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 firing Estes rockets or knowing someone that did. Estes Industries has introduced millions of youngsters of all ages to model rocketry for almost half a century.

About the Starlight™

The original Astron Starlight was released by Estes Industries in their 1968 catalog. It was designed by Bill See, who also designed the Star Blazer (K-31), Little Joe II (K-30) and the 1/100 scale Saturn V (K-36). Featuring lots of balsa fin area and two ring tubes, the unique design of the Astron Starlight made it an instant classic that has stood the test of time. It was released in 1967 as Cat. No. 681-K-32 and retailed for $2.35.

The Semroc Retro-Repro™ Starlight™ is very close to the original design. It features a waterslide decal not present on the original. The shock mount is replaced with a Kevlar® cord for greater reliability. Laser-cut fins make if much easier to assemble.

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.

July 4, 2012

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

STARLIGHT™

CLASSIC DESIGN

EASY TO BUILD

BALSA FINS & NOSE CONE

Design by Bill See

FLYING MODEL ROCKET KIT

1967 Retro-Repro

MADE IN THE USA

SEMROC

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

Starlight™
Kit No. KV-21

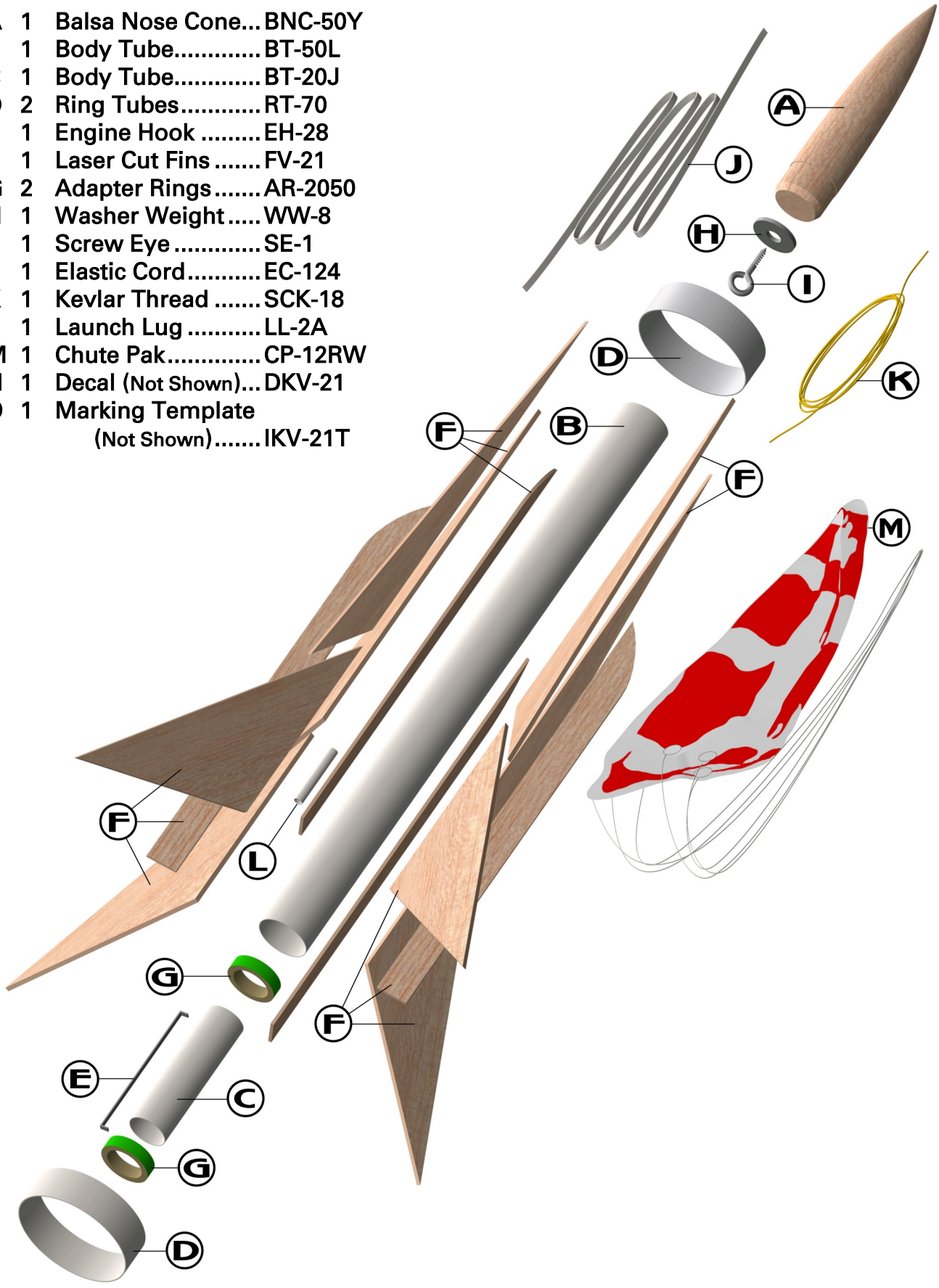
Specifications		Engine	Approx. Altitude
Body Diameter	0.976" (2.5 cm)	A8-3	150'
Length	18.0" (45.7 cm)	B6-4	325'
Fin Span	8.0" (20.3 cm)	C6-5	650'
Net Weight	1.5 oz. (42.6 g)		

