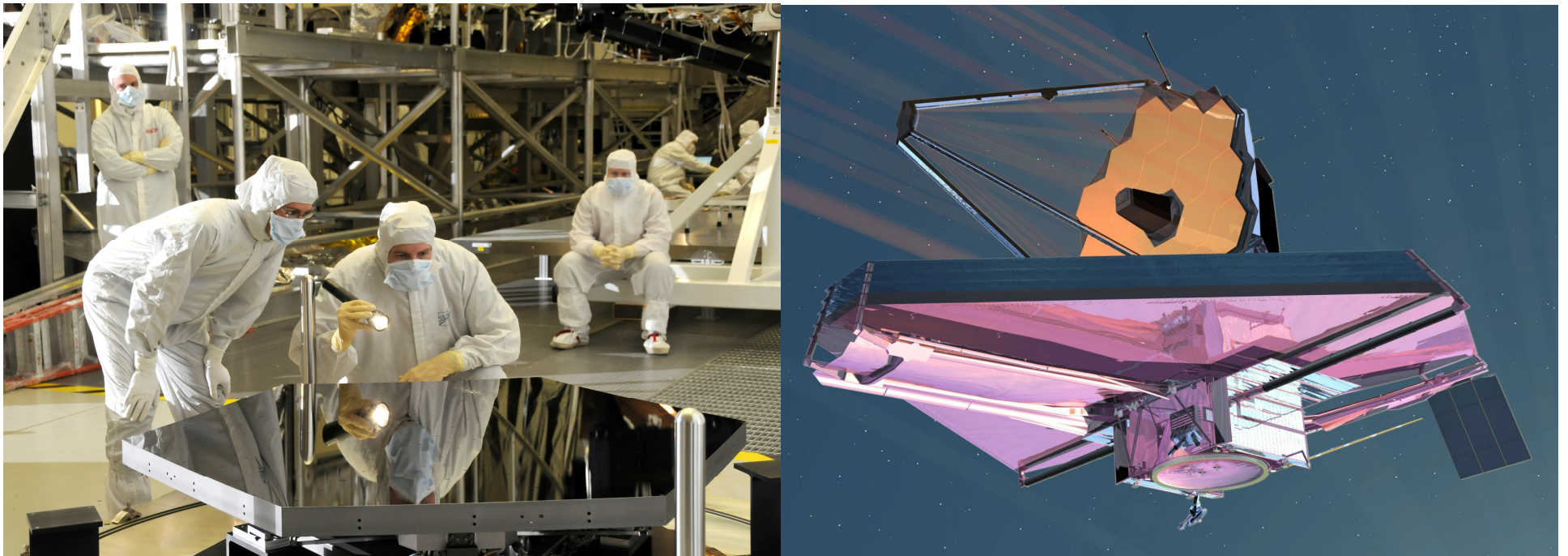


The James Webb Space Telescope (JWST) is a large, infrared-optimized space telescope, scheduled for launch in 2014. JWST will find the first galaxies that formed in the early Universe, connecting the Big Bang to our own Milky Way Galaxy. JWST will peer through dusty clouds to see stars forming planetary systems, connecting the Milky Way to our own Solar System. JWST's instruments will be designed to work primarily in the infrared range of the electromagnetic spectrum, with some capability in the visible range.

JWST will have a large mirror, 6.5 meters (21.3 feet) in diameter and a sunshield the size of a tennis court. Both the mirror and sunshade won't fit onto the rocket fully open, so both will fold up and open once JWST is in outer space. JWST will reside in an orbit about 1.5 million km (1 million miles) from the Earth.

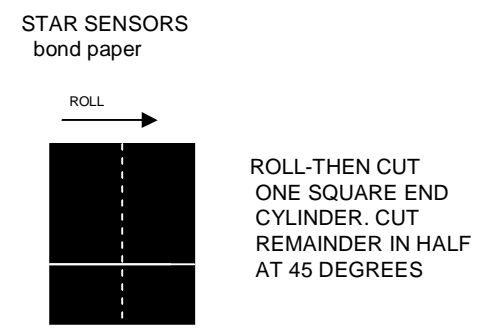
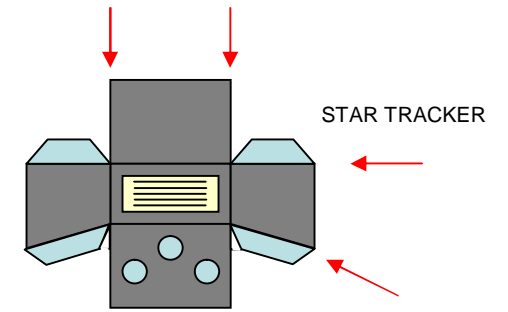
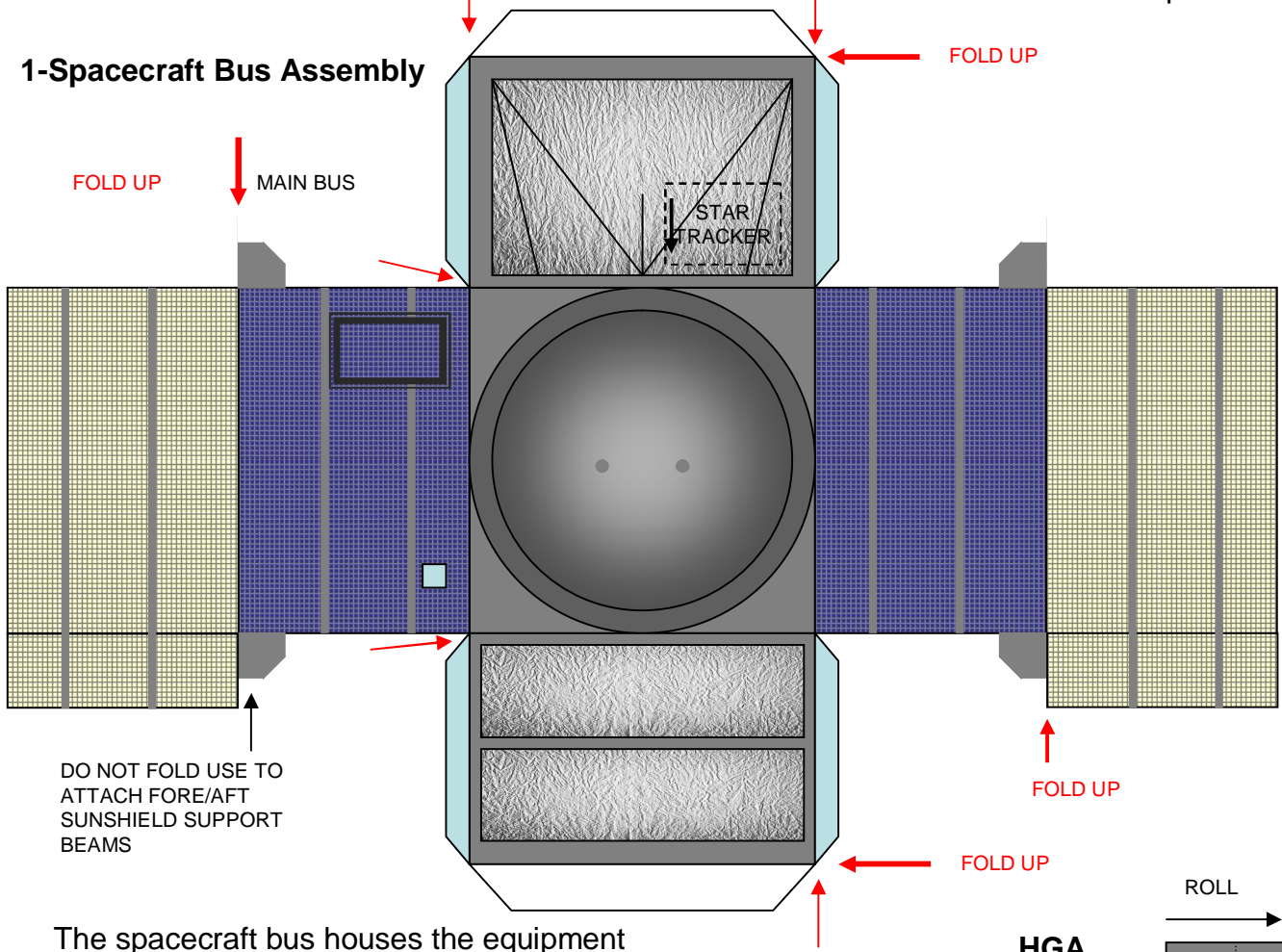


JAMES WEBB SPACE TELESCOPE
1:48 scale

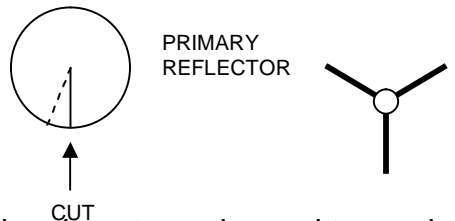
21.3' (6.5m) dia mirror
<http://www.jwst.nasa.gov/>

James Webb Space Telescope – 1:48 scale

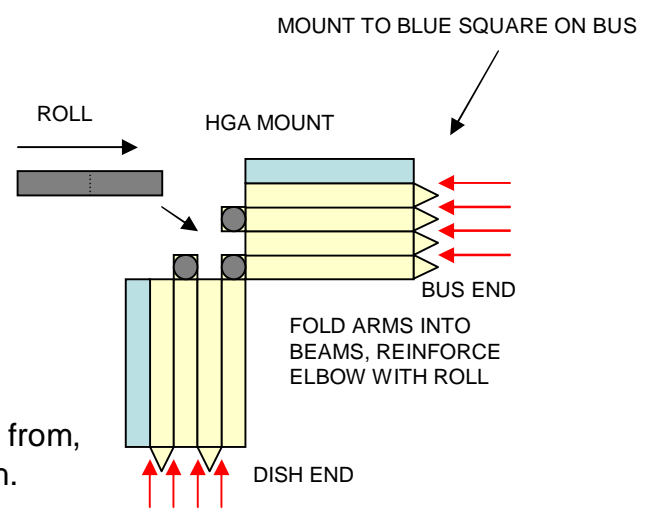
The star tracker takes sightings of reference stars to keep track of where the telescope is pointing.



The spacecraft bus houses the equipment that runs the satellite: keeping the batteries charged; pointing the telescope/spacecraft at the target stars; etc.

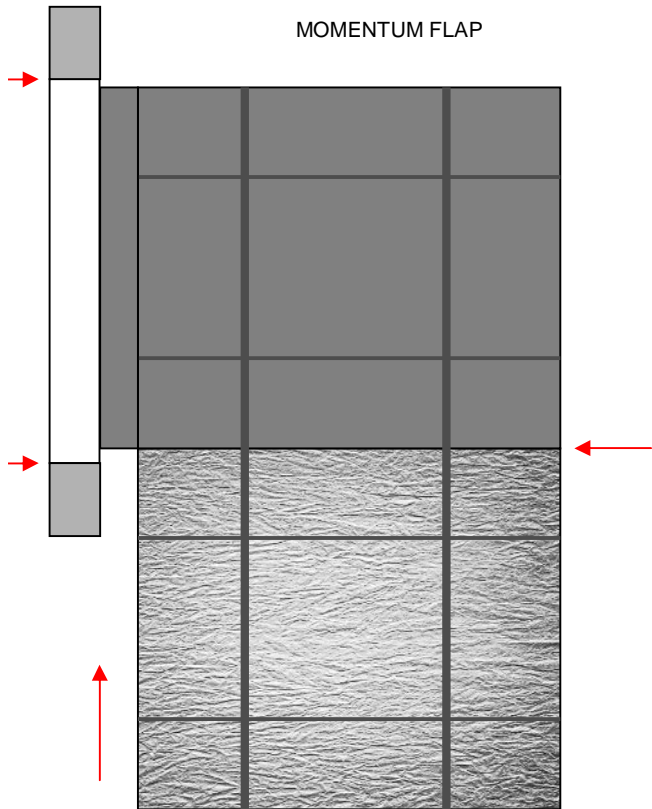


The high gain antenna is used to receive commands from, and return the telescope's observations to, the Earth.



