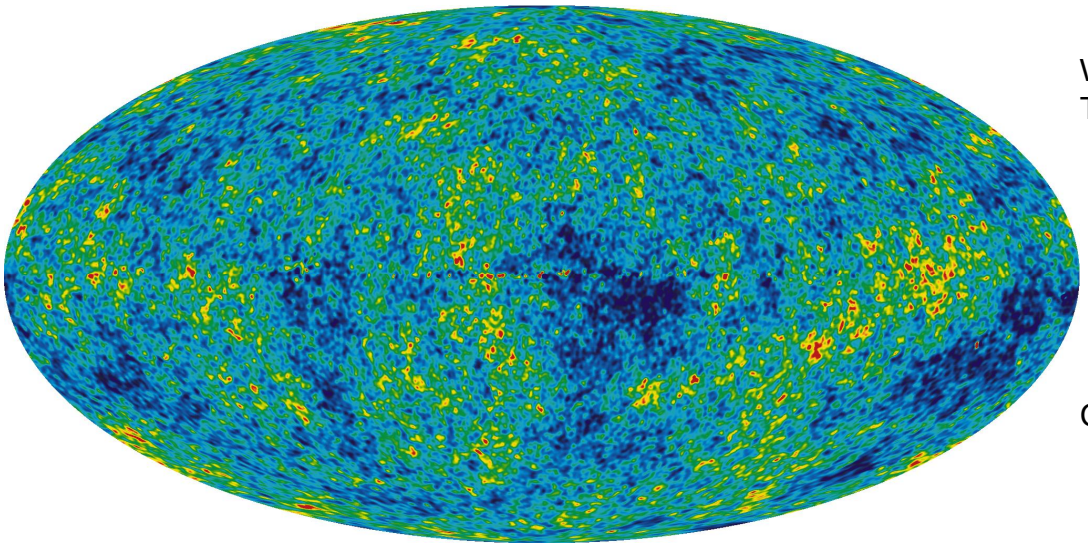
WMAP Wilkinson Microwave Anisotropy Probe 1:24 scale

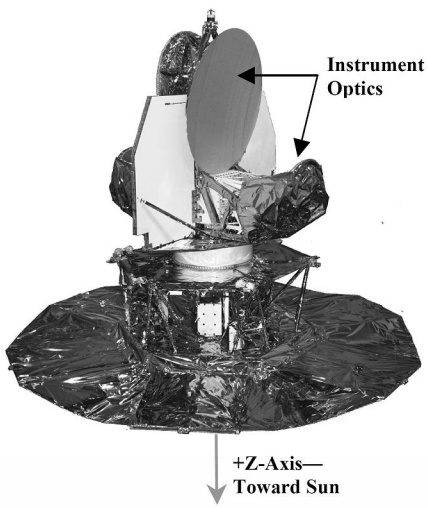
- The Wilkinson Microwave Anisotropy Probe (WMAP) is a NASA Explorer mission that launched June 2001 to make fundamental measurements of cosmology -- the study of the properties of our universe as a whole. WMAP has been stunningly successful, producing our new Standard Model of Cosmology. WMAP continues to collect high quality scientific data.
- WMAP's Top Ten
- 1-NASA's Wilkinson Microwave Anisotropy Probe (WMAP) has mapped the Cosmic Microwave Background (CMB) radiation (the oldest light in the universe) and produced the first fine-resolution (0.2 degree) full-sky map of the microwave sky
- 2-WMAP definitively determined the age of the universe to be 13.73 billion years old to within 1% (0.12 billion years)
- 3-WMAP nailed down the curvature of space to within 1% of "flat" Euclidean, improving on the precision of previous award-winning measurements by over an order of magnitude
- 4-The CMB became the "premier baryometer" of the universe with WMAP's precision determination that ordinary atoms (also called baryons) make up only 4.6% of the universe (to within 0.1%)
- 5-WMAP's complete census of the universe finds that dark matter (not made up of atoms) make up 23.3% (to within 1.3%)
- 6-WMAP's accuracy and precision determined that dark energy makes up 72.1% of the universe (to within 1.5%), causing the expansion rate of the universe to speed up
- 7-WMAP has mapped the polarization of the microwave radiation over the full sky and discovered that the universe was reionized earlier than previously believed. By measuring the polarization in the CMB it is possible to look at the amplitude of the fluctuations of density in the universe that produced the first galaxies. That is a real breakthrough in our understanding of the origin of structure
- 8-WMAP has started to sort through the possibilities of what transpired in the first trillionth of a trillionth of a second, ruling out well-known textbook models for the first time.
- 9-The statistical properties of the CMB fluctuations measured by WMAP appear "random"; however, there are several hints of possible deviations from simple randomness that are still being assessed. Significant deviations would be a very important signature of new physics in the early universe.
- 10-Since 2000, the three most highly cited papers in all of physics and astronomy are WMAP scientific papers.

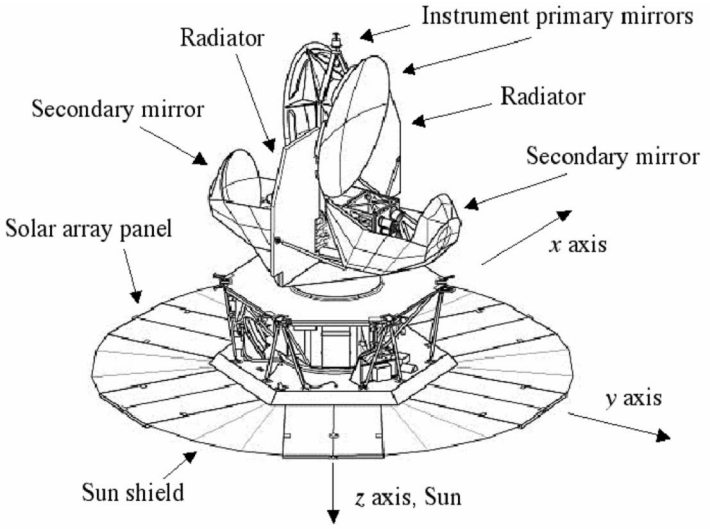


WMAP RESULTS: Five Year Microwave Sky
The detailed, all-sky picture of the infant universe created from five years of WMAP data. The image reveals 13.7 billion year old temperature fluctuations (shown as color differences) that correspond to the seeds that grew to become the galaxies. The signal from the our Galaxy was subtracted using the multi-frequency data. This image shows a temperature range of ± 200 microKelvin.

