




# SATURN™ ASSEMBLY INSTRUCTIONS #2001

## FLYING MODEL ROCKET KIT

### AUTHENTIC 1/100 SCALE KIT



ESTES INDUSTRIES  
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**INTRODUCTION:** This is a flying scale model of the Apollo Saturn V moon rocket. Accurately scaled from NASA drawings, this model is 1/100th the size of the real Saturn. The only scale concession is that the fins are made oversize to provide insured stability during flight. Do **NOT** attempt to alter the size or shape of these fins. The model is flown with one Estes D12-3 engine and uses a two part recovery system. The upper section is recovered on one 18 inch parachute with special harness sling while the lower section is recovered with two 24 inch parachutes.

The instruction book is divided into several sections, each of which concerns a particular sub-assembly or detailing phase of the rocket's construction. It is advisable to read through each section completely before beginning that part of construction. This will help clarify some of the individual construction steps. You will note that the two large body tubes have pencil lines drawn along their length. These are reference lines which insure that body components fit in proper relationship around the rocket exterior.

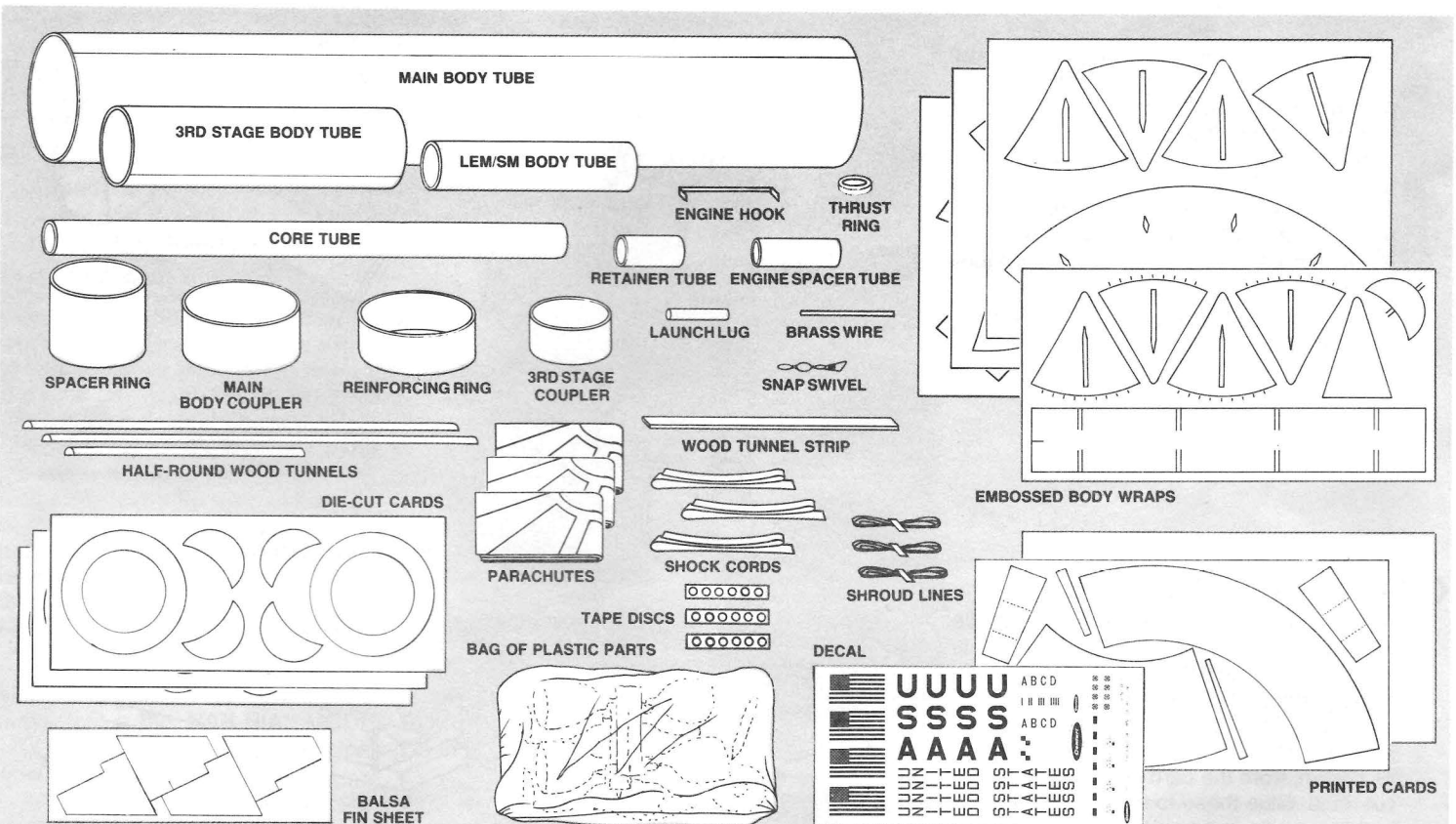
In addition to parts included in the kit, you will need a few basic model building tools, several types of glue, paint and finishing materials as listed here. To fly the model, you will need launching components described in section 14.

**TOOLS:** A sharp pencil, scissors, a hobby knife with several sharp blades, a 12 inch ruler, a sanding block with fine and extra fine grit sandpaper, tweezers, and a sharp pointed scribe (or sharp hard lead pencil).

**GLUE:** Because several types of material are required to produce a lightweight, flying model rocket of this complexity, several types of cement are also required to bond these materials together.

1. Wood glue. Used for the majority of body construction. The preferred type is 'aliphatic resin glue' such as "Titebond" or "Elmer's Carpenter's Glue". Household 'white glue' will also work, but does not set up as quickly as aliphatic resin glue. Note: a type of white glue known as "school glue" is not recommended.
2. Spray adhesive. This glue, which comes in an aerosol spray can, is required for attaching the embossed body wraps to the body tubes. Spray adhesive is available under several brand names, however, make sure the brand you select is designated 'permanent spray adhesive'. 'Artist's' or 'repositionable' spray adhesive will not provide a permanent bond. Note: Wood glue will bond the wraps to the body, but moisture in that glue is apt to cause uneven and unsightly swelling to the surface of the wraps.
3. Model airplane cement. Used to attach plastic to paper parts. This is a tube type, acetone/acetate cement.
4. Plastic model cement. Used for attaching plastic to plastic parts. Available in tube type or liquid form, the tube type is best for this kit.

**PAINT AND FINISHING MATERIALS:** Balsa sanding sealer or brush-on sandable primer for sealing fins and wood parts, masking tape (if available, drafting tape is better), small paint brush, aerosol spray cans of gloss black, white and silver enamel, small bottles of black and white touch up enamel and enamel thinner. Note: Do not use lacquer base paints. They can "craze" the surface of the plastic parts used in this kit. If a flat overall finish is desired, Testor's "Dullcote" or similar clear flat overspray may be used, but be sure to read precautions in painting section.



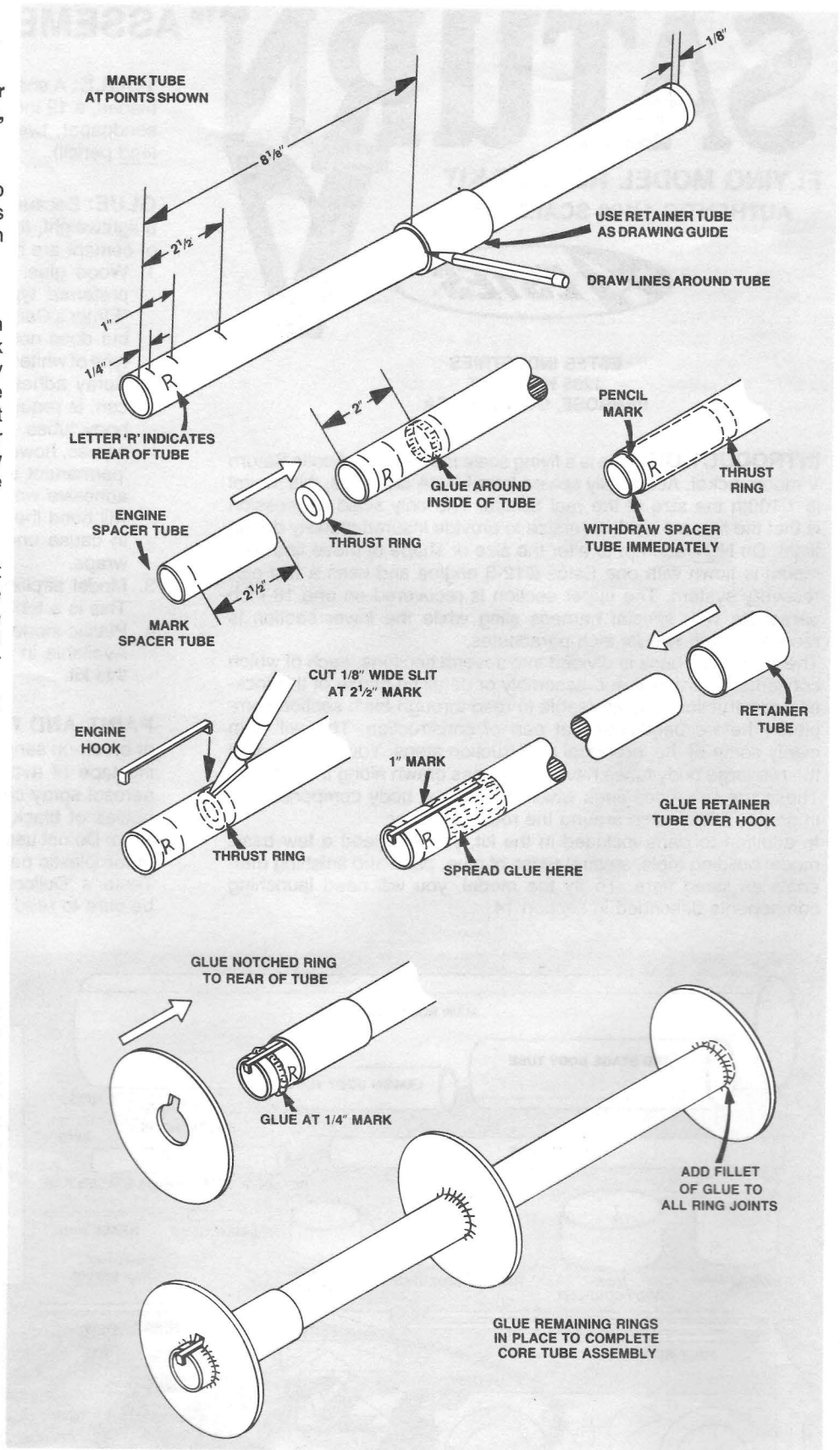
REFER TO ABOVE DRAWING FOR CLARIFICATION OF SIZE AND SHAPE OF VARIOUS KIT PARTS.

# SECTION 1

## CORE TUBE ASSEMBLY

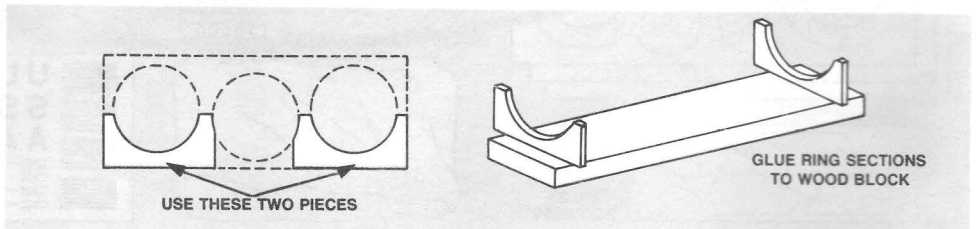
**Parts Required:** Core tube, engine spacer tube, thrust ring, engine hook, retainer tube, die-cut ring card #32473

1. Mark core tube at five places shown. Slip retainer tube over core tube and use as guide to draw lines around tube at each mark. Print an 'R' on rear of tube.
2. The engine spacer tube is used only as an aid in gluing thrust ring into core tube. Mark spacer tube  $2\frac{1}{2}$  inches from one end. Apply a bead of glue around inside of core tube about 2 inches from rear end. Insert thrust ring into rear end of core tube. Insert spacer tube and push in to  $2\frac{1}{2}$  inch mark. Withdraw spacer tube immediately. Let glue dry before proceeding.
3. Cut a  $\frac{1}{8}$  inch wide slit in the core tube at the  $2\frac{1}{2}$  inch mark. Insert one end of engine hook into slit. Apply a film of glue over the hook and tube from the 1 inch mark forward about 2 inches. Slide the retainer tube over the front of core tube and push down to 1 inch mark. Make sure hook is aligned straight with body and let glue dry.
4. Use a knife to free die-cut rings from card. Apply a bead of glue around core tube at  $\frac{1}{4}$  inch mark. Push notched ring onto tube with notch centered on engine hook. Align ring on  $\frac{1}{4}$  inch mark and adjust ring so it is perpendicular to core tube. Hold assembly upright for several minutes until glue begins to dry. Glue another ring to core tube at the  $8\frac{1}{8}$  inch mark. Last ring is glued to core tube  $\frac{1}{8}$  inch from forward end. After glue dries, add small fillets of glue to both sides of each ring/tube joint.



### OPTIONAL STEP:

Although not completely necessary, a cradle for holding the large main body assembly is very handy, especially in later detailing assembly steps. To make a cradle, you will need a piece of wood about 3 to 4 inches wide by 12 to 16 inches long. Cut two pieces, as shown, from the card which held the die-cut rings. Glue these to the top of the wood and the cradle is complete.



## SECTION 2 MAIN BODY ASSEMBLY

**Parts Required:** Core tube assembly, fairing bases (4) from die-cut card #32471, fairing gussets (8) from die-cut card #32472, printed card #83952, main body tube, balsa die-cut sheet of fins.

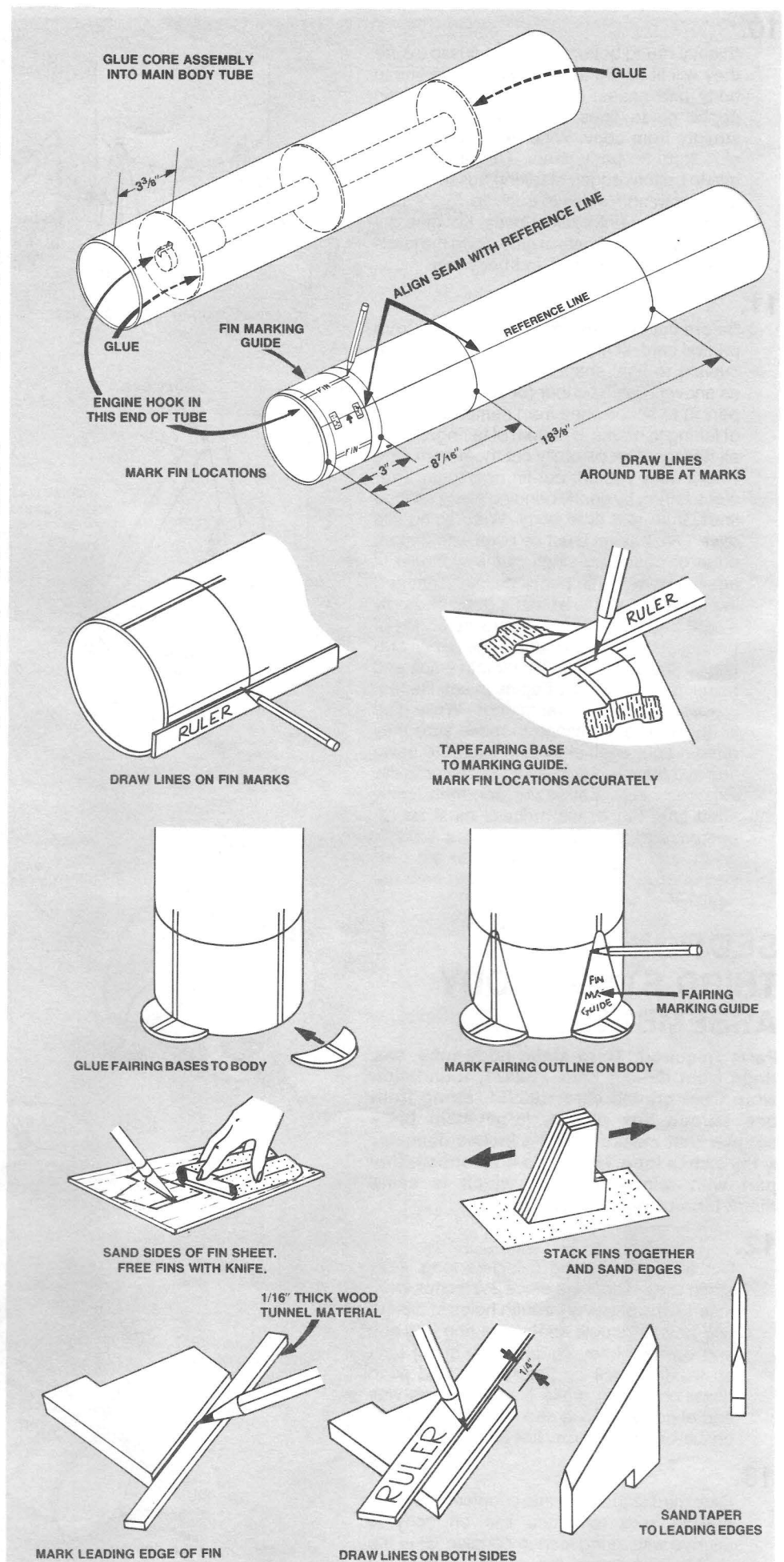
5. Slide core tube into main body tube (NOTE: If fit is too tight, sand edges of rings). Position core assembly so rear ring (end with engine hook) is  $3\frac{3}{8}$  inches from end of body tube. Apply a bead of glue to the ring/body tube joints at both ends. Stand body upright, allow glue to dry, then apply a second bead of glue to the ring/body tube joints.

6. Mark body tube at three places shown. Make sure you measure from the rear of the tube (end with engine hook). Cut the fin marking guide from printed card. Use a ruler and knife to do this so you have straight edges. Wrap the guide around body and tape ends together. Use the edge of the guide to draw lines around the body at the three marks. Slide guide down to within  $\frac{1}{4}$  inch of rear of body. Rotate guide until seam lines up exactly on reference line. Mark tube at both ends of fin location lines. Remove guide and, using a ruler as a guide, draw lines connecting marks. These lines should extend from rear of tube forward for about  $3\frac{1}{2}$  inches.

7. Remove fairing bases from die-cut card. Position one base on the marking guide on printed card and tape ends down. Using ruler as a guide, draw fin location lines on the base. Do same with three remaining bases. Place body upright on piece of waxed paper or plastic wrap. Glue bases to bottom of body. Make sure fin lines on bases are lined up exactly with those on body. Let glue dry before proceeding.

