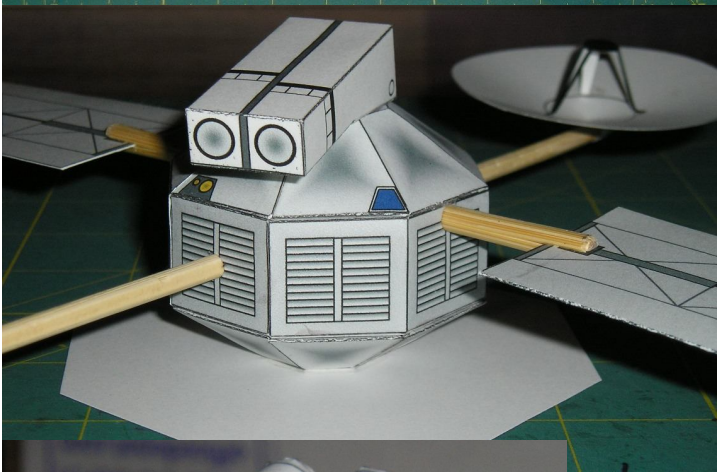
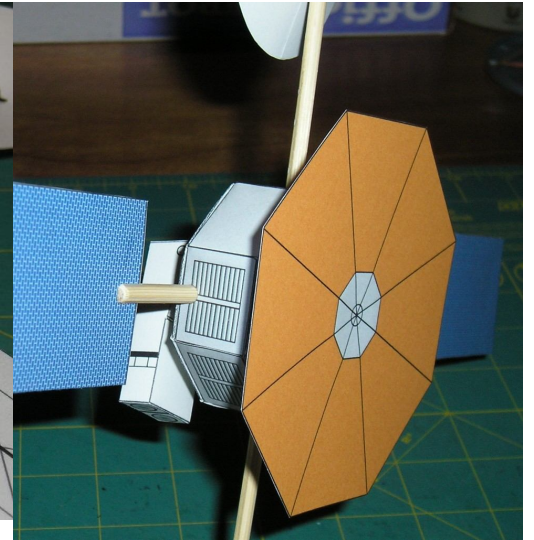
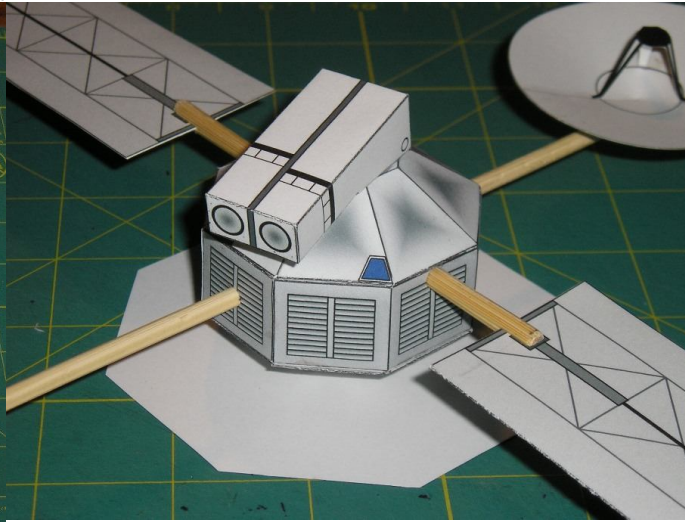
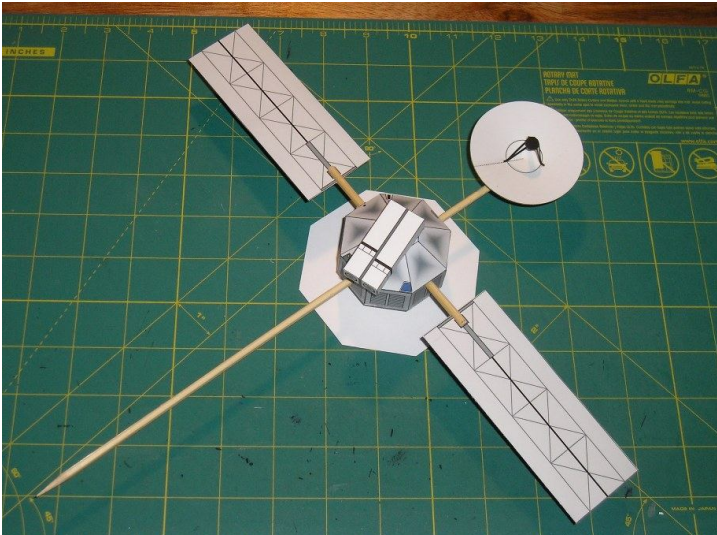


