

Precision Paper Space Models

ATLAS CENTAUR 10 LAUNCH VEHICLE



This 1/96 scale Paper Space Model represents Atlas Centaur 10 (AC-10), the rocket that launched NASA's Surveyor 1 lunar lander from Cape Canaveral Launch Complex 36A on 1966 May 30. AC-10 was the first operational mission for Centaur, the world's first liquid hydrogen-fueled rocket stage. The flight followed a difficult, costly, seven-flight, four year Atlas Centaur test effort.

The six page model can be printed on 20-24 pound paper. Some modelers have reported interesting results using silver paper for the stainless steel Atlas components. To assemble, you will need a pair of scissors and/or a hobby knife, rubber cement, white paper glue, a toothpick or narrow strip of paper, a dowel rod or a round pen or pencil, and some cardstock (ie, several 3 x 5 cards).

The model's Centaur stage is detachable. Forward and aft cardstock bulkheads and double-wrapped tubes create sturdy Atlas and Centaur bodies. When assembled, the model stands 13.54 inches tall and is 1.25 inches in diameter.

MODEL ASSEMBLY INSTRUCTIONS

This model can be assembled with rubber cement, white paper glue, or a combination of the two. White paper glue sets faster than rubber cement, but can wrinkle paper. Rubber cement takes longer to set, but the result is usually stain and wrinkle-free. In the following instructions, the term "cement" is used whenever rubber cement is thought to be the preferred method. The term "glue" means that white paper glue should be used.

ATLAS (FIRST STAGE) ASSEMBLY



1. Cut out Atlas body and Atlas forward and aft bulkhead mounts (Page 1). Trace bulkhead mount outlines on body underfold section on opposite side of page with pencil. Cement adapter mounts to opposite side of gray areas, to what will become the inside of the body tube.

2. Roll Atlas body into a double-layered tube without cementing, then apply rubber cement sparingly with toothpick or small strip of paper at seam only. Use pen or dowel rod inside tube to assist. Clean excess glue with tissue paper. Finish by gluing loose underfold sections at

each end

of the body tube. Use toothpick or small strip of paper to insert glue.

3. Cut out Atlas Forward LOX and Aft bulkheads (Page 2) and cement to a single layer of cardstock. When dry, cut out Forward LOX Bulkhead, roll into cone shape, and glue. When dry, insert into top of Atlas body against Atlas forward bulkhead mount. Trim or sand the bulkhead slightly to get a good fit, if necessary. Apply glue to top of bulkhead once in place. Cut out Atlas Aft bulkhead and glue into place at base of stage against triangular attach tabs, lining up engine fairing base with white engine fairing outlines on side of stage.

4. Cut out Atlas-Atlas Centaur Interstage Adapter (Page 2). Roll and cement to inside top of Atlas main tank body tube, allowing half of adapter to extend from tube.

5. Cut out Atlas Centaur Interstage (Page 2). Roll and cement into a a double-layered cylinder as in Step 1.

When dry, attach to top of Atlas by carefully aligning tube seams and cementing to Atlas-Atlas Centaur Interstage Adapter.

6. Cut out Atlas Centaur Interstage-Centaur Adapter (Page 2) and cement to card stock. When dry, roll and cement to inside top of Interstage, allowing smaller portion to extend from tube.

7. Cut out long and short instrumentation pods (page 3). Fold and cement/glue into long rectangular channels topped by tapered triangular transition sections. Cement into place on opposite sides of Atlas main tank at positions shown. Center the long pod on the Atlas body seam. The bottom of each pod should be at the top of the "ribbed" booster skirt (second line from the missile base). Press the pods firmly against the side of the tank, then press the tapered triangular transition section of each pod into place.

8. Cut out two booster skirt fairings (page 3). Fold in tabs on each side of fairing. Roll fairing slightly until it assumes a tapered cylindrical shape. Test fit fairing by inserting its top, up to the top line on the fairing, into open base of instrumentation pod and by aligning its base with the Aft Bulkhead. Carefully cement/glue both fairings into place, being sure to center the fairing top and bottom.

