

GAIA – ESA billion star telescope

Gaia is an unmanned space observatory of the European Space Agency (ESA) designed for astrometry. The mission aims to compile a 3D space catalogue of approximately 1 billion astronomical objects (approximately 1% of the Milky Way population) brighter than 20 G magnitudes, where G is the Gaia magnitude passband between about 400 and 1000 nanometres light wavelengths. Successor to the Hipparcos mission, it is part of ESA's Horizon 2000 Plus long-term scientific program. Gaia will monitor each of its target stars about 70 times over a period of five years.

Gaia will create a precise three-dimensional map of stars throughout the Milky Way and map their motions, which encode the origin and subsequent evolution of the Milky Way. The spectrophotometric measurements will provide the detailed physical properties of each star observed, characterising their luminosity, effective temperature, gravity and elemental composition. This massive stellar census will provide the basic observational data to tackle a wide range of important questions related to the origin, structure and evolutionary history of our galaxy. Large numbers of quasars, galaxies, extrasolar planets and Solar System bodies will be measured at the same time.

Gaia was launched on 19 December 2013 by Arianespace using a Soyuz ST-B/Fregat-MT rocket flying from Kourou in French Guiana. The spacecraft will be operated in a Lissajous orbit around the Sun–Earth L2 Lagrangian point.

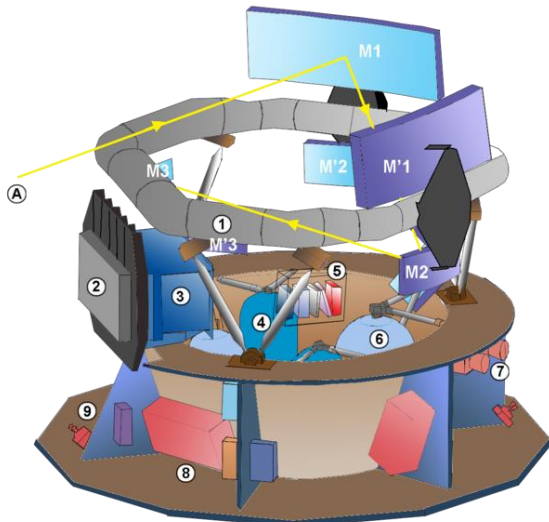
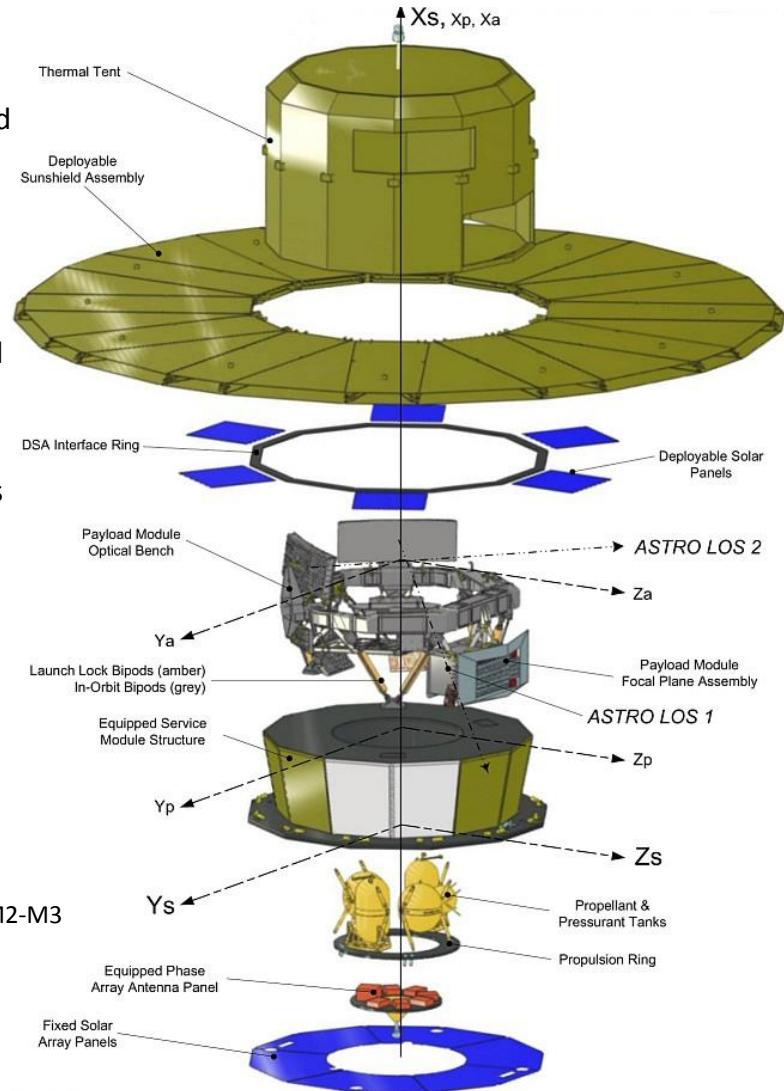


