

## About Semroc

Semroc was acquired by eRockets in February 2015 with Randy Boadway at the helm. The commitment is to provide innovative Flying Model Rocket Kits to the rocketry community at the high level started by Semroc's founder Carl McLawhorn.

Semroc was started by Carl McLawhorn in his college dorm at North Carolina State University in November, 1967. Convincing a small group of investors in his home town of Ayden, North Carolina to invest in a small corporation, the company was re-incorporated as Semroc Astronautics Corporation on December 31, 1969.

Semroc produced a full line of model rocket kits and engines. At its peak, Semroc had twenty-five full time employees working at two facilities. One was for research and development, printing, shipping, and administration. The other was outside town and handled all production and model rocket engine manufacturing. For several years, Semroc was successful selling model rocket kits, supplies, and engines by mail-order and in hobby shops. In early 1971, Semroc became insolvent and had to close its doors.

After 31 years of dreams and preparations, Semroc Astronautics Corporation was reincorporated on April 2, 2002 with a strong commitment to helping put the fun back into model rocketry.

The dream continues as eRockets takes on the line. Seven rocketeers make it all happen in the facility in Dayton, Ohio.

## About the Heli-Rector™

Inspired by different helicopters built by Randy Boadway for NAR completion over the years, with technical and engineering advice from Jay Berry, the Heli-Rector was born. Members of Wright Stuff Rocketeers (WSR) NAR Section 703 were used to test the first 30 models. Results were outstanding at Regional Competitions. The kit also placed in the C Division at NARAM-58 in Walnut Grove, Missouri by a rookie competitor.

**SEMROC**

# HELI ROCTOR™

**Competitive  
Performer**

**Precision Turned  
Balsa Nose Cone**

**Laser Cut  
Balsa Parts**

**13mm Engine**

**Drop Fin Can**

**Helicopter  
Recovery**

*Designed by  
Randy Boadway*



**FLYING MODEL  
ROCKET KIT**

Made in the U.S.A by Semroc - Dayton, Ohio

### Heli-Rector™ Kit No. CV-02

Specifications	Engine	Approx. Altitude
Body Diameter 0.544"	1/2 A3-2T	120'
Length 14.25"	A3-4T	200'
Fin Span 17.0"	A10-3T	200'
Net Weight 18 g		