James Webb Space Telescope – 1:48 scale

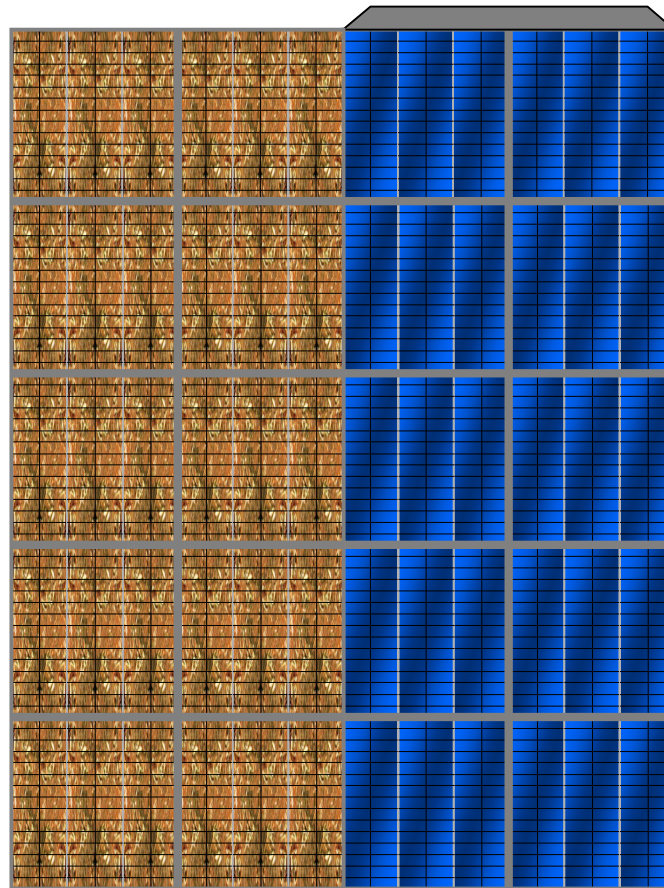
2-Solar Arrays



The momentum flap helps stabilize the spacecraft. JWST is so precise that solar pressure on the large sunshields can actually rotate (slowly) the telescope, spoiling its aim. The flap adjusts to counteract part of this pressure to help keep the telescope view steady.

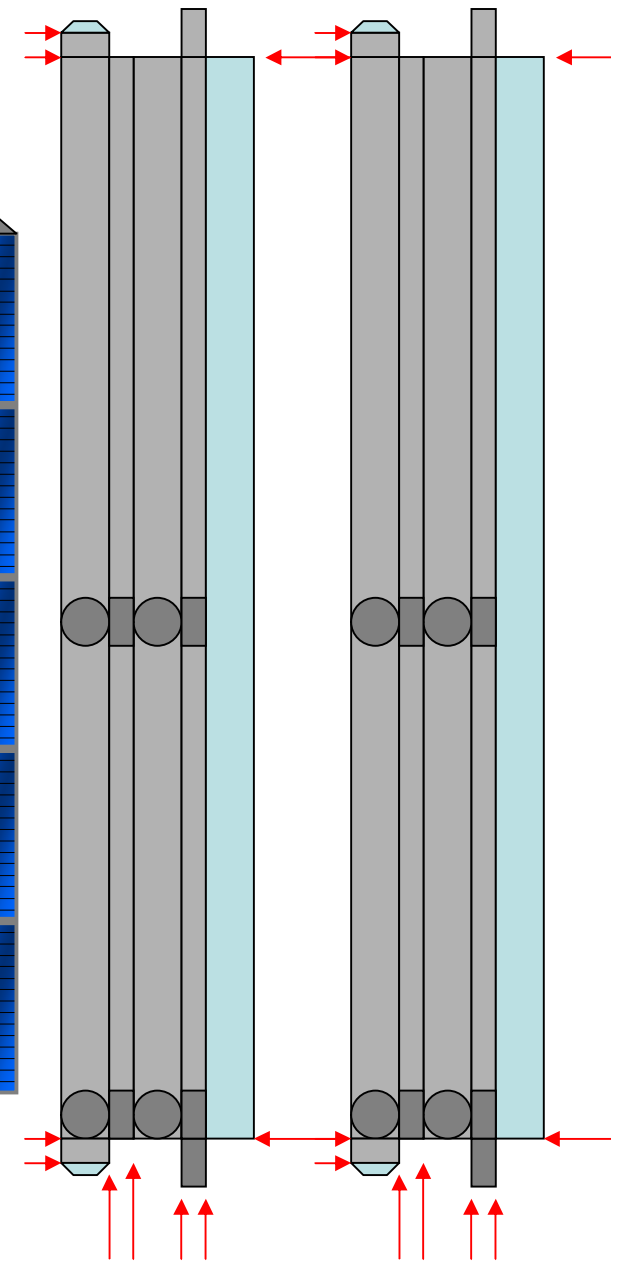
Copyright 2010: John Jogerst. Not for commercial use. For educational or personal use only.

AFT EDGE OF BUS AND AFT END OF SOLAR SHIELD



The solar panel generates the power that runs the satellite and the telescope instruments.