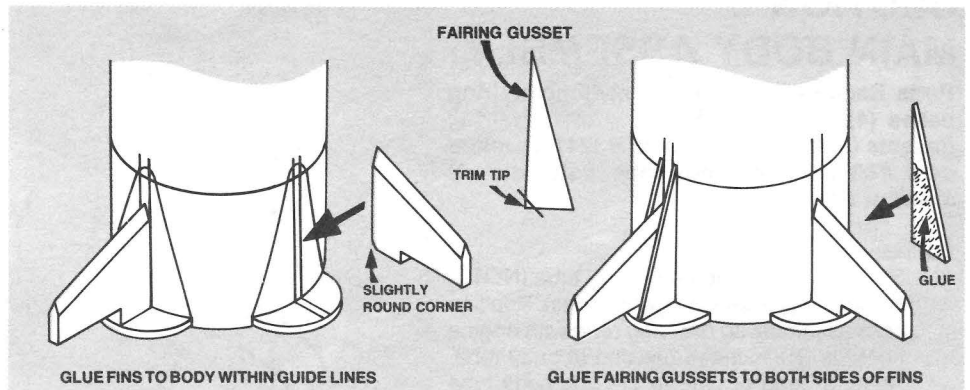
8. Cut the fairing marking guide from printed card. Place guide against body with bottom of guide aligned on a base. Draw a line on body around outside of guide. Repeat with other three fairing positions.

9. Lightly sand sides of balsa sheet. Use a knife to free fins from sheet. Stack fins together and sand edges. Lay one fin on a flat surface. Using the  $\frac{1}{16}$  inch thick piece of wood (from bag of parts) as a guide, draw a line along center of fin leading edge. Next, draw lines on both sides of fin  $\frac{1}{4}$  inch from leading edge. Repeat with remaining fins. Using the lines as a guide, sand a taper to the leading edges of the fins.



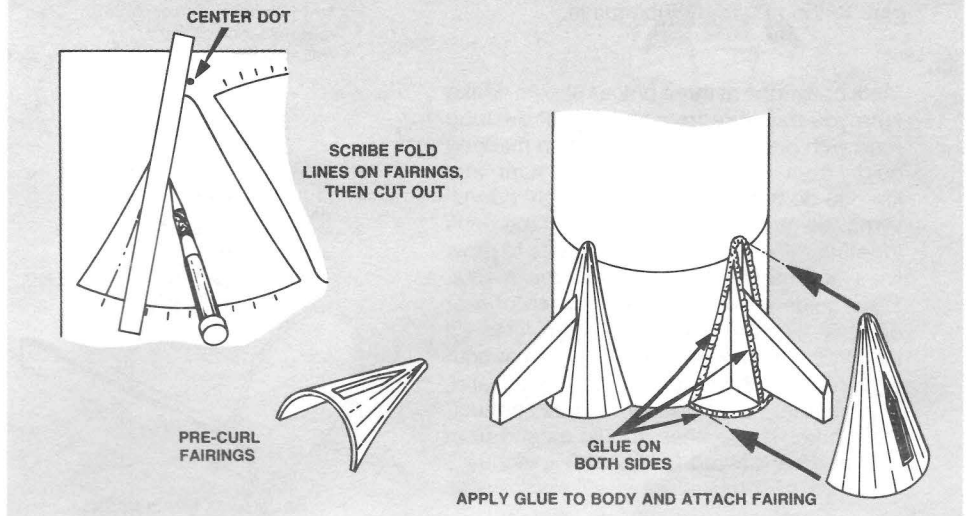
10.

Slightly round bottom corner of fins to insure they will fit tightly against body. Glue fins to body and bases. Make sure fins fit within pencil guide lines and that they extend straight from body. Wipe away any excess glue from fin body joints. Trim away tip of inside bottom edges of fairing gussets. Glue gussets to both sides of each fin. Make sure gussets are tight against body. Let glue dry, then apply small fillets of glue along the joints where gussets, bases and body join.



11.

Before cutting fairing foundation wraps from printed card, scribe lines on them to facilitate curving to final shape. Lay a ruler on card as shown. Use a scribe (or sharp hard-lead pencil) to scribe lines from center dot at top of fairing to marks at bottom of fairing. Scribe all fairings, then carefully cut them from card (make sure you cut out fin openings). Pre-curl a fairing by gently bending along scribed lines, then test fit to body. With fairing slid over a fin, bottom must be even with bottom edge of base and sides of fin should fit against body within pencil outline. Trim fairing, if necessary, to obtain a good fit. Apply a light bead of glue to the outside edges of the gussets and base and to the pencil outline on the body. Slide fairing into place and hold it there until glue begins to set. Repeat process with remaining fairings. While glue is drying, check fairings to make sure they remain tight against body. Finish the balsa fins at this time. Apply sanding sealer to the exposed balsa. Let sealer dry, then lightly sand fins. Since this process must be repeated several times to obtain a smooth finish, you may wish to go on to the next section, returning to the fins each time the sealer has dried.

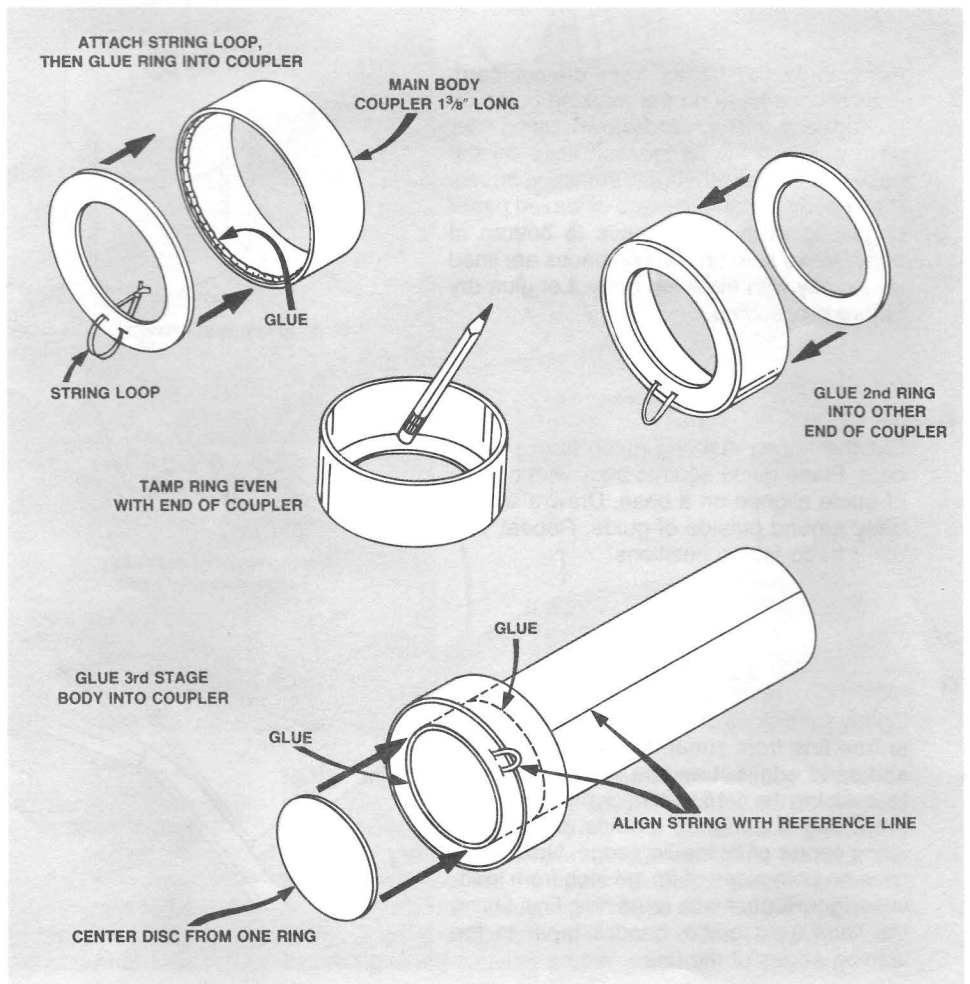


### SECTION 3 THIRD STAGE BODY ASSEMBLY

**Parts Required:** Third stage body tube, two rings from die-cut card #32471, foundation wrap from printed card #83951, string from one shroud line packet, large main body coupler that measures  $3\frac{15}{16}$  inches diameter x  $1\frac{3}{8}$  inches long. **NOTE:** do not confuse this part with reinforcing ring which is same diameter, but only 1 inch long.

12.

Cut a piece of string 5 inches long. Fold string to form doubled piece  $2\frac{1}{2}$  inches long. Insert ends of string through holes in die-cut ring and tie double knot. Glue ring into one end of main body coupler with string knot on inside. Place on flat surface and push down on ring to make sure it is even with end of coupler. Glue second ring inside opposite end of coupler. Let glue dry.

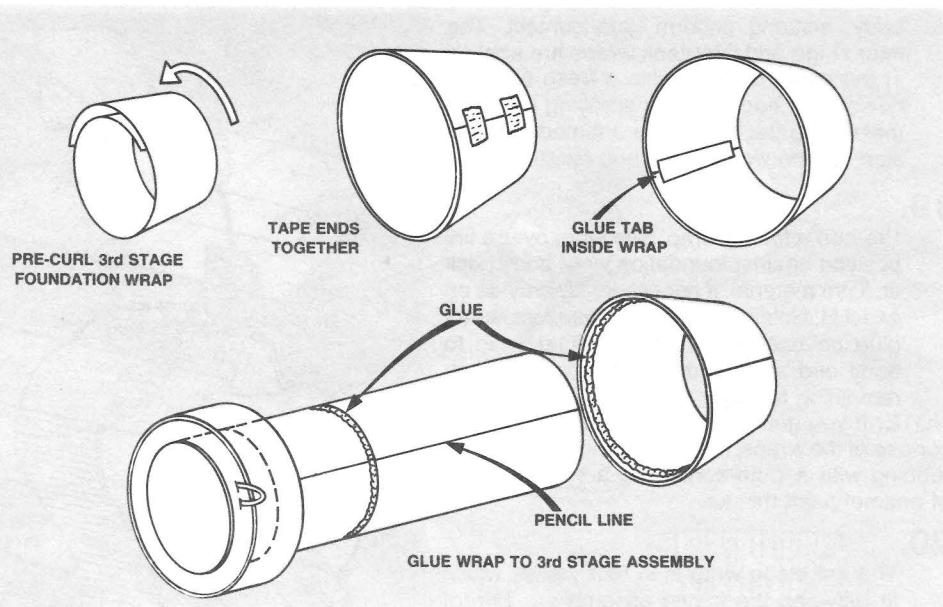


13.

Glue third stage body into coupler assembly, making sure reference line on body is aligned with string loop in coupler. Glue the center from one of the die-cut rings to the bottom of the body tube.

14.

Cutting to the outside edge of the printed line, cut the third stage foundation wrap and glue tab from printed card. Gently curl the wrap until, when released, it holds desired shape. Align the edges carefully and place a couple of small pieces of masking tape over the joint. Smear glue on the tab and glue it over the joint on the inside of the wrap, leaving about 1/16th inch of the joint exposed at both top and bottom of wrap. Let glue dry completely, then remove masking tape from outside of joint.



15.

Slide the wrap over the body assembly and push down until it fits over the coupler. Draw a line around the body at the top of wrap, then remove wrap. Apply a bead of glue around body at the pencil line and around inside of bottom of wrap. Slide the wrap in place again, making sure the joint in the wrap is aligned with reference line on body.

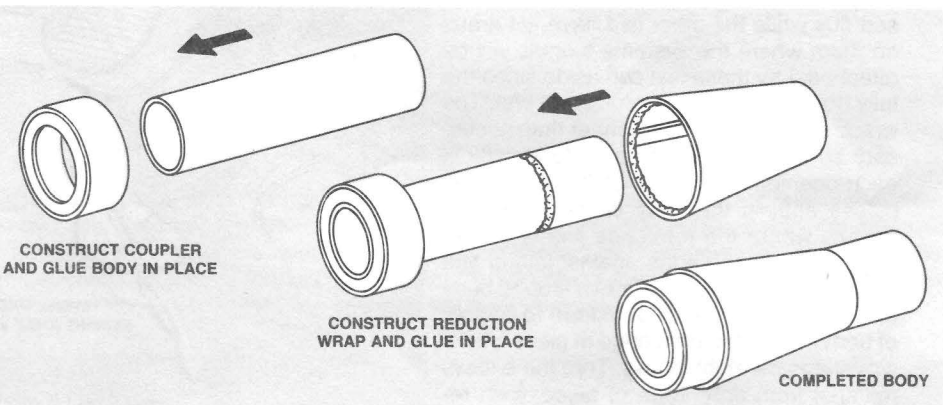
### SECTION 4 - L.E.M./S.M. BODY ASSEMBLY

(Above initials stand for 'Lunar Excursion Module/Service Module')

Parts required: L.E.M./S.M. body tube, two rings from die-cut card #32472, reduction wrap from printed card #83951, 3rd stage coupler.

16.

Follow the same procedure used in assembling the third stage body with the following exceptions: A. No string loop required. B. No center disc required on bottom of tube. C. No reference line on body tube.

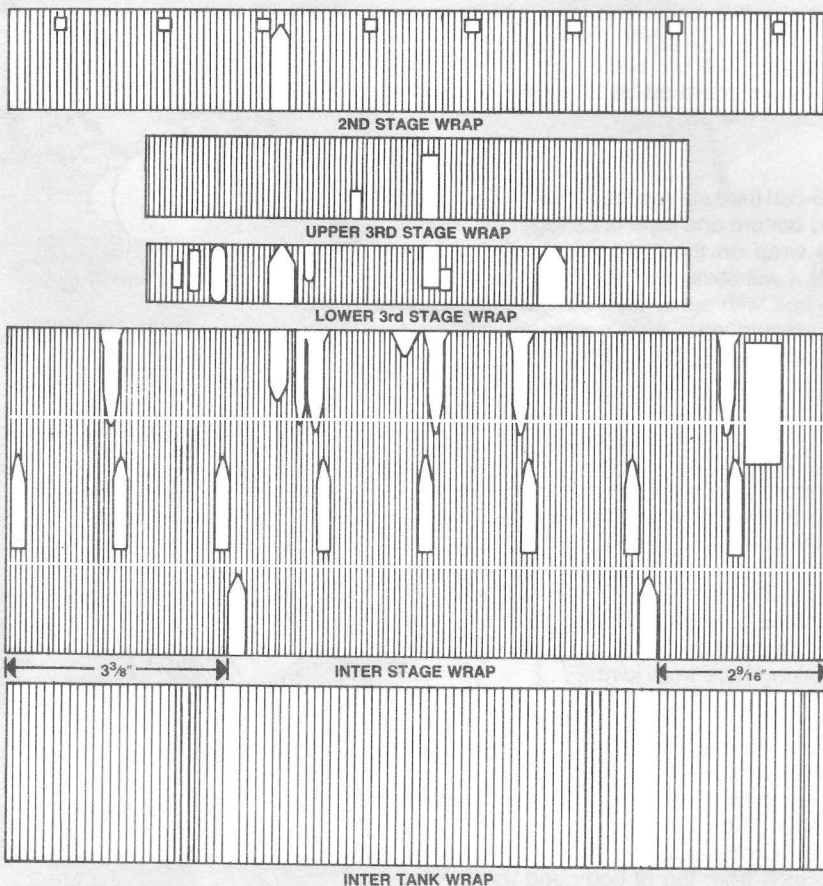


### SECTION 5 - BODY WRAP APPLICATION

Parts required: All embossed body wraps. Note: Use spray adhesive in this section except in Step 21.

17.

Use a knife to free the embossed wraps from the die-cut cards. Save the card material from which the wraps were removed. Lay out the five body wraps exactly as shown in drawing at right. To insure that these wraps do not get attached upside down, write a 'T' on top of each wrap. Note that the inter tank wrap looks the same upside down except the flat areas for the systems tunnels are at different dimensions from ends of part.



18.

The ends of the body wraps must just meet when wrapped around the body. Since moisture can cause the card material to swell, check the fit of each wrap before gluing. If wrap overlaps, mark and trim excess from right hand end of part. Place the 2nd stage wrap, face down, on a piece of newspaper. Spray the back of the wrap evenly with spray adhesive. Attach the left end of the wrap to the body with the left hand edge exactly on the reference line and the top of the wrap even with the top of the body. Carefully apply the wrap around the body, making sure the top of wrap and body remain even. Using a soft cloth, press the wrap firmly against

body, insuring uniform glue contact. The inter stage and inter tank wraps are applied in the same manner. Use a fresh piece of newspaper each time for spraying the glue, make sure the wraps are oriented with top side up and work slowly and carefully.

**19.**

Pre-curl a fairing wrap. Slip wrap over a fin, position against foundation wrap and check fit. Trim material, if necessary, to provide an exact fit. Holding fairing with tweezers, spray glue on back side. Attach fairing wrap to body and smooth down with cloth. Attach remaining fairings.

**NOTE:** If you get any spray glue on the outside surface of the wraps, it may be removed by gently rubbing with a cloth containing a small amount of enamel paint thinner.

