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

SLS Lil' Hustler

Kit No. KV-57

Specifications

Body Diameter	1.34" (3.4cm)
Capsule Diameter	1.84" (4.7cm)
Length	29.8" (75.7cm)
Fin Span	8.7" (22.1cm)
Net Weight	6.0 oz. (170.1g)

Engine	Approx. Altitude
D12-5	650'
E9-6	1150'
E15W-7	1850'

Nylon 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.

What is SLS™?

SLS is short for Semroc Large-Scale Rocketry. Based on the original Centuri Large Scale Line using larger, thicker-walled body tubes, Semroc is introducing several models in the Mid-Power range. Most of the models will fly on 24mm and 29mm engines in the C through G (and small H) impulse levels. Featured in the family are laser-cut basswood fins, Nylon chutes, and laser-slotted tubes allowing much more robust construction designed to last for years of flying.

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.

July 23, 2006

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 motors, 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.

About the SLS Lil' Hustler™

The Centuri Lil' Hustler Carrier Rocket was introduced in the 1967 Catalog as one of the last two members of the Centuri Large Scale Series. It was a 3/4 scale model of the Hustler. It originally shipped with 3 Mini-Max PB F10-4 engines. It was originally released incorrectly as Centuri #KF-10 (later corrected to #KF-8) and was shipped via Railway Express since it included engines that could not be shipped Parcel Post. The initial price was $12.95 including engines. In 1969 it was offered as a kit only with part # KF-8a for $9.50 and included Parcel Post shipping.

The Retro-Repro SLS Lil' Hustler is updated with precision laser-cut basswood fins instead of the hard balsa pre-printed fins used on the original. The Sil-Ray cloth fin reinforcement is replaced by a slotted tube and through-the-wall fins. The original Lil' Hustler had a wire shock cord mount which is replaced with Kevlar® cord for greater reliability. A removable 24 mm engine mount adapter is included to increase the selection of engines that can be used.

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.

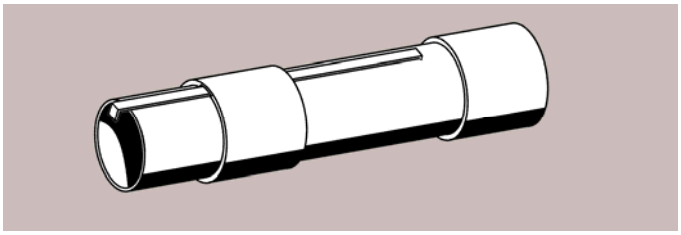
White Glue or Wood Glue | Spray Paint | Fill 'N Finish or Sanding Sealer | Fine Sandpaper 320 to 600 grit | Ruler | Hobby Knife

ASSEMBLY

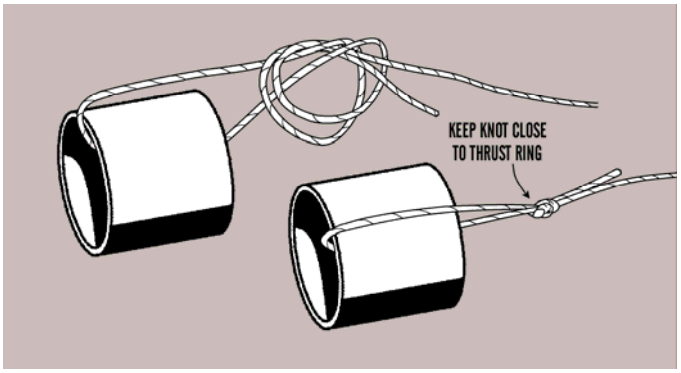
❑ **1.** These instructions are presented in a logical order to help you put your SLS Lil' Hustler™ together quickly and efficiently. Check off each step as you complete it and we hope you enjoy putting this kit together and flying it.