Credit: NASA / WMAP Science Team

Not to scale

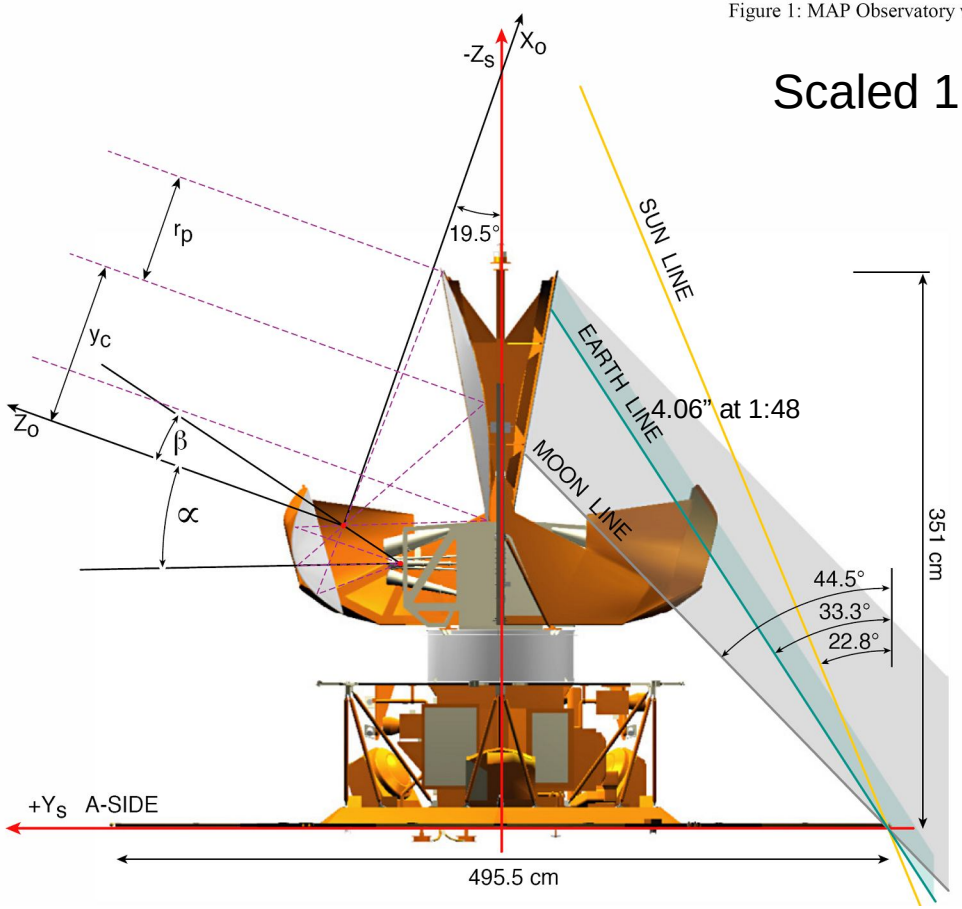


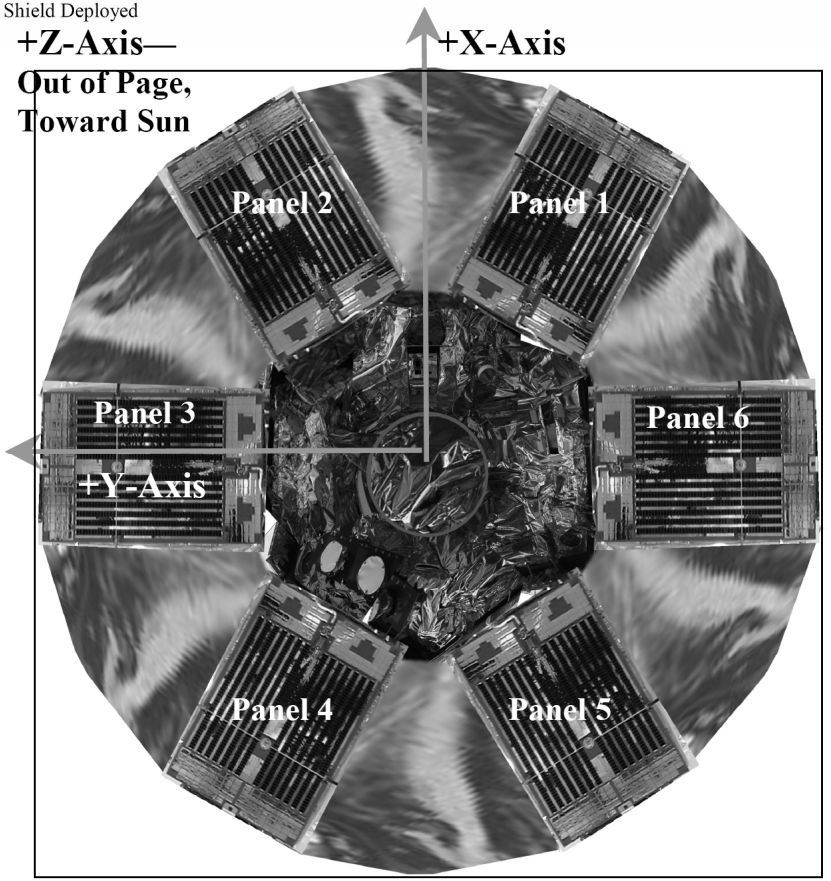


MAP Optical Design and Characterizatic

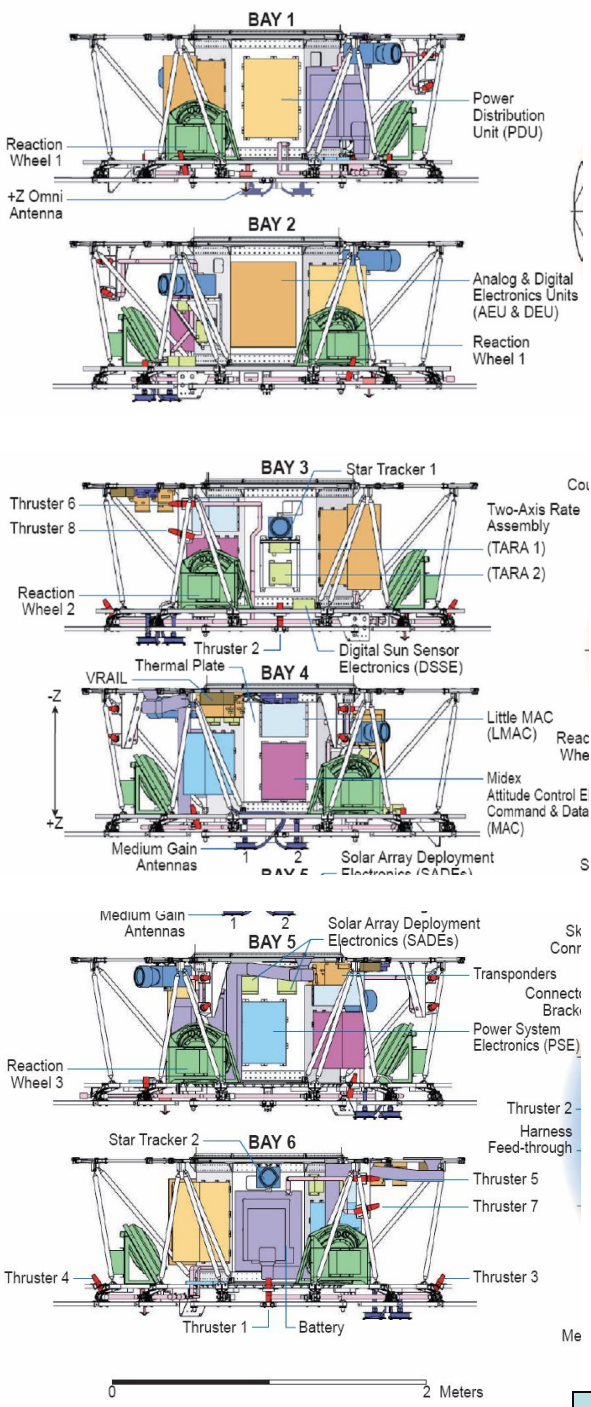
Figure 1: MAP Observatory with Solar Shield Deployed

