



# Model Rocket Safety Code

- 1. Materials.** I will use only lightweight, non-metal parts for the nose, body, and fins of my rocket.
- 2. Motors.** I will use only certified, commercially-made model rocket motors, and will not tamper with these motors or use them for any purposes except those recommended by the manufacturer.
- 3. Ignition System.** I will launch my rockets with an electrical launch system and electrical motor igniters. My launch system will have a safety interlock in series with the launch switch, and will use a launch switch that returns to the "off" position when released.
- 4. Misfires.** If my rocket does not launch when I press the button of my electrical launch system, I will remove the launcher's safety interlock or disconnect its battery, and will wait 60 seconds after the last launch attempt before allowing anyone to approach the rocket.
- 5. Launch Safety.** I will use a countdown before launch, and will ensure that everyone is paying attention and is a safe distance of at least 15 feet away when I launch rockets with D motors or smaller, and 30 feet when I launch larger rockets. If I am uncertain about the safety or stability of an untested rocket, I will check the stability before flight and will fly it only after warning spectators and clearing them away to a safe distance.
- 6. Launcher.** I will launch my rocket from a launch rod, tower, or rail that is pointed to within 30 degrees of the vertical to ensure that the rocket flies nearly straight up, and I will use a blast deflector to prevent the motor's exhaust from hitting the ground. To prevent accidental eye injury, I will place launchers so that the end of the launch rod is above eye level or will cap the end of the rod when it is not in use.
- 7. Size.** My model rocket will not weigh more than 1,500 grams (53 ounces) at liftoff and will not contain more than 125 grams (4.4 ounces) of propellant or 320 N-sec (71.9 pound-seconds) of total impulse. If my model rocket weighs more than one pound (453 grams) at liftoff or has more than four ounces (113 grams) of propellant, I will check and comply with Federal Aviation Administration regulations before flying.
- 8. Flight Safety.** I will not launch my rocket at targets, into clouds, or near airplanes, and will not put any flammable or explosive payload in my rocket.
- 9. Launch Site.** I will launch my rocket outdoors, in an open area at least as large as shown in the accompanying table, and in safe weather conditions with wind speeds no greater than 20 miles per hour. I will ensure that there is no dry grass close to the launch pad, and that the launch site does not present risk of grass fires.
- 10. Recovery System.** I will use a recovery system such as a streamer or parachute in my rocket so that it returns safely and undamaged and can be flown again, and I will use only flame-resistant or fireproof recovery system wadding in my rocket.
- 11. Recovery Safety.** I will not attempt to recover my rocket from power lines, tall trees, or other dangerous places.

## LAUNCH SITE DIMENSIONS

Installed Total Impulse (N-sec)	Equivalent Motor Type	Minimum Site Dimensions (ft.)
0.00 — 1.25	1/4A	50
1.26 — 2.50	A	100
2.51 — 5.00	B	200
5.01 — 10.00	C	400
10.01 — 20.00	D	500
20.01 — 40.00	E	1000
40.01 — 80.00	F	1000
80.01 — 160.00	G	1000
160.01 — 320.00	2 Gs	1500

**SEMROC**

# STARFIRE

## 1966 World Champion Parachute Duration Sport Rocket

### Easy to Build

Laser Cut Fins

Designed by Lee Piester

1966 AstroRepro

## FLYING MODEL ROCKET KIT

MADE IN THE USA

**SEMROC**

Made in the U.S.A. by Semroc Astronautics Corporation - Knightdale, N.C. 27545

### STARFIRE™ Kit No. KV-20

Specifications	Engine	Approx. Altitude
Body Diameter .908" (2.3 cm)	A8-5	350'
Length 15.8" (40.1 cm)	B6-6	880'
Fin Span 4.1" (10.5 cm)	C6-7	1400'
Net Weight 0.8 oz. (23.8 g)		

## PARACHUTE RECOVERY

## What is a Retro-Repro?

A Retro-Repro is a retro reproduction of an out-of-production model rocket kit. It is a close approximation of a full scale model of an early historically significant model rocket kit from one of the many companies that pioneered the hobby over the past half century. A retro-repro is not a true clone or identical copy of the original. It incorporates improvements using modern technology, while keeping the flavor and build appeal of the early kits.

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## About

### Centuri Engineering Company

Centuri Engineering Company was started in 1961 by Leroy (Lee) Piester in his garage while he was still in college in Phoenix, Arizona. With his wife, Betty, they built Centuri into one of the largest model rocket companies ever.

