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THE HOW-TO-DO-IT MAGAZINE

*HOW TO BUILD A MINIATURE
MOONSHOT — 8 FEET TALL!*

*HOW TO BUILD A
BOEING 737
TICKET COUNTER
SPECIAL*



*AIRspace VISITS
THE 1969 MODEL
ROCKETRY CONVENTION*

HOW TO BUILD A MINIATURE MOONSHOT 8 FEET TALL!!

The five modules of the Apollo Lunar Spacecraft, duplicated in Revell's Apollo Lunar Kit, along with a portion of the final S-IVB rocket stage, are not complete until you add the rest of the huge Saturn V rocket, which blasts the entire complex free of the earth. Even the completed model, in exact 1/48th scale, is huge...



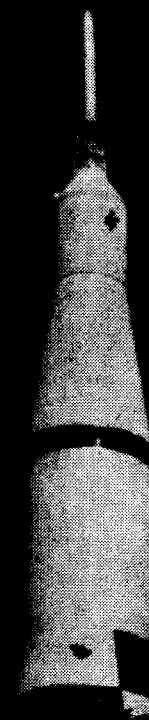
by Robert Schleicher

FIVE CENTURIES have passed since the incredibly bold European adventurers sailed "over the edge of the world" in their voyages of discovery and exploration. In A.D. 1969, the ominous thoughts and fears of earlier decades are, indeed, still with us, though the fears of today have a modern direction... As America's space sailors of the Apollo space ship sail off the earth, many who stay behind fear the unknown mysteries of the vastness of outer space — just as those left behind in ancient times feared the unknown of the vast mysterious oceans.

The force of countless winds will be generated by the Saturn V rocket engines as it propels the spacecraft and its three pioneer explorers off the edge of the earth and into the fringes of space. Perhaps these three space explorers will recall some of the instinctive terror which, centuries earlier, plagued sailors as they sailed out of sight of land. The

Apollo "sailors" will, indeed, sail out of sight of land — AND earth AND sky — as their home disappears behind the crusty lunar horizon.

How fortunate we are to have the faith we do in technology, as we



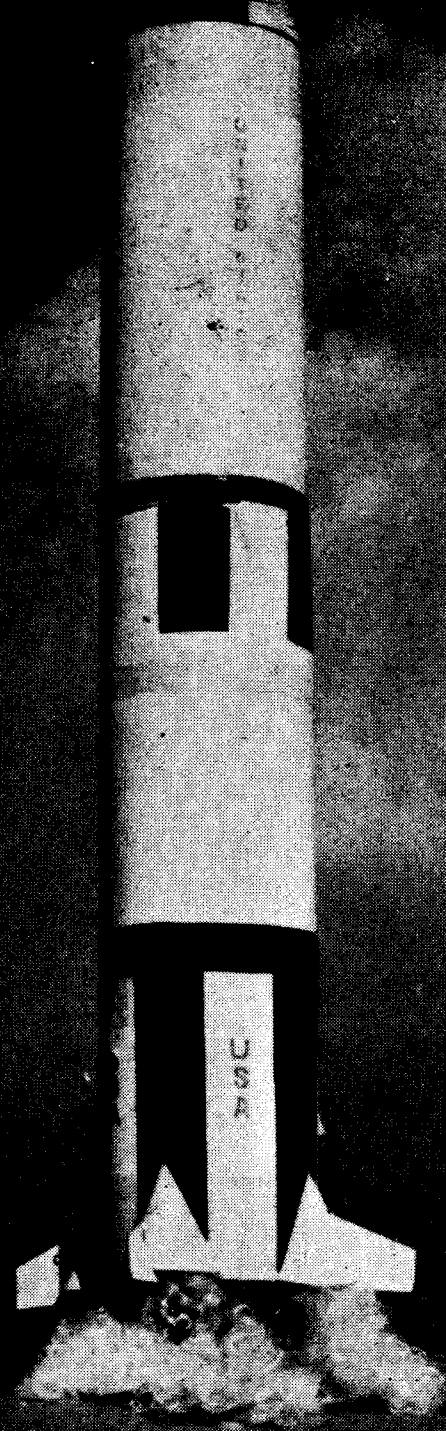
witness the most exciting exploratory venture in five centuries on our television screens! Decades of research and technological development, with dozens of simulated and actual flights, like Apollo 8's lunar orbiting adventure, have taken much of that ever-present fear of the unknown from this flight. The fact remains, however, that an American will soon walk on land where no earth being has ever before set foot.

You can participate in the action and excitement of the flight in full, three-dimensional realism if you build the 1/48 scale duplicate of the Saturn V and Apollo spacecraft shown on these pages. Your gargantuan hands, 48 times as large and powerful as your Apollo's minute crew, can manipulate the moonshot vehicles in maneuvers identical to the intricate patterns of this first American landing on an extraterrestrial body!

Your miniature moonshot vehicles will give you a better idea of the immensity of this lunar exploration and its 'hardware'. Your Saturn V/Apollo model is but 1/48 life-size, yet it stands nearly 8 feet high, with its crew members a mere inch-and-a-half tall!

Most of the "action" maneuvers of America's first manned landing on the moon occur with the various modules of the Apollo Lunar Spacecraft. Apollo's modules include; the CM (Command Module), CSM (combined Command and Service Modules), LES (Launch Escape System), LM (Lunar Module), and SM (Service Module). The functions and details of these various Apollo modules are faithfully duplicated in Revell's \$6 Apollo Lunar Kit. This plastic hobby kit includes the three astronauts in various poses in the Command Module, in the LM, and on the moon's surface; as well as the various stages of Apollo and a portion of the final S-IVB stage of the Saturn V rocket, all in exact 1/48 scale.

The accompanying photos illustrate the techniques in modeling a 1/48 scale Saturn rocket to match the size of the Revell kit. It would be relatively simple to fabricate the Apollo's exterior shape using the same type of cardboard used to model the Saturn, but the intricate details of the various individual modules present far more of a challenge to even an expert modeler. The Revell model, if completed according to the kit's instructions, offers all of these details, with the added advantage of interlocking tabs to allow any portion of the final stages of maneuvers, to and from the lunar surface, to be duplicated. The total cost for materials, including the Revell Apollo Lunar Spacecraft kit, should not exceed \$17 as listed in the "Bill of Materials".



MINIATURE MOONSHOT

1. "Bill of Materials" lists ALL of the items needed to complete your model of the Saturn V/Apollo mission.



BILL OF MATERIALS

ART OR DRAFTING SUPPLY STORE:

2 pieces 30" x 20" Matte board,
approx. 3/64" thick @ \$.50 \$ 1.00
4 pieces 2-ply "Strathmore" brand* smooth
finish paper, approx. 23 1/8" x 29 1/8" @ .70 ... 3.50

HARDWARE STORE

1 roll 1 1/2" wide masking tape 1.98
2 rolls 1 1/2" wide black "Mystic" tape @ .69 1.38
1 roll 1" wide black "Mystic" tape39
1 bottle (2 ounces) white glue39
1 box "Angle Hair" imitation X'mas snow98
1/4 pint flat black Latex paint49

LUMBER YARD:

1 piece wood 1" x 12" x 11 1/2" approx. .50

HOBBY SHOP OR DEPARTMENT

1 No. H1838 Revell 1/48 scale
Apollo Lunar Spacecraft kit 6.00

TOTAL COSTS:** \$16.61

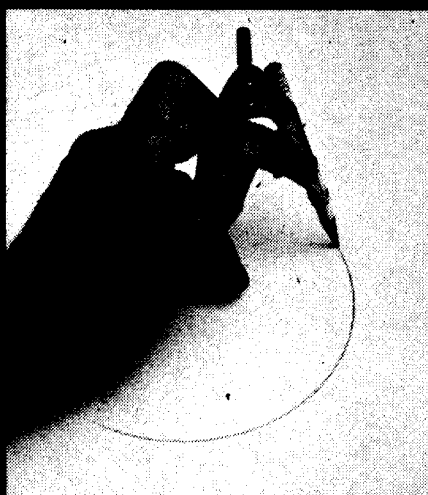
*NOTE: Insist on this type and brand of paper. It has no grain, so it can be easily rolled in any direction. It cuts cleanly, without fuzz, and accepts glue readily.

