

LISA Pathfinder – 1/28 scale Assembly Instructions By GA – 2015



You may notice some small Variations from your model and the one illustrated in these instructions. Many of them have been corrected and should reflect on your model.

Due to the odd shape of the spacecraft bus and solar panel, it appears to be off-center in relation to the spacecraft bus much like the actual spacecraft; plus trying to duplicate the solar panel to exact specs of the real one was proven difficult due to my limited design skills.

The 'LISA' stands for Laser Interferometer Space Antenna, an earlier concept for a spaceborne observatory for gravitational waves, and now used to describe a class of missions based on the original LISA concept. LISA Pathfinder will test key technology for future LISA-like space missions to study the gravitational Universe.

launched on December 3, 2015, on a Vega rocket from Europe's spaceport in Kourou, French Guiana, on its way to demonstrate technology for observing gravitational waves from space which are ripples in the fabric of spacetime, predicted a century ago by Albert Einstein's General Theory of Relativity.

Einstein's theory predicts that these fluctuations should be universal, generated by accelerating massive objects. However, they have not been directly detected to date because they are so tiny. For example, the ripples emitted by a pair of orbiting black holes would stretch a million kilometre-long ruler by less than the size of an atom.

At its core is a pair of identical 46 mm gold-platinum cubes separated by 38 cm, which will be isolated from all external and internal forces acting on them except one: gravity.

The mission will put these cubes in the purest free-fall ever produced in space and monitor their relative positions to astonishing precision, laying the foundations for gravitational wave observatories in space. Such future missions will be key partners to the ground sites already searching for these elusive cosmic messengers. Space and ground experiments are sensitive to different sources of gravitational waves, both opening up new possibilities to study some of the most powerful phenomena in the Universe.

Gravitational waves are the next frontier for astronomers. We have been looking at the Universe in visible light for millennia and across the whole electromagnetic spectrum in just the past century', says Alvaro Giménez Cañete, ESA's Director of Science and Robotic Exploration.

"But by testing the predictions made by Einstein one hundred years ago with LISA Pathfinder, we are paving the road towards a fundamentally new window on the Universe."

LISA Pathfinder will operate as a physics laboratory in space. Over an intense period of six months, mission scientists will analyse the data received on Earth from each day's operations .

The LISA Pathfinder mission will test in flight:

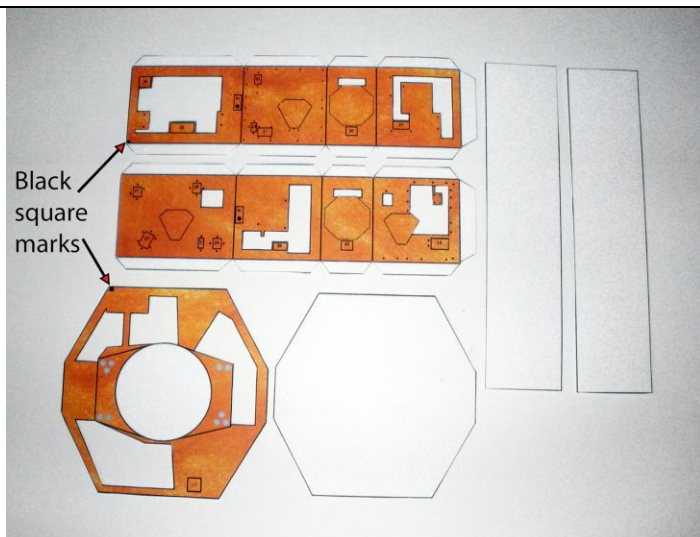
- Inertial sensors
- Interferometry between free floating test masses
- Drag Free and Attitude Control System (DFACS)
- Micro-Newton propulsion technology: FEEP (Field Emission Electric Propulsion) and colloidal thrusters of NASA/JPL.

LISA Pathfinder is an ESA-led mission. It involves European space companies and research institutes from France, Germany, Italy, The Netherlands, Spain, Switzerland, UK, and the US space agency NASA.

Could Albert Einstein be right? We may find out soon.

enjoy.