**20.**

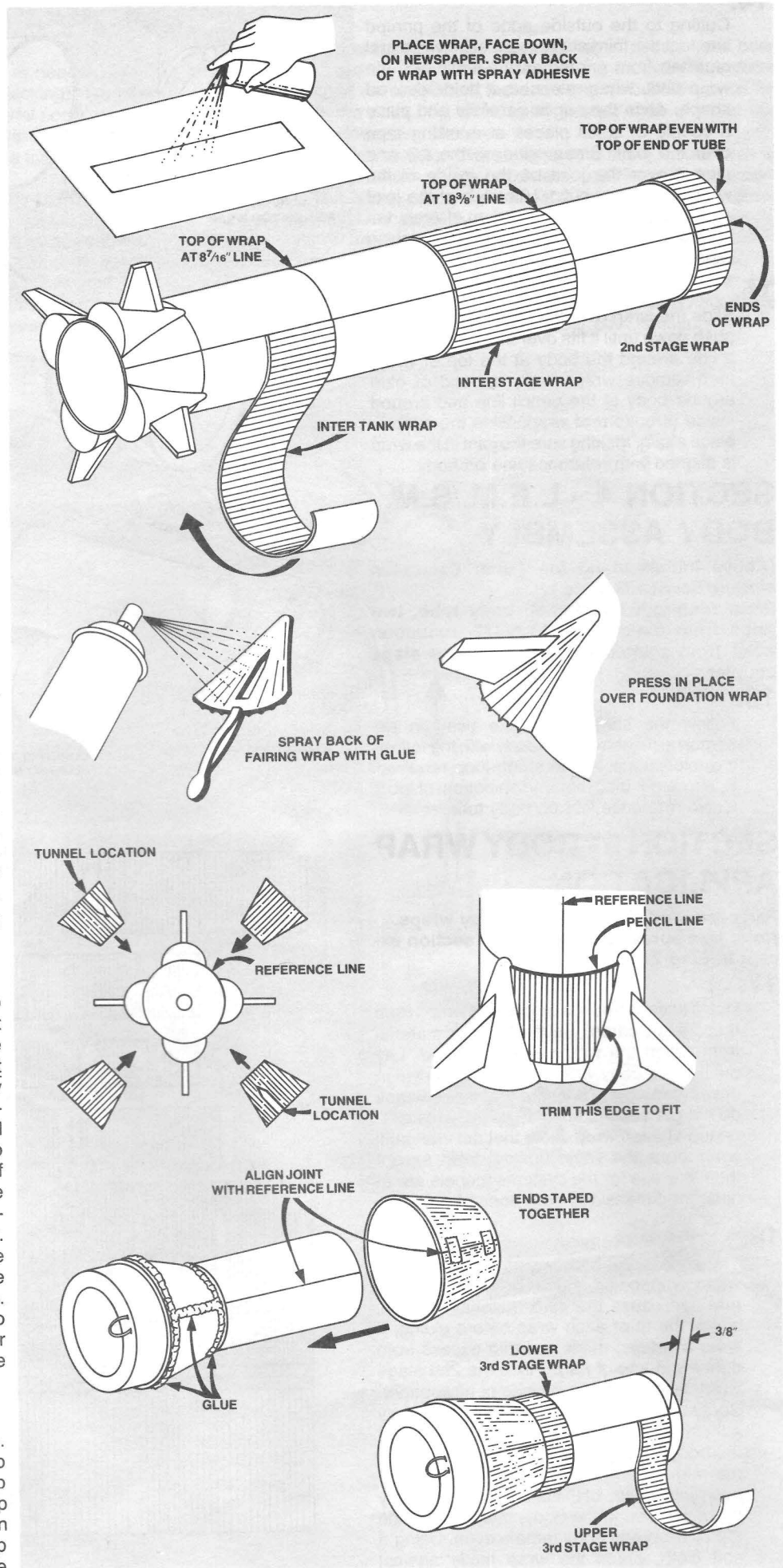
The 1st stage wrap is in four pieces which fit between the fairing assemblies. Two of the pieces are entirely covered with embossed ribs while the other two have flat areas on them where the systems tunnels will be attached. Lay these last two aside since the fully ribbed pieces will be attached first. The wraps are die-cut slightly longer than necessary so they may be trimmed to exactly fit each opening. Place one of the fully ribbed pieces against the body between the two fairings where the reference line is drawn. Align part with left edge against fairing and top exactly on pencil line drawn around body (Note that wrap does not extend to bottom of body). Mark the right edge of piece where it overlaps the right fairing. Trim the excess material from right edge of piece, then recheck fit. Apply spray glue to back of piece and attach to body. The remaining fully ribbed piece is glued to the opposite side of the body. The two pieces with tunnel locations are attached to the two remaining areas of the body.

**21.**

Pre-curl third stage reduction wrap. Align top and bottom and tape ends together. Test fit the wrap on the 3rd stage body to insure that it will slide over tube. This wrap is not applied with spray glue because the spray glue would "grab" before wrap could be seated completely over foundation wrap. Wood glue is used in this step, but avoid using too much glue or it could distort the surface of the wrap. Apply a bead of glue around the top, bottom and along the joint of the foundation wrap. Smooth the glue with your finger. Slip the reduction wrap over the top of the body and, with joint aligned on reference line, slide it down over foundation wrap. Using the cloth, smooth the wrap down so it makes good glue contact all around. After glue has completely dried, carefully remove masking tape from joint.

**22.**

Spray the back of lower 3rd stage wrap. Starting at the reference line, attach the wrap to the body with the bottom edge of the wrap against the reduction wrap. Press wrap against body all around tube. Measure down 3/8 inch from top of body and mark. Wrap upper 3rd stage wrap around body and tape



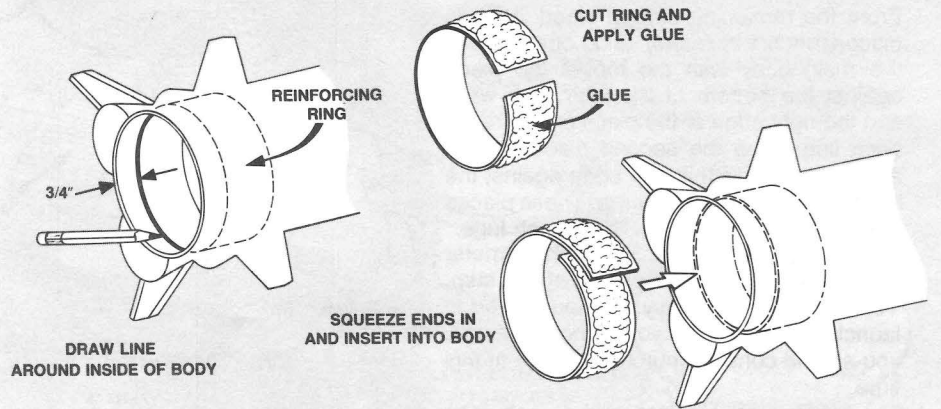
ends. Slide wrap up to mark and draw a line around body. Remove wrap, spray back with glue and attach to body with end on reference line and top on pencil line.

## SECTION 6 BODY DETAILS

**Parts required: Three half round and one rectangular wood tunnel pieces, reinforcing ring, set of plastic parts, launch lug, 1 1/4 inch piece brass wire.**

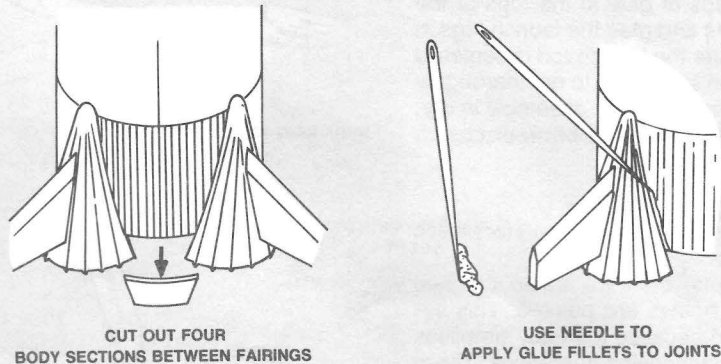
**23.**

Insert reinforcing ring into rear of main body. Push ring in until it is 3/4 inches from rear of body and draw line around inside of body. Remove ring. Cut through ring on one side. Apply wood glue all around outside of ring. Pulling ends of ring inward, insert into body. With end of ring at 3/4 inch mark, let ring expand against body. Starting at cut place, work around body, pressing ring firmly into place against inside of body tube.



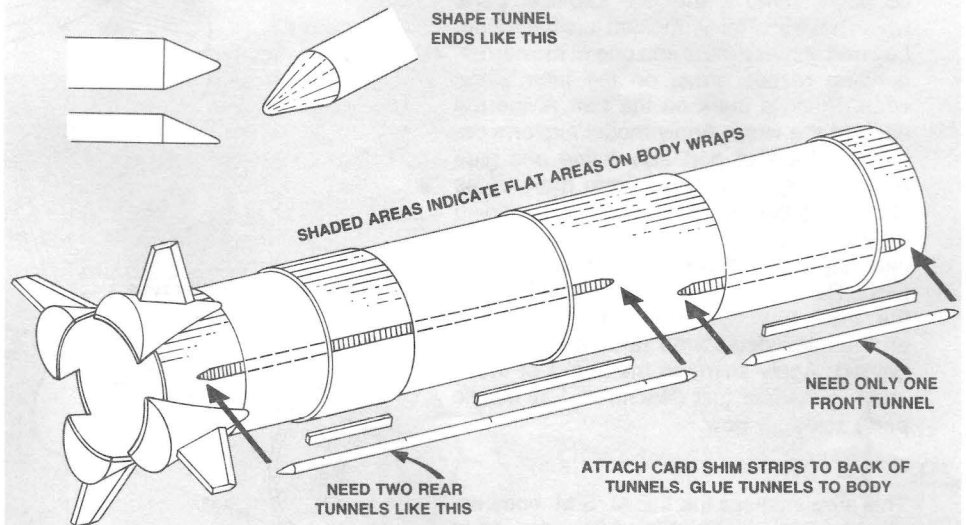
**24.**

Using several light cuts, carefully cut out and discard the four sections of body tube that extend between the fairings, below the 1st stage wraps. To fill any slight gaps where the 1st stage wraps join the fairing wraps, use a needle with the point dipped in wood glue to apply very small glue fillets to the joints. Immediately after applying glue, pull your little finger along each joint to smooth the glue into an even fillet. Fillet the fin/fairing joints in the same manner.



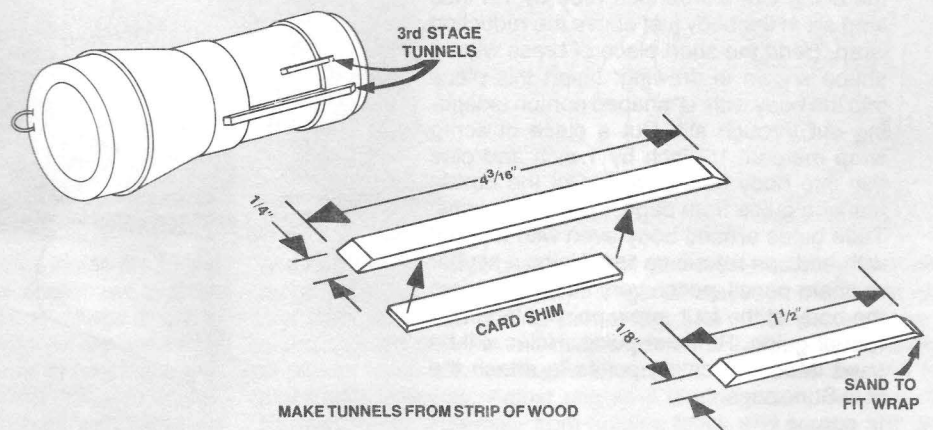
**25.**

Cut one of the long pieces of half round tunnel material to 1 3/16 inches long. Taper both ends of the tunnel to match drawing. Place the tunnel on the body with the ends fitted into the flat areas on the body wraps. Mark the tunnel where it intersects the ends of the three body wraps. Cut a 1/4 inch wide strip from a piece of leftover body wrap card. Cut lengths from this strip to fit the tunnel in the areas between the body wraps. Glue these shim strips to the bottom of the tunnel, on the pencil lines. Sand the tunnel with fine sandpaper and glue in place on the body. Make another identical tunnel and glue in place on the opposite side of the body. The short piece of half round is cut to 7/4 inches long, constructed in the same manner as the rear tunnels and attached to the front portion of the body.



**26.**

From the 1/16 inch by 1/4 inch strip of wood, cut a piece 4 3/16 inches long. Sand a bevel to both ends. Place the tunnel on the 3rd stage body with the ends fitted into the flat areas in the body wraps and mark the wrap intersect points on the wood. Cut a shim strip to proper length and glue to bottom of tunnel. Lightly sand tunnel and glue to body. Cut a 1 1/2 inch long piece from the remaining strip of wood. Cut this piece lengthwise to form a piece 1/8 inch wide and bevel ends. Instead of adding card backing, sand the back of this tunnel where it fits onto the forward body wrap. Sand top and sides of tunnel and glue in place.



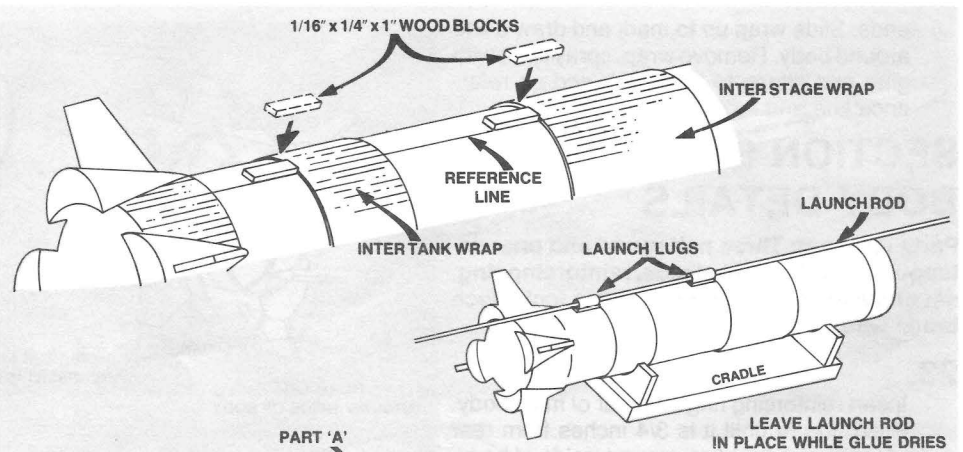


27.

From the remaining strip of wood, cut two pieces, each 1 inch long. Glue one piece to the main body with the top of the piece against the bottom of the inter tank wrap and the right edge of the piece on the reference line. Glue the second piece directly above the first with its top edge against the bottom of the inter stage wrap. These pieces are stand-off supports for the launch lugs.

**NOTE:** You will need a 3/16 inch diameter launch rod to aid in completion of this step. You will need this heavy duty launch rod to launch the Saturn V. If you do not have one, you should consider purchasing one at this time.

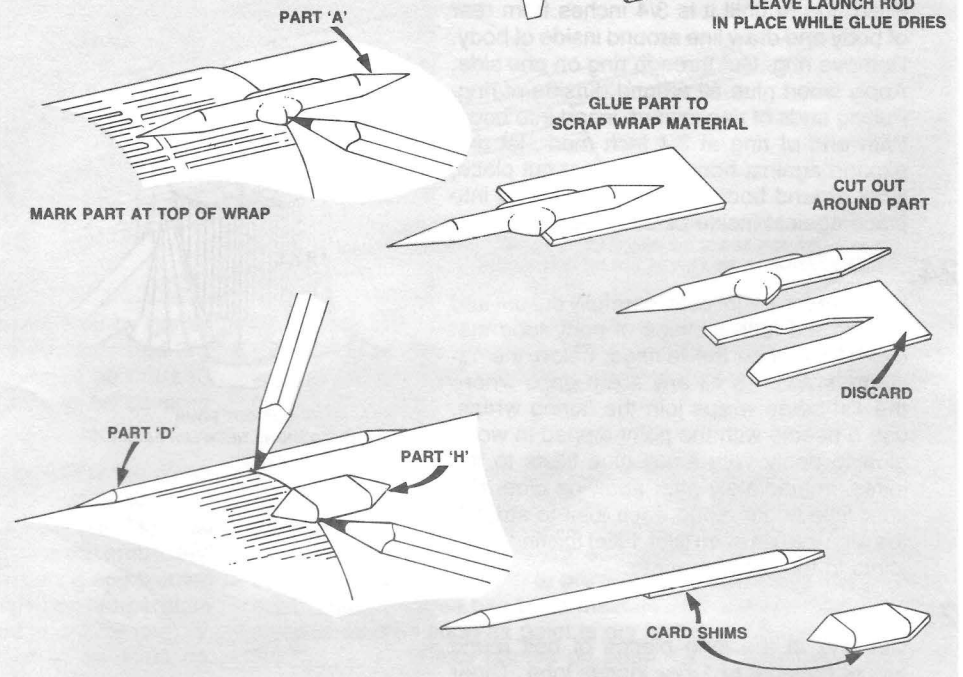
Cut the launch lug into two 1 inch long pieces. Slide the lugs onto the middle of the rod. Apply beads of glue to the tops of the wood stand-offs and glue the launch lugs in place. Make sure the launch rod is centered in the lugs, then allow glue to dry thoroughly before removing rod. After assembly is dry, apply glue fillets to the joints between launch lugs, stand-offs and body.



28.

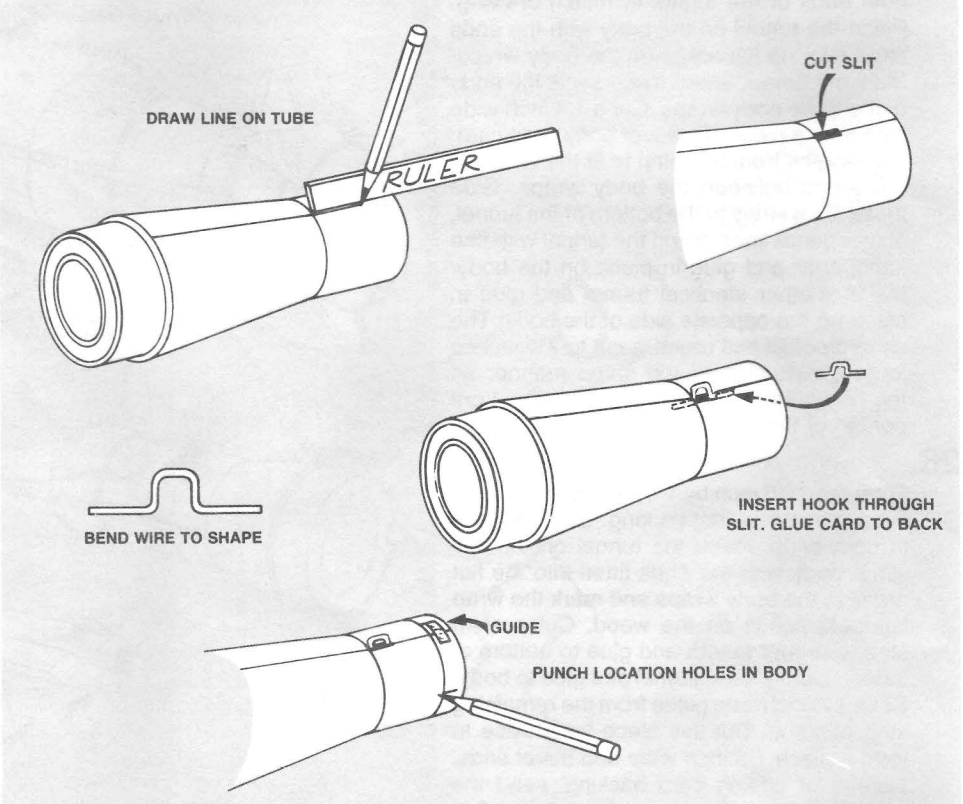
**NOTE:** Refer to photos on page 13 for plastic parts locations.

Plastic body detail parts will not be attached until after the bodies are painted. This sequence is used because it greatly simplifies the painting and masking operations. There are seven parts, however, that should be modified at this time. From the "tree" of plastic parts, remove the five identical parts which have a letter 'A' molded into back side. Lay one of these parts into one of the corresponding recess areas on the inter stage wrap. Place a mark on the part at the top edge of the wrap. Apply model airplane cement to back of part above line and glue part to a piece of scrap wrap material as shown. Do the same with the four remaining 'A' parts. Let the glue dry completely, then carefully trim card around outside of plastic parts. Remove plastic parts 'D' and 'H' from the "tree". Find the location areas for these on the inter stage wrap (they are close together). Apply shims to the backs of these parts in manner just described. Lay plastic parts aside for now.