Centuri was known for its unusual and innovative designs, producing over 140 different kits with something for every model rocketeer. They also produced model rocket engines and pioneered the modern composite high powered engines with their Enerjet line.

Centuri Engineering was sold to Damon in the late 1960's and shared the same parent corporation with Estes Industries, the largest model rocket company in the world. The Centuri product line was kept separate from the Estes line until 1983. A few of the old kits have been reissued by Estes since then, but for the most part, Centuri Engineering Company lives today only in the dreams of the senior members of the model rocket community.

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October 27, 2007

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Box 1271 Knightdale, NC 27545 (919) 266-1977

## LIMITATION OF LIABILITY

Model rockets are not toys, but are functional rockets made of lightweight materials and are launched with NAR or Tripoli safety certified model rocket engines, electrically ignited and flown in accordance with the NAR Model Rocket Safety Code. If misused, model rockets can cause serious injury and property damage. Semroc certifies that it has exercised reasonable diligence in the design and manufacture of its products. Semroc cannot assume any liability for the storage, transportation, or usage of its products. Semroc shall not be held responsible for any personal injury or property damage whatsoever arising out of the handling, storage, use, or misuse of our products. The buyer assumes all risks and liabilities therefrom and accepts and uses Semroc products on these conditions.

Your purchase and use of any Semroc products is construed as your agreement to and acceptance of these terms. If you do not agree to these terms and conditions, you must return the product, unused, for refund or credit.

## 100% SATISFACTION GUARANTEE

If you are not 100% satisfied with your Semroc product, we will make it right by providing whatever you consider fair, from refund to replacement.

Contact us at:

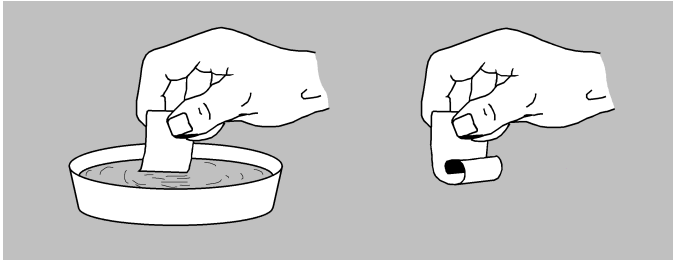
**Semroc Astronautics Corporation**  
Customer Service Department  
P.O. Box 1271  
Knightdale, North Carolina 27545

## JOIN THE NAR!

Sign up online at [www.nar.org](http://www.nar.org) to join the premier model rocketry organization. Semroc fully supports the National Association of Rocketry and recognizes it as the sport's official voice. The NAR is the oldest and largest sport rocketry organization in the world. Since 1957 over 80,000 serious sport rocket modelers have joined the NAR to take advantage of the fun and excitement of organized rocketry. It is always more fun if you fly with friends. The *Sport Rocketry* magazine is one of the best ways to keep informed of new developments in the hobby. Check online at [www.semroc.com/nar](http://www.semroc.com/nar) for promotions just for NAR members.

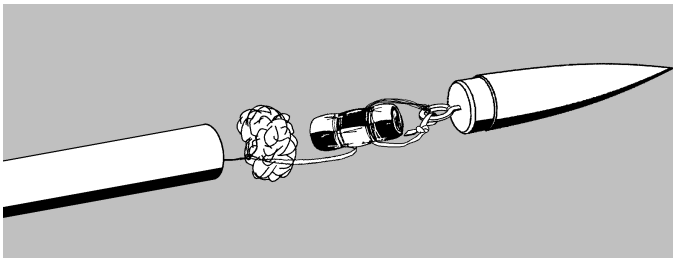


- ❑ **26.** After the paint has dried, decals should be applied. The decals supplied with the Starfire™ are waterslide decals. Apply each decal before starting the next. Check for fit before wetting the decal. A drop of detergent in the water will allow for more movement before the decal sets.



## FLIGHT PREPPING

- ❑ **27.** Mounting the engine: Wrap a few turns of masking tape around the engine to get a snug fit in the engine mount. Make sure it is all the way in and against the engine block.
- ❑ **28.** Pack the recovery wadding from the top of the body tube. Use a sufficient quantity to protect the parachute, but not too much that there is no room left. There is not much room left after sufficient wadding is applied.
- ❑ **29.** Fold the parachute and pack it and the shock cord on top of the recovery wadding. Slide the payload section into place, making sure it does not pinch the shock cord or parachute.