GA (Zach)

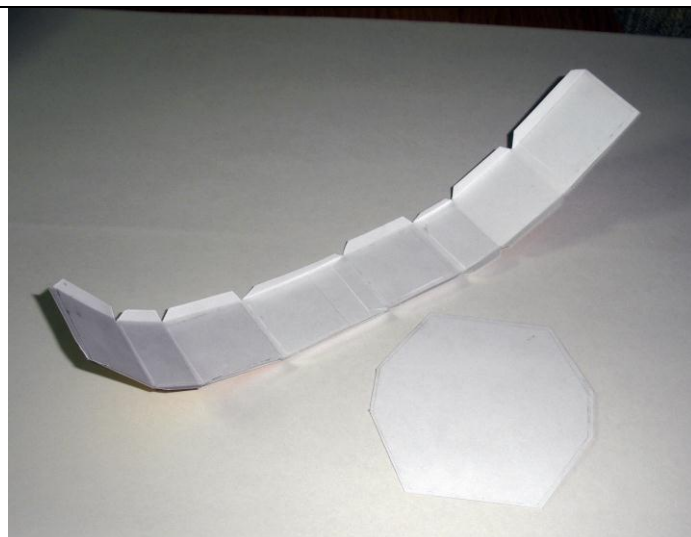


Part 1, 2, 3, 4, 6, 7

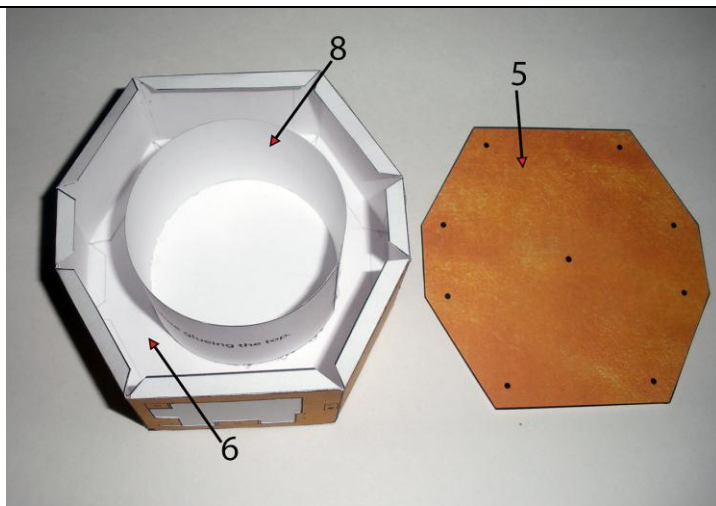
Remove the light blue sections on 1, 2, 6

Cut 3 and 4 into sections indicated by the lines.

Note the 2 small black square marks on 1 and 6, these are reference marks for proper positioning later.

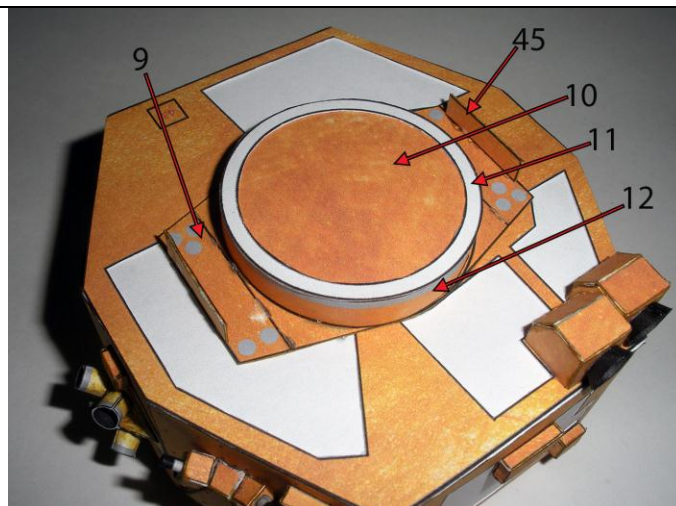


Glue 1 and 2 together - see parts sheet for proper placement - and prefold. Glue the sections from 3 and 4 to matching areas on the backside with light grey color showing through the cutouts. May need to trim to fit. Glue 7 to the backside of 6 in like maner.