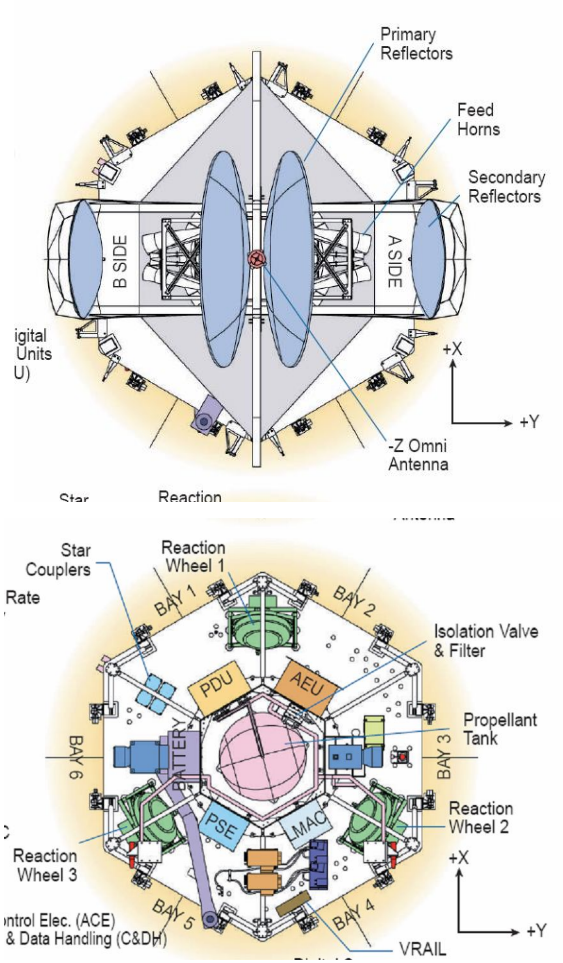
Scaled 1:48



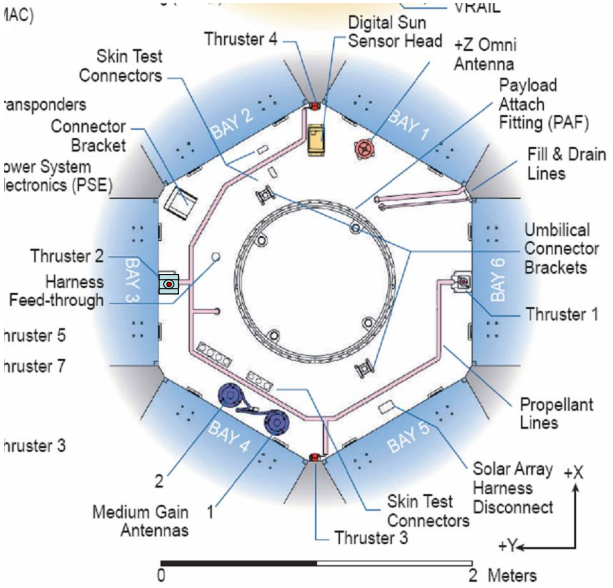


Scaled page 1:48



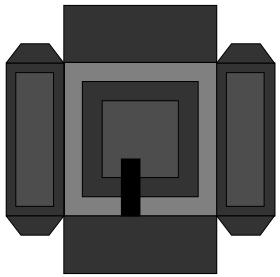


Note – two triangular areas of non-reflective paint added to top of shield in front of star trackers



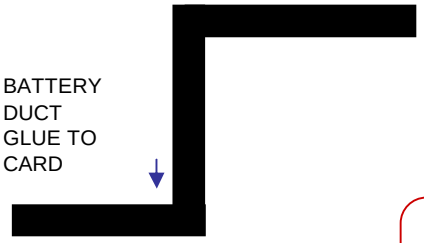
pdf@147%; reductions 39% and 44%

WMAP 1:24



BATTERY

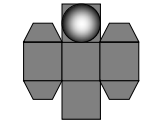
APPROXIMATE PLACES TO BEND



BATTERY DUCT GLUE TO CARD

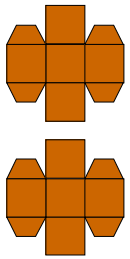
6 ELECTRONICS

STAR TRACKER



ROLL

5



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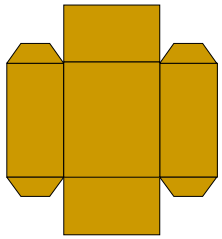

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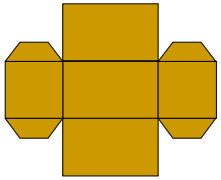
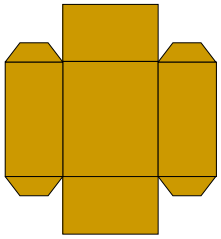
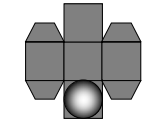


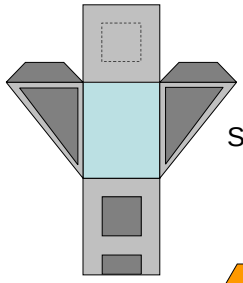
MAC



3 STAR TRACKER

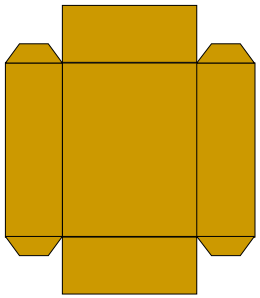


ROLL

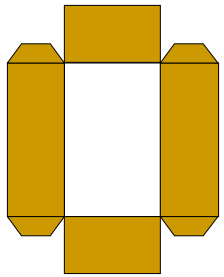


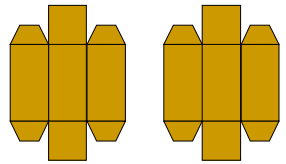
ST BRACKET

2 AEU DEU



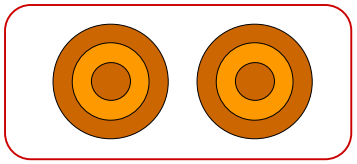
1 PDU

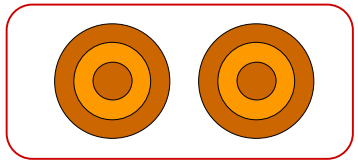


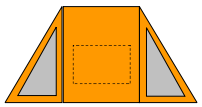


VRAIL – ATTACH TO UNDERSIDE OF TOP DECK BETWEEN BAYS 4 AND 5.

REACTION WHEELS GLUE CIRCLES TO THICK CARD







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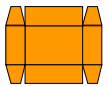

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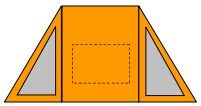

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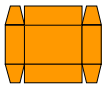

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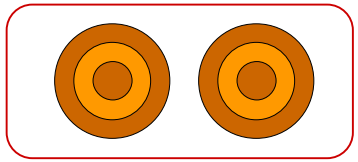