PARACHUTE RECOVERY

Parts List

A	1	Balsa Nose Cone	BNC-50Y
B	1	Body Tube	BT-50L
C	1	Body Tube	BT-20J
D	2	Ring Tubes	RT-70
E	1	Engine Hook	EH-28
F	1	Laser Cut Fins	FV-21
G	2	Adapter Rings	AR-2050
H	1	Washer Weight	WW-8
I	1	Screw Eye	SE-1
J	1	Elastic Cord	EC-124
K	1	Kevlar Thread	SCK-18
L	1	Launch Lug	LL-2A
M	1	Chute Pak	CP-12RW
N	1	Decal (Not Shown)	DKV-21
O	1	Marking Template (Not Shown)	IKV-21T

EXPLODED VIEW

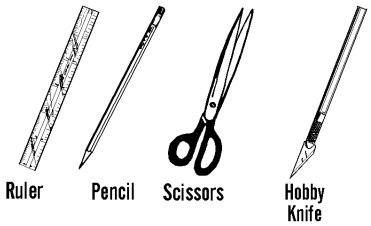


BEFORE YOU START!

Make sure you have all the parts included in this kit that are listed in the Parts List in 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. 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. Wax paper is also needed.



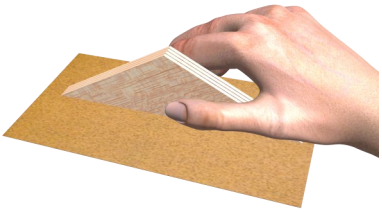
ASSEMBLY

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

FIN PREPARATION

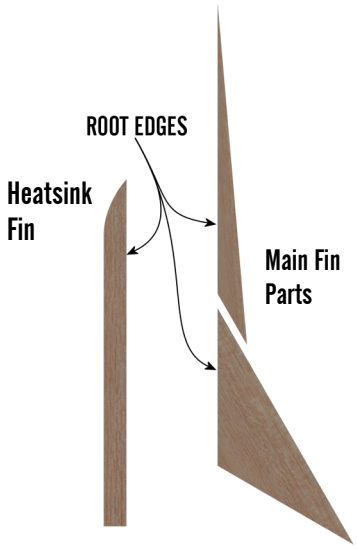
❑ **2.** Lightly sand each side of the two laser-cut fin sheets (**FV-21**). Carefully push the laser-cut fins from their sheet. Start at one point on each fin and slowly and gently work around the fin.

