

# Maxi-Force

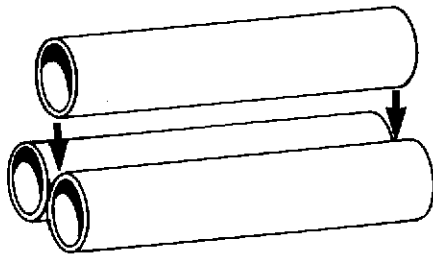
## Advanced Model Rocket

In order to complete the assembly of the rocket components supplied in this kit, you will need a pair of scissors, a pencil, a ruler, sandpaper, Titebond Glue and Epoxy (six or ten minute), a modeling knife, a paint brush, enamel spray paint of your choice, masking tape, sanding surface coat epoxy, and waxed paper.  
 Read all instructions carefully and test-fit all parts together before applying any epoxy or glue. If parts don't fit, sand as required for proper fit.

### MAXI-FORCE ASSEMBLY INSTRUCTIONS

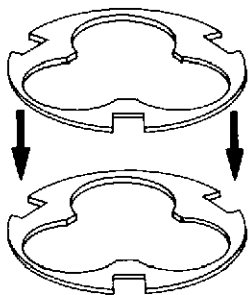
#### ENGINE MOUNT ASSEMBLY

1. Glue or epoxy two engine mount tubes together on a flat surface so ends are even. Allow glue to set. Then glue third engine mount tube to mount assembly with all the tube ends even and allow to dry.



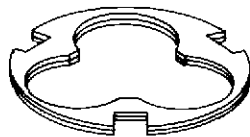
GLUE TUBES TOGETHER WITH ENDS EVEN

2. Remove the centering rings from the die-cut sheets and glue similar rings together on waxed paper. Wipe away excess glue and allow to dry. Remove any excess glue or epoxy from rings with sandpaper.



GLUE THREE RING SETS TOGETHER ON WAXED PAPER

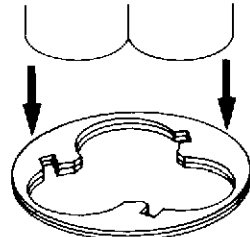
GLUE



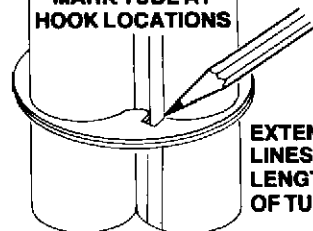
WHEN GLUE HAS SET, REMOVE EXCESS GLUE

3. Slide rear centering ring onto engine mount tube assembly and mark engine hook locations on tubes. Using a door frame as a guide, draw lines at engine locations the length of the tubes.