- ❑ **30.** 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 controllers.
- ❑ **31.** Carefully check all parts of your rocket before each flight as a part of your pre-flight checklist. Launch the Starfire™ from a 1/8" diameter by 36" long launch rod.

## About the Starfire™

The Centuri Starfire was introduced at the first International Model Rocket Championship Meet held at Dubnica, Czechoslovakia on May 28-29, 1966. It was originally designed by Leroy (Lee) Piester for competition in the Parachute Duration event. It used a 16" chute and won an award. The production model that was offered in the 1967 catalog had a 12" chute for sport flying and a 20" chute for competition. The Starfire was the best selling kit in the Centuri line and was Catalog # KC-12. It was priced initially at \$1.95.

The Semroc Starfire™ is a close replica of the original. It features a balsa nose cone like the early models and laser-cut fins. A 12" two-color chute is included along with Kevlar® cord for an improved shock cord mount. A competition chute is not included, but a larger chute may be substituted for parachute duration contests. The smaller chute is perfect for smaller field flying.

## BEFORE YOU START!

Make sure you have all the parts included in this kit that are listed in the Parts List in the center of these instructions. 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. If you are uncertain of the location of some parts, refer to the exploded view in the center of these instructions. 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.

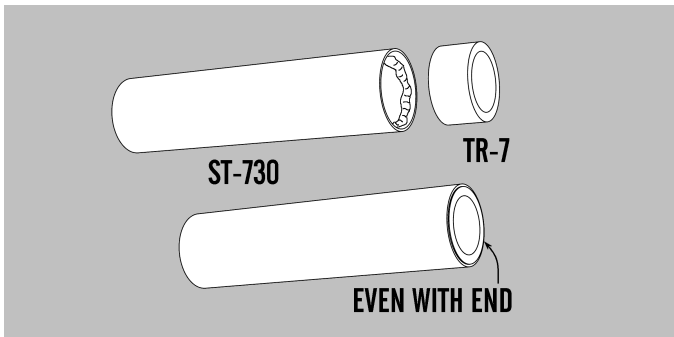


# ASSEMBLY

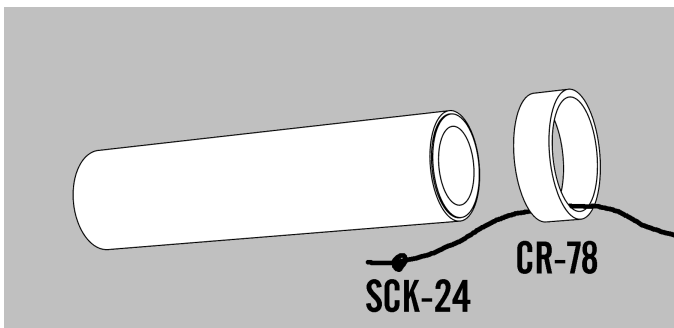
**1.** These instructions are presented in a logical order to help you put your Starfire™ together quickly and efficiently. Check off each step as you complete it and enjoy putting this kit together.

## ENGINE MOUNT

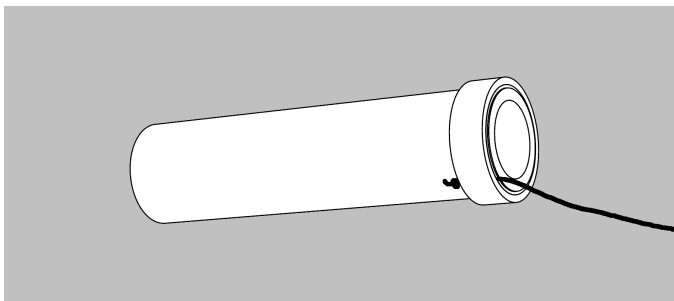
**2.** Apply a bead of glue just inside one end of the engine tube (ST-730.) Insert the thrust ring (TR-7) into the engine tube until the ring is even with the engine tube.



**3.** Thread the yellow Kevlar thread (SCK-24) through one of the two centering rings (CR-78.) Tie a knot in the end as shown. Slide the centering ring over the end of the engine tube that has the thrust ring until it is even with the end of the tube.

