

Hiten (JAXA)

1:48 and 1:24 scale

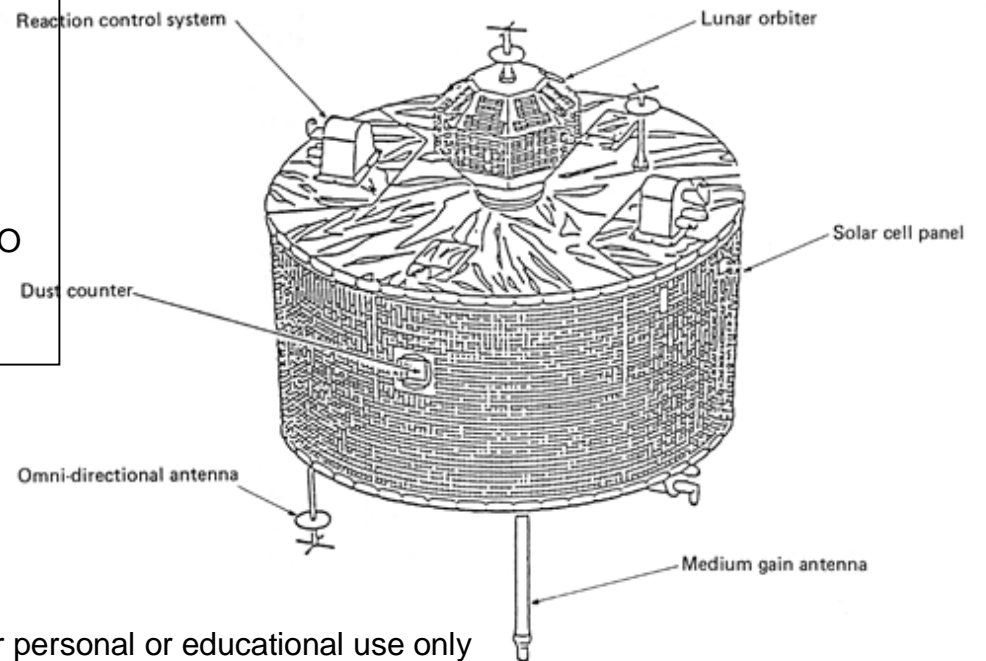
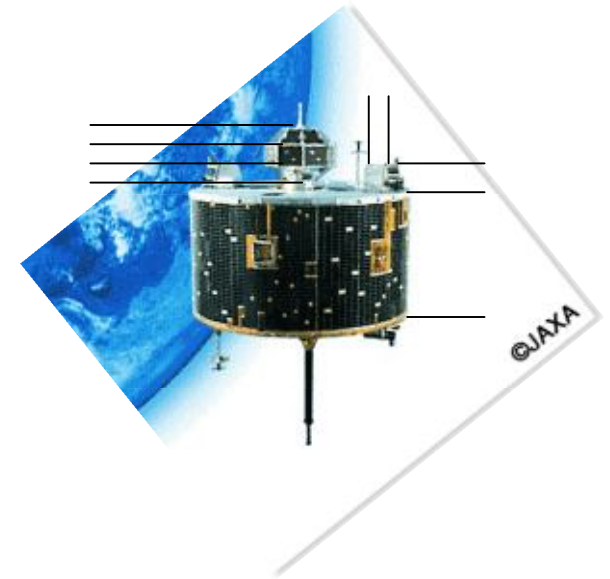
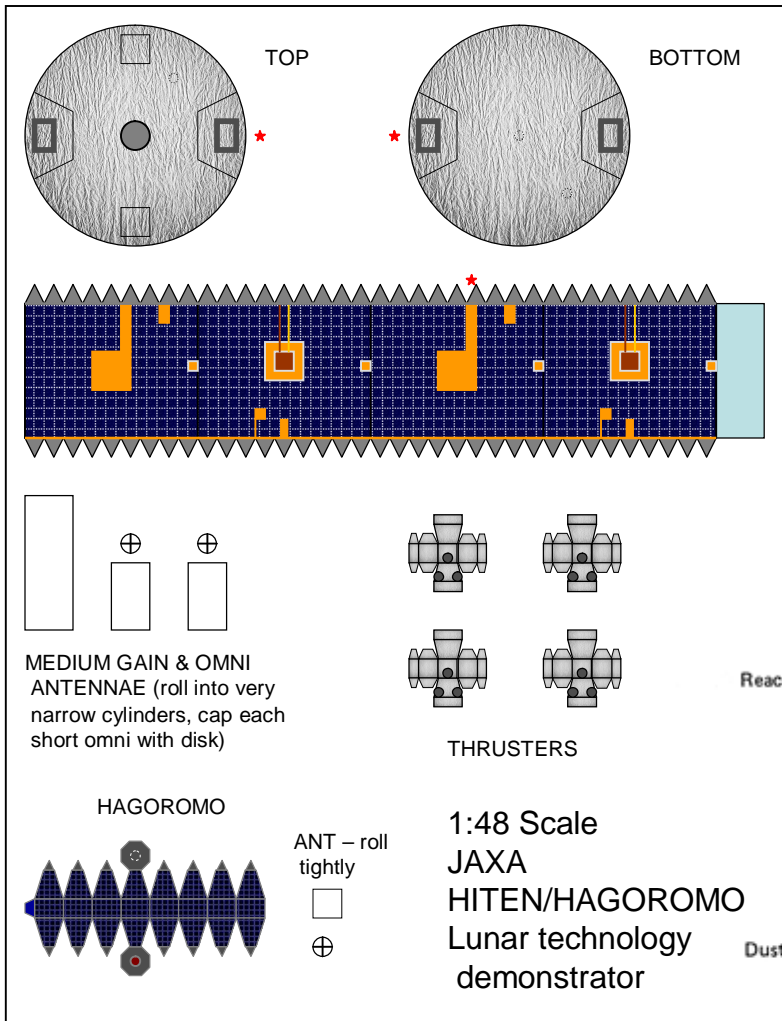
- Hiten was a cylindrically shaped spacecraft, 1.4 m (4.6') in diameter and 0.8 m (2.6') high. The small polyhedral-shaped Hagoromo lunar orbiter was mounted on top of the spacecraft. Spacecraft propulsion and attitude control was provided by eight 23-N and four 3-N hydrazine thrusters, two spin-type Sun aspect sensors, a star scanner, a steerable horizon crossing indicator, three accelerometers, a nutation damper, and control electronics including an onboard processor. An optical navigation subsystem, consisting of two CCD image detectors to detect the Moon and bright stars was also tested.
- Communications were accomplished through a medium gain collinear array antenna in both X-band and S-band protruding from the bottom surface of the spacecraft and two cross dipole omni-directional low gain antennas in S-band only, one mounted on the top and one on the bottom.
- The Hagoromo orbiter was a 12 kg, 26-faced polyhedron, 36 cm (1.18') between opposite faces. A solid propellant (KM-L) retrorocket with a mass of 4 kg was mounted inside the spacecraft for lunar orbit insertion. Sixteen of the surfaces were covered with 1000 sheets of indium-phosphorus solar cells which could generate about 10 W. Two way communications with a ground station were provided by an S-band transponder and an omni-directional cross-dipole antenna mounted on top of the orbiter.