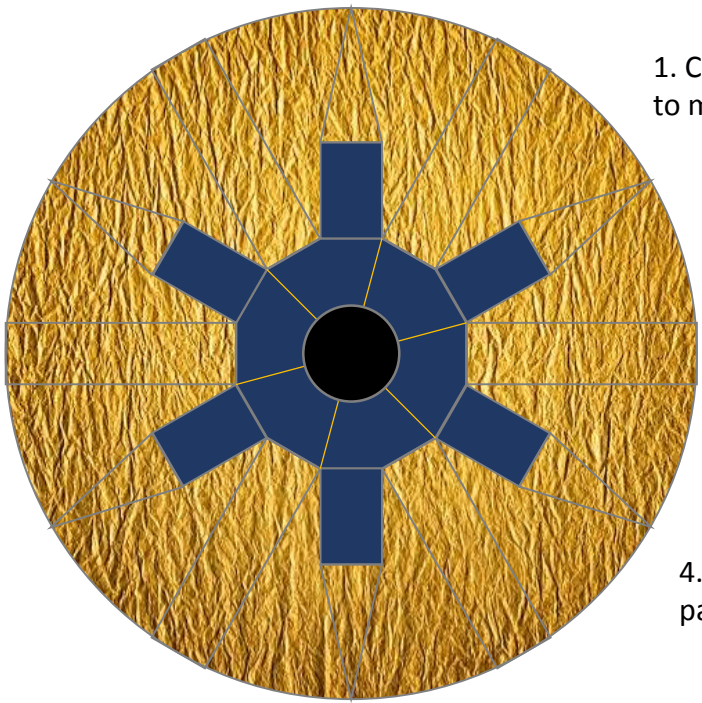
Diagram of Gaia:

- M1, M2 and M3: Mirrors of telescope 1
- M'1, M'2 and M'3: Mirrors of telescope 2
- mirrors not shown: M4, M'4, M5, M6
- A: Light path of telescope 1 between mirrors M1-M2-M3
- 1: Optical bench (silicon carbide torus)
- 2: Focal plane cooling radiator
- 3: Focal plane electronics[21]
- 4: Nitrogen tanks
- 5: Diffraction grating spectrograph
- 6: Liquid propellant tanks
- 7: Star trackers
- 8: Telecommunication panel and batteries
- 9: Main propulsion subsystem



Dimensions 4.6 m × 2.3 m (15.1 ft × 7.5 ft)

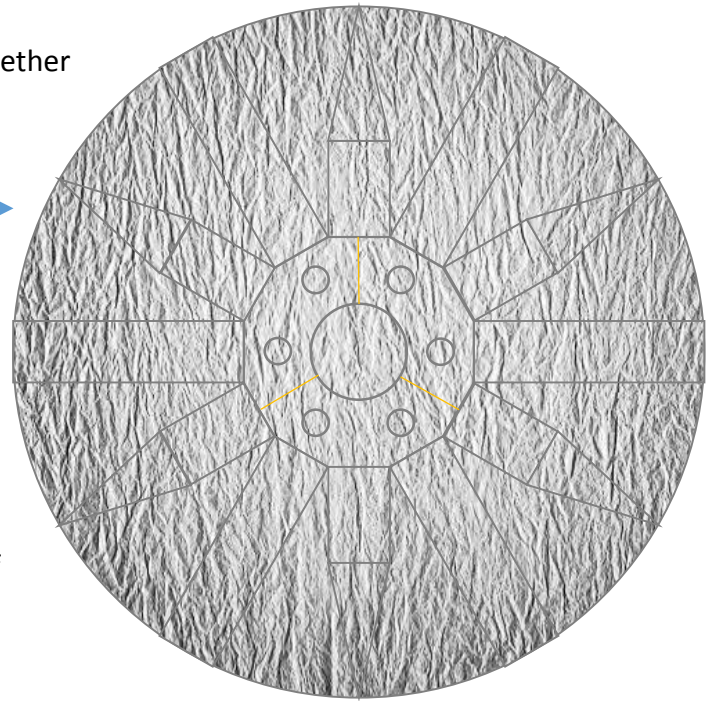
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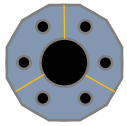
1. Cut out and glue unprinted sides together to make sunshield.



