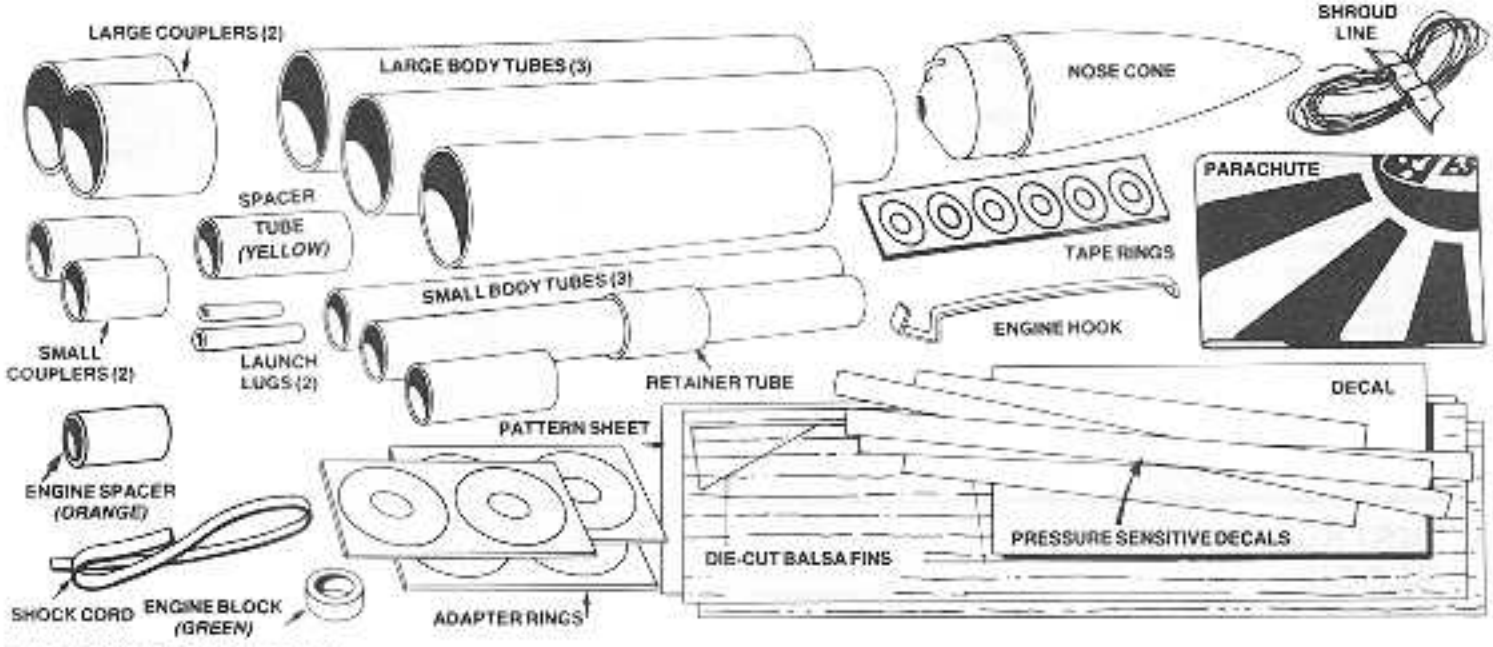
ESTES INDUSTRIES
1295 H STREET
PENROSE, CO 81240 USA

FLYING MODEL ROCKET
KIT #2094

HOW TO USE THESE INSTRUCTIONS:

READ ALL INSTRUCTIONS BEFORE STARTING WORK ON THIS MODEL

A. This rocket, incorporating basic model rocketry construction techniques, will help you in the continuing development of your rocketry modeling skills.
B. **Read each step first** and visualize the procedure thoroughly in your mind before starting construction.
C. Lay parts out on the table in front of you. (Check inside tubes for any small parts.)
D. Use parts drawing to match all parts contained in kit.
E. Collect all construction supplies that are not included in the kit.
F. The tube marking guide is printed on the pattern sheet.
G. Test fit parts before applying any glue.
H. Sand parts as necessary for proper fit.
I. The construction supplies required for each step are listed at the beginning of each step.
J. Check off each step as you complete it.



PARTS DRAWING

EXTREMELY IMPORTANT: THE PARTS DRAWING IS FOR REFERENCE ONLY! DO NOT USE THIS DRAWING ALONE TO ASSEMBLE THIS MODEL.

The parts drawing is only intended to assist you in locating the parts included in this kit. Refer back to this parts drawing as you build your model step by step. This method will help you to put the parts into perspective as you progress through the construction.

CONSTRUCTION SUPPLIES

In addition to the parts included in your kit, you will need these construction supplies. Each step shows which supplies will be required.

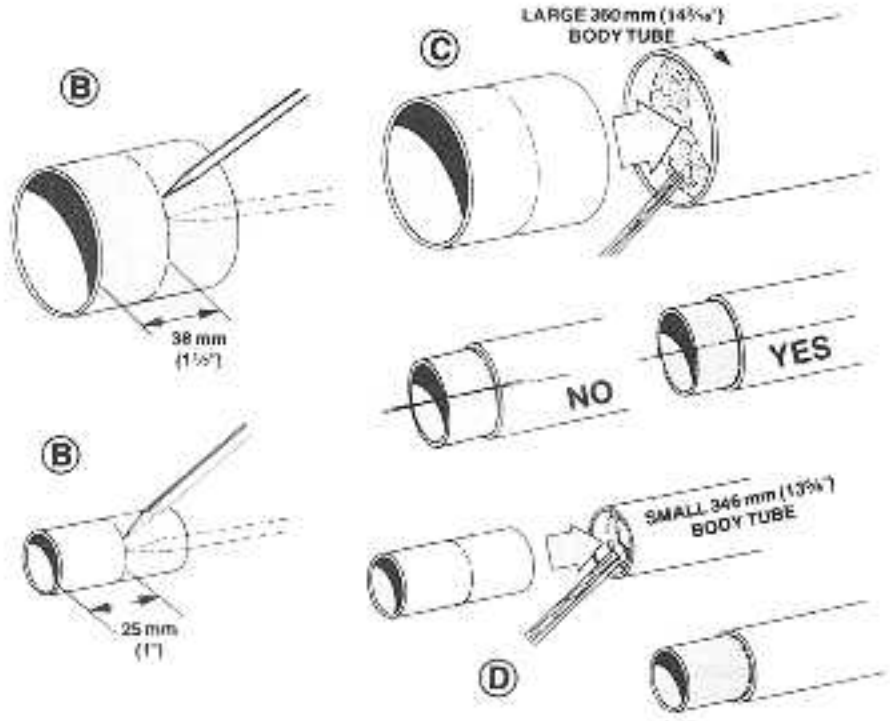
1. INSTALL TUBE COUPLERS

A. ☐ Locate both large and both small tube couplers.

B. ☐ Mark the large tube coupler 38 mm (1½") from one edge at several places. Mark the small tube couplers 25 mm (1") from one edge at several places.

C. ☐ Apply a band of glue around the inside edge of one end of one of the large 360 mm (14³⁄₁₆") long body tubes. Push one of the large tube couplers into the tube until the marks on the coupler are even with the end of the tube. Check that the coupler is aligned properly before the glue begins to set. Repeat for the other tube coupler and large 360 mm (14³⁄₁₆") body tube.

D. ☐ Glue a small tube coupler into one end of a 346 mm (13⅝") long smaller diameter body tube. Check coupler alignment. Repeat for the other small 346 mm (13⅝") body tube and coupler.