# Mariner 10 – First Mission to Mercury

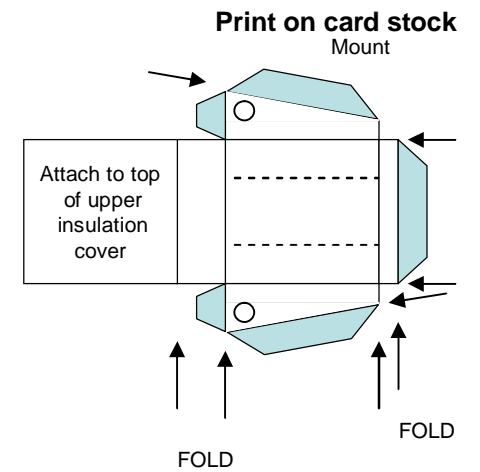
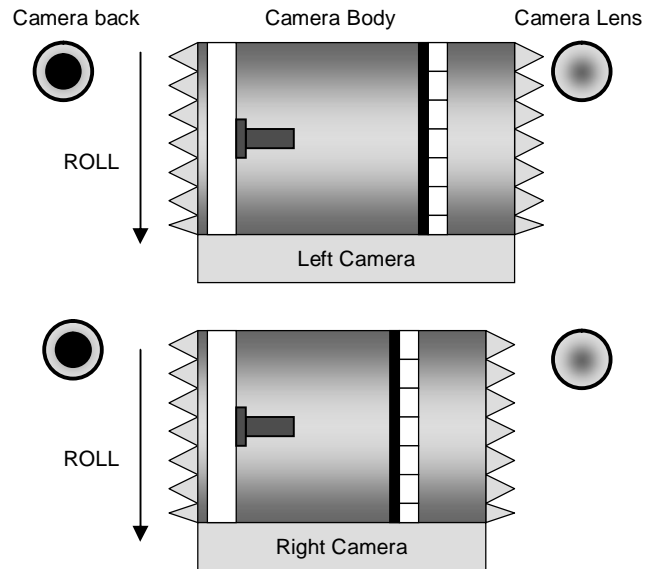
- Mariner 10 was the seventh successful launch in the Mariner series and the first spacecraft to visit Mercury. It was also the first spacecraft to use the gravitational pull of one planet (Venus) to reach another (Mercury), and the first spacecraft mission to visit two planets. The spacecraft flew by Mercury three times in a retrograde heliocentric orbit and returned images and data on the planet. Mariner 10 returned the first-ever close-up images of Venus and Mercury. The primary scientific objectives of the mission were to measure Mercury's environment, atmosphere, surface, and body characteristics and to make similar investigations of Venus. Secondary objectives were to perform experiments in the interplanetary medium and to obtain experience with a dual-planet gravity-assist mission.
- **Spacecraft and Subsystems**
- The spacecraft structure was an eight-sided forged magnesium framework with eight electronics compartments. It measured 1.39 m diagonally and 0.457 m in depth. Two solar panels, each 2.69 m long and 0.97 m wide, were attached at the top, supporting 5.1 sq m of solar cell area. Fully deployed the spacecraft measured 8.0 m across the solar panels and 3.7 m from the top of the low-gain antenna to the bottom of the heat-shield. A scan platform with two degrees of freedom was mounted on the anti-sunward face. A 5.8 m long hinged magnetometer boom extended from one of the octagonal sides of the body.
- Mariner 10 carried a motor driven high-gain dish antenna, a 1.37 m diameter aluminum honeycomb-disk parabolic reflector, which was mounted on a boom on the side of the spacecraft. A low-gain omnidirectional antenna was mounted at the end of a 2.85 m boom extending from the anti-solar face of the spacecraft.
- **Assembly Instructions**
- For assembly you will need a scissors, glue or glue stick, and three small dowels or bamboo skewers. Print pages 3 and 4 on cardstock (60 lb paper or heavier). If you wish to make the optional detailed TV Cameras, print page 2 on cardstock as well.
- Before cutting out the main bus, note which panels line up with the solar panels and the High Gain Antenna. Score the fold lines and cut out the main bus. Fold the side panels down and join with the triangular tabs on their edges. Fold the remaining tabs down, fold the octagonal bottom panel down and secure to close the box.
- Score the fold lines and cut out the solar panels. Fold each in half and secure. Cut a narrow dowel or bamboo skewer to the length indicated and spit the ends. After all other steps are complete and the TV camera system is installed, puncture the two black dots on opposite sides of the main bus to mount the solar panels (dots are close to the top of the bus). Push the dowel/skewer through the bus and slip the solar panels into the split ends and secure.
