About Estes Industries, Inc.

In July 1958, G. Harry Stine of Model Missiles, Inc. in Denver, Colorado approached Vern Estes about making model rocket engines for them. On January 15, 1959, Vern's automated model rocket engine fabricating machine, "Mabel", produced the first of many millions of Estes model rocket engines. In 1960, Estes was producing more engines than Model Missiles could sell. Vern and his wife Gleda opened a mail order rocket company and introduced the Astron Scout and Astron Mark.

In 1961, a catalog was mimeographed and hand stitched on Gleda's sewing machine. Later that year, Estes Industries had outgrown the confined space in Denver. In December 1961, the entire operation was moved to an old farm in Penrose, Colorado quickly establishing the small town as the "Model Rocket Capital of the World."

Estes Industries was sold to Damon in September 1969. The name Estes is synonymous with model rocketry. Almost everyone remembers growing up launching Estes rockets or knowing someone that did. Estes Industries has introduced millions of youngsters of all ages to model rocketry for over half a century.

About the Ranger™

The Astron Ranger was released by Estes Industries in the 1963 catalog. It was designed by Vern Estes in 1962. Featuring two chutes and a large payload section, the Ranger became popular as the first commercially available cluster model rocket kit. The Ranger design was the precursor to the Big Bertha, Super Bertha, Mini Bertha, and many other kits offered by many other companies. It was released as Catalog No. 631-K6 and retailed for $3.75.

The Semroc Retro-Repro™ Ranger™ is very faithful to the original design. An ejection baffle is added for a more reliable attachment point for the shock cord. Laser-cut fins and precision balsa nose cone and coupler make the old classic come back to life.

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.

December 12, 2011, May 27, 2015

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

Ranger™
Kit No. KV-83

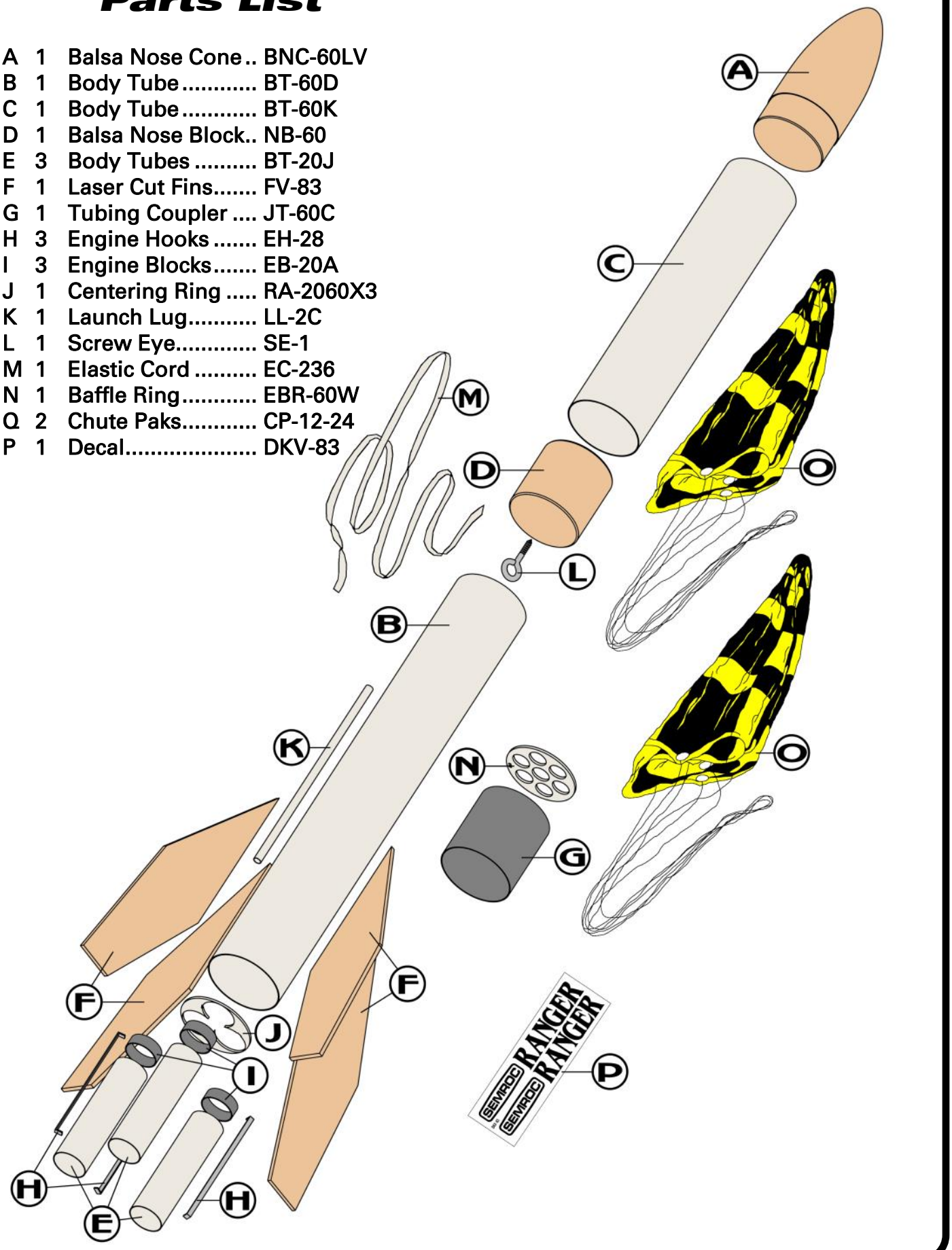
Specifications		Engine	Approx. Altitude
Body Diameter	1.637" (4.2 cm)	(Three) A8-5	400'
Length	23.9" (60.7 cm)	(Three) B6-6	900'
Fin Span	5.7" (14.5 cm)	(Three) C6-7	1600'
Net Weight	2.3 oz. (65.3 g)		

