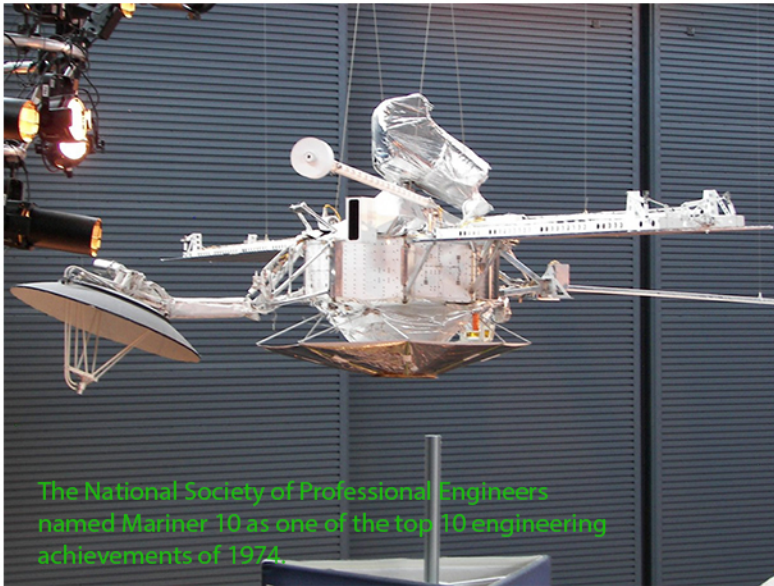


Mariner 10



The National Society of Professional Engineers named Mariner 10 as one of the top 10 engineering achievements of 1974.



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 in one mission. 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.

Mariner 10 was launched by NASA on November 3, 1973 on an Atlas Centaur rocket, from launch complex 36B at Cape Canaveral Air Force Station.

The Atlas stage burned for around four minutes, after which it was jettisoned, and the Centaur stage took over for an additional five minutes, propelling Mariner 10 to a parking orbit. The temporary orbit took the spacecraft one-third of the distance around Earth: this maneuver was needed to reach the correct spot for a second burn by the Centaur engines, which set Mariner 10 on a path towards Venus. The probe then separated from the rocket; subsequently, the Centaur stage diverted away to avoid the possibility of future collision. Never before had a planetary mission depended upon two separate rocket burns during the launch.

Mariner 10 was launched approximately two years after Mariner 9 and was the last spacecraft in the Mariner program. (Mariner 11 and 12 were allocated to the Voyager program and redesignated Voyager 1 and Voyager 2).

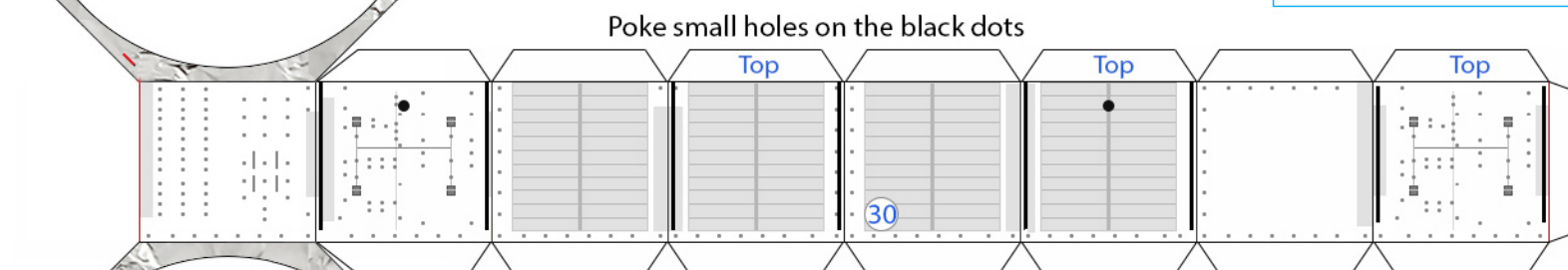
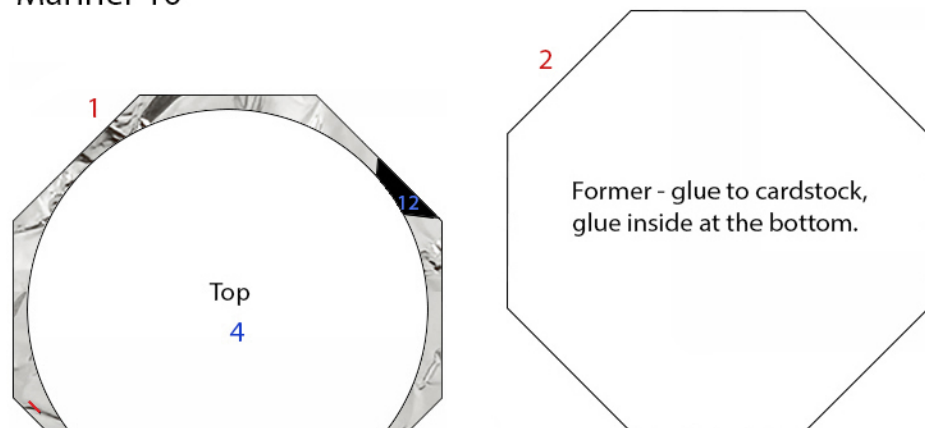
Mariner 10 used the solar radiation pressure on its solar panels and its high-gain antenna as a means of attitude control during flight, the first spacecraft to use active solar pressure control.