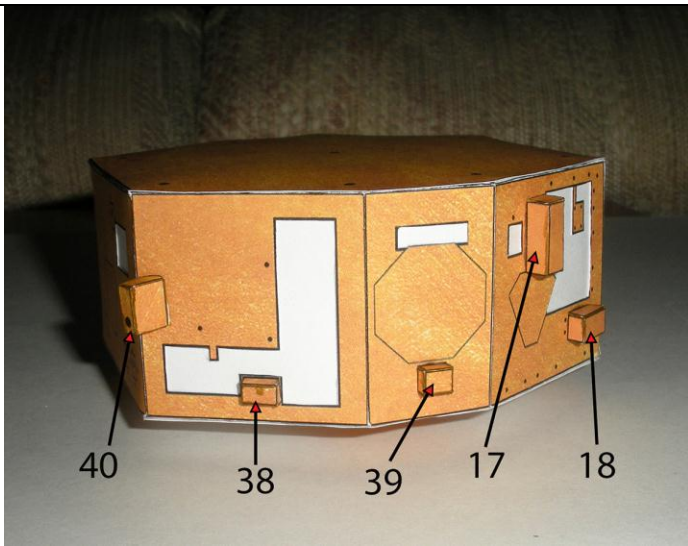


Glue 6 on the Bottom – **matching the two small black square marks (found on 1 and 6) together.**

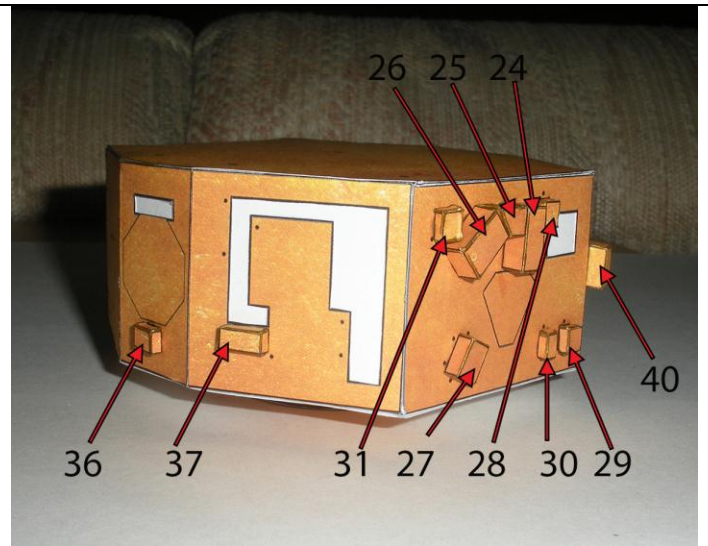
Roll 8 into a cylindar and glue at the center inside. This serves as the inner support. Glue 5 on top. May need to trim the edges around the top.



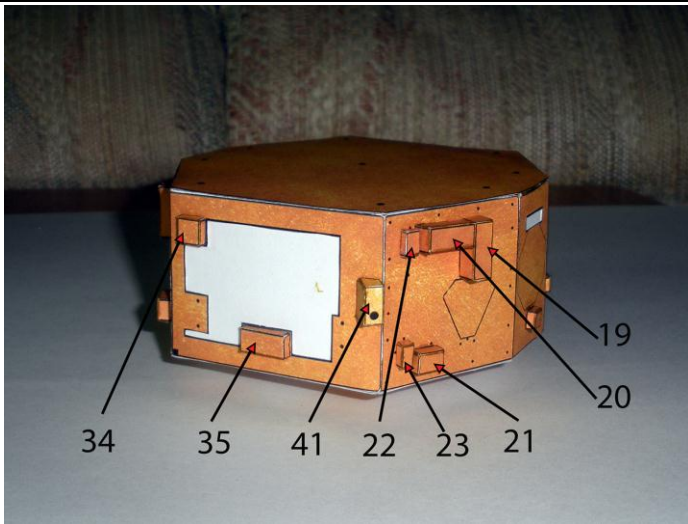
Glue 9 on thick cardstock. Fold 45 in half. Roll 12 into a ring and 10 should fit inside it, Glue 11 on top of the 10-12 assembly. Glue all these over the matching graphic on the bottom of the spacecraft bus shown.



