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



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

TAU ZERO™
Kit No. KN-2

Specifications		Engine	Approx. Altitude
Body Diameter	.759" (1.9 cm)	A8-3	275'
Length	16.0" (40.6 cm)	B6-4	600'
Fin Span	5.3" (13.4 cm)	C6-5	1150'
Net Weight	1.0 oz. (28.3 g)		

STREAMER RECOVERY

About Semroc Astronautics Corporation

Semroc Astronautics Corporation 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.

December 15, 2008

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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 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 for promotions just for NAR members.

comm system. "...We have come as you requested. Please identify yourselves."

Jason glanced around him at his crew, which included humanoids, as well as the short-lived treelike Lwaan, and the much hardier insectoid V'Lox. Kr'len's tenth-generation descendant Rk'nol had been Jason's navigator for seven years, and was nearing its retirement.

Jason said, "Send the holographic message."

***

Young Jason was waiting somewhat nervously for the mystery ship's response. The holographic display suddenly sprang to life, showing equations that he recognized were related to the speed of light. Then the figures began to change, and the numeric value for the Greek letter "Tau" began approaching zero. The display seemed to explode in a dramatic but tolerable flash of light, and a series of completely new figures appeared.

"The clock strikes zero," Jason realized, "and a whole new set of equations comes into play."

***

Silver-haired Jason found D'reza meeting his gaze with her compound vidreceptors. He smiled briefly, and told her, "It's time." Glancing at Rk'nol, Jason told the navigator, "Let's go, old friend. The mysteries of the other side of lightspeed are waiting for us."

The ship leaped ahead, beyond the laws of physics we understand, into a universe we can't begin to imagine.

"Now," Jason mused, "Everything changes."

--Jay Goemmer
December 2008

About the Tau Zero™

The Tau Zero™ is the first original Semroc kit to be designed by Jay "Centuri Guy" Goemmer of Twin Falls, Idaho, who says he's "an incurable Semroc fan." Released in 2008, the Tau Zero combines an unusually-shaped nose cone, forward-swept outer fins, and an unexpected ring fin. These features add up to a futuristic sport rocket with some minor building challenges for the intermediate rocketeer. The Tau Zero kit is rated a Skill Level 2 for construction, or as much as a Skill Level 3, depending on the complexity of your chosen paint scheme.

The phrase "Tau Zero" is borrowed from the 1970 Poul Anderson novel of the same name.

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.

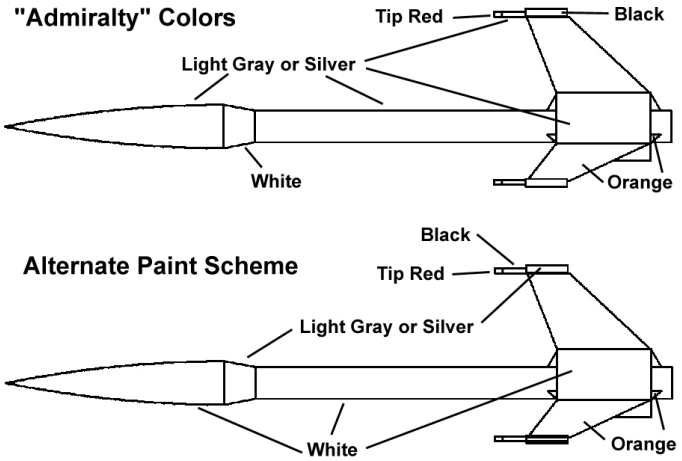


A WORD ABOUT PAINTING

Because of the Tau Zero's unusual multiple-fin configuration, you may want to finish and paint the body tube and fin assemblies **before** gluing the ring fin to the inner fins. As a result, the recommended paint scheme will require completing some of the assembly steps "out of order" when compared to a typical model rocket.