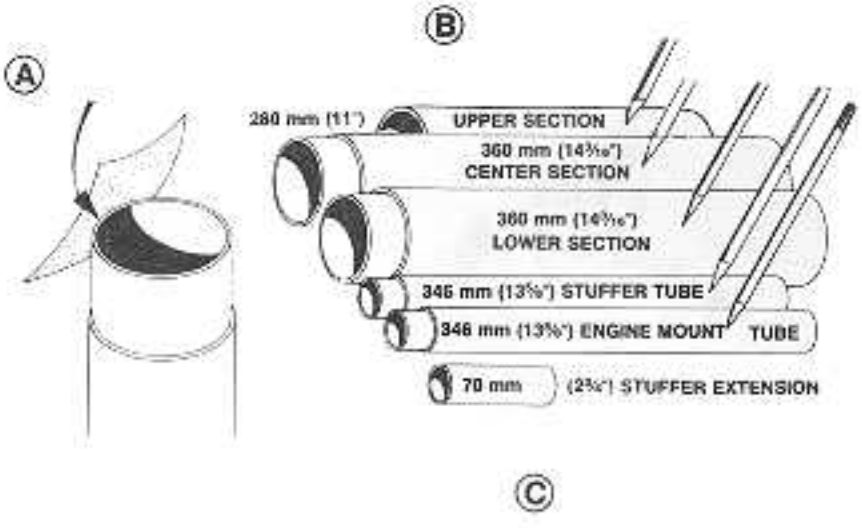


2. IDENTIFY BODY TUBING

A. ☐ Sand all exposed tube coupler edges round as shown.

B. ☐ Use a soft pencil to identify the two large 360 mm (14³⁄₁₆") body tubes. One should be identified as the LOWER SECTION and the other as the CENTER SECTION. Mark the remaining large 280 mm (11") long body tube UPPER SECTION.

C. ☐ Identify one of the smaller 346 mm (13⅝") long body tube as ENGINE MOUNT TUBE. Mark the remaining 346 mm (13⅝") long smaller body tube as STUFFER TUBE. Mark the remaining small 70 mm (2¾") long body tube STUFFER EXTENSION.

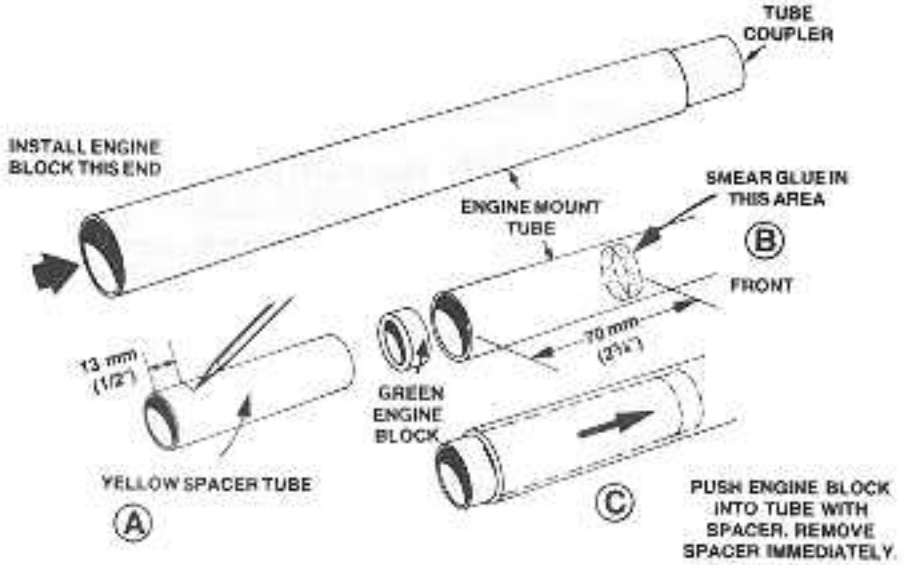


3. INSTALL ENGINE BLOCK

A. ☐ Mark the YELLOW spacer tube 13 mm (1/2") from one end.

B. ☐ Place a band of glue around the inside of the end of the engine mount tube as shown. The glue should be about 70 mm (2¾") inside the tube.

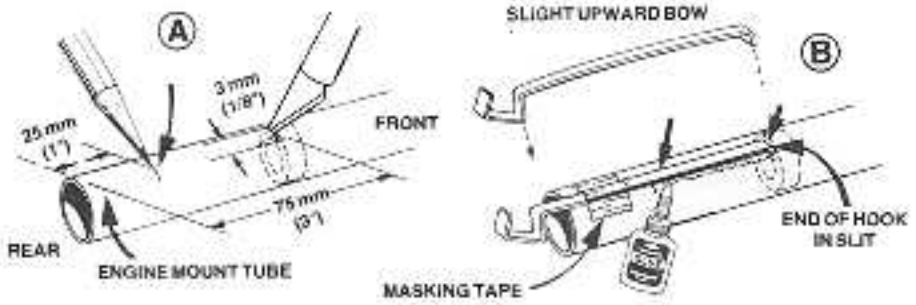
C. ☐ Insert the green engine block into the tube and push it into place with the YELLOW spacer tube. This operation must be done quickly to avoid the glue "grabbing" the engine block in the wrong place. Stop pushing when the mark on the spacer tube is even with the end of the engine mount tube. REMOVE the spacer tube IMMEDIATELY and discard.



4. ATTACH ENGINE HOOK

A. ☐ Mark the end of the engine mount tube with the engine block at 25 mm (1") and 75 mm (3"). Cut a 3 mm (1/8") wide slit at the 75 mm (3") mark.

B. ☐ Bend engine hook slightly as shown. Apply a line of glue from the slit rearward to the 25 mm (1") mark. Push one end of the engine hook into the slit and align it straight on the tube. Hold the hook in place temporarily with masking tape.

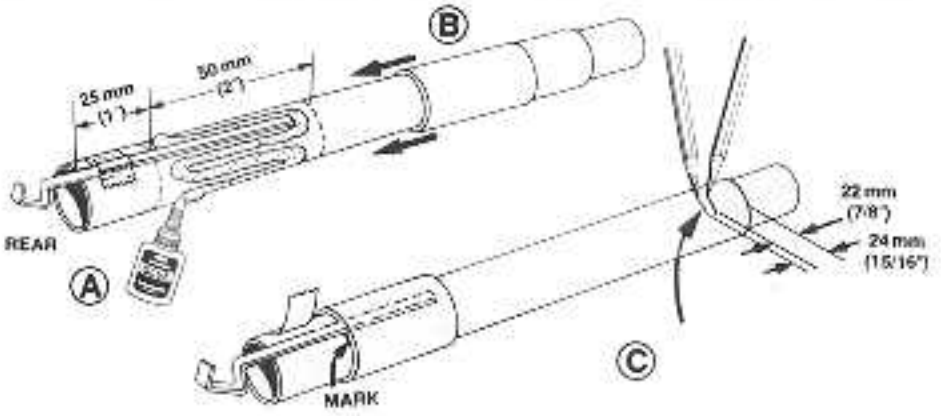


5. ATTACH ENGINE HOOK RETAINER

A. ☐ Apply glue around the engine mount tube as shown.

B. ☐ Slide the hook retainer tube onto the front of the engine mount tube and down over the glue, stopping at the 25 mm (1") mark. Remove the masking tape.