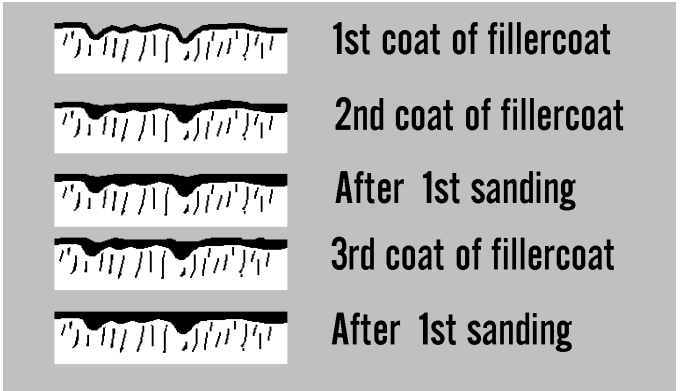


**4.** Apply a bead of glue around both sides of the centering ring. Pull the thread until the knot seats against the centering ring. Keep glue off the outside edge of the ring.



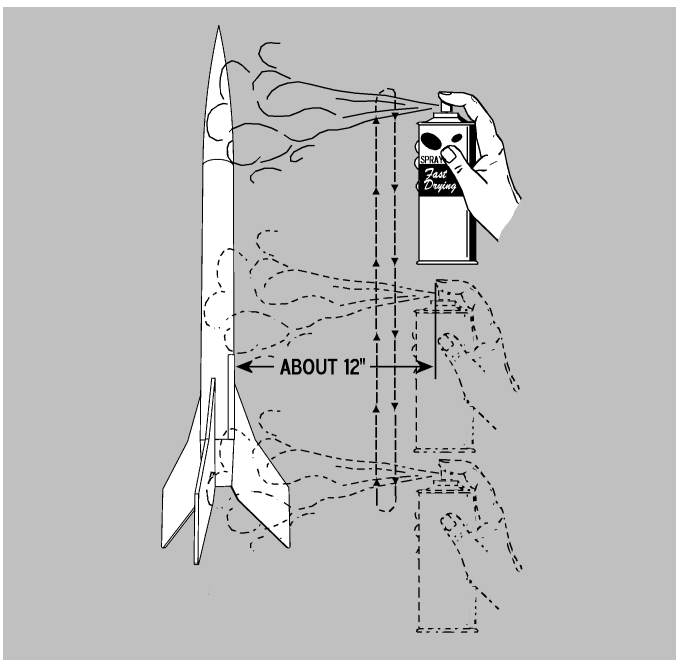
# FINISHING

**23.** When the fillets have dried, prepare balsa surfaces for a smooth professional looking finish. Fill the wood grain with balsa fillercoat or sanding sealer. When dry, sand with fine sandpaper. Repeat until smooth.



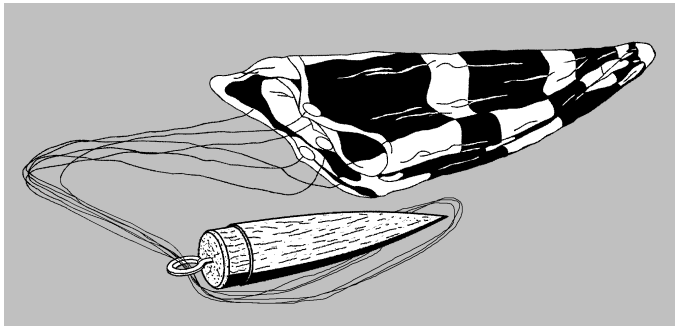
**24.** After all balsa surfaces have been prepared, wipe off all balsa dust with a dry cloth. First spray the model with an enamel primer, then spray a base color of gloss white. For better visibility, bright colors should be used for final coats.

**25.** Spray painting your model with a fast-drying enamel will produce the best results. PATIENCE...is the most important ingredient. Use several thin coats, allowing each coat to completely dry before the next coat. Start each spray a few inches above the model and end a few inches below the model. Keep the can about 12" away and use quick light coats. The final coat can be a little heavier to give the model a glossy wet-looking finish.