MOTOR MOUNT

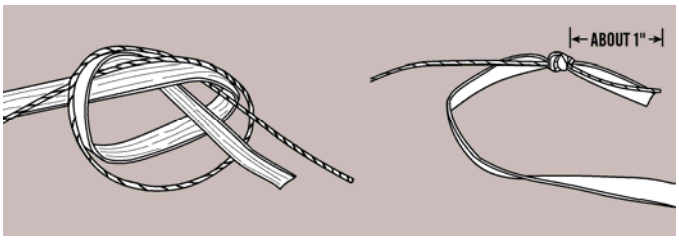
❑ **2.** Follow the instructions included with the EM-9115 Engine Mount kit to build the adapter. Allow it to dry thoroughly.



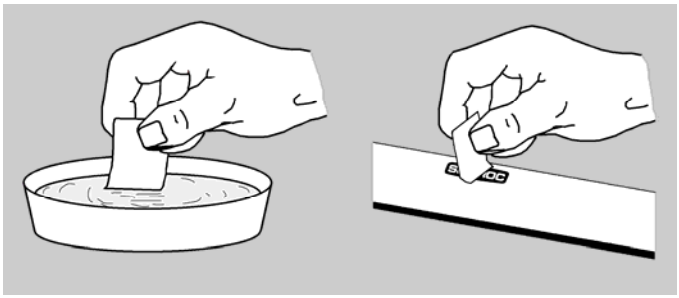
❑ **3.** Loop the yellow Kevlar® thread through the thrust ring as shown. Tie both ends of the Kevlar® thread in an overhand knot leaving one end short and the other end as long as possible. Keep the knot and one end of the thread as close to the ring as possible as shown. Put a drop of glue on the knot to keep it from coming untied.



❑ **4.** Using the long free end of the Kevlar® thread and one end of the elastic shock cord, tie an overhand knot joining the elastic shock cord to the Kevlar® thread. Pull the thread and cord tight leaving about 1" of excess after the knot. Put a drop of glue on the knot to keep it from coming untied.



❑ **21.** After the paint has dried, decals should be applied. The decals supplied with the SLS Lil' Hustler are waterslide decals. Add a drop of detergent to the water to make the decals easier to slide into place. Each decal should be cut separately from the sheet. The roll bars are a challenge to get aligned so be patient and keep the decal wet until it is in the proper place.



FLIGHT PREPPING

❑ **22.** The built-in engine mount is designed for a 29mm engine. Use masking tape to friction fit the engine. A 24mm adapter is included for smaller engines. Use the spacer for 2.75" engines (D) and leave it out for 3.75" engines (E).

❑ **23.** 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 for the recovery system.

❑ **24.** 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.

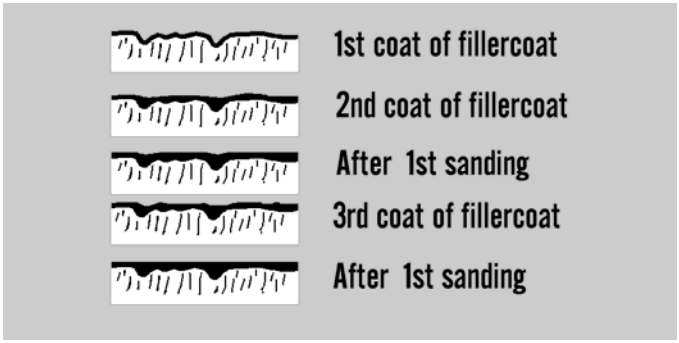
❑ **25.** Refer to the model rocket engine manufacturer's instructions to complete the engine prepping. Different engines have different igniters and methods of hooking them up to the launch controllers.

❑ **26.** Carefully check all parts of your rocket before each flight as a part of your pre-flight checklist. Launch the SLS Lil' Hustler from a 3/16" diameter by 36" long or longer launch rod.

❑ **27.** After each flight, remove the engine mount and clean it thoroughly for many hours of fun flying with your SLS Lil' Hustler!