C. ☐ Mark the engine mount tube 22 mm (7/8") and 24 mm (15/16") from the forward end as shown.

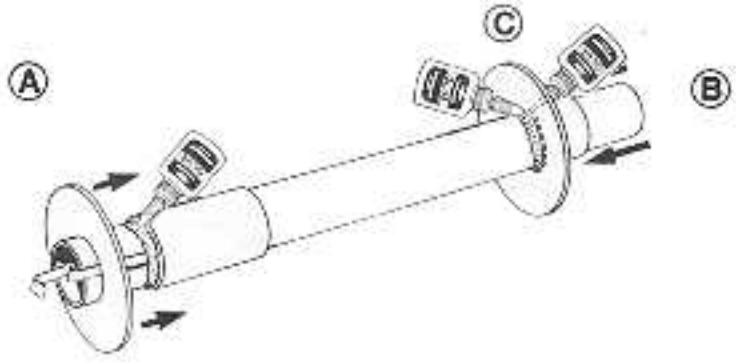


6. ATTACH CENTERING RINGS

A. ☐ Apply glue around the engine mount tube just behind the retainer tube. Slide one of the die-cut adapter rings onto the tube and up against the retainer tube.

B. ☐ Slide another adapter ring onto the forward end of the engine mount tube and position it between the marks.

C. ☐ Apply glue around both sides of the ring where it touches the tube. Make sure the ring is straight as shown before the glue sets. Allow glue to dry.

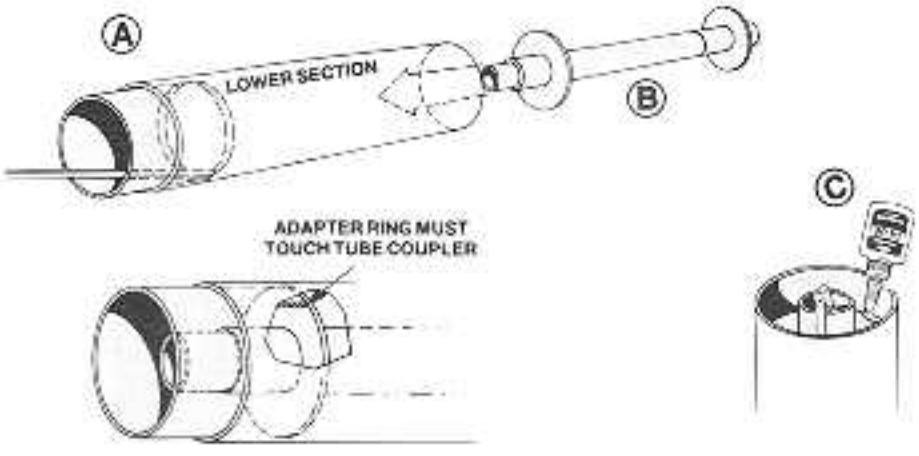


7. INSTALL ENGINE MOUNT ASSEMBLY

A. ☐ Apply glue around the inside of the large lower section body tube just behind the tube coupler.

B. ☐ Slide the completed engine mount assembly into the rear of the lower section body tube and up against the tube coupler. Allow glue to dry.

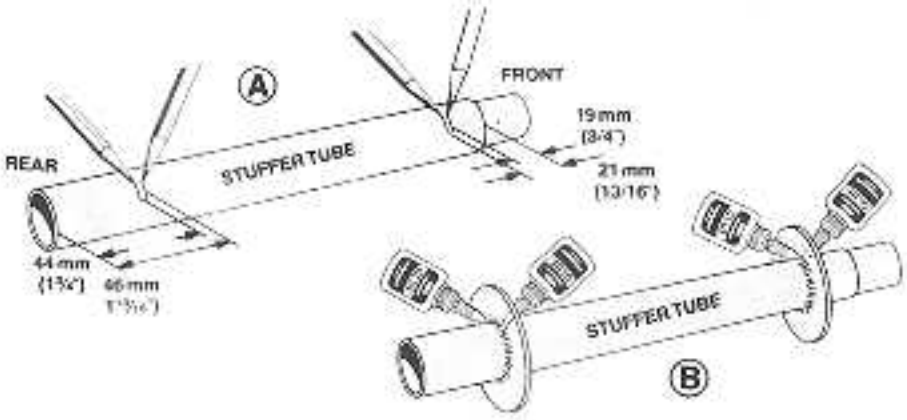
C. ☐ Apply glue around the inside of the rear of the body tube where it touches the adapter ring.



8. ATTACH STUFFER TUBE CENTERING RINGS

A. ☐ Mark the stuffer tube 44 mm (1¾") and 46 mm (1 13/16") from the rear as shown. Mark the tube 19 mm (3/4") and 21 mm (13/16") from the front as shown. Do NOT measure from the end of the tube coupler.

B. ☐ Position one adapter ring between each set of marks as shown. Apply glue around both sides of each ring where they touch the tube. Allow glue to dry.

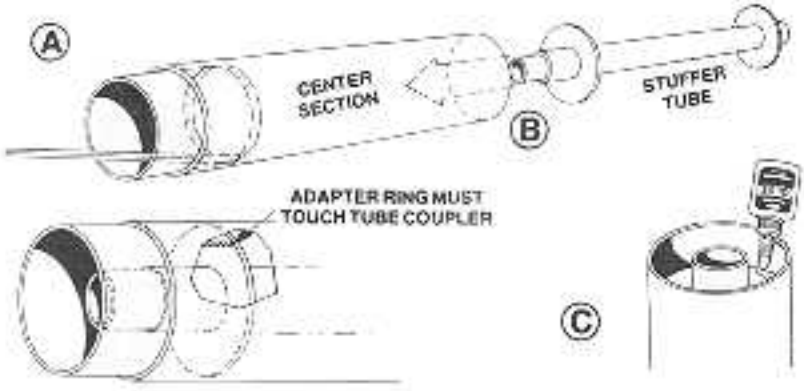


9. INSTALL STUFFER TUBE ASSEMBLY

A. ☐ Apply glue around the inside of the center section body tube just behind the tube coupler.

B. ☐ Slide the stuffer tube assembly into the rear of the center section body tube and up against the tube coupler as shown.

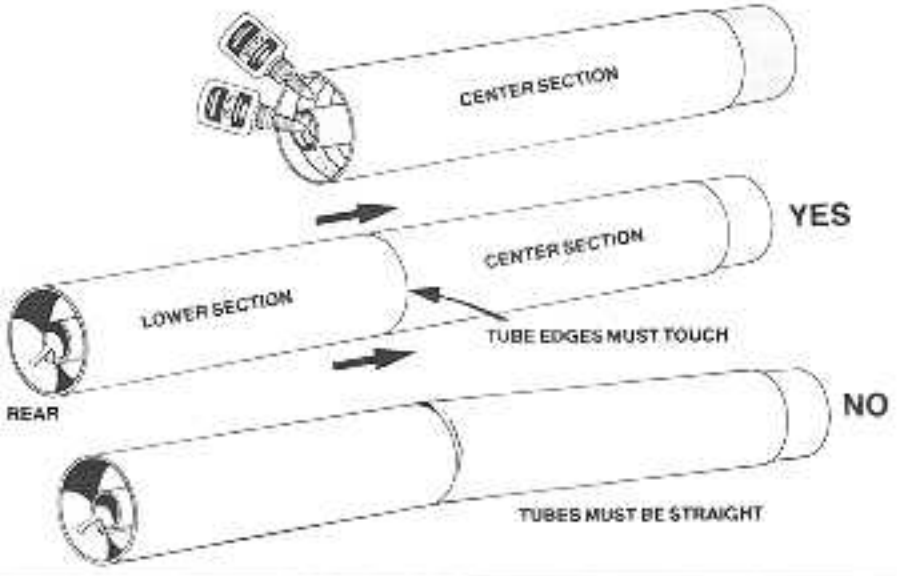
C. ☐ Apply glue around the inside of the rear of the body tube where it touches the adapter ring.