SLIDE REAR RING ONTO TUBE ASSEMBLY

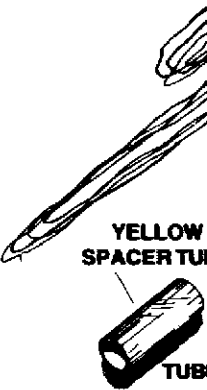


MARK TUBE AT HOOK LOCATIONS



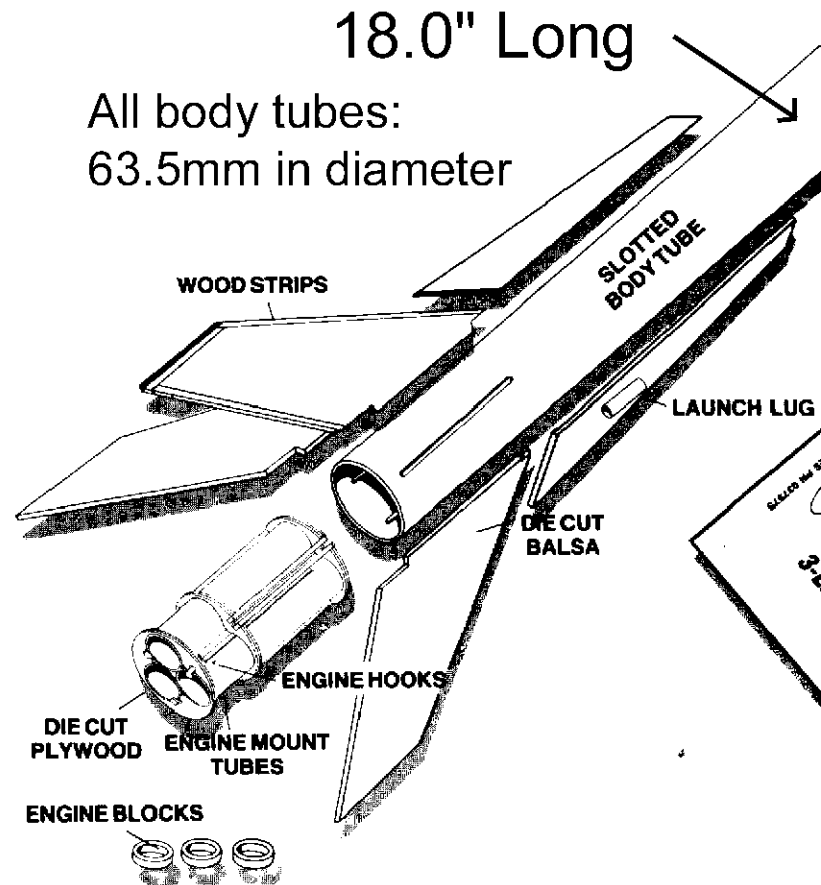
EXTEND LINES LENGTH OF TUBES

NYLON PARACHUTE



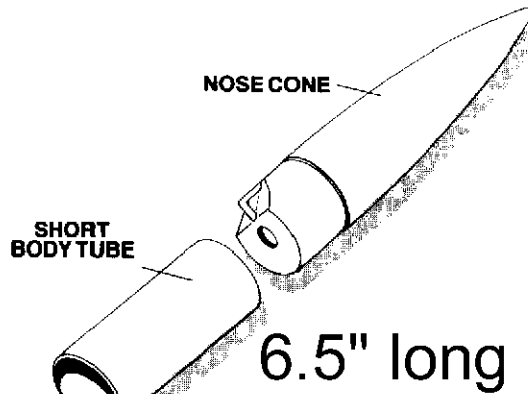
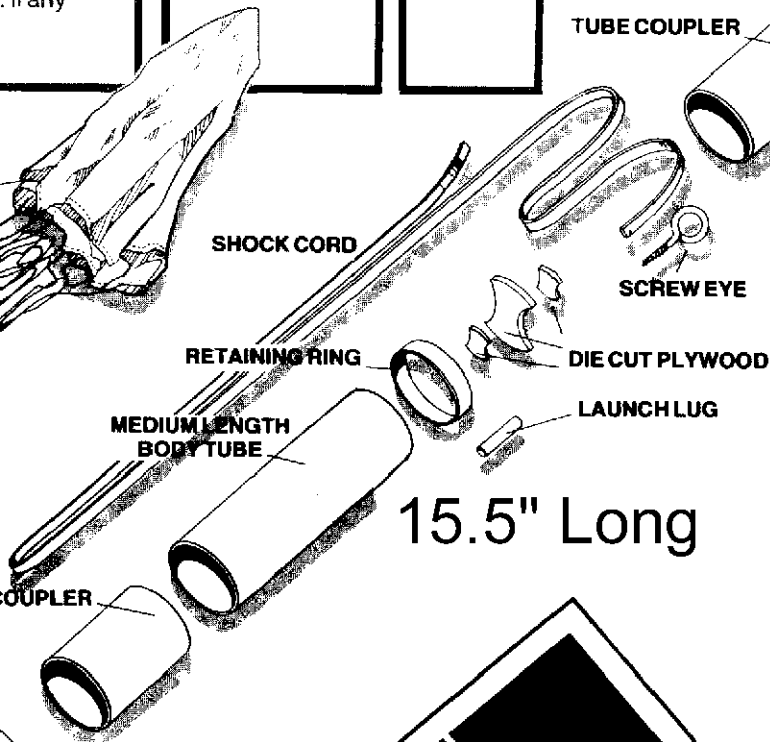
YELLOW SPACER TUBE

TUBE

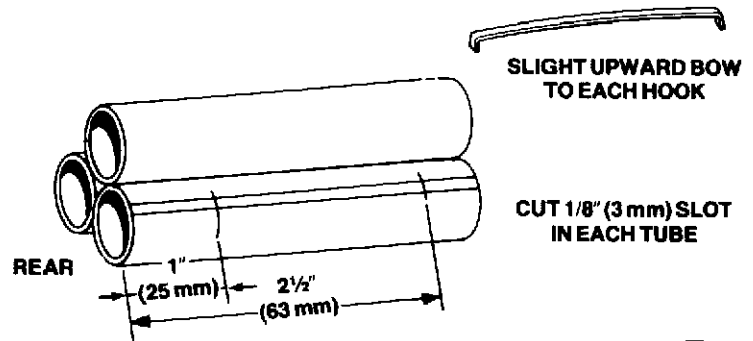


TM

need: a  
e type), a  
sealer or  
If any



4. Mark each engine mount tube at 1" (25 mm) and 2½" (63 mm) from one end. Cut a 1/8" (3 mm) wide slit at the 2½" (63 mm) mark. Push the engine hook into slit and slide one ring into place at the 1" (25 mm) mark. Apply glue or epoxy over hooks and at ring-tube joint and set aside to dry.



MARK TUBES

NO EPOXY ON HOOK IN THIS AREA

1" (25 mm) MARK

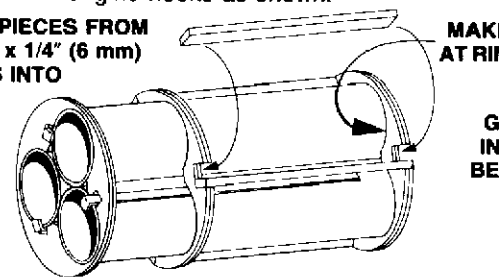
5. Glue or epoxy remaining centering rings to the engine mount tubes flush with the ends of tubes. Apply a fillet of glue or epoxy at ring-tube joint. Glue or epoxy six fin ribs (cut from 1/8" [3 mm] x 1/4" [6 mm] x 14" [35.6 cm]) wood into six pieces 3½" [89 mm] long) into ring notches as shown. Glue or epoxy engine blocks into place against engine hooks as shown.