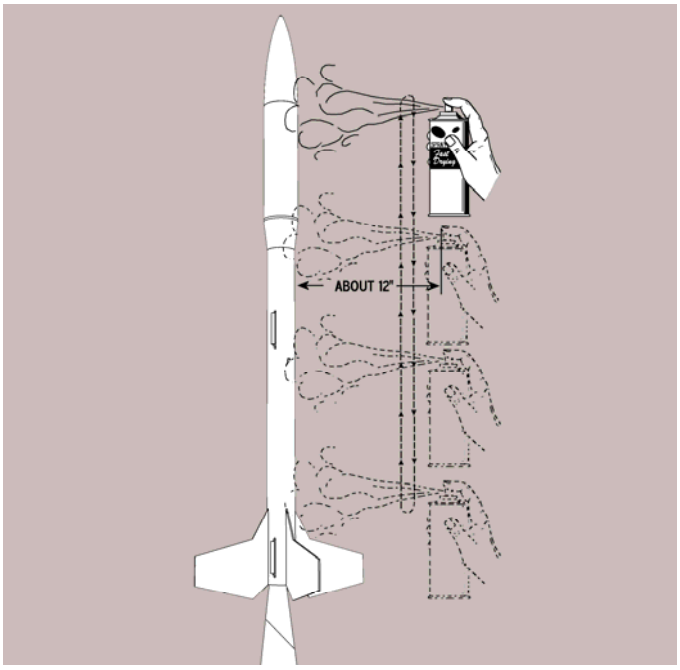
FINISHING

❑ **18.** When the fillets have dried, prepare balsa and basswood surfaces for a smooth professional looking finish. Fill the wood grain with diluted Fill n' Finish or sanding sealer. When dry, sand with fine sandpaper. Repeat until smooth.

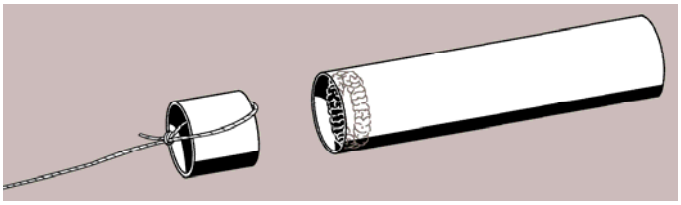


❑ **19.** After all balsa and basswood surfaces have been prepared, wipe off all dust with a dry cloth. First spray the model with an enamel primer. Choose a high visibility color combination like white and yellow for the final color.

❑ **20.** 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.

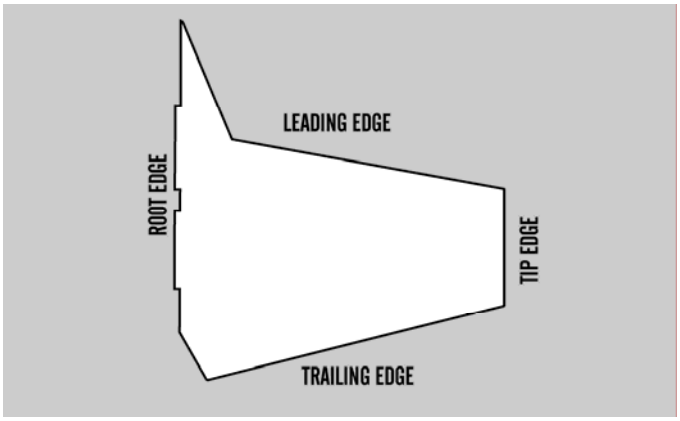


❑ **5.** Apply a bead of glue inside one end of the small body tube (LT-11555.) Insert the thrust ring into the body tube until the ends are even. Clean up any excess glue pushed inside the tube or the engine will not fit properly. When the assembly is dry, push the shock cord back through the body tube so it comes out the bottom away from the thrust ring.