10. JOIN LOWER AND CENTER BODY SECTIONS

A. ☐ Apply glue inside the center section and stuffer tube near the end as shown.

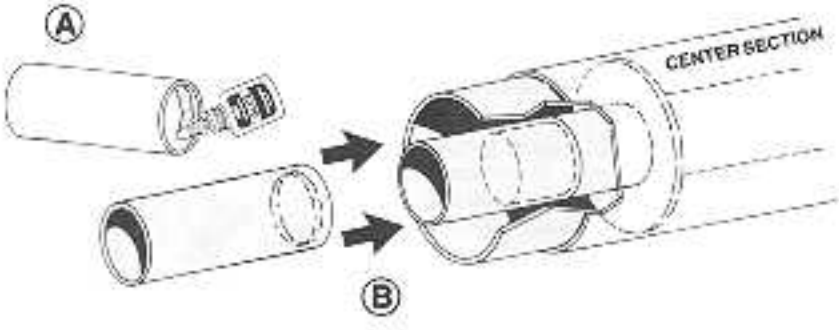
B. ☐ Join the lower and center section body tubes with a twisting motion. Be sure the tubes are aligned straight and the tube edges touch before the glue sets.



11. ATTACH EXTENSION TUBE

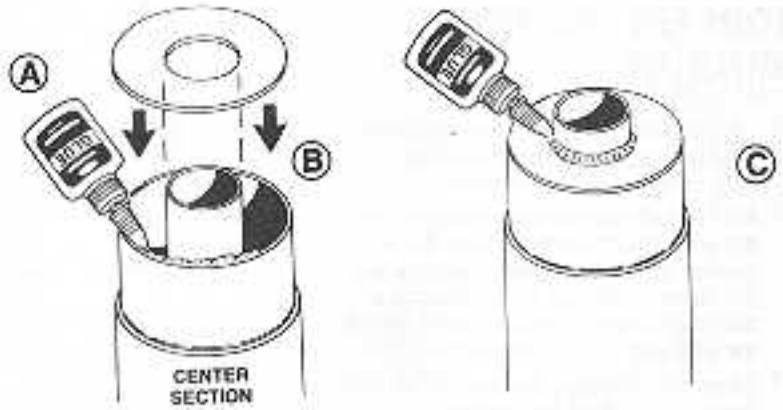
A. ☐ Apply glue around the inside of one end of the 70 mm (2¾") long stuffer extension tube.

B. ☐ Push the stuffer extension tube down and over the small protruding tube coupler inside the forward end of the center section body tube. Allow the glue to dry.



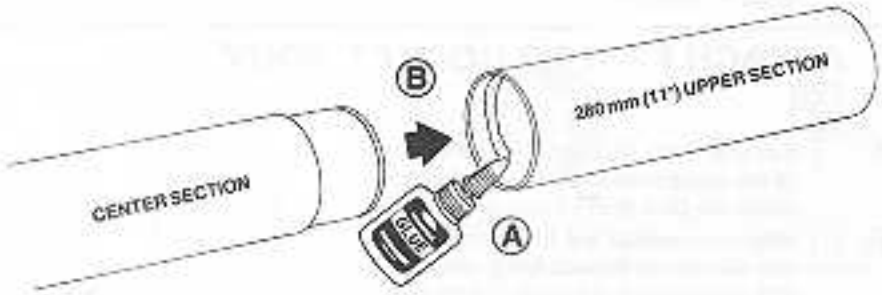
12. ATTACH FORWARD CENTERING RING

- A. ☐ Apply glue to the edge of the large tube coupler extending from the forward end of the center section body tube.
- B. ☐ Slide an adapter ring onto the protruding stuffer tube extension and seat it all around the tube coupler edge.
- C. ☐ Apply glue around the ring where it touches the tube. Allow the glue to dry.



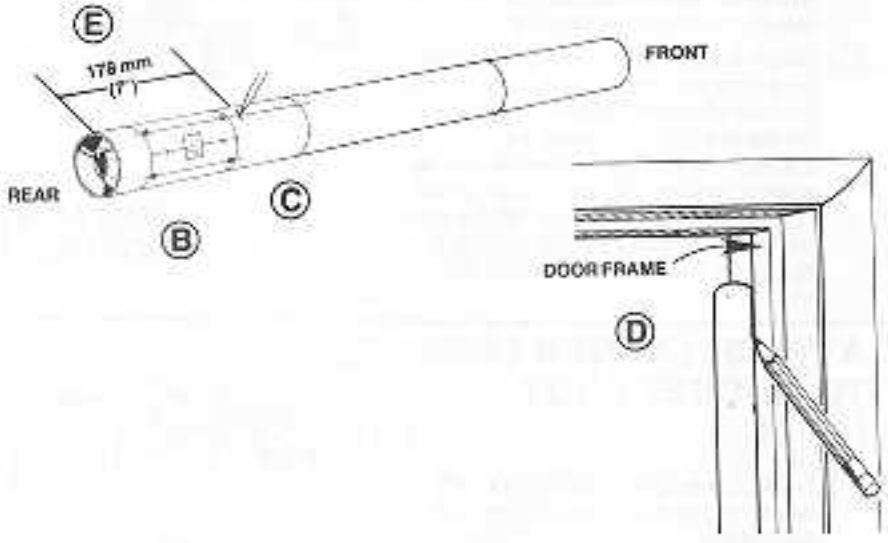
13. JOIN CENTER AND FORWARD BODY SECTIONS

- A. ☐ Apply glue around the inside of one end of the upper section body tube. The glue should be placed about 25 mm (1") from the tube end.
- B. ☐ Join the center section tube and upper section tube with a twisting motion. Be sure the tubes are straight before the glue begins to set. Allow the glue to dry.



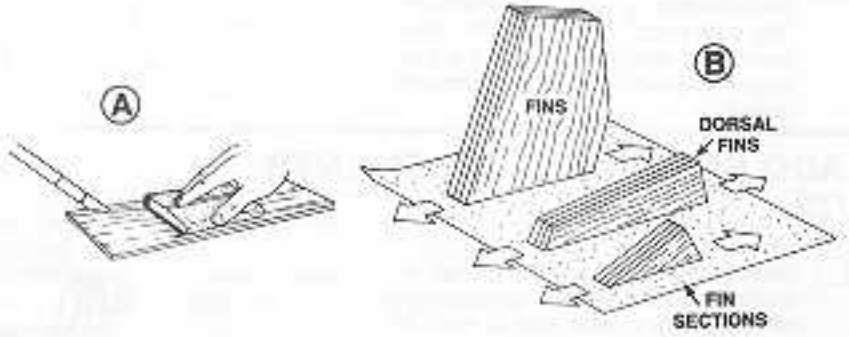
14. MARK BODY TUBE FIN LOCATIONS

- A. ☐ Cut out the tube marking guide from the pattern sheet.
- B. ☐ Wrap the guide around the lower section body tube near the end as shown. Hold the marking guide in place with a small piece of tape.
- C. ☐ Mark the tube at each arrow point. Remove the marking guide.
- D. ☐ Draw straight lines connecting each pair of marks. The lines should extend from the bottom edge of the tube to the joint made with the center section body tube.
- E. ☐ Make a tick mark on each line 178 mm (7") from the rear of the body tube.



15. SAND FINS SMOOTH

- A. ☐ Fine sand both balsa die-cut sheets. Carefully remove each part by freeing edges with a sharp hobby knife.
- B. ☐ Stack fins, fin sections and dorsal fins together. Sand all edges smooth.