4. Cut out part and glue to the top of part 2.

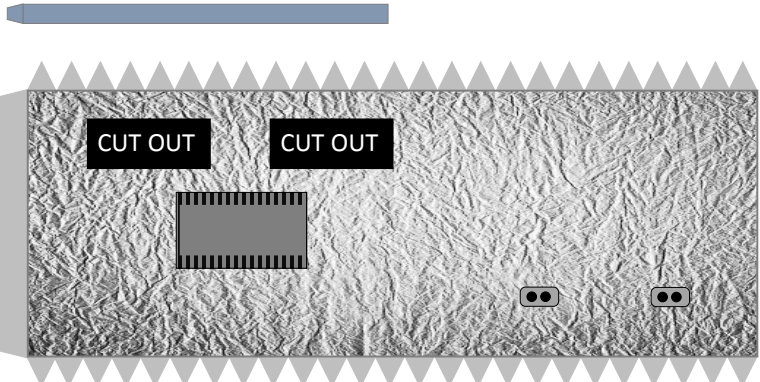


1:50 scale

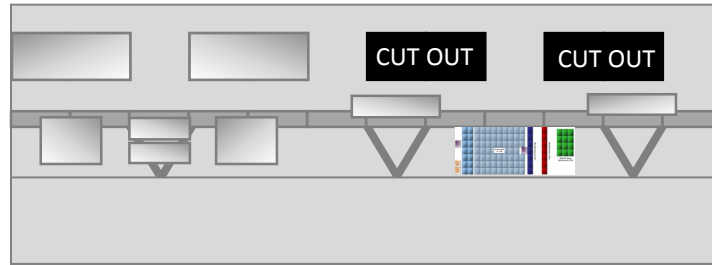


5. Cut out parts, roll the band into a ring and glue. Glue the "circle" to the band, then glue the completed assembly to the center bottom (gold side) of the sunshield.

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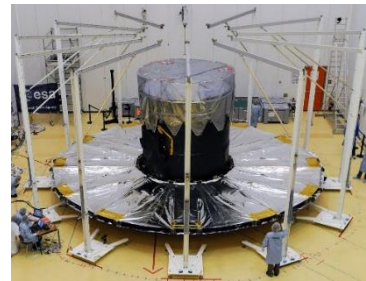