The spacecraft passed Venus on February 5, 1974, the closest approach being 5,768 km at 17:01 UT. It was the twelfth spacecraft to reach Venus and the eighth to return data from the planet, as well as the first mission to succeed in broadcasting images of Venus back to Earth.

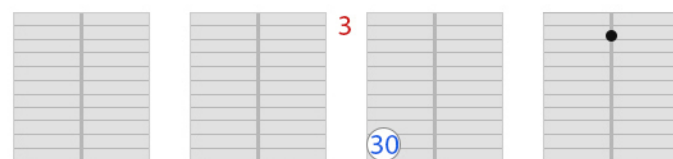
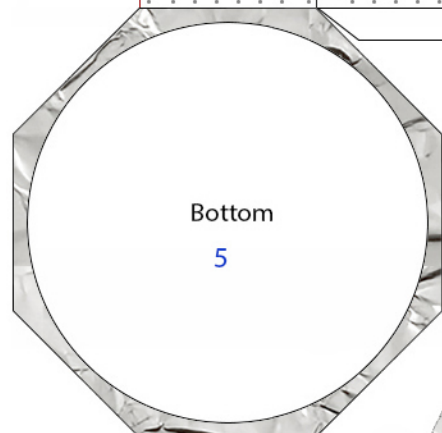
The spacecraft also flew past Mercury three times. The first Mercury encounter took place at 20:47 UT on March 29, 1974, at a range of 703 kilometers (437 mi), passing on the shadow side. After looping once around the Sun while Mercury completed two orbits, Mariner 10 flew by Mercury again on September 21, 1974, at a more distant range of 48,069 km (29,869 mi) below the southern hemisphere. After losing roll control in October 1974, a third and final encounter, the closest to Mercury, took place on March 16, 1975, at a range of 327 km (203 mi), passing almost over the north pole.

Mariner 10 is presumably still orbiting the Sun, although its electronics have probably been damaged by the Sun's radiation. Mariner 10 has not been spotted or tracked from Earth since it stopped transmitting. The only way it would not be orbiting would be if it had been hit by an asteroid or gravitationally perturbed by a close encounter with a large body. Both of these occurrences are extremely unlikely, so it is assumed to still be in orbit.