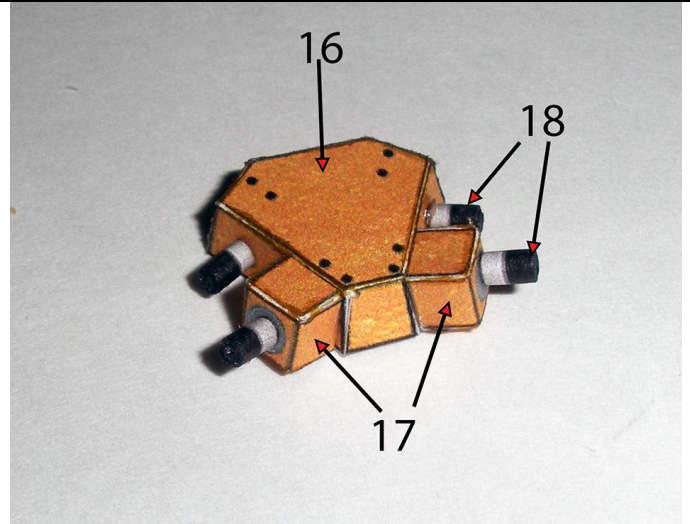
Cut and fold all these and glue over the matching numbered graphics on the spacecraft bus.



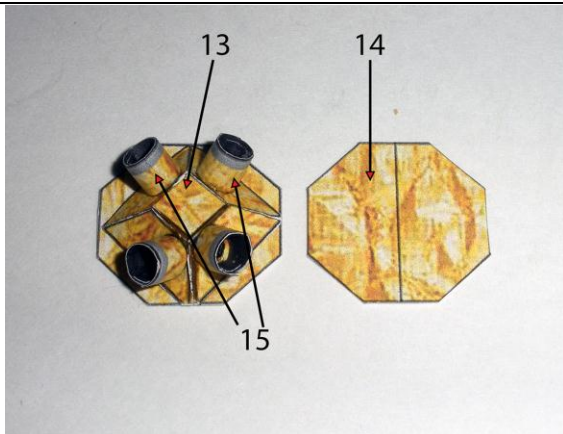
Cut and fold all these and glue over the matching numbered graphics on the spacecraft bus .



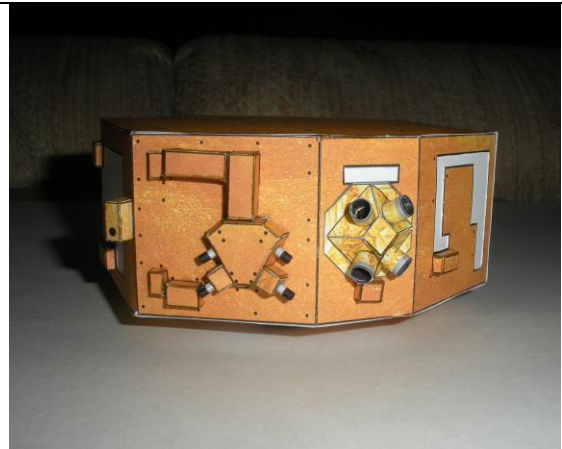
Cut and fold all these and glue over the matching numbered graphics on the spacecraft bus .
Do this for all other parts with matching numbered graphics on the spacecraft bus.