8-Secondary Mirror Assembly

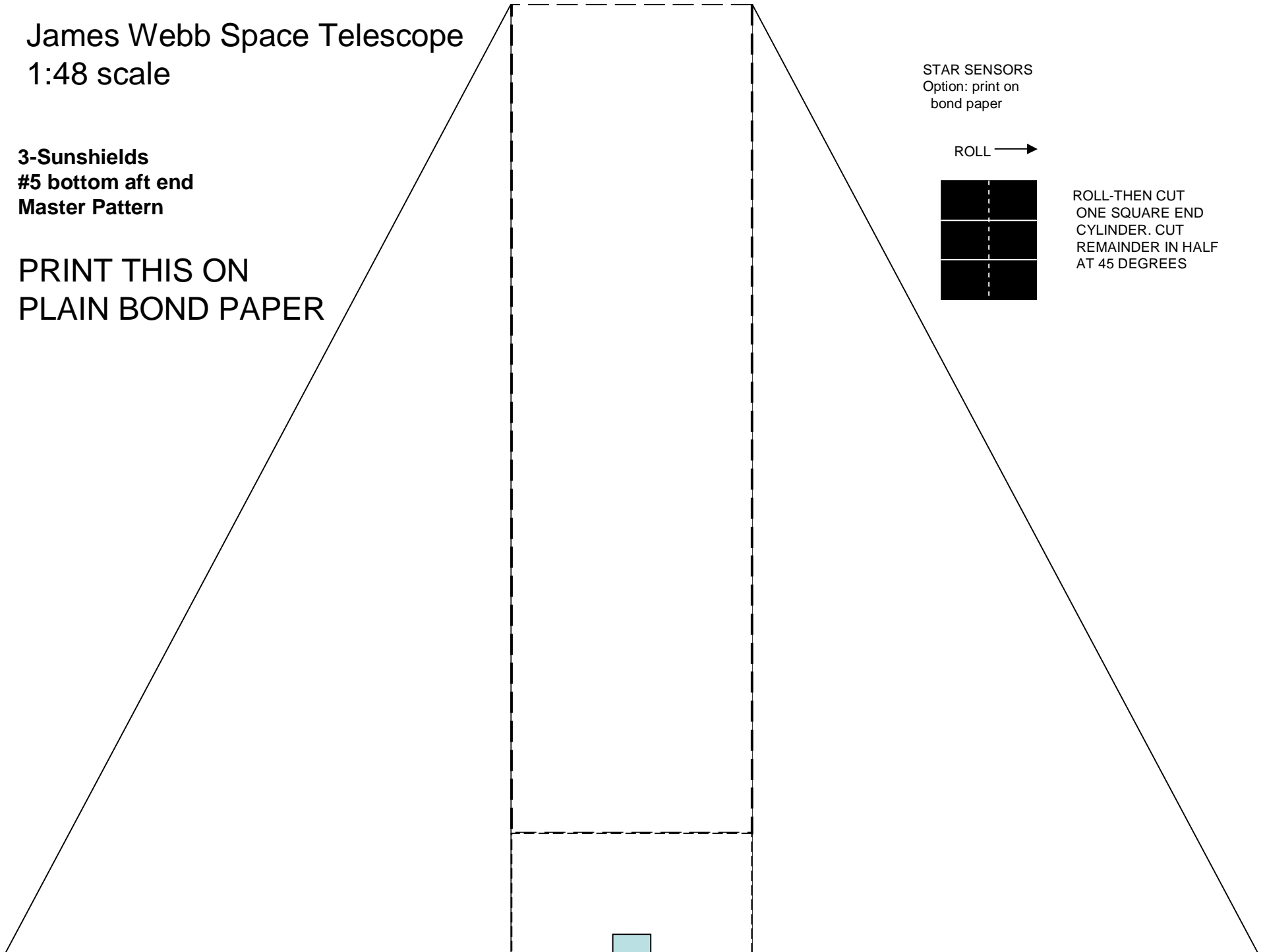


SECONDARY MIRROR SUPPORT STRUTS
2 OF 3

James Webb Space Telescope 1:48 scale

**3-Sunshields
#5 bottom aft end
Master Pattern**

**PRINT THIS ON
PLAIN BOND PAPER**



STAR SENSORS
Option: print on
bond paper

ROLL →



ROLL-THEN CUT
ONE SQUARE END
CYLINDER. CUT
REMAINDER IN HALF
AT 45 DEGREES

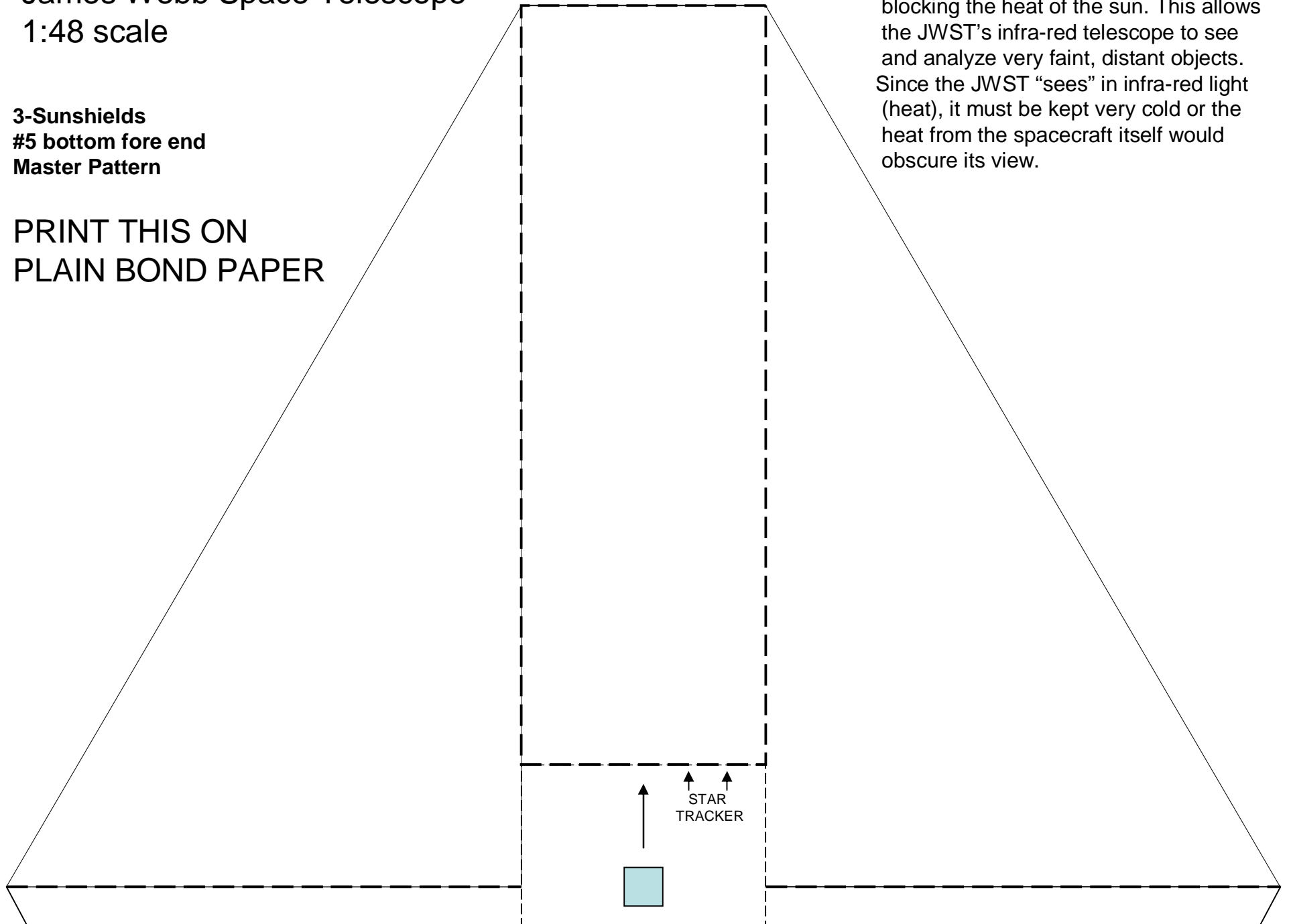
James Webb Space Telescope

1:48 scale

3-Sunshields
#5 bottom fore end
Master Pattern

PRINT THIS ON
PLAIN BOND PAPER

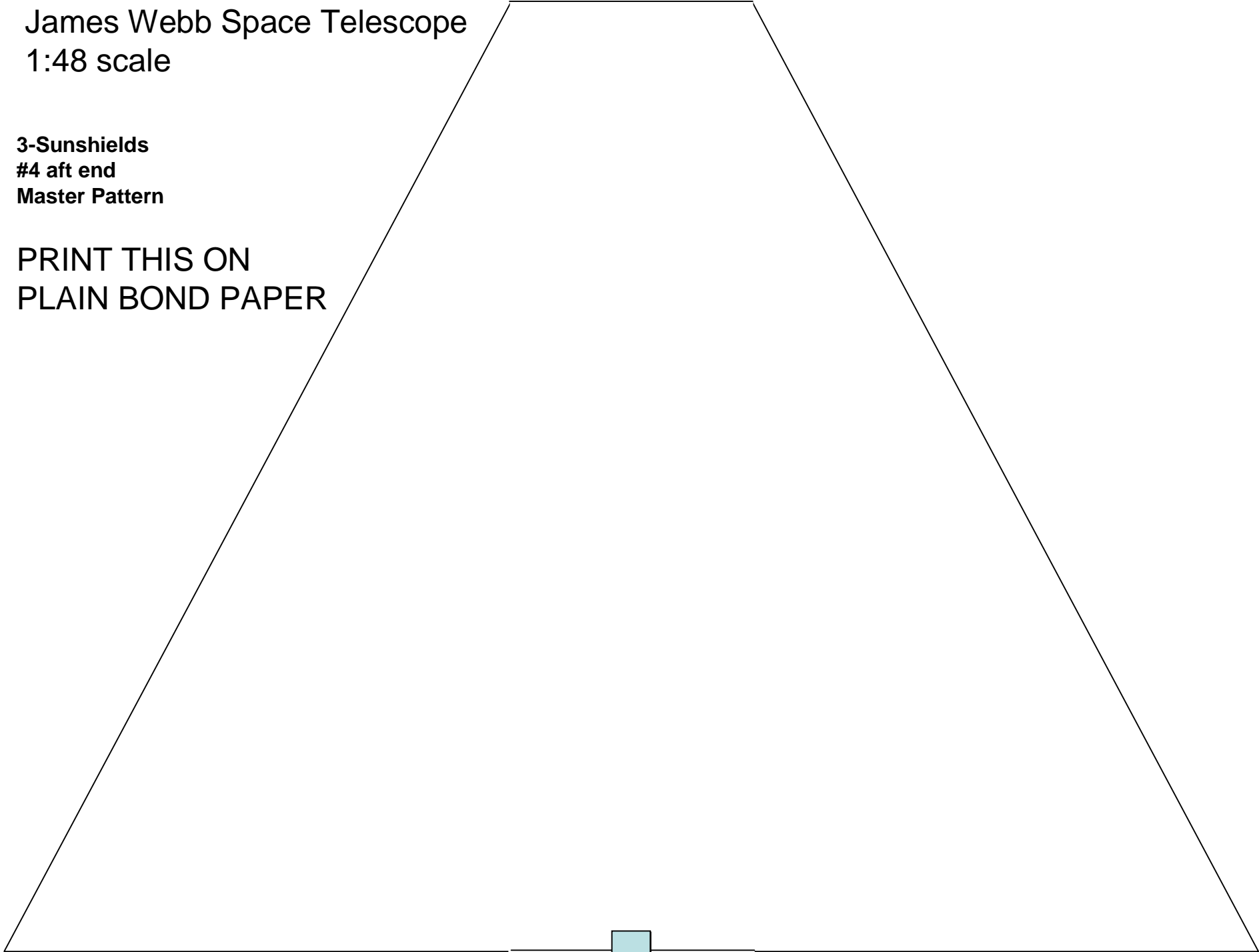
The sunshields keep the satellite cool by blocking the heat of the sun. This allows the JWST's infra-red telescope to see and analyze very faint, distant objects. Since the JWST "sees" in infra-red light (heat), it must be kept very cold or the heat from the spacecraft itself would obscure its view.



