James Webb Space Telescope

THE HOME STRETCH

ALMOST!

Science with the Hubble and James Webb Space Telescopes V

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Introduction

JWST Has Made Tremendous Progress In The Last Few Years!

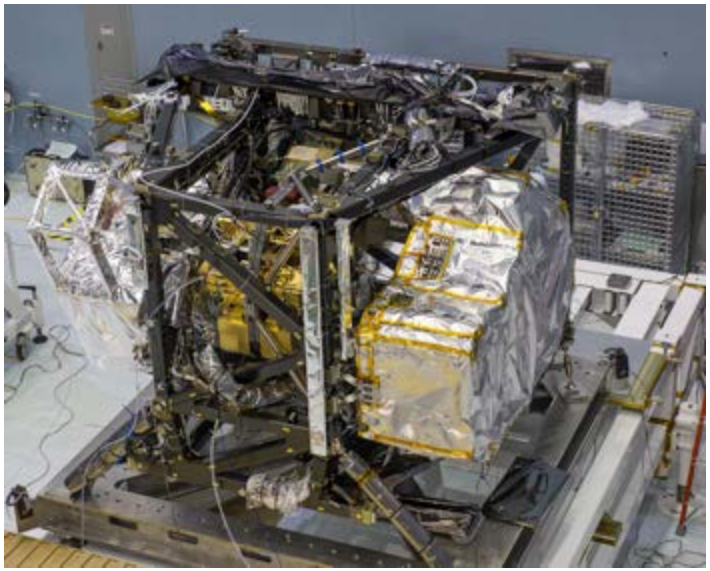
JWST Is Fully Immersed In Integration And Test, But Testing JWST Is A Formable Challenge

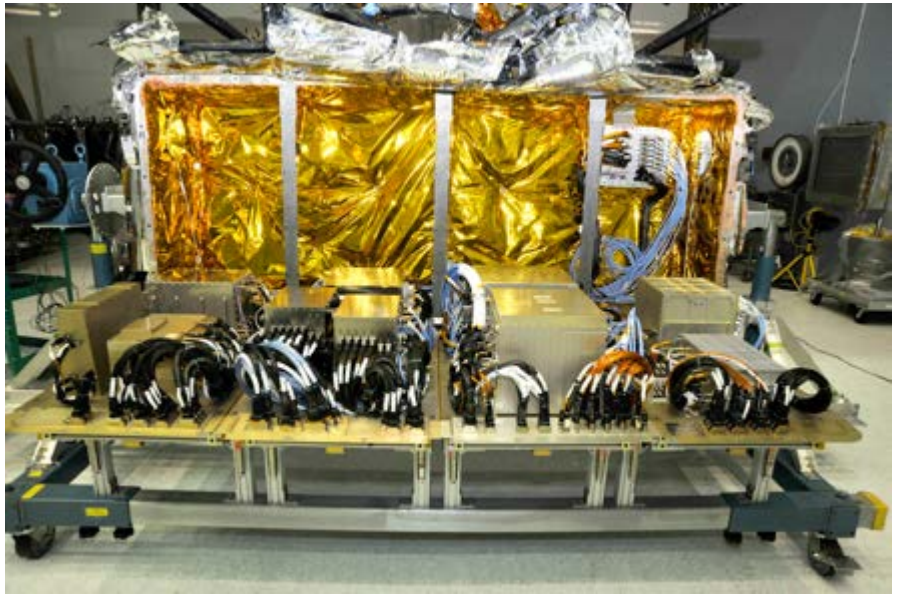
JWST's Size, Complexity, And Cryogenic Characteristics Require A Multifaceted Test Plan To Verify Mission Readiness

Each Of These Tests Are Opportunities To Uncover Issues Which Must Corrected To Be Able To Move Forward

