

HAND-HELD HUBBLE

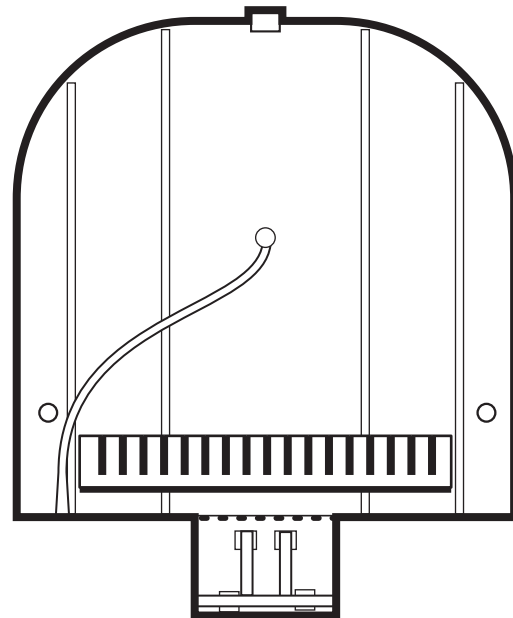
Model Wrappers

The wrappers show the Hubble Space Telescope's exterior features and the locations of its science instruments. On Page 7 you'll find a list of the abbreviations that appear on the wrappers along with brief descriptions of the parts they represent.

These pages contain all of the wrappers needed to complete the Hand-Held Hubble model. The assembly instructions can be found on the Web at: www.hubblesite.org/go/model.

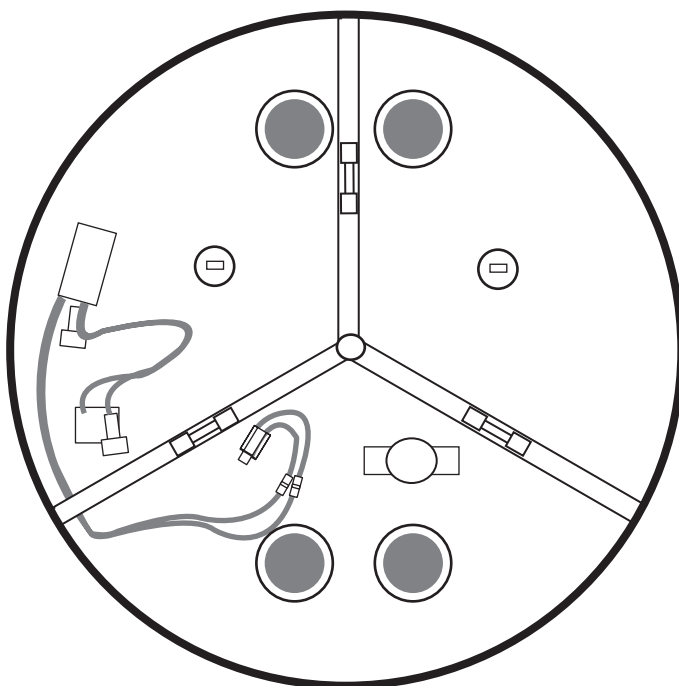
Glue the Aft Bulkhead and Aperture Door pieces to cardboard or posterboard before cutting them out.

Aperture Door



Fold Aperture Door at dotted line. Glue or tape flap to Forward Shell where indicated.