CUT SIX PIECES FROM 1/8" (3 mm) x 1/4" (6 mm) WOOD STRIPS INTO 3½" (89 mm) LONG EACH

GLUE RINGS EVEN WITH END OF TUBES

MAKE EPOXY FILLET AT RING-TUBE JOINTS

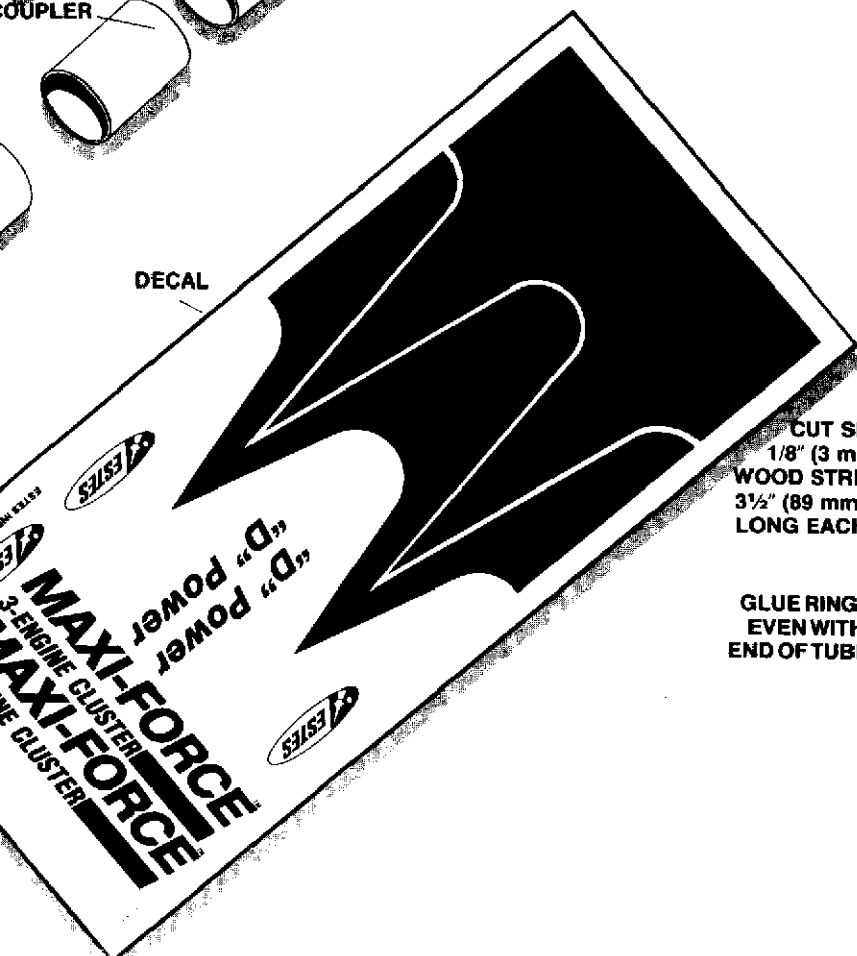
GLUE FIN RIBS INTO NOTCHES BETWEEN RINGS



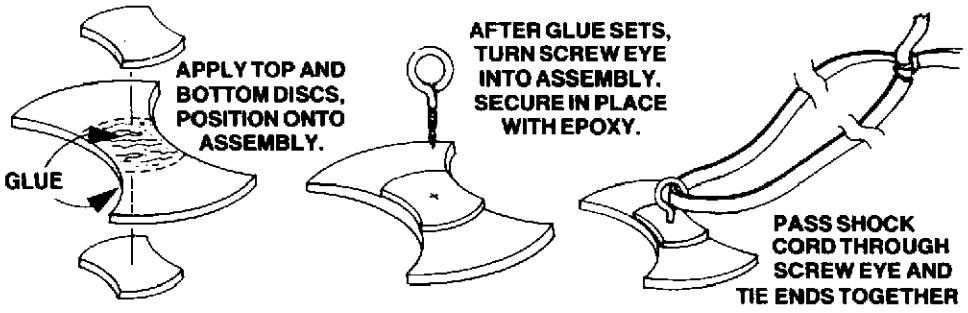
YELLOW SPACER

PUSH ENGINE BLOCK AGAINST HOOKS WITH YELLOW SPACER TUBE

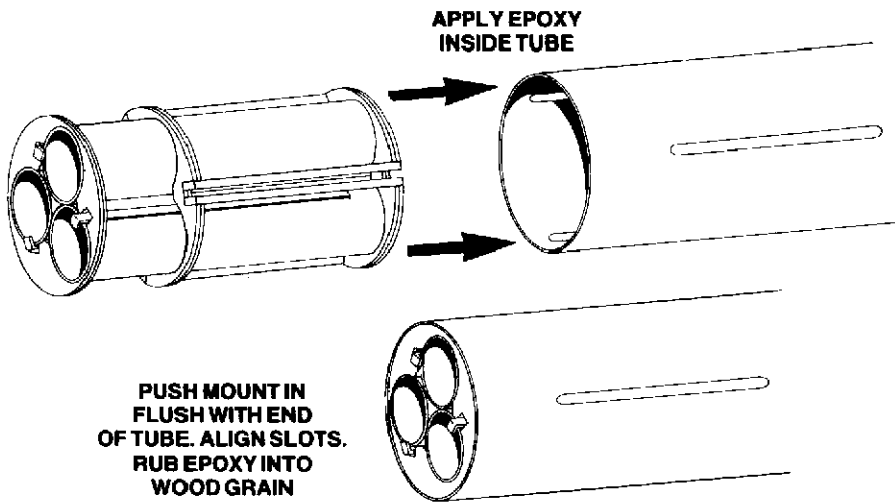
SMALL AMOUNT OF GLUE



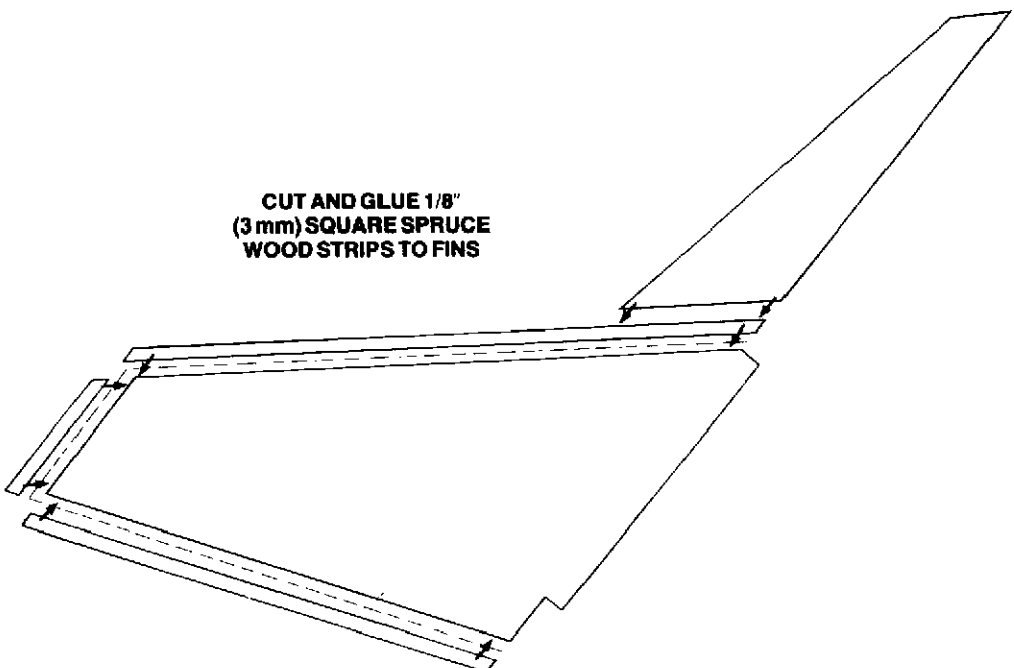
- 6.** Assemble shock cord mount as shown. Use epoxy to secure screw eye in the center of mount and coat exterior of assembly. Pass shock cord through screw eye then tie ends together to make a loop.