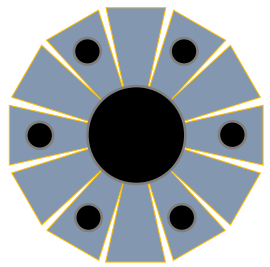
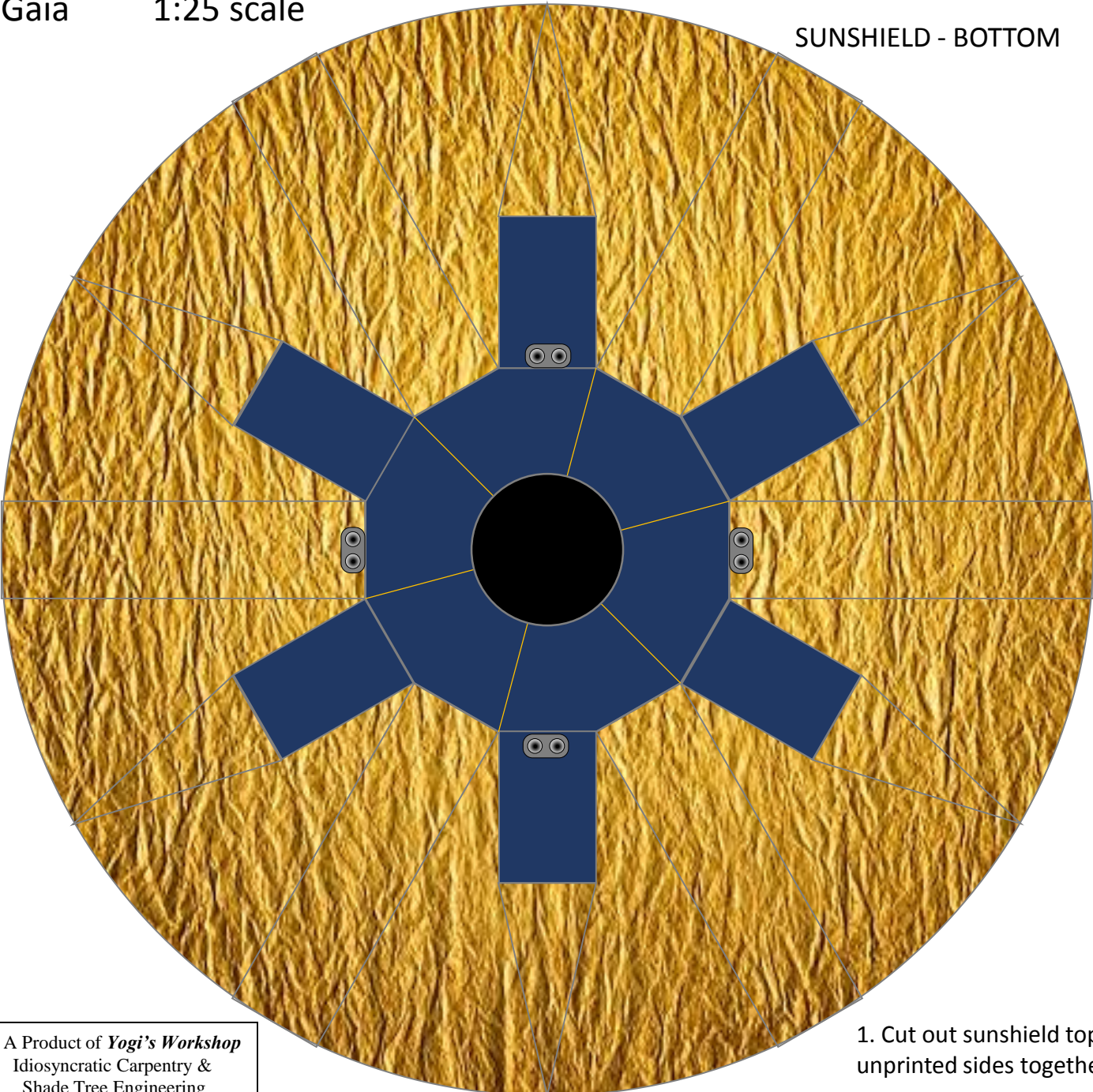
2. Cut out part, cut out black openings, then roll into a cylinder and glue using the tab. After inserting part 3, fold down the tabs and glue the assembly to the gray side of the sunshield.



3. Cut out part, cut out black openings, then roll into a cylinder. Slip inside part 2, lining up the openings and glue in place.

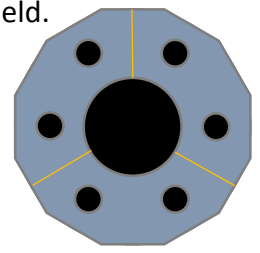
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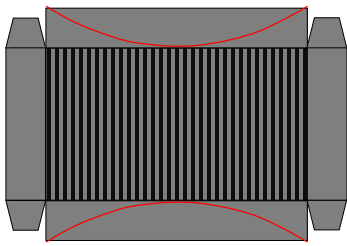
9. Cut out the launch mount and comms antennae. Fold petals down and glue into a flat prism. Glue completed part to the bottom/center of the sunshield (gold & blue side).

9a. Alternate simple launch mount. Cut out parts, roll the band into a ring and glue. Glue the "circle" to the band, then glue the completed assembly to the center bottom (gold side) of the sunshield.