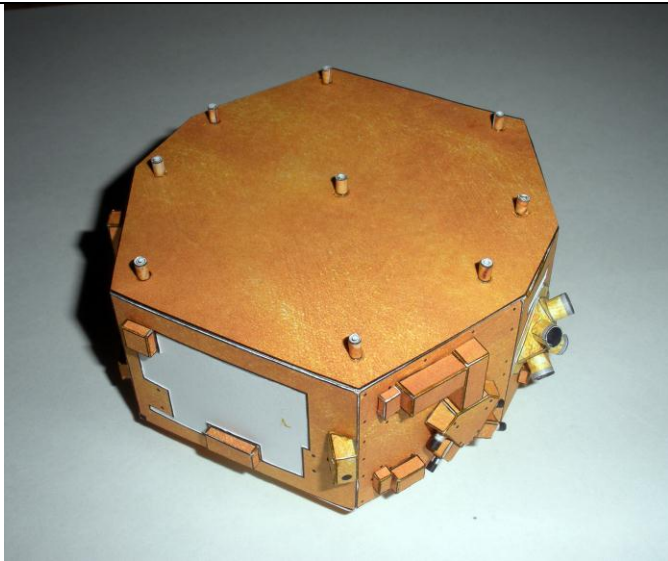
Assemble parts above, glue 17 on the X on 16, glue 18 in place shown.
Make 3 of these.



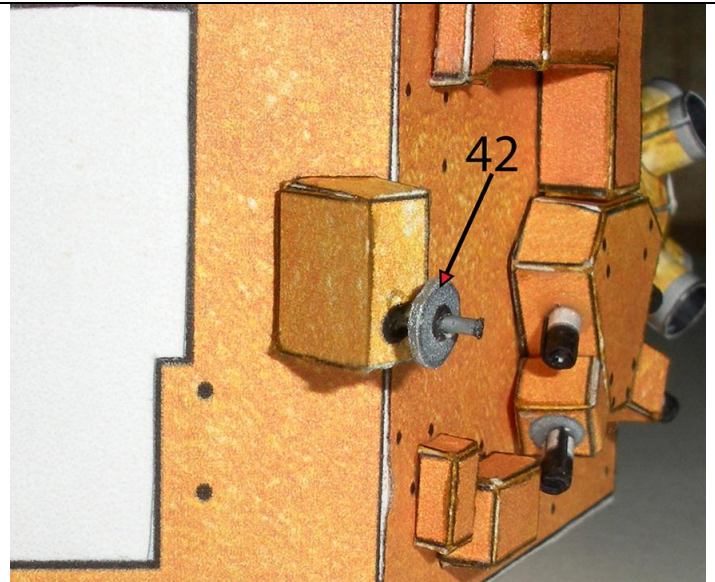
Color back of 15 black, roll into tubes, form 13 into a flattened pyramid.
Glue 15 over the black circles on 13, glue assembly on 14 – the line is used to insure straightness. Make 2 of these.



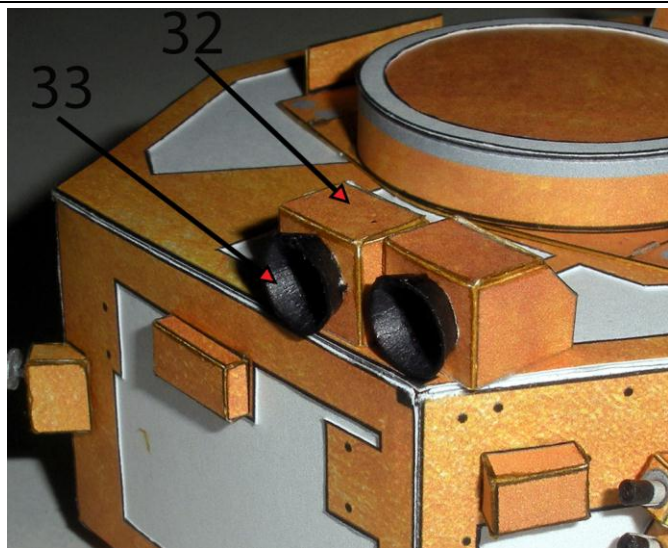
Glue all of these onto the matching graphics on the spacecraft bus. For 13-15 assembly, **the two nozzles closest together are at the bottom.**