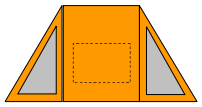

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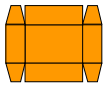
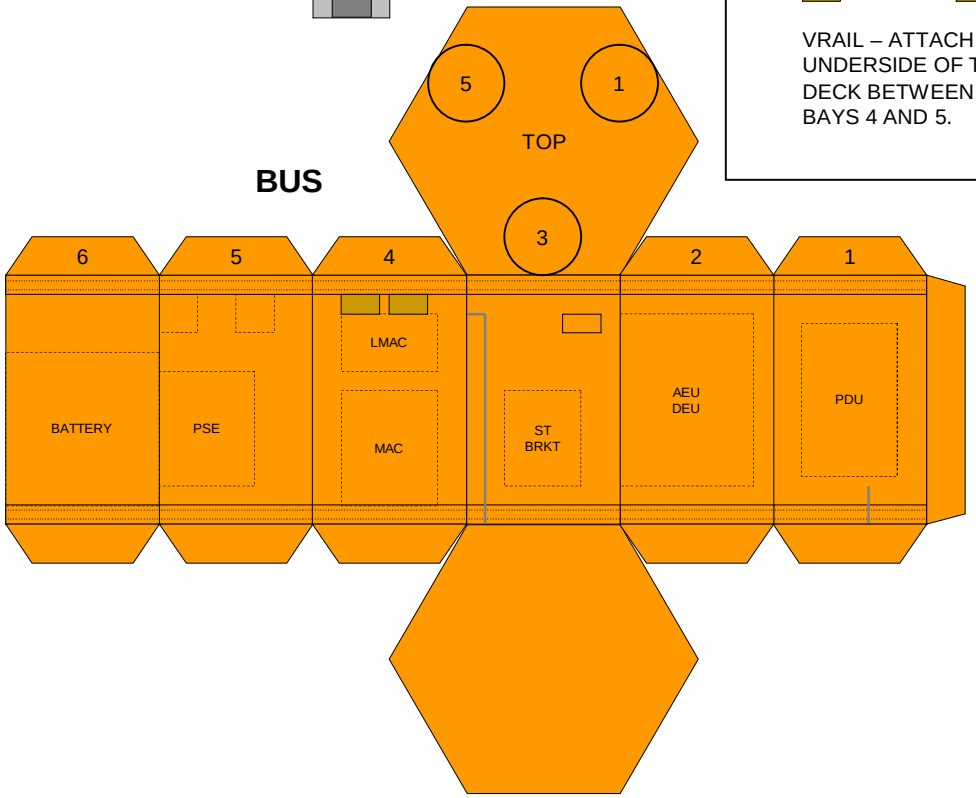
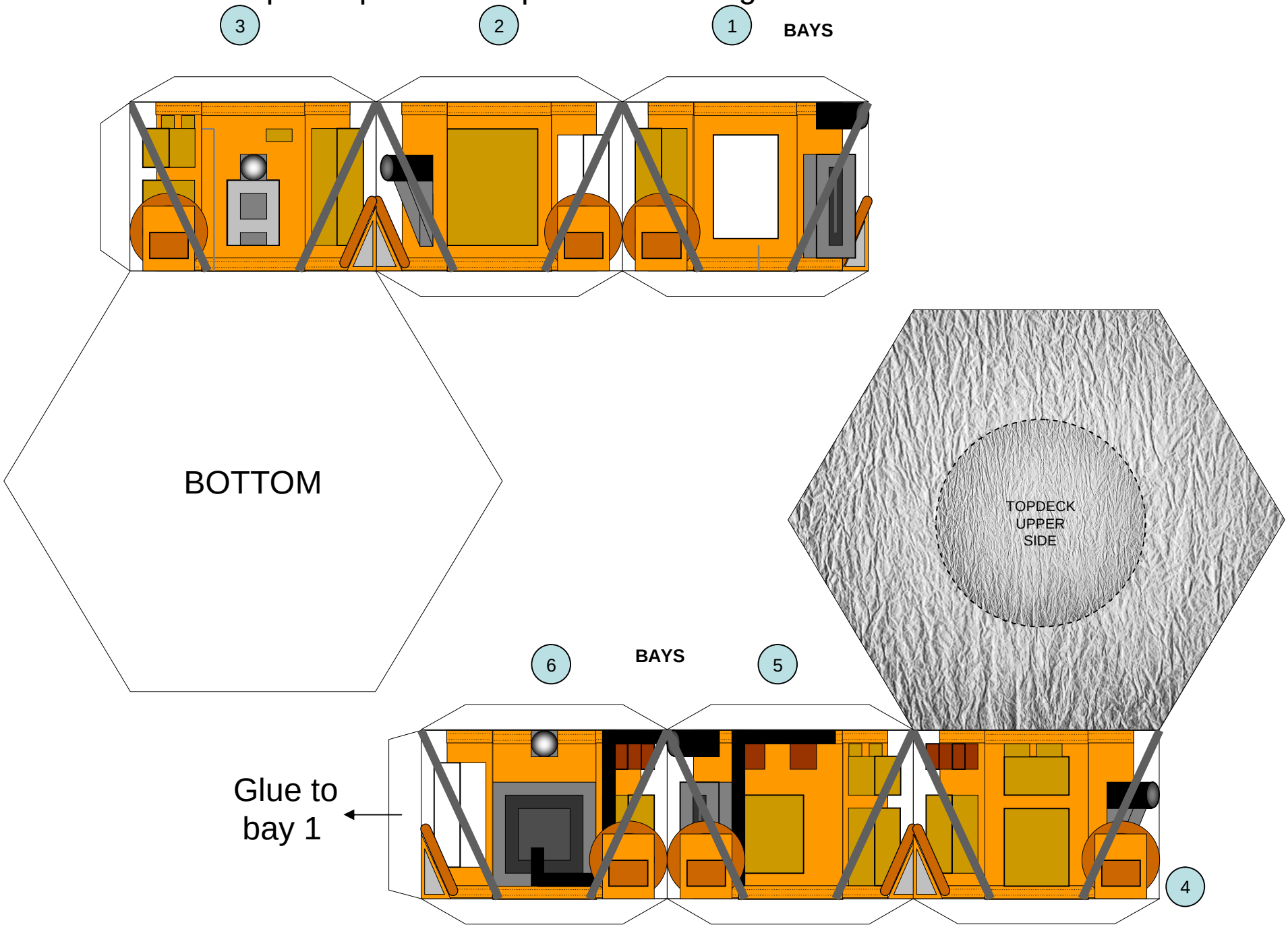


CONTROL BOX

BUS

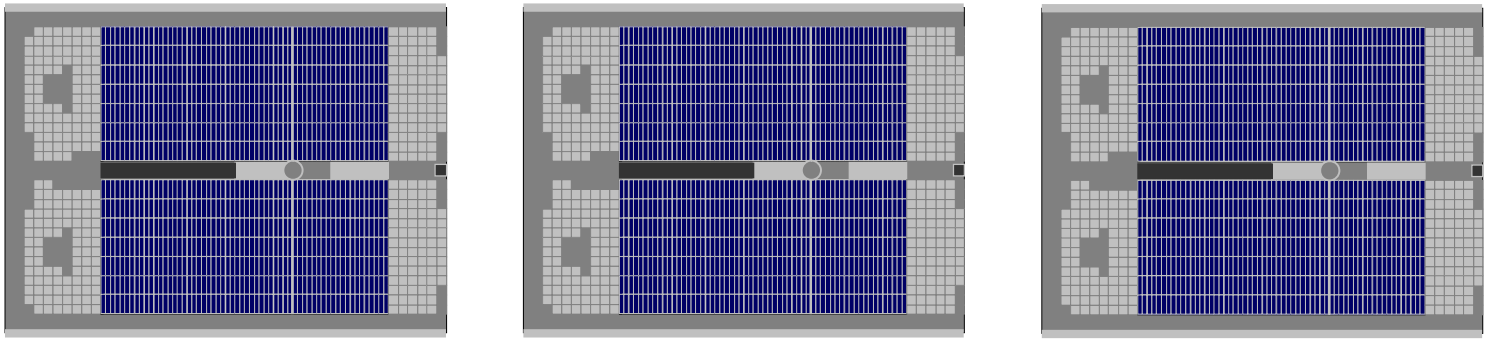


WMAP 1:24 – simplified parts. One-piece bus hexagon.