1. Cut out sunshield top and bottom and glue unprinted sides together.

SUNSHIELD - TOP

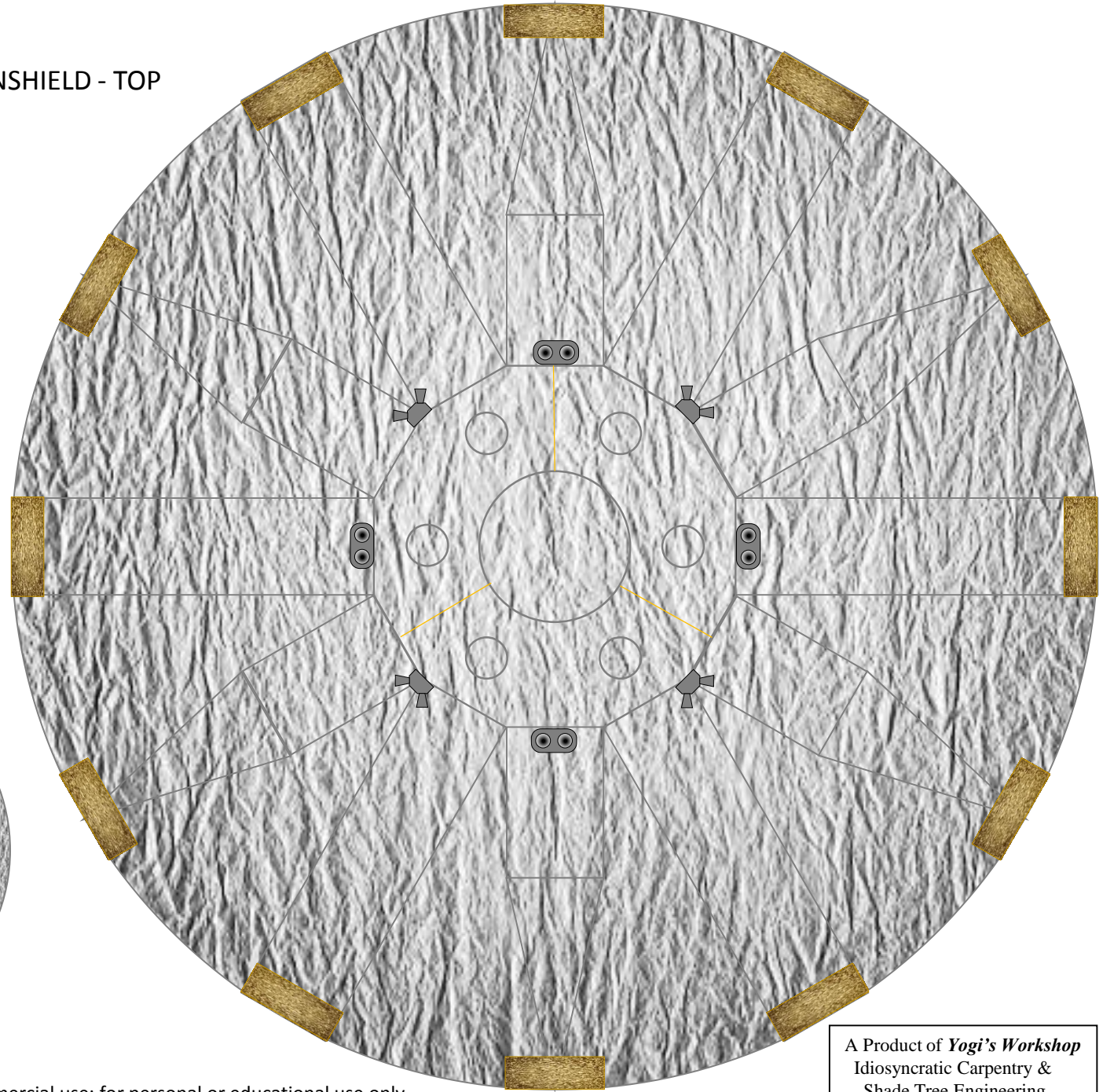


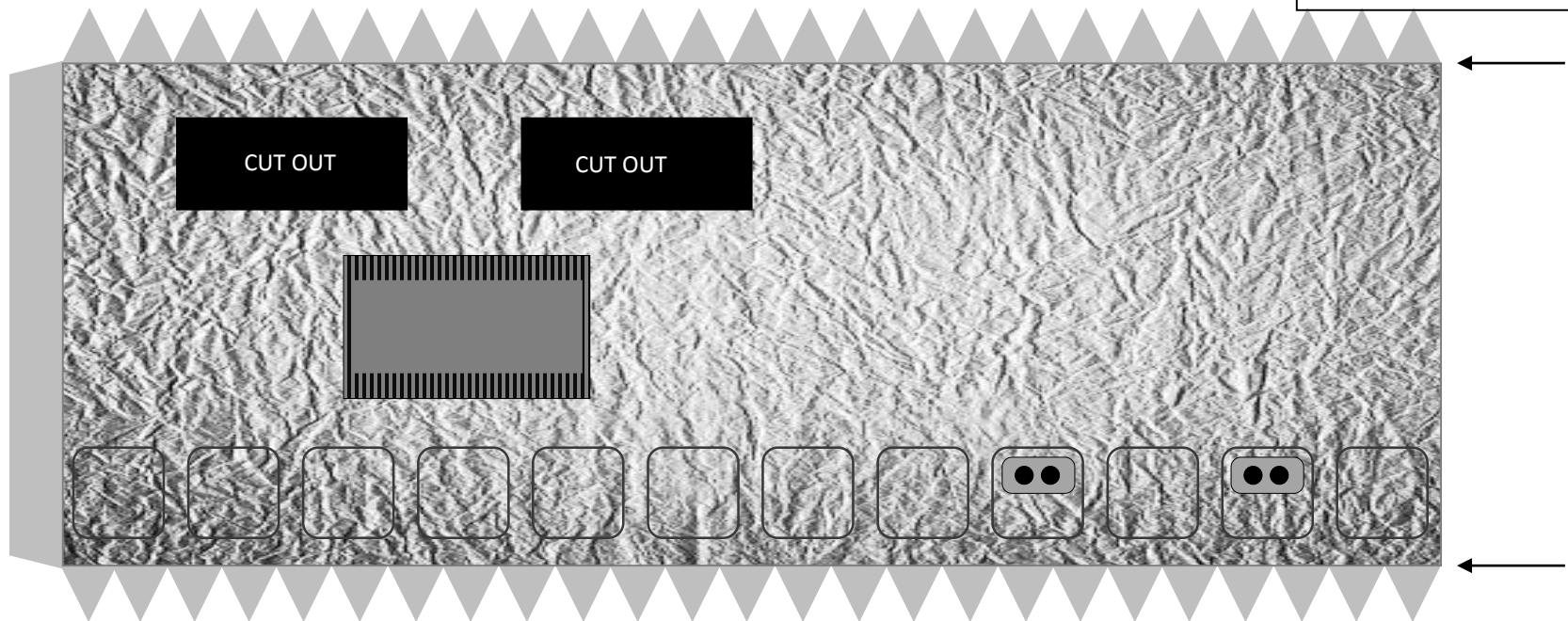
8. FOCAL PLANE RADIATOR (optional). Cut out shape, cut along red lines. Fold into a box and glue to the telescope body over the printed graphic.