**NOTE: Glue and paint to finish plastic model kit not included.

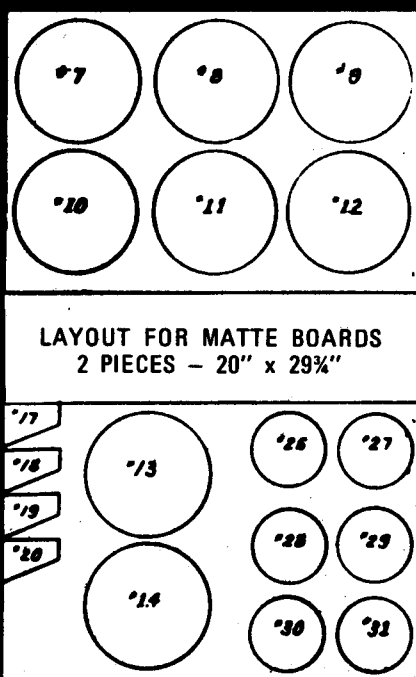
TOOLS REQUIRED:

Heavy scissors
Hobby knife with NEW blade
Metal ruler or straightedge
Yardstick

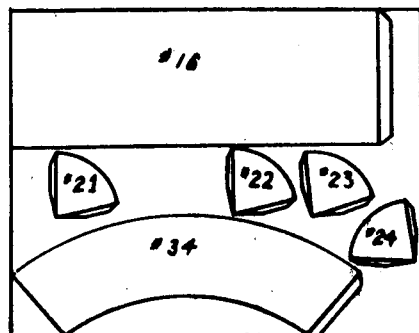
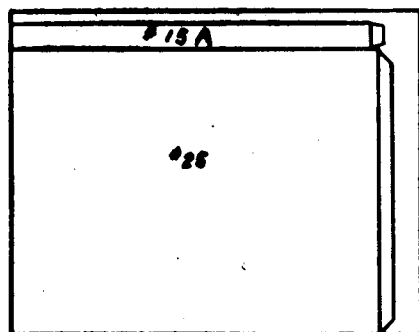
Nail
Drafting compass
Pencil
2D nails



2. Follow the pattern drawings to lay out the various pieces on the Strathmore or Matte board, with each piece positioned exactly as shown in photos 12, 13, 14, 15 and 16. All curved lines must be drawn with a compass.



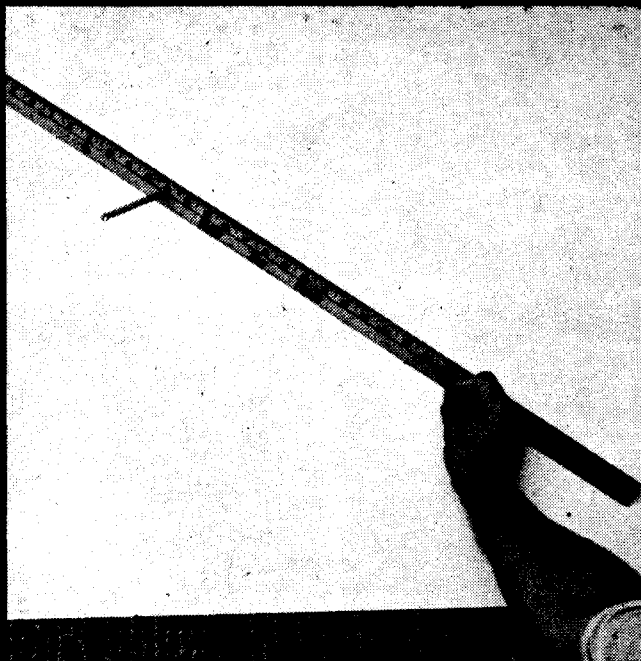
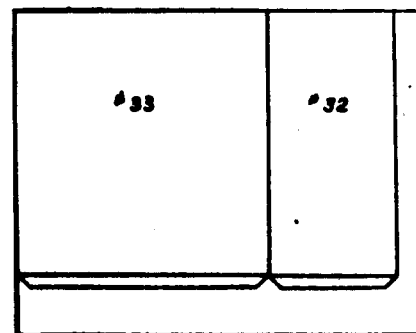
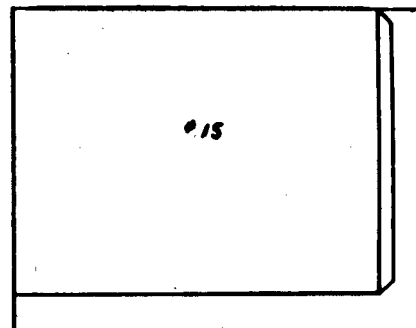
3. Use a steel straight edge or yardstick to guide your pencil when drawing any straight line.



LAYOUT FOR
2-PLY STRATHMORE BOARDS

5 PIECES NEEDED
23 1/8" x 29 1/8"

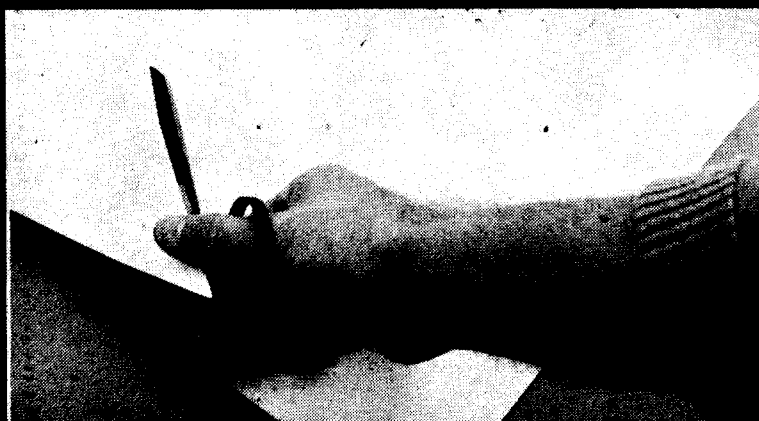
(LAYOUT FOR FIFTH
PIECE ON PAGE 43)



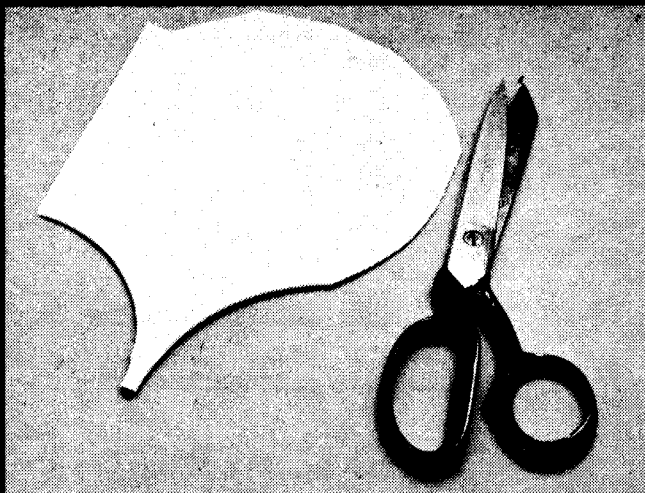
4. Drill a 1/4" hole, or securely clamp a pencil to a yardstick, then drive a nail to serve as a pivot point 14 1/2" and 20 1/4" from pencil tip to draw curved edges of piece No. 34.



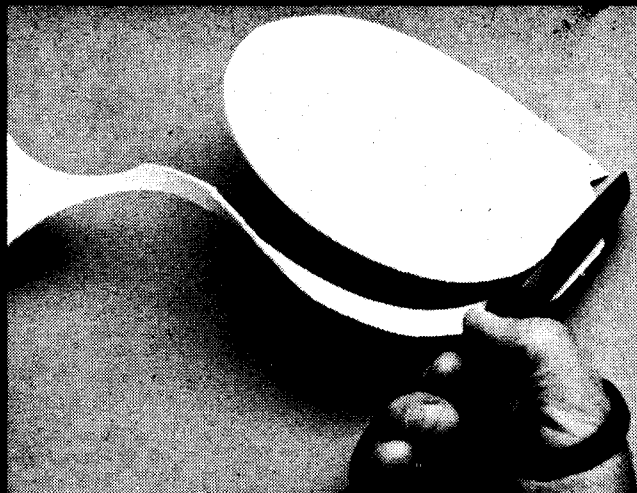
5. Draw the rib lines shown on the photos of the completed Saturn V model BEFORE the pieces are cut from the Strathmore paper. The lines on piece No. 34 will be more uniformly spaced if a round weight or a heavy bottle is placed at the radius center to guide one end of the yardstick used as a straightedge. The large black areas of rocket are tape that will be added to completed model.



6. The 2-ply Strathmore cuts easily with sharp scissors. Be sure to leave tapered flaps attached to each piece.



7. Matte board circles are a bit more difficult to cut. Start by rough cutting $\frac{1}{2}$ " around each circle with heavy scissors to about shape shown here.