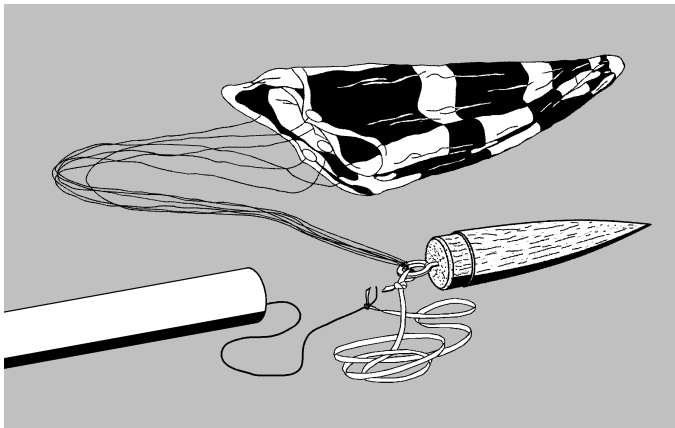


## FINAL ASSEMBLY

- 21.** Assemble chute using instructions printed on the canopy. Attach chute by passing the lines through the screw eye and looping them over the tip of the nose cone as shown. Pull the lines tight and make sure they are all of equal length. Put a drop of glue on the joint to keep the lines from moving. If you are planning on adding a larger chute for competition, it might be easier to use swivels for attachment.



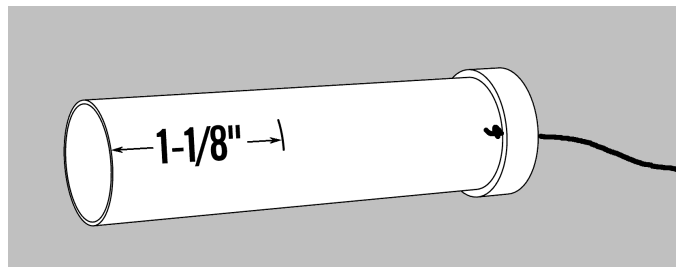
- 22.** Pull the Kevlar® thread out of the top of the main body tube. Tie the loose end to one end of the elastic cord. Tie the other end of the elastic cord to the screw eye. Put a drop of glue on both knots to keep them from untying.



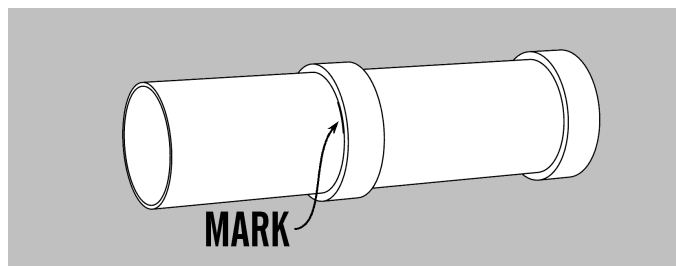
This completes the assembly of your

# STARFIRE

- 5.** Place a mark 1-1/8" from the bottom of the engine tube opposite the centering ring just installed.

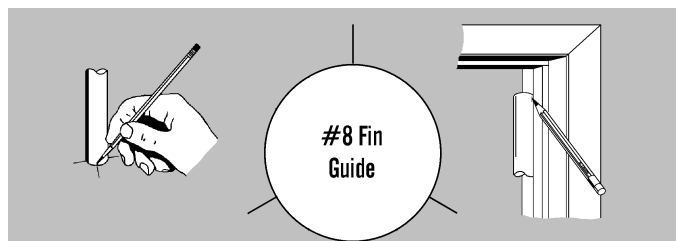


- 6.** Slide the remaining centering ring over the bottom of the engine tube until the mark just appears. Apply a bead of glue around each side of the centering ring, keeping glue off the outside surface of the ring. Stuff the Kevlar® thread inside the engine tube to keep it out of the way until later. Allow the engine mount to dry thoroughly.



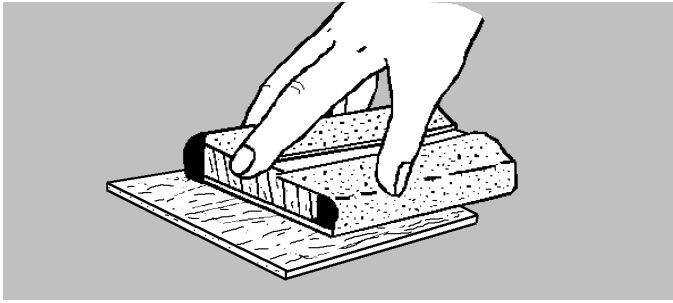
## MARK THE TUBE

- 7.** Stand the main body tube on the fin guide below. Mark the three 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 at least two inches from the end of the tube.