7. Cut out telescope body top and glue to the top of the telescope body.



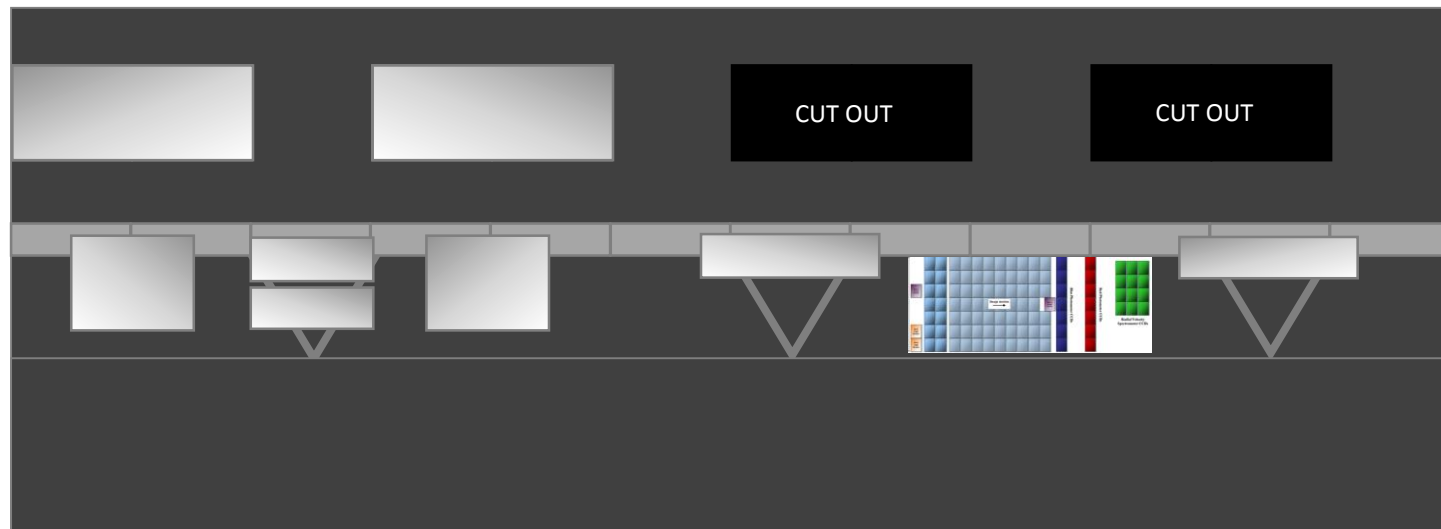
TELESCOPE BODY - TOP



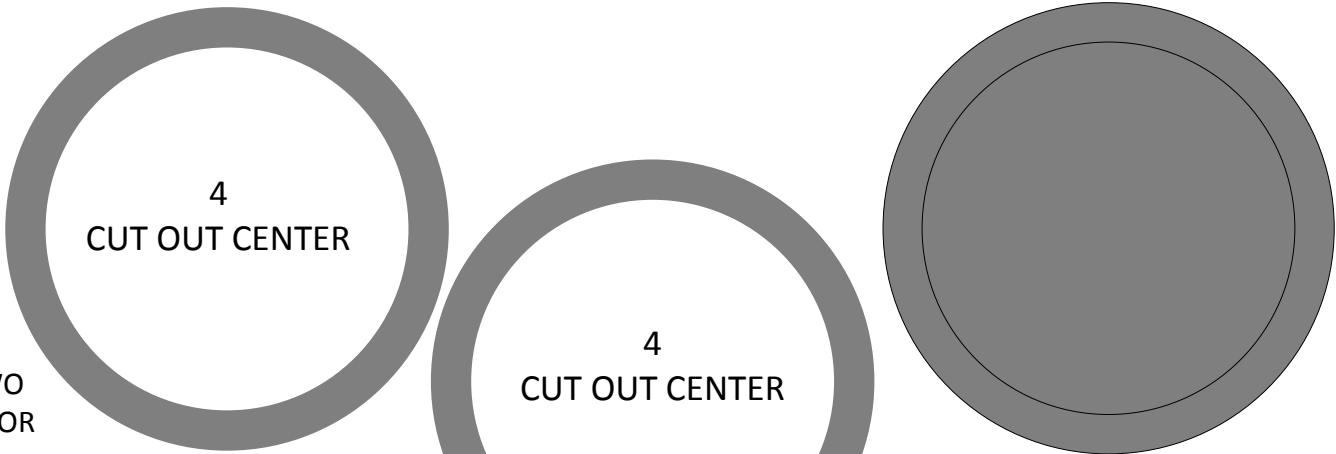


2. Cut out telescope exterior and cut out the two apertures. Roll into a cylinder and glue using the tab.

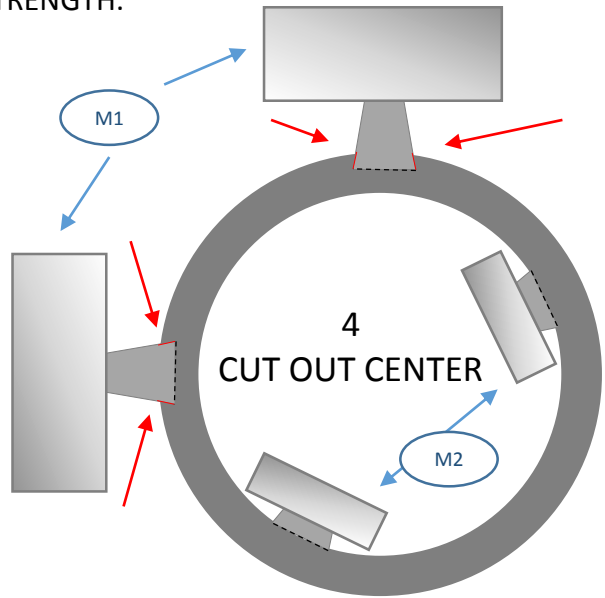
TELESCOPE BODY – INTERIOR (SIMPLIFIED – OPTICAL BENCH PARTS NOT REQUIRED)