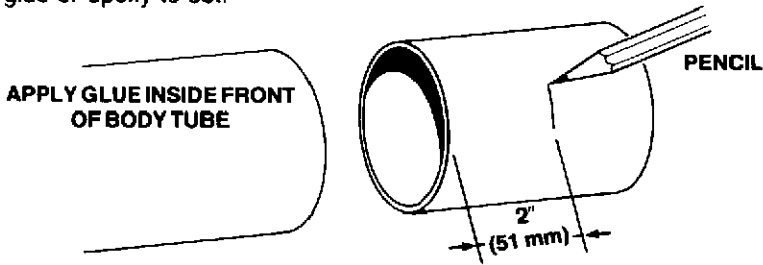
- 7.** Check fit of engine mount assembly in rocket body tube. Sand plywood part edges as necessary to attain smooth fit. Glue or epoxy engine mount assembly in place inside body tube. Align engine mount even with end of tube and slots in tube with slots between plywood ribs before glue sets. **DO NOT GET GLUE OR EPOXY IN FIN SLOTS.** Allow assembly to dry, then rub one or two coats of epoxy into the grain of the exposed rear plywood ring.



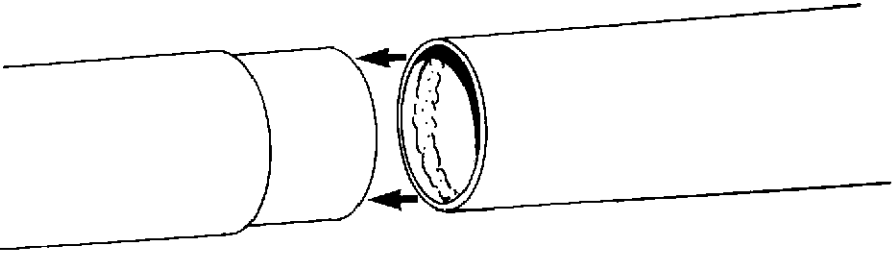
- 8.** Sand balsa fin edges smooth and straight. Cut, match, and glue or epoxy 1/8" (3 mm) square spruce to fin edges and assemble fins as shown.



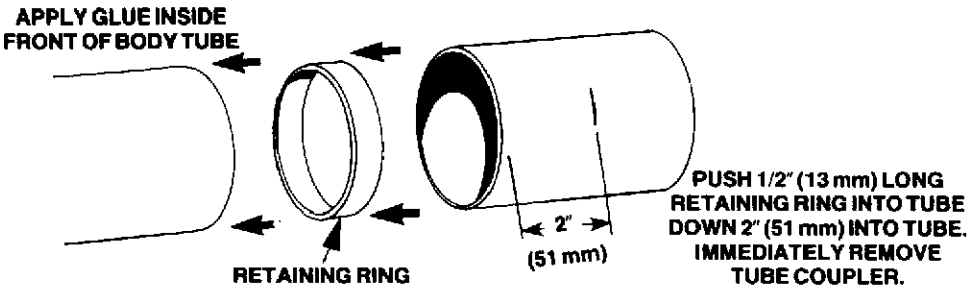
9. Mark tube coupler 2" (51 mm) from one end. Apply glue or epoxy around inside front of body tube. Push tube coupler into tube to the 2" (51 mm) mark. Allow glue or epoxy to set.



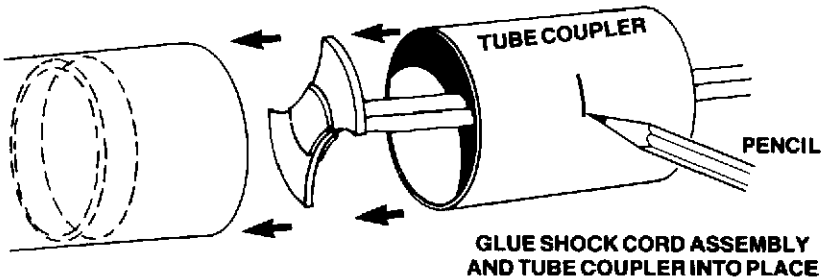
10. Apply glue or epoxy around inside of one end of medium length tube. Push medium length body tube over tube coupler and down against main body tube. Allow to dry.



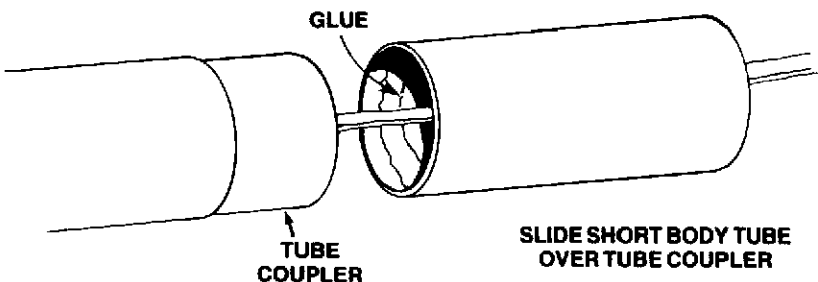
11. Mark other tube coupler 2" (51 mm) from one end. Apply glue or epoxy around inside front of tube assembly, about 1 1/2" (39 mm) inside end of tube. Push 1/2" (13 mm) long retaining ring into tube with tube coupler. Remove coupler after stopping at the 2" (51 mm) mark. Allow glue or epoxy to dry.