- Cut out the upper and lower insulation covers. Fold down the sides and join with the triangular tabs on the edges. Fold the remaining tabs inward and glue the upper insulation cover to the top of the main bus, aligning the black rectangles. This is the side the high gain antenna will be on. Attach the lower insulation cover to the bottom of the main bus.
- Cut out the sun shade and glue to the bottom of the lower insulation cover where marked. Line up the octagonal sunshade with the octagonal main bus.
- Score the fold lines and cut out the TV camera system. Fold the camera into a box shape and secure. Glue the camera onto the upper insulation cover where indicated. The camera can point in any direction, but should not point at the solar panels or high gain antenna as this would obstruct its view.
  - Optional detailed cameras. Score the fold lines on the Camera Mount, then cut out the mount, two cylinders, two lenses, and two backs. Roll the cylinders around a pencil and secure with tape or glue. Fold the tabs on the ends of the cylinders inward and secure the lens over the end with the black and white band. Secure the back to the other end with the white band. Fold the mount into a wedge and secure. Secure the cameras to the top of the mount along the dotted lines facing downward with the back ends even with the edge of the mount – the longer camera goes on the left. Secure the completed camera to the top of the upper insulation cover.
- Cut out the high gain antenna and the optional tripod. Slit the antenna along the solid line, then overlap to the dotted line to form a shallow cone and secure. If you install the tripod: bend the legs of the tripod down, put a spot of glue on the end of each leg, and glue them to the smaller circle on the face of the antenna – they should be equally spaced around the circle. Cut an 18" length of dowel (if you can't find an 18" dowel, 8" or longer is OK). Pierce the two remaining dots on the sides of the main bus (dots are in the center of the side panels) and push the dowel through. Leave 3" extending from the side with the white squares – where the high gain antenna will go. Glue the mounting strap to the end of the dowel and attach the ends of the strap to the back of the high gain antenna to secure it.
- Cut another piece of narrow dowel to the length indicated for the low gain antenna mast. Puncture the black dot on the side of the upper insulation cover and secure the antenna mast in the hole.