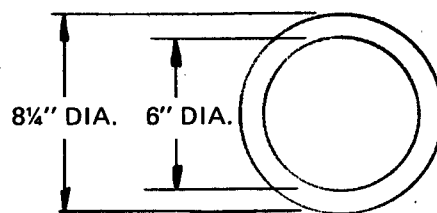


8. Outer edge of circular matte board pieces can be trimmed with heavy scissors when only about a half inch or so of scrap remains around circumference of each piece.

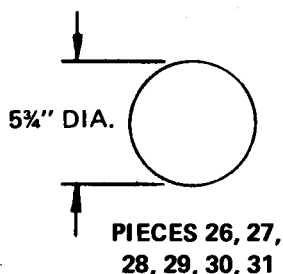
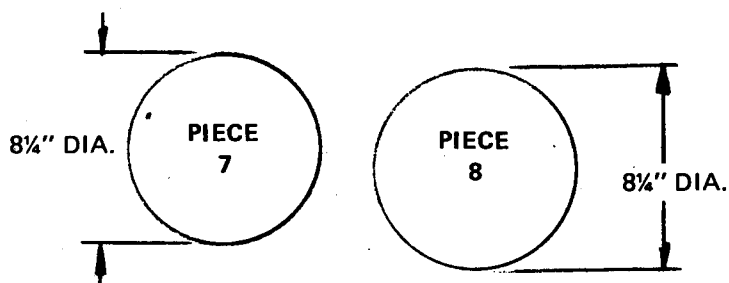


9. Inner hole on ring pieces, Nos. 9, 10, 11, 12 and 13, must be cut with the very tip of a sharp hobby knife. Make about three light cuts to penetrate full thickness of material.