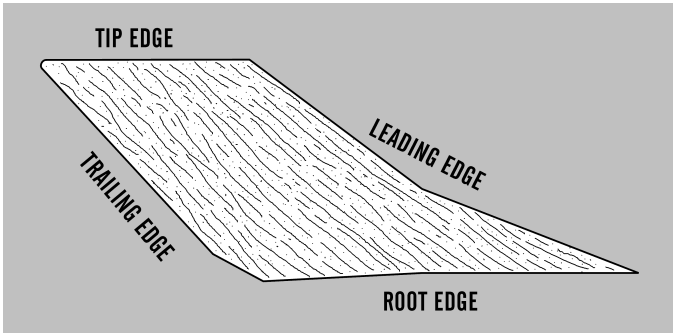


## PREPARE THE FINNS

- 8.** Lightly sand each side of the laser-cut fins. Carefully push the laser-cut fins from their sheet. Start at one point on each fin and slowly and gently work around the fin. Be especially careful with the unsupported tips.

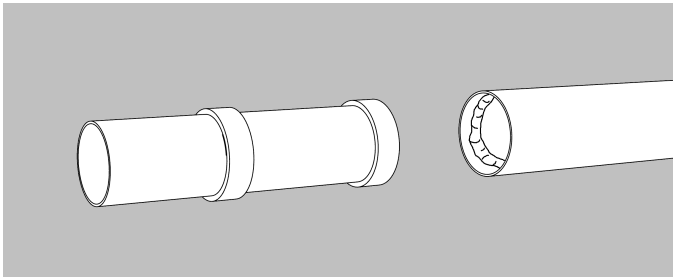


❑ **9.** Round all edges except the root edges (which will be glued to the body tube). The root edge is angled to fit the boattail.

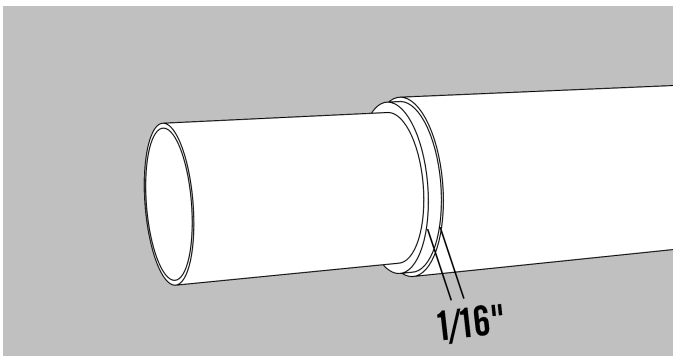


## INSTALL THE MOUNT

❑ **10.** Apply a generous bead of glue inside the marked end of the main body tube.

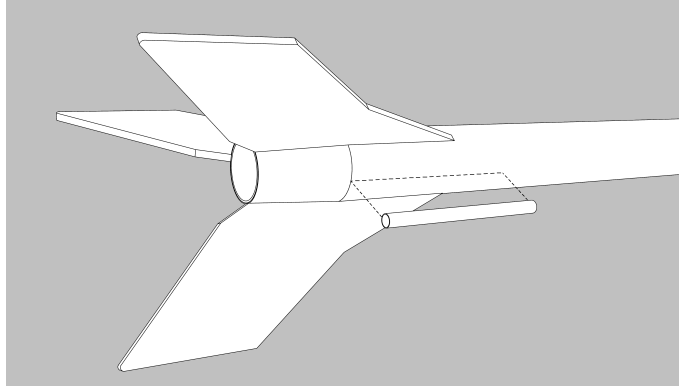


❑ **11.** Press the engine mount into the main tube until 1/16" of the bottom centering ring is left exposed. Do not stop until the assembly is correctly positioned or the glue will set.



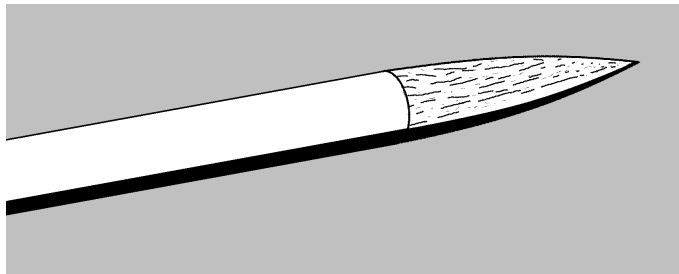
## LAUNCH LUG

❑ **18.** Glue the launch lug along the side of the body tube, centered between two of the fins and even with the bottom of the body tube at the joint between the body tube and the boattail.