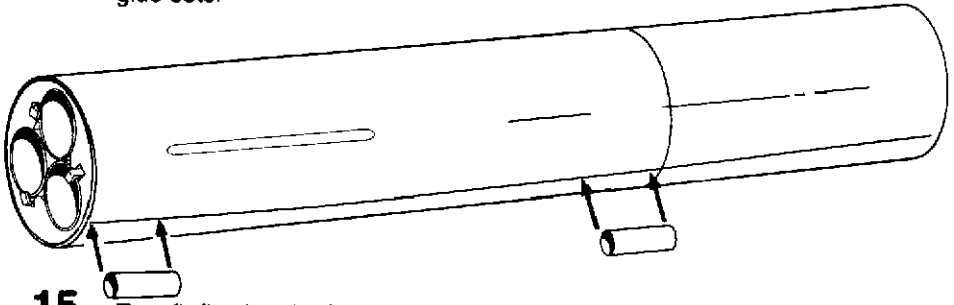
12. Apply glue or epoxy into tube in front of 1/2" (13 mm) ring. Place shock cord mount onto forward edge of 1/2" (13 mm) ring. Slide tube coupler into tube against shock cord mount. Allow to dry.



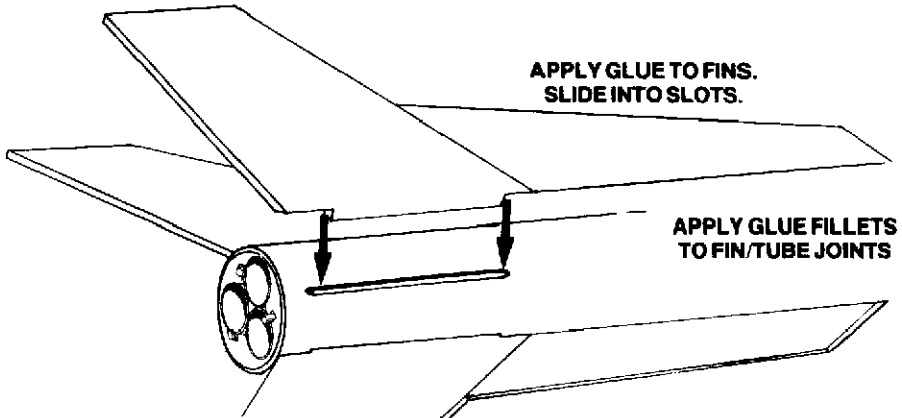
13. Apply glue or epoxy around inside of one end of the short body tube. Push short body tube over tube coupler and down against main body tube assembly.



- 14.** Draw a straight line the length of body tube between one set of fin slots. Glue or epoxy one launch lug on line even with end of tube, and the remaining lug just below the first junction of the tubes. Make sure lugs are straight before glue sets.



- 15.** Test fit fins into body tube slots. Sand as necessary for proper fit. Apply glue or epoxy to the tab area and root edges of fin, slide fins into slots. Allow glue or epoxy to set before assembling next fin.



- 16.** Apply glue or epoxy fillets to each side of each fin at fin body tube joint. This adds important strength to fin assembly.

## FINISHING

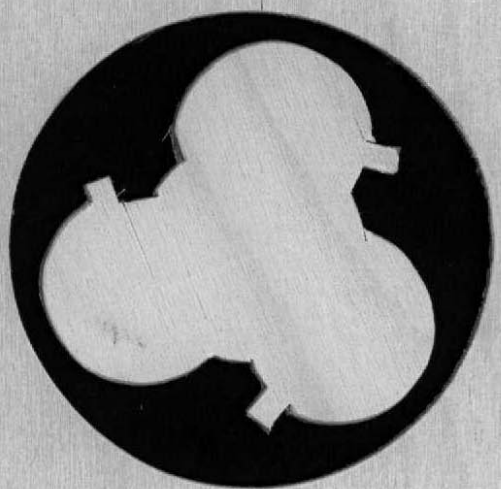
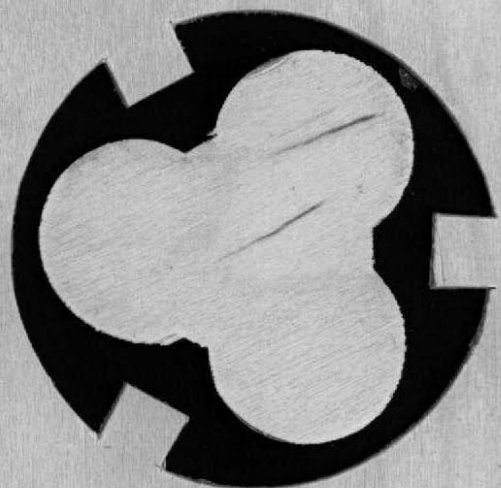
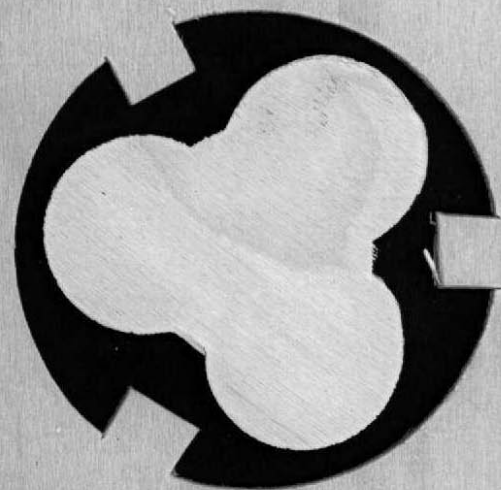
- 1.** Sand nose cone with fine sandpaper to remove excess plastic from around sides of nose cone.
- 2.** Seal fins with sanding sealer and lightly sand. Repeat sealing and sanding process until fins are smooth. Lightly sand all glue or epoxy glue joints smooth.
- 3.** When satisfied with the sanded finish of your rocket, apply a primer coat of paint to your rocket and sand away any imperfection on rocket and nose cone. Apply two even coats of gloss white paint and allow to dry. Finish painting the MAXI-FORCE in the colors of your choice or follow the decor shown on the box illustrations.
- 4.** When paint is completely dry, pass shock cord loop through eyelet on nose cone, open shock cord loop and pass nose cone through. Pull shock cord tight against nose cone.
- 5.** Pass parachute shroud line loops through eyelet on nose cone, open shroud line loops and pass parachute through loops. Pull lines tight against nose cone.

