is for your charges to eject the main parachute.

Drill a 3/16" pressure hole in the body tube just above the upper centering ring.

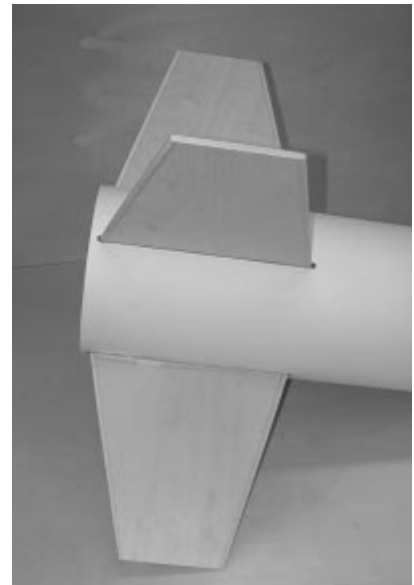
Drill a 3/16" vent hole in the electronics bay hatch also.



Test fit all four fins into their slots. The root of the fin MUST make contact with the motor tube. This is very critical, failure here will result in a crash.

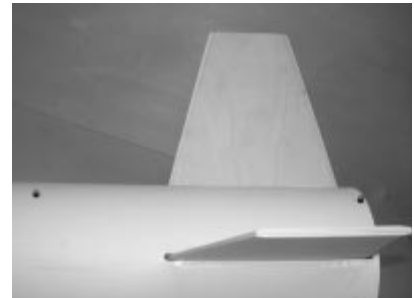
Apply a bead of epoxy both sides of a fin as shown, then to the root edge of the fin and to both sides of the fin where it will join the body tube. Slide the fin into place and wipe the excess epoxy away.

We recommend you do two fins at a time, opposing fins, and use a straight edge to ensure the fins are parallel to each other. Once you have two glued and the epoxy has cured, move on to the remaining fins.



The rail guides are positioned at the first and third ring, counting from the bottom.

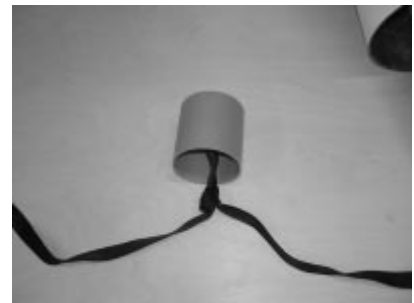
Drill a 7/64 hole through the airframe INTO A CENTERING RING, and mount the rail guides as shown. The rail guide should spin on its mounting screws.



The nose cone shock cord is as shown. Leave a 15' section for the apogee charge, connecting it to the nose cone and the remainder to the piston and main chute. The main chute is packed tightly and slid into the motor tube on top of the piston. It is held in by taping paper over the top of the tube. The drogue sits outside the motor tube.



Attach the piston to the shorter of the two shock cord segments. The piston should be located about 2 feet from the end of the cord. The main parachute attaches to the end of this cord and the drogue and nose cone to the other segment.



If you plan to fly your Goblin using motor ejection, you can. Pack the main chute above the piston in a tight wrap, and the ejection will push the nose off and the main out at the same time.

### **Finishing and painting**

The best method for finishing is to start sanding the airframe using 60 grit sandpaper and a soft sanding block. Sand at a 45 degree angle to the airframe, this helps prevent flat spots. Do not over sand with the 60 grit, just smooth the glass joints. Do not sand the fins with 60 grit, just the airframe and the nose cone. Move to 120 grit on the airframe and nose, continuing with the soft sanding block. You can also sand the fins with the 120, smoothing the leading edge if desired.

Next lightly sand the entire rocket with 220 grit, using the soft sanding block. Prime with a good filling primer, like an automotive primer. If you are using spray cans, select a filling primer.

Sand and prime until you are happy with the finish. Paint as desired.

You do not need to add any nose weight to your Goblin, with any motor configuration. The center of gravity should be 49" back from the tip of the nose of forward of that point. Most popular simulation software programs will show the rocket to be unstable, but it is not.

We hope you enjoy your Goblin, and appreciate any comments you have.

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