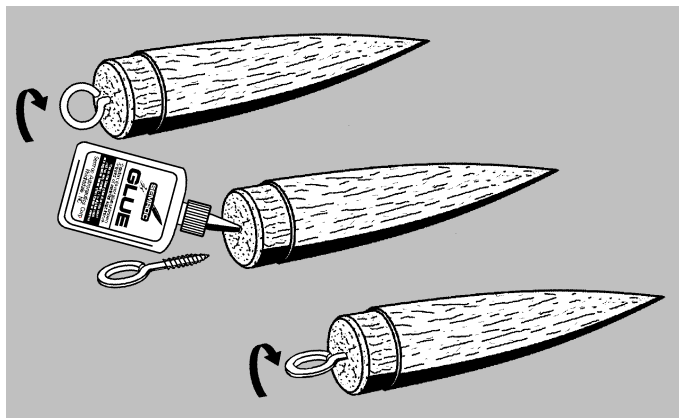


## NOSE CONE

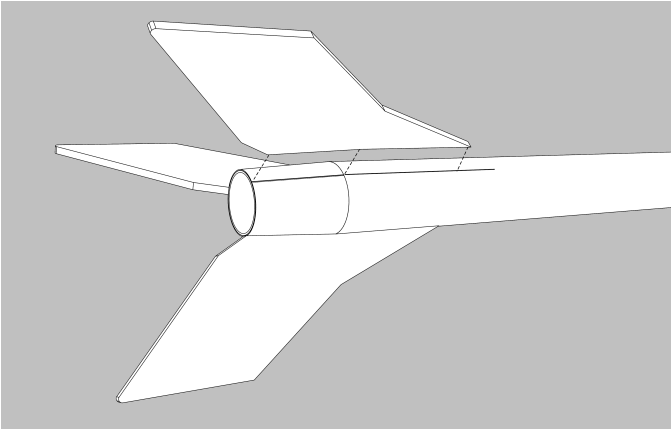
❑ **19.** Insert the nose cone in the body tube and check for proper fit. The nose cone should be snug to hold itself in alignment. If it is too loose, add masking tape. If it is too tight, sand the shoulder slightly.



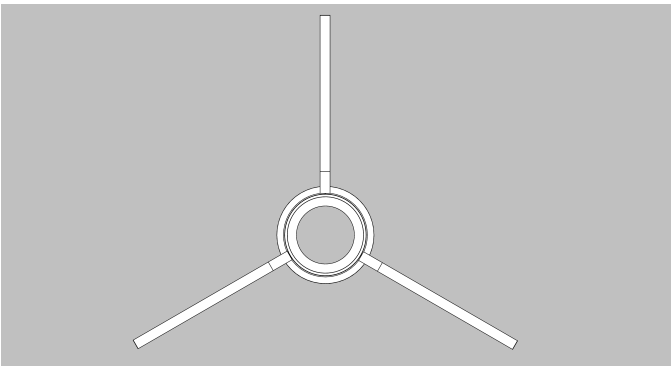
❑ **20.** Twist the screw eye into the center of the base of the nose cone. Unscrew it and squirt glue into the hole. Reinstall the screw eye and wipe off any excess glue.



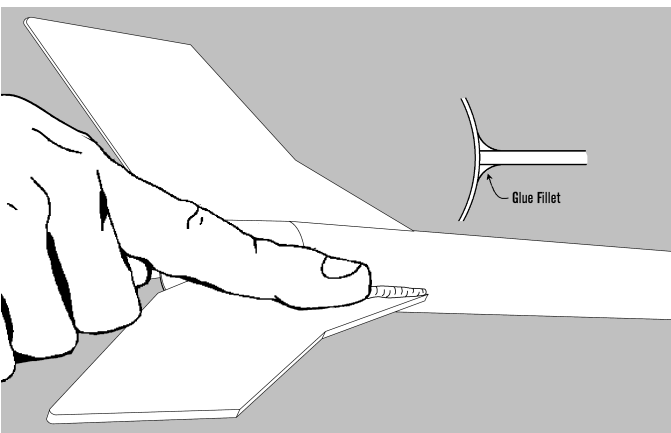
❑ **15.** Apply a bead of glue to the root edge of one of the fins. Apply it along one of the marked lines. Remove it and allow the glue to become tacky. Apply another light film of glue and reapply the fin to the body tube. Repeat for the remaining two fins. One of the fins should cover the paper joint on the boattail.