Aft Bulkhead

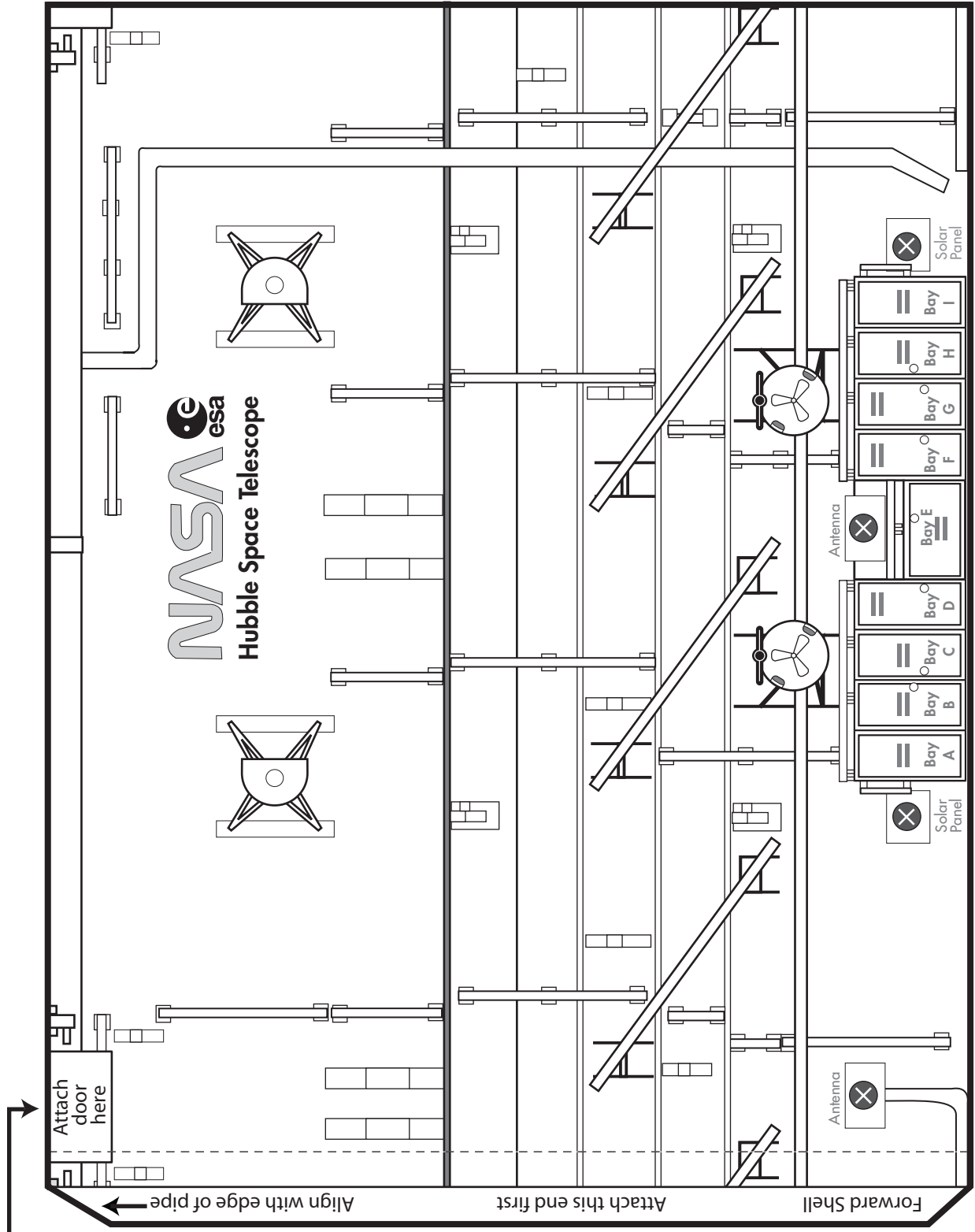


Measure the dashed line below to make sure your printer is making these pages at the correct scale.

If the line is not exactly 1" long, you may have to change your printer options. In the Print dialog box, do the following:

- If you're using Acrobat 5, **deselect** "Shrink Oversized Pages to Paper Size" and "Expand Small Pages to Paper."
- If you're using Acrobat 4, **deselect** "Fit to Page."