❑ **3.** Stack all the like fins in sets. Line each set of fins 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.** Glue each main and upper fin to its extension as shown below. Use a straightedge or ruler to align the two parts along the root edges. Wax paper will prevent parts from sticking to your workspace.

❑ **5.** Round all the edges of each fin, except the root edges. Leave them flat. Repeat for all eight fins. The root edges will be glued to the body tube.

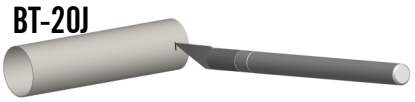


ENGINE MOUNT

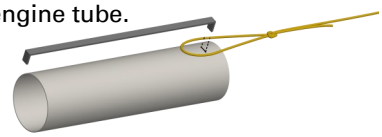
❑ **6.** Bend the engine hook (**EH-28**) slightly so it forms a slight bow in the direction shown.

❑ **7.** Tie an overhand loop in one end of the yellow Kevlar® cord (**SCK-18**) and pull the knot tight.

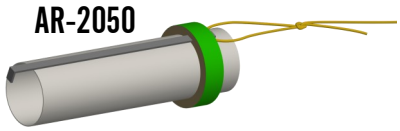
❑ **8.** Place a mark 1/4" from one end of the engine tube (**BT-20J**). Use a hobby knife to place a small punch at the mark.



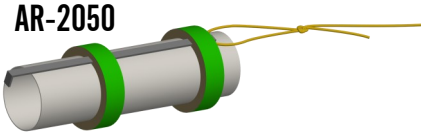
❑ **9.** Insert one end of the engine hook through the loop in the yellow Kevlar® cord and into the punch in the engine tube.



❑ **10.** Slide one of the adapter rings (**AR-2050**) from the bottom of the engine tube until it is against the end of the engine hook and against the yellow Kevlar® cord.

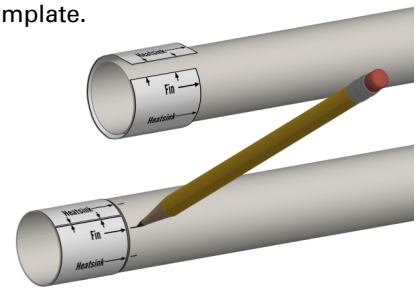


❑ **11.** Mark 1" from the bottom of the engine mount tube and slide the other centering ring (**AR-2050**) from the bottom until the bottom of the ring is even with the mark. Run a bead of glue around each side of each ring against the engine tube. Keep glue away from the green outside surface. Allow to dry.

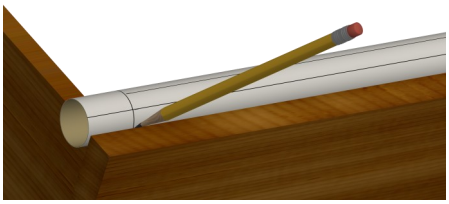


MARK TUBE

❑ **12.** Cut out the fin marking template on the solid lines. Wrap it around the bottom of the main body tube (**BT-50L**) with the long arrows pointing as shown. Tape the guide with the alignment marks meeting. Place a mark at each of the eight arrows and then draw a line around the tube using the top edge of the marking template as a guide. Remove the template.

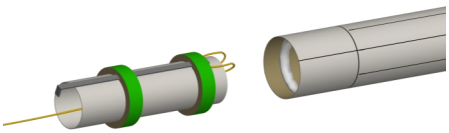


❑ **13.** Find a convenient channel or groove such as a partially open drawer (as shown), a door jamb or a piece of molding. Using the channel, extend the marks the full length of the tube for every other mark. Extend the other four marks from the marked ring to the top of the tube.



