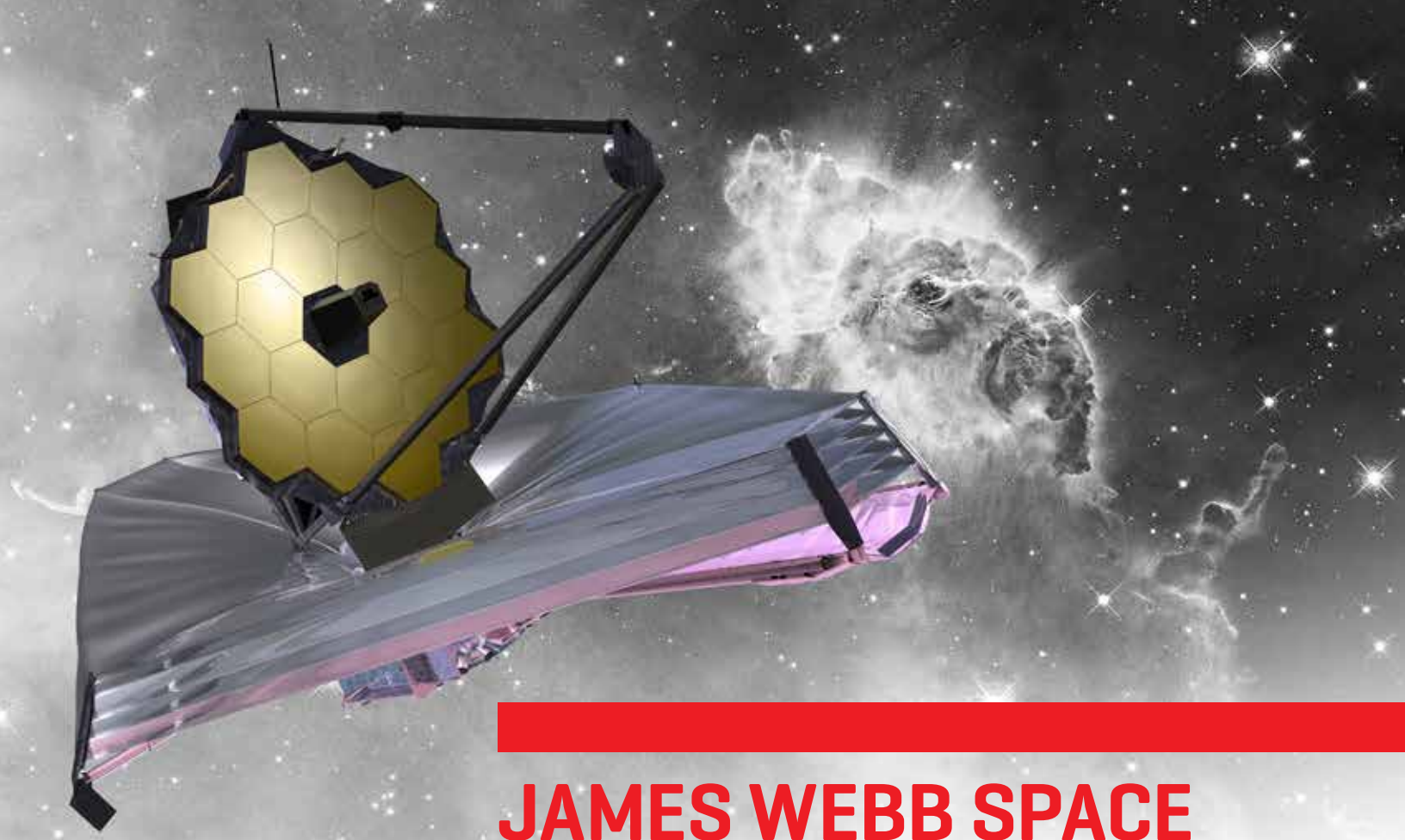


JAMES WEBB SPACE TELESCOPE (JWST)

ASSEMBLY, INTEGRATION, AND TESTING

The James Webb Space Telescope (JWST) is a space-based observatory that will provide unprecedented images of the universe's first stars and galaxies.

JWST FACTS

Mission duration: 5-10 years

Diameter of primary mirror: approximately 6.5 m (21.3 ft)

Number of primary mirror segments: 18

Primary mirror material: beryllium coated with gold

HARRIS ROLE

As part of the NASA team, Harris Corporation is responsible for integrating components made by various members of the team to form the optical telescope element, which is the portion of the telescope that will collect light and provide sharp images of deep space. After completing this integration and the integration of the science instrument module, Harris began a series of optical tests of the telescope at cryogenic temperatures to help ensure the optical telescope element will work properly in space.

JWST MISSION

The successor to the Hubble Space Telescope, the JWST is slated for launch in 2018 and will take three months to travel 1.5 million km (940,000 miles) to a point in space where it will be balanced between the gravity of the Earth and the sun. The JWST is a large, infrared-optimized telescope designed to study the formation of the first stars and galaxies, the evolution of galaxies, the production of elements by stars, and the process of star and planet formation. The JWST will be located much farther from Earth than Hubble and will contain a tennis court-sized sun shade that will keep the telescope cold, which is necessary for viewing infrared light. The JWST will be packed inside and carried into orbit aboard an Ariane 5 launch vehicle.