## APPLYING DECALS

Be careful when handling and cutting the self adhesive decals supplied with this kit. Do not crease the decal sheet. Decals will take a set to any crease. Cut out each decal with a sharp pair of scissors or a hobby knife. Make smooth cuts, do not nick as this can cause the decal to tear when it is peeled off the backing sheet. Cutting decals out along edges and names as blocks of decal will make application of decals much easier.

To apply large decals, it is advisable to peel backing paper off decal slightly and cut away a slice of backing paper to expose only enough decal adhesive to align decal and then once decal is aligned, peel backing off and smooth down decal removing any air as it is adhered to rocket.

An alternate way to apply large decals is to fill a bowl with warm water and add one or two drops of dishwashing detergent to the water. Carefully remove decal from backing sheet and dip it into the water. Apply the decal to the rocket, slip decal into position and press the air bubbles and water from under decal from the center of decal out to its edges without moving decal so adhesive of decal will grab and hold on the surface of the rocket.





# CLUSTER MOTOR PREPARATION AND IGNITION

This instruction sheet illustrates the recommended procedures required to insure Estes Pro Series™ cluster motor ignition. Any deviation from these procedures, or experimentation, or use of other than the Estes Command Control™ ignition system and Solar Igniters™ may produce less than perfect motor ignition.

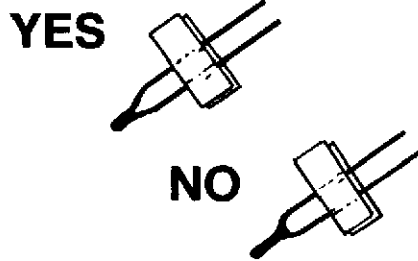
Always remember that reliable cluster motor ignition is a combination of properly installed igniters, a high current launch control system and battery, and proper electrical connections. The Estes Pro Series™ cluster ignition system has been carefully tested to meet these requirements and is strongly recommended.

In order to insure that as many as four Estes Solar Igniters™ function properly, the launch control system must be able to deliver over ten amps of instantaneous electrical current to them. The Estes Command Control™ launch controller exceeds this requirement by using a combination of heavy #18 cable and a standard R/C high current six-cell NiCad battery pack. The system even allows the use of two of these NiCad packs for over 100 watts of available ignition power for most any imaginable cluster or igniter system.

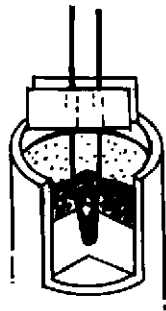
In addition, the new Estes™ igniter holders add important ignition reliability to the Pro Series™ cluster technique. Their design and use holds the pyrotechnic mixture of Solar Igniters™ securely in place against the motor propellant. This insures positive and instantaneous heat flow to the propellant. Failure to use these igniter holders may lead to unreliable ignition of Estes Pro Series™ cluster model rockets.

## MOTOR IGNITER PREPARATION

**1.** Separate igniters with a pair of scissors. Check igniters for possible flaws. Any Solar Igniter™ which is missing a pyrotechnic ignition bead should be discarded or returned to Estes or to your dealer for replacement. Check the two wire leads to be sure they are not touching at any point.



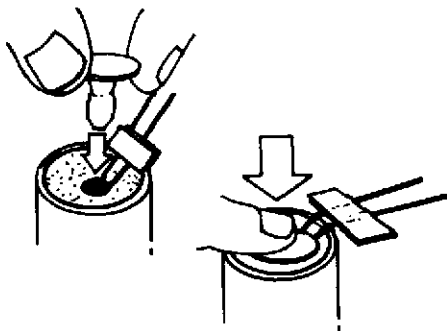
**2.** Hold or stand motor upright. Drop an Estes Solar Igniter™ straight into the nozzle. The pyrotechnic bead will then be in direct contact with the motor propellant.



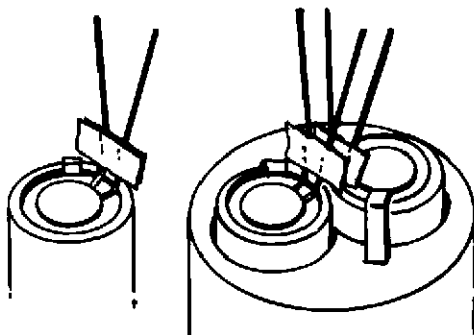
**Igniter tip must contact with propellant at end of throat.**

**ALL THE WAY DOWN**

**3.** Still holding the motor upright, push an Estes™ igniter holder all the way into the nozzle until it stops. The igniter wires will automatically bend to one side of the motor as the holder is pressed into place. Repeat steps two and three for all motors to be used in the cluster.



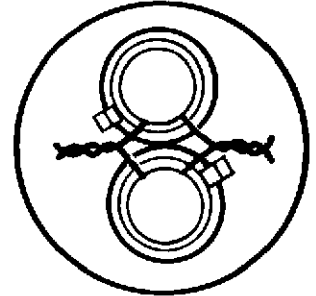
**4.** Bend the igniter leads straight up at the outside edge of the motor as shown. Install the motors in their motor mounts being careful to turn them so that the igniter leads touch each other in pairs as described to the right. Study the different motor cluster arrangement illustrations carefully for clarity.