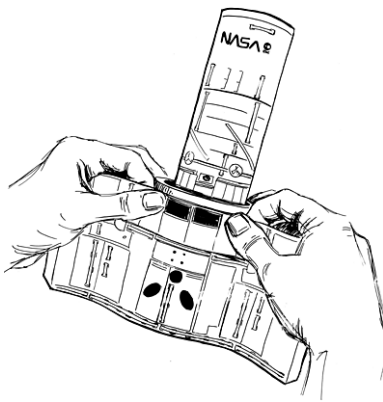
┆-----┆ 1 inch



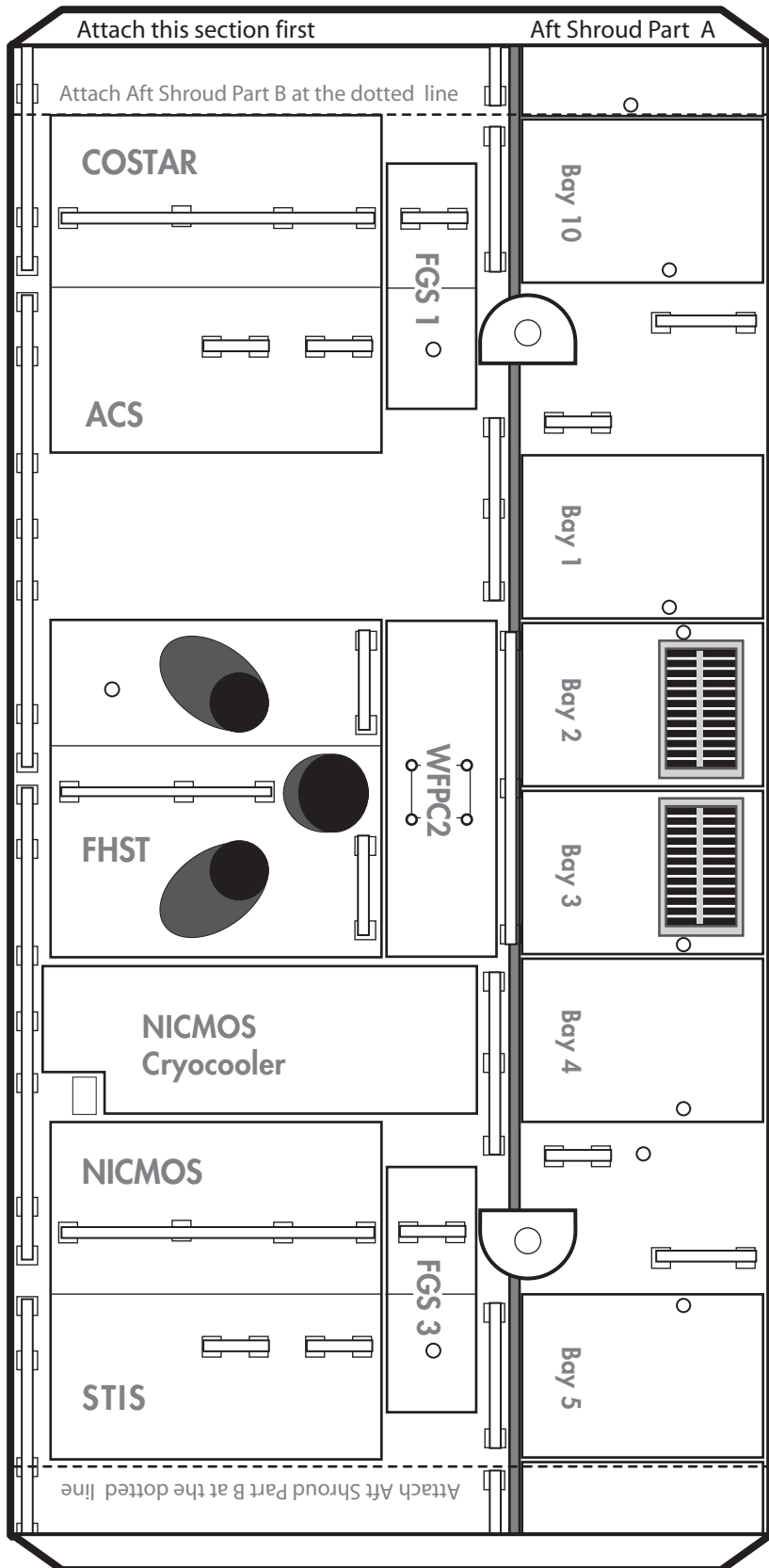
Aperture door attaches here

Drill holes through the ⊗ for the Communications Antennae and the Solar Panels.

