

Precision Paper Space Models

ATLAS AGENA-D LAUNCH VEHICLE



This 1/96 scale Paper Space Model represents the Atlas Agena-D that launched Gemini Agena Target Vehicle (GATV) 5003 for NASA's Gemini 8 mission on March 16, 1966 from Cape Canaveral Launch Complex 14. GATV-5003 served as the passive target for the world's first successful space docking that day, then remained operational to serve as a rendezvous target for Gemini 10 several months later. GATV-5003 was the second of [six Atlas Agena-D vehicles used during the Gemini program](#).

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 Agena-D stage is detachable. Forward and aft cardstock bulkheads and double-wrapped tubes create sturdy stage bodies. When assembled, the model stands 13.1 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 bulkhead mount (Page 1). Trace bulkhead mount outline on body underfold section on opposite side of page with pencil. Cement adapter mount to opposite side of gray area, 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 and Aft bulkheads (Page 2) and cement to a single layer of cardstock. When dry, cut out Forward Bulkhead and 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 Main Tank Cylinder/Tapered Section Adapter (Page 2). Roll and cement to inside top of Atlas main tank body tube, allowing feathered half of adapter to extend from tube.

5. Cut out Atlas Main Tank Tapered Section (Page 2). Roll and cement into a double-layered conic section as in Step 1. When dry, attach to top of Atlas Main Tank Cylinder by carefully aligning tube seams and cementing to the Adapter.

6. Cut out Atlas Tapered Section Upper Adapter (Page 2). Roll and cement to inside top of Tapered Section, allowing feathered 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.

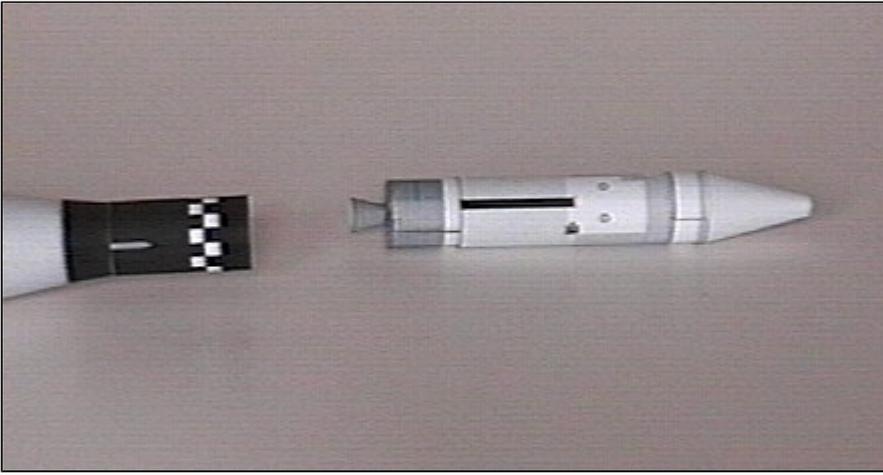
12. Cut out two Rocketdyne LR89-5 booster engines (page 4). Assemble using sustainer engine procedure. Attach engines to outer positions of aft bulkhead. The booster engines and booster skirt fell away from Atlas after a little more than two minutes of flight.

INTERSTAGE ASSEMBLY

13. Cut out tapered Atlas/Agena-D Interstage Adapter (Page 5). Roll, cement, then cement to Atlas Tapered Section Upper Adapter at top of tapered Atlas tank section.

14. Cut out Atlas/Agena-D Interstage Upper (Cylinder) section (Page 5). Roll, cement, then cement to portion of Atlas Tapered Section Upper Adapter that extends from top of tapered Interstage Adapter. Align Interstage seam with Atlas seam.

AGENA-D (SECOND STAGE) ASSEMBLY



15. Cut out Atlas Agena-D Upper Body (Page 5). Roll and cement into a double-layered cylinder as in Step 1.
16. Cut out Agena-D Lower Body (Page 5). Roll and test fit into bottom of Agena-D Upper Body. When fit is snug, cement Lower Body into a cylinder, then cement top of Lower Body into bottom (black striped portion) of Upper Body.
17. Cut out Agena -D base (Page 5) and cement to card stock. Cut out again and glue to base of Agena-D Lower Body.
18. Cut out Agena -D Nose Cone (Page 5). Roll into cone, then sparingly apply cement to underfold section at seam and at base.
19. Attach Nose Cone to top of Agena-D by applying cement to attach strips. Align Nose seam with Agena body seam.
20. Cut out Agena-D Nose Cone Cylinder Overwrap (Page 5). Wrap around "NC" part of Upper Agena-D body, aligning seams, and cement in place.
21. Cut out Agena-D Nose Cone Top (Page 5) and cement or glue to top of nose cone.
22. Cut out Bell engine Nozzle (Page 5). Roll into cone and cement. When dry, glue to center of Agena-D base.
23. When Atlas and Agena are both dry, test fit Agena 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 Agena later.
24. Atlas Agena-D is ready to launch!

HISTORY

NASA selected Atlas Agena-D to launch Gemini Agena Target Vehicles (GATVs) during the manned Gemini program. GATVs were launched from Cape Canaveral LC 14 while Gemini crews waited atop their Gemini Titan 2 vehicles on LC 19 a few miles up the coast. If all went well, the Gemini Titan would liftoff about 1.5 hours later as GATV completed its first orbit.

Although the program was eventually successful, two of the first three GATV launches failed. An Agena engine "hard start" kept GATV 5002 from orbiting for a planned docking with Gemini 6 in October 1965, forcing NASA to improvise the subsequent Gemini 6-7 rendezvous mission. GATV 5003, with redesigned engine start valve sequencing, successfully made it to orbit on March 16, 1966 for the first space docking with Gemini 8.

Two months later, GATV 5004 failed to orbit for Gemini 9 when its Atlas booster failed. Gemini 9 subsequently rendezvoused with, but was unable to dock with, a hastily devised, Atlas boosted "Augmented Target Docking Adapter", which did not use an Agena stage.

The last three GATV launches were trouble free. Gemini 12 used GATV 5001R, a refurbished stage initially used for ground testing.

Atlas Agena-D (GATV) Firing History

Mission	Date	Site	Comments
GATV 5002	10-25-65	CC14	Failed to orbit. Agena exploded due "hard start". (Gemini 6)
GATV 5003	3-16-66	CC14	Success. Docked with Gemini 8.
GATV 5004	5-17-66	CC14	Failed to orbit. Atlas booster engine gimballing hard over 10 sec before staging. (Gemini 9)
GATV 5005	7-18-66	CC14	Docked with Gemini 10.
GATV 5006	9-12-66	CC14	Docked with Gemini 11.
GATV 5001R	11-11-66	CC14	Docked with Gemini 12.

===== CC = Cape Canaveral

Last Update: January 10, 2003