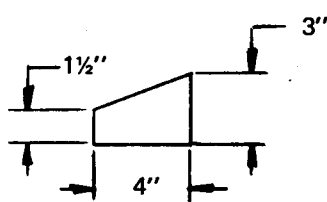
PIECES
9, 10, 11,
12, 13, 14



10. Pieces No. 7, 8, 9, 10, 11 and 12 are cut from one piece of Matte board in positions shown.

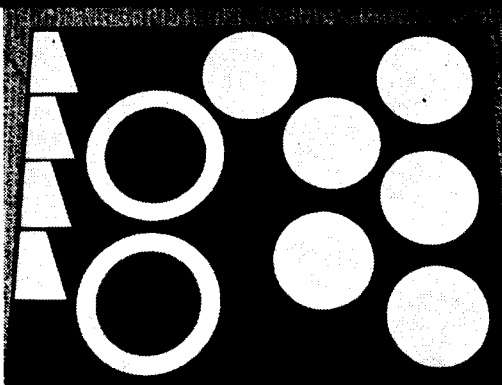


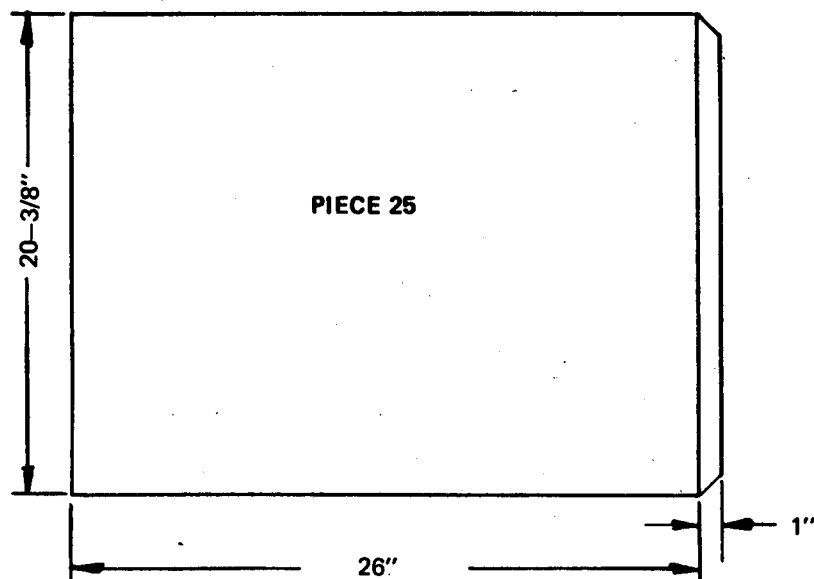
PIECES 26, 27,
28, 29, 30, 31



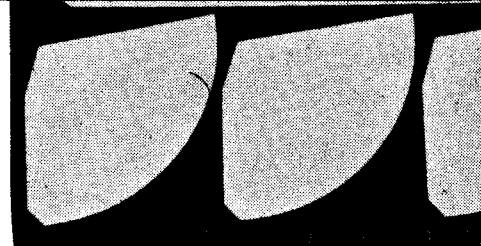
PIECES
17, 18, 19, 20

11. Pieces No. 13, 14, 17, 18, 19, 20, 26, 27, 28, 29, 30 and 31 are also cut from the Matte board.

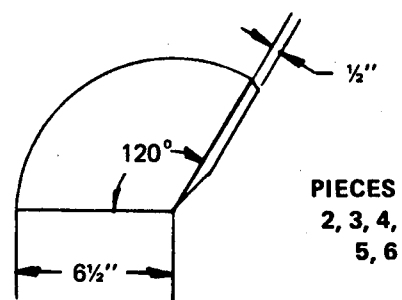




12. Pieces No. 15A and 25 are cut from first piece of the 2-ply Strathmore.

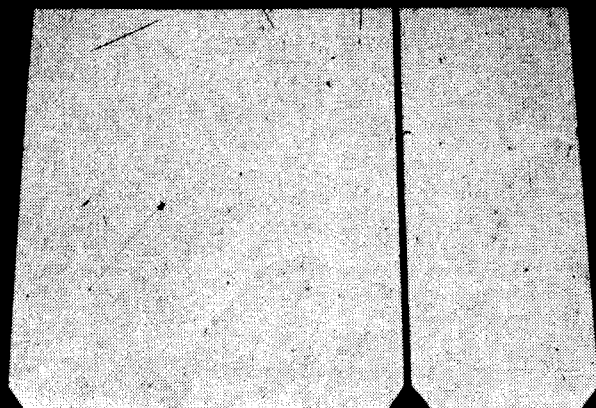


13. Pieces No. 2, 3, 4, 5 and 6 are cut from the second piece of 2-ply Strathmore.

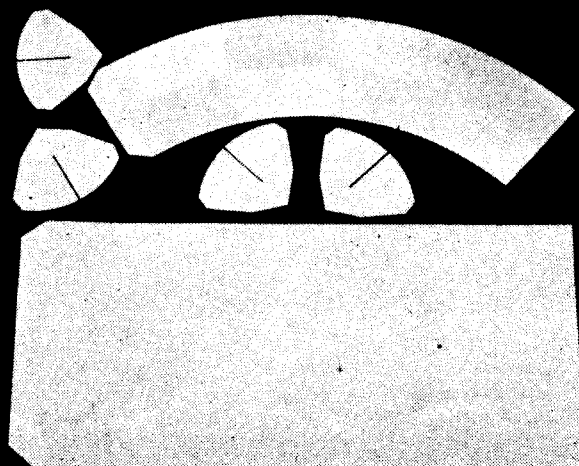


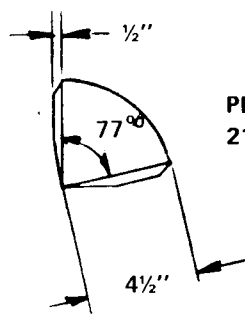
PIECES
2, 3, 4,
5, 6

14. Pieces No. 32 and 33 are cut from the third piece of 2-ply Strathmore.

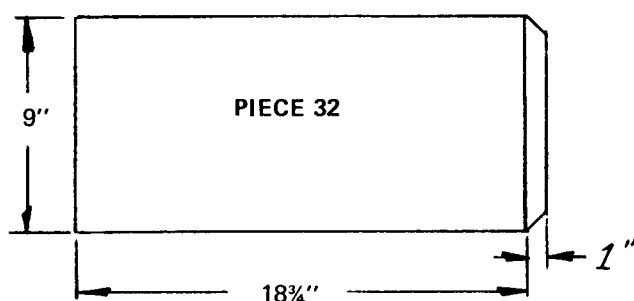
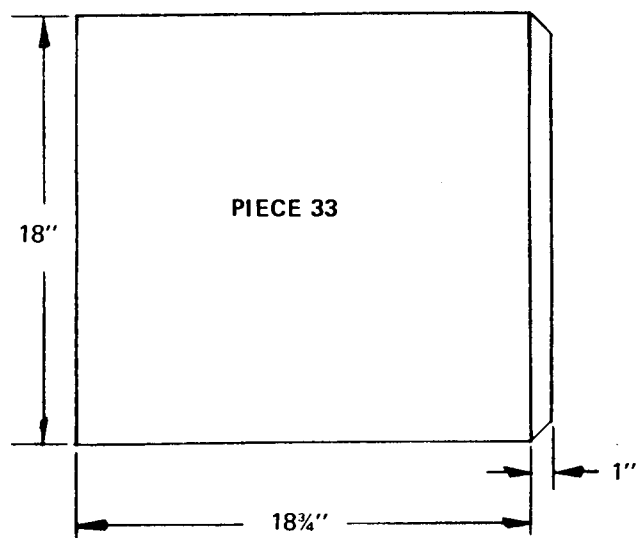
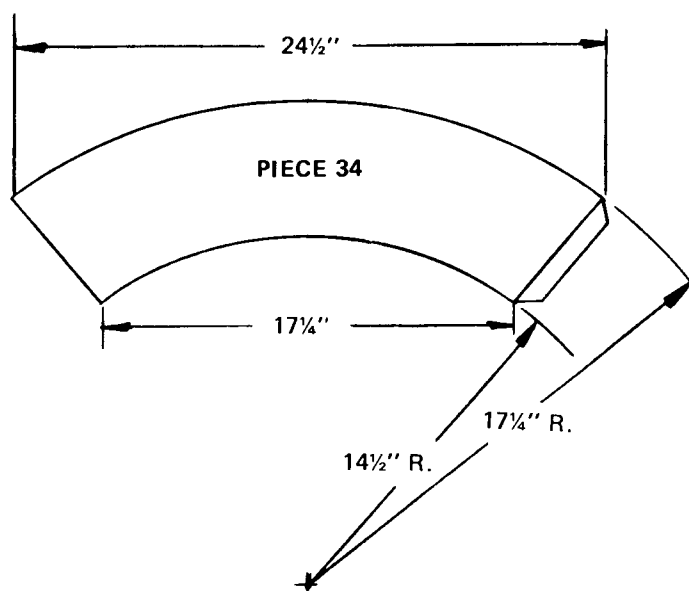


15. Pieces No. 16, 21, 22, 23, 24 and 34 are cut from the fourth piece of 2-ply Strathmore.

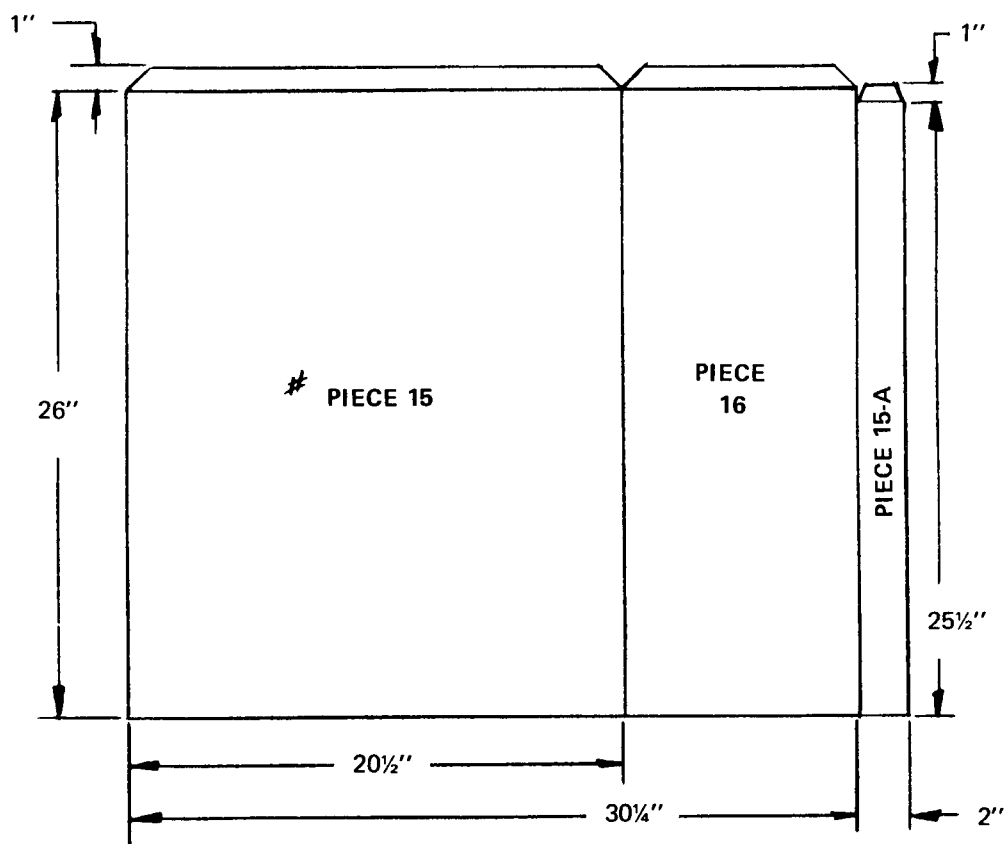


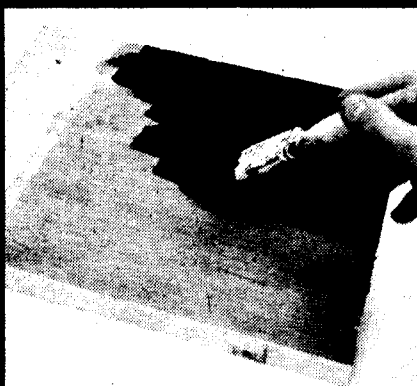


PIECES
21, 22, 23, 24

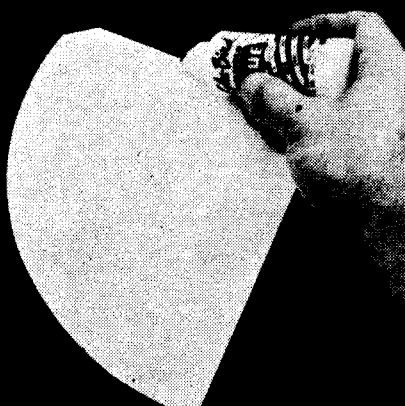


16. Piece No. 15 is cut from the fifth piece of 2-ply Strathmore..

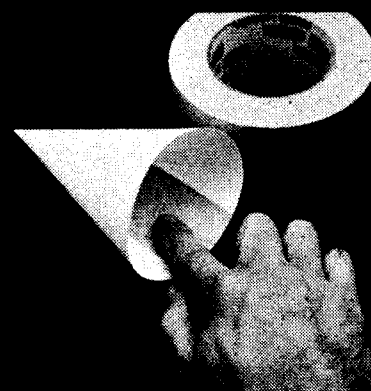




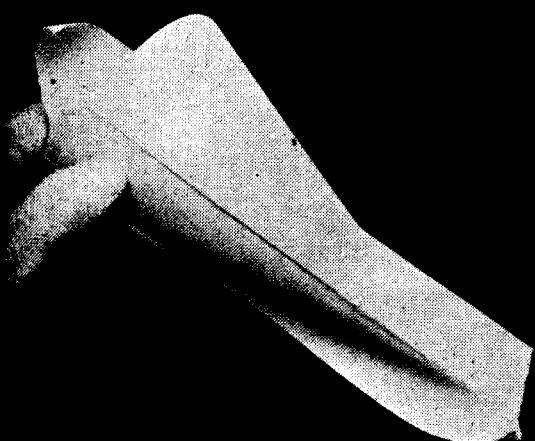
17. Piece No. 1 is the 11½" length of 1" x 12" board. Sand all edges smooth and paint with flat black latex wall paint.



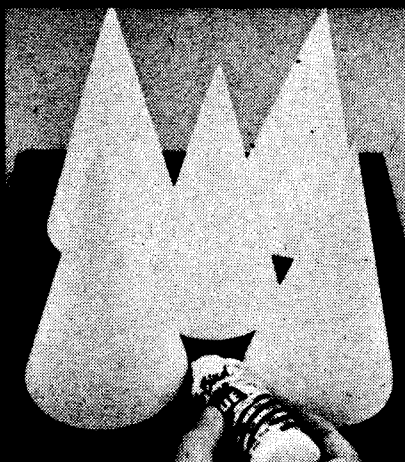
18. Apply a thick bead of white glue to the flap on cones No. 2, 3, 4, 5, and 6 and spread it evenly with a finger tip.