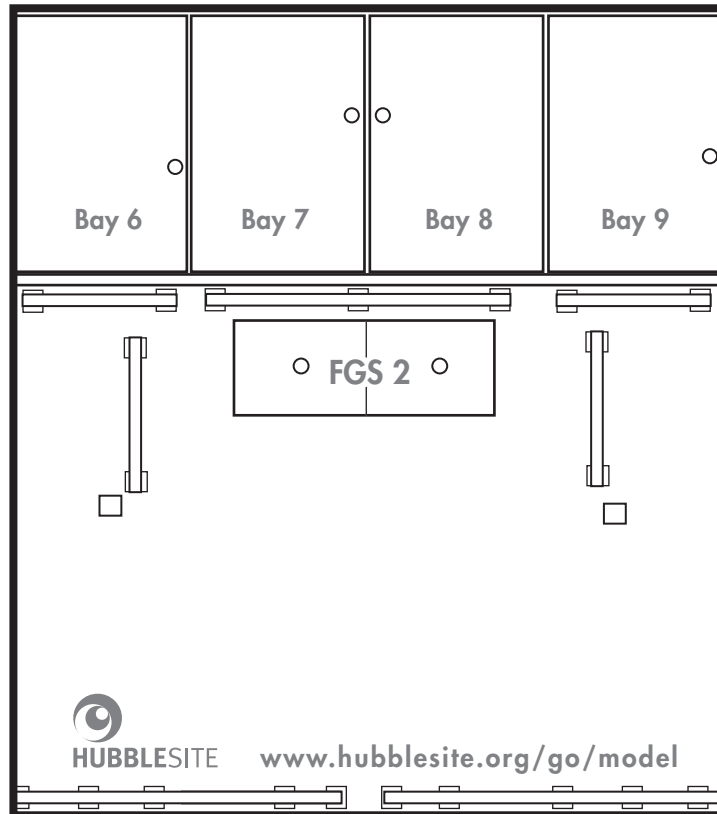
Aft Shroud Part A



When attaching Part A of the Aft Shroud wrapper, make sure that the NASA logo on the Forward Shell and the three circular shapes on the Aft Shroud Part A form a straight line.