29.

This step involves the L.E.M./S.M. body assembly. Draw a straight line from the top of the reduction wrap glue seam to the top of the body. Cut a 1/32 inch wide by 1/4 inch long slit in the body just above the reduction wrap. Bend the short piece of brass wire to shape shown in drawing. Insert this piece into the body with 'U' shaped portion extending out through slit. Cut a piece of scrap wrap material 1/2 inch by 1 inch and glue this into body behind wire. Cut the nozzle marking guide from page 15 of instructions. Tape guide around body even with top and with ends on reference line. Using a scribe or sharp pencil, punch very small holes into the body at the four arrow points along bottom of guide. Remove guide. Holes will be used later as locating points to attach the R.C.S. nozzles.



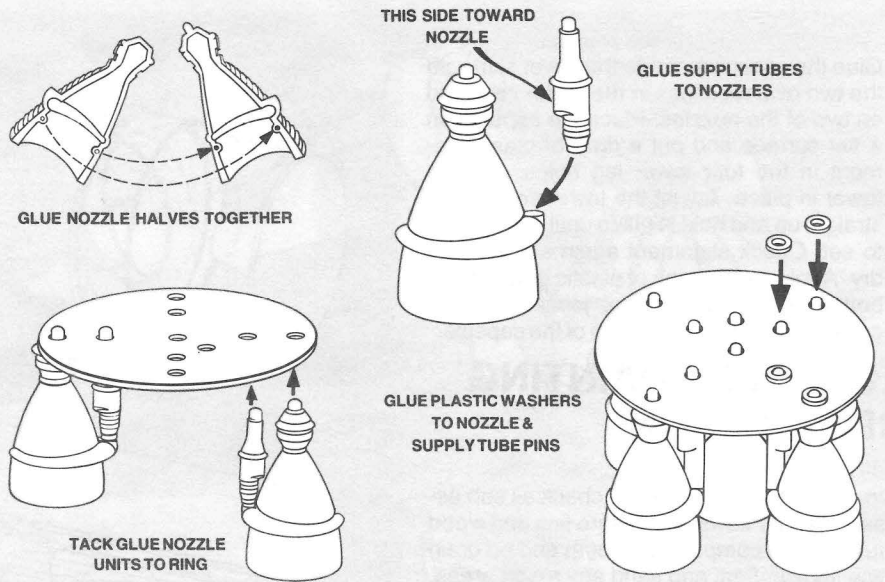
## SECTION 7

### NOZZLE ASSEMBLY

Parts required: Gray plastic nozzle parts, bulkhead from die-cut card #32472, spacer ring. Use plastic cement in this section except where noted.

30.

Cut the nozzle parts from the plastic sprue. Trim any "flash" from the outside of the parts. Five nozzle halves have pins on the back and the other five have receptacles which receive the pins. Using plastic cement, glue the nozzle halves together. Remove supply tubes from sprue and trim any "flash". Note that the middle portions of the tubes protrude to one side. Glue a supply tube to a nozzle with this heavy side pointing toward the nozzle. It will be necessary to hold the tube in place until the glue begins to set. At that time, check tube to make sure it points straight up. Make any adjustments and let glue dry. Attach remaining tubes in same manner. Apply small beads of glue to joints for added strength and let dry.



31.

Apply a small amount of plastic cement to the top of a nozzle and its supply tube. Insert pins through two holes in the bulkhead as shown. This will hold the parts together until final gluing can take place. "Tack glue" the remaining nozzle units to the bulkhead. Place assembly on a flat surface and, pressing down on bulkhead, adjust all nozzles so their bottoms are flat on work surface. Using plastic cement, glue the washers over the pins that extend through the bulkhead. Let glue dry, then apply model airplane cement over washers and surrounding areas of bulkhead.

32.

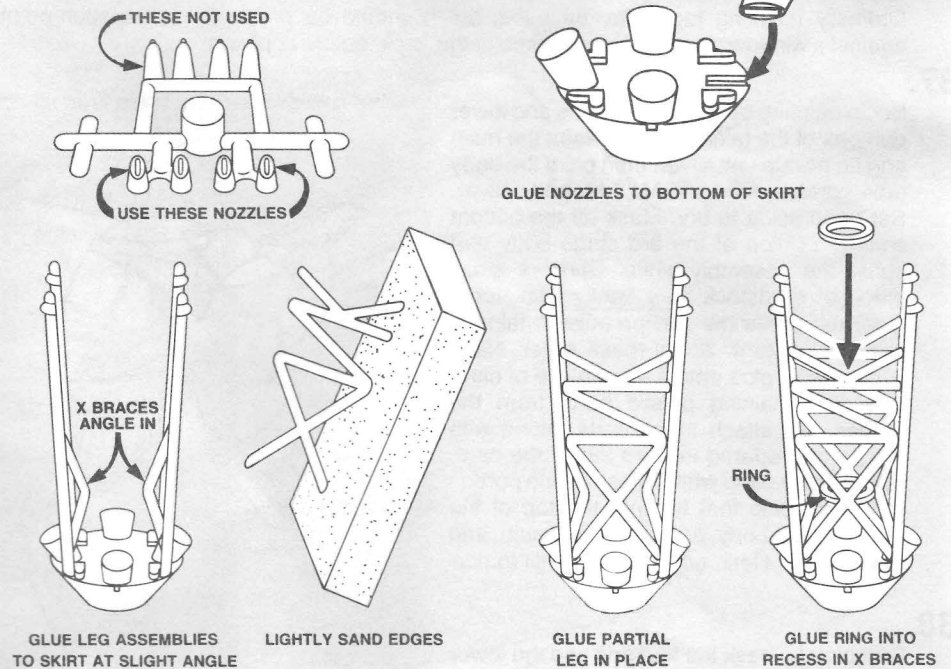
Apply wood glue around one end of spacer ring and glue to top of bulkhead. NOTE: Ring does not have to be exactly centered on bulkhead. After glue has dried, test fit nozzle unit into bottom of body. If it won't fit, lightly sand edges on ring, but not too much. This should be a snug fit.

## SECTION 8 - APOLLO CAPSULE ASSEMBLY

Parts required: Plastic parts for Apollo capsule, escape tower and motor.

33.

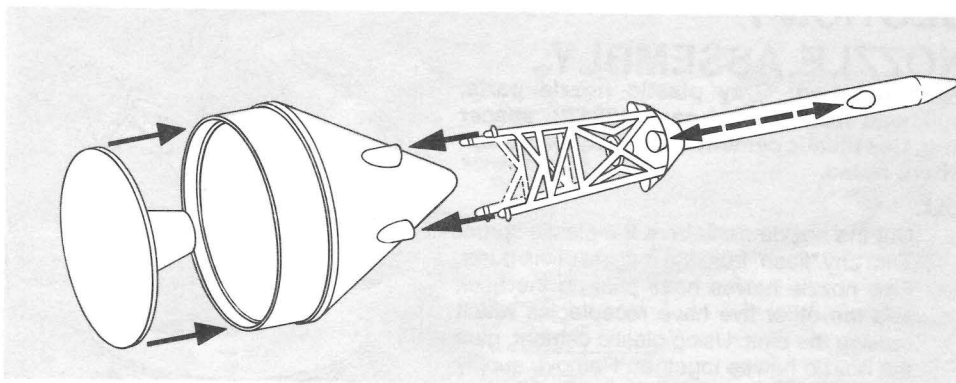
The tower assembly is constructed upside down. Since the tower skirt is small and difficult to hold, it is attached to a temporary holding block. Lightly spray a small piece of wood or cardstock with spray glue. Attach the skirt, upside down, to the material. Cut the escape motor nozzles (shown in drawing) from the plastic sprue. The nozzles have small ribs on top which fit into grooves in the skirt. Using plastic cement, glue the nozzles in place. Next, the two leg assemblies are glued in place with the ends of the legs located inside the raised corner pieces on the skirt. The legs should be angled out slightly, then glue allowed to dry. Note the 'X' braces on these angle in towards one another. Lightly sand edges of a partial leg assembly and test fit between legs. If any of the braces appear crooked, gently bend to straighten (NOTE: 'X' brace on this part also angles inward). Fit this unit into place and line up braces with those on the legs. Apply plastic glue to the joints on the two center braces



and hold in place until glue sets. Let glue dry completely, then glue the ends of the 'X' braces and diagonal braces in place. Let glue dry, then attach remaining partial leg. The small support ring is glued into the tower in the middle of the 'X' braces. Apply a drop of plastic cement to the inside of each 'X' and lower the ring into place with tweezers. Adjust ring so it is straight and let glue dry. Remove tower assembly from holding block and scrape any glue residue from top of skirt.

34.

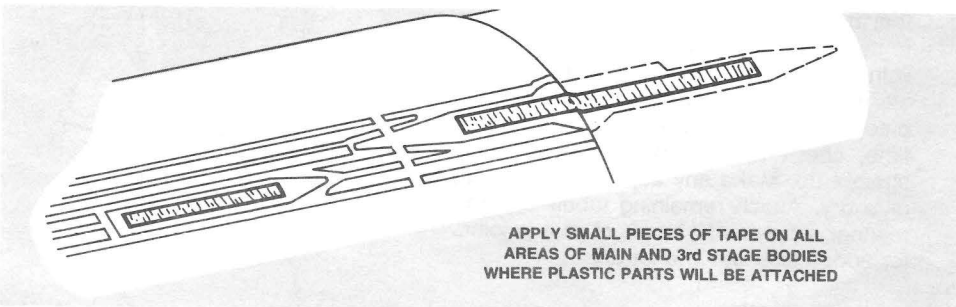
Glue the escape motor to the tower skirt with the two oval recesses in the motor centered on two of the nozzles. Place the capsule on a flat surface and put a drop of plastic cement in the four tower leg holes. Set the tower in place. Adjust the tower so it points straight up and hold in place until glue begins to set. Check alignment again and let glue dry. Apply small drops of plastic glue around bottom of legs to reinforce joints. Glue the capsule base into the bottom of the capsule.



## SECTION 9 - PAINTING PREPARATION

35.

In preparation for painting, check all sub assemblies for flaws. Make sure fins and wood tunnels are completely smooth and no grain line shows. Seal and sand any rough areas. Check all joints between parts. Any slight gaps should be filled with small amounts of glue applied with a needle, then wiped smooth with a finger. Remove any residue of spray glue with a tissue dipped in a small amount of enamel thinner. Wood glue may be removed by gently sanding with fine sandpaper. All areas of the main body and 3rd stage where plastic detail parts will be applied should be masked so glue will bond well. Don't mask the entire area to be covered



by a part, only enough to provide some unpainted glue surface beneath part (see drawing). After all preparations are complete, wipe all parts with a damp cloth to remove dust and oily finger prints.

36.

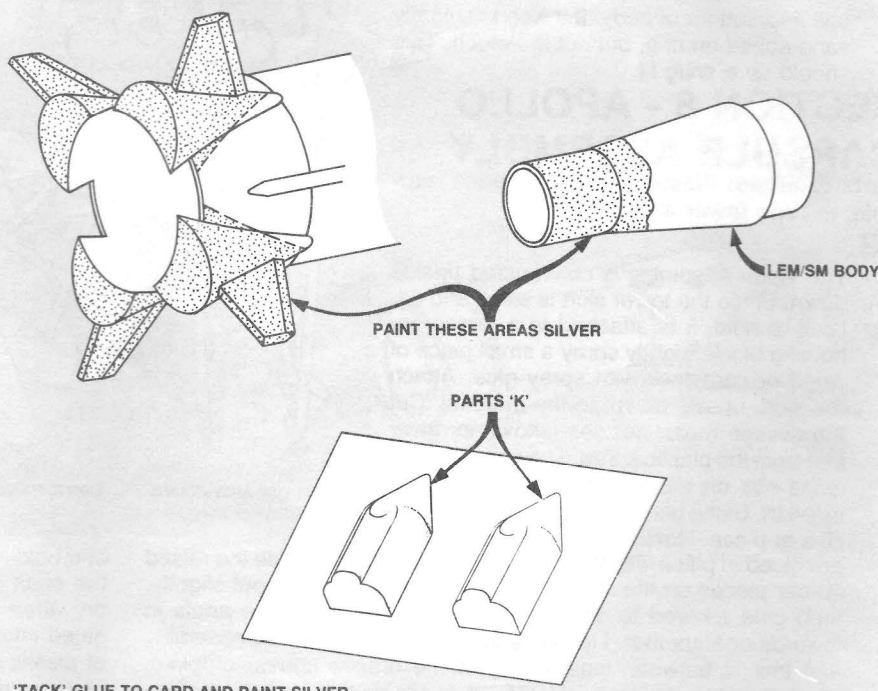
Painting and masking technique: When painting, follow the directions printed on the spray cans. Don't spray too heavy or runs can result. Make sure the surface is completely covered, but don't use more paint than necessary. Too much paint will fill in the embossed body detail and will retard drying time. Before masking any painted area, make sure paint is thoroughly dry. Depending on temperature and humidity, it may take a day or more for paint to dry completely. 'Drafting' tape, which has a low "tack" is preferred for masking. Ordinary masking tape may be used, but it should be pressed against a window glass to remove some of the "tack" before applying

to model. When masking surfaces which have a compound curve, cut the tape into narrow strips so it may more easily follow the curve. Carefully mask all paint separation points, then fill in with tape or, for larger areas, cover with paper. Make sure all edges of the paper are taped down to prevent overspray from sifting underneath. After an area has been masked and sprayed, very carefully remove tape as soon as paint is dry to the touch. **NOTE:** Refer to four photos on page 13 for clarification of color separation points. Study these before you begin painting.

37.

Begin painting by spraying the fins and lower portions of the fairings silver. Paint the main engine nozzle unit silver, then paint the body tube portion of the L.E.M./S.M. body silver. Set parts aside to dry. Mask off the bottom coupler portion of the 3rd stage body and spray the assembly white. Spray a small piece of cardstock very lightly with spray glue and press the two propulsion fairings (parts K) onto it. Spray these silver. Next, lightly spray glue onto a large piece of card. Cut all remaining plastic parts from the sprues and attach these parts, along with the parts prepared in Step 28, to the card. Spray these parts white. Mask off the portion of the capsule that fits into the top of the L.E.M./S.M. body and spray capsule and tower white. Next, go watch TV until tomorrow.

REFER TO PHOTOS ON PAGE 13 FOR PAINTING DETAILS



38.

Completely mask the four fins and the lower portions (including bottoms) of the fairings. There are embossed lines around the fairings which show where the tape is applied. Spray the main body white. Paint up inside the bottom of the body for a short distance, but avoid getting any more paint than necessary inside the top of the body. Set aside to dry, but do not remove masking tape from fins and fairings. These must remain

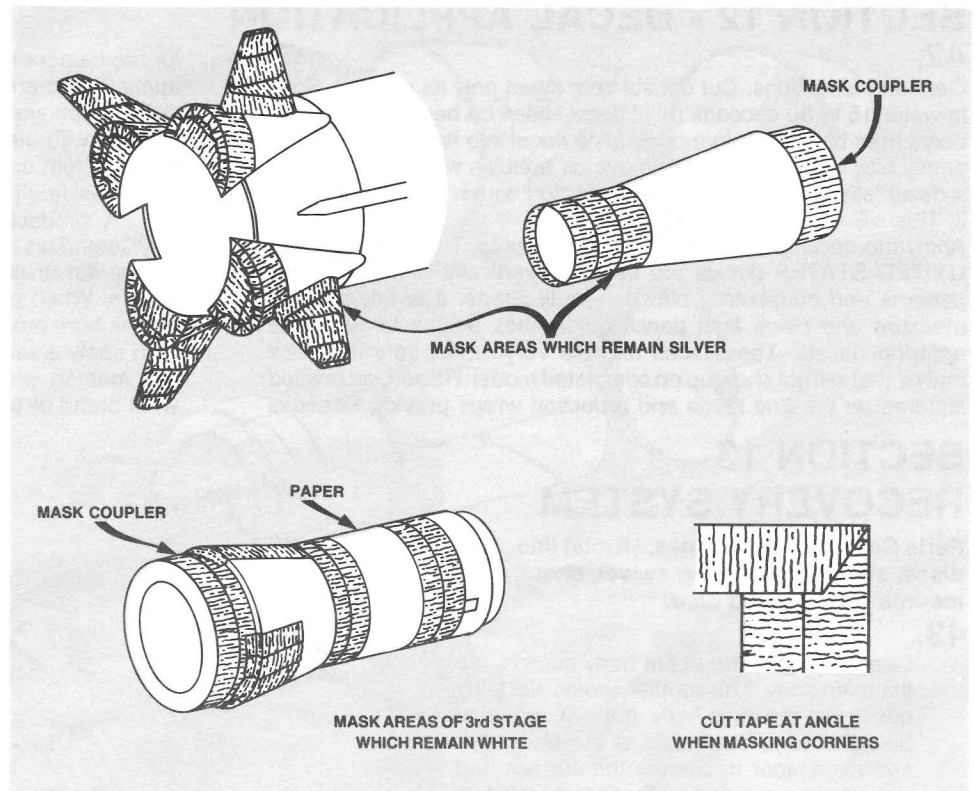
masked until after the black paint has been applied. Mask off the body tube portion of the L.E.M./S.M. body. Also mask the coupler at the bottom. Spray the reduction portion white.

39.

Mask off the 3rd stage body from top of reduction wrap to embossed line around upper 3rd stage wrap. Portions of the reduction wrap are masked to produce the roll pattern shown. There is a raised embossed line around part of the wrap which shows where horizontal separation occurs. Vertical separation points are indicated by the seam in the wrap plus three other places where the raised corrugations are wider than the remaining corrugations. Find these points, check against photographs, then mask off the areas to remain white. Spray the exposed areas black, let dry and remove tape.

40.