James Webb Space Telescope
1:48 scale

3-Sunshields
#4 aft end
Master Pattern

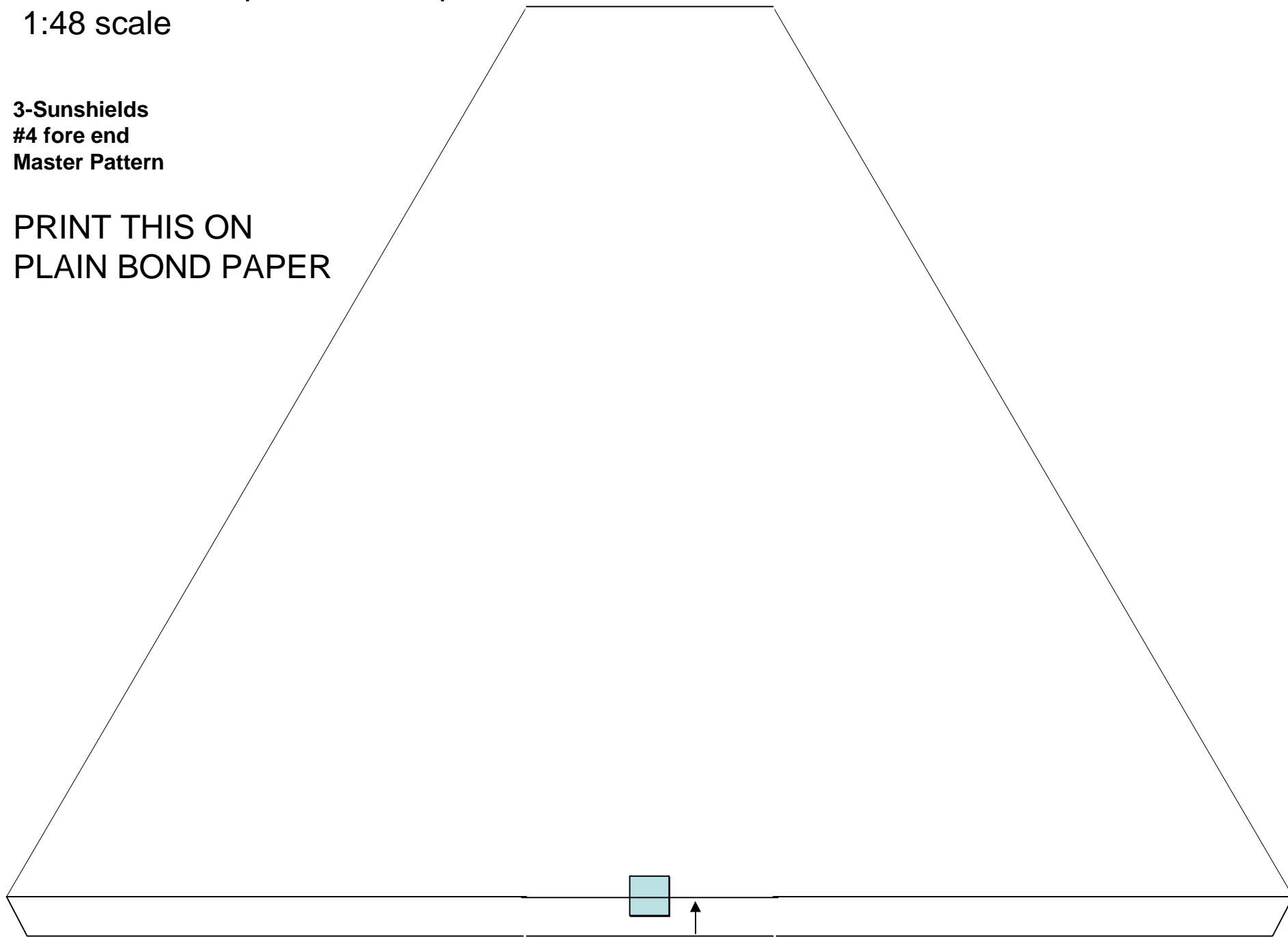
PRINT THIS ON
PLAIN BOND PAPER



James Webb Space Telescope
1:48 scale

3-Sunshields
#4 fore end
Master Pattern

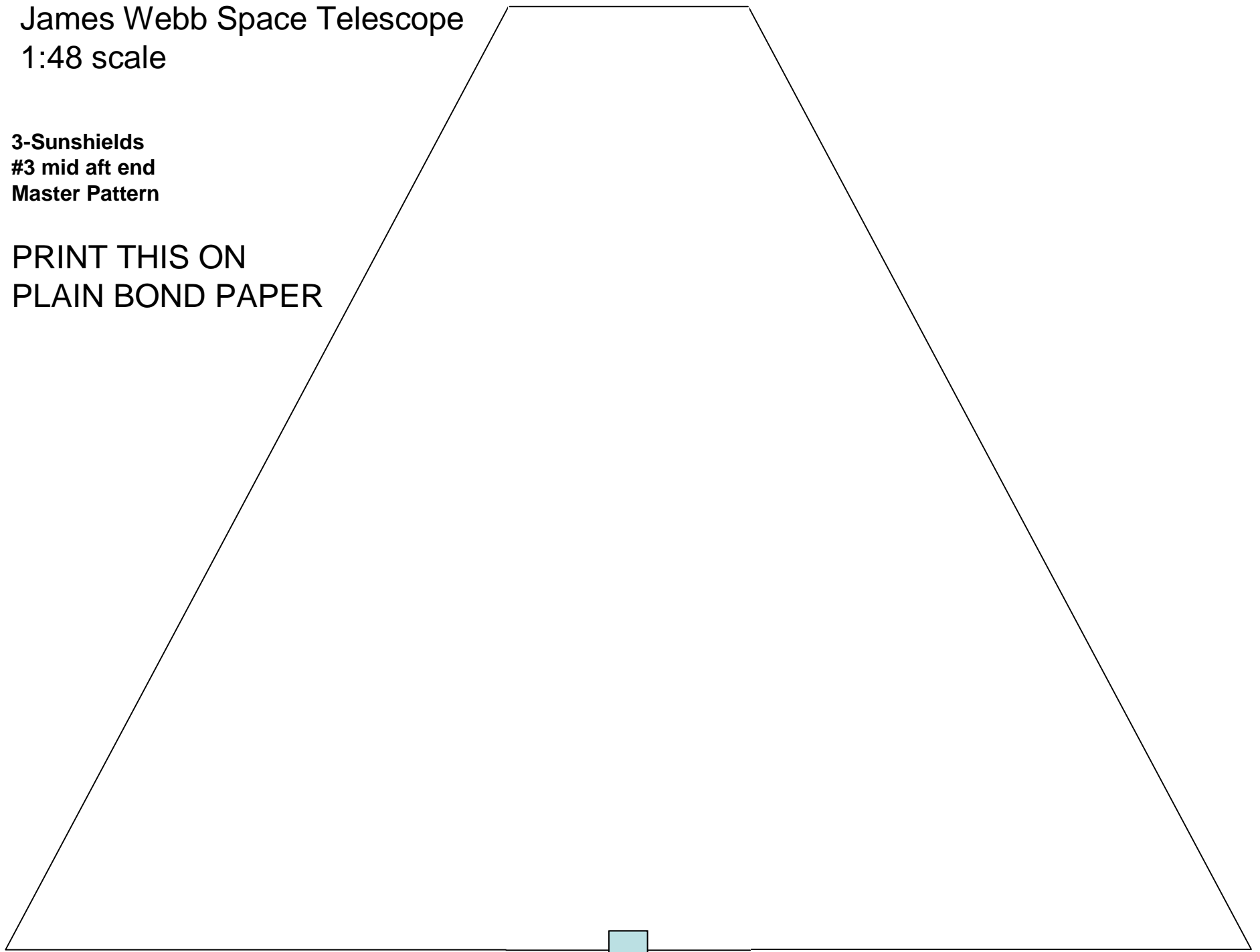
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PLAIN BOND PAPER



James Webb Space Telescope
1:48 scale

3-Sunshields
#3 mid aft end
Master Pattern

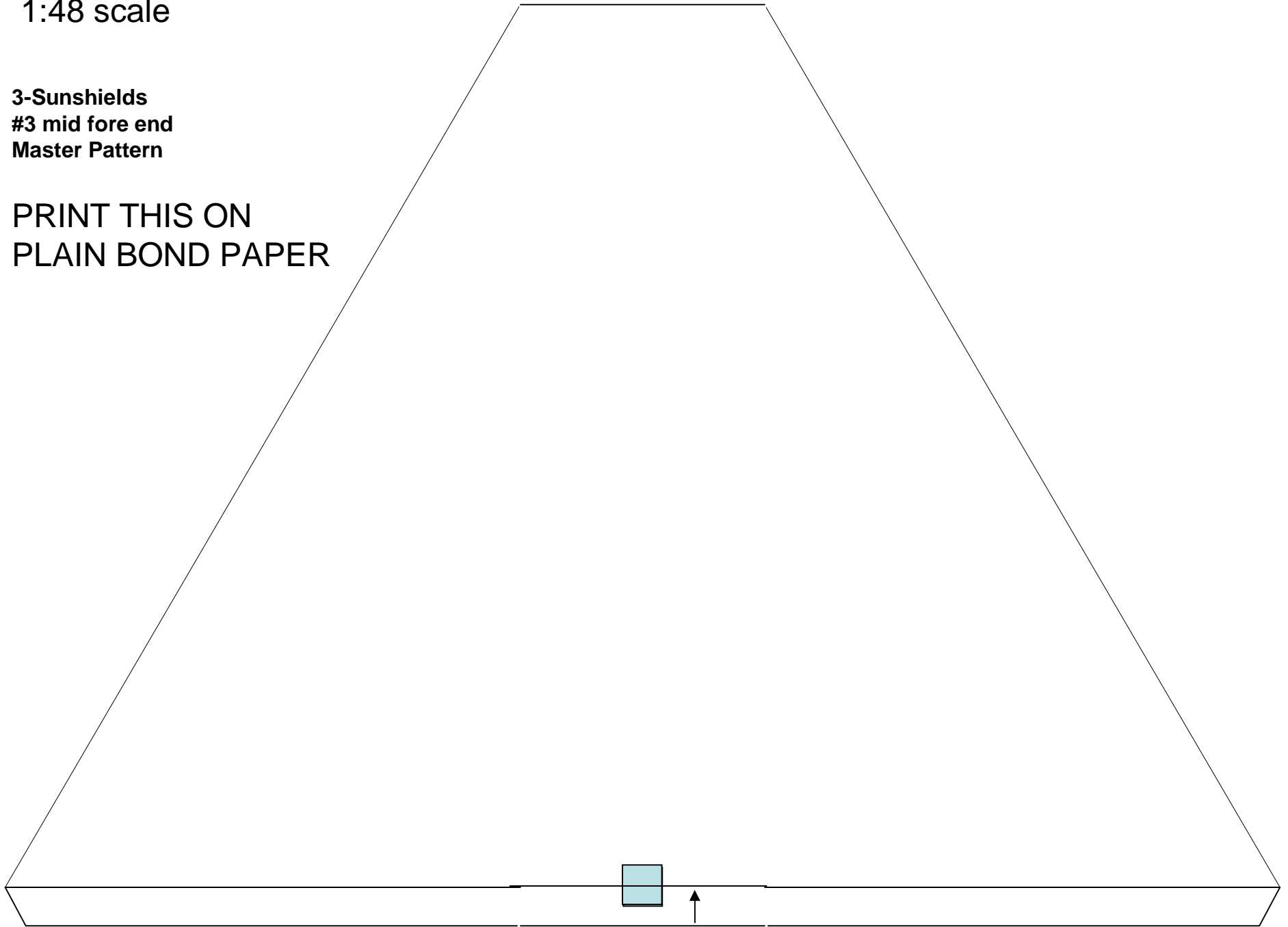
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PLAIN BOND PAPER