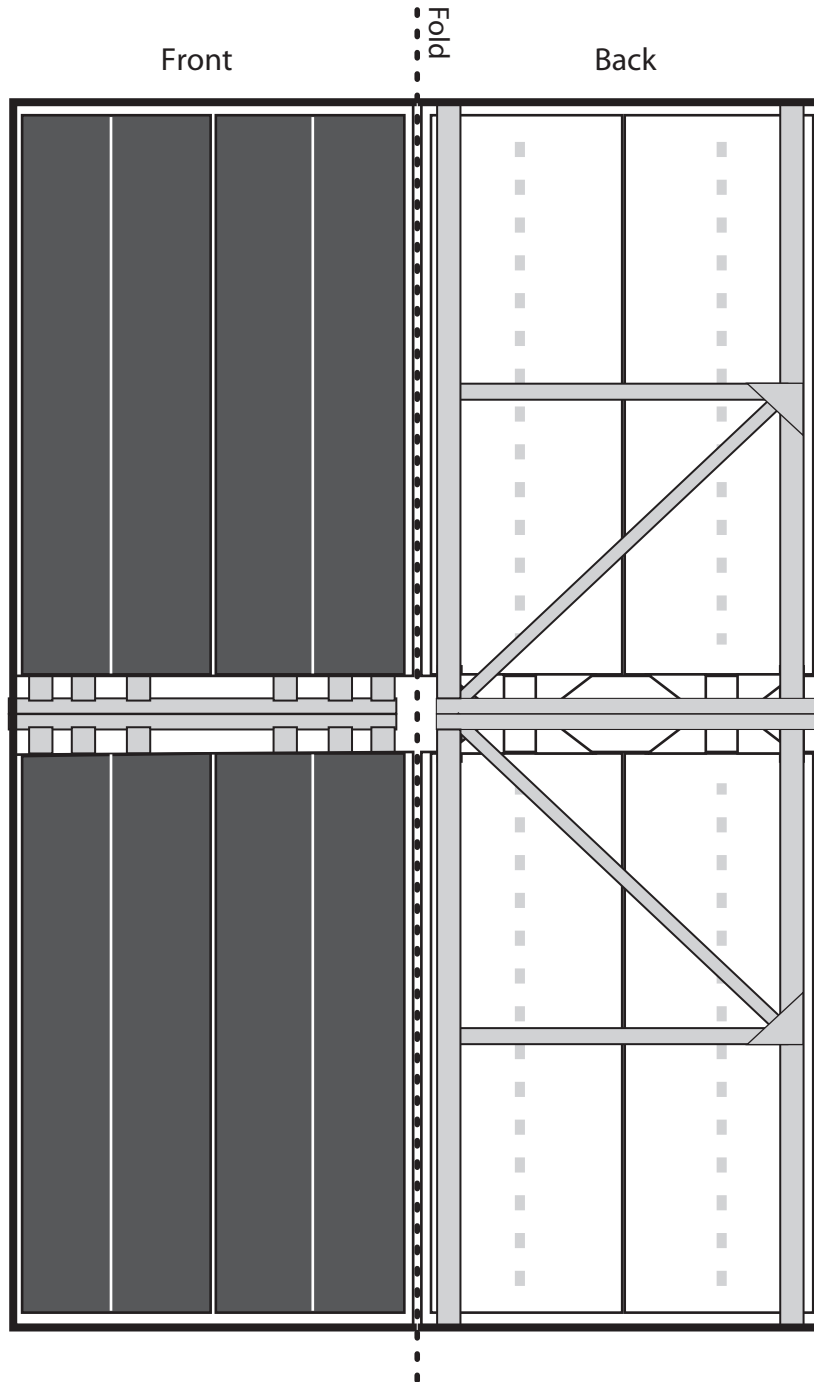


Aft Shroud Part B

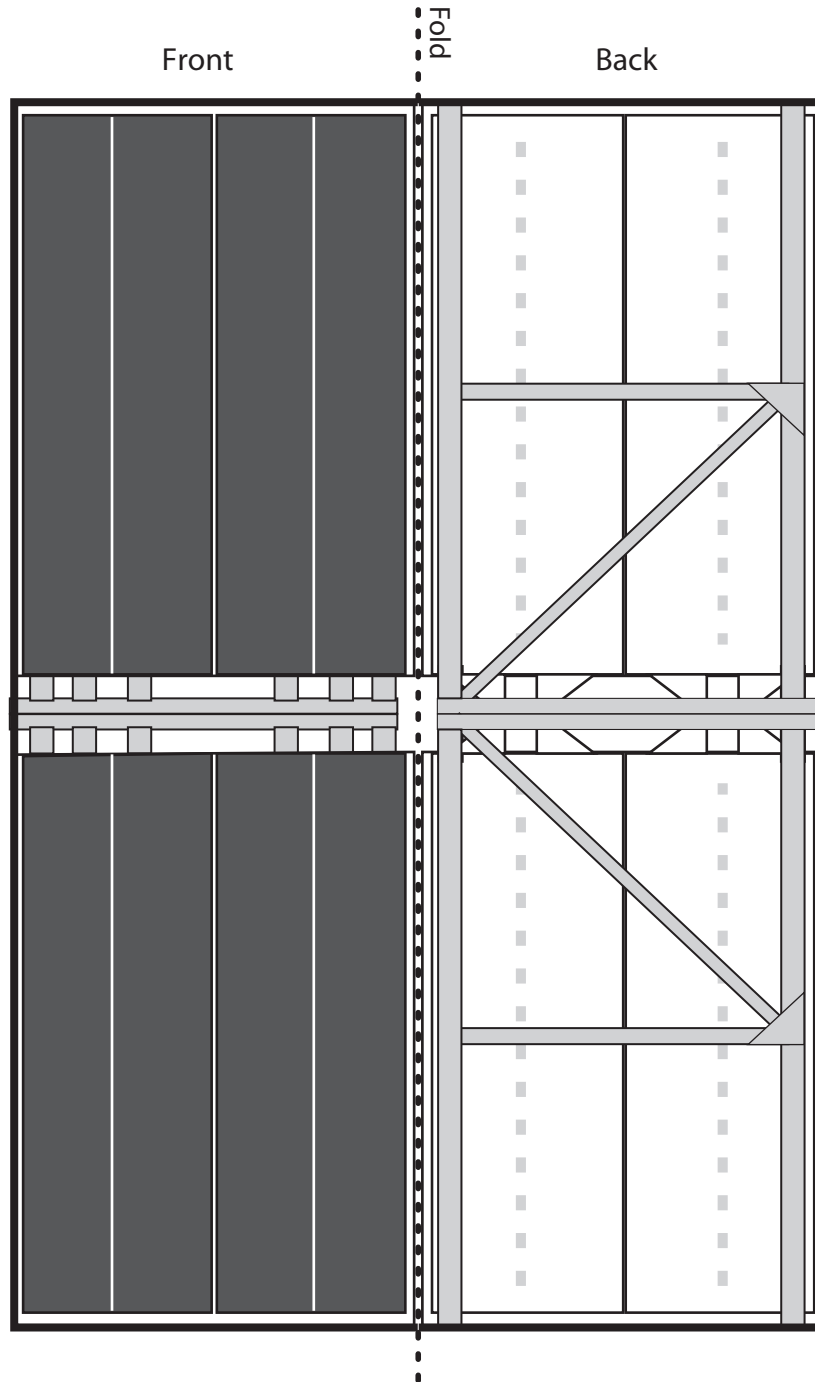


Line up Part B of the Aft Shroud wrapper along the dotted lines on Part A and secure it with cellophane tape. Check that the wrapper's features are lined up correctly in the area where the two pieces overlap.