After white is completely dry on main body, it may be masked to spray the black paint pattern areas. The horizontal black area around the inter stage wrap is defined by raised embossed lines around the wrap. The vertical separation areas are located on the center lines of the fins and half way between the fins. Draw light pencil lines from the tops of the fins straight up to the tops of the fairings. Cut a piece of paper the exact length of the distance between two fins. Fold the paper in two and this will give you a guide to mark the midpoint between fins. On the inter stage wrap, the eight separation points are 3/64 inch to the right of the locator areas for the retro-rocket

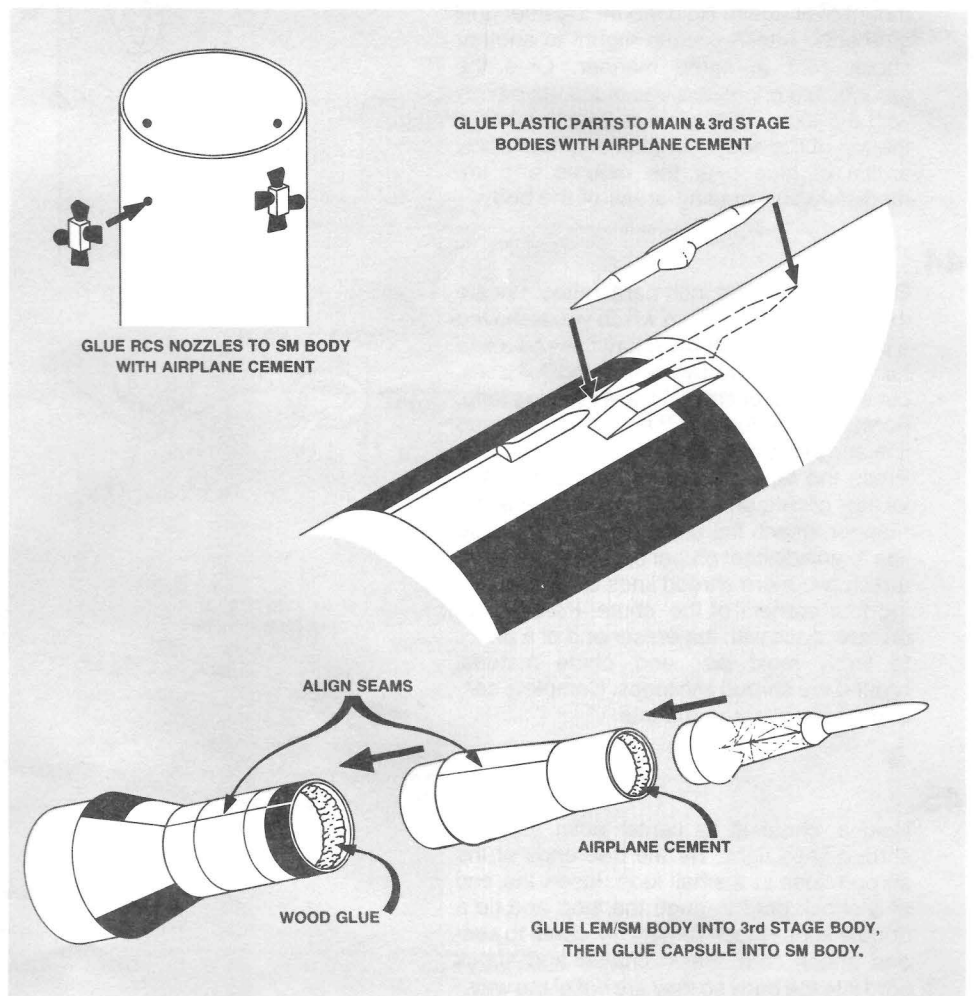


fairings (parts C). Draw light pencil lines along the color separation points. Mask the body and spray the black areas. Let dry and remove tape. Brush paint the four nozzles on each of the RCS units (part L) black. Paint the bottoms of the nozzles in the escape tower and the inside of the oval recesses in the escape tower black.

## SECTION 11 FINAL DETAILS

41.

The RCS units are attached to the SM body, centered on the small holes (from Step 29). Using a scribe or pencil, enlarge the holes until they are 1/16 inch in diameter (no larger). Apply a small amount of model airplane cement to the back of an RCS unit and glue in place over a hole. Align the unit and let glue dry. From the inside of the body, apply more airplane cement to the hole and surrounding area. Attach remaining RCS units. Remove the small bits of tape from plastic parts locations on main and 3rd stage bodies. Using model airplane cement, glue the plastic parts in place (refer to photos for placement). If any glue squeezes out from beneath a part, do not try to remove immediately. Let glue dry, then carefully cut it away with a knife blade. Touch up any areas that require it with white or black paint. Apply wood glue around the inside of the 3rd stage body and glue the L.E.M./S.M. body in place, making sure the seam in the LEM reduction wrap is aligned with the seam in the upper 3rd stage wrap. Note, even though these have been painted, the seams should be faintly visible. Place the capsule on top of the assembly and rotate it until it is aligned as shown in the photos. Place a light pencil mark across the joint between capsule and body. Remove capsule, apply model airplane cement inside the top of the SM body and replace capsule with pencil marks aligned.



## SECTION 12 - DECAL APPLICATION

### 42.

General Instructions: Cut decals from sheet only as needed. Soak in water 15 to 30 seconds (until decal slides on backing). Transfer decal from backing onto model. Slide decal into final position, then gently blot away water and remove air bubbles with a soft cloth. If a decal "sticks" before it is in final position, brush a little water over it. This will allow it to be easily moved.

Apply the decals, using the photos as a guide. The USA, flag and UNITED STATES decals are centered vertically within the paint patterns and horizontally between body wraps. It is advisable to measure and place light pencil guide lines on the body before applying decals. These lines may be very small, very light 'tick marks' that will not show up on completed model. Raised, embossed squares on the 2nd stage and reduction wraps provide locations

for the camera and sway target decals. After all decals have been applied (and are dry) wipe the surface of the model with a damp cloth to remove water spots. If there are any air bubbles, prick the bubbles with the point of a knife, apply a small drop of water and press a cloth down over the area.

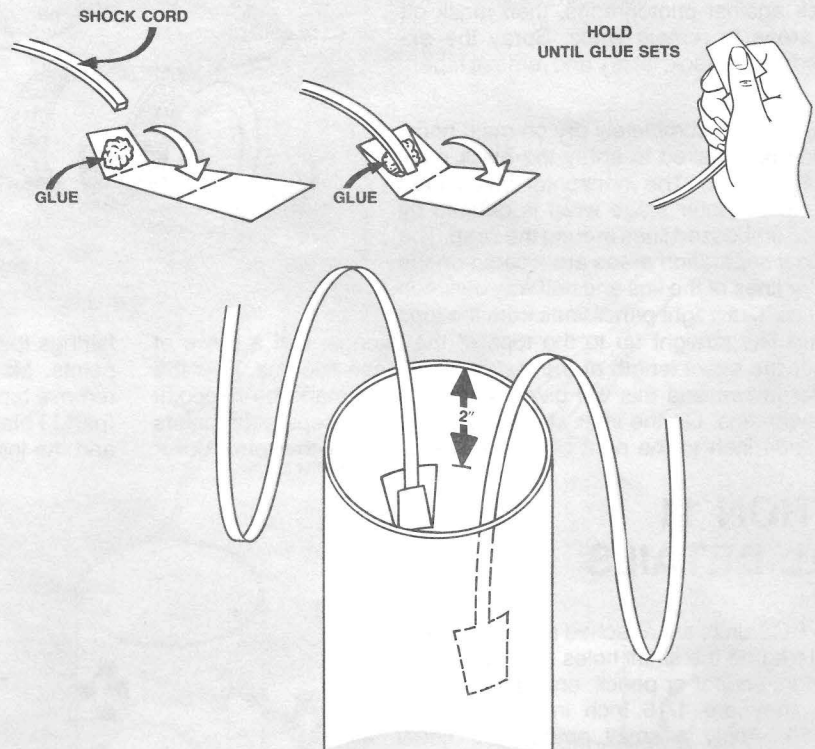
Many builders prefer a flat overall finish to a scale model such as this. A product which many modelers use is called 'Testor's DullCote'. This is a quick drying clear lacquer spray which produces a very flat finish. If applied in a heavy coat, it can also ruin the decals. When applying 'DullCote', hold the spray can at least 12 inches from model and apply a very light coat. Let dry completely, then apply a second (and if necessary a third) very light coat. Use this method when applying any protective overspray, no matter what brand or whether a flat or gloss clear coat is used.

## SECTION 13 RECOVERY SYSTEM

**Parts Required: Parachutes, shroud line, tape discs, shock cords, snap swivel, shock cord mounts from printed card.**

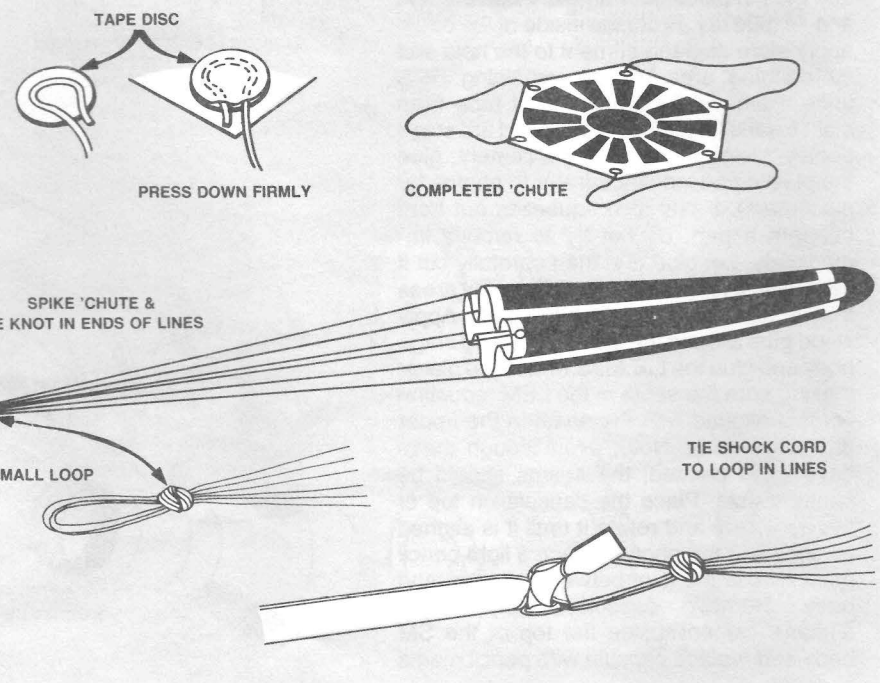
### 43.

Check the fit of the upper body section into the main body. The coupler should slip fairly easily into the main body. If the fit seems to be tight, sand the inside of the body with fine sandpaper to smooth the surface and provide an easy sliding fit. Cut out the two shock cord mounts. Fold one mount on dotted lines then unfold. Spread wood glue on section 1 and lay end of shock cord into glue. Fold over and apply glue to back of first section and exposed portion of section 2. Place shock cord as shown and fold mount over again. Hold mount together until glue sets. Attach second mount to another shock cord in same manner. Glue the mounts into opposite sides of the main body with the tops of the mounts 2 inches below the top of the body. Let glue dry, then apply a film of glue over the mounts and immediately surrounding areas of the body.



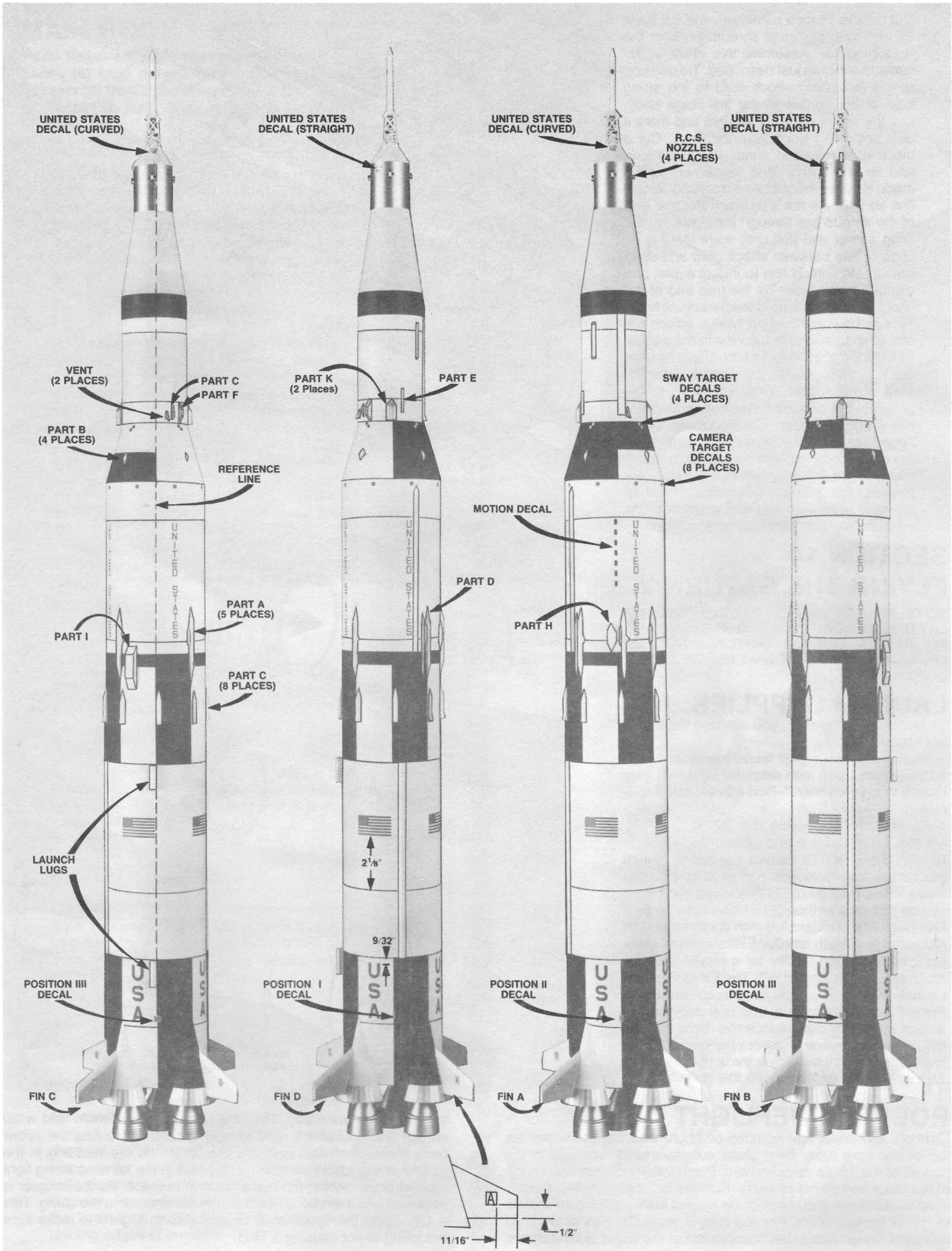
### 44.

Cut out the two 24 inch parachutes. Locate the shroud line coil from which you removed a piece of line in step 12. Lay this coil aside for now. From the two remaining full coils, cut six pieces of shroud line 47 inches long. Form a small loop in the end of a shroud line and press onto sticky side of a tape disc. Press the tape disc down onto one of the locator circles on a parachute. In the same manner, attach the other end of this shroud line to an adjacent corner of the 'chute. Next, attach two more shroud lines to the remaining four corners of the 'chute. Press down on tape discs with the eraser end of a pencil to firmly mold disc and 'chute material around the shroud line loops. Complete second 'chute in same manner.



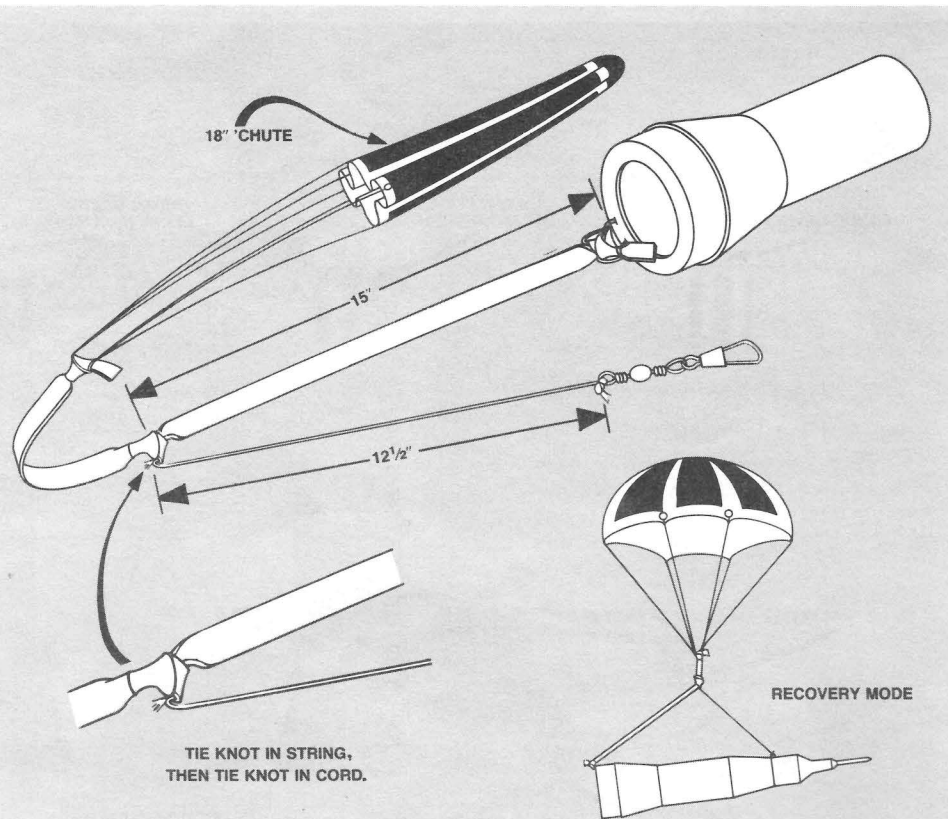
### 45.

Hold a 'chute at its center point and pull shroud lines tight. Tie the free ends of the shroud lines in a small loop. Insert the end of a shock cord through the loop and tie a double knot. Attach remaining 'chute to second shock cord. Pack 'chutes and shock cord into the body so they are out of the way.



46.

Cut out the 18 inch parachute and cut three 35 inch long pieces of shroud line from the remaining coil. Assemble this 'chute in the same manner as just described. Tie one end of the remaining shock cord to the string loop at the bottom of the 3rd stage body. Lay the shock cord out straight and mark it at a point 15 inches from the body. Cut a piece of shroud line about 18 inches long and tie one end around shock cord at the mark. Next, tie the shock cord around shroud line so knot will not slip. Insert the free end of the shroud line through the eyelet on the snap swivel and pull until there is 12½ inches of line between shock cord and snap swivel. Tie shroud line to swivel eyelet and clip off excess line. Tie the free end of the shock cord to the loop in the parachute lines. To see how this system works, attach the end of snap swivel to the loop in the anchor wire (at top of LEM reduction wrap). Holding the top of the 'chute, you can see that the front of the model points up slightly. This prevents the delicate tower from making initial ground contact upon recovery. When rigged for flight, the shroud line runs down the upper body and into the 'chute compartment where 'chutes and shock cords are packed. For display purposes, the snap swivel is unhooked and everything is packed, out of sight, in the 'chute compartment.



## SECTION 14 FLYING THE SATURN V

**NOTE:** REMOVE DISPLAY NOZZLE UNIT AND LAY IT ASIDE. OBVIOUSLY, THIS CANNOT BE IN PLACE DURING ACTUAL ROCKET LAUNCH. THE NOZZLE UNIT IS FOR STATIC DISPLAY ONLY.