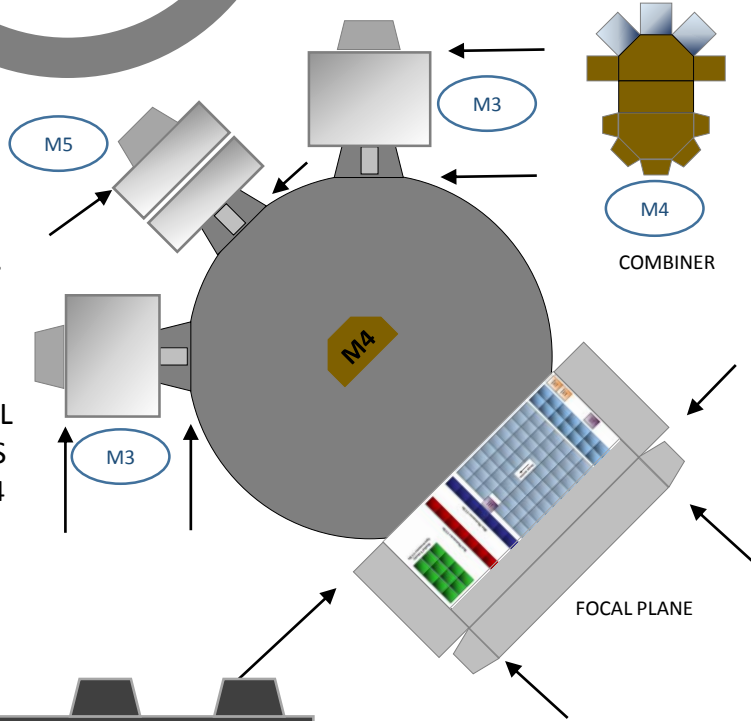
3. Cut out telescope interior and cut out the two apertures. Roll into a cylinder, printed side in, and glue inside the exterior – lining up the aperture cut outs. If building the detailed optical bench, replace this part with an equally sized piece of black paper. Glue the paper inside the body exterior and cut out the apertures.



4. OPTICAL BENCH – UPPER LAYER. CUT ON RED LINES AND BEND LARGE MIRRORS UP TO FIT INSIDE BODY, BEND SMALL MIRRORS DOWN. CURVE M1 MIRRORS SLIGHTLY. GLUE THE OTHER TWO RINGS TO THE BOTTOM OF THE BENCH FOR STRENGTH.



5. OPTICAL BENCH – LOWER. ARROWS INDICATE FOLDS. PARTS ON THE DISK FOLD UP. TABS AT THE TOP OF THE MIRRORS FOLD DOWN. FOLD FOCAL PLANE INTO A BOX AND GLUE. OPTICAL BENCH UPPER LAYER ASSEMBLY GLUES TO THE THREE TABS AND TOP OF THE FOCAL PLANE, ALIGNING THE M3 MIRRORS UNDER THE M1 MIRRORS. FOLD M4 INTO A BOX AND GLUE WHERE INDICATED.



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6. OPTICAL BENCH – FLOOR SUPPORT. ROLL AND GLUE INSIDE LOWER TELESCOPE BODY, BEND TABS DOWN TO FORM LEDGE TO SUPPORT FLOOR. GLUE OPTICAL BENCH FLOOR IN PLACE. GLUE ASSEMBLED OPTICAL BENCH TO FLOOR WITH M1 MIRRORS OPPOSITE THE OPENINGS IN THE TELESCOPE BODY. GLUE THE COMPLETED TELESCOPE BODY TO THE CENTER/TOP OF THE SUNSHIELD (GRAY SIDE).