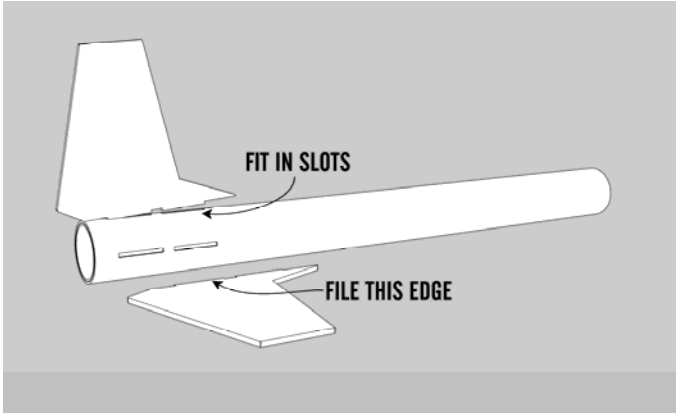


FIN ASSEMBLY

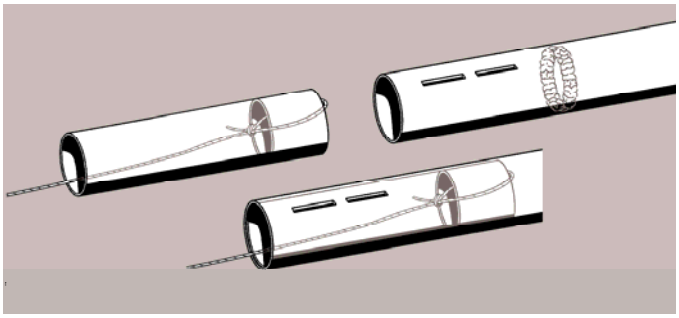
❑ **6.** Lightly sand each side of the four fins. The tip is very fragile until it is glued to the body tube! Round all edges except the root edges (which will be glued to the body tube). The tip edges and trailing edges may be tapered for better aerodynamic cross section. Check all fins for fit in the slots in the body tube and sand if necessary.



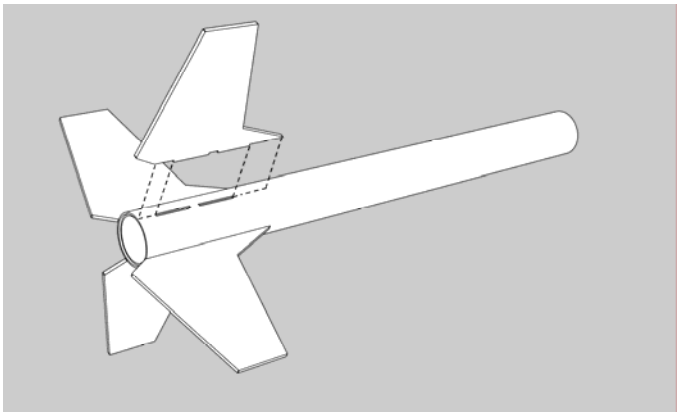
❑ **7.** Check all four fin assemblies for fit in the slots in the slotted body tube. These are close tolerance so the fins will be supported well. It may be necessary to bevel the root edge slightly for easier insertion. A small piece of sandpaper or a nail file will help with the fit.



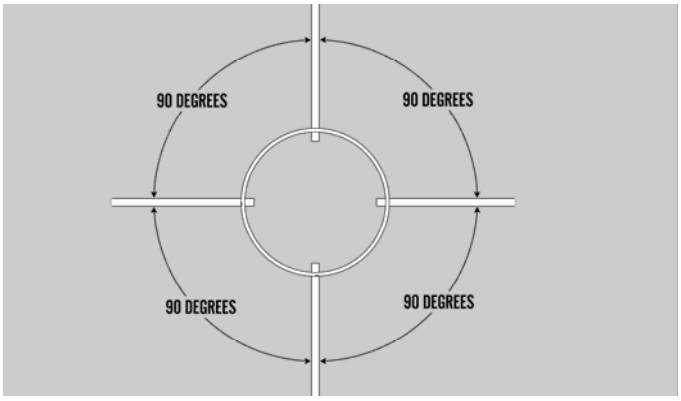
❑ **8.** Apply a generous bead of glue inside the slotted end of the main body tube just above the slots. Use the supplied glue applicator to get the glue inside the tube without filling the slots. Push the engine mount assembly with the thrust ring end first into the main body tube until both ends are even. Proceed to the next step without waiting for the glue to completely dry.



❑ **9.** Apply a bead of glue along one root edge including the two tabs. Insert the fin into the slots, checking for alignment. Repeat for the other fins. While the glue is setting, keep checking for proper alignment. Stand the tube on end and wipe all glue runs. The forward tips may try to bow upwards away from the body tube if your glue is water-based. A small piece of masking tape will hold them down until the glue sets.