James Webb Space Telescope
1:48 scale

3-Sunshields
#3 mid fore end
Master Pattern

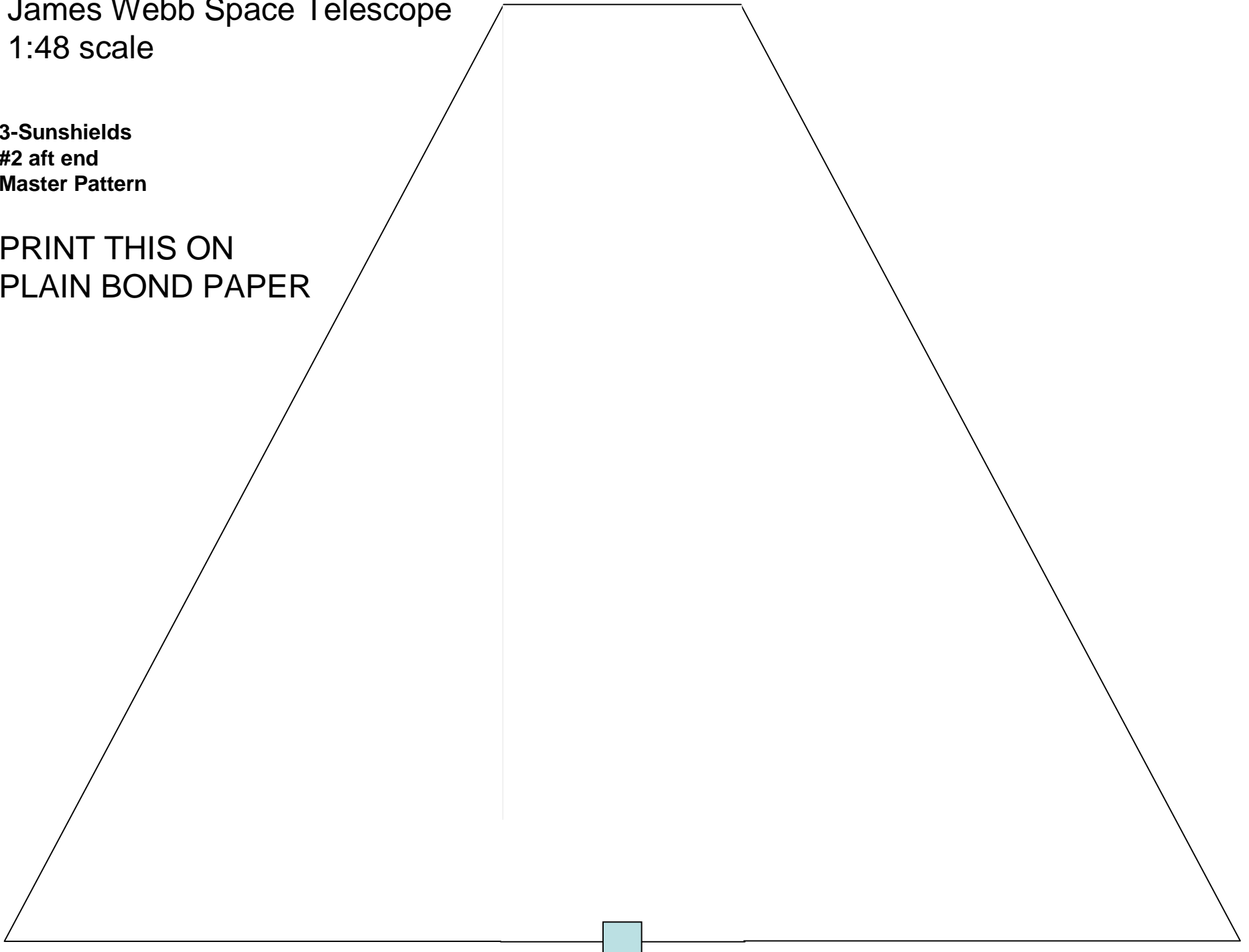
PRINT THIS ON
PLAIN BOND PAPER



James Webb Space Telescope
1:48 scale

3-Sunshields
#2 aft end
Master Pattern

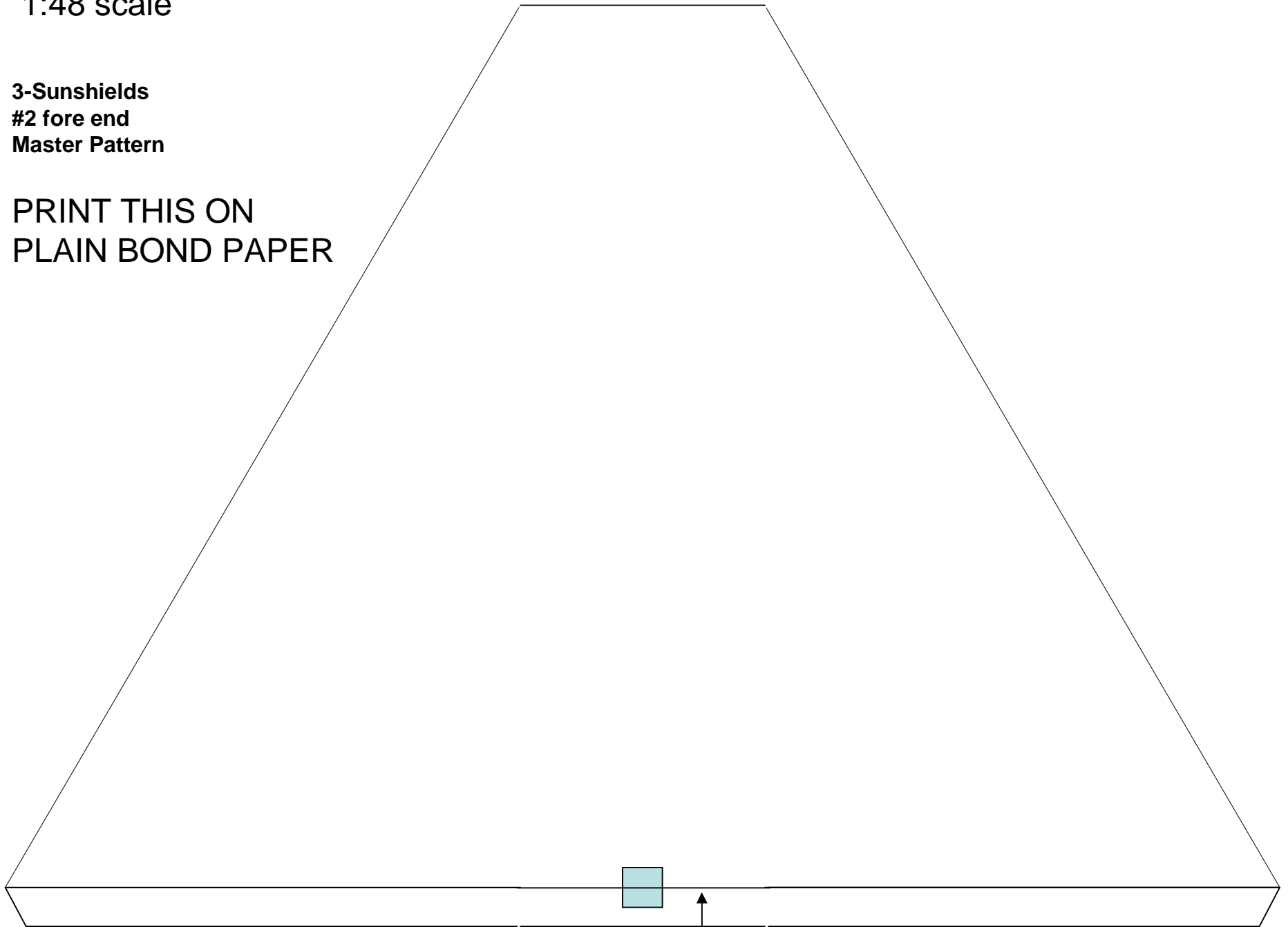
PRINT THIS ON
PLAIN BOND PAPER



James Webb Space Telescope
1:48 scale

3-Sunshields
#2 fore end
Master Pattern

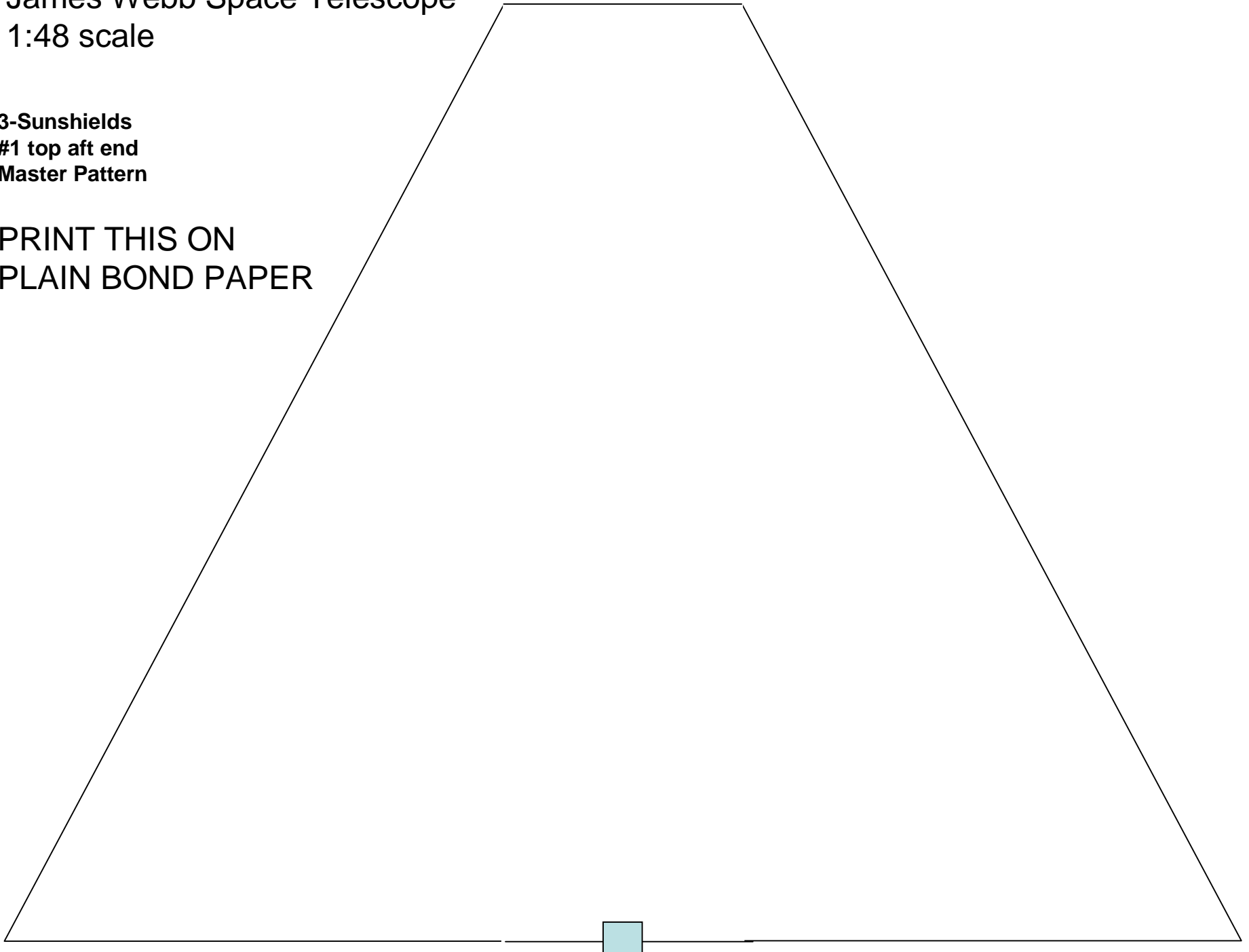
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James Webb Space Telescope
1:48 scale

3-Sunshields
#1 top aft end
Master Pattern

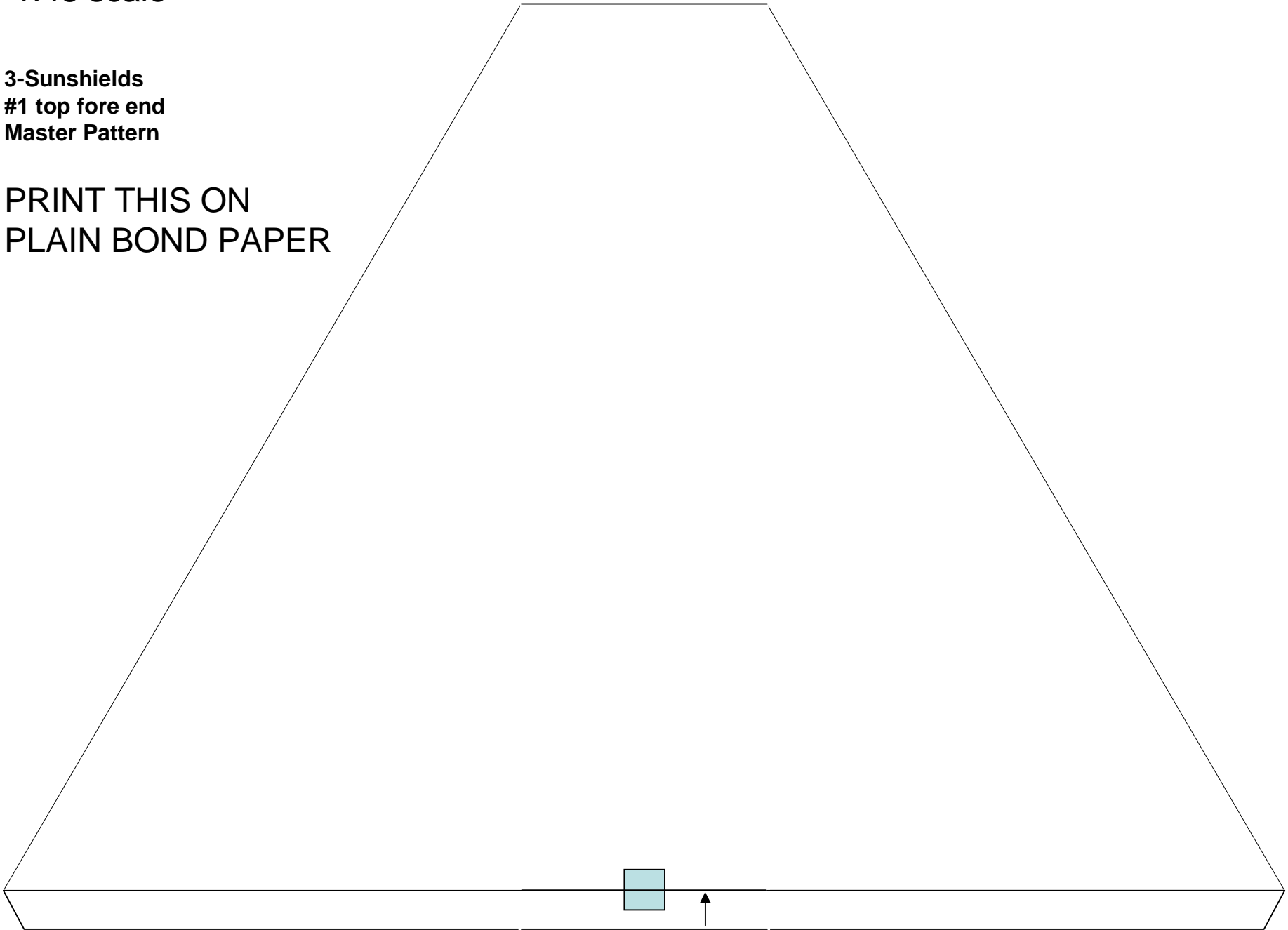
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PLAIN BOND PAPER