Skill Level 1

Parts List

A	1	Balsa Nose Cone	BNC-60LV
B	1	Body Tube	BT-60D
C	1	Body Tube	BT-60K
D	1	Balsa Nose Block	NB-60
E	3	Body Tubes	BT-20J
F	1	Laser Cut Fins	FV-83
G	1	Tubing Coupler	JT-60C
H	3	Engine Hooks	EH-28
I	3	Engine Blocks	EB-20A
J	1	Centering Ring	RA-2060X3
K	1	Launch Lug	LL-2C
L	1	Screw Eye	SE-1
M	1	Elastic Cord	EC-236
N	1	Baffle Ring	EBR-60W
O	2	Chute Paks	CP-12-24
P	1	Decal	DKV-83

EXPLODED VIEW



BEFORE YOU START!

Make sure you have all the parts included in this kit that are listed in the Parts List to the left. 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 to the left. It is important that you always ensure that you have adequate glue joints.

TOOLS

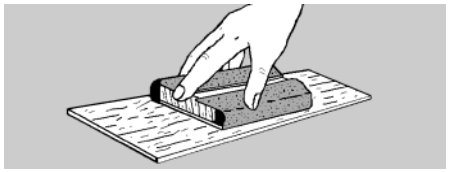
In addition to the parts supplied, you will need the following tools to assemble and finish this kit.

ASSEMBLY

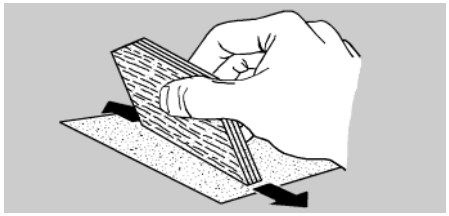
❑ **1.** These instructions are presented in a logical order to help you put your Ranger™ together quickly and efficiently. Check off each step as you complete it and we hope you enjoy putting this kit together.

FIN PREPARATION

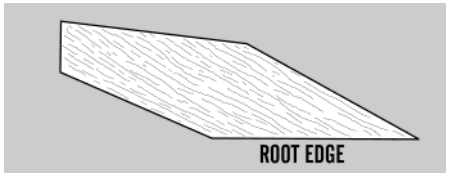
❑ **2.** Sand each side of both of each sheet of the laser-cut fins (**FV-83**). Carefully push the laser-cut fins from each sheet. Start at one point on each fin and slowly and gently work around the fin.



❑ **3.** Stack all four fins together. Line them up squarely and sand the fins back and forth over some fine sandpaper to get rid of the hold-in tabs as shown below.

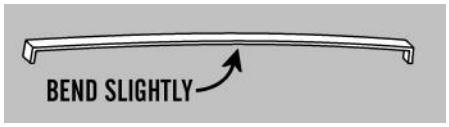


❑ **4.** Round all the edges of each fin, except root edge which should be left flat to be glued to the body tube. Sand both sides until they are smooth.