PREPARATION

Many experienced rocketeers prepare balsa surfaces and paper body tubes before beginning construction. This consists of sanding the "shiny" surface off the body tubes, filling the balsa grains, and sanding the fins and nose cone smooth. It's also common to spray the entire rocket with primer, as well. Since the Tau Zero is a "paint as you go" model, you may want to take these additional steps now to ensure a more professional finish. Two color schemes are shown below. Paint the inside of the tail ring with flat black paint.



ASSEMBLY

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

ENGINE MOUNT ASSEMBLY

❑ **2.** Tie one end of the yellow Kevlar® cord to the thrust ring.

When Tau Equals Zero

D'reza's suddenly excited insectoid whine caught Jason's attention.

"Captain! The ships you've been expecting are here!" she buzzed.

"Good," Jason replied. "Open a universal comm channel to the fleet." Turning to his navigator Kr'len, Jason ordered, "Hold this position."

Kr'len's whiplike tendrils flicked restlessly across the navigational controls. "Stationary position, aye, sir."

Jason cleared his throat and nodded to D'reza, who indicated the communications array was active.

"For thousands of years now, our individual starfaring races have sighted so-called mystery ships, which seem to appear and disappear at will. Now, we have all come together at the invitation of one of these ships, to hopefully uncover the mystery behind whoever and whatever they are," Jason said. "This is the time and the place specified by the message that we all received."

Right on schedule, the mystery ship seemed to ripple into existence. It was rumored to exceed the speed of light, and was sleek and streamlined even though it didn't have to be. The craft sported an elegant needle-sharp nose, what appeared to be a Bussard ramscoop toward the aft end, and deadly ion cannons on the forward-swept wingtips.

Jason said with just a trace of a quiver in his voice, "Hail them. Tell them... tell them we come in peace. And--we want to know who they are."

*****

Jason's hair was silver now, what little was left.

The message he'd been expecting for a hundred years was finally coming in over the

FLIGHT PREPPING

❑ **32.** Mounting the engine: Insert the engine and make sure the engine hook latches it securely in place.

❑ **33.** Pack the recovery wadding from the top of the body tube. Use a sufficient quantity to protect the streamer, but not too much that there is no room left.

❑ **34.** Roll the streamer and pack it and the shock cord on top of the recovery wadding. Slide the nose cone into place, making sure it does not pinch the shock cord or streamer.

❑ **35.** 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.

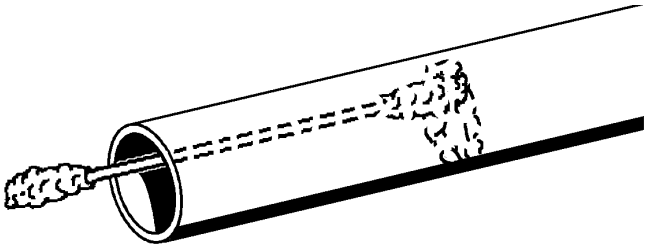
❑ **36.** Carefully check all parts of your rocket before each flight as a part of your pre-flight checklist. Launch the Tau Zero from a 1/8" diameter by 36" long launch rod.



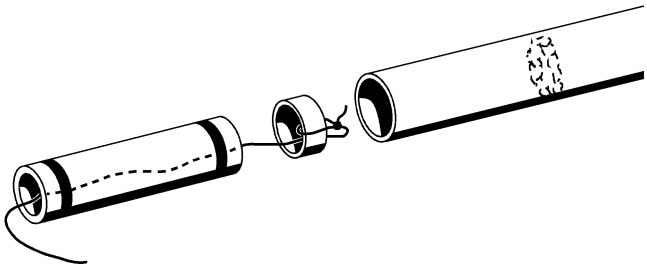
❑ **3.** The thrust ring is to be glued 2 1/2" from the end of the body tube. Mark the empty engine casing 1/4" from one end. Set the casing aside.



