

Assembly Instructions for the Moon Rocket "Friede"

The story of the *Friede*

In 1929 Fritz Lang (director of *Metropolis*) released a silent film about space travel, *Frau im Mond* or *Woman in the Moon*. Lang had great ambitions for the project, and as technical advisor he engaged Germany's leading rocketry expert, Hermann Oberth.

The plot of *Woman in the Moon* follows a group of six people who undertake a hazardous journey to the Moon to search for gold deposits believed to exist there. Their rocket, named *Friede* after the only woman in the crew, is launched with great public fanfare (including a launch countdown, used for the first time in this movie). Upon reaching the Moon, they discover not only gold, but a breathable atmosphere (one of the movie's few scientific errors). Conflict develops among the crew; two are killed and part of the ship's oxygen supply is lost. In the film's climax the crew must decide who among them will return to Earth.

Woman in the Moon was the first serious depiction of space flight in film, and was unequalled in its realism until the movie *Destination Moon* of 1950. The rocket Oberth designed for the film was based on his own theoretical model for a lunar rocket, and many of its features — fin stabilization, liquid-fuelled engines and multiple stages — looked forward to later spacecraft designs. It was so accurate, in fact, that when the German military began its own rocket program the scale model, diagrams and prints of the film were regarded as state secrets and confiscated by the police.

In addition to his technical advice, Hermann Oberth was asked to build a real rocket to be launched as a publicity stunt at the premiere of the movie. Though this stunt rocket was not completed in time for the opening, work was continued by Oberth and other rocket enthusiasts (including a teenager named Wernher von Braun). Oberth and Von Braun contributed to many of the advances in German rocketry during the 1930s and '40s and both later worked for the American government. They, along with Fritz Lang, lived to see their vision made real with the Apollo 11 lunar landing in 1969, forty years after the release of *Woman in the Moon*.

The Model

This model builds into a 1/144 scale replica of the *Friede* with a height of about twelve inches and a base width of over four inches. Optional parts are provided to allow a detachable crew module and 3-dimensional engine exhausts. A word of caution: this is not suitable for assembly by young children, due to the use of sharp tools and the complexity of some assembly steps. It is recommended for those with some previous experience in card modeling. If you have any comments or suggestions regarding this kit, I can be reached by e-mail at models@currell.net

This document contains the instructions only. Model parts are contained in the document `fr_parts.pdf`.

Print out the parts document on 8.5"x11" or A4 size white card stock suitable to your printer. **Note:** four copies of parts sheet **E** are required, and sheet **F** is only needed if building the model with detachable top stage or 3-dimensional engine exhausts.

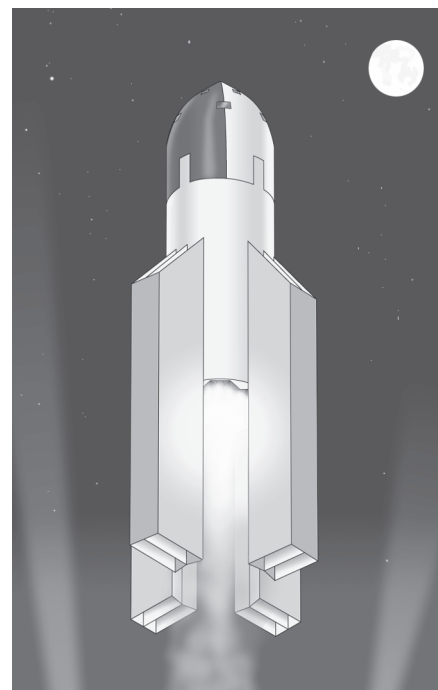
Tools

Before beginning, you will need the following tools and materials:

- a) white glue
- b) a glue applicator such as wooden toothpicks or a small paintbrush
- c) scissors (optional)
- d) a sharp knife for cutting
- e) a flat cutting surface
- f) a ruler or straight edge
- g) a scoring tool or blunt knife for creasing the fold lines
- h) a long, slender tool such as a letter opener, for applying pressure to hard-to-reach places

Hints

- a) Select a well-lit, comfortable work area that will remain undisturbed when you are not there.
- b) Keep your hands and tools clean when working, to avoid getting glue on visible parts of the model.
- c) It's easier to stay organized if you only cut out those parts you need for each step.
- d) Make sure your knife is sharp. When cutting straight lines, use a straight-edge. Scissors, if used carefully, can be used for large curved parts.
- e) Study the diagrams carefully, and always test-fit the parts before applying glue.
- f) You may wish to colour the edges of the parts to make seams less visible. Pencil crayon or paint applied with a fine brush can be used (experiment on scrap pieces to see what works best).