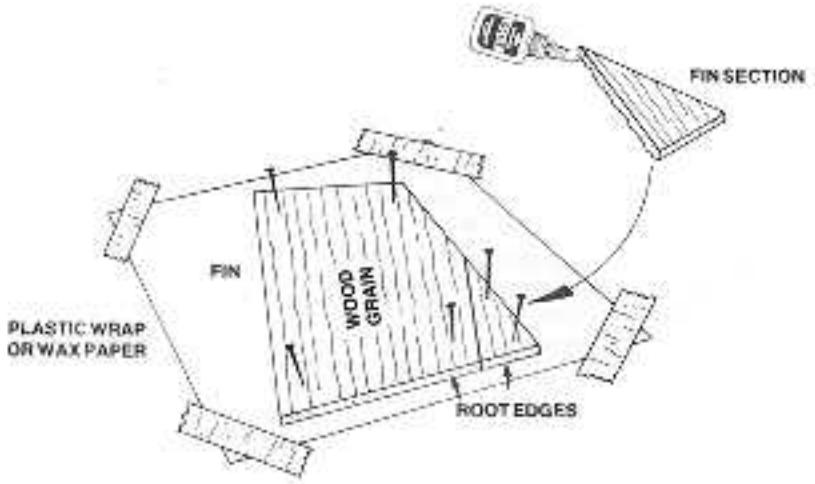
16. JOIN FIN SECTIONS

A. ☐ Lay and stretch a section of kitchen plastic wrap or wax paper on a work surface. Hold tight using tape at the corners.

B. ☐ Pin a fin to the plastic wrap. Apply glue to the edge of a fin section. Push the fin section against the fin, align carefully, and pin in place. Be sure the root edges of both the fin and fin section match before the glue sets. Wipe away excess glue.

C. ☐ Glue the remaining fins and fin section together in the same manner.

D. ☐ Re-sand completed fins after glue has dried if necessary.

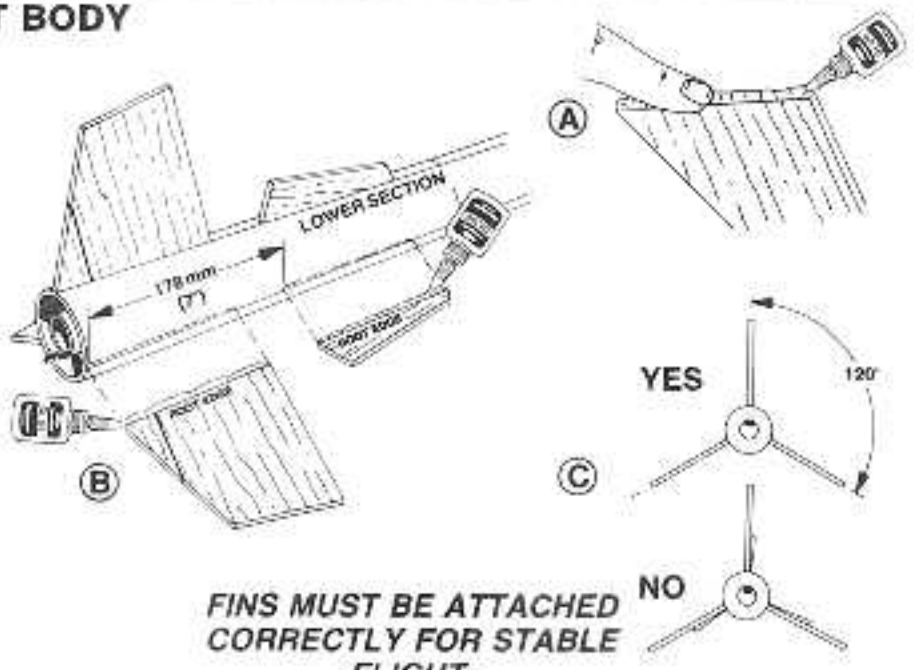


17. ATTACH FINS TO ROCKET BODY

A. ☐ Apply and rub glue into the root edges of the completed fins and dorsal fins. Allow the glue to dry thoroughly.

B. ☐ Attach completed fins to the body tube one at a time as follows: Add more glue to the root edge and position the fin on the lower section body tube next to an alignment line as shown. Be sure the trailing edge of the fin is even with the end of the body tube and is aligned straight on the tube before the glue sets. Repeat for the other two fins.

C. ☐ Attach dorsal fins to the body tube one as a time as follows: Add more glue to the root edge and position the dorsal fin on the lower section body tube on the same fin side of the alignment line as shown. Position the rear of each dorsal fin even with the tick mark. Make sure the dorsal fin is aligned with the fin just behind it. Repeat for other two dorsal fins.



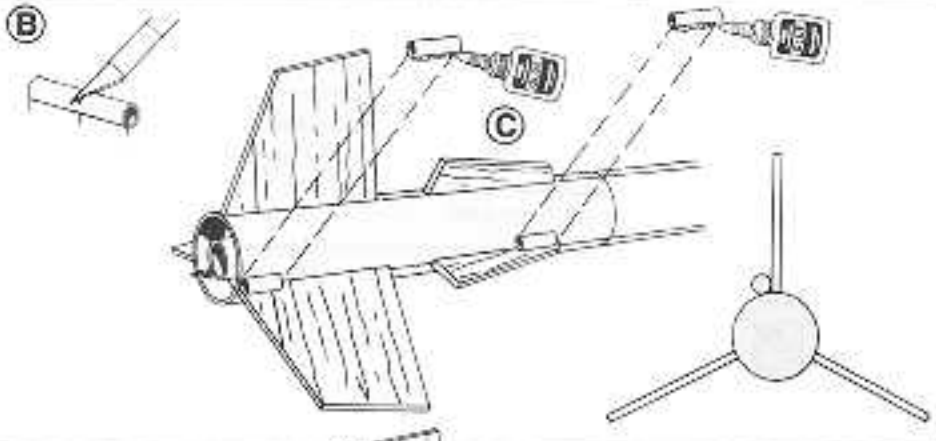
FINS MUST BE ATTACHED CORRECTLY FOR STABLE FLIGHT.

18. ATTACH LAUNCH LUGS TO ROCKET BODY

A. ☐ Select 5 mm (3/16") or 6 mm (1/4") launch lug to match the rod on your launch pad.

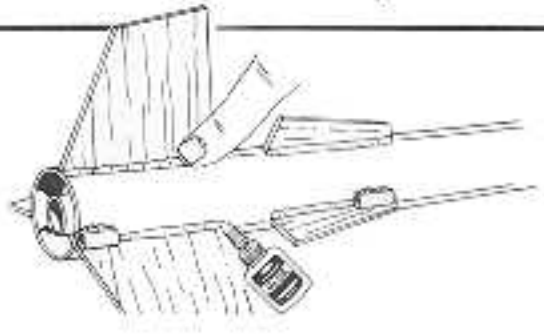
B. ☐ Cut the launch lug in two pieces of equal length.

C. ☐ Glue one of the launch lugs at one of the fin/body tube corners even with the rear of the body tube. Glue the other launch lug directly in front of the first, near the forward end of the matching dorsal fin.



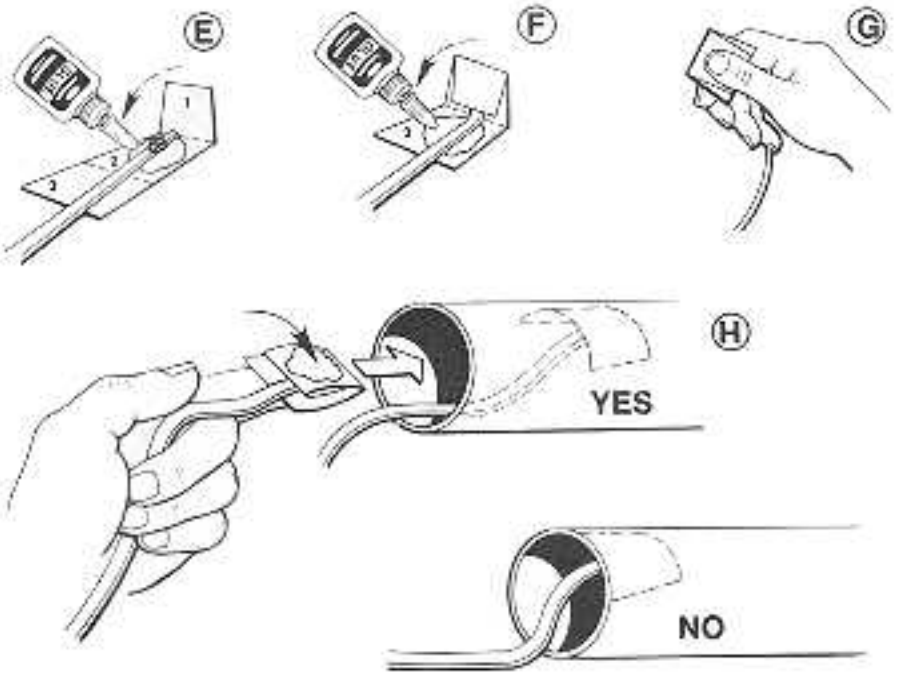
19. ADD GLUE REINFORCEMENTS

☐ When all glue on the fins and dorsal fins is completely dry, add an additional glue reinforcement to each side of each fin and launch lug as shown. Do not obstruct launch lugs. Use a finger to smooth out the glue before it dries.