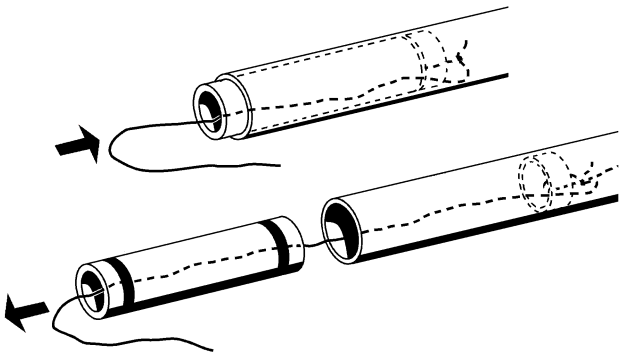
❑ **4.** Put a large dab of glue on a cotton-tipped swab and spread the glue around inside the tube no farther than 2 1/2". Try not to get any glue close to the end of the tube.



❑ **5.** Insert the free end of the Kevlar® cord attached to the thrust ring through the engine spacing tube. Insert the thrust ring just inside the end of the body tube.

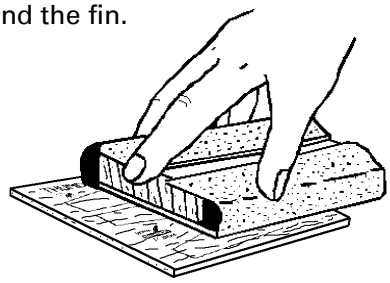


❑ **6.** Use the marked engine casing to push the thrust ring until the mark on the casing is even with the end of the body tube. CAUTION: Once you have started to push, do not stop or the ring will "freeze" in place. Remove the empty case immediately and discard.

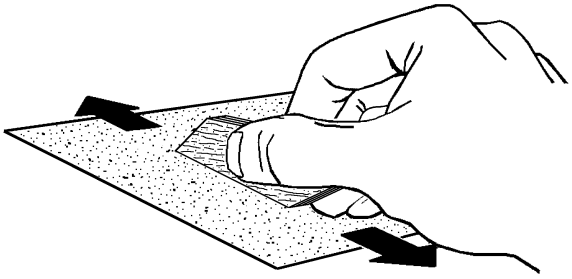


FIN PREPARATION

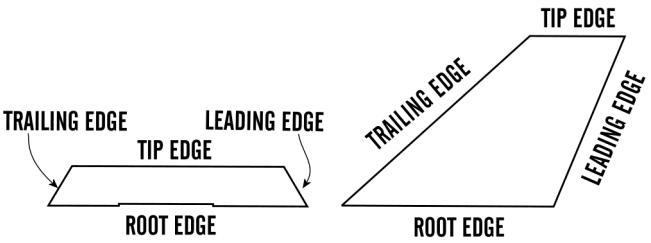
❑ **7.** Lightly sand each side of the laser-cut fins. Carefully push the laser-cut fins from their sheet. Start at one point on each fin and slowly and gently work around the fin.

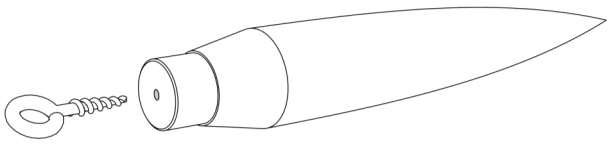


❑ **8.** Stack the two sets of three inner and outer fins separately, and line them up squarely. Run each set of fins back and forth over some fine sandpaper to get rid of the hold-in tabs as shown below.



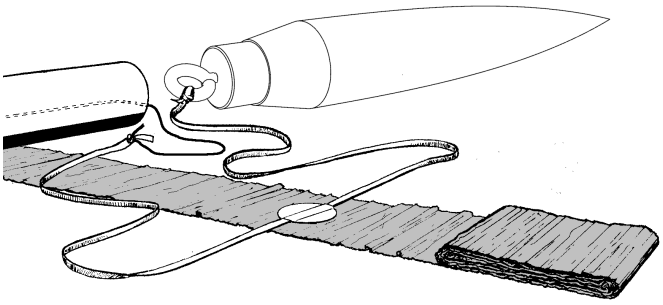
❑ **9.** If you prefer, round the leading and trailing edges of the fins. The root and tip edges will be glued to the body tube, ring fin, and the optional "ion cannons," respectively.