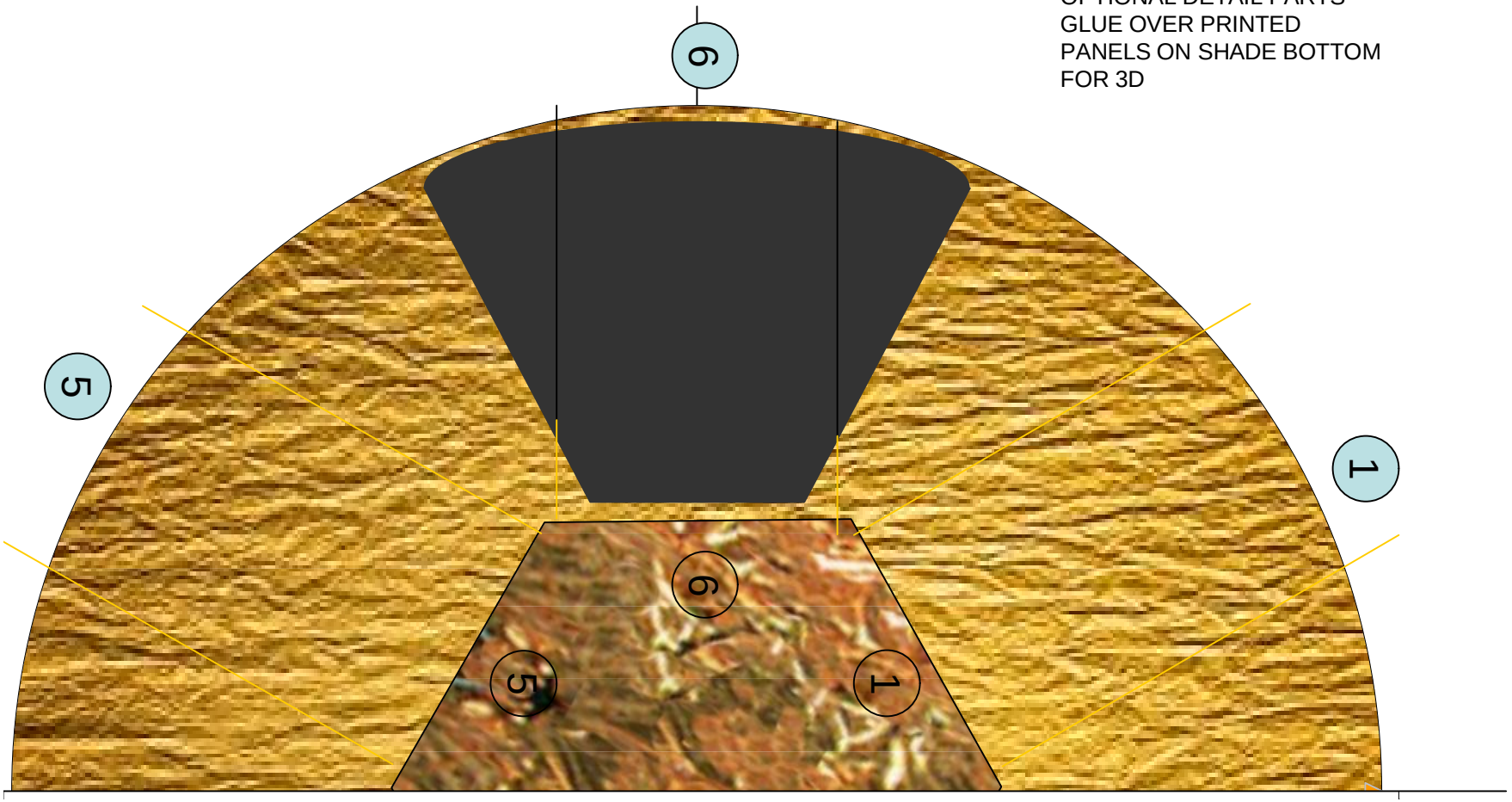


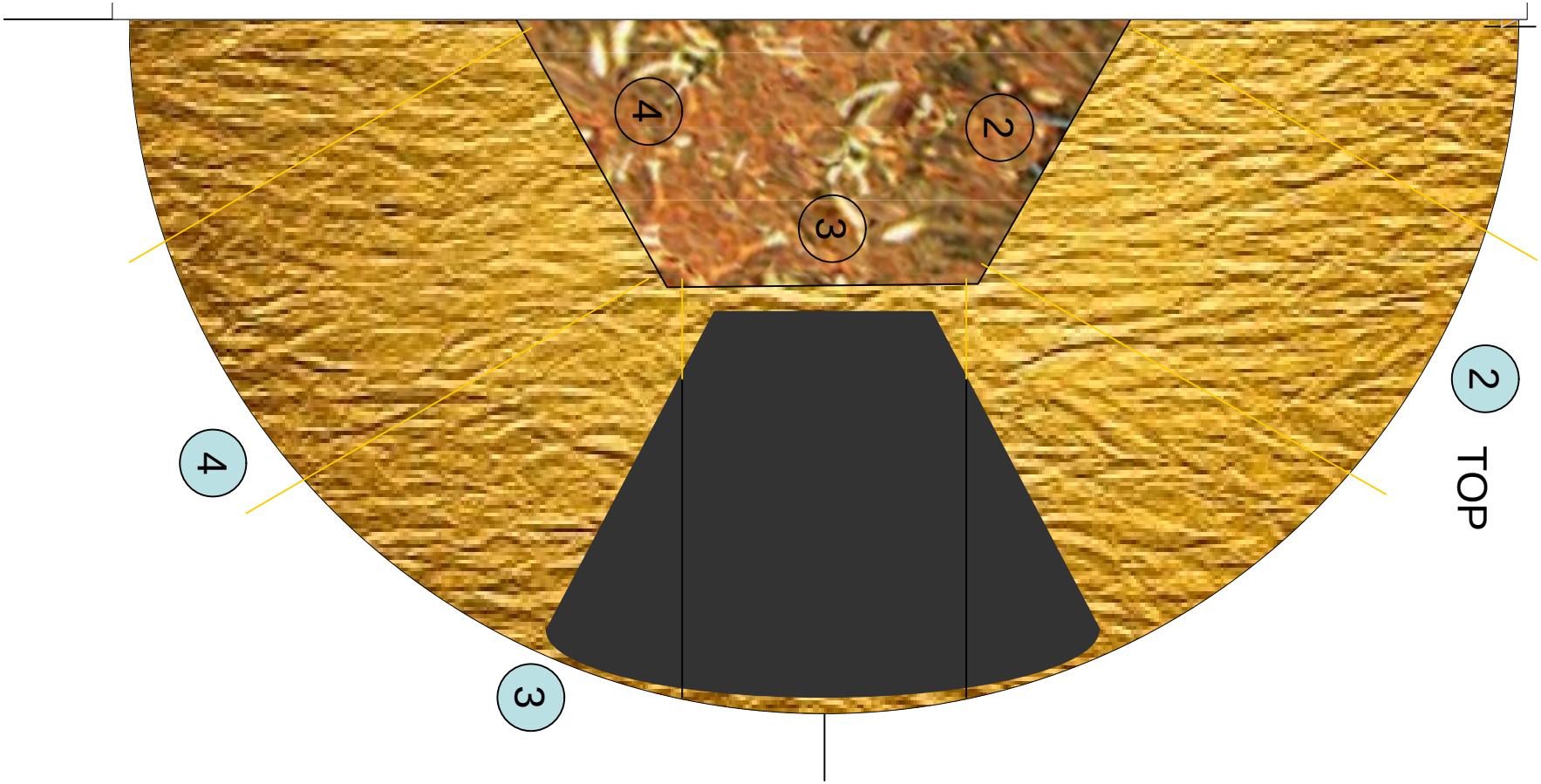
WMAP 1:24

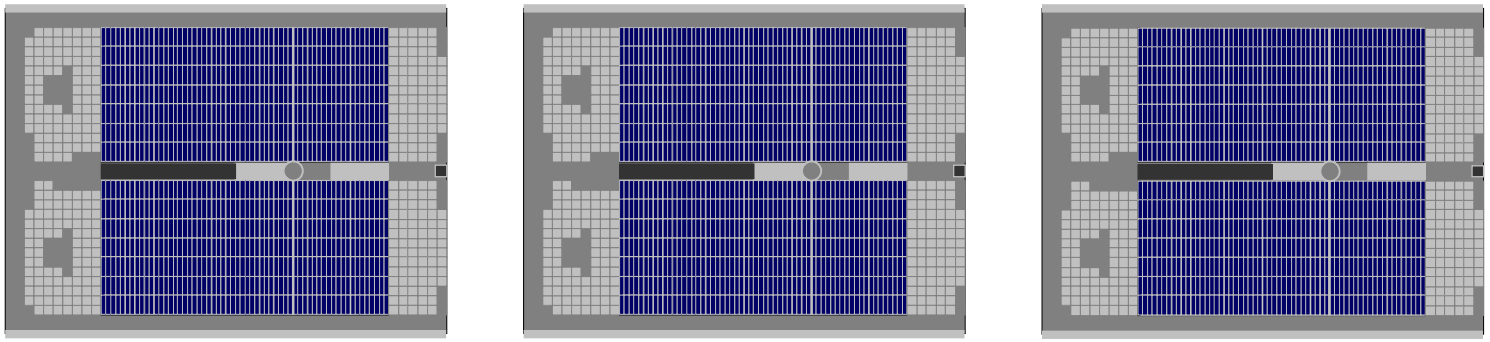
SHADE TOP



OPTIONAL DETAIL PARTS
GLUE OVER PRINTED
PANELS ON SHADE BOTTOM
FOR 3D







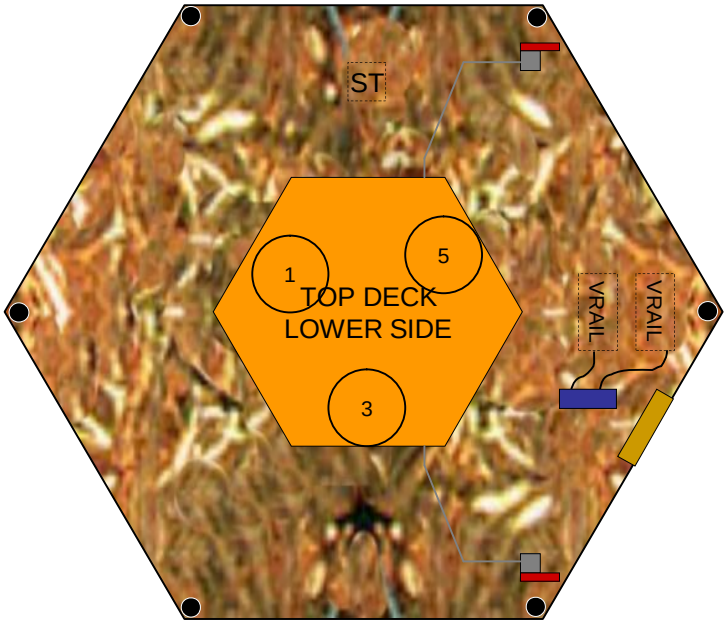