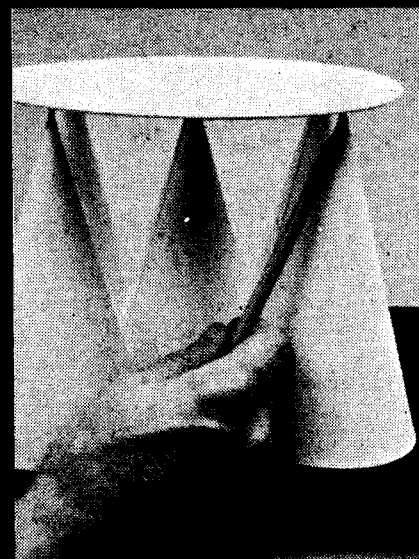
19. Wrap cone into its conical shape so straight edge meets line just beside flap and tape with 1½" masking tape on the inside.



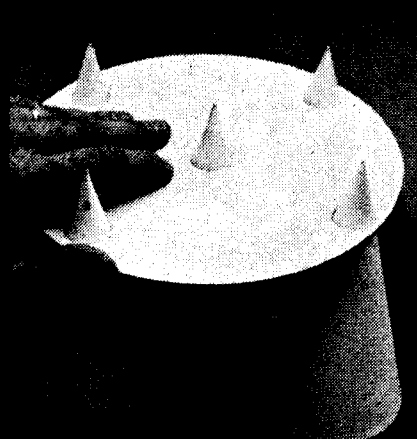
20. Apply a rough piece of 1½" masking tape to outside of cone to hold material in place over flap while glue dries. Remove outer tape only after glue has dried overnight.



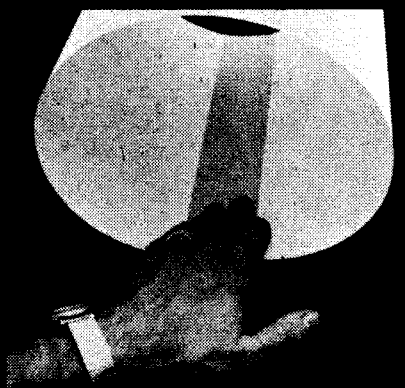
21. Glue all five cones, No. 2, 3, 4, 5 and 6 to board No. 1 with a bead of white glue around base of each cone. Place one cone in direct center of No. 1 and position other four in an exact square around center cone. Place a heavy book over tips of cones while glue dries.



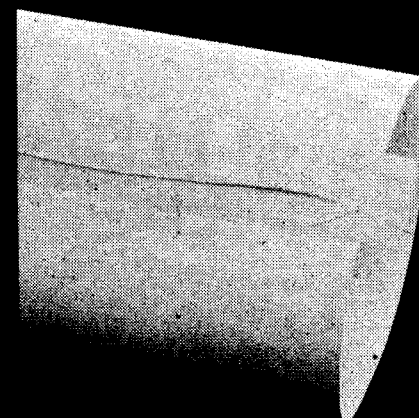
22. Place piece No. 7 over cones with its center over tip of center cone. Mark where each cone tip hits No. 7 with a light pencil mark.



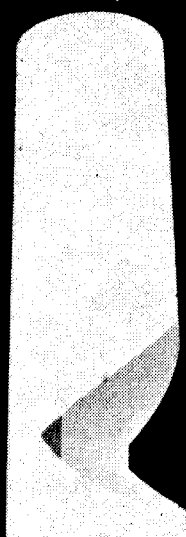
23. Use the sharp hobby knife to cut a 1" hole with the just-marked pencil area as the center of each hole and test fit over cones. Enlarge any holes necessary to allow No. 7 to rest perfectly parallel to board No. 1.



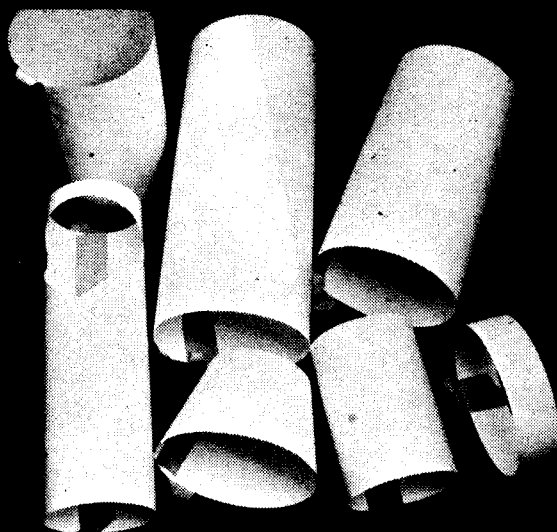
24. Wrap all tubes (Nos. 15, 15A, 16, 25, 32, 33, and 34) so that the line at the edge of the flap just touches the opposite edge of piece. Apply a thick bead of glue to flap, spread it over flap area evenly, then apply a piece of 1½" masking tape the full length of each tube on the inside.



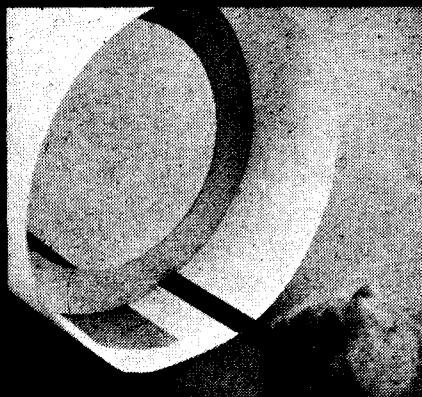
25. Temporarily apply a second strip of 1½" masking tape to the outside of each tube to hold tube edge and flap together while the glue dries overnight.



26. Tube No. 33 is assembled exactly as others. (Ignore unnecessary notch cut from this tube — it will be hidden inside parts number 16 and 34 when our Saturn is fully assembled and should not be cut from your tube No. 33.)



27. All tubes can be taped and glued at one time so the glued joints on each will all be dry and ready for further assembly. All outer strips of masking tape must be carefully pulled off when glue is fully dried.



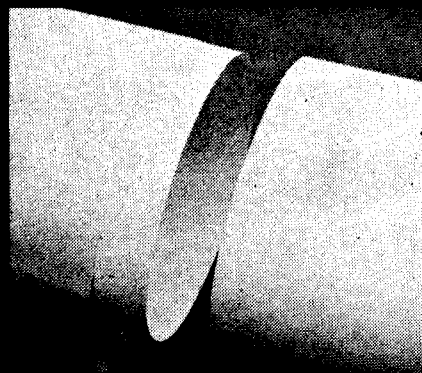
28. Position one of the O-shaped rings (No. 9, 10, 11, 12, 13 or 14) 3" in from one end of tube No. 15. Check 3" measurement all around edge of tube to be sure ring is correctly aligned inside tube.



29. Apply a thick bead of glue all around joint between ring and tube wall.



30. Smear an even coat of white glue just inside the bottom edge of tube and insert a second O-shaped ring so it fits exactly flush with bottom edge of tube No. 15.



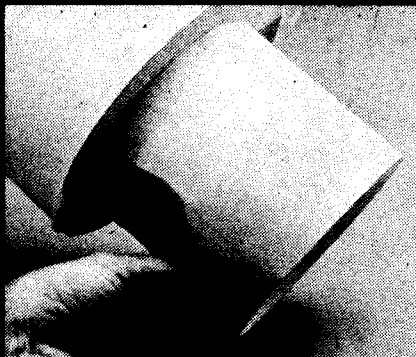
31. Insert another of the O-shaped rings about 3" in from opposite end of tube No. 15 and glue. Smear glue all around inside of the same end of tube and slip short tube No. 15A inside tube No. 15. Smear glue around protruding 1" of 15A and then slip tube No. 16 over the glue-smear end of tube No. 15A so tubes No. 15 and No. 16 form a single 17½" long tube, with No. 15A serving as a reinforcing and joining tube inside.



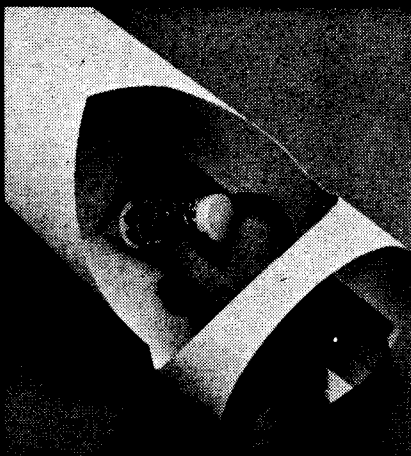
32. Insert disc No. 7 into open end of tube No. 16 and position exactly ½" in from edge. Apply a bead of glue around joint between disc and tube.