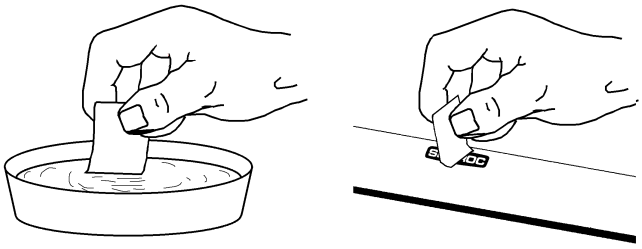


FINAL ASSEMBLY

❑ **30.** 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. Attach the middle of streamer near the middle of the elastic cord with the tape disk.



❑ **31.** After the paint has dried, decals should be applied. The decals supplied with the Tau Zero™ 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.

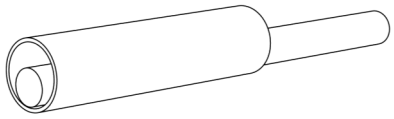


This completes the assembly of your

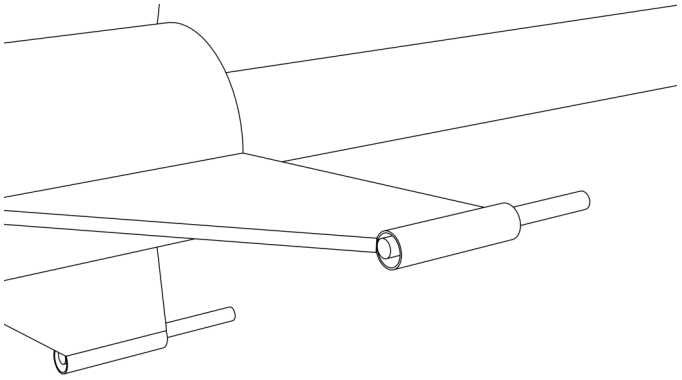
TAU ZERO

ION CANNONS

❑ **26.** Apply a thin bead of glue along one end of one of the wood dowels, matching the length of the launch lugs. Glue the wood dowel inside the launch lug against one side as shown. Repeat for the other two assemblies.



❑ **27.** Glue one of the gun assemblies to the tip of each large fin with the dowel positioned towards the fin. Using your finger, apply a fillet of glue along each side of the assembly. Allow them to dry in a vertical position.



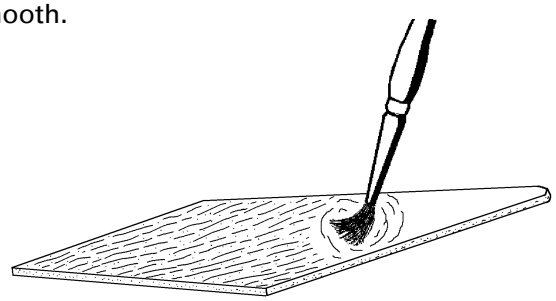
NOSE CONE

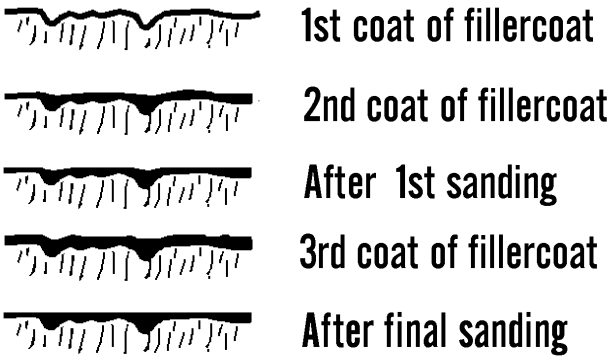
❑ **28.** Insert the nose cone in the body tube and check for proper fit. The nose cone should be snug to hold itself in alignment. If it is too loose, add masking tape. If it is too tight, sand the shoulder slightly.