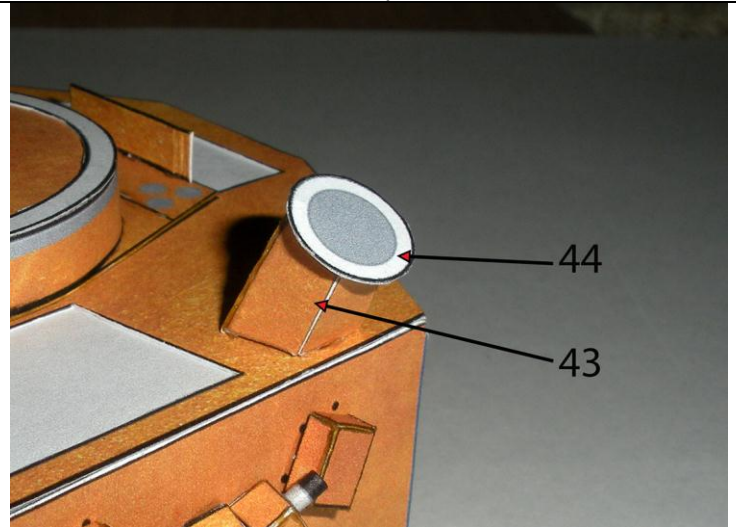
Solar panel mounts.
Roll part 54 into solid rods, then glue on the top over the small black circles. Can use colored tooth picks-4mm long.



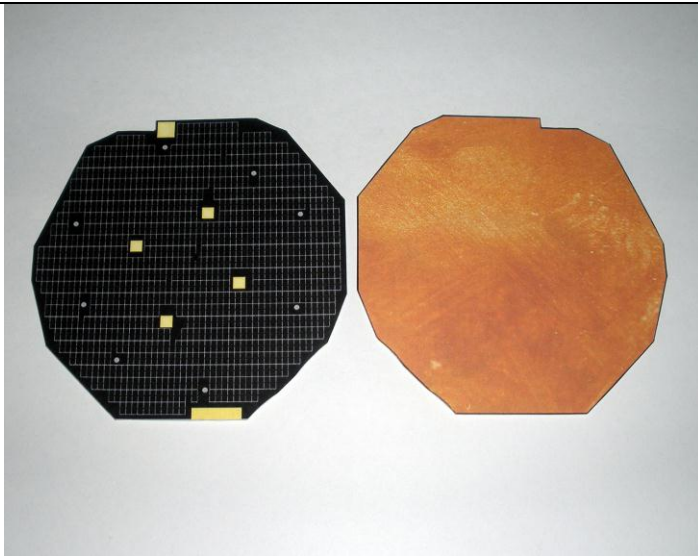
Use a 2 plastic broom straws colored silver – 10 mm long.
Glue part 42 on another layer of cardstock.
Poke a very small hole in parts 40, 41, 42 on the black dots (40 and 41 are found on the spacecraft).
Glue the plastic straws inside 40 and 41, about 1/3 will stick out, let dry.
Slide 42 onto the straws shown above, glue in place.
Should have 2 of these on the spacecraft.



Color backside of 33 black.
Assemble 32, 33 (Make 2). Glue on the bottom - note the location in relation of the spacecraft bus markings.
One is located slightly behind the other.

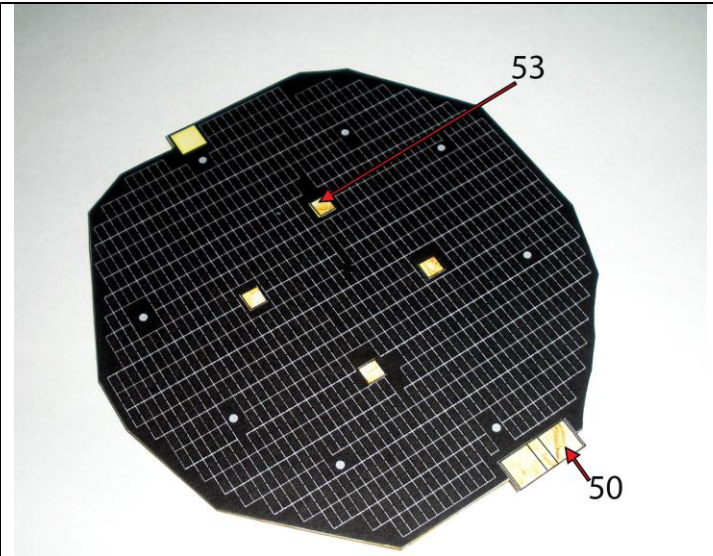


Glue this on the matching graphic on the bottom. Angled outward.