### LAUNCH SUPPLIES:

To launch the Saturn V™, you will need the following items:

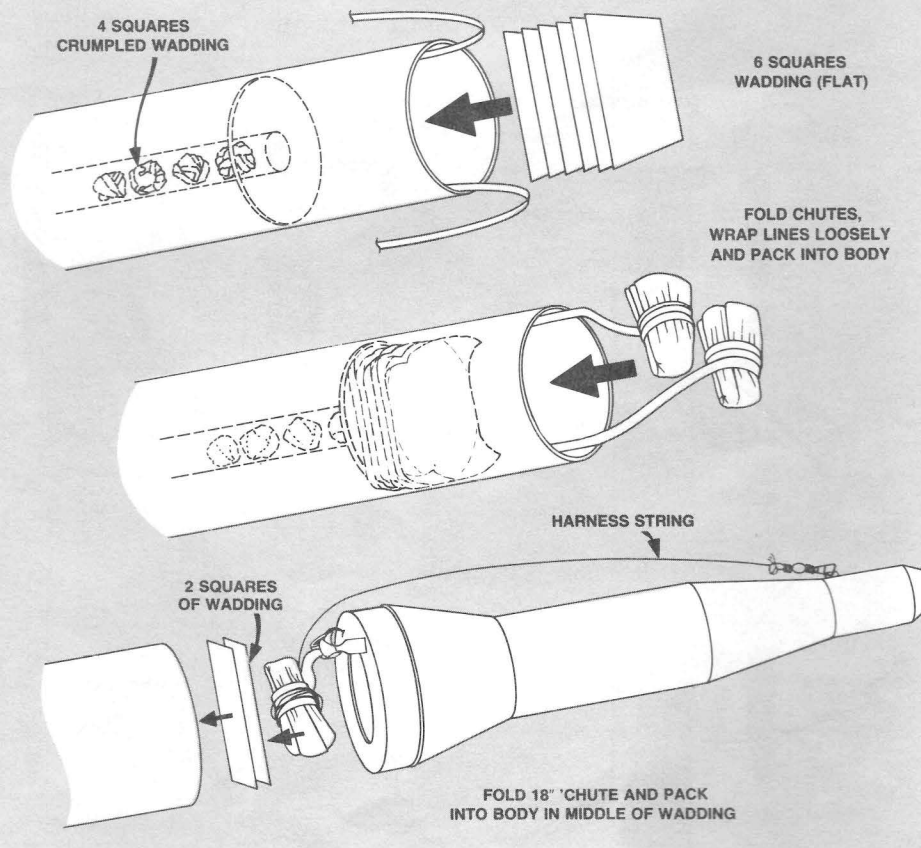
—An Estes model rocket launching system with a heavy duty, 3/16 inch diameter by 3 foot long launch rod (Estes Maxi™ -Rod #2244, sold separately).

—Estes recovery wadding (No. 2274).

—Estes D12-3 engine and igniter.

**IMPORTANT NOTE:** Do not attempt to launch this rocket from a launch pad smaller than the Estes Porta-Pad (No. 2217) and do not use a launch rod smaller than 3/16 inch diameter by 3 feet long. The standard 1/8 inch diameter launch rod, used to launch smaller Estes rockets, does not have sufficient rigidity for a model as large and heavy as the Saturn V™. The Estes Big Foot Launch Pad™ (no longer produced) and Estes Porta-Pad™ both have a hub unit designed to accept the heavy duty launch rod. Note that the roll pin must be removed from the center of the blast deflector so it will fit over the 3/16 inch rod.

*Use only Estes products with this rocket.*



## ROCKET PREFLIGHT

Crumple and insert four squares of 'chute wadding down into the top of the core tube. Next place six squares of wadding in the bottom of the 'chute compartment. Place these squares one on top of the other and do not crumple. Fold the two main 'chutes, loosely wrap shroud lines and shock cords around them and place in middle of 'chute compartment. Place a couple more squares of wadding on top of these. Attach the snap swivel of the upper body harness

to the anchor wire loop. Fold the upper section 'chute and wrap shroud line and shock cord loosely around it. Holding the upper body above the main body lay the 'chute on the wadding in the middle of the 'chute compartment. Holding the harness string tight against body, socket the upper section in place. As the coupler is socketed into main body, it will cause some slack in the string. This is OK. Twist the upper body back and forth slightly to make sure the string is not causing a bind.

## PREPARE ENGINE

Insert igniter into engine nozzle. Push in as far as it will go. Fold igniter down flat against end of engine. Apply a piece of tape to end of engine and press firmly into place. It is important that the igniter be held firmly in place. Spread igniter leads and bend them back in tight 'U' shapes to provide more "grip" for micro-clips.

## FLYING SITE

Choose a large grassy field away from power lines, tall trees and low flying aircraft. The site should be a clear area at least 250 feet square. The launch area must be free of dry weeds and brown grass. Launch only when **wind is calm** and visibility is good. If there are other people in the area, make sure they are alerted before you launch.

If the weather is cold, do not pack the parachutes until just before launching. It is also advisable to sprinkle talcum powder on the 'chutes to facilitate deployment.

## LAUNCH PROCEDURE

- 10 Remove safety cap from launch rod and slide rocket onto rod. Make sure rod passes through both launch lugs. Replace safety cap.
- 9 Place launch controller about 15 feet from pad and unroll wire leads. Make sure the safety key is removed from controller (safety key should be attached to safety cap which should be in place on end of launch rod).
- 8 Raise rocket about 6 inches on launch rod and tip the rocket and launcher over at an angle. Reaching into the bottom of the rocket, attach micro-clips to the igniter leads. Make sure the clips do not touch each other. Carefully tip the assembly back into an upright position. Make sure the harness string has not been inadvertently wrapped around launch rod.
- 7 Remove safety cap from rod, move to controller and insert safety key to arm the controller.
- 6 Alert all persons in the area that you are ready to launch, give an audible count-down 5...4...3...2...1. Push the button and hold until engine fires. . .

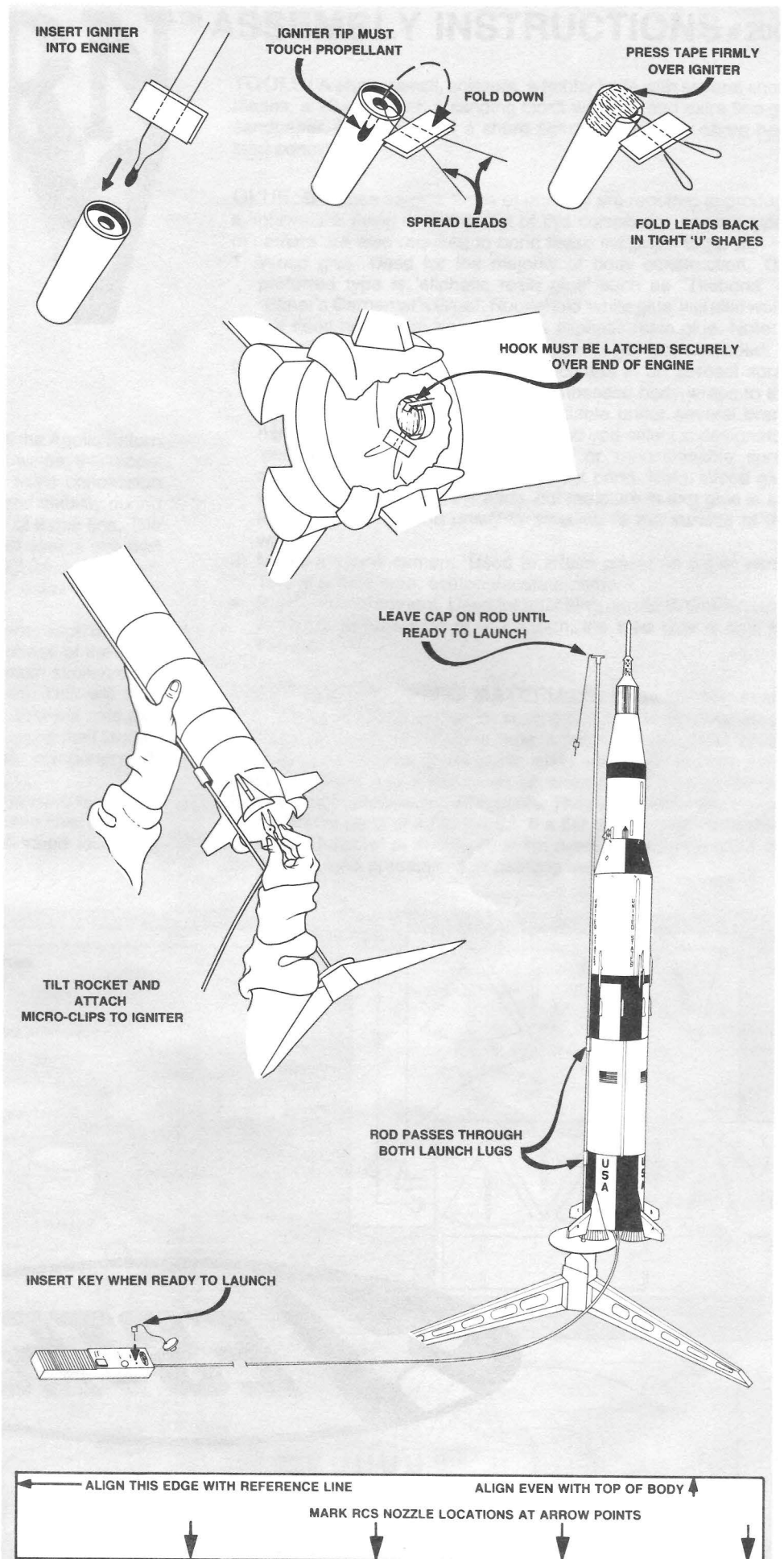
## MISFIRES

Failure of the rocket engine to function properly is usually caused by the failure to install the igniter correctly. If igniter tip is not in firm contact with the engine propellant, the igniter can burn in two without igniting engine. The second major cause for misfire involves the micro-clips. If strain is put on the controller lead wires, it can cause a micro-clip to come loose from an igniter lead, or it can pull the igniter partially out of the engine, or it can pull the micro-clips together so they cause a short circuit. Any of these would produce a misfire.

## FOR YOUR SAFETY AND ENJOYMENT

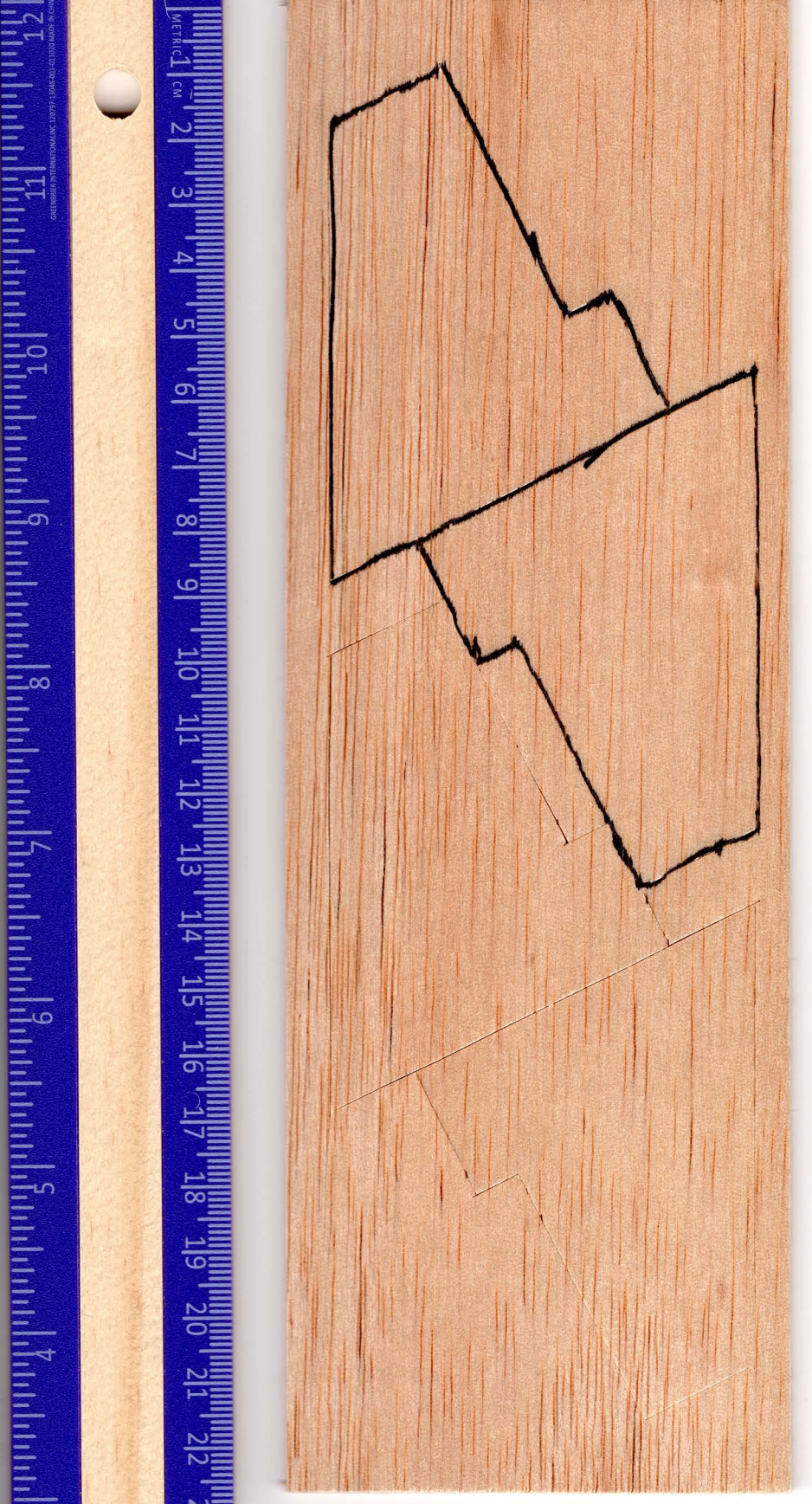
Always follow the NAR-HIA\* MODEL ROCK-ETRY SAFETY CODE while participating in any model rocketry activities.

\*National Association of Rocketry-The Hobby Industry of America

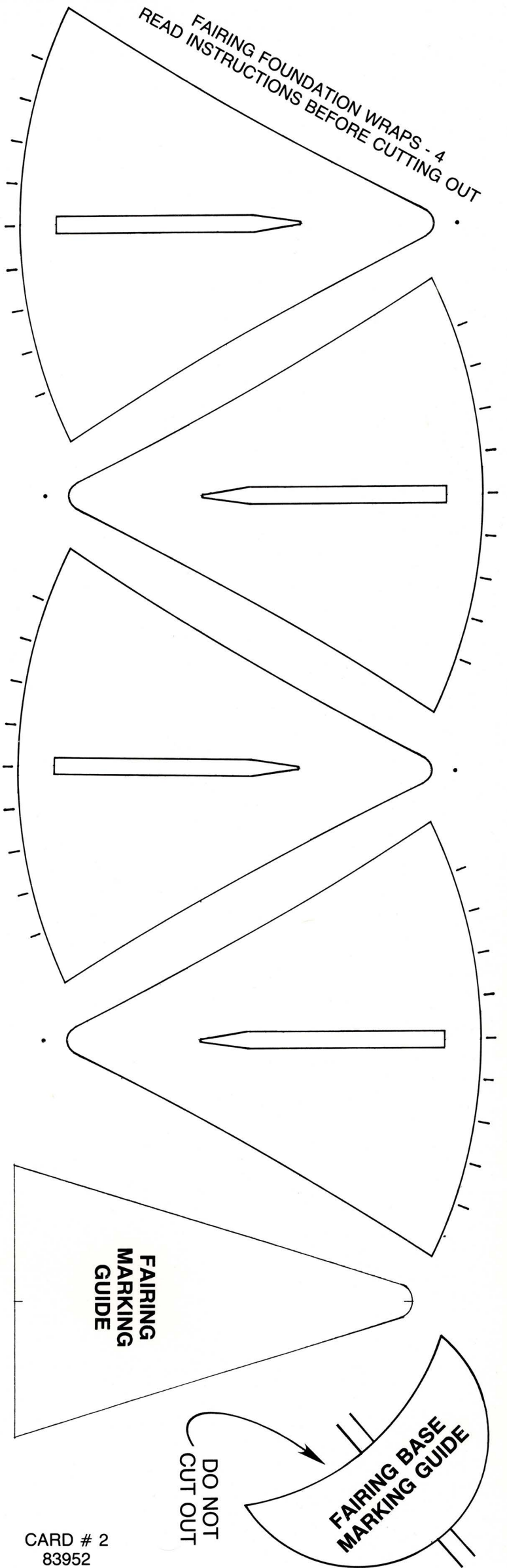








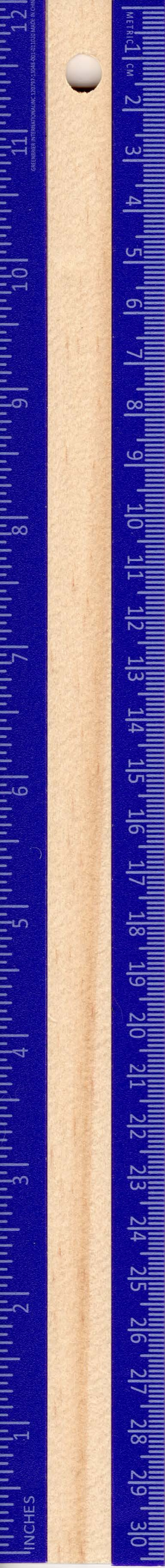
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READ INSTRUCTIONS BEFORE CUTTING OUT