SHADE
TOP

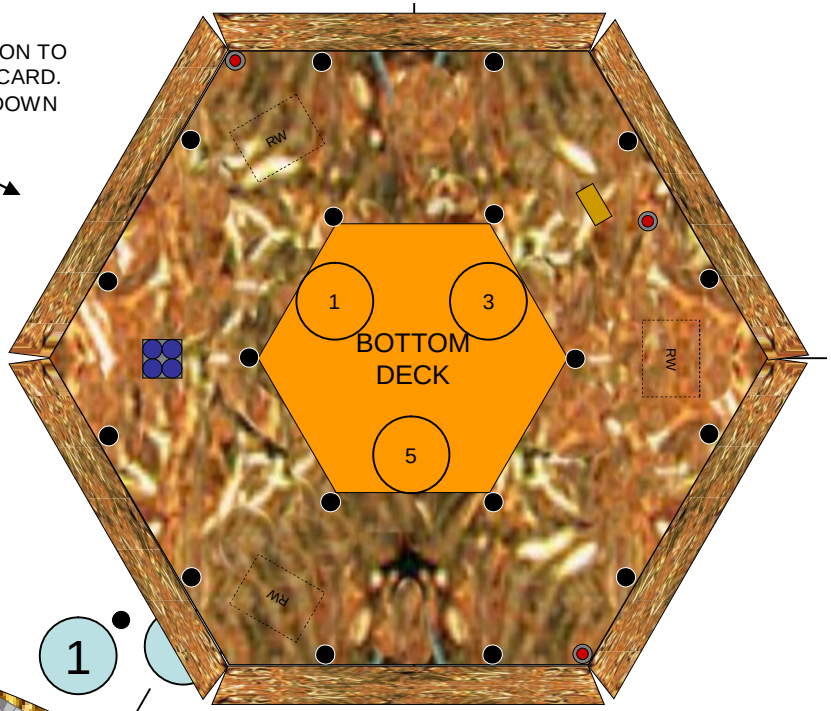
OPTIONAL DETAIL PARTS
GLUE OVER PRINTED
PANELS ON SHADE BOTTOM
FOR 3D

WMAP 1:24

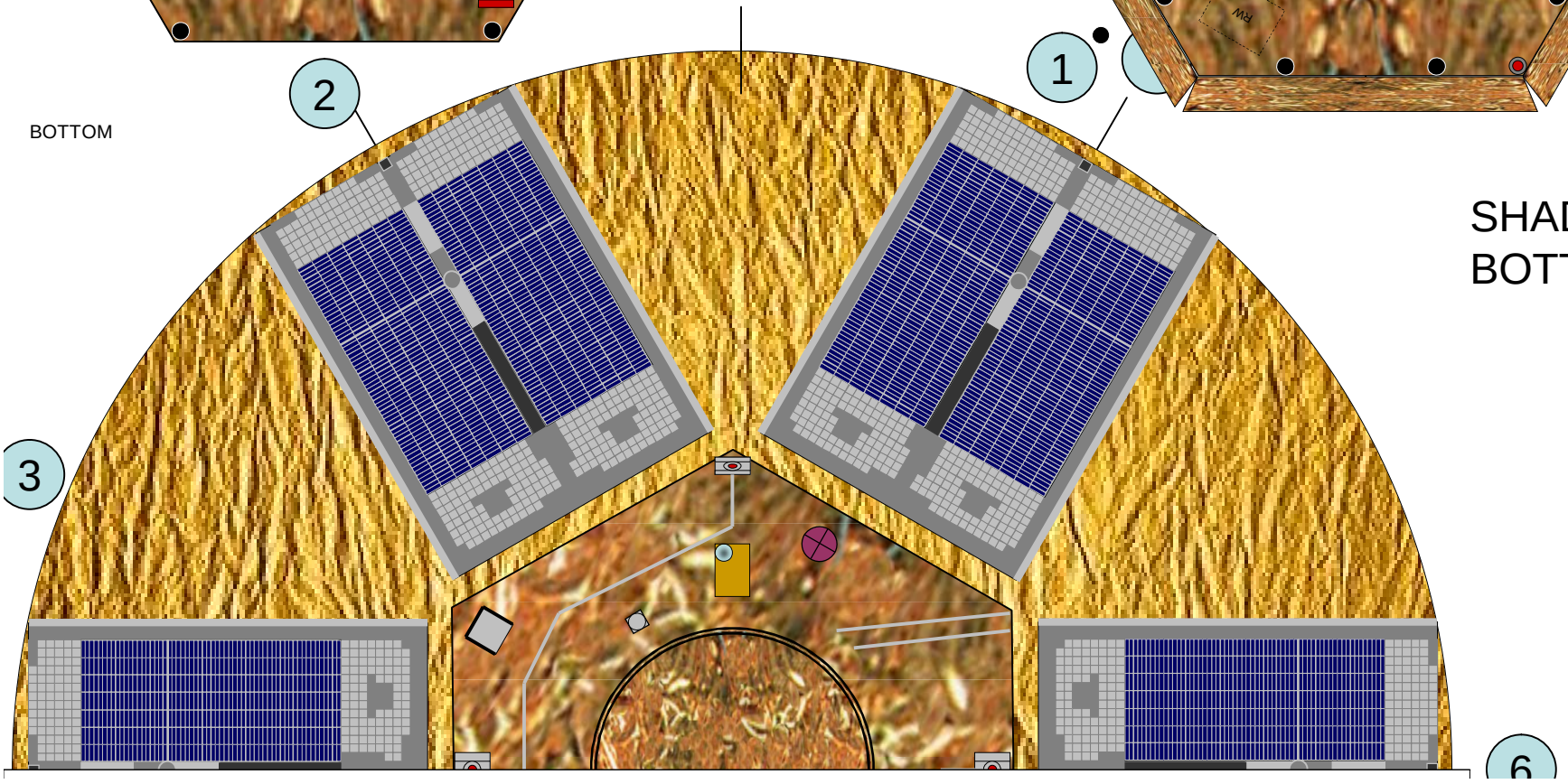
WMAP 1:24

GLUE HEXAGON TO 1.5mm CARD. BEND DOWN OUTER SKIRT.