❑ **29.** Punch or drill a 1/8" diameter hole 3/4" deep in the exact center of the base of the nose cone using a punch, awl, pencil, or power drill. 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.

BALSA FINISHING

❑ **10.** Prepare the balsa fins and the nose cone 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.

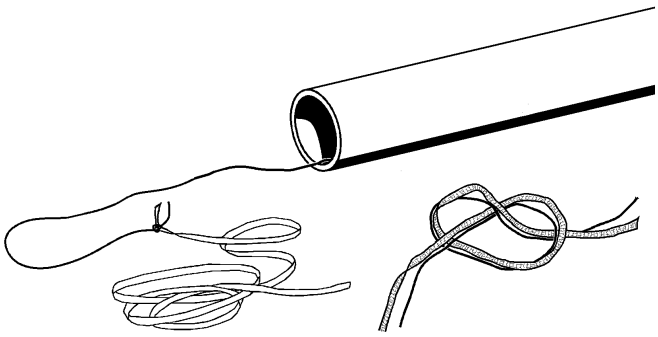




❑ **11.** After all balsa surfaces have been prepared, wipe off excess dust with a dry cloth.

SHOCK CORD

❑ **12.** Prepare the shock cord as follows. Line up one end of the elastic shock cord with the free end of the Kevlar® cord, and tie an overhand knot at the end of the two cords. Pull the knot tight and place a small drop of white glue on the knot to prevent it from loosening.

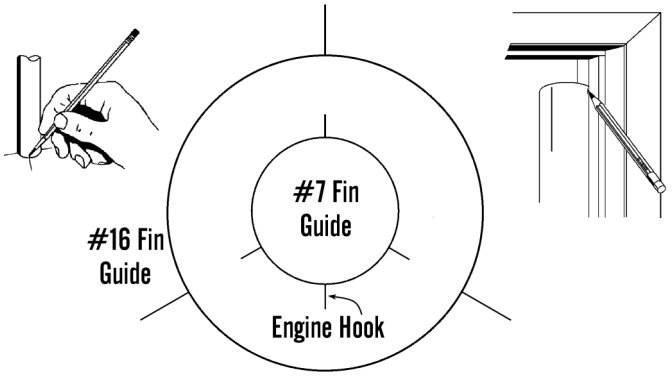


❑ **13.** Feed the shock cord and yellow Kevlar® cord back through the body tube until they come out the opposite end. Make sure they are pulled all the way through. It may be necessary to shake the tube or pull the shock cord through with a coat hanger or small, thin wood dowel.



MARK TUBE

❑ **14.** Stand the #7 body tube on the fin guide below. Mark the fin and engine hook positions on the sides of the tube. Place the #16 ring fin on its fin guide, and mark that body tube as well.



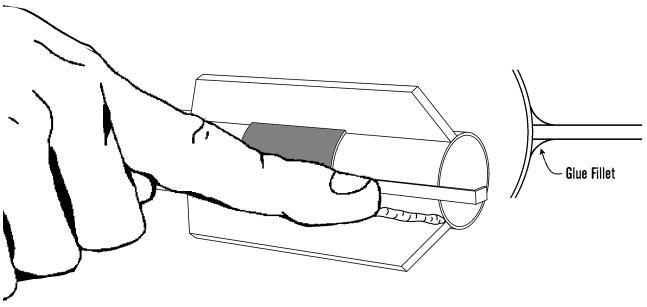
❑ **15.** Find a convenient channel or groove such as a partially open drawer, a door jamb (as shown), or a piece of molding. Using the channel, extend the marks the full length of the #16 ring fin to provide lines for aligning the fins. On the ST-7 body tube, extend the three fin lines and the engine hook line 3 1/2" from the base of the tube.

FIN ATTACHMENT

NOTE: Instead of centering your fins on the lines marked on the body tube, line up the root edge of your fins with those lines. If you are right-handed, place the fins to the right of the body tube lines. You'll need to maintain this alignment for all of the fins as you attach them to ensure they're spaced evenly around the tube.