Solar Panel 1



Solar Panel 2



HAND-HELD HUBBLE

What's What

All of the labeled items on these model wrappers represent working parts of the real Hubble Space Telescope. Here is a brief introduction to them.

For a more detailed description of how the telescope works, visit HubbleSite at www.hubblesite.org.

ACS

The Advanced Camera for Surveys (ACS) is Hubble's newest camera. It is used to observe weather on other planets in our solar system, conduct new surveys of the universe, and study the nature and distribution of galaxies.

Aft Shroud

The Aft Shroud is simply the rear section of the telescope. It contains all of Hubble's science instruments.

Aperture Door

The Aperture Door "guards" the telescope's internal mechanisms. It is usually open, which allows starlight to enter the telescope and be picked up by the science instruments. Sometimes the door is closed to protect the mirror and instruments from space debris.

Bays

Hubble's 20 bays are "closets" that contain the telescope's instruments and electronics.

Communications Antennae

Hubble's communications antennae allow astronomers and technicians to communicate with the telescope — telling it what to do and when to do it. The antennae send and receive information between the telescope and the Flight Operations Team at the Space Telescope Science Institute.

Abbreviations

ACS	Advanced Camera for Surveys
COSTAR	Corrective Optics Space Telescope Axial Replacement
FGS	Fine Guidance Sensor
FHST	Fixed Head Star Tracker
NICMOS	Near Infrared Camera and Multi-Object Spectrometer
STIS	Space Telescope Imaging Spectrograph
WFPC2	Wide Field and Planetary Camera 2

COSTAR

The Corrective Optics Space Telescope Axial Replacement (COSTAR) apparatus functions like eyeglasses for Hubble. When the telescope was launched in 1990, the shape of the primary mirror was flawed, which resulted in "fuzzy" images. COSTAR's small, carefully designed mirrors, which sit in front of the telescope's science instruments, correct this problem.

NICMOS Cryocooler

The NICMOS cryocooler is a "refrigerator" that keeps the instrument very cold — below -321°F , or 77 degrees Kelvin. The sensitive infrared detectors in NICMOS must operate at very cold temperatures to avoid exposure to unwanted light in the form of heat.

FGS

Hubble's four Fine Guidance Sensors (FGS) are targeting devices that lock onto "guide stars" and measure their positions relative to the object being viewed. Adjustments based on these precise readings keep Hubble pointed in the right direction.

FHST

Fixed Head Star Trackers (FHST) are small telescopes with wide fields of view that are used in conjunction with the Fine Guidance Sensors. The star trackers locate the bright stars that are used to orient the telescope for scientific observations.

Forward Shell

The Forward Shell makes up the front part of the telescope. It houses Hubble's light baffle and mirrors.

Mirrors

Hubble has two mirrors: the primary mirror and the secondary mirror. The primary mirror reflects the light gathered by the telescope back to the secondary mirror, which focuses it and bounces it back toward the science instruments.

NICMOS

The Near Infrared Camera and Multi-Object Spectrometer (NICMOS) is Hubble's heat sensor. Its sensitivity to infrared light makes it useful for observing objects hidden by interstellar gas and dust (such as stellar nurseries and planetary atmospheres) and for peering into deepest space.

Solar Panels

The Solar Panels are Hubble's power stations. They gather sunlight and convert it to electricity, which runs the telescope's scientific instruments, computers, and radio transmitters. The Solar Panel's solar cell "blankets" generate 3000 watts of electricity — enough to power 30 household light bulbs.

STIS

The Space Telescope Imaging Spectrograph (STIS) is a versatile instrument that can act somewhat like a prism, separating light from the cosmos into its component colors. The colors of an object reveal many clues about its age and composition.

WFPC2

The Wide Field and Planetary Camera 2 (WFPC2) is the "workhorse" instrument behind nearly all of the most famous Hubble pictures. As Hubble's main camera, it is used to observe just about everything.

Credits

This model was developed by the Office of Public Outreach at the Space Telescope Science Institute. We would like to thank our colleague Max Mutchler for creating the original Hubble model and for assisting us with this upgraded version.

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Complete instructions for building this scale model of the Hubble Space Telescope can be found at www.hubblesite.org/go/model on the World Wide Web.



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