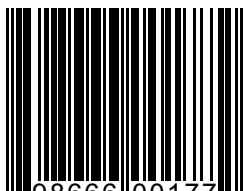




K-177



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FIBERGLASS

TWITCH™

Specifications

Length: 34.5"

Diameter 3"

Weight: 29oz

Motor Mount: 38mm

Fins: 3 - 3/32" G10

Estimated CP: 27.5" from nose tip

Parts List

- (1) Plastic Nose Cone
- (1) Pre-slotted body tube
- (2) Centering rings
- (1) 38mm motor tube
- (3) G10 fins
- (1) Eyebolt
- (1) Nut
- (1) Washer
- (1) Nylon shock cord
- (2) Rail buttons and screws

You'll need these items to complete this kit

- 5 Minute Epoxy
- Filler and Paint
- Zap or CA Super Glue
- Motor Retainer
- Pencil
- 120/220 Sandpaper

 **madcow Rocketry**
put some fun in your rockets!

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.

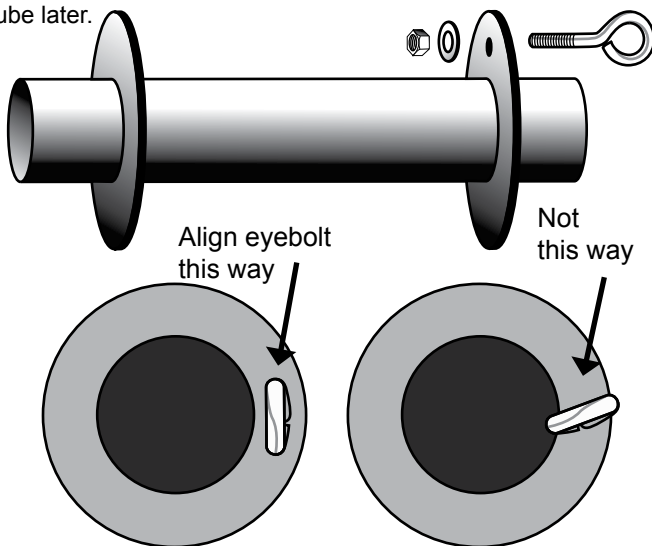
Fiberglass parts still contain small amounts of mold release and other materials on the surface that will inhibit adhesives and/or paint. It is important to clean each part prior to assembly with a solution of 1 part rubbing alcohol, 3 parts water and a drop of dish washing soap. **IMPORTANT:** do not 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.

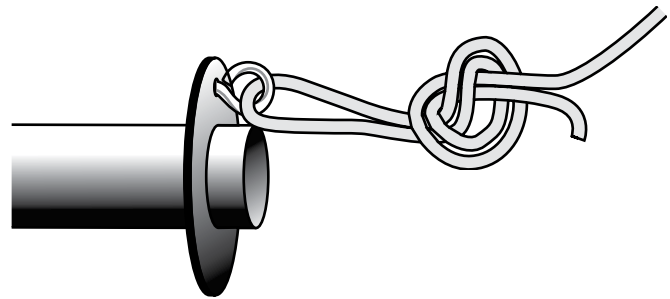
IMPORTANT: Before assembling any part with epoxy, rough up the surface to be epoxied using 60-80 sandpaper. The scratches in the fiberglass surface will give the epoxy something to grab onto. Epoxy will not soak into the fiberglass like wood or cardboard - epoxy will not grip very well to fiberglass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

Motor Mount Assembly

- Step 1 - Rough the surface of the motor tube where the centering rings will contact it - also rough the surface where the fin tangs will contact the motor tube.
- Step 2 - Test fit the centering rings over the motor mount tube and sand if necessary. Also test fit the centering rings in the body tube and sand if necessary.
- Step 3 - Mark the motor tube 1/2" from the aft end of the motor tube. Spread some epoxy on the motor tube around the mark and slide the aft centering ring on the tube until it aligns with the mark.
- Step 4 - Drill a 1/4" hole in the forward centering ring for the eyebolt. Mark the motor tube 1/2" from the front of the motor tube. Spread some epoxy around the mark and slide the centering ring on the motor tube until it aligns with the mark.
- Step 5 - Mount the eyebolt using the nut and washer in the forward ring hole. Apply some epoxy to the threads of the eyebolt and nut to ensure it will not come loose later. Make sure the eyebolt is aligned so that it will not interfere with the body tube when the motor assembly is inserted into the body tube later.



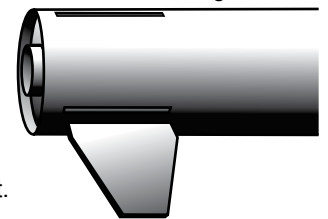
- Step 6 - Attach one end of the shock cord to the eyebolt using an overhand knot as shown. Set this assembly aside for later.