JWST'S PRIMARY MIRROR

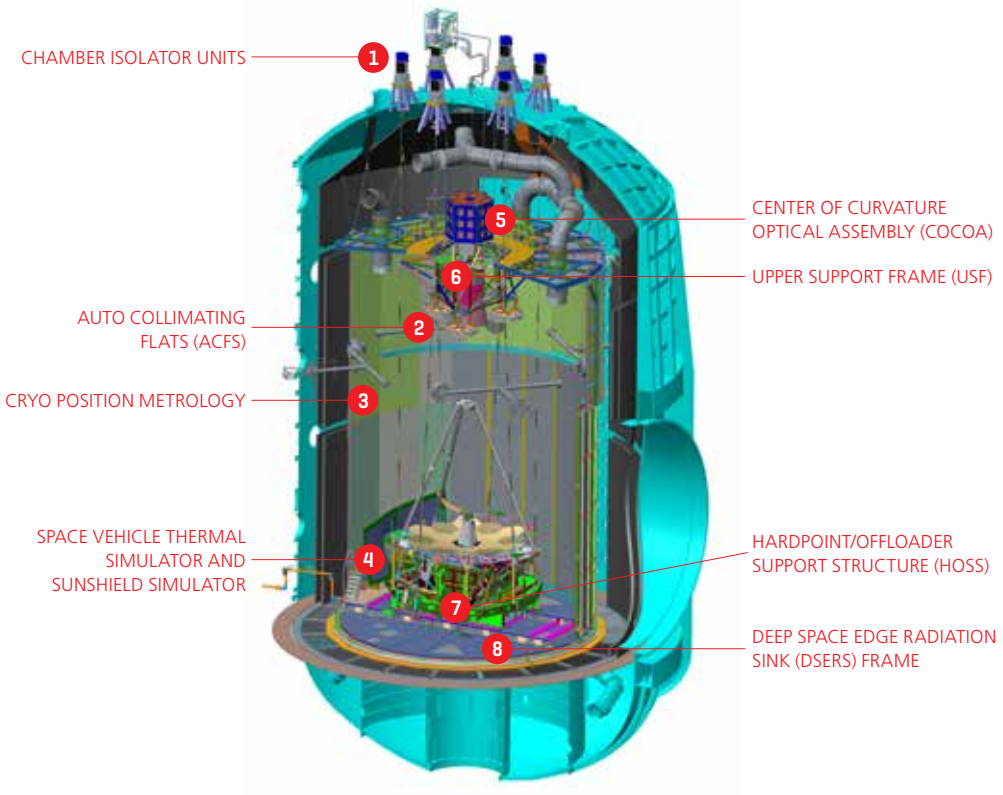
2.5 times larger in diameter, or about six times larger in area than Hubble

1,000 times more sensitive in the infrared spectrum than Hubble

The overall weight of the telescope will be significantly lighter due to ultra-thin, ultra-lightweight mirror segments that were unavailable when Hubble was built

Photo credit: NASA

CRYOGENIC TESTING: Cryogenic testing for the James Webb Space Telescope began in 2015 at NASA's Johnson Space Center in Houston, Texas, and will continue into 2017.



1. CHAMBER ISOLATOR UNITS

Provide dynamic isolation from external vibration sources to create a near flight-like disturbance environment.

2. AUTO COLLIMATING FLATS (ACFS)

Three, 1.5m (60") mirrors provide the ability to test the end-to-end performance of the telescope and instrument suite. Each flat can be tipped and tilted as needed.

3. CRYO POSITION METROLOGY

Four state-of-the-art photogrammetry cameras rotate on windmill-like booms to provide absolute position within the chamber to an accuracy of 0.1mm (0.004"). Absolute Distance Measurement delivers radius of curvature of primary mirror.

4. SPACE VEHICLE THERMAL SIMULATOR AND SUNSHIELD SIMULATOR

Replicates the thermal interfaces between the spacecraft and the telescope. Inner sunshade layer provides the thermal interaction of the flight sunshade.

5. CENTER OF CURVATURE OPTICAL ASSEMBLY (COCOA)

Optical test system used to ensure that all 18 primary mirror segments can be aligned and work together properly as one large mirror. Multi-wavelength interferometer allows the primary mirror to be phased and figure corrected using the flight mirror actuators.

6. UPPER SUPPORT FRAME (USF)

Supports the optical equipment inside the cryogenic environment. Serves as metrology base for the optical test equipment and the flight system.

7. HARDPOINT/OFFLOADER SUPPORT STRUCTURE (HOSS)

9m (30') welded stainless steel support structure that holds the flight JWST telescope and instrument system.

8. DEEP SPACE EDGE RADIATION SINK (DSERS) FRAME

Reproduces deep space radiation sink; required for Thermal Pathfinder.