# Mariner 10 – First Mission to Mercury

1:24 scale

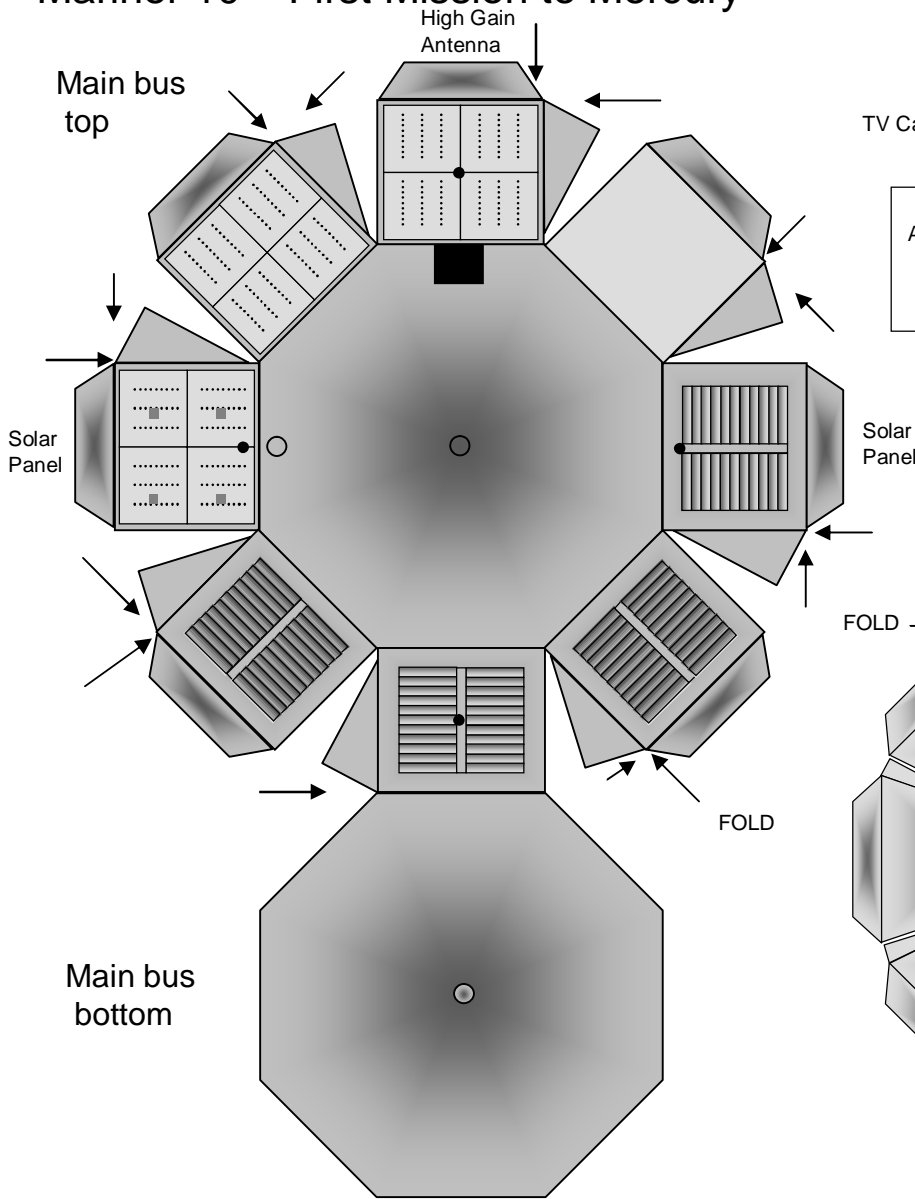


## OPTIONAL - TV Camera System

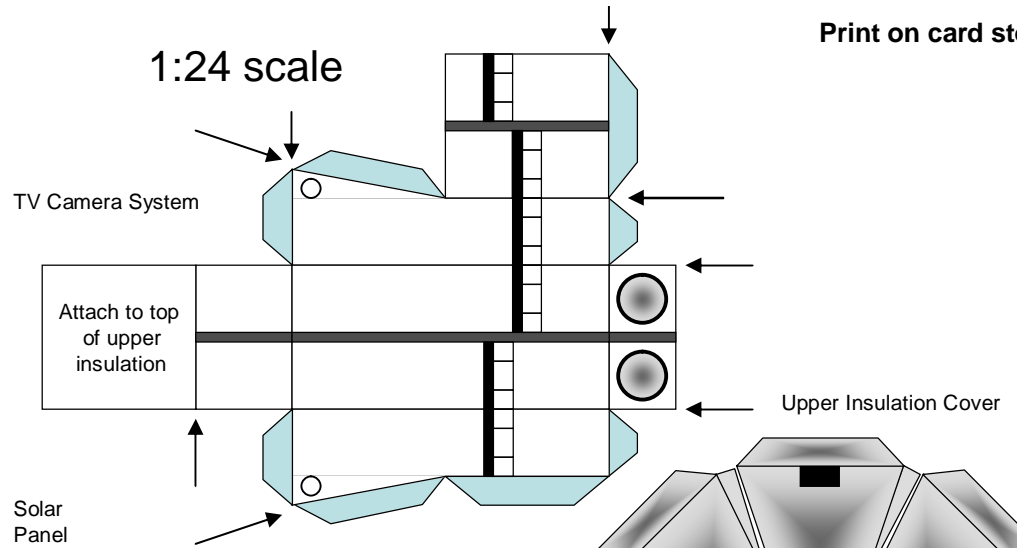


Copyright 2009, John Jogerst. Not for commercial