Body Tube Assembly

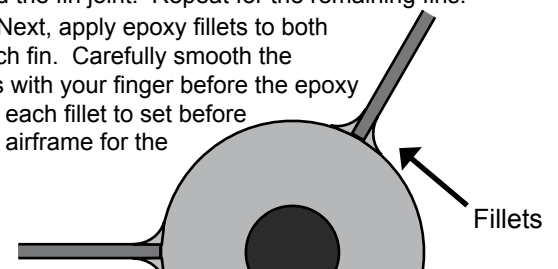
- Step 7 - Using the motor tube assembly, wrap the shock chord into a small bundle and stuff it inside the motor tube for this next step. Test fit the motor tube assembly into the aft end of the body tube to ensure a snug fit. Sand the centering rings if necessary. Make sure you rough up the inside of the body tube where the centering rings will attach.
- Step 8 - When you are satisfied with the fit, spread some epoxy on the inside of the body tube just in front of the fin slots and slide the forward centering ring of the motor assembly into the body tube. **Make sure you have the motor assembly facing the right way - the centering ring with the eyebolt should slide in first!**

Keep going by spreading some more epoxy on the inside of the body tube near the aft edge before sliding the aft centering ring into the body tube. Continue sliding the assembly inside the body tube until the aft centering ring is all the way in body tube, but doesn't yet interfere with the fin slot. It's a good idea to test fit a fin in each slot here before the epoxy sets. Hold the body tube with the motor tube assembly down until the epoxy sets. Make sure the weight of the motor assembly doesn't cause it to slide out of alignment.



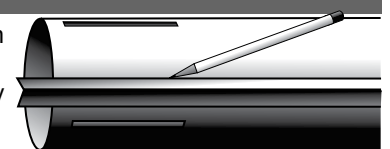
Fin Assembly

- Step 9 - Test fit each of the fins into the pre cut fin slots. The fin should seat firmly against the motor tube - sand each fin if necessary. Don't forget to rough up all surfaces. When you are satisfied with the fit, apply some epoxy to the end of the fin tang that will contact the motor tube as well as any fin root that will contact the body tube. Also, spread a thin layer of epoxy on each side of the fin tang. Slide the fin into place and check the alignment. Continue rechecking the fin alignment until you are sure the epoxy has set. Clean any excess epoxy from around the fin joint. Repeat for the remaining fins.
- Step 10 - Next, apply epoxy fillets to both sides of each fin. Carefully smooth the epoxy fillets with your finger before the epoxy sets. Allow each fillet to set before rotating the airframe for the next fillet.



Rail Button Attachment

- Step 11 - Using a door jam or small section of angle stock, pencil a line halfway between two of the fins on the main body tube that extends from the front to the back of the body tube.



- ❑ Step 12 - Drill a 5/64" hole on the rail button line for the forward and aft rail buttons. The aft hole should be 1 1/2" from the aft end of the body tube and the forward hole should be at the CP. The CP is measured from the tip of the nose cone.
- ❑ Step 13 - Apply a small amount of epoxy in the holes and attach the rail buttons using the supplied #6 wood screws. Make sure the screw is loose enough for the rail button to spin freely - this ensures the button is not compressed to the point it will hang on the rail guide. **IMPORTANT: The screw from the forward rail button should be behind the forward centering ring. If it isn't, make sure the forward rail button screw protruding through the body tube doesn't snag the chute. Epoxy over the screw to provide a smooth surface. The screw can also be cut shorter.**

A WORD ABOUT PLASTIC NOSE CONES: All plastic nose cones expand and contract with heat and cold. A nose cone that fits correctly at room temperature when moved to a desert heat of 120°f may become so tight that it cannot be removed. Likewise, a nose cone moved from room temperature to a snow covered flying field of 25°f may become so loose that it drag separates at motor burnout. It is always a good idea to adjust your nose cone fit on the flying field at the temperature you expect to fly in. You can adjust the fit by adding masking tape around the base to tighten the fit, or by shaving off some of the plastic ridges to loosen the fit.

Final Assembly

- ❑ Step 14 - Assemble your model and insert the largest motor you intend to fly (or simulate the weight with a 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 CP point is measured from the tip of the nose cone. If the CG is behind the desired point, add weight inside the nose cone by pouring lead shot into the nose cone tip and adding some epoxy. **IMPORTANT: Screw in a screw through the plastic nose cone into the lead to hold it in place. Grind or cut off the screw head before filling and applying the nose cone finish. The epoxy will not stick to the inside of the nose cone and if you do not anchor with a screw, the liftoff force will cause the weight to become dislodged causing an unstable model.**
- ❑ Step 15 - Using the same knot you used in step 6, attach the other end of the shock cord to the nose cone. Attach the parachute to the shock cord near the nose cone. Also attach the chute protector to the shock cord near the nose cone.
- ❑ Step 16 - Drill a small 1/8" hold in the chute compartment to allow venting. Make sure you do this without the chute in the chute compartment.
- ❑ Step 17 - At this point install your positive motor retention device. The kit does not include a motor retention device and this will need to be purchased separately.
- ❑ Step 19 - Your model is now ready to paint and apply the decals.

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: always remember to check your balance point and ensure your CG is forward of the specified CG point.

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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