- ASSEMBLY – score the fold lines on the thrusters and Hagoromo mini-sat, cut out parts. The antennae may be easier to construct if you use lightweight paper for them.

- Hagoromo – fold/glue into a polyhedron. Glue the central band together first, then carefully fold in the upper facets. First, dry fit by folding down the top and pressing down to bring the facets into alignment. Then, open the top, apply glue, and repeat. Repeat for the bottom of the minisat. Roll antenna into very narrow cylinder and mount to dotted circle on top. Alternately, glue two layers of card together and cut a narrow strip for the antenna. Cap antenna with small disk.

- Hiten – roll main bus into a cylinder and glue. Fold in tabs on top and bottom and glue on the top – note the picture for alignment (small red stars indicate matching locations). The dust counters (reddish-brown squares should be 90 degrees out from the thruster mounts – gray rectangles on top/bottom). Glue on the bottom, making sure the thruster locations line up with those on the top and the small circles locating the omni antennae are on opposite sides of the center (see picture).
 - Fold/glue thrusters into small angular boxes, then glue in place over the gray rectangles on the top/bottom of the main bus. The dot on top (nozzle) goes to the outer edge.
 - Roll the antennae into very narrow cylinders and glue in place. Alternately, glue two layers of card together and cut a narrow strip for the antennae. The shorter omni antennae attach to the offset dotted circles on the top and bottom. The medium gain antenna attaches to the center of the bottom.