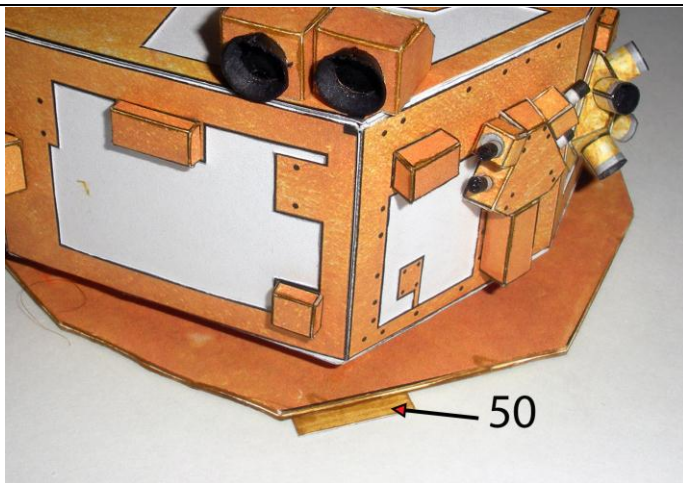


Solar panels

Glue both top and bottom onto thick cardstock.
Cut and glue back-to-back. Color edges dark yellow.



Cut out and color the back side part 50 dark yellow.
Glue 50 over the long yellow rectangle, half should hang over the edge of the solar panel.
Glue 53 over the small yellow squares (4 places).



Critical! Because both spacecraft and the solar panel have odd, ill-regular shapes, practice positioning the spacecraft onto the solar panel first.

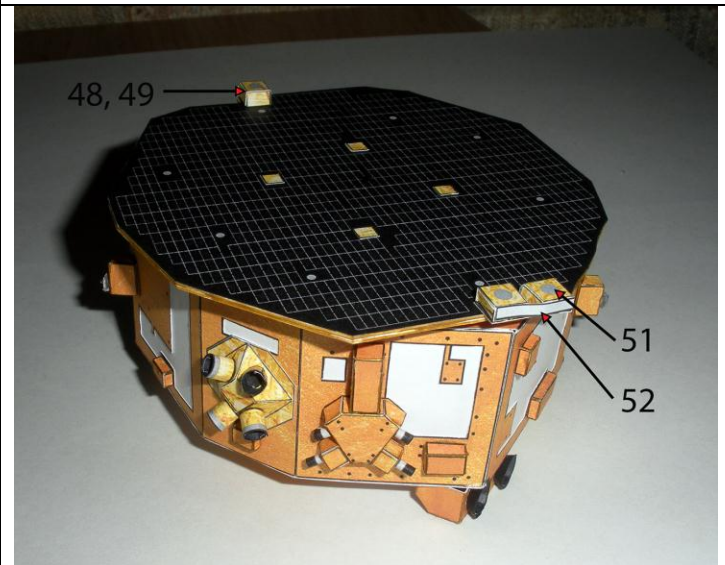
Note the positioning above.

I do this with both the spacecraft and solar panels are turned up-side-down.

Apply glue on the 9 solar panel mounts on the top. Turn everything up-side-down and glue the spacecraft on the backside of the solar panel.

Note the position of the part 50 on the solar panel in relation to the indicated spacecraft markings above. Center the spacecraft over the solar panel as best as possible.

Let the glue dry before handling.



Assemble and glue 48 over the yellow square. Glue 49 on the outside of 48.

Assemble 51 (2 of them) and glue onto part 50 – half should hang over the edge. They should be a couple of millimeters apart. Glue 52 to the outside of 51 – see above.

Your model is complete, congratulations.