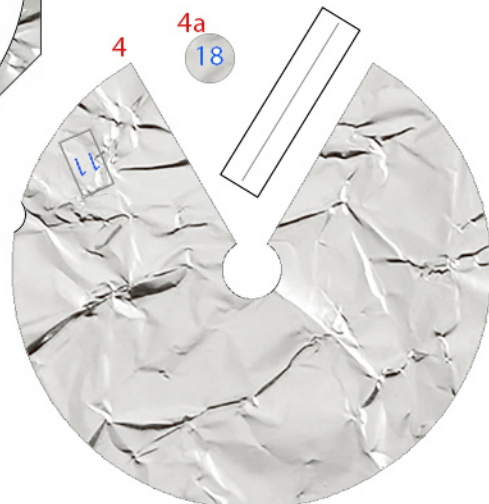




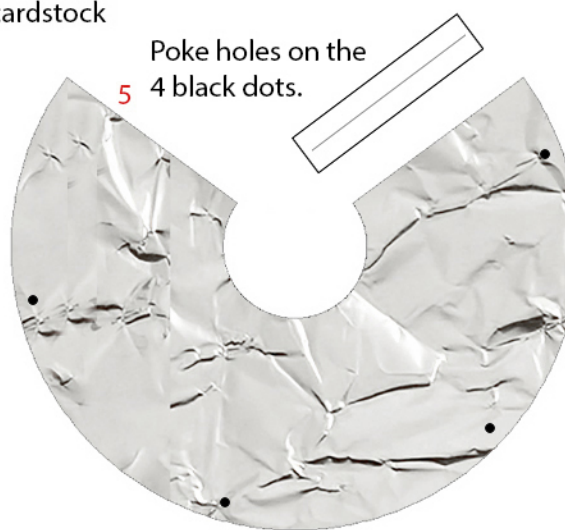
Poke small holes on the black dots



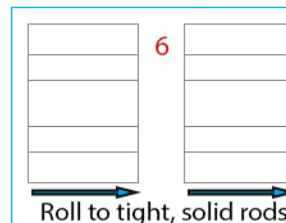
Glue to cardstock



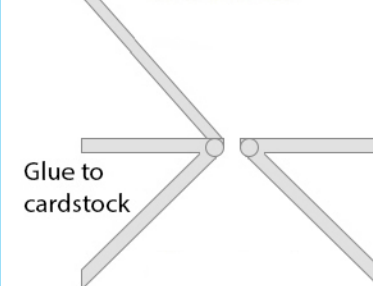
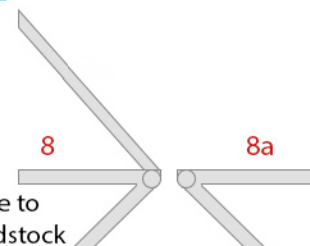
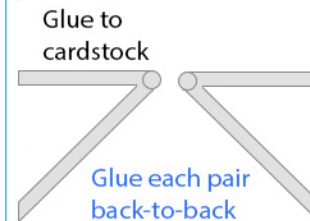
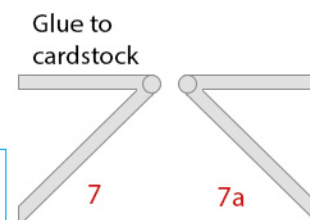
Top cone



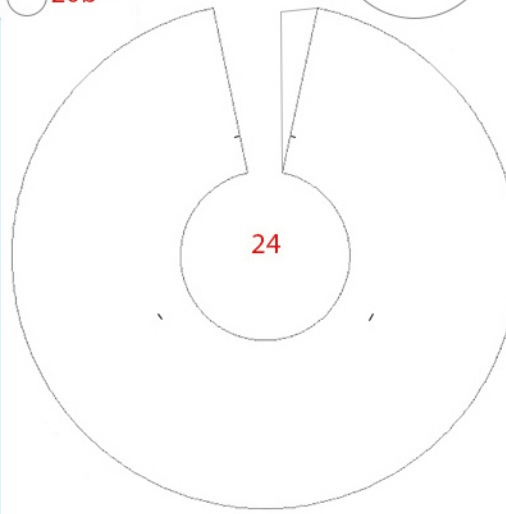
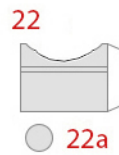
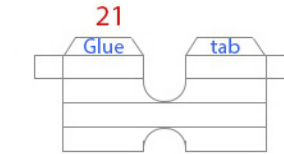
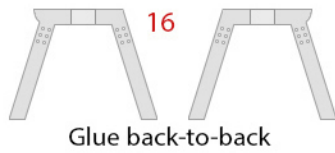
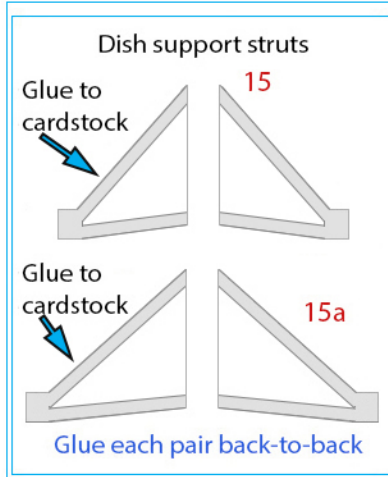
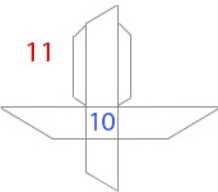
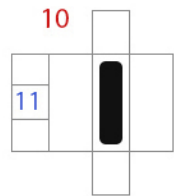
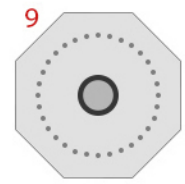
Bottom cone