Assembly

In these instructions, the directional terms “top” and “bottom” assume the rocket is vertical (fins at bottom). Scoring of parts is indicated by thin black lines outside the part’s outline or by dashed lines on the part’s surface. Score parts *before* cutting them out. In the diagrams, subassemblies are identified by a number within a circle (e.g. ②), corresponding to the step in which it was assembled.

Assemble the nose sections (**steps 1–3**). The nose is made up of five assemblies, which comprise an outer surface segment (the “skin” of the rocket), a connecting strip and (except for the tip segment) a circular former to provide strength and maintain the segment’s shape. To construct a typical assembly, carefully cut out the parts and glue the connecting strip to the inside of the surface segment. These strips have a thin line along the centre, which must be lined up with the respective edges of the surface segment (see the diagrams). The segment is then rolled so the edges butt together and are held by the connecting strip. Once dry, the former ring is glued inside the assembly, as close to the narrow end as necessary to obtain a snug fit. Join all the nose segments. Ensure that the seams of all segments line up.

At this point choose if you will use the pre-printed (flat) engine exhausts or build the 3-dimensional representation.

2-dimensional exhausts

Glue the former ring D4 to the base plate A8 (**step 4**).

Ignore steps 5 and 6.

3-dimensional exhausts

Ignore step 4. The exhausts are grouped in seven clusters. For each cluster, cut out and fold the centre exhaust F8 and six outer exhausts F9 (**step 5**). With the wide openings facing down on a flat surface, carefully glue the outer exhausts to the edges of the centre exhaust. Glue each engine cluster to the mounting plate F7 so that the narrow openings correspond to the black areas on the plate (**step 6**). Begin with the centre cluster and add the remaining six clusters abutting it. Finally, cut out and discard the 2-dimensional engine shape from the base plate A8. Attach the plate to the bottom of the engine assembly, and the former ring D4 to the top.

At this point choose if the top stage will be detachable.

Solid rocket body (front stage not detachable)

Cut out the body surface B1 as a single piece (ensure the fin mounting slots have been opened up). Assemble the body (**step 7**). This section is quite large, so take care when joining the edges together. Add the former ring D4/D4a at the top of the cylinder and the engine assembly (from either step 4 or step 6) at the bottom. The engine base plate should be flush with the bottom edge of the cylinder, and the small black triangle on the base plate lined up with the body seam.

Ignore steps 8–12, 20 and 21.

Detachable top stage

Ignore step 7. Cut out the body surface B1 (ensure the fin mounting slots have been opened up), and carefully cut along the separation line (**step 8**). Attach connecting strips B2 and B3 to the surface parts.

Assemble the top stage (**step 9**), positioning the former disc F5/F6 so that the disc edge lines up with the top of the notches in the skin, and the small black triangle on F6 lines up with the seam. Use black ink or paint to colour the side edges of the inner plates A6 (**step 10**). Glue the inner plates to the inside of the top stage with the beveled corners at the bottom edge, so that the sides of the plate protrude slightly into the notches, and curve the plates and the outer skin to follow the circular shape of the former disc.

Assemble the bottom stage (**step 11**). Add the former ring D4/D4a at the top of the cylinder and the engine assembly (from either step 4 or step 6) at the bottom. The engine base plate should be flush with the bottom edge of the cylinder, and the small black triangle on the base plate lined up with the body seam. For each of the four protruding flaps, glue first the narrow plate F3 then wide plate F4 to the inside surface, curving the plates so that the outer skin follows the circular shape of the former disc (**step 12**). Ensure that the plates are centred on the flap, so that the slot on each side is the same width.

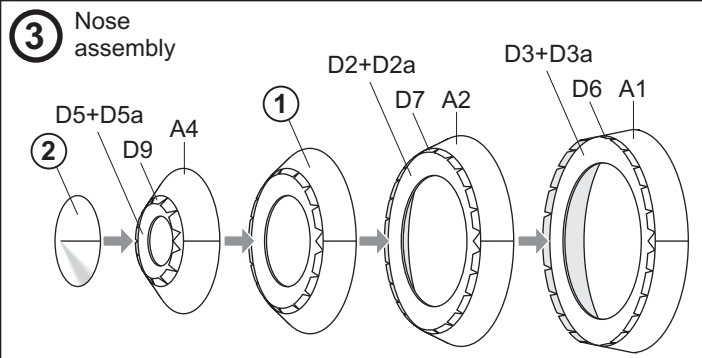
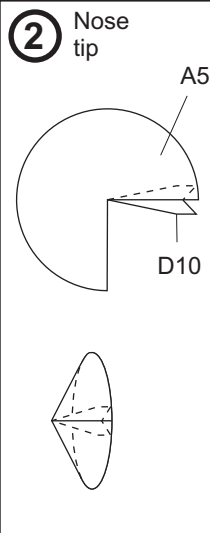
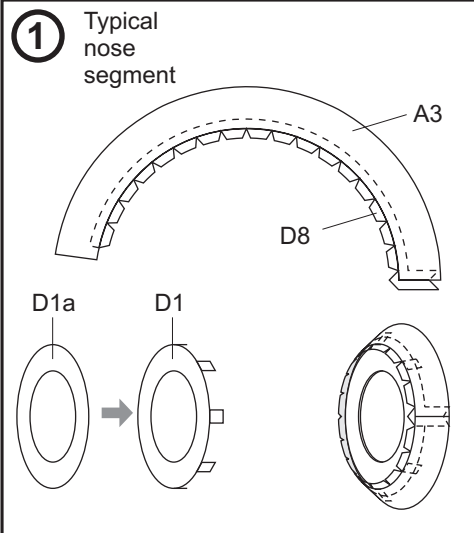
Glue the nose assembly from step 3 to the body or (if top stage is detachable) to the top stage base (**step 13**).