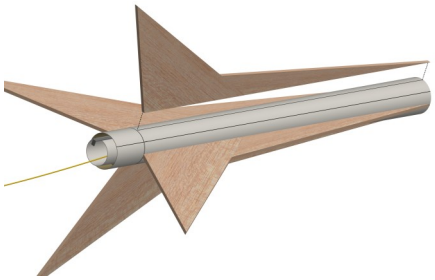
ATTACH MOUNT

❑ **14.** Pull the Kevlar cord through the top of the engine mount tube and out the bottom of the tube. Apply a thick bead of glue inside the end of the body tube that has the marked ring. Insert the engine mount assembly with the Kevlar loop end first into the main body tube until the bottom of the engine tube is 1/4" from the bottom of the main tube. Do not stop until it is in the correct place. Allow to dry completely in a vertical position.

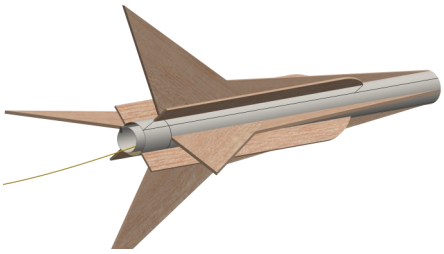


ATTACH FINS

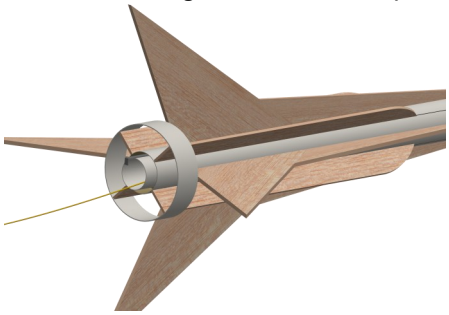
❑ **15.** Apply glue to the root edge of one of the large fin assemblies and position it along one of the lines that begins at the drawn ring. Remove the fin assembly, set it aside and allow it to almost dry, apply additional glue, and reposition. Repeat for the other three fin assemblies. If you follow these instructions, the fins will not require much additional work to keep them aligned. Allow the fins to completely dry, checking carefully to make sure they are parallel with the main body tube.



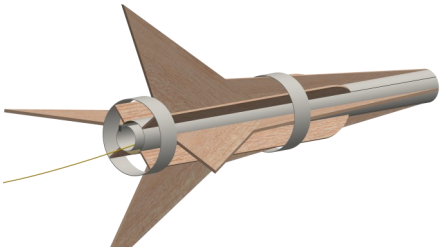
❑ **16.** Apply glue to the root edge of one of the long heatsink fins and position it along one of the long lines drawn for the fins on the side of the body tube and even with the bottom of the tube. Use the same techniques used on the main fin assemblies and repeat for the other three heatsink fins. Allow the fins to completely dry, checking carefully to make sure they are parallel with the main body tube.



❑ **17.** Slide one of the ring tubes (**RT-70**) over the bottom of the heatsink fins. Sanding may be necessary to achieve a good fit. Align it until it touches the bottom of each of the main fins. Apply a fillet of glue against each heatsink fin where it touches the ring tube. Allow to dry.

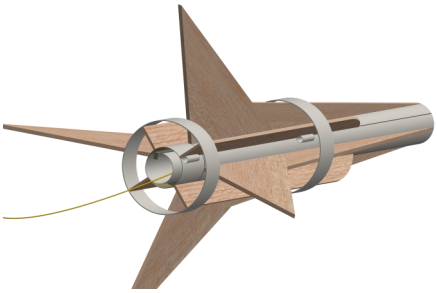


❑ **18.** Slide the remaining ring tube (**RT-70**) over the top of the heatsink fins. Sanding may be necessary to achieve a good fit. Align it until it touches the leading edge of each of the main fin assemblies. Apply a fillet of glue against each heatsink fin where it touches the ring tube. Allow to dry.



LAUNCH LUGS

❑ **19.** Cut the launch lug (LL-2A) into two equal pieces. Glue one of the launch lugs against one of the heatsink fins and the main body tube and even with the bottom of the main body tube. Allow to dry. Attach the other launch lug against the same side of the same heatsink fin and against the main body tube and under the top ring tube.