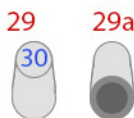
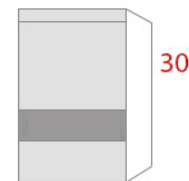
Solar Panel support struts



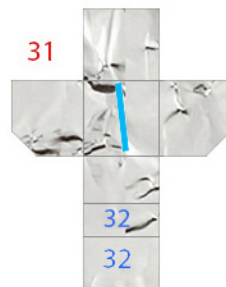
Mariner 10



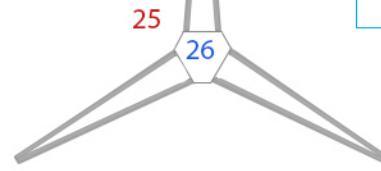
Dish 1
Color back Black



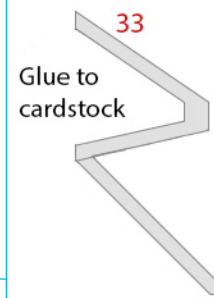
Glue to cardstock,
then back-to-back



Glue these to
cardstock



Dish 2



Glue to
cardstock



Glue these
back-to back



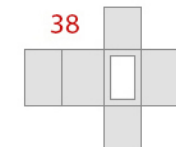
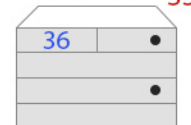
Glue to
cardstock

Glue these
back-to back

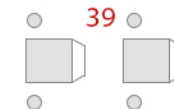


Need a plastic broom straw cut at
120 mm long, colored light grey or
silver.

Poke small holes on
the black dots 35



Color back side
the same color



Mariner 10

40a



41



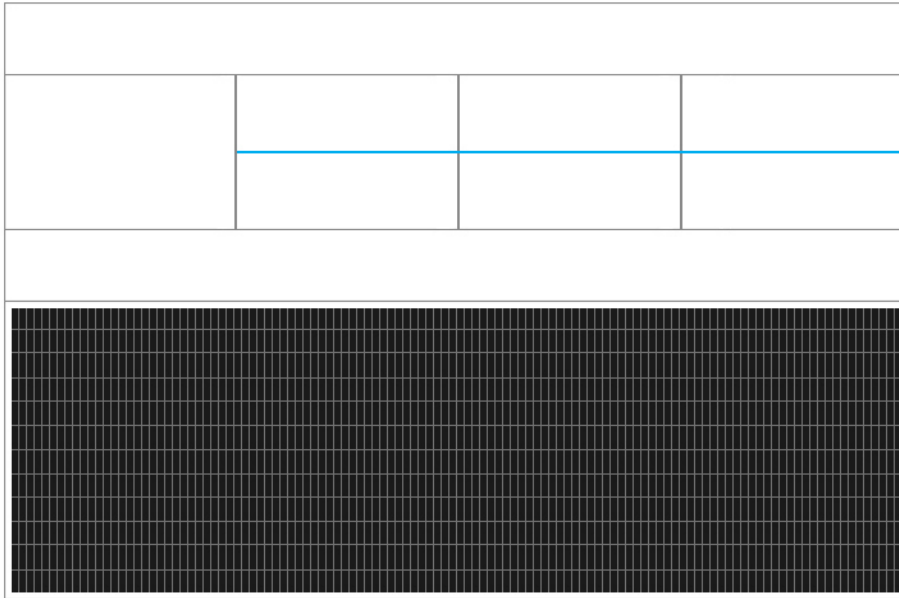
Glue to cardstock, poke holes on the inner circles

Need a long wood skewer, acrylic rod or similar material around 1.5 mm diameter, cut around 90 mm long, colored white for the low-gain antenna.