James Webb Space Telescope
1:48 scale

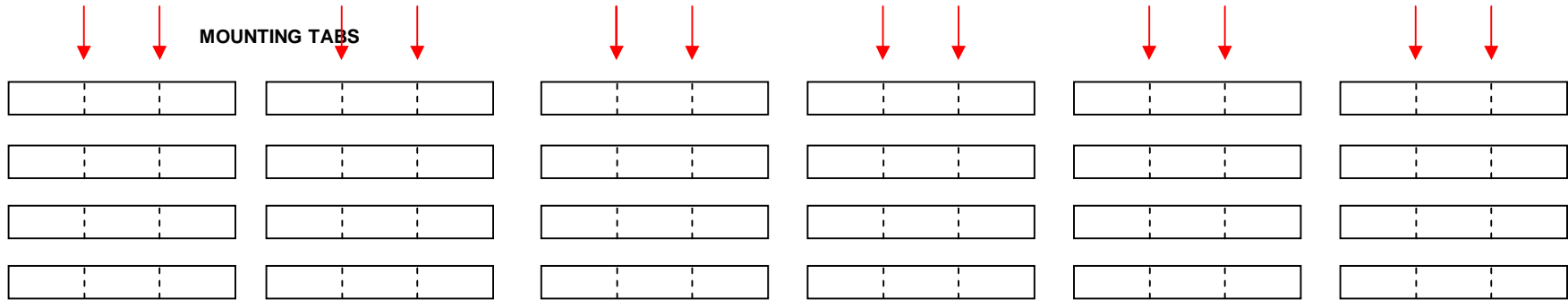
3-Sunshields
#1 top fore end
Master Pattern

PRINT THIS ON
PLAIN BOND PAPER

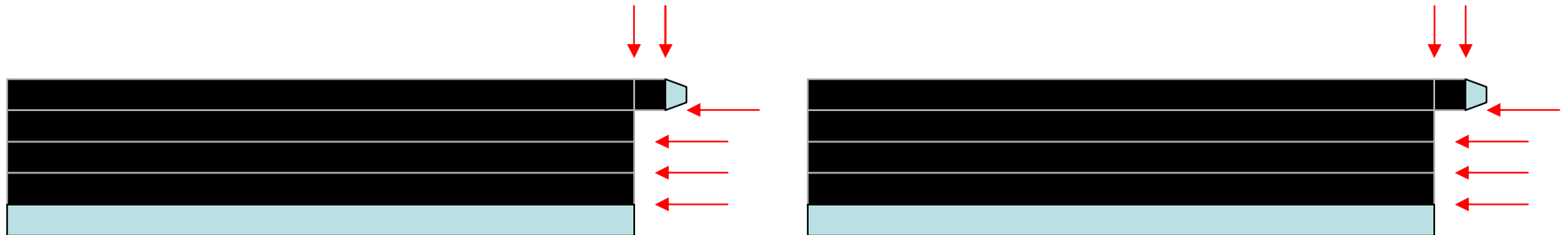


James Webb Space Telescope – 1:48 scale

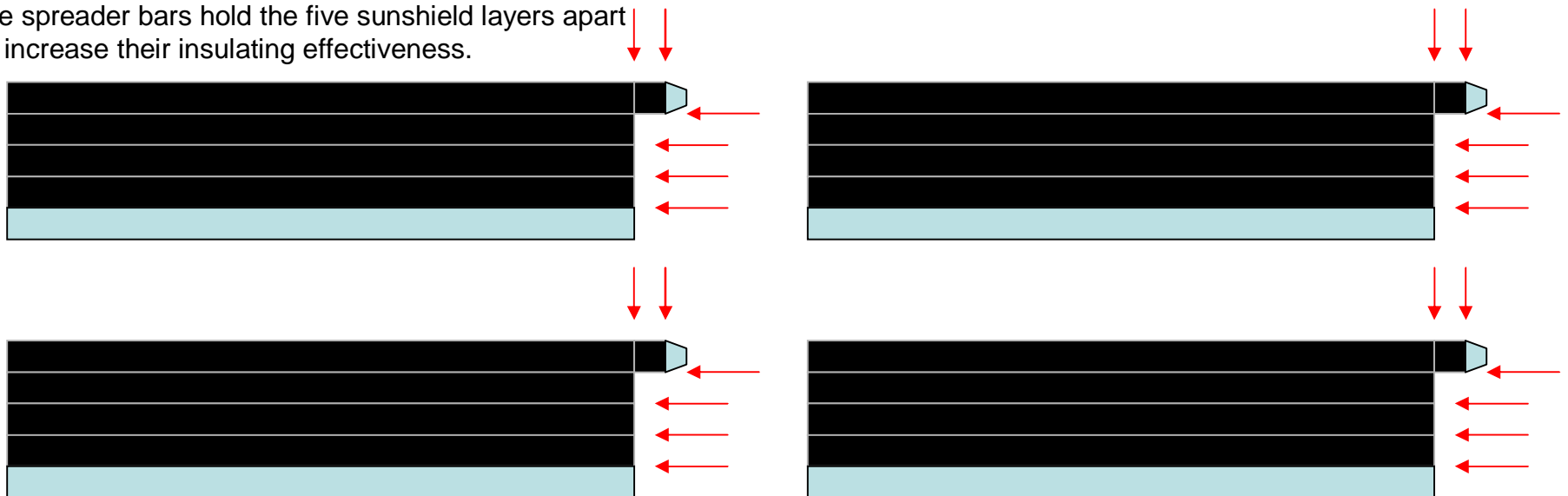
3-Sunshields



SPREADER BARS – cut cross beam bars short to achieve angle of sunshade



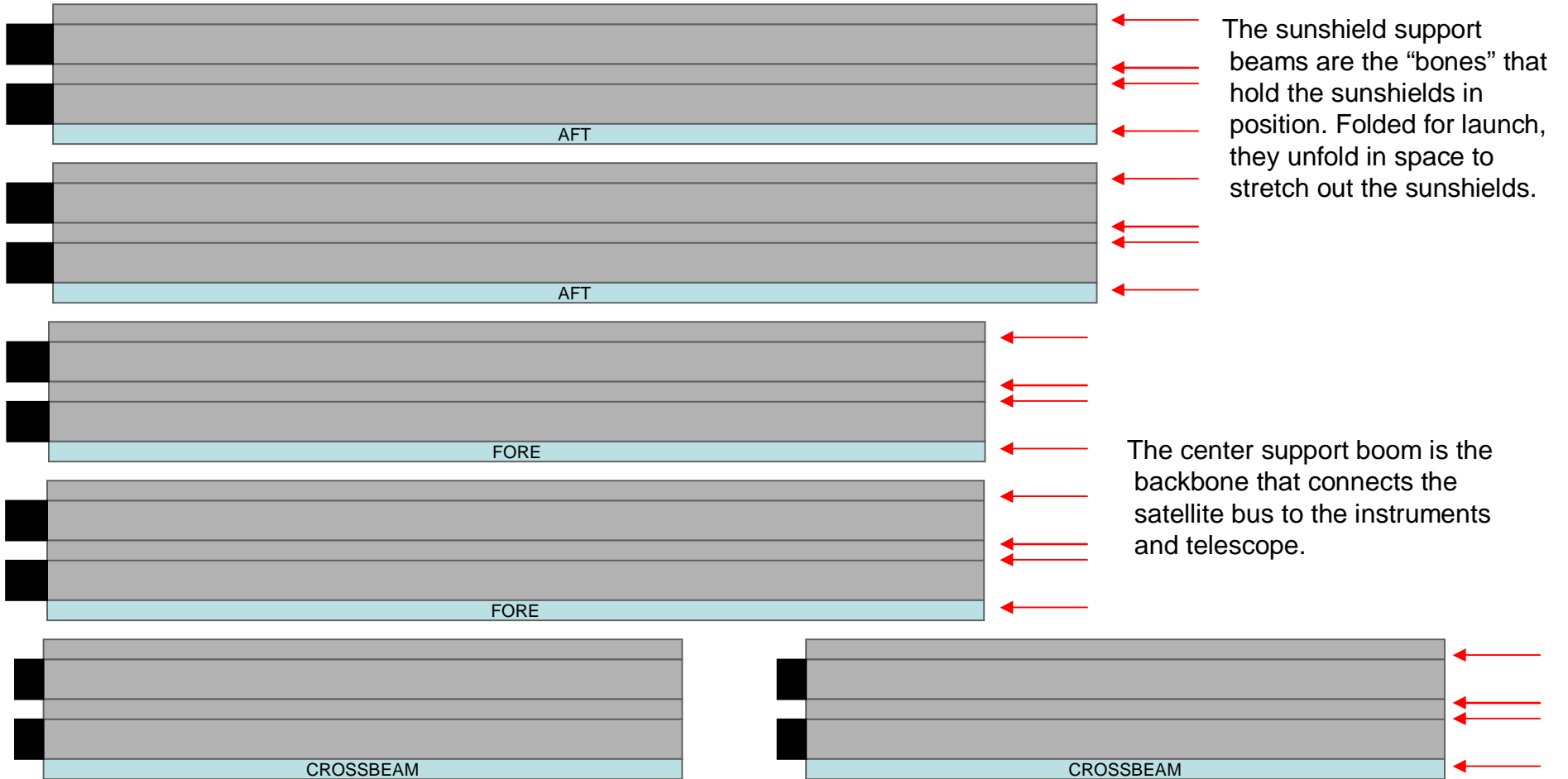
The spreader bars hold the five sunshield layers apart to increase their insulating effectiveness.



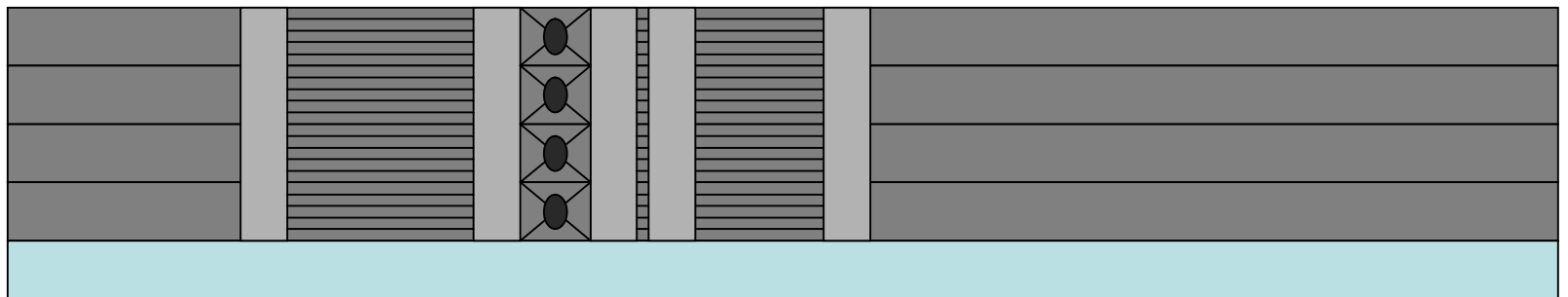
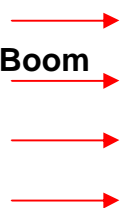
James Webb Space Telescope – 1:48 scale

Do not bend black “ears” on end-used to attach to spreader bars.