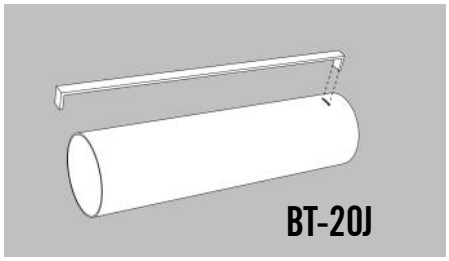


ENGINE MOUNT

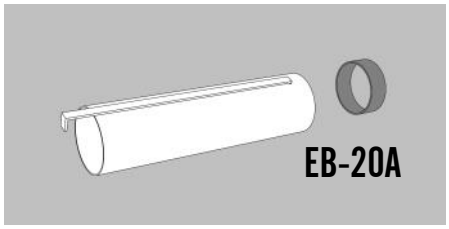
❑ **5.** Bend one of the engine hooks (**EH-28**) slightly so it forms a slight bow in the direction shown.



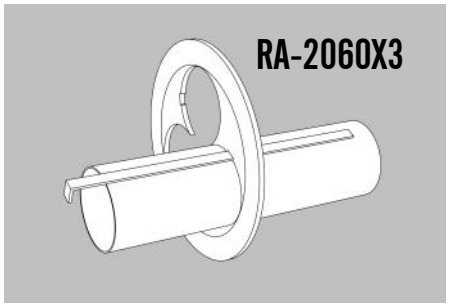
❑ **6.** Measure 1/4" from one end of one of the engine tubes (**BT-20J**). Use the hobby knife to punch a 1/8" wide slit on the mark and parallel with the end of the tube. Insert one end of the engine hook into the slit. Do not glue yet.



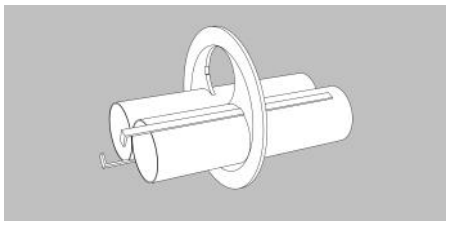
❑ **7.** Apply a bead of glue inside the punched end of the engine tube. Insert one of the engine blocks (**EB-20A**) inside the engine tube and flat against the engine hook. After the ring is in place, run a bead of glue around the inside of the ring to protect it from the ejection gases.



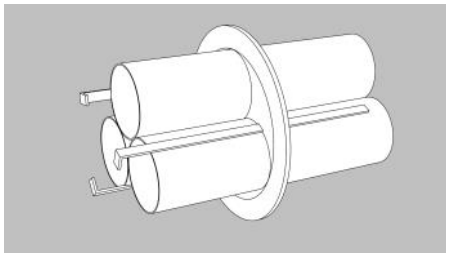
❑ **8.** Carefully punch out the center three holes in the centering ring (**RA-2060X3**). Be careful to not punch out the outer ring at this time! Insert the engine mount assembly into one of the holes, aligning the engine hook with the notch in the inner ring. Center the ring on the tube.



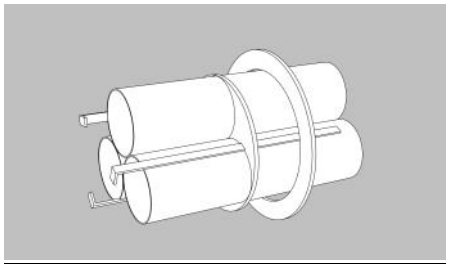
❑ **9.** Make a second engine tube assembly repeating steps 5 through 7. Add the second assembly in another hole in the centering ring, aligning the engine hook in the notch as before. Align the end of the engine tube with the first engine tube.



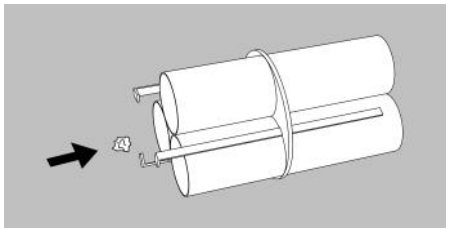
❑ **10.** Make a third engine mount assembly and insert in the remaining hole in the centering ring. Align the engine hook in the notch and align all three ends so they are even with each other. Make sure the centering ring is in the center of the three tubes. It is not time to glue the assembly. **Keep all glue away from the outer ring,** which will be removed in a later step. Apply a bead of glue along the top (slotted) end of each engine hook. Apply a bead of glue along each joint where the tubes join each other. Carefully apply a bead of glue on each side of the ring where it contacts the tubes. Again, **keep glue away from the outer ring!** Allow to dry.