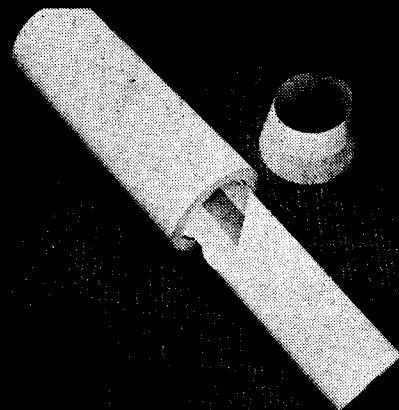
33. Glue two of the O-shaped rings in one end of tube No. 25, with one 3" in from end and the other flush with the end. On opposite end of tube, glue disc No. 8 inside tube No. 25 exactly 3" in from end. Finally, glue another of the O-shaped rings to the edge of tube 25 just above disc No. 8 — this will be the TOP end of tube No. 25.



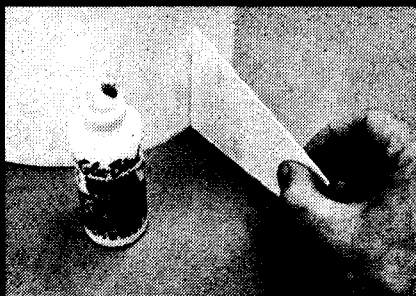
34. Glue three discs (No. 26, 27 and 28) inside tube No. 32, with one disc midway down tube and the other two spaced exactly $\frac{1}{4}$ " in from each end. Glue tube No. 32 inside of end of tube No. 15, leaving about $4\frac{1}{2}$ " of tube No. 32 protruding, as shown. Masking tape can be used to hold these two tubes in alignment until glue dries. Then tape can be removed.



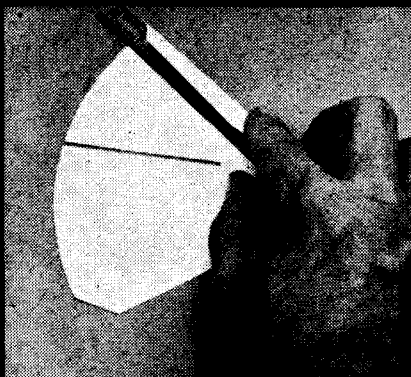
35. Insert the remaining three discs (No. 29, 30 and 31) inside tube No. 33. Place disc number 30 near center of tube and glue as shown. Glue discs No. 29 and No. 31 exactly $\frac{1}{4}$ " in from each end of tube.



36. Apply a thick bead of glue to one end of tube No. 33 and insert it into the TOP end of tube No. 25, with the end of tube No. 33 glued against disc No. 8. Apply a bead of glue around top joint between two tubes. Glue the large end of tube No. 34 to the top of tube No. 25..



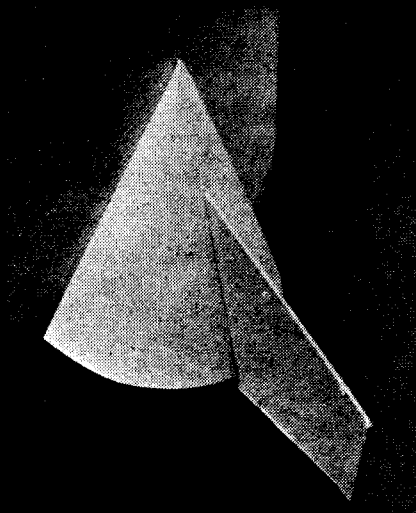
37. The four rocket engines around the outer edges of the Saturn V rocket are fitted around the fins at its base. No. 17, 18, 19 and 20 are glued in position shown, spaced $4\frac{5}{8}$ " apart, around bottom (end with piece No. 7 in place) of tube No. 16, next to outer holes in piece No. 7.



38. Rocket engines on edges of Saturn V are simulated with half-round cones No. 21, 22, 23 and 24. Fold flap on each side of these pieces over a steel straight edge to form a smooth crease.



39. Hand form each of the half-round cones and their flaps into the shape of those in photo.



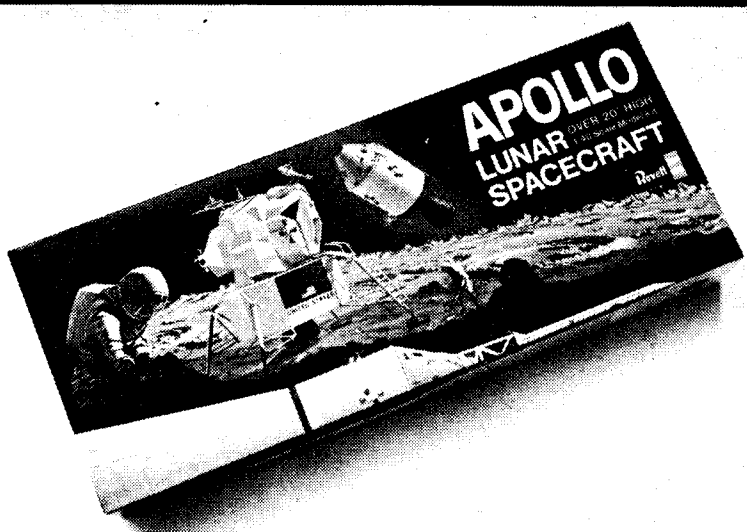
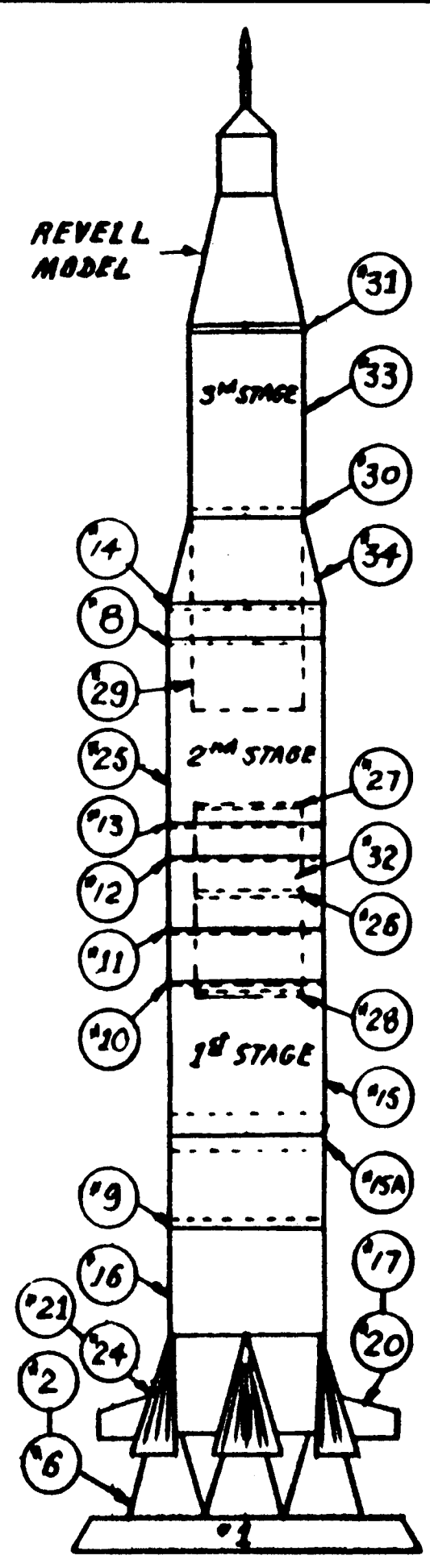
40. Tape each of the flaps under half-round cones to side of tube, then run a bead of glue down outside joint between cones and tube, and between cones and fins.



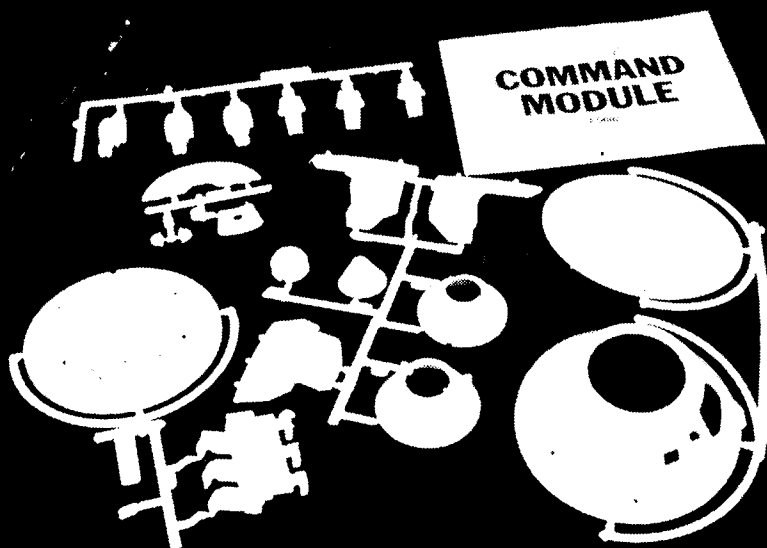
41. Black area on sides of piece No. 34 is 1" wide black "Mystic" tape. Apply tape in four rows, leaving ends rough until all four rows are in place.