**Skill Level 3**

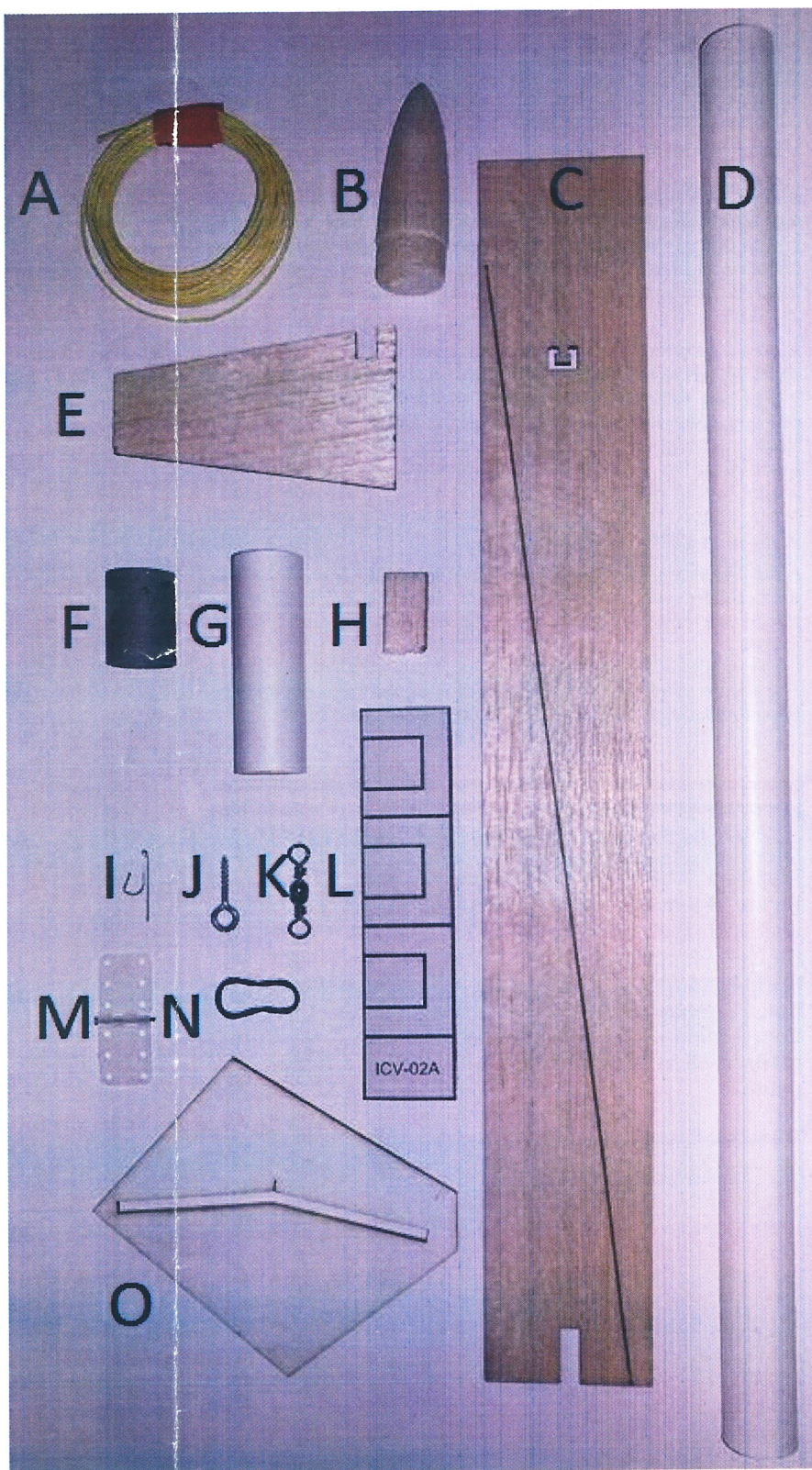
November 17, 2016

Copyright © 2016 Semroc  
www.semroc.com



## Parts List

A	1	Kevlar Cord .....	SCK-24
	1	Kevlar Cord .....	SCK-30
B	1	Nosecone.....	BNC-5E
C	3	Balsa Wood Blades....	FCV-02
D	1	Main Airframe Tube...	BT-5-110
E	3	Balsa Wood Fins.....	FCV-02
F	1	Tube Coupler.....	HTC-5B
G	1	Fin Unit Tube.....	BT-5-MJ
H	3	Balsa Blade Stop.....	FCV-02
I	3	Wire Hooks.....	WHK-02
J	1	Screw Eye.....	SE-2
K	1	Barrel Swivel.....	SV-7B
L	1	Hinge Mount Shroud..	ICV-02S
M	3	Nylon Hinge.....	DUB-119
N	6	Rubber Band.....	CSB-2
O	1	Blade Angle and Dihedral Tool	..... ICV-02B





## BEFORE YOU START!

Make sure you have all the parts included in this kit that are listed in the Parts List. In addition to the parts included in this kit, you will also need the tools and materials listed below. Read the entire instructions before beginning to assemble your rocket. When you are thoroughly familiar with these instructions, begin construction. Read each step and study the accompanying drawings. Check off each step as it is completed. In each step, test-fit the parts together before applying any glue. It is sometimes necessary to sand lightly or build-up some parts to obtain a precision fit. It is important that you always ensure that you have adequate glue joints.

## TOOLS

In addition to the parts supplied, you will need the following tools to assemble and finish this kit. Masking tape and wax paper is also needed.



Super Glue



White Glue or Wood Glue



Sandpaper



Hobby Knife



Ruler



Pencil



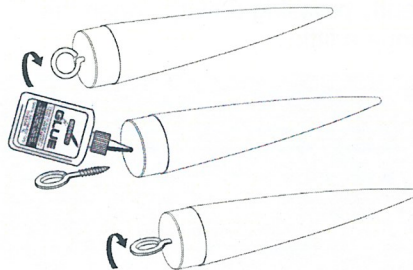
Scissors

## Assembly

These instructions are presented in a logical order to help you put your Heli-Rector™ together quickly and efficiently. Check off each step as you complete it. We hope you enjoy putting this kit together and flying it!