❑ **11.** When the assembly is completely dry, remove the outer ring from the assembly.

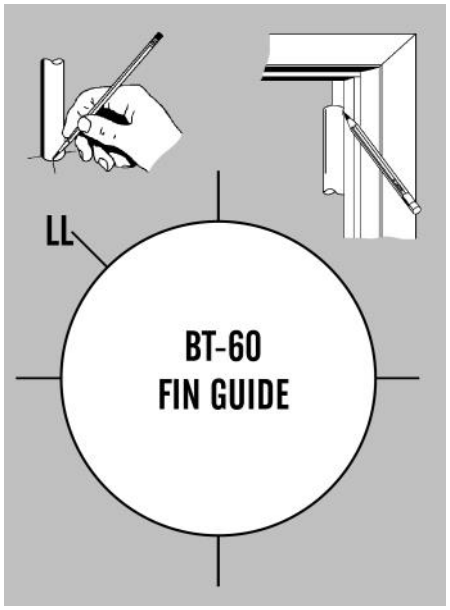


❑ **12.** Ball up a small piece of tissue and insert it into the central area between the three tubes. Seal it with a drop of glue to block the exit from the ejection gases.

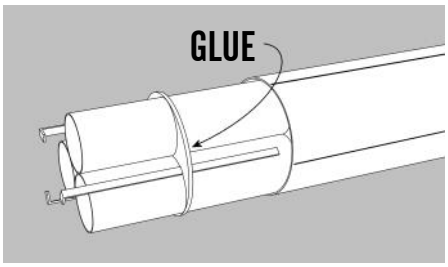


MARK TUBE

❑ **13.** Stand the longest of the two large body tubes (**BT-60D**) on the fin guide below. Place five marks on the tube at the positions indicated. Place a mark LL on the line that will be used for the launch lug. 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 all five marks about 5" from the bottom of the tube to provide lines for aligning the fins.

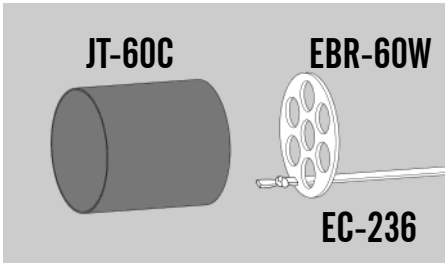


❑ **14.** Partially insert the engine mount with the top end just inside the marked end of the large body tube. Apply a heavy bead of glue on the inside surface of the centering ring. Push the engine tube assembly into the main body tube until the engine tubes are even with the main body tube. Rotate the tube in a horizontal position for a few moments to allow the glue to run against the main body tube forming a seal. Support the assembly in an upright position until the glue completely dries.

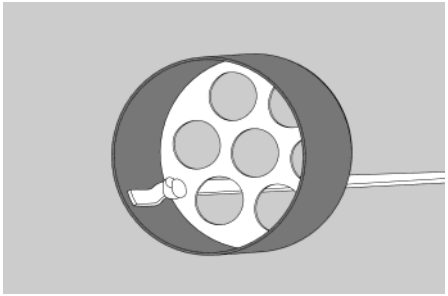


EJECTION BAFFLE

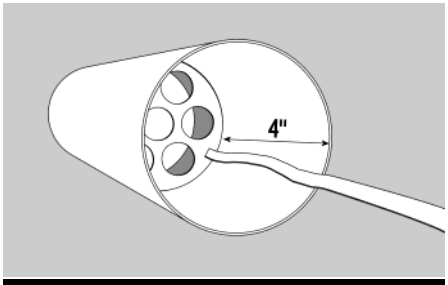
❑ **15.** Punch out all the holes from the baffle ring (**EBR-60W**). Insert one end of the elastic shock cord (**EC-236**) into the small slot near the edge of the ring. Tie a knot in the end and pull it until the knot is against the ring. Apply a generous bead of glue on the knot. Align the ring on one end of the coupler tube (**JT-60C**) and glue it in place so the outer edge of the baffle is even with the coupler tube.



❑ **16.** Apply a generous bead of glue inside the coupler tube against the joint between the baffle ring and the coupler tube. Glue the end of the elastic cord to the coupler tube.