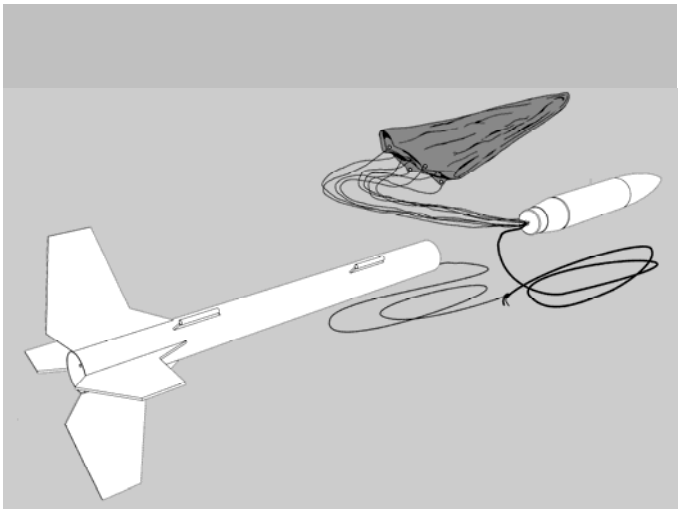


❑ **10.** Sight down the end of the tube and make sure all fins are at 90 degree (right) angles to adjacent fins.



ATTACH PARACHUTE

❑ **17.** Tie the free end of the elastic cord securely to the screw eye in the balsa reducer. Attach the pre-assembled Nylon chute to the screw eye. Make sure all the lines are the same length. A snap swivel may be used to make detachment easier.

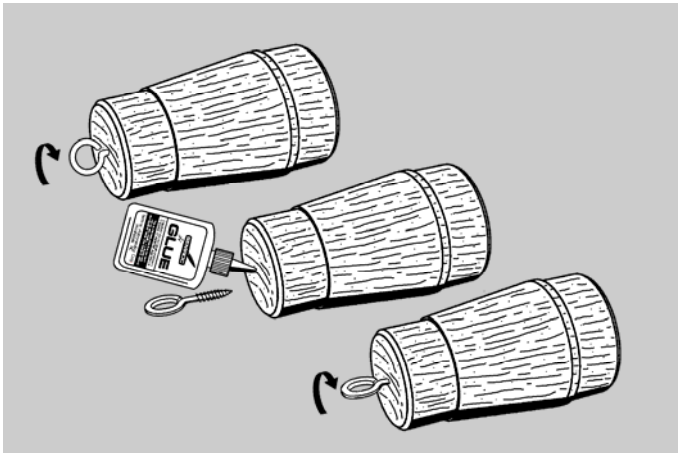


This completes the assembly of your

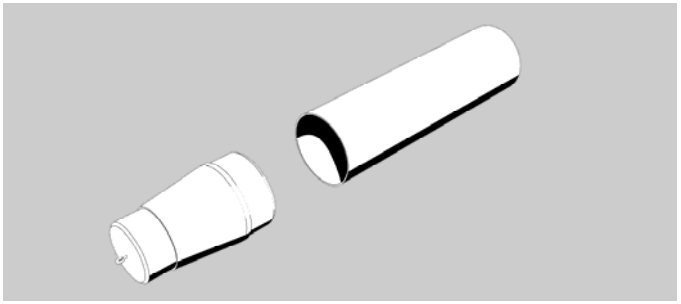
SEMROC Lil' HUSTLER

ASSEMBLE PAYLOAD

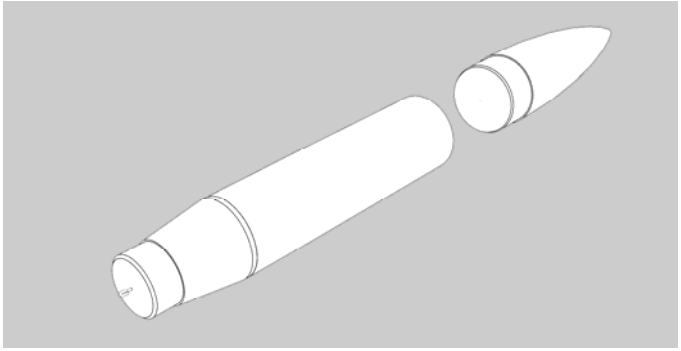
❑ **14.** Twist the screw eye into the center of the smaller end of the reducer. Unscrew it and squirt glue into the hole. Reinstall the screw eye and wipe off any excess glue.