9. Cut out LOX pipe (Page 4). Roll pipe into tight cylinder and cement. Cement LOX pipe to side of Atlas main tank on black line, seam side inward. LOX pipe carried liquid oxygen around fuel tank from the upper LOX tank during fueling on pad and in flight.

10. Cut out two vernier fairings (Page 4). Fold and glue into tapered triangular shape. Attach to opposite sides of Atlas main tank just above booster fairing (second line up from base of missile). The small 1000 pound thrust, 45 degree angle vernier motors were mounted on these fairings.

11. Cut out Rocketdyne LR105-5 sustainer engine (page 4). Roll into truncated cone, underfolding inner layer so "B" lines up with "A". Cement underfold end at bottom of thrust chamber. Cut upper adapter strips and fold inward. Glue engine to center of aft bulkhead. The sustainer engine stayed attached to the Atlas body during the flight.

12. Cut out two Rocketdyne LR89-5 booster engines (page 4). Assemble using sustainer engine procedure. Attach engines to outer positions of aft bulkhead. The booster engines and booster skirt fell away from Atlas after a little more than two minutes of flight.

CENTAUR (SECOND STAGE) ASSEMBLY



13. Cut out the Centaur Body and Centaur Forward and Aft Bulkhead Mounts (Page 5). Trace bulkhead mount outlines and attach as in Step 1.

14. Roll and cement Centaur Body into a double-layered cylinder as in Step 1.

15. Cut out Centaur LH2 Tank Forward Bulkhead, Centaur Thrust Structure Base, and Centaur Thrust Structure (Page 6). Cement all three parts to card stock.

16. When dry, cut out LH2 Forward Bulkhead from card stock, roll into cone shape, and glue. When dry, insert into top of Centaur body against Centaur Forward Bulkhead Mount. Trim or sand the bulkhead slightly to get a good fit, if necessary. Apply glue to top of bulkhead once in place.

17. Cut out Centaur Thrust Structure from card stock, roll into truncated cone, and glue.

18. Cut out Centaur Thrust Structure Base Adapter (Page 6). Roll and insert into Centaur Thrust Structure so that triangular attach tabs extend from bottom, smaller diameter end.

19. Cut out Centaur Thrust Structure Base from card stock. Align Base so that the Centaur Body seam lines up with an imaginary line passing through the two RL-10 mounting points. Glue to attach tabs extending from bottom of Centaur Thrust Structure.

20. When dry, insert Thrust Structure into base of Centaur body against Aft Bulkhead Mount. Trim or sand if

needed. Glue into place, leaving no excess glue. This will ensure a snug Centaur/Interstage press fit later.

21. Cut out Centaur-Fairing Adapter (Page 5). Cut upper portion into strips. Roll into Cylinder, insert into top of Centaur Body allowing attachment strips to extend from top, and cement.

22. Cut out Payload Fairing Nose (Page 6). Roll into cone, then sparingly apply cement to underfold section at seam and at base.

23. Attach Payload Fairing Nose to top of Centaur by applying cement to attach strips. Align Nose seam and roll bars with Centaur seam and roll bars.

24. Cut out Centaur LH2 Tank Insulation Panels (Page 5). Wrap around grey part of Centaur body, aligning seams, and cement in place.

25. Cut out RL-10 Nozzles and Thrust Chambers (Page 6). Roll Nozzles into cone and cement. Roll Thrust Chambers into cylinders and cement. When dry, glue Thrust Chambers to top of Nozzles.

26. When dry, glue RL-10 engines to Centaur Thrust Structure Base on the black circles.

27. When Atlas and Centaur are both dry, test fit Centaur to top of Atlas Interstage. If necessary, trim interior adapter slightly with scissors to allow for a tight fit. This is meant to be a friction fit.

Do not glue if you would like to be able to remove Centaur later.

28. Atlas Centaur 10 is ready to launch!

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