**5.** Twist the igniter leads together as described below.

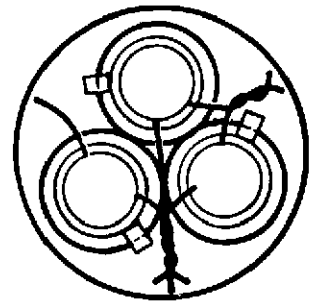
### Two Motor Cluster

Rotate the two motors in their motor mounts until the tape on the igniter leads touch as shown in Step 4. Twist the wire leads together tightly. Spread the leads outward from the center of the rocket.



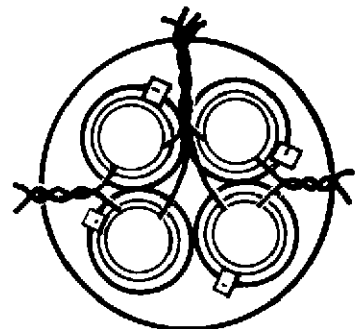
### Three Motor Cluster

Pay careful attention to the illustration. Rotate two of the motors in their motor mounts until the tape on their igniter leads touch. Rotate the third motor until one igniter lead touches the inside lead pair as shown. Twist these three inside igniter leads together tightly. Now twist the outside pair together. Spread the outside leads outward. Leave the center bundle standing.



### Four Motor Cluster

Pay careful attention to the illustration. Rotate the motors in their mounts until tape on the igniter leads touch. Carefully twist the four inside igniter leads into a bundle. Then twist the two outside igniter lead pairs together. Spread the outside leads outward. Leave the center bundle standing.

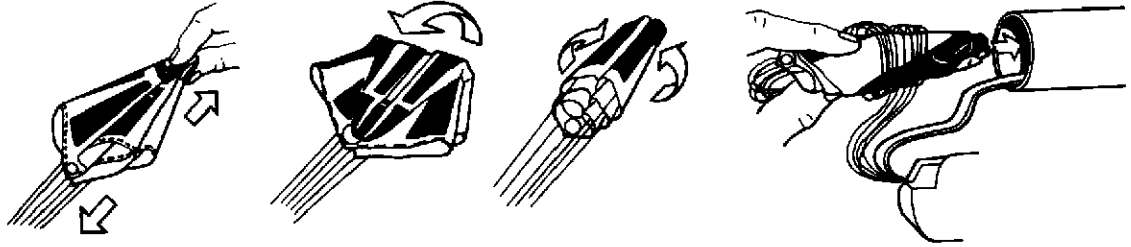




## PREPARE ROCKET FOR FLIGHT

**1.** Hold the recovery system shock cord to one side of the inside of the body tube. Insert 10 to 16 squares of Estes™ recovery wadding into the open end of the rocket body. The wadding should remain loose. NEVER tamp the wadding tight into the tube.

**2.** Fold the parachute and wrap the shroud lines around it as shown. The lines should be tight enough so that the parachute will slide easily inside the rocket body. Insert the parachute into the rocket onto the top of the recovery wadding. Then insert the shock cord into the rocket on top of the parachute.



**3.** Install the nose cone into the forward end of the rocket body. Be certain the fit is neither too loose or too tight. If the nose cone falls out of the rocket body when the model is pointed downward, the fit is too loose. If while pointed downward, the nose cone can't be shaken out of the tube, the fit is too tight. If too loose, wrap tape around shoulder for snug fit. If too tight, lightly sand shoulder slightly for looser fit.

## LAUNCH SITE SELECTION

Always fly model rockets from large open fields away from power lines, airports, buildings, and trees. The launch site chosen for launching Estes Pro Series™ model rockets should be a minimum of 1/4 mile long on each side. There should never be dried grass or weeds at the site which are easily combustible. Always place the launch pad in the center of the field whenever possible.

## LAUNCH PROCEDURE

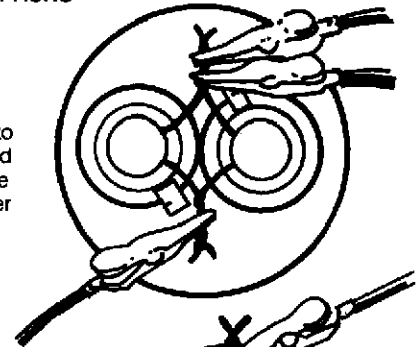
**1.** Remove the safety key and launch rod safety cap from the launch rod. **HOLD THE SAFETY KEY AND SAFETY CAP IN ONE HAND.** Carefully align the rocket launch lugs with the launch rod and slide the rocket down the launch rod and onto the blast deflector. Adjust the igniter leads as necessary so that they do not touch the metal blast deflector.

**2. MAKE CERTAIN THAT NO ONE IS HOLDING THE LAUNCH CONTROLLER AND THAT BATTERY PACKS ARE NOT CONNECTED AT THIS TIME. KEEP SAFETY KEY AND SAFETY CAP IN ONE HAND.**

**3.** Attach the launch system micro clips to the igniter leads. (It is strongly recommended that the inside jaws of the micro clips be cleaned before each launch. This can be done quite easily by simply passing a folded piece of fine sandpaper back and forth between the closed jaws a few times.)

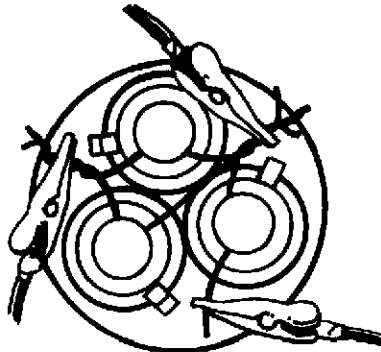
### Two Motor Cluster Arrangement

Attach the BLACK wire clip to one of the twisted igniter lead pairs. Attach BOTH RED wire clips to the other twisted igniter lead pair.