4-Sunshield support beams – trim ends if needed to butt with spacecraft bus assembly

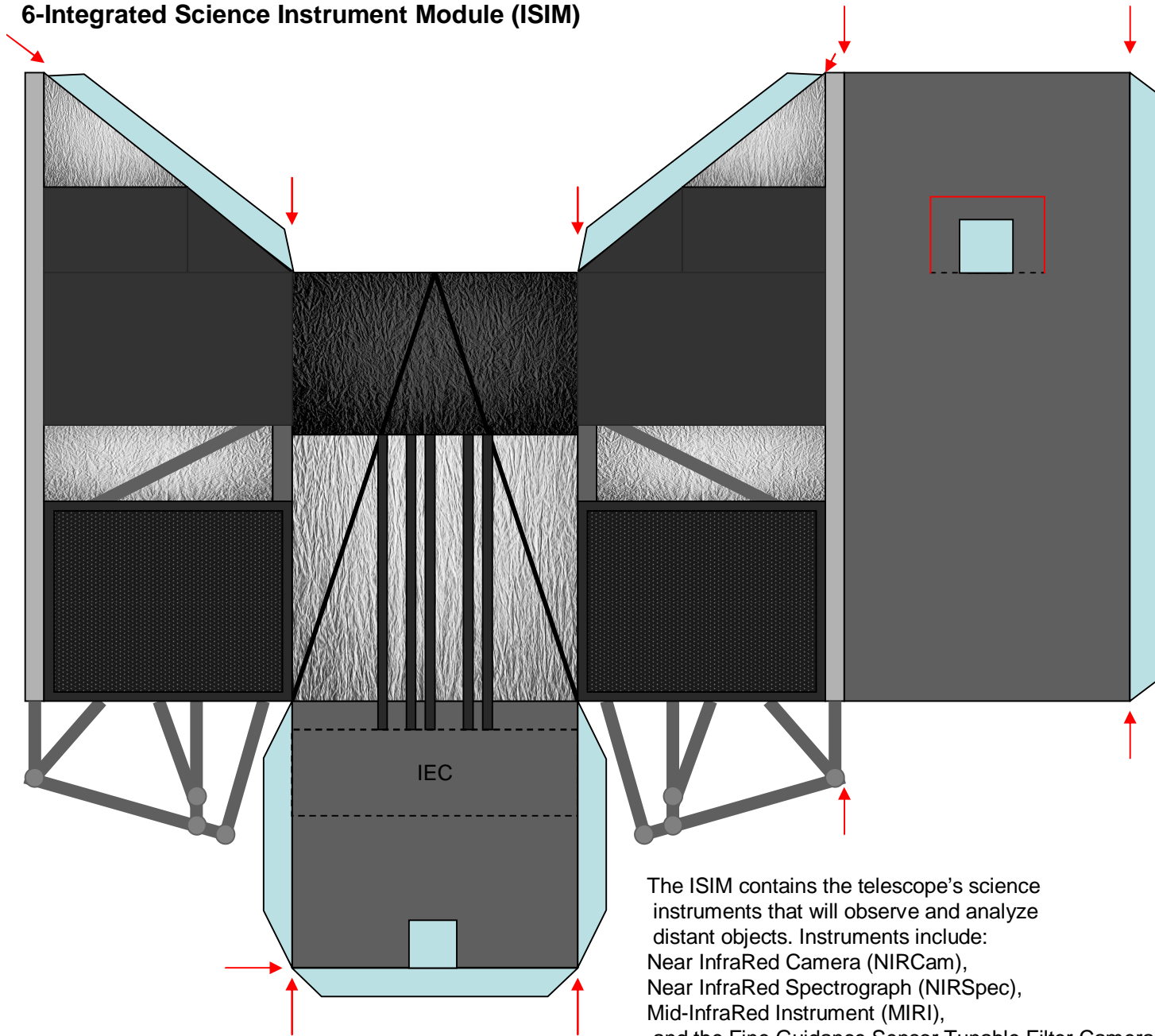


5-Center Support Boom



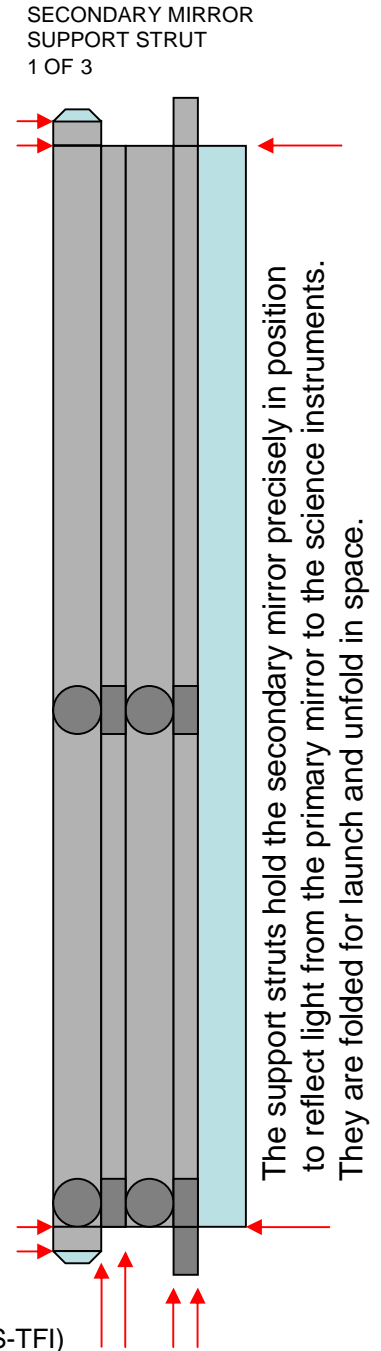
James Webb Space Telescope – 1:48 scale

6-Integrated Science Instrument Module (ISIM)



The ISIM contains the telescope's science instruments that will observe and analyze distant objects. Instruments include: Near InfraRed Camera (NIRCam), Near InfraRed Spectrograph (NIRSpec), Mid-InfraRed Instrument (MIRI), and the Fine Guidance Sensor Tunable Filter Camera (FGS-TFI)

8-Secondary Mirror Assembly

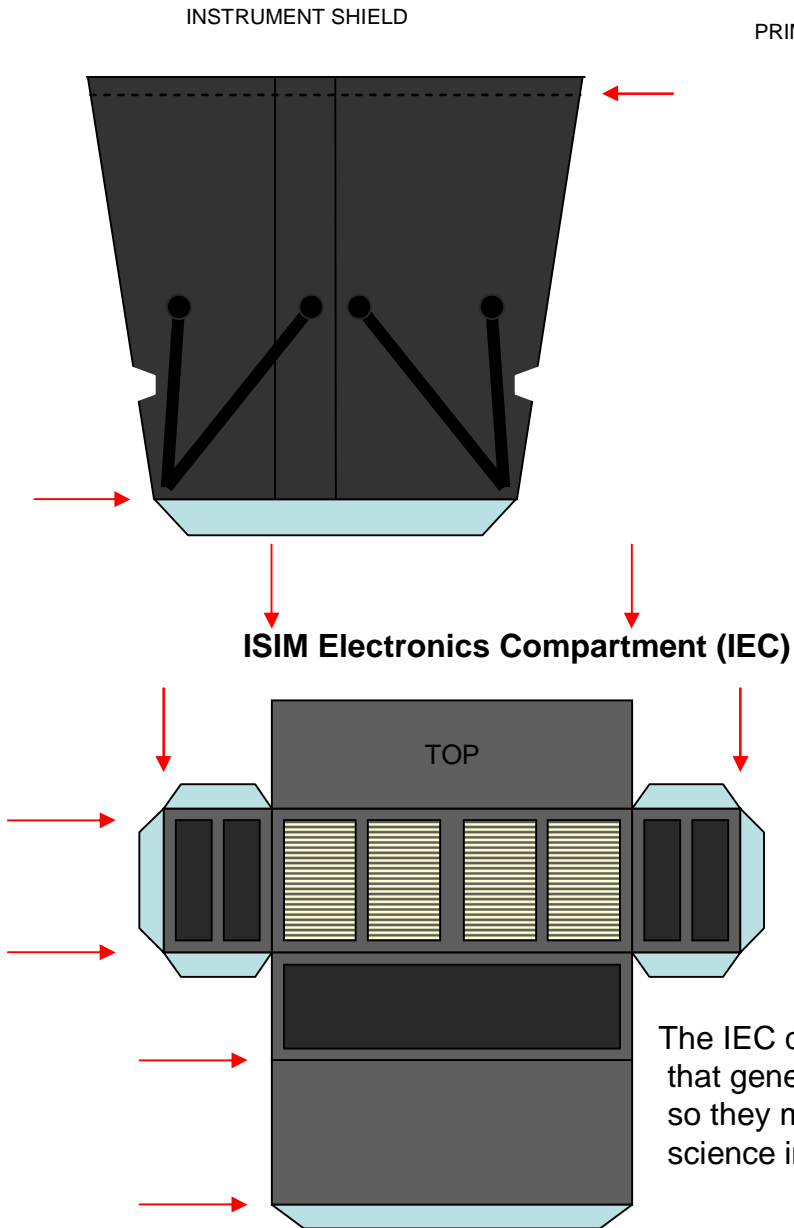


James Webb Space Telescope – 1:48 scale

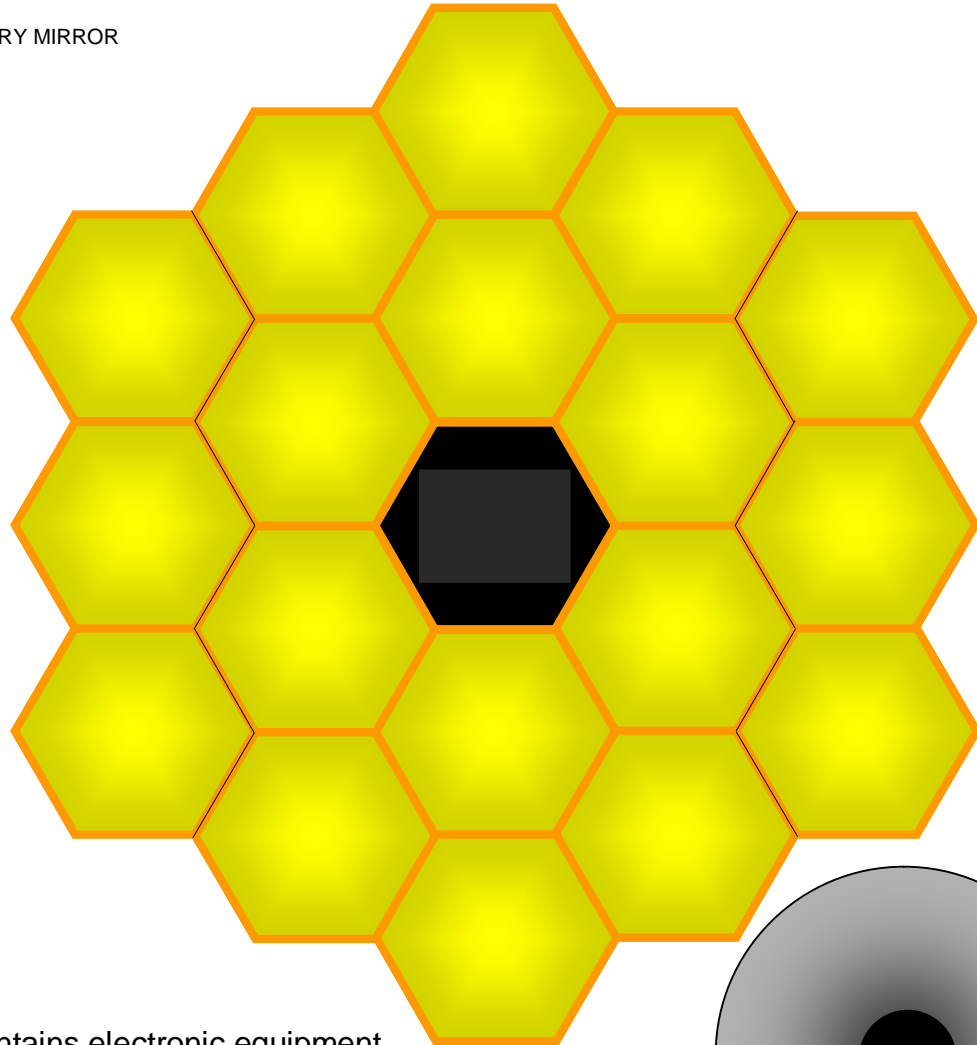
6-Integrated Science Instrument Module

7-Primary Mirror

The primary mirror collects infrared light for the science instruments. A 6.5 meter (21' 4") mirror makes JWST the most powerful space telescope. JWST uses infrared light (heat) to see objects at the very edge of our visible universe.