WHERE WE ARE NOW

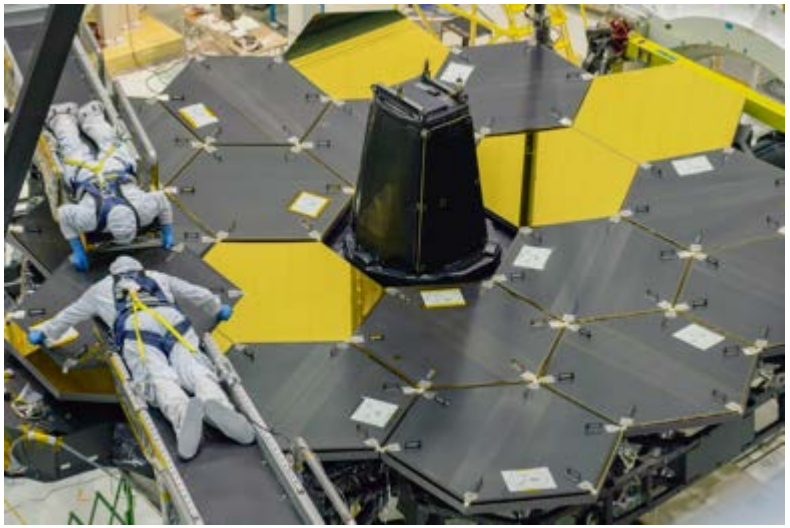
Integrated Science Instrument Module

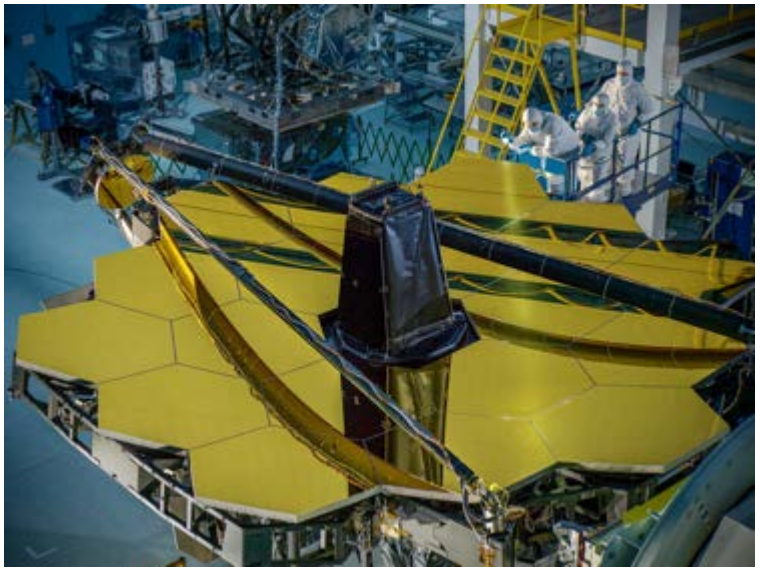




JWST Has An Outstanding Set Of Instruments!