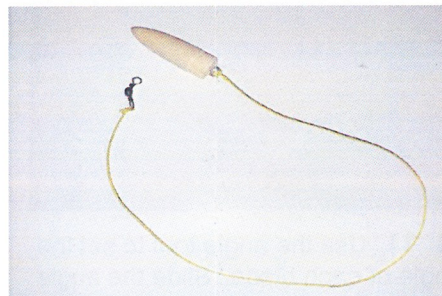
### Nose Cone

- ❑ 1. Twist the screw eye into the center of the nosecone. Remove, add a drop of wood glue to the hole and re-insert the screw eye.



- ❑ 2. Cut the 30 inch piece of Kevlar in half. Take one piece and tie it to the screw eye with 3 square knots. Tie the other end of the Kevlar to the barrel swivel with 3 square knots. Set the knots with a drop of glue.

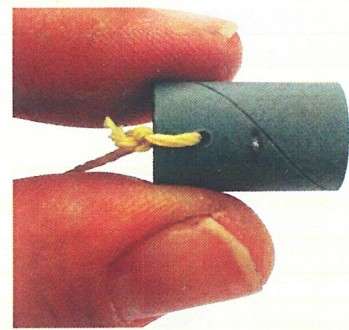
Set this aside for now to allow the glue to dry.



### Fin Unit

- ❑ 3. Mark the center of the tube coupler.

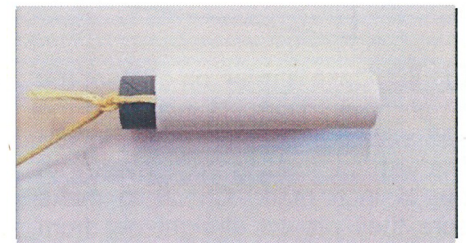
Thread the remaining 15 inch piece of Kevlar through the hole in the coupler. Use 3 square knots to secure the Kevlar to the coupler. Set the knots with a drop of glue.



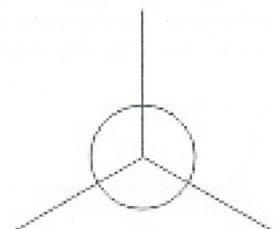
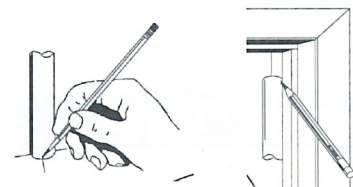
- ❑ 4. Smear an even, thin layer of wood glue inside of the fin unit tube less than 1/4" from the top.

Insert the coupler up to the mark in the middle of the tube.

Check inside the fin unit tube and make sure no glue has run down below the coupler. Allow the wood glue to dry.



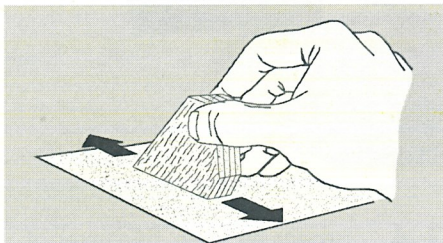
- ❑ 5. Stand the fin unit tube on the guide below and mark the fin positions on the side of the tube. Find a convenient channel or groove such as a partially open drawer, a door jamb (as shown,) or a piece of molding. Using the channel, extend the marks the length of the tube.



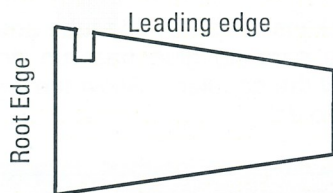


## Fin Preparation

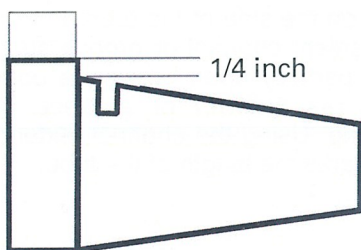
- ❑ 6. Stack the fins together and sand all edges square.