BOTTOM



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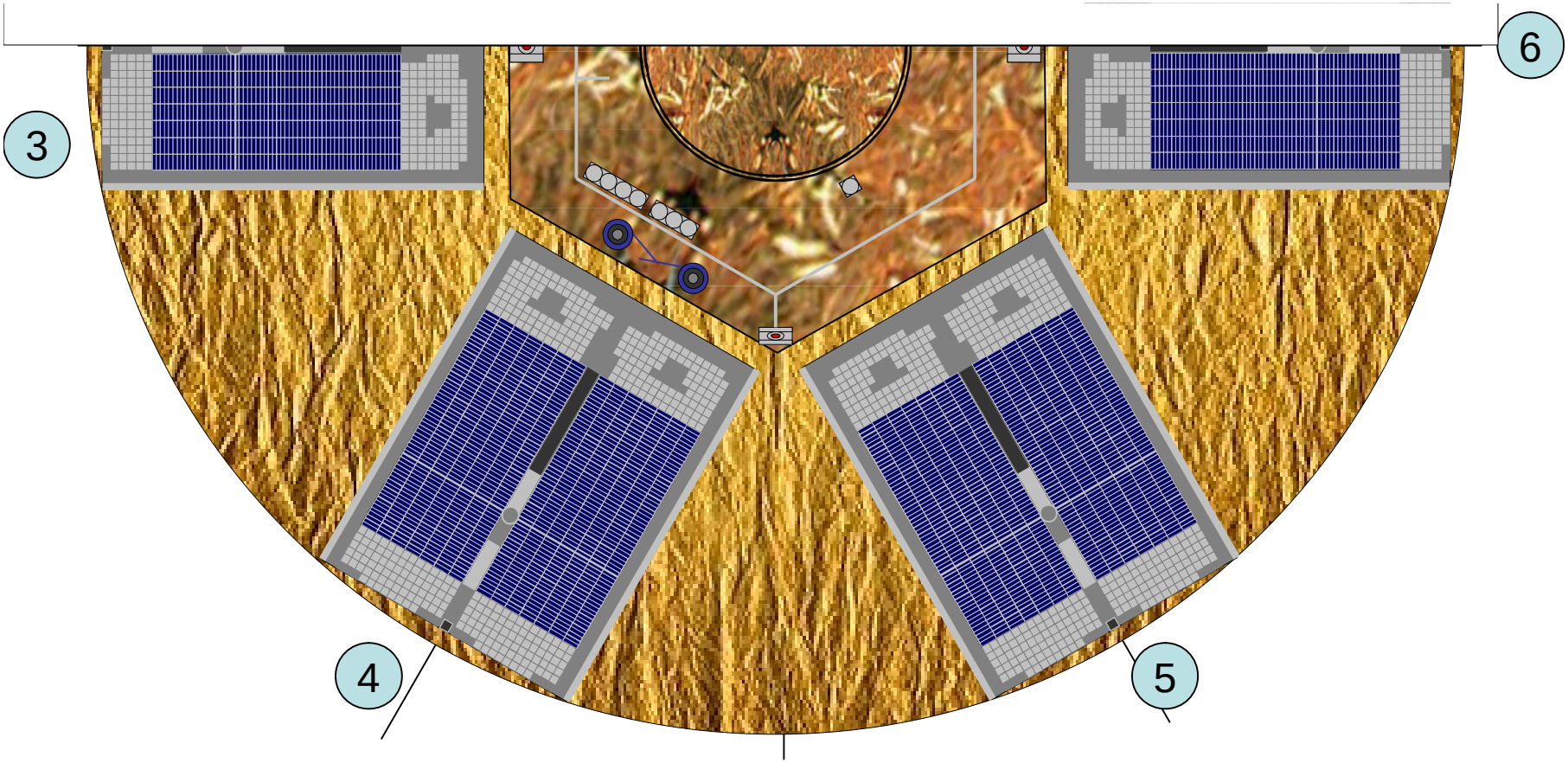

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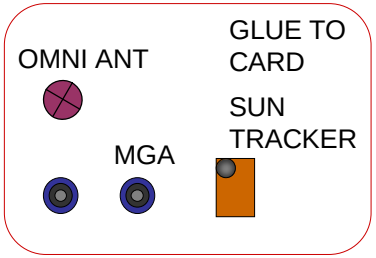
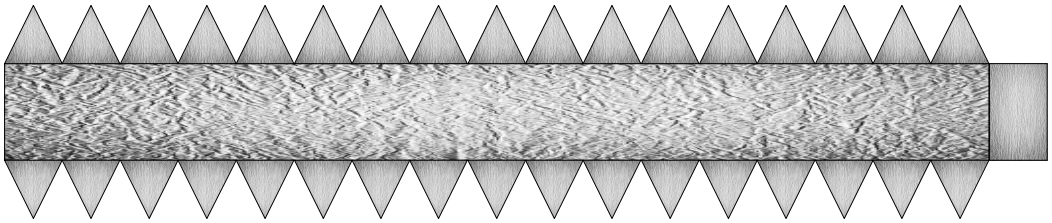