use. For personal or educational use only.

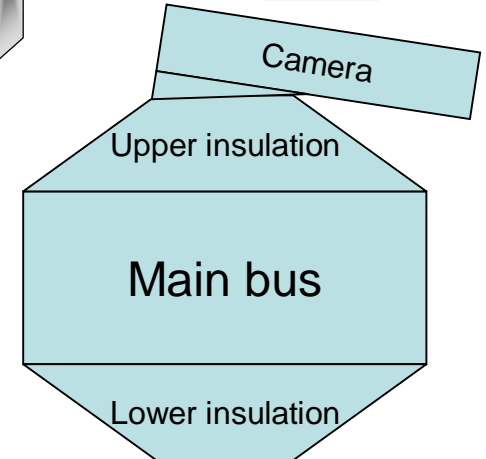
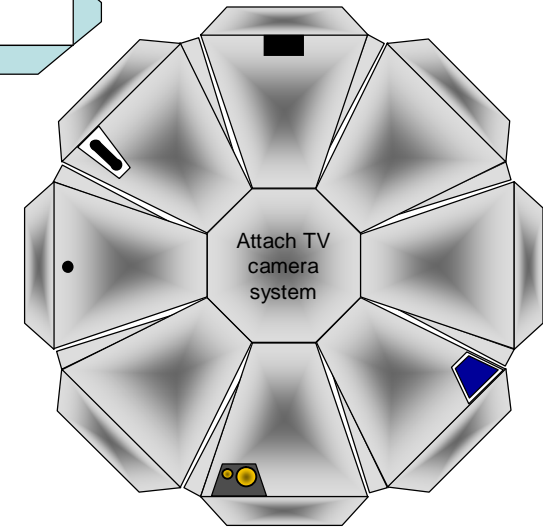
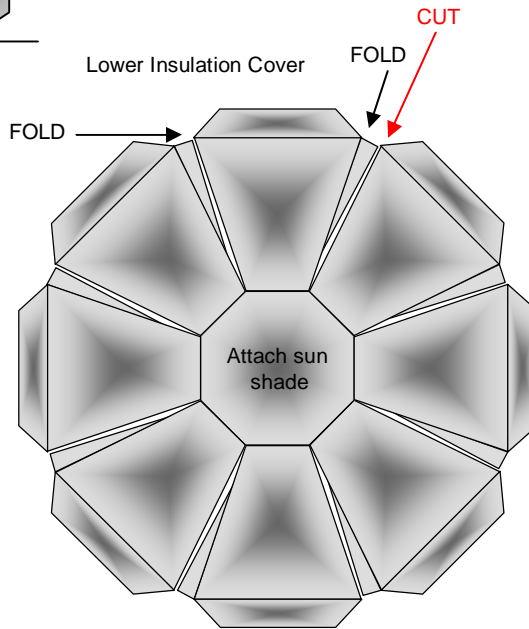
# Mariner 10 – First Mission to Mercury