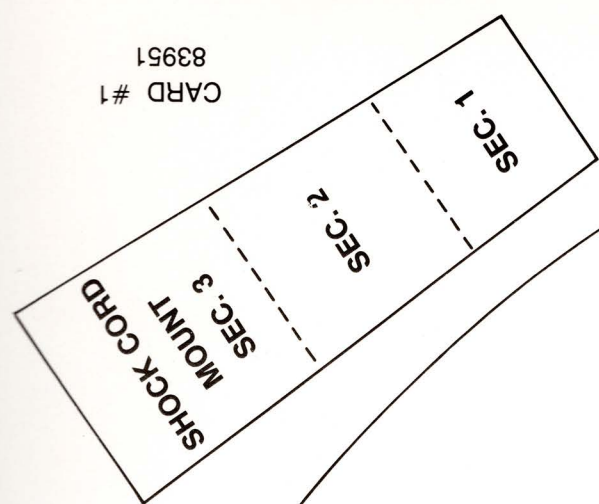
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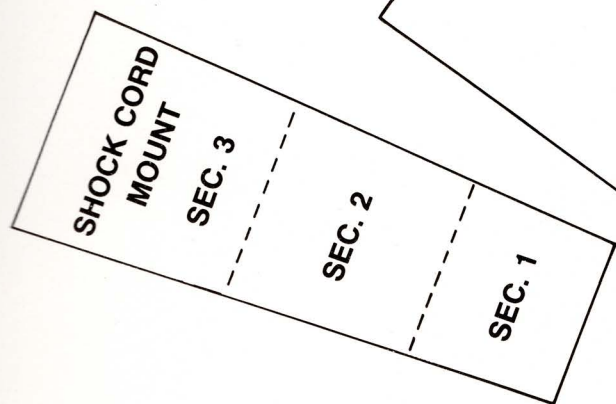
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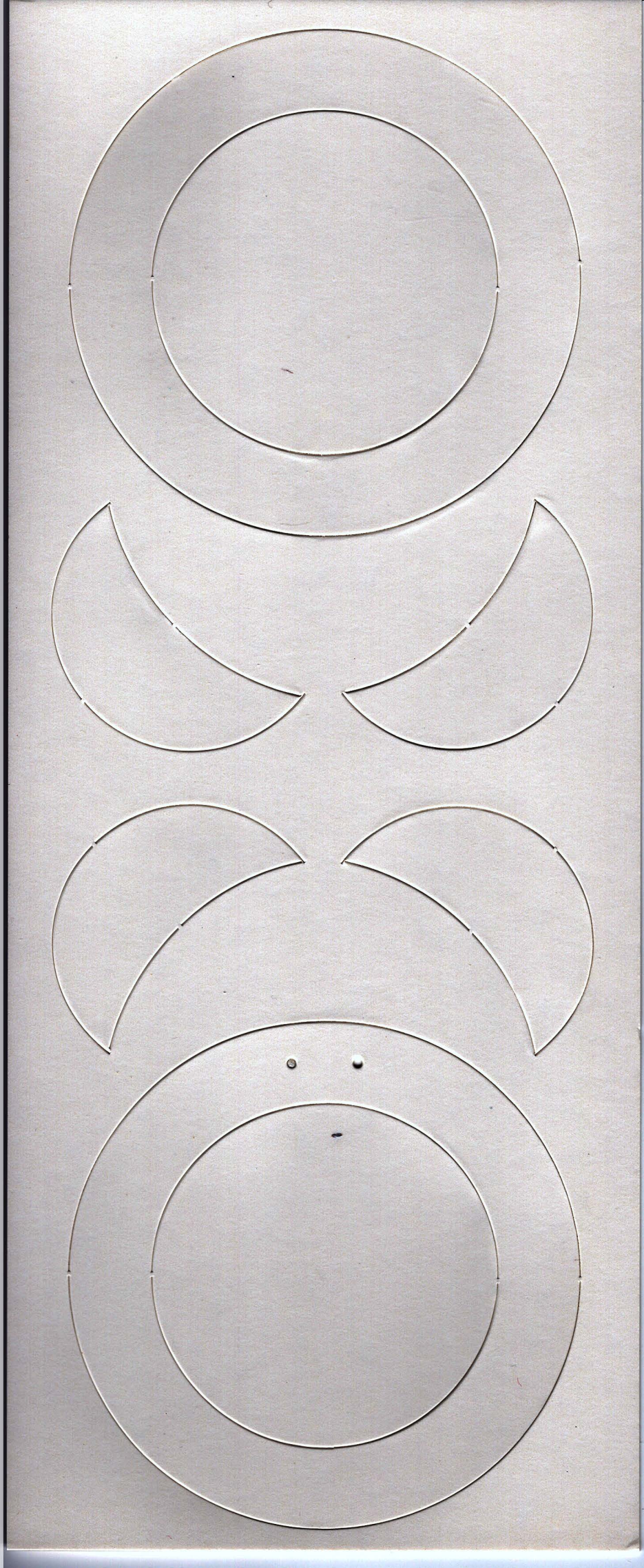
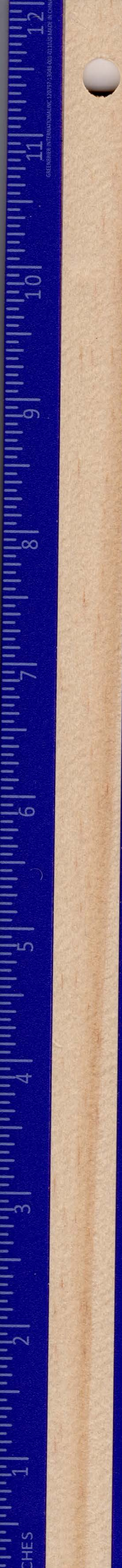
3RD STAGE FOUNDATION WRAP

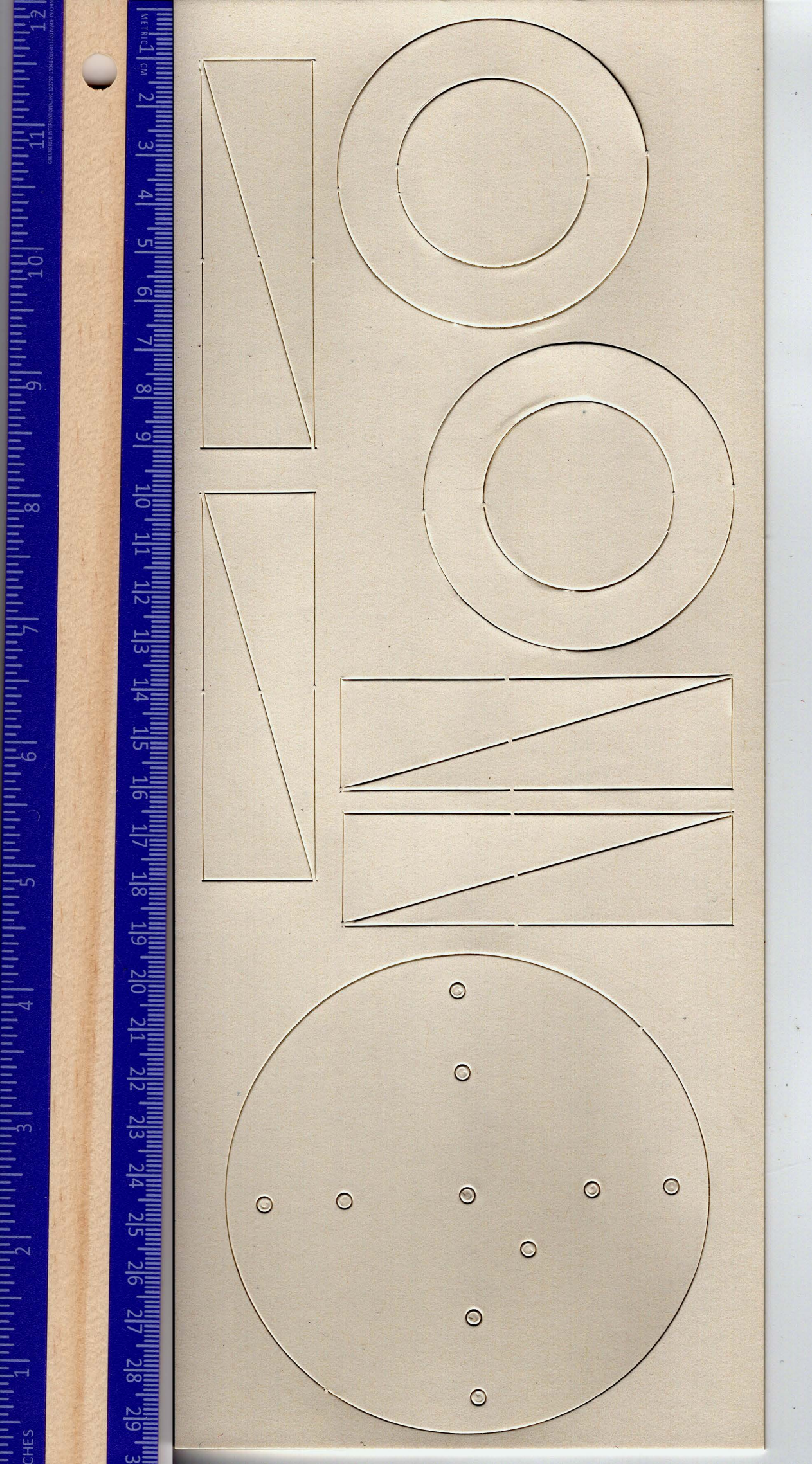
L.E.M. WRAP GLUING TAB

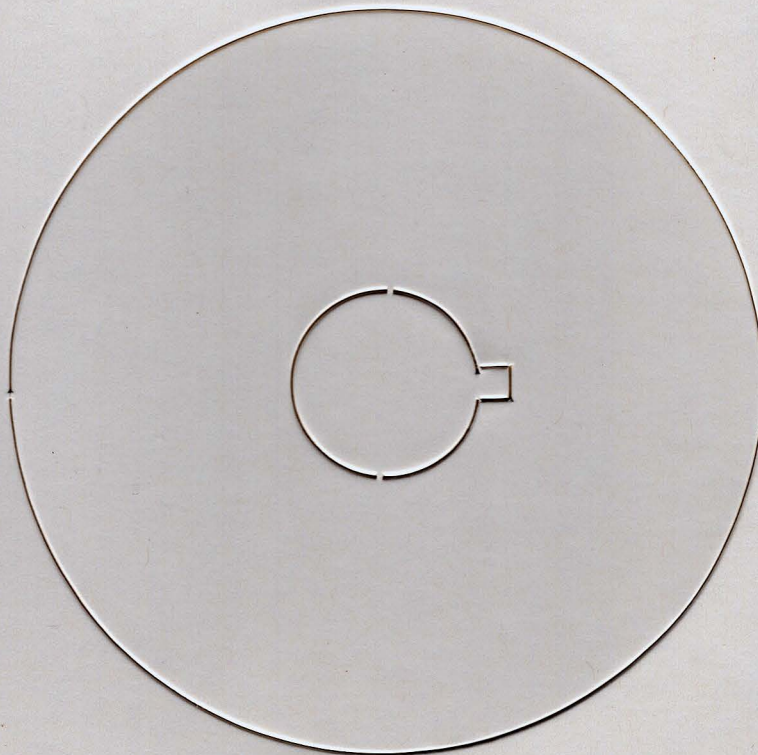
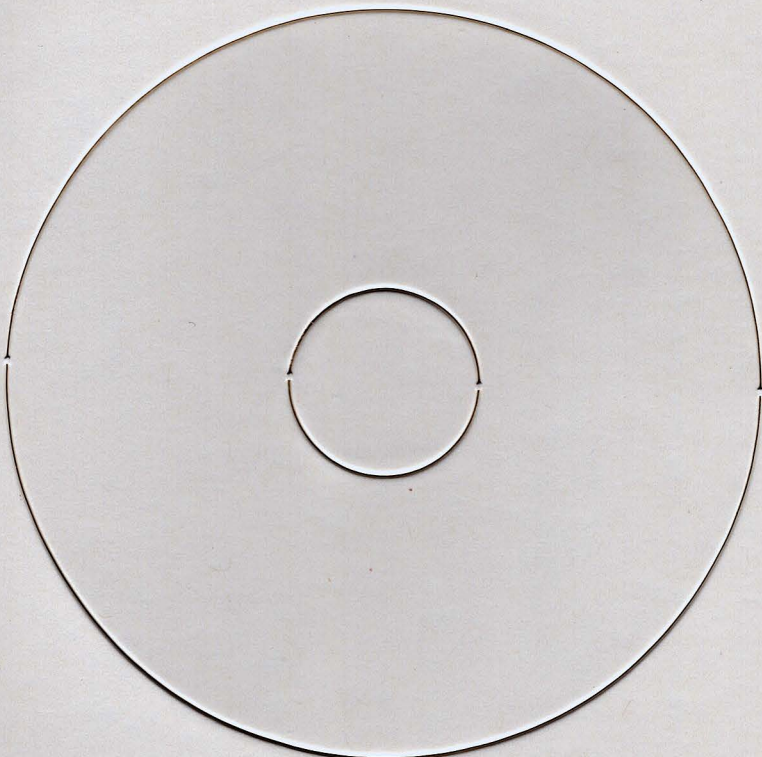
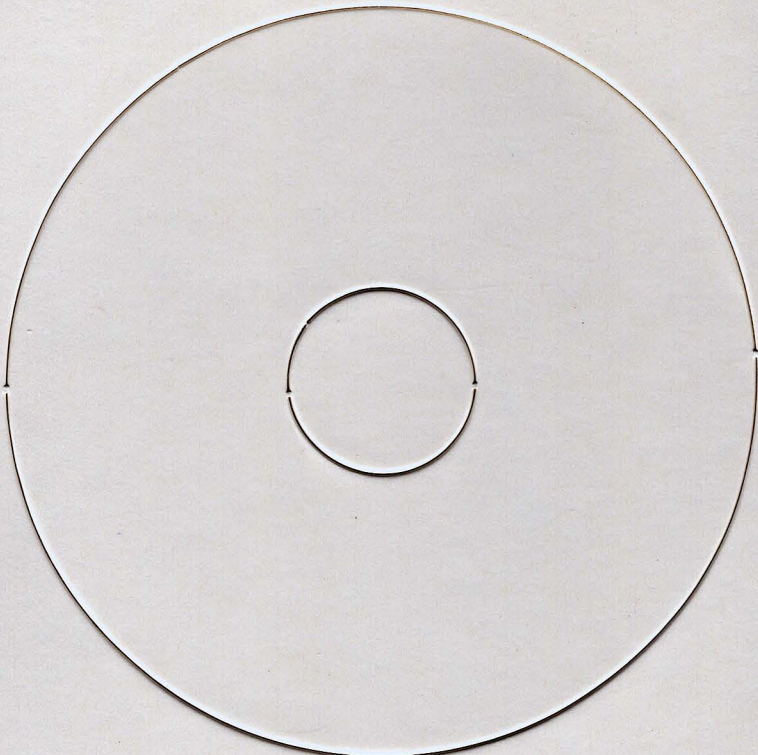
3RD STAGE GLUING TAB



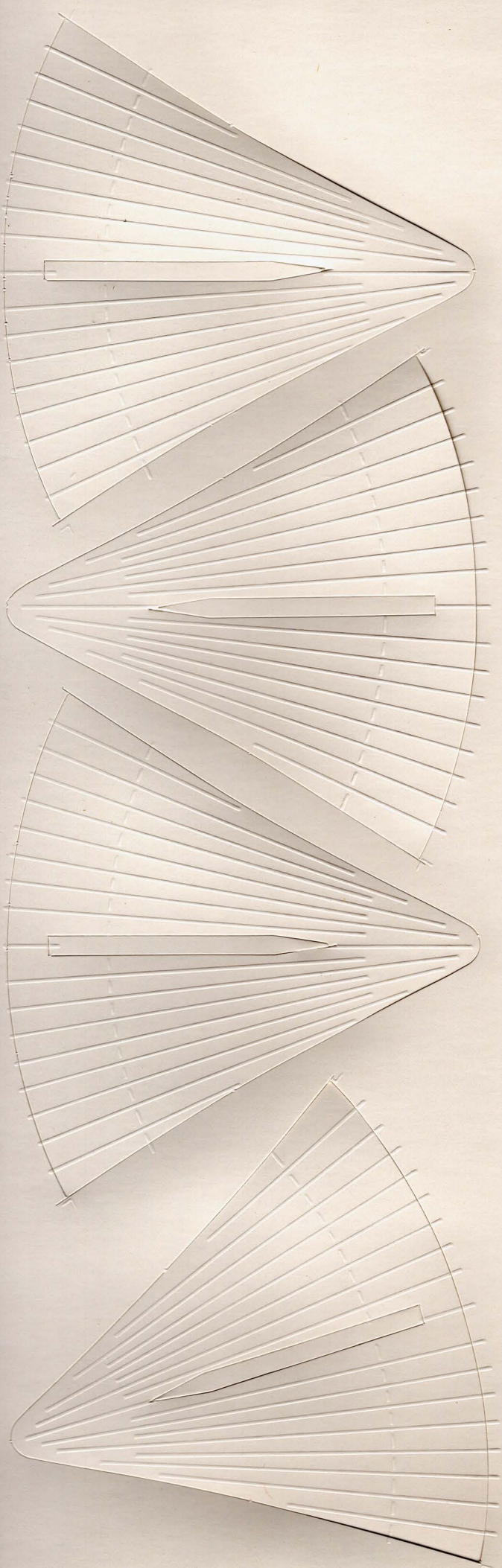
L.E.M. REDUCTION WRAP







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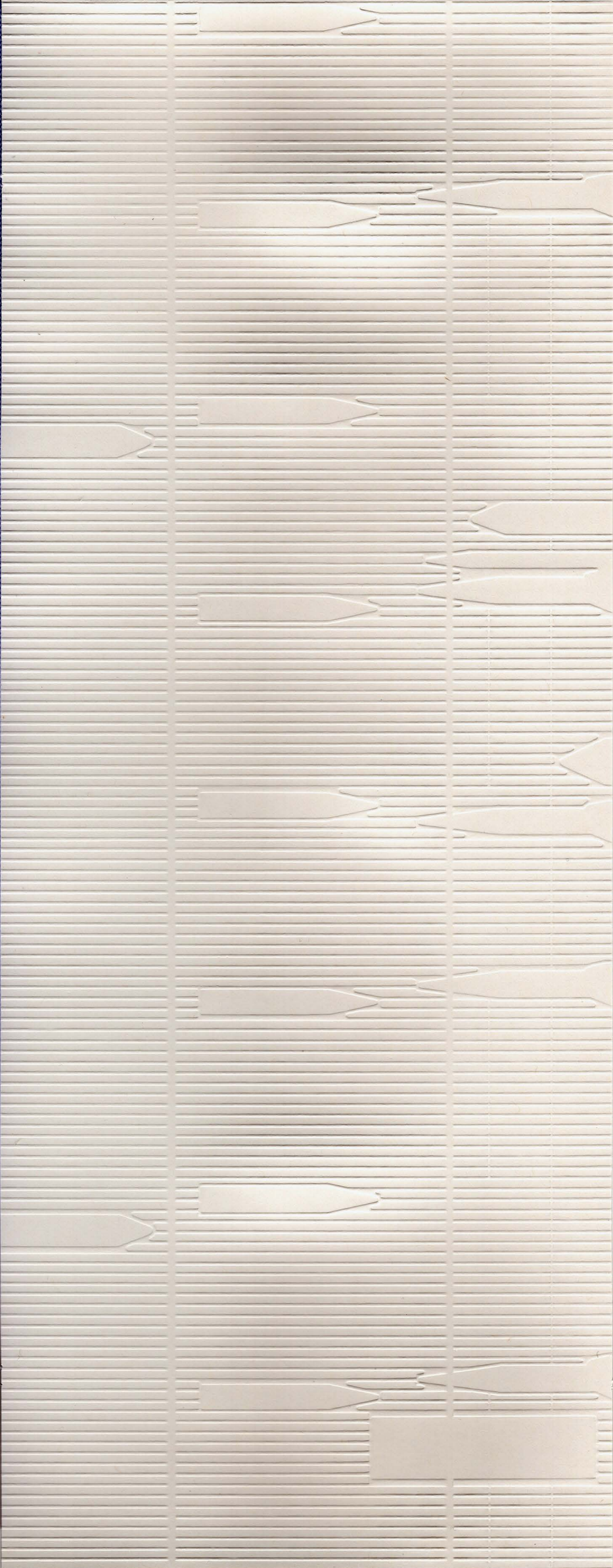