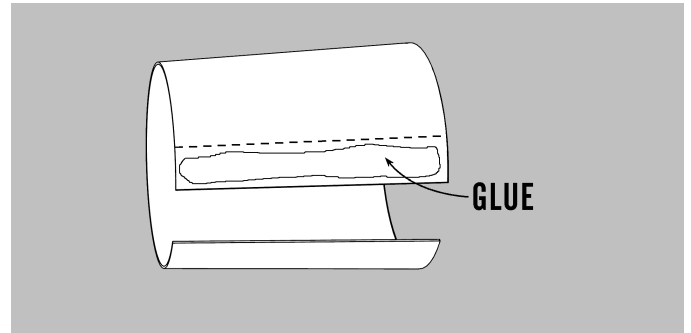
❑ **16.** Sight down the assembly from the bottom and make sure all fins are equally spaced as shown. If any are not correct, reapply them and re-check.



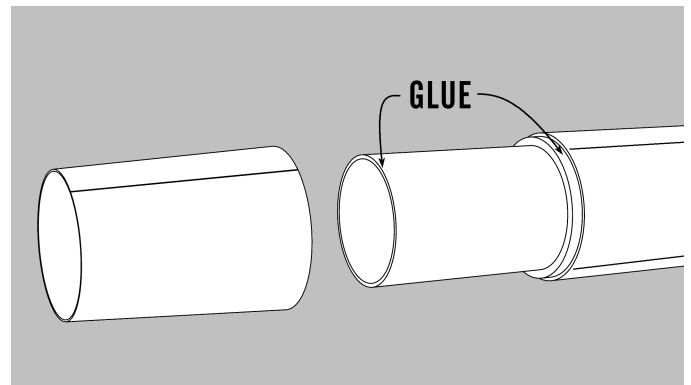
❑ **17.** After the fin assembly is completely dry, run a small bead of glue along both sides of each fin-body tube joint. Using your index finger, smooth the glue into fillets.



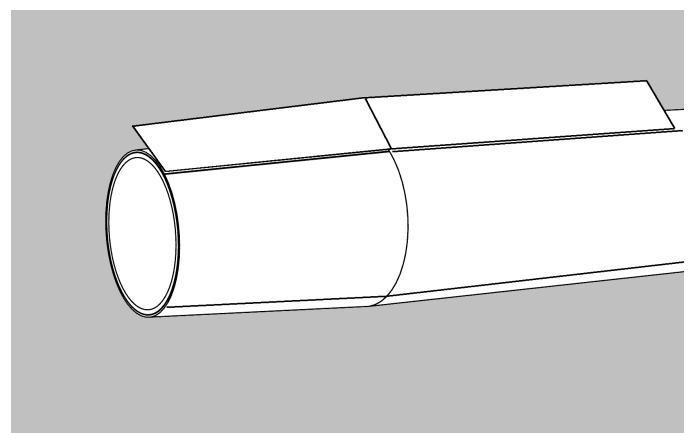
❑ **12.** Cut out the paper boattail on the solid lines. Curl the paper into a cone with the glossy side to the outside. Test the ring for fit aligning the opposite side against the dotted line. Apply a thin film of glue on the area inside the dotted line and smooth with your finger. Line up the opposite edge along the dotted line and hold in place until the glue sets.



❑ **13.** Apply a bead of glue around the exposed centering ring and another bead around the bottom end of the engine tube as designated below. Slide the boattail over the tubes, aligning the joint to one of the marked lines.



❑ **14.** Using a strip of paper, aligned to each of the remaining lines, extend the line drawn on the body tube along the length of the boattail.



## Parts List

A	1	Body Tube	.....	ST-880
B	1	Body Tube	.....	ST-730
C	1	Balsa Nose Cone	.....	BC-848
D	1	Laser Cut Fins	.....	FV-20
E	2	Centering Rings	.....	CR-78
F	1	Thrust Ring	.....	TR-7
G	1	Launch Lug	.....	LL-122
H	1	Screw Eye	.....	SE-10
I	1	Elastic Cord	.....	EC-118
J	1	Kevlar Thread	.....	SCK-24
K	1	Plastic Parachute	.....	RC-12
L	1	Tape Disc	.....	TD-6
M	1	Shroud Line	.....	SLT-6
N	1	Decal	.....	DKV-20
O	1	Shroud	.....	IKV-20S

## EXPLODED VIEW