1:24 scale

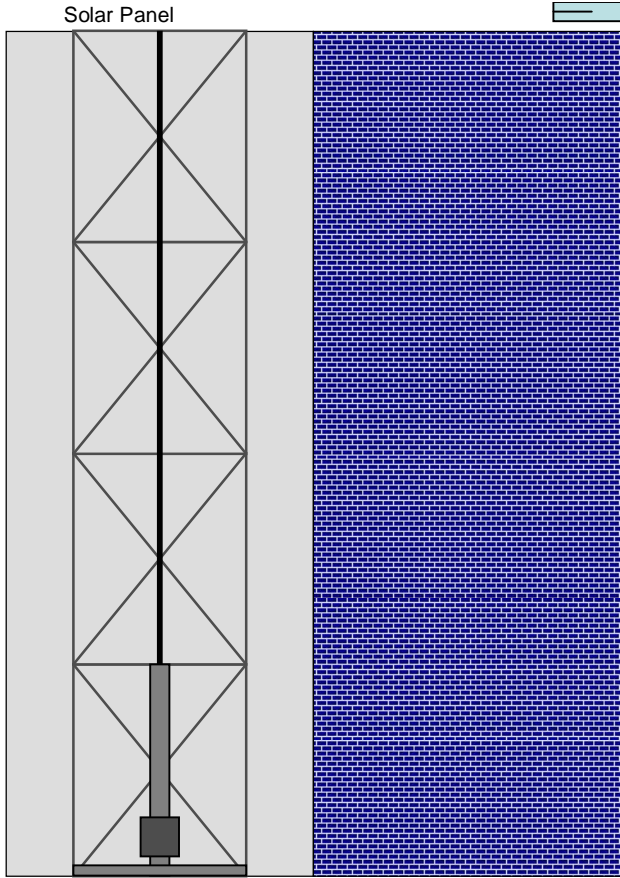


Print on card stock



Cut dowel to this length for the low gain antenna mast.