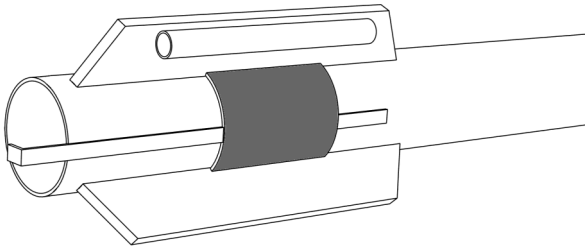
❑ **16.** Make two marks on the engine hook line, 1" and 2 1/2" from the base of the ST-7 tube. The forward end of the EH-28 engine hook will go at the bottom of the TR-7 thrust block. Using a pen knife, cut a slot for the engine hook, making the cut to the **right** of the engine hook line. (See "NOTE" above for further explanation.)

❑ **23.** After the fin assemblies are completely dry, run a small bead of glue along both sides of each fin-body tube joint. Use your index finger to smooth the glue into fillets.

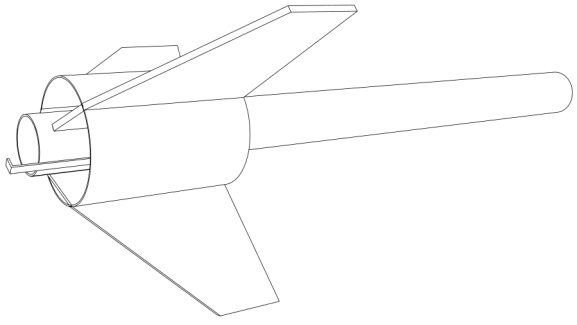


LAUNCH LUG

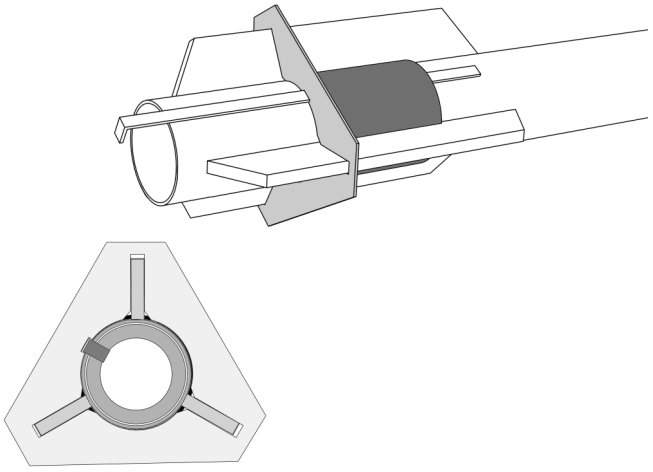
❑ **24.** Glue the launch lug near the outer edge of an inner fin, 1/4" from the leading and trailing edges. The lug will also be glued to the inside of the ring fin, so position it carefully.



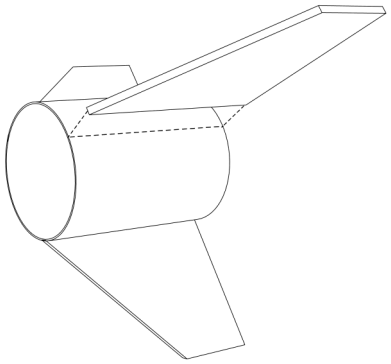
❑ **25.** Slide the outer fin assembly over the inner fins and check for fit. Twist it slightly and apply a thin bead of glue under each of the large fins on the inside of the ring. Twist it back into position. Apply a bead of glue on each joint where the inner fins touch the outer ring.