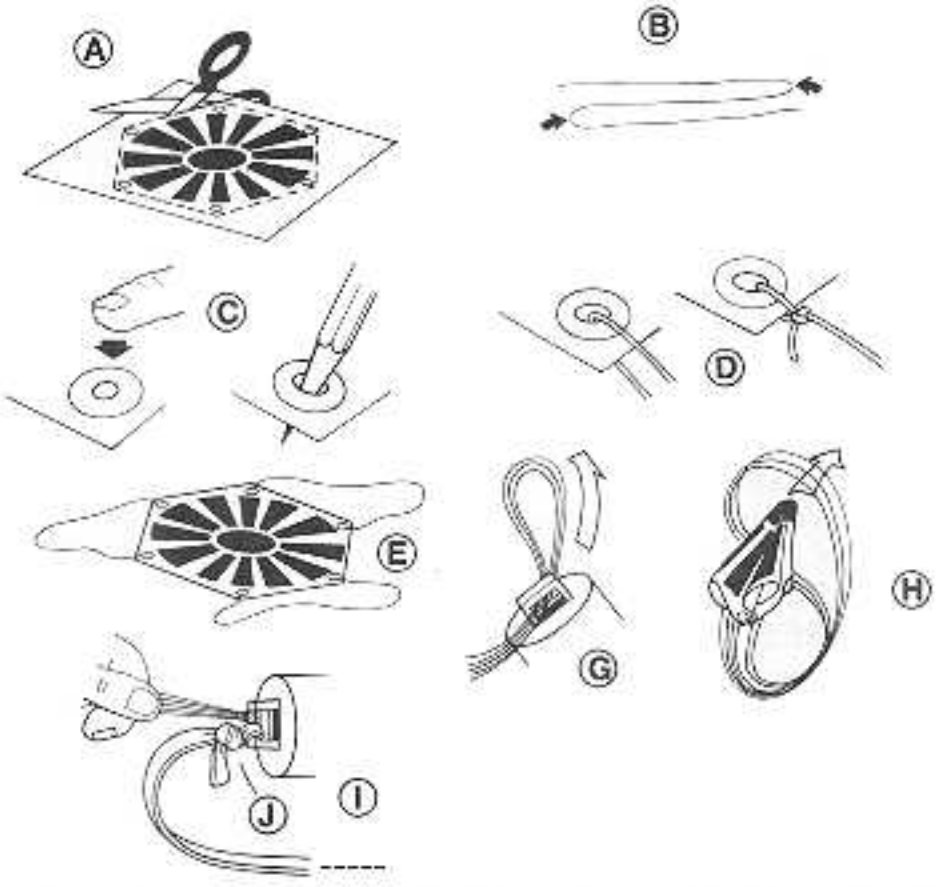
20. SHOCK CORD MOUNT ASSEMBLY

- A. ☐ Locate the shock cord mount on the pattern sheet.
- B. ☐ Cut out the shock cord mount along the solid black outline.
- C. ☐ Crease on dotted lines by folding.
- D. ☐ Tie a knot at the very end of the end of the loose shock cord.
- E. ☐ Spread glue on section 3 and lay knotted end of shock cord into the glue at a slight diagonal as shown.
- F. ☐ Fold section 1 forward. Apply glue to section 3. Fold forward again.
- G. ☐ Clamp firmly with your fingers for two minutes until glue dries.
- H. ☐ Apply glue inside front of body tube no less than 50 to 75 mm (2-3") from end. The glued area should be same size as shock cord mount. Press mount firmly into glue as shown. Hold until glue sets.



21. PARACHUTE ASSEMBLY AND ATTACHMENT

- A. ☐ Cut out parachute on printed edge lines.
- B. ☐ Remove tape from shroud line, unwind cord, fold and cut into three equal lengths.
- C. ☐ Attach tape rings to top of parachute and press firmly into place. Punch hole through the parachute material with the point of a sharp pencil. (Do not use a dull pencil or ballpoint pen.)
- D. ☐ Pass shroud line through hole in parachute and tape ring. Tie lines together with a double knot.
- E. ☐ Attach remaining lines to other corners to complete parachute.
- F. ☐ Clear loop on nose cone with the point of scissors.
- G. ☐ Thread shroud lines through loop on nose cone.
- H. ☐ Pass parachute back through loop of shroud lines as shown.
- I. ☐ Pull lines tight.
- J. ☐ Tie free end of shock cord to the loop on the nose cone.

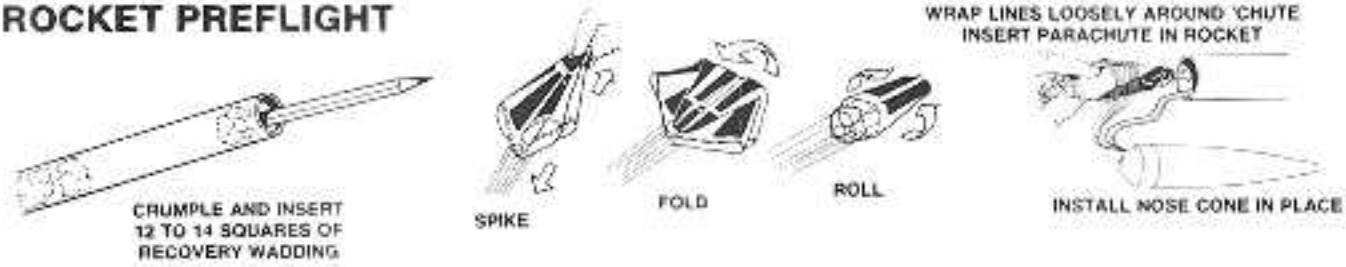


FINISHING YOUR SHADOW™

Apply a heavy coat of sanding sealer to all balsa parts and allow to dry. Lightly sand all sealed surfaces. Repeat sealing and sanding until all balsa grain is filled and smooth. When all sanding sealer is completely dry, paint the entire model with white spray paint. Follow the instructions on the spray can for best results. Several light coats may be necessary to achieve a solid bright white. Let the white dry for at least 24 hours before applying or masking for other colors.