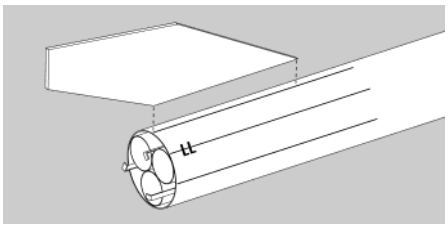


❑ **17.** Test fit the ejection baffle in the top of the main tube. Sand the edges so it will slide freely in the tube. Apply a bead of glue about 4" inside the top of the main tube. Orient the baffle assembly so the baffle and elastic cord are at the top end. Slide the ejection baffle in the tube past the bead of glue until the top of the baffle is about 4" from the top of the tube. Rotate the main tube as the glue is drying so it does not pool in one place. Allow to dry completely.

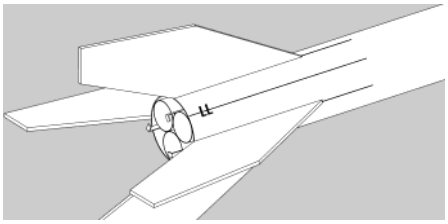


ATTACH FINS

❑ **18.** Apply glue to one of the fins and position it along one of the lines, other than the one marked LL, drawn on the main body tube. Remove it, allow it to almost dry, re-apply glue and reposition it. Allow this fin to dry before proceeding, checking for perpendicular positioning with the main body tube.

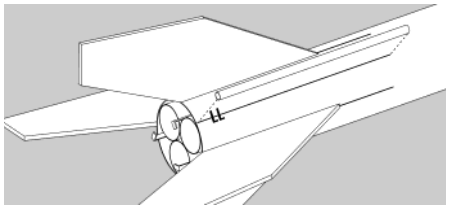


❑ **19.** Using the same procedure, glue the remaining three fins to the main body tube on the two remaining short lines. Do not glue to the "LL" line which will be used later for the launch lug.



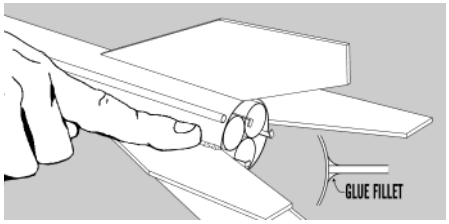
LAUNCH LUG

❑ **20.** Glue the launch lug (**LL-2C**) along the marked line "LL" drawn earlier on the main body tube. Align it even with the bottom of the tube. Sight down the tube to insure the launch lug is parallel with the fins. Apply a bead of glue along the sides of the launch lug where it touches the tube.



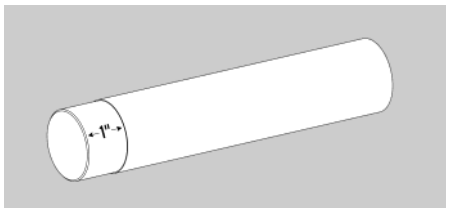
APPLY FILLETS

❑ **21.** After the fin assembly is completely dry, run a small bead of glue along both sides of each fin-body tube joint. Using your forefinger, smooth the glue into fillets. Allow this assembly to dry in a vertical position.

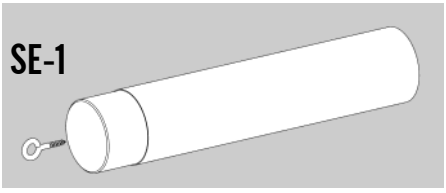


PAYLOAD

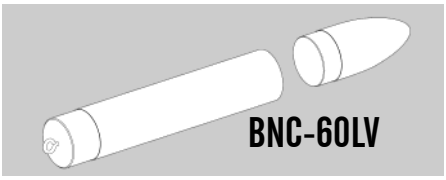
❑ **22.** Check the large balsa block (**NB-60**) for fit in the payload tube (**BT-60K**) and the main body tube. A small amount of sanding may be necessary. Apply a thin bead of glue just inside one end of the payload tube. Insert the balsa nose block until it leaves about 1" exposed. Allow to dry.



❑ **23.** Twist the screw eye (**SE-1**) into the center of the nose block. Unscrew it and squirt glue into the hole. Reinstall the screw eye and wipe off any excess glue.