- ❑ 7. **Optional:** Round all of the edges except for the root edges of each fin. Do not round the root edge as it needs to be flat to adhere to the body tube.

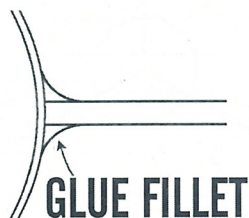


- ❑ 8. Make a mark on each of the fin alignment lines  $\frac{1}{4}$  inch from the end with the coupler. Glue on the fins with the leading edge even with the  $\frac{1}{4}$  inch mark. Check to make sure they project straight out from the tube and the notch on each fin faces the coupler.



## Apply Fillets

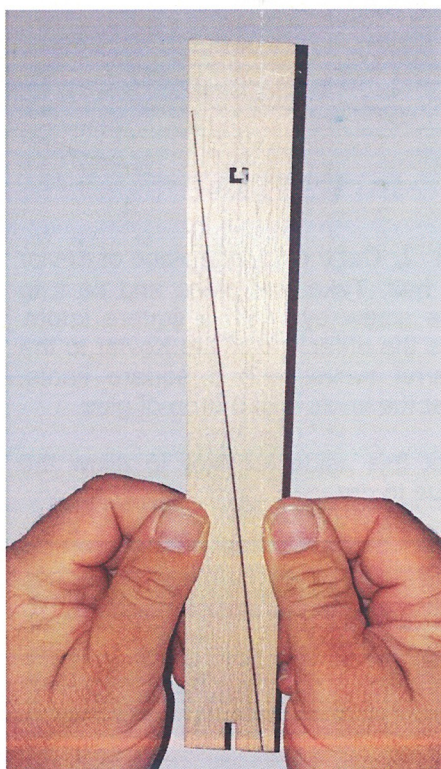
- ❑ 9. After the fin assembly is completely dry, run a small bead of wood glue along both sides of each fin-body tube joint. Using your forefinger, smooth the glue into fillets.



## Blades

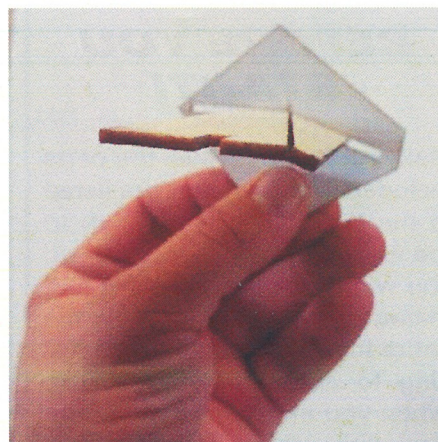
**Optional:** Airfoil the blades. Hold the blade with the notched end toward you as shown in the Illustration in step 10. Sand the leading edge (right) round and using a sanding block sand the trailing edge (left) to a taper.

- ❑ 10. Next, form the blades. Hold the blade with the notched end facing you. The cut in the blade serves as a hinge and should be running from lower right to upper left. With a thumb on either side of the hinge, work your way from one end of the blade to the other while gently pressing down to open the hinge a little.



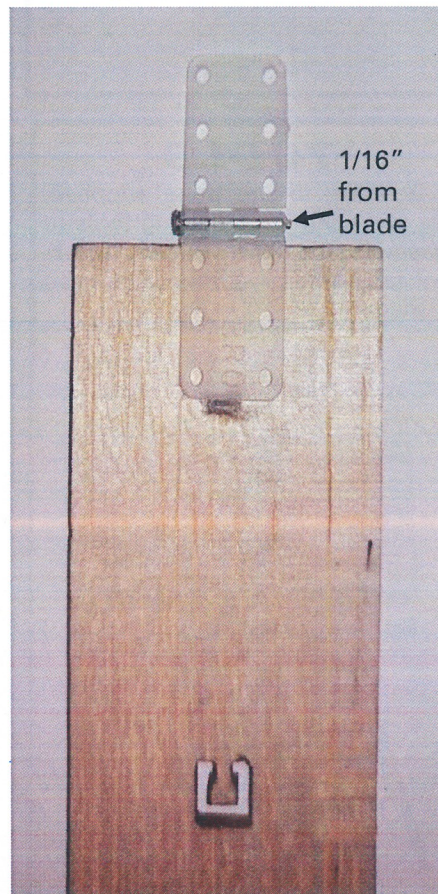
- ❑ 11. Use the angle tool to set the angle of each blade. Slide the angle tool onto the blade from the notched end and push it up to the center of the blade. The small mark on the tool is to be aligned with the cut in the blade. With the angle guide in place, either put a drop of thin CA glue into the hinge or a small thin bead of wood glue. If you opt for wood glue you should leave the guide in place until the glue dries. In either case, be careful to avoid gluing the guide to the blade.