When building the four fin assemblies, work on a flat surface to prevent distortion. Assemble the outer surface (**step 14**) and fold the fins. Join the inner vane halves and glue to the main structure (**step 15**). Fold the inner plate C1 (inked surface facing inside) and glue to the inside of the main structure (**step 16**). Finally, attach the outer plate A7 (**step 17**), ensuring the “scorch marks” are towards the top. Line up the tabs on the fin assemblies with the slots in the rocket body, and attach the fins (**step 18**). Ensure the fins are at right angles to the body, and that the rocket rests on its fins without wobble. Because of the depth of the body, a long slender tool such as a paintbrush might be needed to apply glue to the fin tabs from the inside.

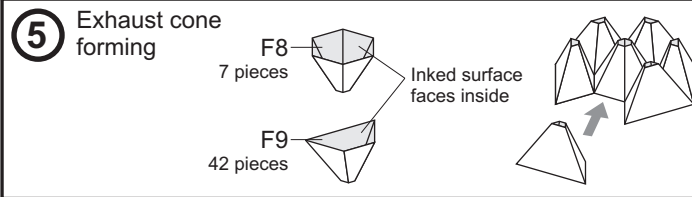
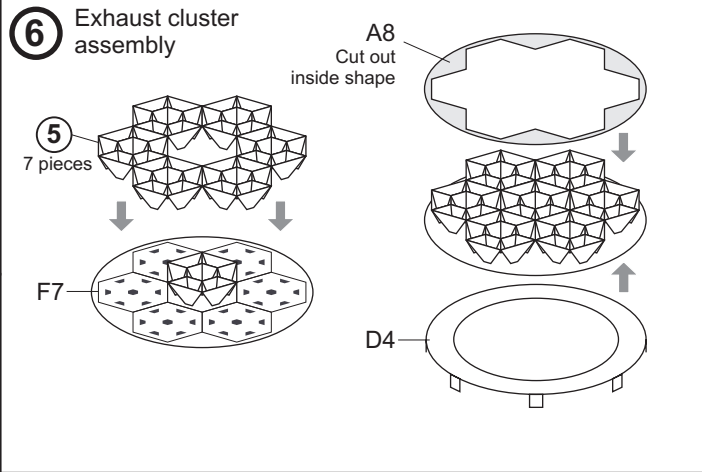
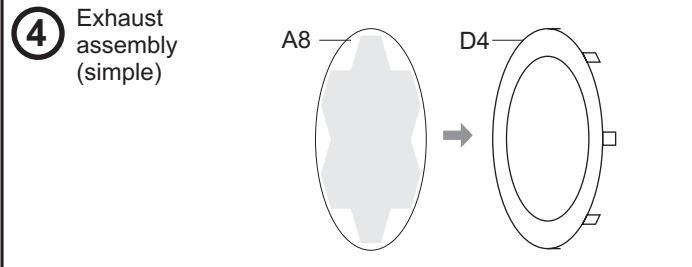
Assemble figure B4/B5 (**step 19**) for display beside the rocket to indicate its scale.

If the top stage is detachable, assemble the parachute platform (**step 20**) on a flat surface to prevent distortion. Glue the platform supports to the bottom stage, centred on the former disc. If desired, folded tissue paper or cloth (coloured black) may be added on top of the parachute disc to simulate the main parachute.