WMAP 1:24

ROLL

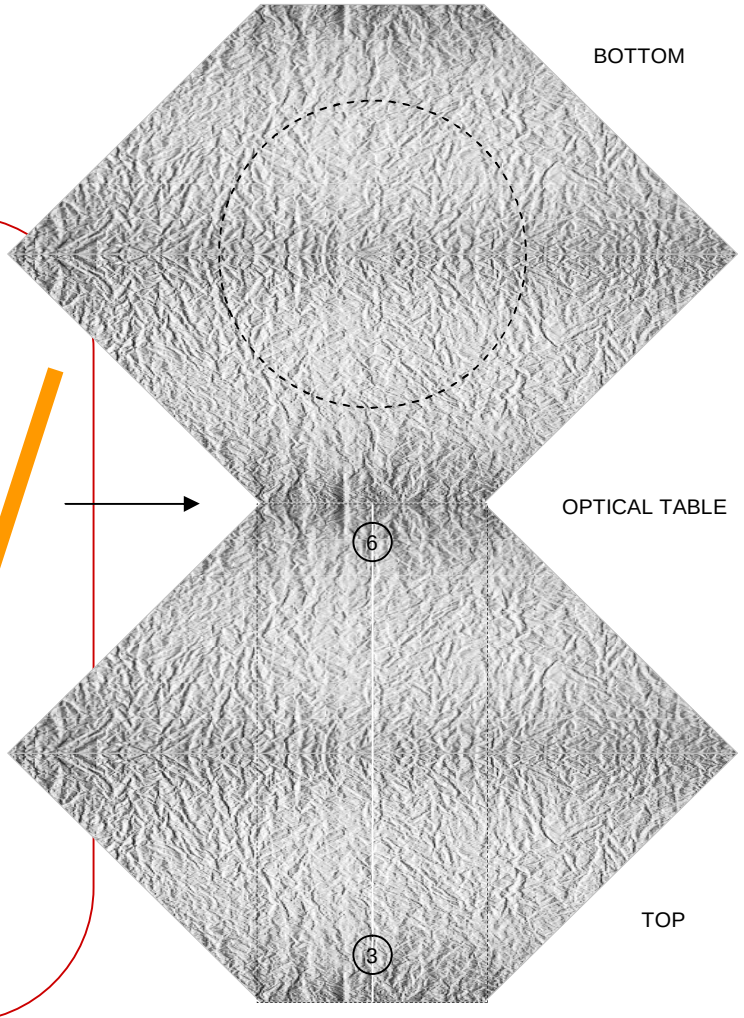
WMAP 1:24



OPTICAL TABLE PEDESTAL

OPTICAL TABLE ALIGNMENT
FACES BAYS 3 AND 6

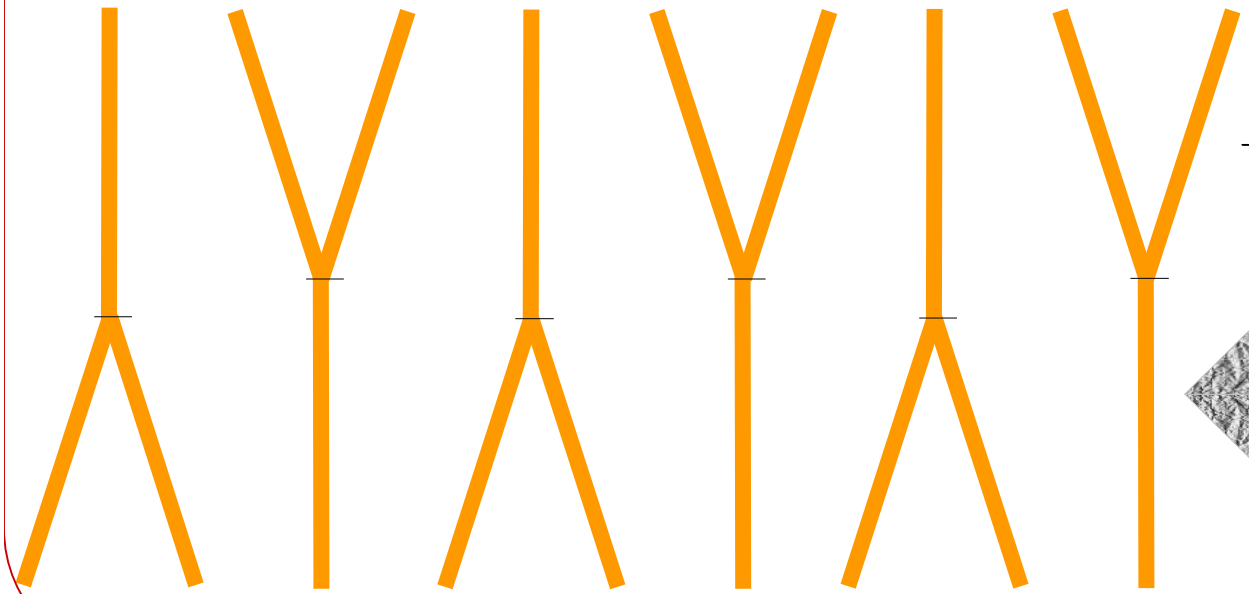
BOTTOM



OPTICAL TABLE

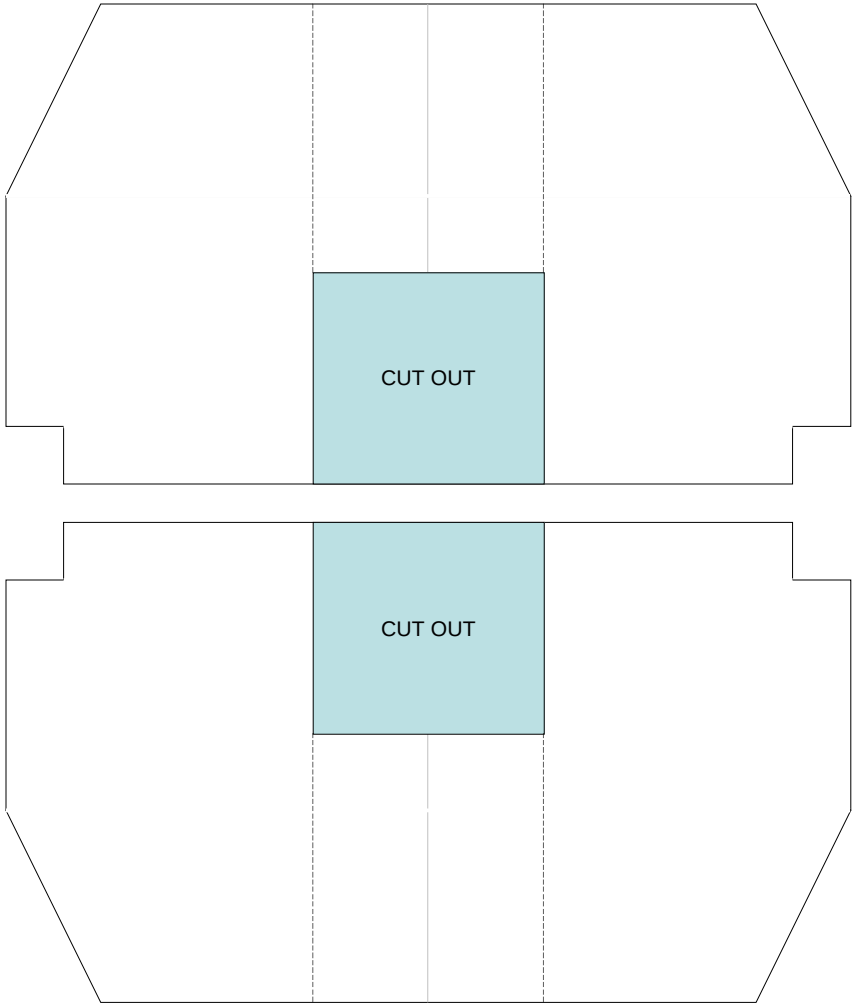
TOP

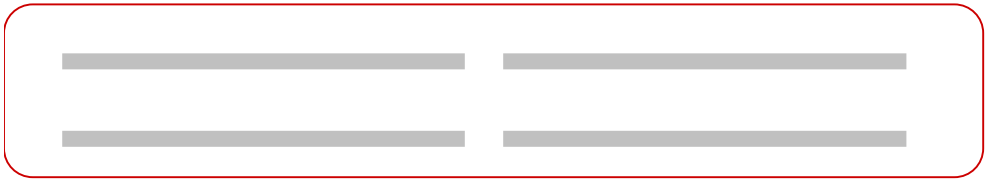
BUS INTERDECK STRUT SETS-GLUE TO CARD OR ROLL
NARROW TUBES FROM PLAIN PAPER



WMAP 1:24

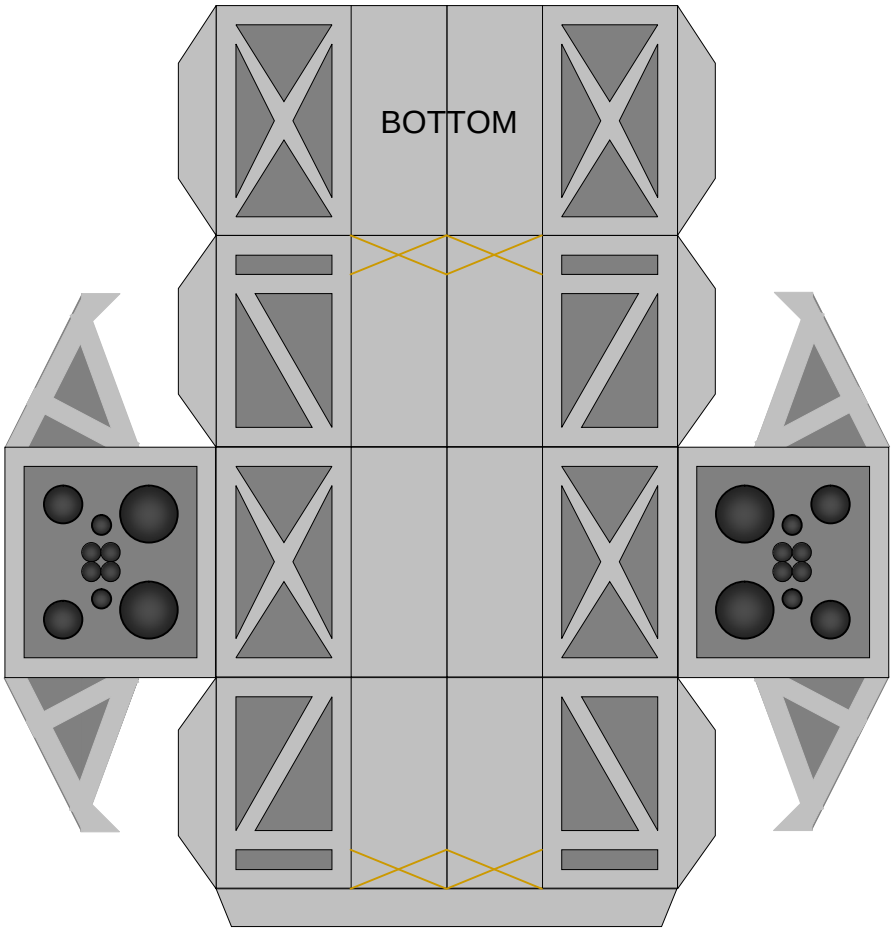
THERMAL REFLECTOR/RADIATOR – GLUE TO 1mm CARD





STRUTS-CUT TO FIT

MICROWAVE FEEDS



WMAP 1:24