Need a music wire or thin-stiff wire around .047 inch (1 mm) diameter, cut at 275 mm long for the solar array support rod.

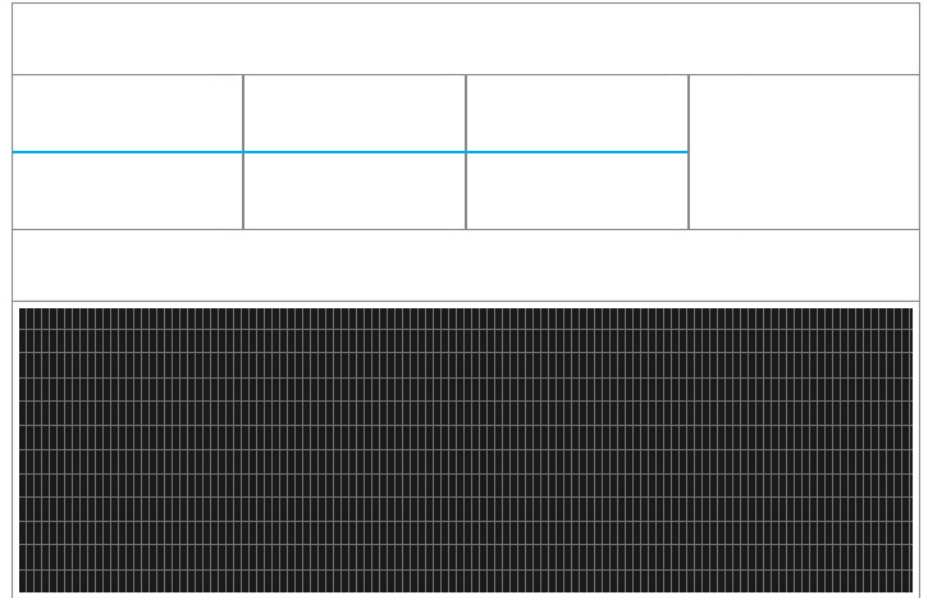
Need two music wires or similar material around .047 inch (1 mm) diameter, cut at the same length as the line below, colored white.

42

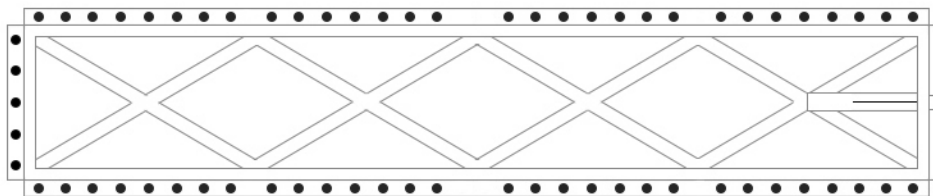


Fold in half, glue back-to-back

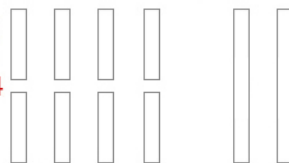
43



Fold in half, glue back-to-back

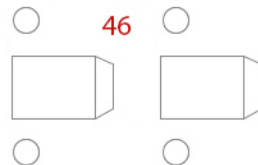


44



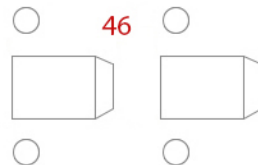
Glue to cardstock

45



Roll to small tubes

46



Don't print beyond this page, use the following page to print the foil graphics on the **back side** of this part.



Need 8 plastic broom straws, colored light grey or silver cut around the same length as the line below for the support struts for the above part.
May need to trim some for proper fit.



Use this to print the graphics to the back side of the sun shade part on the previous page.



Use this to print the back side of Dish 1 (part 24) on page 3 black.