Repeat for all 3 blades.



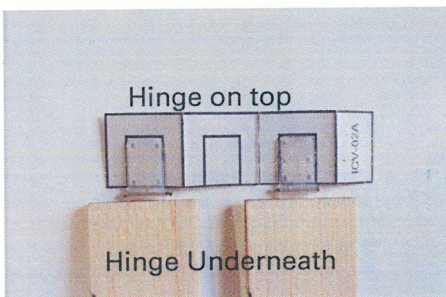
## Hub Assembly

- ❑ 12. After the glue on the blades has dried, flip them over and glue the hinges on with medium or thick CA. The hinge pin should be  $\frac{1}{16}$  from the end of the blade and parallel to the blade. Make sure it is perfectly centered on the blade. Repeat for all 3 blades.





❑ 13. Fold the paper support shroud on the heavy lines and then unfold it. Lay it flat on the table with the hinge outlines facing you. Take a blade and line up the hinge with the outline on the far right side of the shroud. The blade should be oriented so the hinge is on the underside of the blade. Glue the hinge onto the shroud with medium or thick CA. Do not get glue on the hinge pins. Repeat this process for the blade on the far left of the shroud. Do not glue the center blade to the shroud yet.

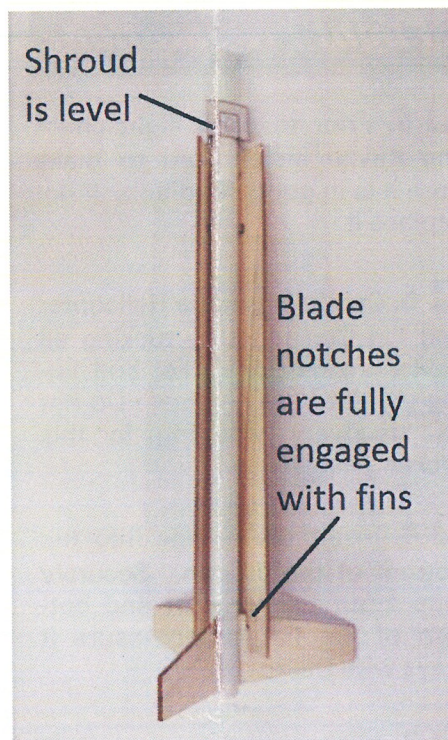


❑ 14. When the glue on the hinges has cured, glue the shroud together with wood glue using the overlap mark as a guide. This will make a triangle.

❑ 15. Slide the fin unit onto the main airframe tube. Take the shroud with the 2 blades glued to it and slide it onto the top of the rocket. The notches in the blade tips should fit into the notches in the fins and hold things in place.

Carefully line up the blades with the fins—make sure the blades project straight up from the fins and the notches are fully engaged.

When you're happy with the alignment, take the third blade and insert it in the fin notch. Hold it in place and glue the hinge to the shroud. Do not get glue on the hinge pins. Allow time for the glue to dry.