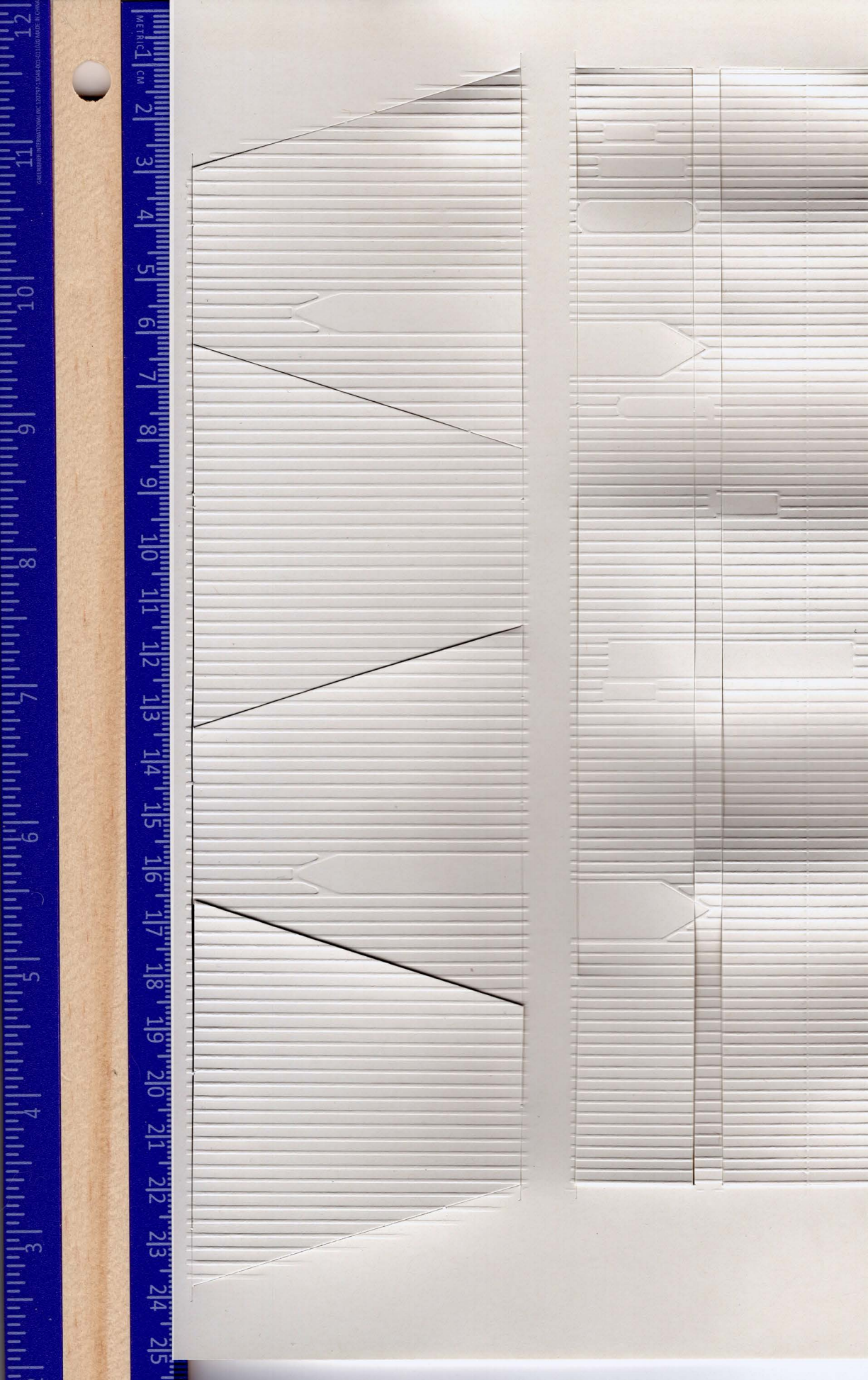
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Blank lined paper with horizontal ruling lines.



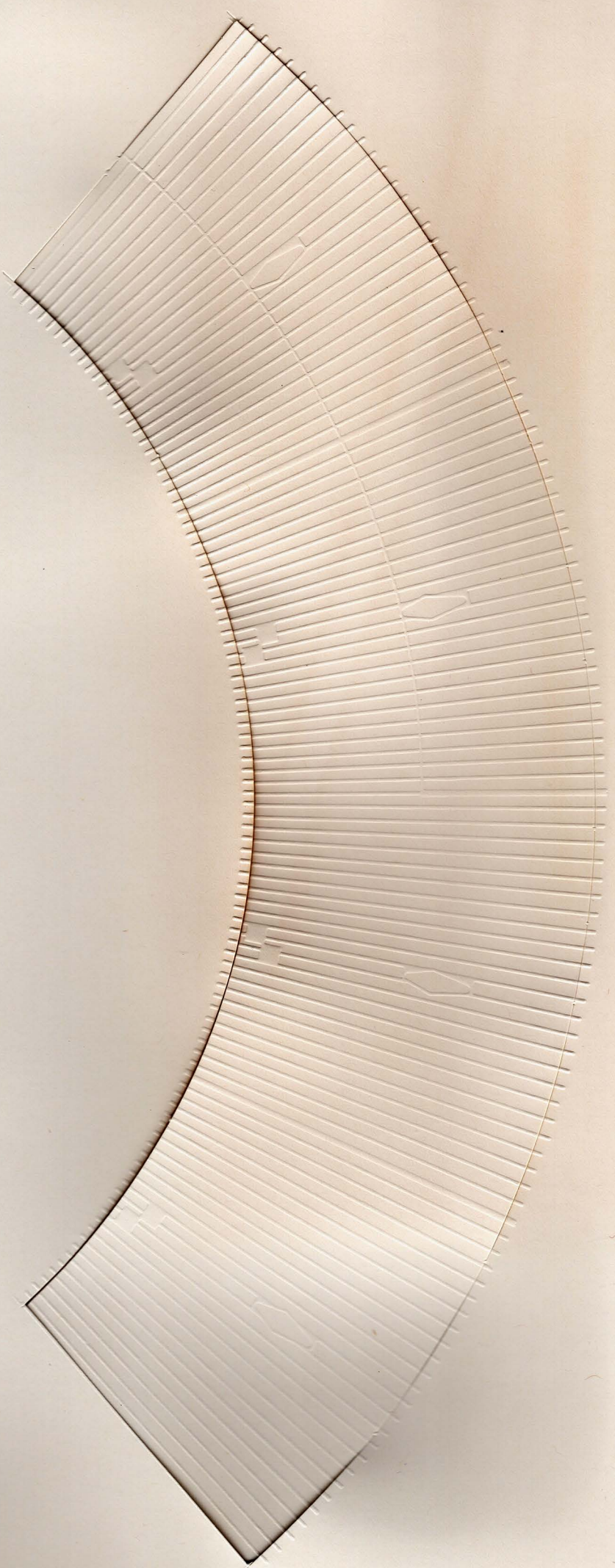
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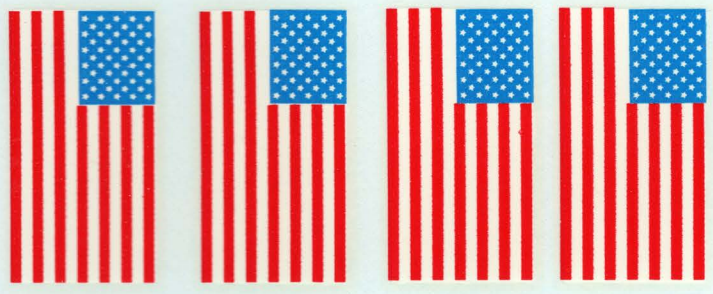


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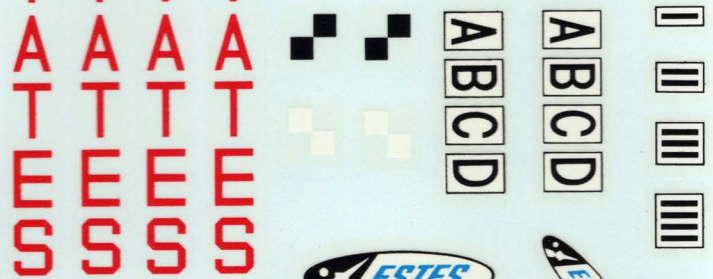
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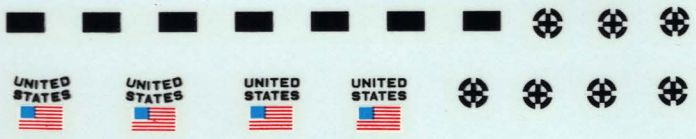
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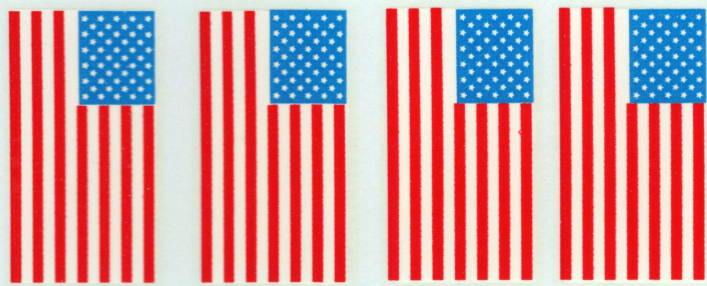
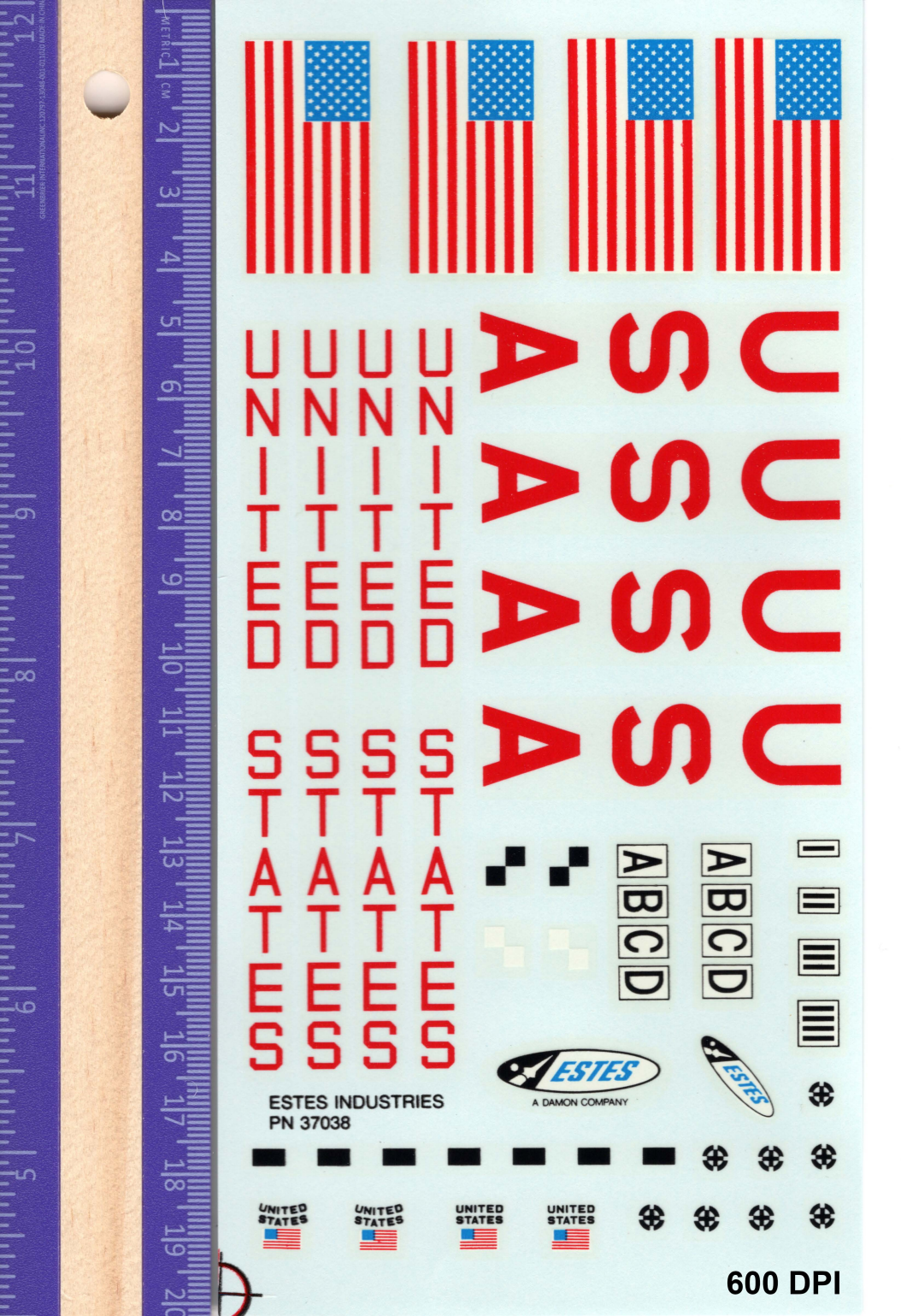


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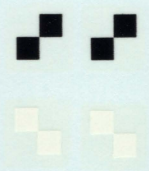
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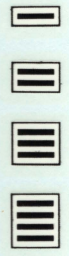
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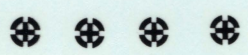
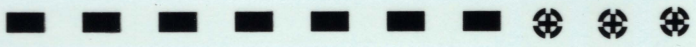
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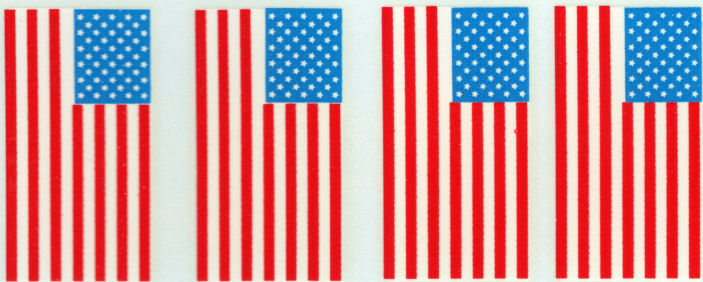
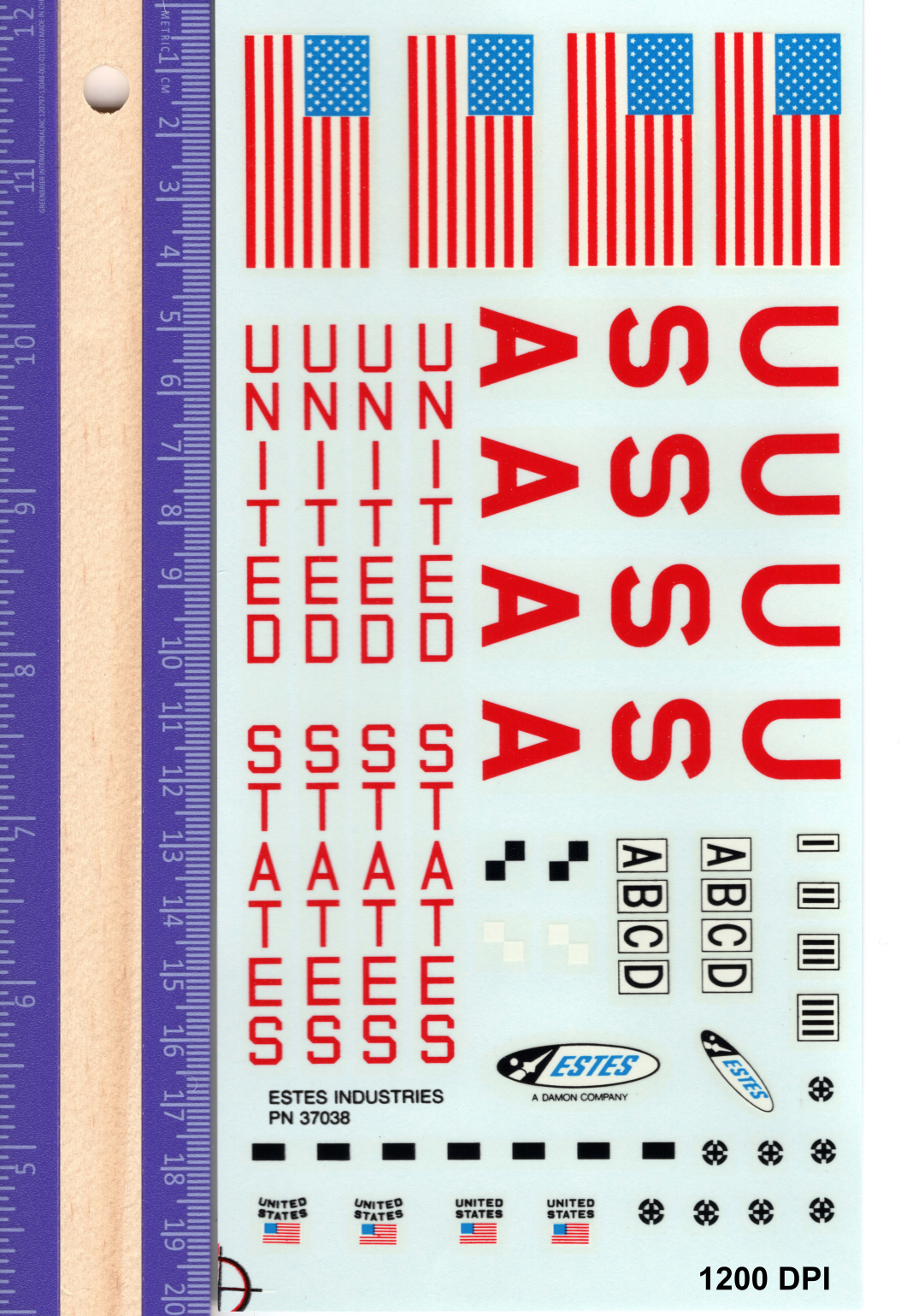
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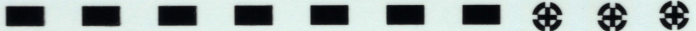
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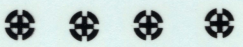
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1200 DPI







# SATURN

FLYING MODEL KIT