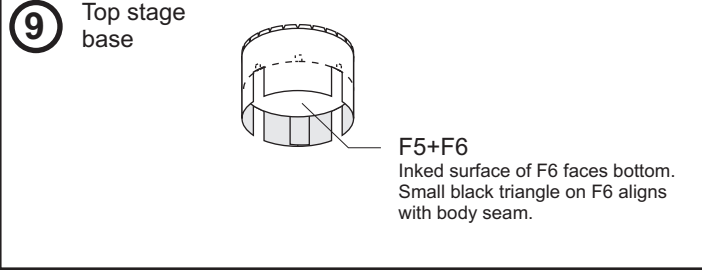
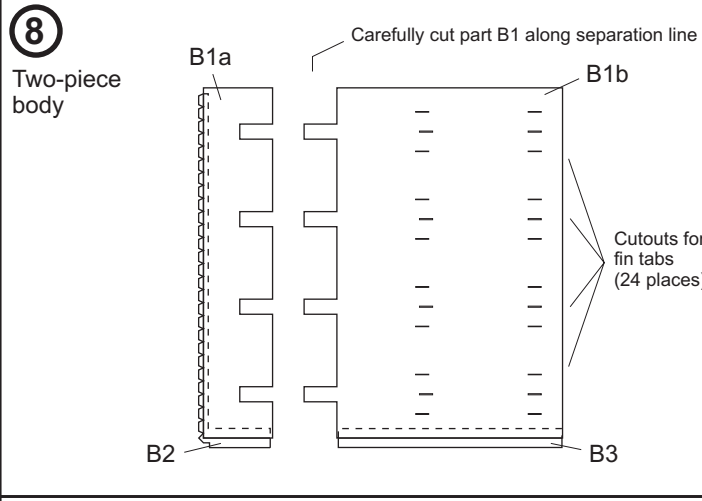
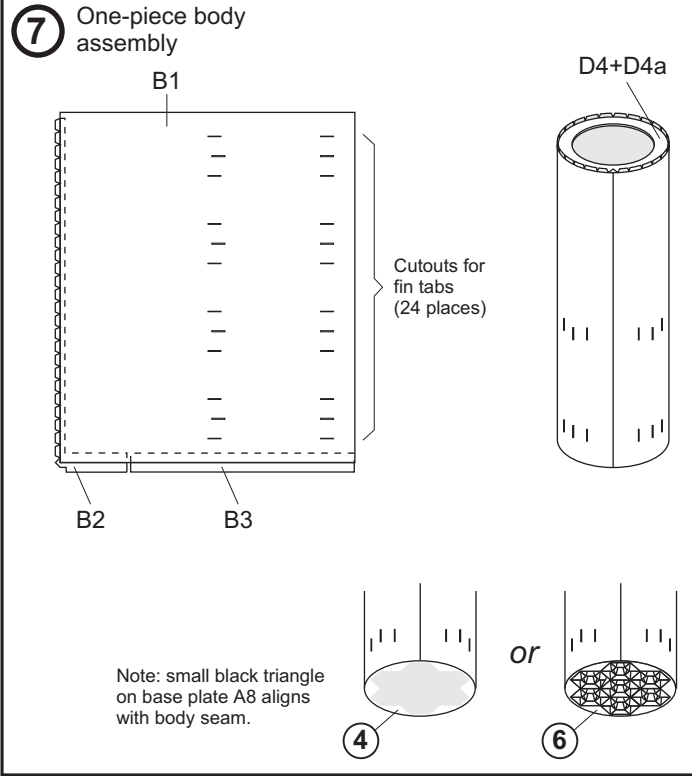
The top and bottom stages, if detachable, may be joined together (do not glue) with the inner plates forming a “tongue and groove” joint (**step 21**).



? OPTIONAL STEPS
 For simple (flat) exhausts, perform step 4 and ignore steps 5 & 6.
 For 3-dimensional exhausts, proceed to step 5.



? OPTIONAL STEPS
 For one-piece body, perform step 7 and ignore steps 8-12, 20 & 21.
 For detachable top stage, proceed to step 8.



<p>10 Top stage inner plates</p> <p>A6 (4 pieces) Inked surface faces inside. Curve to match body contour. Side edges protrude slightly into notches in body.</p> <p>Use ink or paint to blacken side edges on non-inked surface of A6.</p>	<p>11 Bottom stage body</p> <p>D4+D4a Inked surface of D4a faces up.</p> <p>Note: small black triangle on bottom plate A8 aligns with body seam.</p>	
<p>12 Bottom stage inner plates</p> <p>F4 (4 pieces) F3 (4 pieces) Centre on tab</p>	<p>13 Nose placement</p>	<p>14 Fin assembly outer surface (four pieces)</p>
<p>15 Fin assembly inner vane</p>	<p>16 Fin assembly inner surface</p> <p>C1 Inked surface faces inside.</p>	
<p>17 Fin assembly outer plate</p> <p>A7</p>	<p>18 Fin placement</p>	<p>19 Figure</p> <p>B5 B4</p>
<p>20 Parachute platform (separate stage version only)</p> <p>F2</p> <p>Optional parachute may be added using folded tissue paper or cloth.</p> <p>Fold and glue supports as shown.</p> <p>F1 Inked surface of curved sides faces outward</p>	<p>21 Final assembly (separate stage version only)</p> <p>Do not glue</p> <p>Inner plates of top stage slide into grooves on bottom stage.</p>	