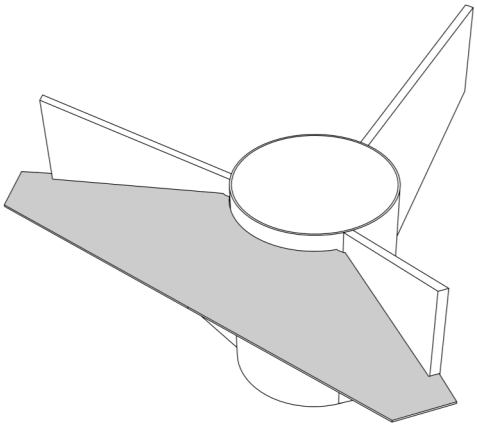
❑ **20.** Slip the smaller of the two fin alignment guides onto the body tube from the rear and over the inner fin to hold it in place. Repeat for the other two fins. Refer to the end view.

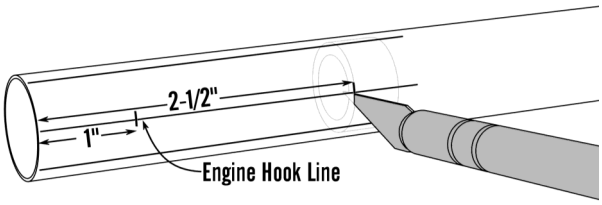


❑ **21.** Use the same technique to attach the outer fins to the ST-16 ring fin.

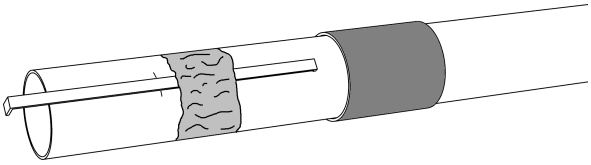


❑ **22.** As you apply each fin, check it for correct angles using the fin alignment guide provided.

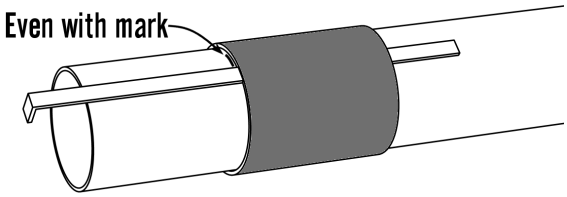




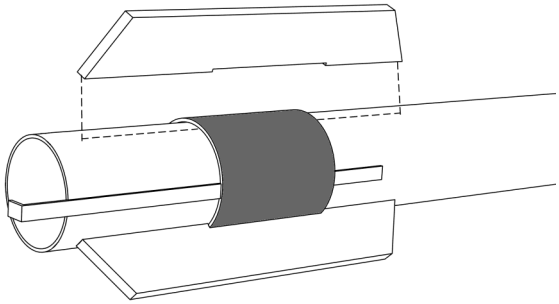
❑ **17.** Insert one end of the engine hook into the tube slot. Slip the RR-7 retainer ring over the front of the tube, and slide it toward the back. Apply a ring of glue around the outside of the body tube just forward of the 1" mark.



❑ **18.** POSITIONING IS CRITICAL HERE! Slip the retaining ring over the engine hook, sliding it into position 1" from the end of the body tube. Wipe away any excess glue before it dries.



❑ **19.** Run a thin bead of glue along the root edge of one of the inner fins. The rear end of the inner fin should be 1/4" from the end of the body tube. Attach the fin to the body tube immediately next to one of the lines drawn earlier. Remove the fin and wait a few minutes until the glue gets tacky. Add another bead of glue to the fin and reapply it.



Parts List

A	1	Balsa Nose Cone	BC-760
B	1	Body Tube	ST-7100
C	1	Body Tube	ST-1622
D	1	Laser Cut Fins	FN-2
E	1	Empty Casing	MC-727
F	1	Thrust Ring	TR-7
G	1	Engine Hook	EH-28
H	1	Retaining Ring	RR-7
I	1	Launch Lug	LL-117
J	3	Launch Lugs	LL-310
K	3	Wood Dowels	WD-202
L	1	Elastic Cord	EC-124
M	1	Screw Eye	SE-14
N	1	Kevlar Thread	SCK-24
O	1	Streamer	RS-240
P	1	Disc	TD-1
Q	1	Glue Applicator	GA-1
R	1	Tau Zero Template	IKN-2T
S	1	Decal	DKN-2

EXPLODED VIEW