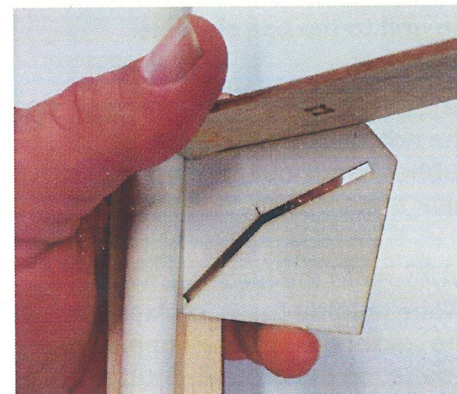
❑ 16. With everything lined up, pull the paper of the shroud back and smear white glue on the back side with a piece of wood scrap or a cotton swab. Do not allow glue to run down the tube. Make sure the blades and fins remain in alignment.

❑ 17. Next, wrap the 24" length of Kevlar cord around the shroud. Anchor one end down with a drop of CA. Wind the Kevlar over the hinge tabs around the shroud. Glue the loose end of Kevlar to the shroud with another drop of CA. Soak the Kevlar with thin CA. Do not get glue on the hinge pins.



## Dihedral

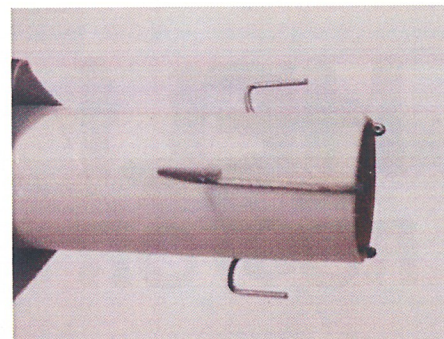
❑ 18. Use the Blade Angle and Dihedral Tool to set the dihedral of the blades. Locate the three balsa wood blade stops. Use the angle tool to set the blade dihedral by aligning one edge with the underside of the blade and the other edge with the airframe tube. When the proper angle is reached, glue a blade stop to the top center of the blade so that it is touching the Kevlar wrapped around the shroud.



Make a small puddle of medium CA on a piece of scrap. While holding the angle in place with one hand, take the blade stop, dip it into the CA puddle and quickly glue it to the blade against the Kevlar. Repeat for all 3 blades.

## Nose Assembly

❑ 19. Find the 3 wire hooks. Carefully hook them over the top of the body tube in line with the hinges. Set them in place with a small drop of CA on the outside of the tube.





- ❑ 20. Hold onto the nosecone so the Kevlar and barrel swivel dangle straight down. Drop the cord into the top of the tube. Apply a thin even layer of wood glue 1/4 inch inside the top of the airframe and seat the nosecone into the glue.

## Final Assembly

- ❑ 21. Remove the fin unit from the rocket. The barrel swivel and Kevlar should slide out easily. Tie the loose end of Kevlar from the fin unit to the barrel swivel.
- ❑ 22. Insert rubber bands into the notches in the blades. Hook rubber bands over the hooks near the nosecone.
- ❑ 23. Fold the blades down. While holding them in place, flip the rocket over so the cone is pointed at the ground. Stuff the Kevlar cord into the airframe, then put the fin unit on so that the notches engage with the blade notches.

## Finishing

- ❑ 24. Weight is critical for a good performance, if you feel compelled to finish this rocket consider using markers rather than paint.
- ❑ 25. Congratulations! You've completed the construction of your Semroc

# HELI ROCTOR

## Flight Preparation

- ❑ 6. Prior to each flight check the Kevlar shock cord to make sure it is in good condition. If not replace it.
- ❑ 5. Carefully put the Helicopter and Fin Can together tucking all Kevlar inside the rocket and lining up all of the notches. Do not use recovery wadding in this rocket.
- ❑ 4. Insert the engine into the bottom of the fin can. Securely tape around the motor and bottom of the fin can to insure it stays with the rocket.
- ❑ 3. Refer to the model rocket engine manufacturer's instructions to complete the engine prepping. Different engines have different igniters and methods of hooking them up to the launch controller.
- ❑ 2. Be sure all 3 rubber bands are properly mounted for flight.
- ❑ 1. Load your Heli-Roctor onto a 1/8" diameter by 36" long launch rod. By going through one of the Triangular Blade Shrouds corners. Be sure the launch rod is up against the body tube prior to launch. A launch lug is not included or required to launch this rocket.
- ❑ 0. After each flight, promptly remove the spent engine casing and dispose of properly.