42. Trim off ends of tape with a hobby knife so all are even and smooth out any wrinkles in tape. 1" black tape is also used around base of tube No. 25 and to hold Saturn/Apollo Adaptor section of Revell Apollo kit to top of tube No. 33. All other black areas are formed with the $1\frac{1}{2}$ " black "Mystic" tape.



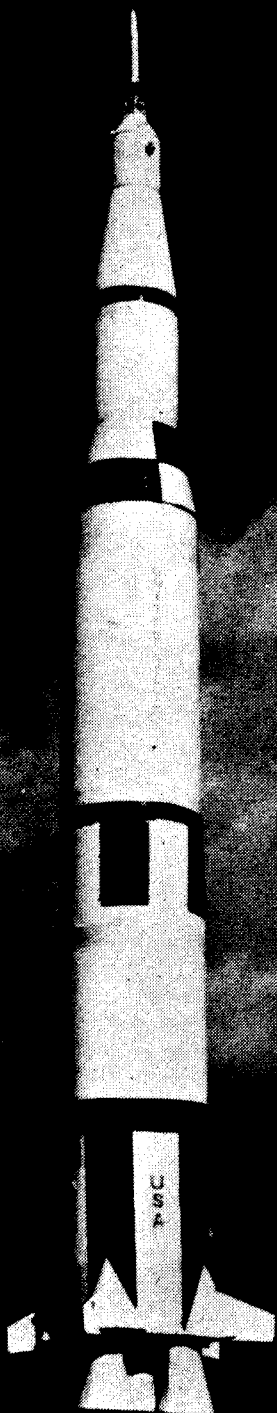
43. Revell Apollo Lunar Spacecraft kit is same 1/48 scale as the Saturn V rocket you just completed. Kit includes the final stage of Saturn rocket and the LM Adaptor, as well as the complete Apollo hardware.



44. Each module of the Revell Apollo kit is individually wrapped and labeled inside kit.



45. Saturn V and the Revell Apollo modules assemble as shown, with base No. 1 and cones at bottom, then tubes No. 15 and No. 16 forming the first (S-IC) stage of the Saturn V. Tubes No. 25, No. 34 and No. 33 form the second (S-II) and third (S-IVB) stages of Saturn V. The Revell Apollo forms the final stage of the spacecraft. With only the Revell Saturn/Apollo Adaptor permanently attached to our miniature Saturn V, the various Apollo modules can be easily removed to demonstrate the final maneuvers in the first American manned flight to the moon's surface. . . our paper and cardboard Saturn can, thus, be considered as a realistic display stand for the Apollo kit.

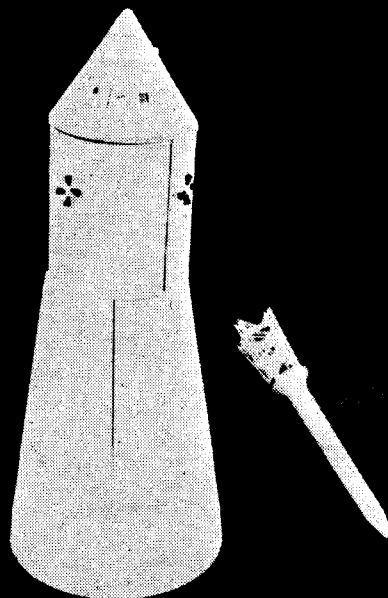


46. Our 1/48 scale Saturn was built to demonstrate the Apollo mission from lift-off to splash-down. Let's follow it through. . . The belching clouds of flame and unburned oxygen are simulated with Xmas-time "Angel Hair", painted in bright orange and yellow near rockets.

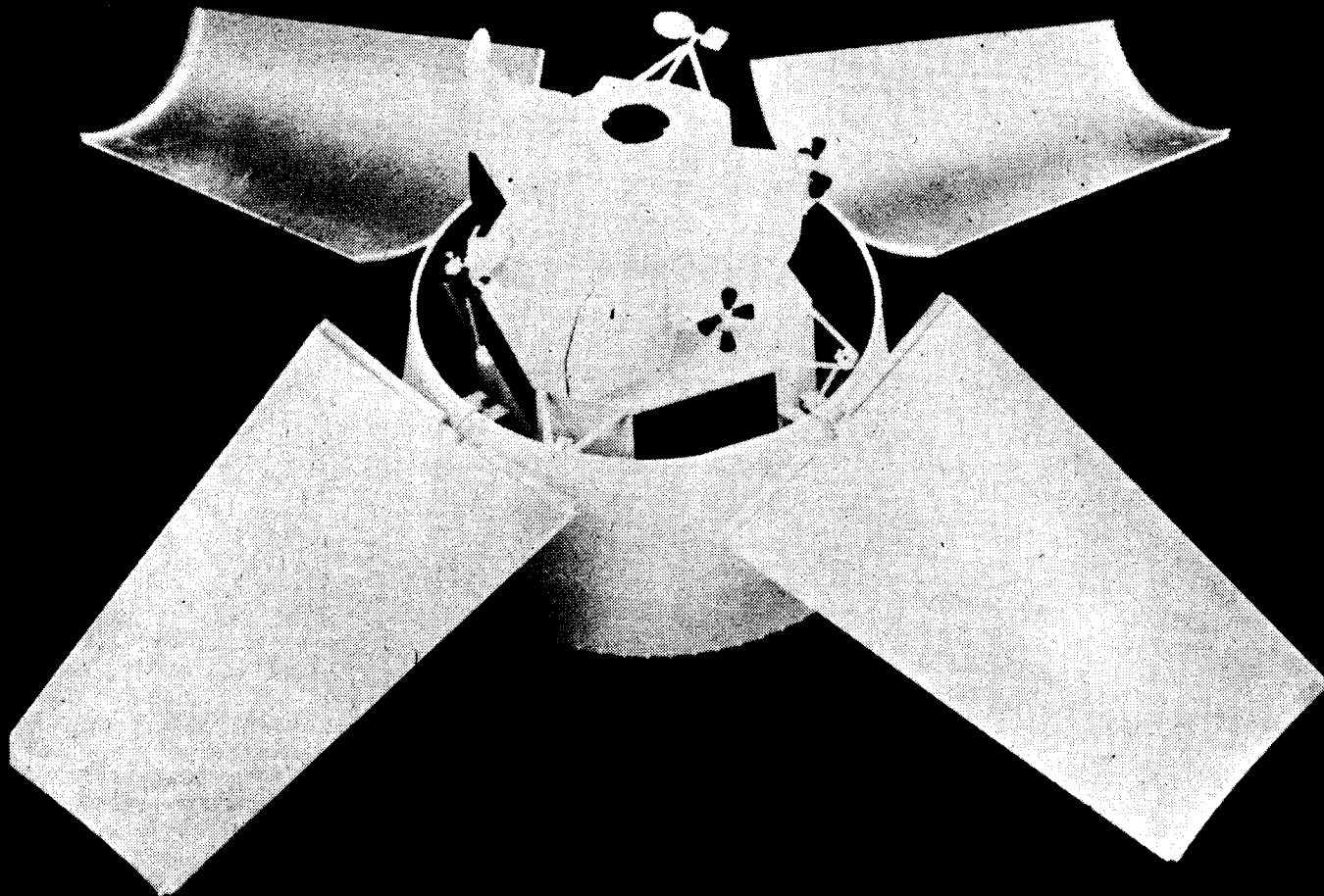
47. About 2½ minutes after lift off, and about 38 miles above the earth, the first stage separation occurs.