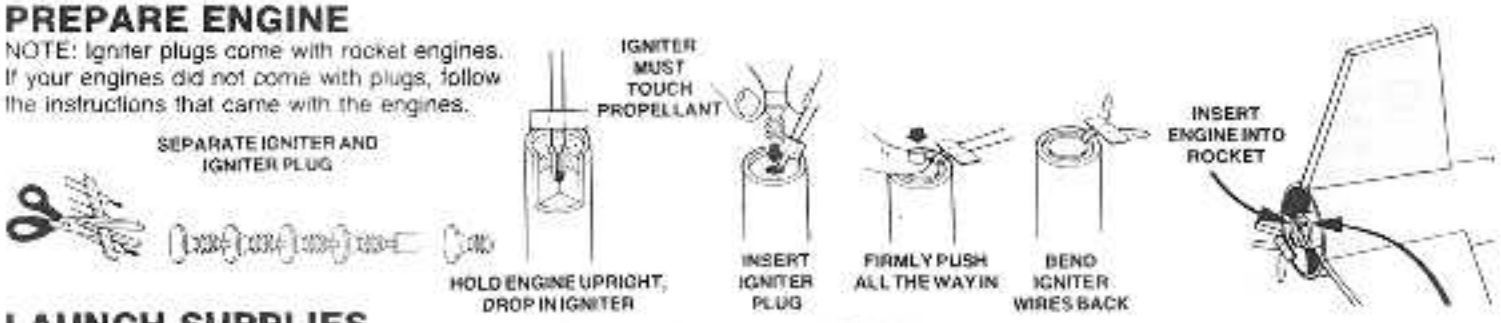
The Shadow™ may be painted any color or color combination you wish. Use frosted type cellophane tape and plastic film to mask and protect areas of the model when applying other colors. When all paint is completely dry, cut out and add final decoration using the self-adhesive decal included.

ROCKET PREFLIGHT



PREPARE ENGINE

NOTE: Igniter plugs come with rocket engines. If your engines did not come with plugs, follow the instructions that came with the engines.



LAUNCH SUPPLIES

To launch your rocket you will need the following items:
—Estes Electrical Launch Controller and Launch Pad with 5 mm (3/16") or 6 mm (1/4") Launch Rod
—Estes Recovery Wadding No. 2274
—Recommended Estes Engines: D12-3 (First Flight), E15-4

When flying with a D engine, slide orange engine spacer in engine mount tube in front of engine. For E engine flights, the spacer is not needed.

To become familiar with your rocket's flight pattern, use a D12-3 engine for your first flight.

When using an E engine, you must be 10 meters (30 feet) from your rocket at launch so make certain your controller has 10 meters (30 feet) of cable. We recommend the Estes Command Control™ launch controller and Estes Power Plex™ launch pad to fly this rocket.

Use only Estes products to launch this rocket.

FLYING YOUR ROCKET

Choose a large field away from power lines, tall trees, and low flying aircraft. Try to find a field at least 150 meters (500 feet) square. The larger the launch area, the better your chance of recovering your rocket. Football fields and playgrounds are great.

Launch area must be free of dry weeds and brown grass.

Launch only during calm weather with little or no wind and good visibility.

MISFIRES

If the igniter functions properly but the propellant does not ignite, keep in mind the following: An Estes igniter will function properly even if the coated tip is chipped. However, if the coated tip is not in direct contact with the engine propellant, it will only heat and not ignite the engine.

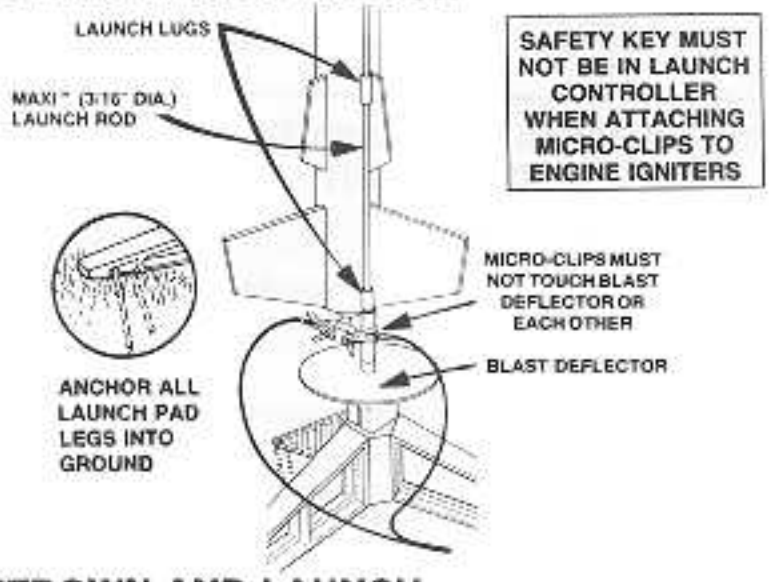
When an ignition failure occurs, remove the safety key from the launch control system and wait one minute before approaching the rocket. Remove the expended igniter from the engine and install a new one. Be certain the coated tip is in direct contact with the engine propellant, then reinstall the igniter plug as illustrated above. Repeat the countdown and launch procedure.

FOR YOUR SAFETY AND ENJOYMENT

Always follow the NAR* MODEL ROCKETRY SAFETY CODE while participating in any model rocketry activities.

*National Association of Rocketry

COUNTDOWN AND LAUNCH



COUNTDOWN AND LAUNCH

(10) BE CERTAIN SAFETY KEY IS NOT IN LAUNCH CONTROLLER.

(9) Remove safety cap and slide launch lug over launch rod to place rocket on launch pad. Make sure the rocket slides freely on the launch rod.

(8) Attach micro-clips to the igniter wires. Arrange the clips so they do not touch each other or the metal blast deflector. Attach clips as close to protective tape on igniter as possible.

(7) Move back from your rocket as far as launch wire will permit (at least 5 meters - 15 feet for a D engine or 10 meters - 30 feet for an E engine).

(6) INSERT SAFETY KEY to arm the launch controller.

Give audible countdown 5...4...3...2...1

LAUNCH!!

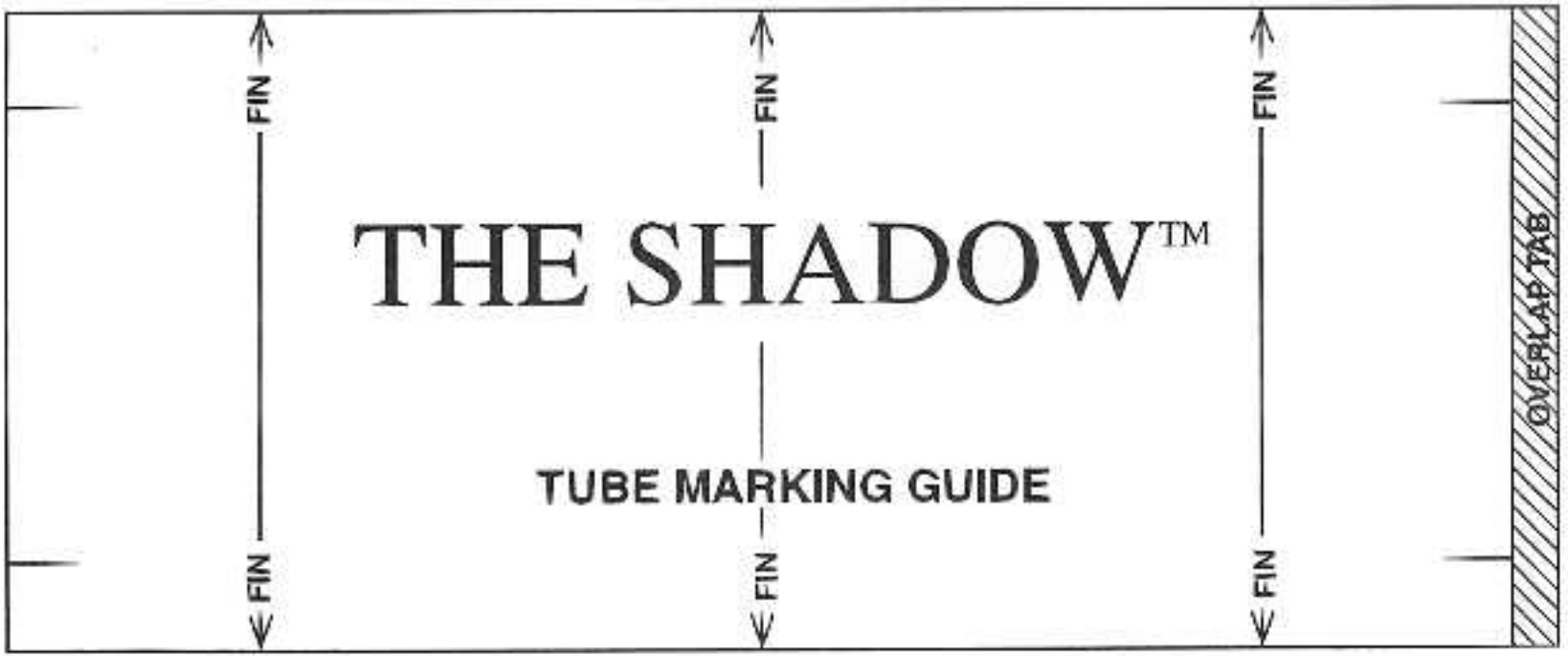
PUSH AND HOLD LAUNCH BUTTON UNTIL ENGINE IGNITES