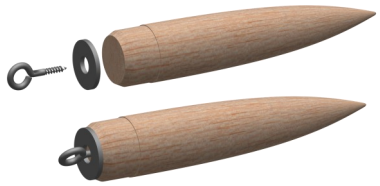
APPLY FILLETS

❑ **20.** After the fins are 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. Apply a fillet of glue on each side of the launch lugs. Allow this assembly to dry in a vertical position.

NOSE CONE

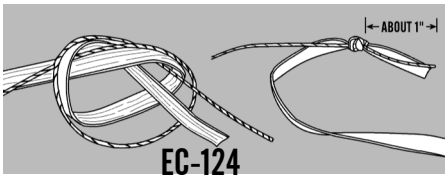
❑ **21.** Insert the nose cone (**BNC-50Y**) in the body tube and check for proper fit. The nose cone should be snug to hold itself in alignment. If it is too loose, add masking tape. If it is too tight, sand the shoulder slightly.

❑ **22.** Screw the screw eye (**SE-1**) into the base of the nose cone, remove and fill the hole with glue. Reinsert the screw eye through the washer weight (**WW-8**) and into the nose cone until the eye and weight are flush with the base of the nose cone.

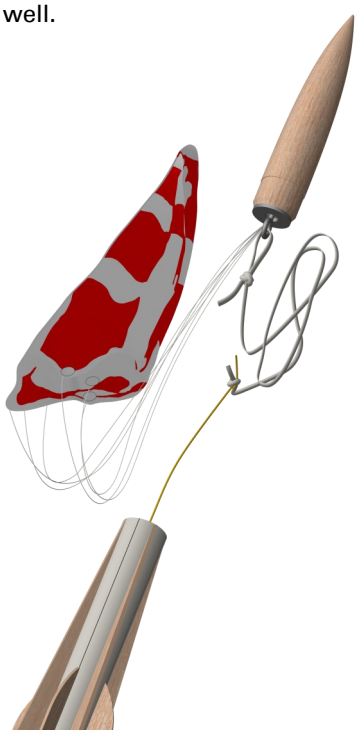


FINAL ASSEMBLY

❑ **23.** Tie the free end of the Kevlar® cord to one end of the elastic cord (**EC-124**) using an overhand knot. Pull the elastic cord and Kevlar cord back through the main body tube and out the top of the tube.

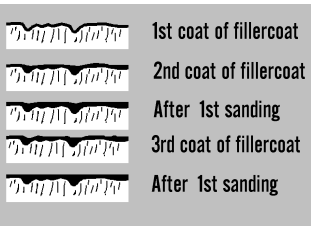


❑ **24.** Assemble the chute (**CP-12RW**) using instructions provided with it. Pull the lines tight on the chute and make sure they are all of equal length. Attach the chute by tying them to the screw eye. Put a drop of glue on the joint to keep the lines from moving. Attach the free end of the elastic cord to the screw eye. Put a drop of glue on that joint as well.



FINISHING

❑ **25.** 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.



❑ **26.** 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 silver and transparent blue for the final colors. The original Starlight had silver ring tubes and nose cone and the rest was painted silver with a final coat of transparent blue paint.

❑ **27.** 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.

❑ **28.** After the paint has dried, decals should be applied. The decals supplied with the Starlight™ 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.

❑ **29.** Slide the decal in place and use the paper backing to work the bubble out. Repeat for all the decals.

FLIGHT PREPPING

❑ **30.** Mounting the engine: Insert the engine and make sure the engine hook keeps the engine in snugly. The hook may be slightly bent to make sure the engine is retained.

❑ **31.** Apply a few sheets of recovery wadding in the top of the main body tube. Fold the parachute 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 parachute.

❑ **32.** 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.

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

❑ **34.** After each flight, promptly remove the spent engine casing and dispose of properly.