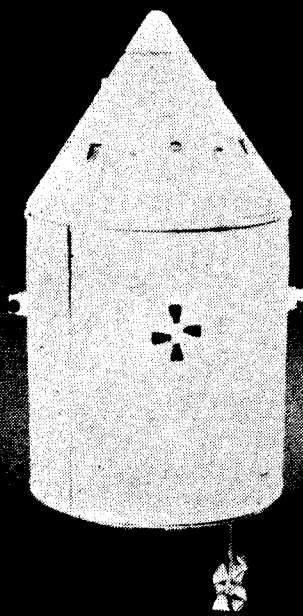
48. The Revell Apollo kit includes the oil derrick-like tower at the very tip of the Saturn V/Apollo, called the "LES", or "Launch Escape System". In the event the mission had to be aborted prior to about 3 minutes after lift off, the LES would be ignited to carry the three man crew in their Command Module away from the Saturn V rocket.



49. After about three minutes of flight, the normal Service Module and Command Module separation and re-entry systems can be used. The LES, although considered as part of the Apollo hardware, is jettisoned just after the first stage separation.

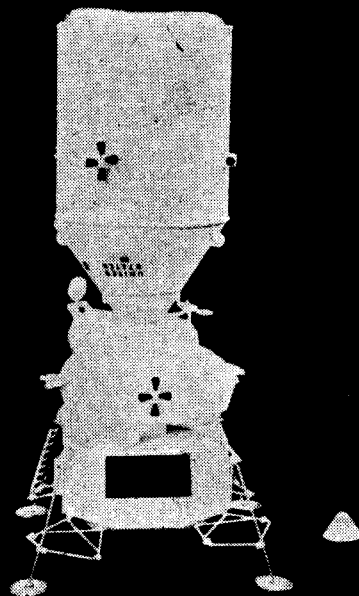


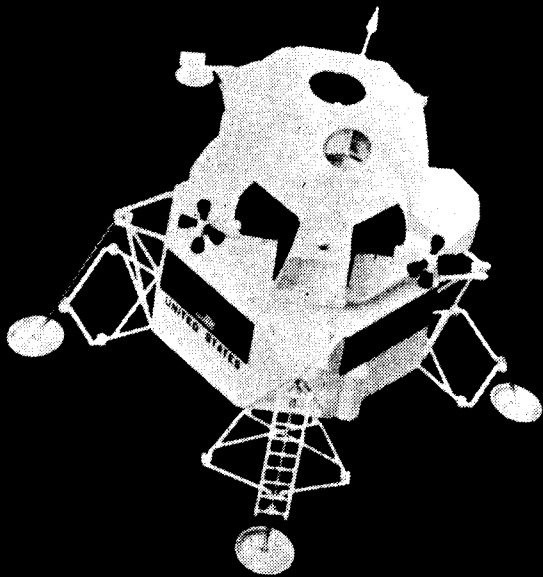
50. About 6½ minutes after lift off, the second stage separation occurs, with the S-IVB stage of the Saturn V (tube No. 33 on our model) and Apollo continuing on. This, the third stage of the Saturn V flight plan, achieves the final earth orbit, stabilizes and fires again on a lunar trajectory. After the third stage begins coasting toward the moon, the Apollo/Saturn Adaptor Section separates from the CSM (Combined Service and Command Modules) and the Adaptor Section opens up to allow the CSM access to the LM (Lunar Excursion Module) housed inside.



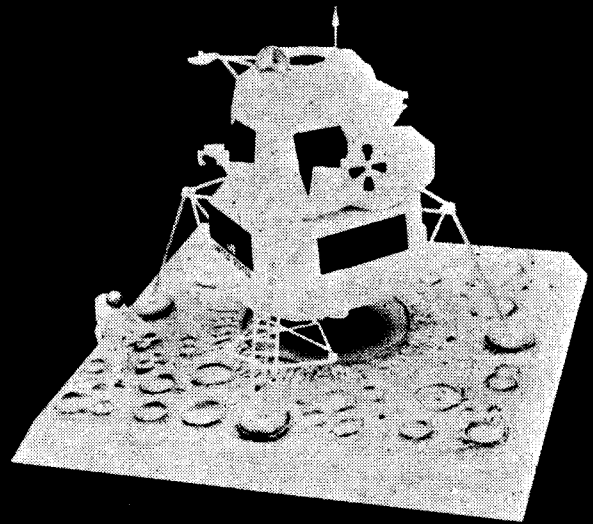
51. The CSM makes a complete turn in space and heads back toward the Saturn/Apollo Adaptor Section.

52. The CSM docks with the LM and heads toward the moon to achieve a lunar orbit, with the CSM engine providing the boost. As the combined LM and CSM reach lunar orbit, the engine of the CSM is fired for about 6 minutes to brake the spacecraft into a circular orbit. Two of the three astronauts now crawl through the docking hatch into the LM, leaving the third in the CSM.

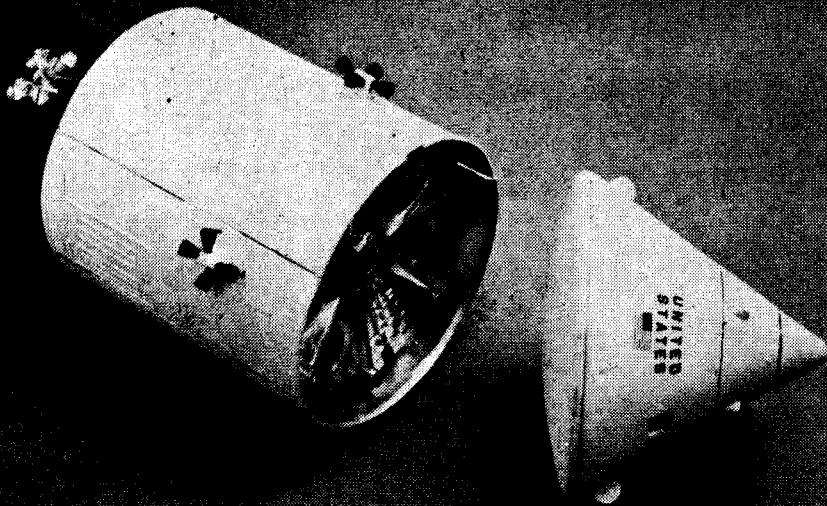




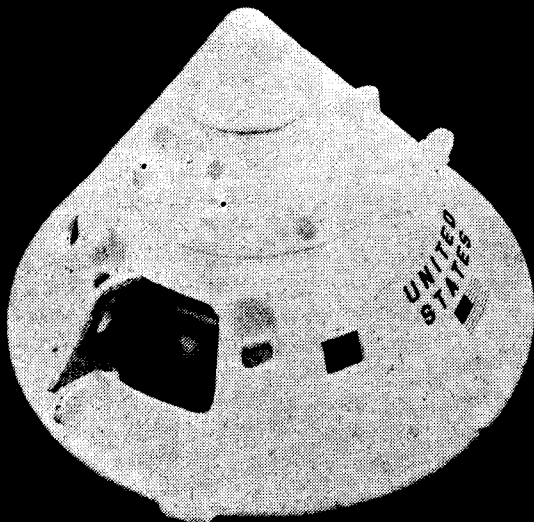
53. The LM uncouples from the CSM and descends into an elliptical lunar orbit in preparation for the final descent onto the moon's surface. The descent engine on the bottom of the LM brakes speed of the LM's descent. The groups of four black, horn-like engines on four sides of the LM are the RCS, or "Reaction Control System", which allows the LM to be maneuvered above the lunar surface, much like a helicopter.



54. After lunar touchdown, one of the astronauts at a time disembarks from the LM to explore the Moon on foot. The third astronaut remains in lunar orbit in the CSM. The lunar lift-off must be timed to allow the LM to meet with one of the CSM's lunar orbits. Only the top half of the LM lifts off, using the leg-equipped landing stage as a launching pad. The top half of the LM then redocks with the CSM and the two astronauts join their orbiting partner in the Command Module of the CSM. The LM is then discarded and the CSM ignites and is maneuvered into a trajectory toward the earth.



55. Just before entering the earth's atmosphere, the Service Module is jettisoned from the Command Module. The CM then has about three minutes to reorient itself, through the use of small RCS engines, so its thick, heat-shielded, base is forward. As the CM descends from the start of the earth's atmosphere (about 76 miles up), its friction through the atmosphere will result in about 4500-degrees F temperatures on its base. The final braking of the CM is done by three parachutes until splash down in the blue Pacific.



56. The three astronauts will exit through the top of the CM. The operating door on the Revell model is used for their initial entry into the capsule just prior to lift-off.

EDITOR'S NOTE: Since this is the most spectacular building project we've ever encountered, we'd like to see how YOUR 8 foot Apoppo/Saturn looks. . . So, if you'll send us black and white photos of your completed models, built from this article, we'll publish some of them in a future issue.