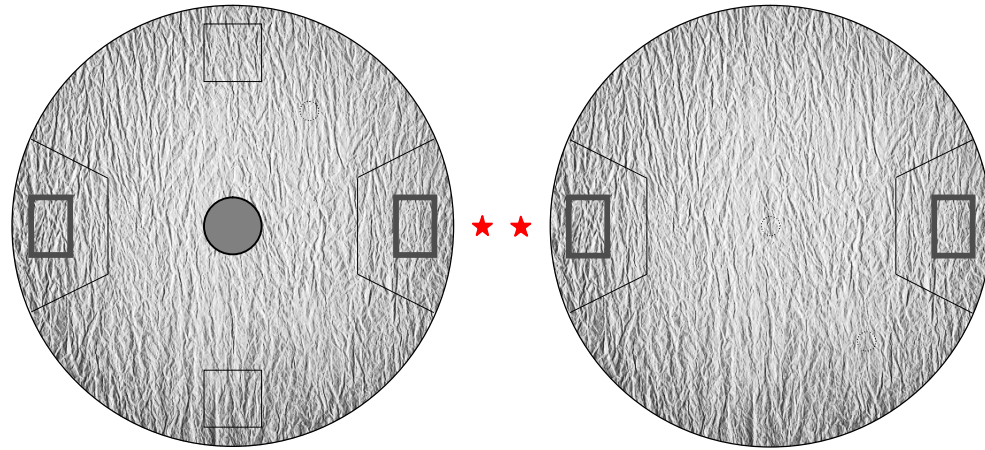
MAIN BUS



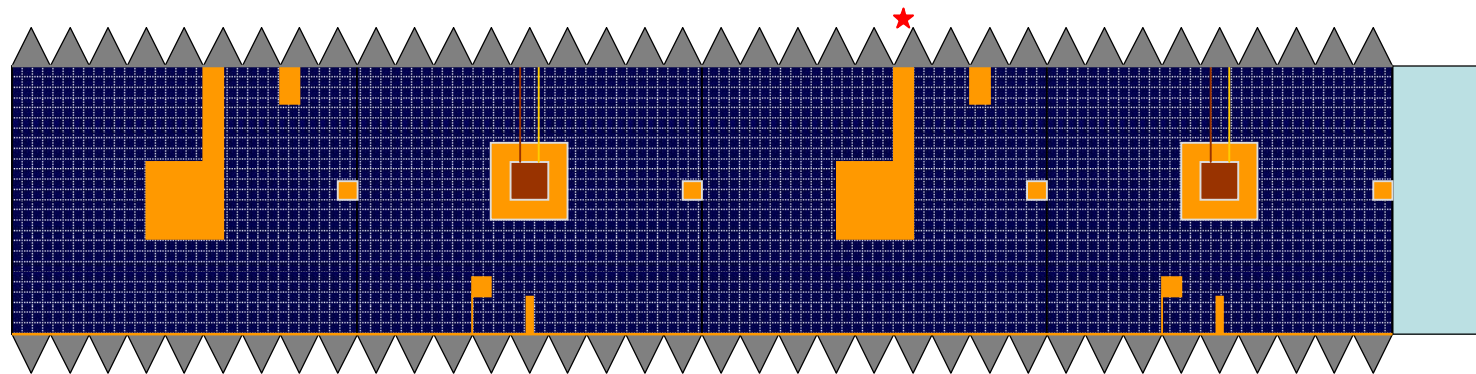
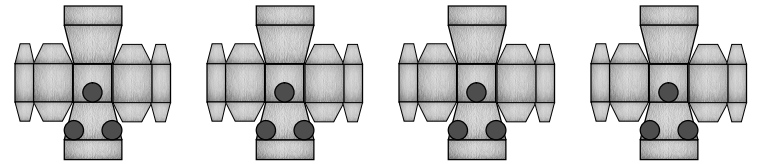
MAIN BUS

TOP

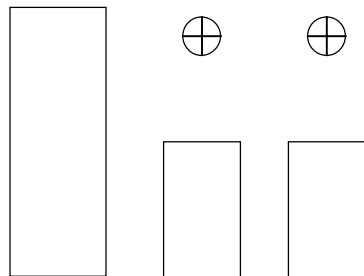
BOTTOM



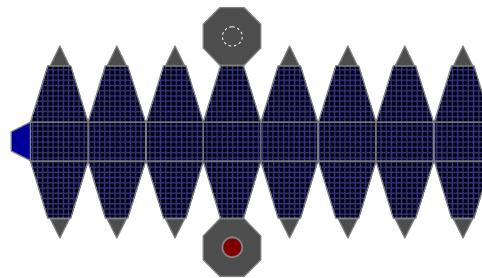
THRUSTERS



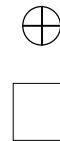
MEDIUM GAIN & OMNI
ANTENNAE (roll into very
narrow cylinders, cap each
short omni with disk)



HAGOROMO



ANT – roll
tightly



1:24 scale
JAXA
HITEN/HAGOROMO
Lunar technology
demonstrator