Use only Estes products to launch this rocket.

If you use the Estes E2™ or Command Control ™ Launch Controllers to fly your models, use the following launch steps.

A. After attaching micro-clips and moving away from the rocket, etc., insert the safety key into the controller receptacle. If the igniter clips have been attached properly to the igniter, the audio continuity indicator will beep on and off.
B. Hold the yellow (left) arm button down. The audio indicator will produce a steady tone.
C. Verbally count down from five to zero loud enough for the bystanders to hear. Still holding the yellow arm button down, push and hold the orange (right) button down until the rocket ignites and lifts off.

REMOVE SAFETY KEY FROM LAUNCH CONTROLLER. KEEP SAFETY KEY WITH YOU OR REPLACE SAFETY KEY AND SAFETY CAP ON LAUNCH ROD.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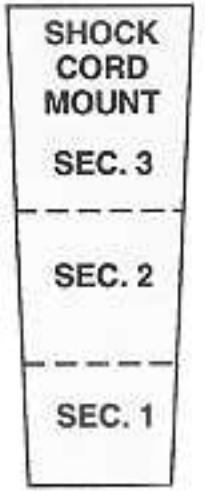
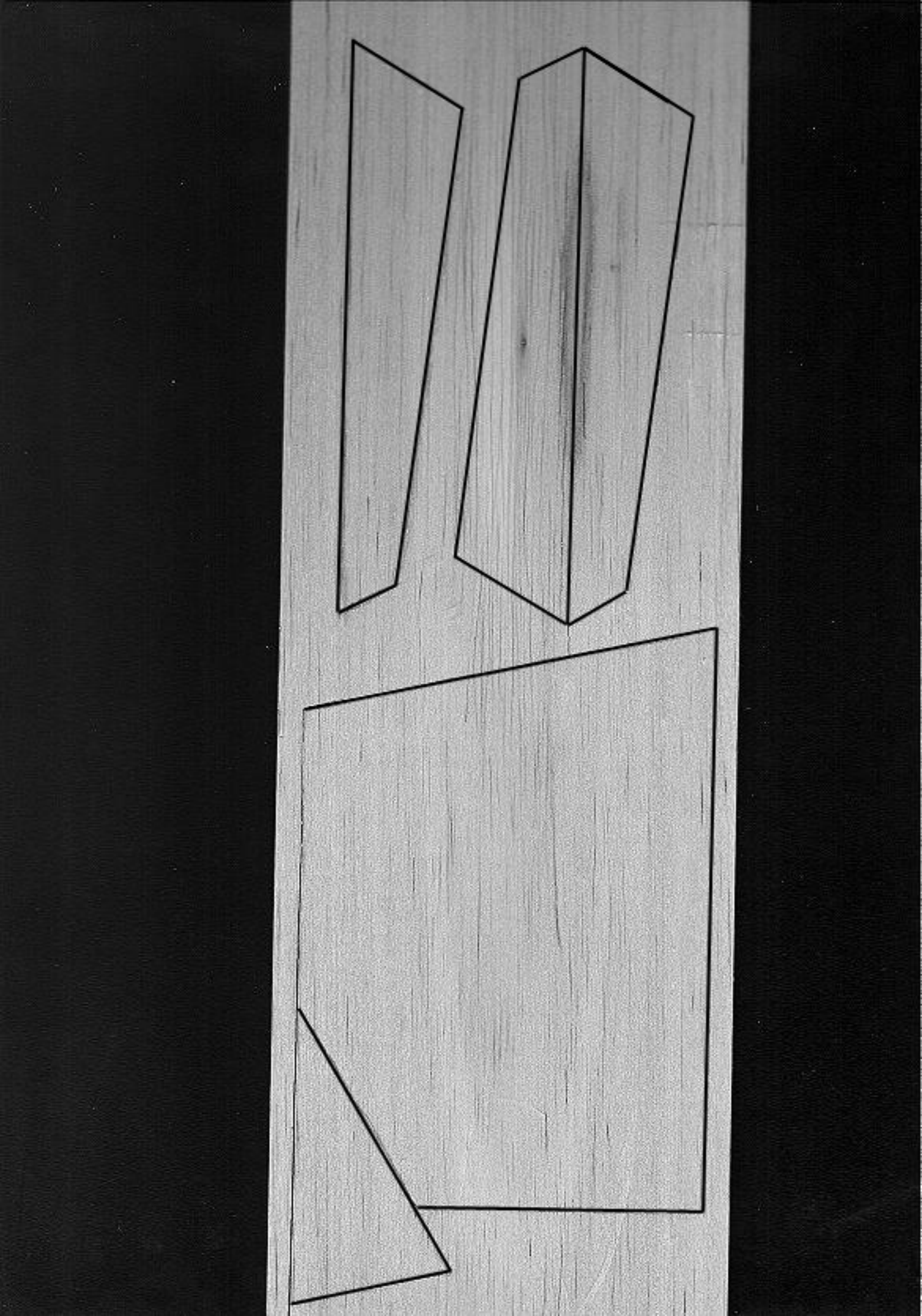
OVERLAP TAB
THE SHADOW™
TUBE MARKING GUIDE

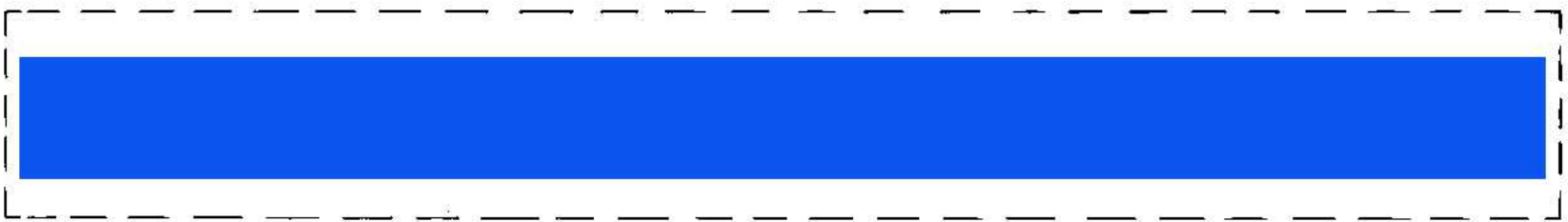

SHOCK CORD MOUNT
SEC. 3
SEC. 2
SEC. 1

PN 084365



NOTE: CUT OUT THESE FIN DECALS INDIVIDUALLY

THIS END TOWARD FRONT OF FIN ▸



ESTES
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