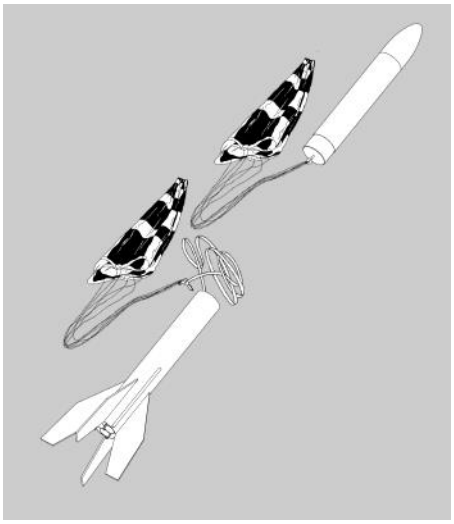


❑ **24.** Insert the nose cone (**BNC-60LV**) into the payload tube and check for fit. A small amount of sanding may be necessary. Make sure it is tightly fitted, using masking tape if necessary. If a payload is added, screws or external tape may be required to secure the nose cone in flight.



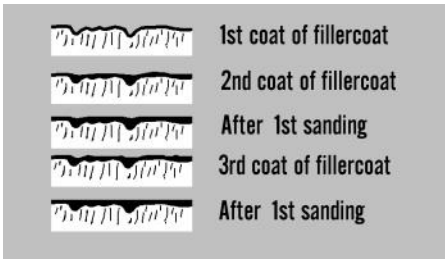
FINAL ASSEMBLY

❑ **25.** Assemble the chutes (**CP-12-24**) using instructions included with the chutes. Pull the lines tight on each chute and make sure they are all of equal length. Attach one chute to the shock cord. Attach the other chute to the screw eye in the payload section.



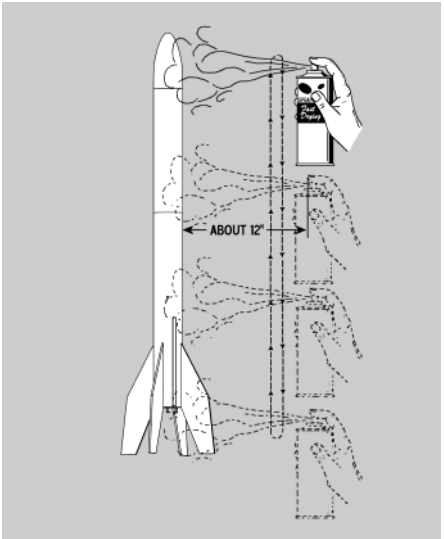
FINISHING

❑ **26.** 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.

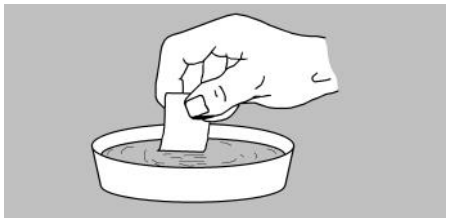


❑ **27.** After all balsa surfaces have been prepared, wipe off all balsa dust with a dry cloth. First spray the model with an enamel primer. Choose high visibility colors like white, yellow and black for the final colors.

❑ **28.** 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.



❑ **29.** After the paint has dried, decals may be applied. The decals supplied with the Ranger™ are waterslide decals. Each decal should be cut separately from the sheet. Think about where you want to apply each decal and check for fit before wetting the decal. Use the cover photo for suggested placement. Dip each decal in a small dish of water that has a drop of detergent. It will take about 30 seconds before the decal is loose enough to apply.



❑ **30.** Slide the decal in place and use the paper backing to work the bubble out. Repeat for all the decals. Be careful with covering decals with a clear coat. Many of the new sprays are not compatible. Future floor polish is suggested.

FLIGHT PREPPING

❑ **31.** Mounting the engines: Insert three identical engines and make sure the engine hooks keep the engines in snugly.

❑ **32.** Apply a few sheets of recovery wadding in the top of the main body tube. Since the main tube is short, the baffle does not cut down all the hot gases. Fold the parachute attached to the main tube first and pack it and the shock cord on top of the recovery wadding. Fold the payload parachute and pack it on top of the first chute. Slide the payload section into place, making sure it does not pinch the shock cord or parachute.

❑ **33.** 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. Always use at least a 12-volt system in top condition. The lead wire should be at least 16 gauge or less and no more than 20 feet in length. Make sure all connections are tight and the electrical system is in perfect order. A full tutorial on clustering is outside the scope of these instructions. If you are not experienced with clustering, a search online will yield many tutorials to get you started on one of the most challenging propulsion methods for model rocketry.

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

❑ **35.** After each flight, promptly remove the spent engine casing and dispose of properly. Clean any residue from your model for many flights.