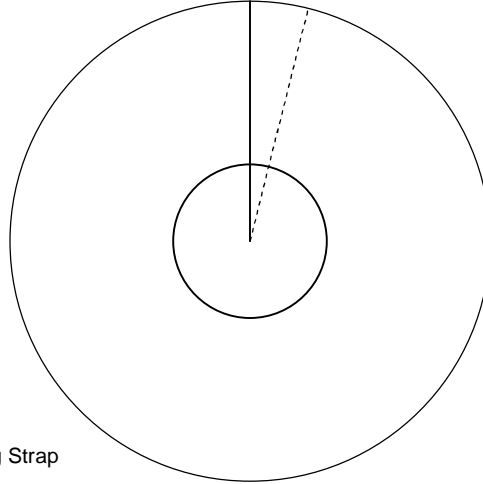
Sun Shade



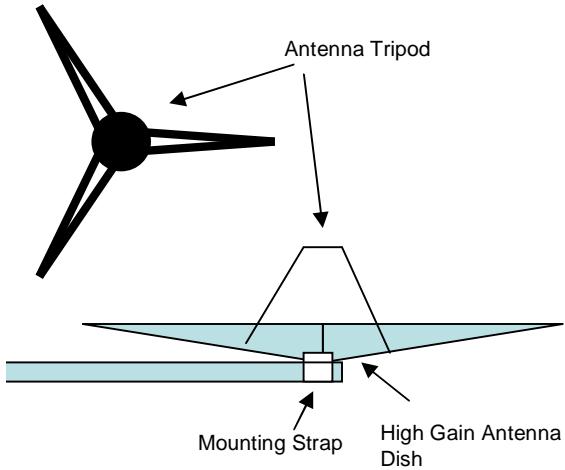
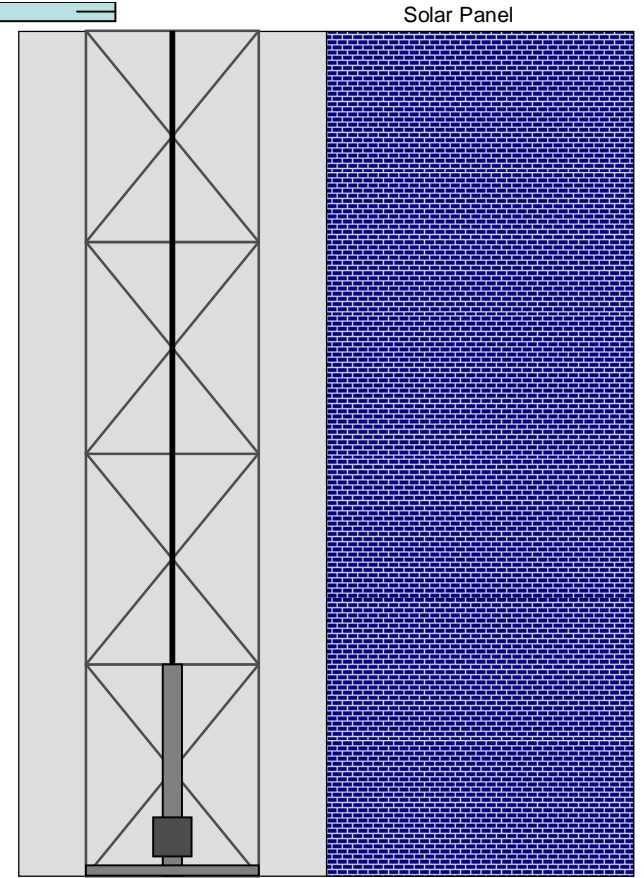
Cut dowel to this length for solar panel support

CUT, overlap to dotted line to make a shallow cone.

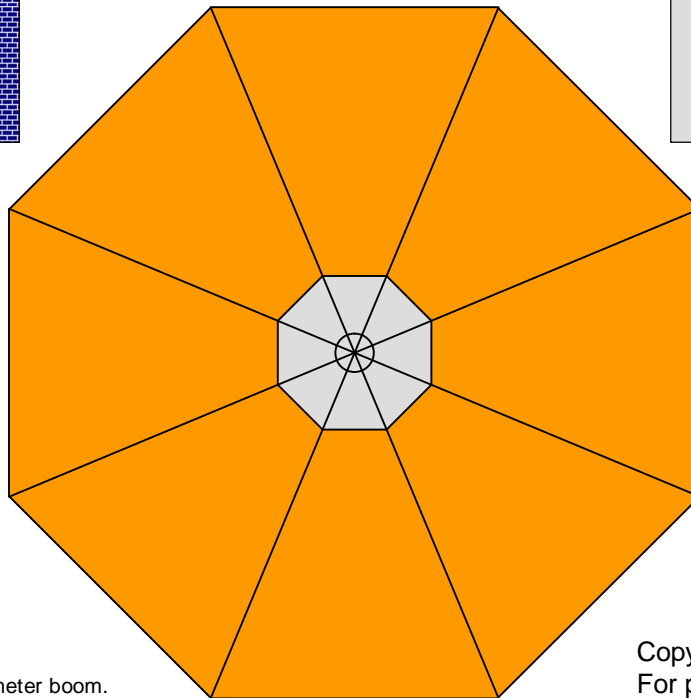
High Gain Antenna Dish



Mounting Strap

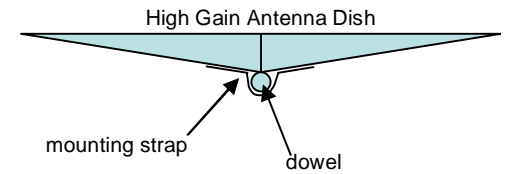


Cut dowel to 18" for High Gain Antenna support and magnetometer boom.



Sun Shade

Fold in half and glue together.  
Attach split end of dowel to hold panels.



**Print on card stock**

Copyright 2009, John Jogerst. Not for commercial use.  
For personal or educational use only.