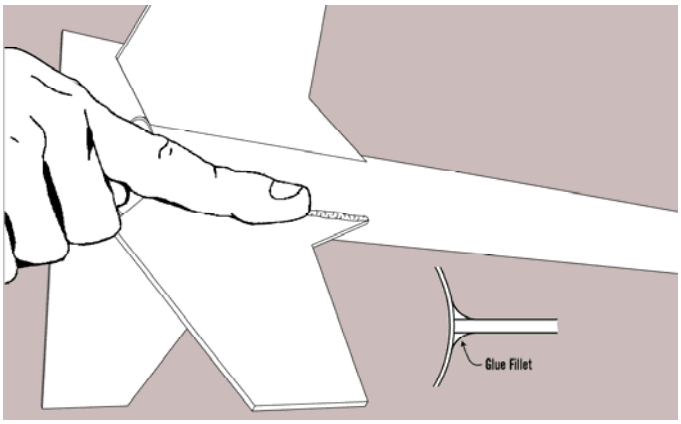
❑ **15.** Check the balsa adapter for fit in the upper body tube and the lower body tube. A small amount of sanding may be necessary. Spread a small amount of glue on the inside of the upper body tube. Insert the balsa adapter until it seats even with the shoulder. Allow to dry.



❑ **16.** Insert the nose cone into the large body tube and check for fit. A small amount of sanding may be necessary. Make sure it is tightly fitted using masking tape if necessary. If a payload is added, screws or external tape may be required to secure the nose cone in flight.



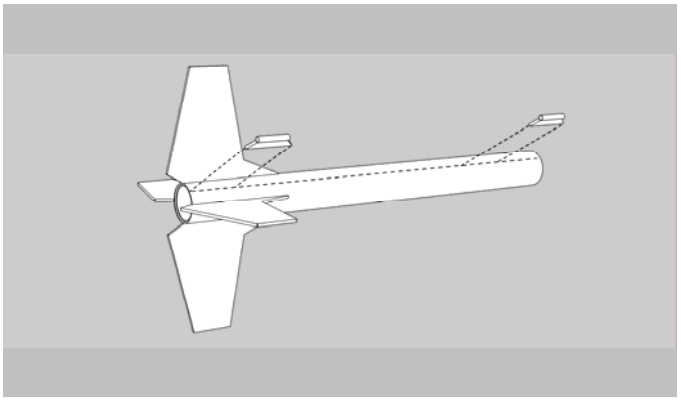
❑ **11.** Using your finger, apply fillets of glue along the outside fin-to-body tube joints. Stand it on end, watching for runs. Allow the assembly to completely dry.



ATTACH LAUNCH LUGS

❑ **12.** Glue one of the launch lugs to the top of one of the standoffs. After it is dry, apply a heavy fillet of glue on both sides. Repeat for the other launch lug assembly. Allow to completely dry.

❑ **13.** Glue the bottom launch lug assembly midway between two of the fins and about 1/4" from the bottom of the main body tube. Glue the upper launch lug assembly in line with the bottom lug and about 2" from the top of the tube. Sight down the tube to insure the launch lugs are parallel with the fins and in line with each other. Apply a bead of glue along the sides of both launch lug standoffs.



Parts List

A	1	Body Tube	LT-125150
B	1	Body Tube	LT-17560
C	1	Balsa Nose Cone	BC-17567
D	1	Balsa Reducer	BR-125-175
E	1	Body Tube	LT-11555
F	1	Laser Cut Fins	FV-57
G	1	Kevlar Thread	SCK-24
H	1	Elastic Cord	EC-236
I	1	Screw Eye	SE-12
J	2	Launch Lugs	LL-310
K	2	Laser Cut Standoffs	FV-57S
L	1	Thrust Ring	TR-115
M	1	24mm Engine Mount	EM-9115
N	1	Nylon Parachute	PN-18
O	1	Decal	DKV-57
P	1	Glue Applicator	GA-1

EXPLODED VIEW