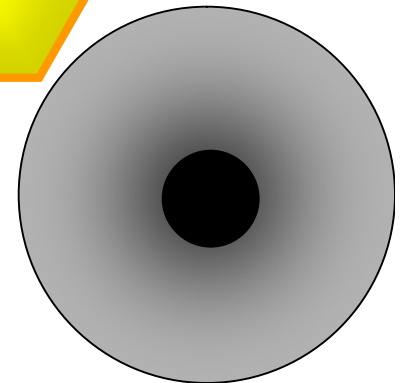


PRIMARY MIRROR

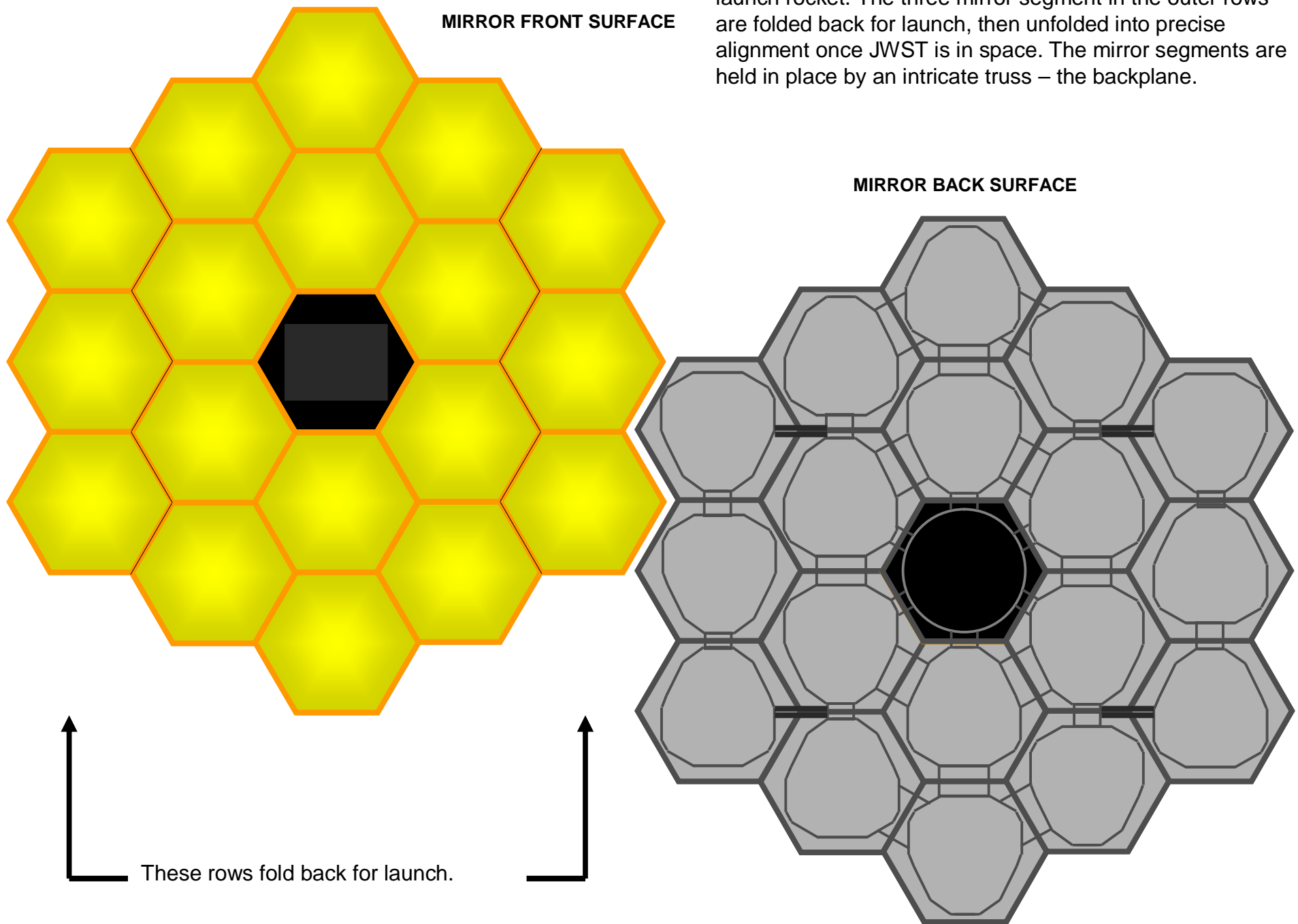


The IEC contains electronic equipment that generates heat when operating, so they must be isolated from the science instruments.

Hubble Space Telescope mirror to scale



The JWST mirror is so large it must be folded to fit into its launch rocket. The three mirror segments in the outer rows are folded back for launch, then unfolded into precise alignment once JWST is in space. The mirror segments are held in place by an intricate truss – the backplane.



MIRROR FRONT SURFACE

MIRROR BACK SURFACE

These rows fold back for launch.

James Webb Space Telescope – 1:48 scale

REVISED BACKPLANE - FRONT

For a detailed scratch-build, refer to pictures and the JWST web site.

Backplane structure is truss of box beams.

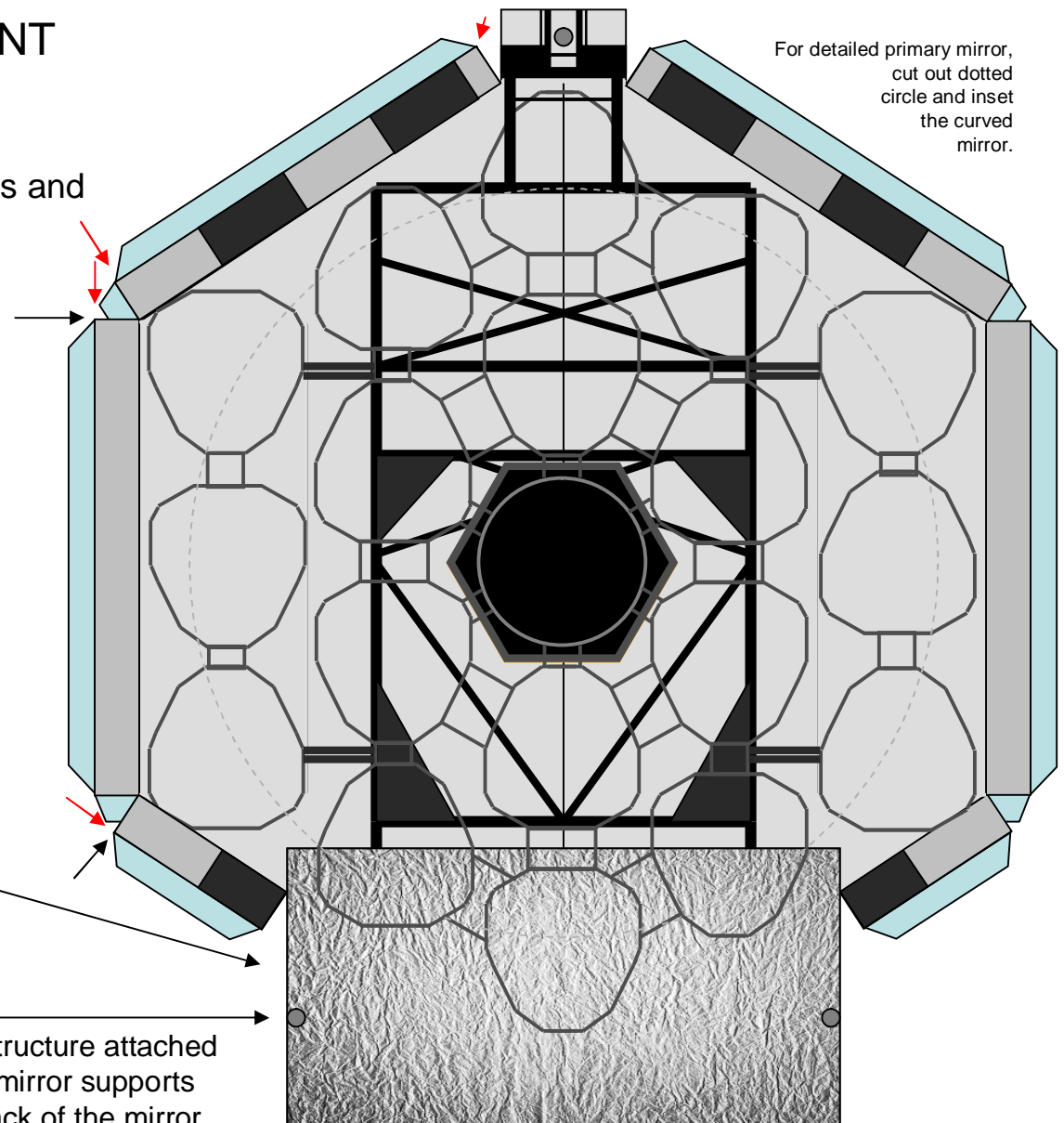
Mirror mounts are welded, tube structures.

Outer column of 3 mirrors folds back for launch.

Shield is thin sheet.

Secondary mirror support struts mount to pads on backplane truss behind shield.

For detailed primary mirror, cut out dotted circle and inset the curved mirror.



The JWST backplane actually consists of a truss structure attached to the ISIM (black rectangular shape on part); the mirror supports (oval structures on part); thermal shields on the back of the mirror supports and a shielding panel at the bottom that prevent heat from the ISIM and IEC from reaching the mirrors. This part has been simplified to make it easier to build.

James Webb Space Telescope – 1:48 scale

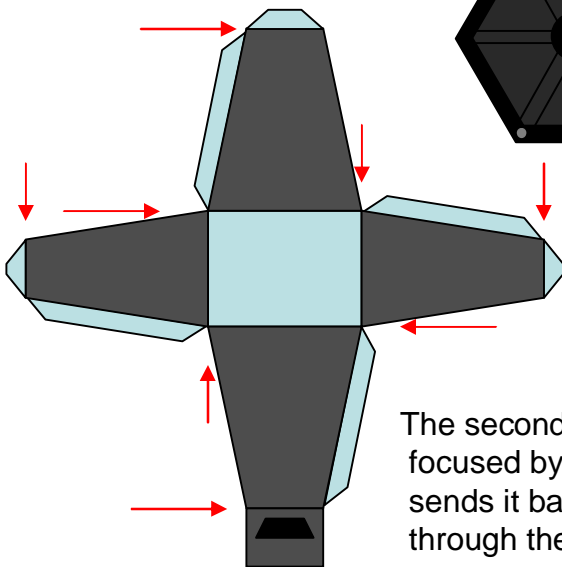
REVISED BACKPLANE - BACK

For a detailed scratch-build, refer to pictures and JWST web site.

Backplane structure is truss of box beams.
Protective covers over attachments.

8-Secondary Mirror Assembly

AFT OPTICS –
CENTER ON
FACE OF MIRROR



The secondary mirror takes the light focused by the primary mirror and sends it back to the instruments through the aft optics.