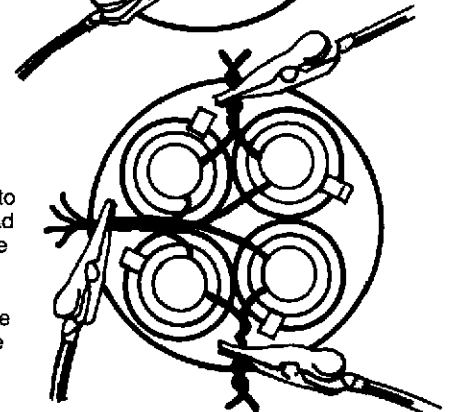
### Three Motor Cluster Arrangement

Attach the BLACK wire clip to the center twisted igniter lead bundle. Attach one RED wire clip to the outside twisted igniter lead pair. Attach the remaining RED wire clip to the remaining single igniter lead.



### Four Motor Cluster Arrangement

Attach the BLACK wire clip to the center twisted igniter lead bundle. Attach one RED wire clip to one of the outside twisted igniter lead pairs. Attach the remaining RED wire clip to the remaining outside twisted igniter lead pair.



**4.** Examine the connections carefully. Be certain that the micro clips do not touch one another or the metal blast deflector. Be certain that none of the twisted igniter leads have loosened. If so, disconnect the micro clips, remove the rocket from the launch pad, and re-twist the igniter leads.

**5.** Check to be certain the launch controller is at its maximum distance from the launch pad. Move it as necessary so that the sun will be at your back at launch.

**6.** Still holding the safety key and safety cap, connect a standard six-cell 1.2 amp-hour NiCad battery pack to either cable connector. Do not remove the connector jumper from the cable unless you are using two NiCad batteries. (Two NiCad battery packs are NOT required when launching any of the Estes Pro Series™ two, three, or four motor cluster model rockets.)

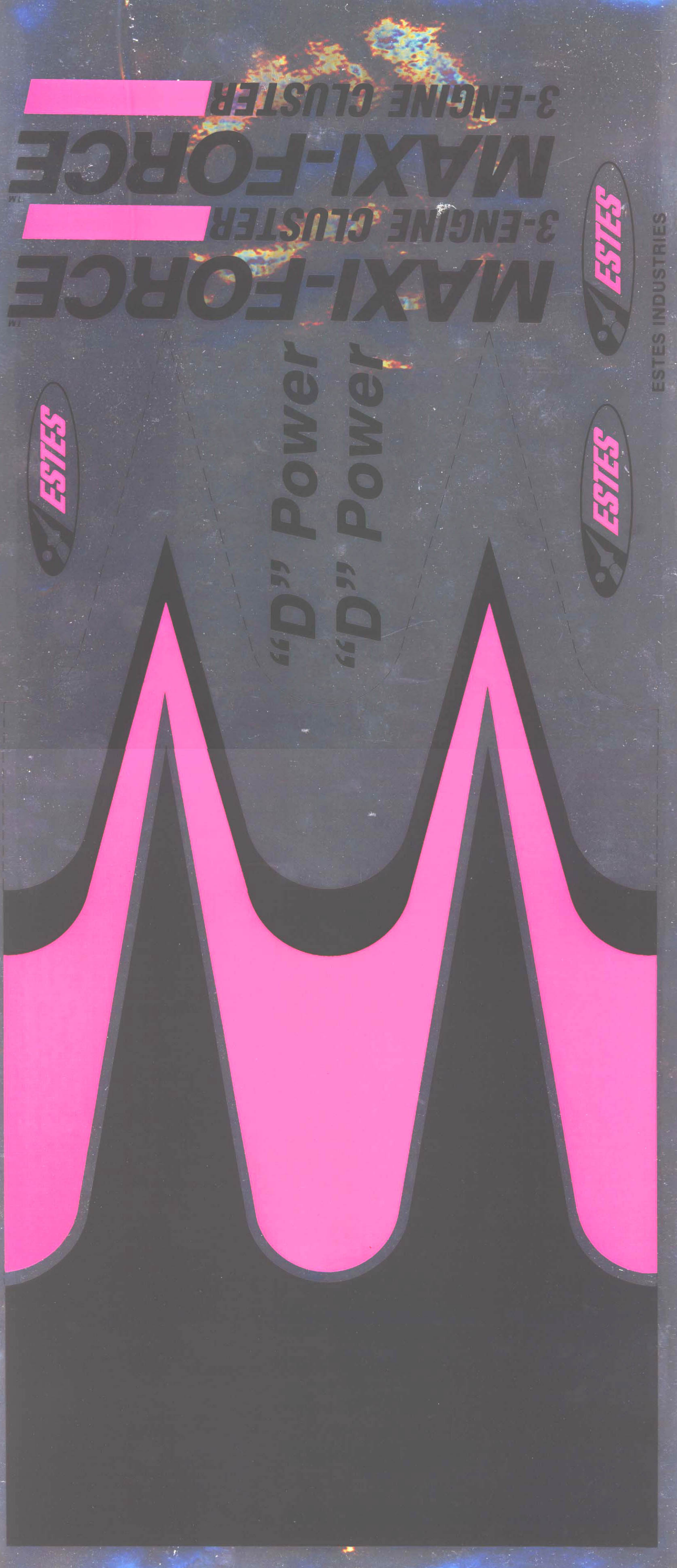
**7.** Give a verbal warning to others that you are ready to launch your rocket and that they need to move back a minimum of 30 feet (9 meters) from the launch pad.

**8.** Insert the safety key into the launch controller. The continuity light should now glow indicating the launch circuit is complete.

### **9. GIVE A SHORT AUDIBLE COUNTDOWN...5...4...3...2...1...LAUNCH!**

Press the launch button and hold it down until ignition occurs and the rocket lifts off. Release the launch button as the rocket leaves the launch pad. Remove the safety key from the controller as you follow the rocket skyward.

Do not place another rocket on the launch pad until the battery has been disconnected from the controller cable. Return the safety cap to the end of the launch rod as soon as possible.



Decal Note: Grey area is supposed to be reflective metallic