Fully Integrated Telescope

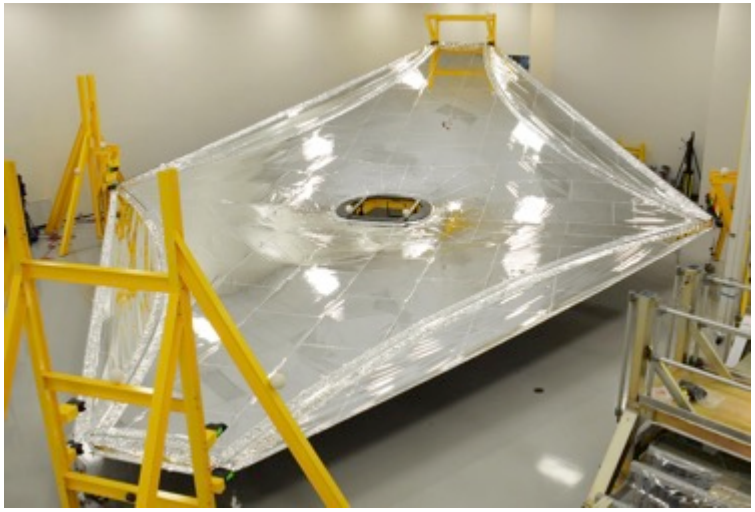


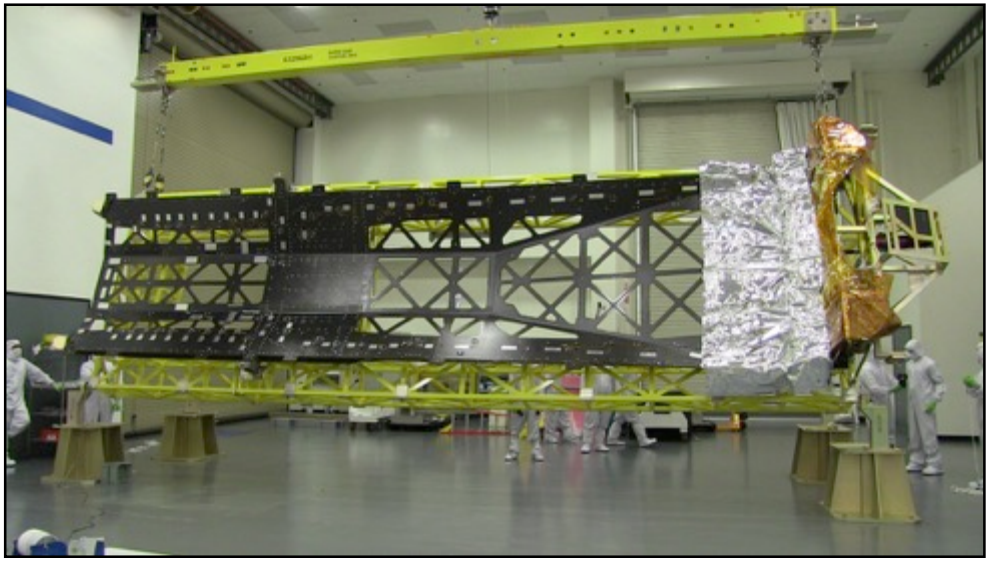


OTE/ISIM Instrument Module Integration

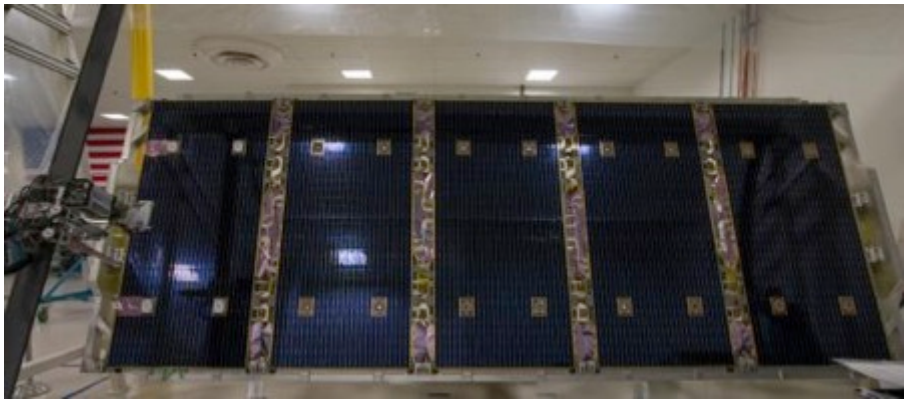
OTIS - Optical Telescope Element/ Integrated Science Instrument Module

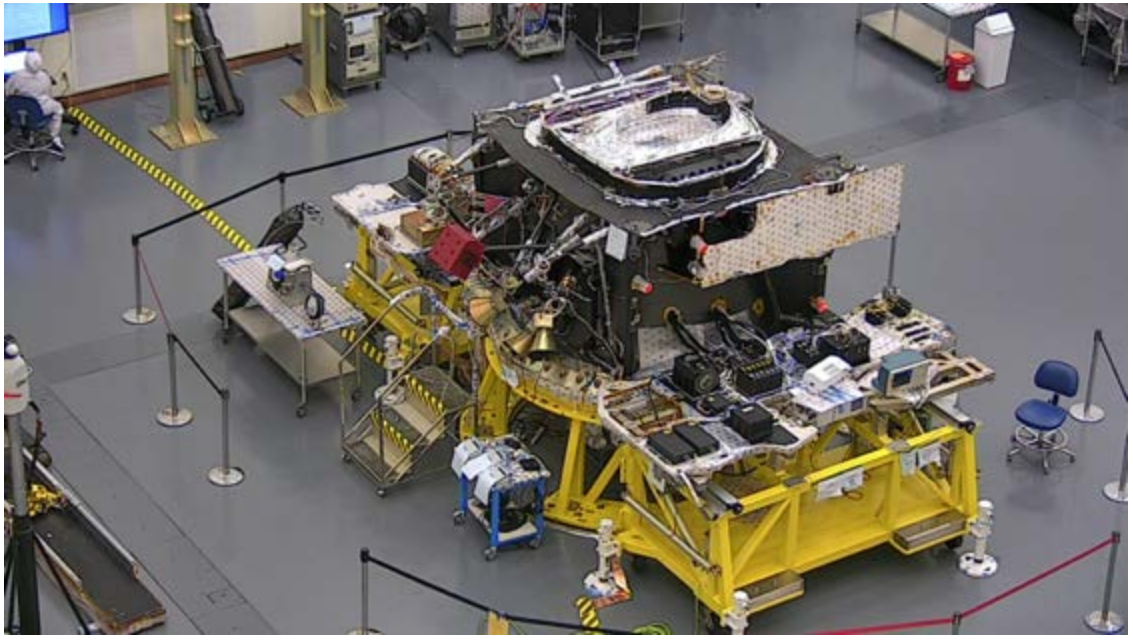
Spacecraft Element - Sunshield





Spacecraft Element - Bus





Science and Operations Center (S&OC)

All Observatory Control, Science Planning, And Science Data Processing Operational Systems Are On Schedule

- S&OC subsystems have been and will be used to support Integration and Test
- Continuing to conduct S&OC interface testing over operational networks
  - Successful tests with Deep Space Network, Space Network, Flight Dynamics Facility
- Mature S&OC subsystems have been integrated into a single system which enable the conduct of science
  - Guaranteed Time Observer and Early Release Science Calls for Proposals were released to the scientific community in January

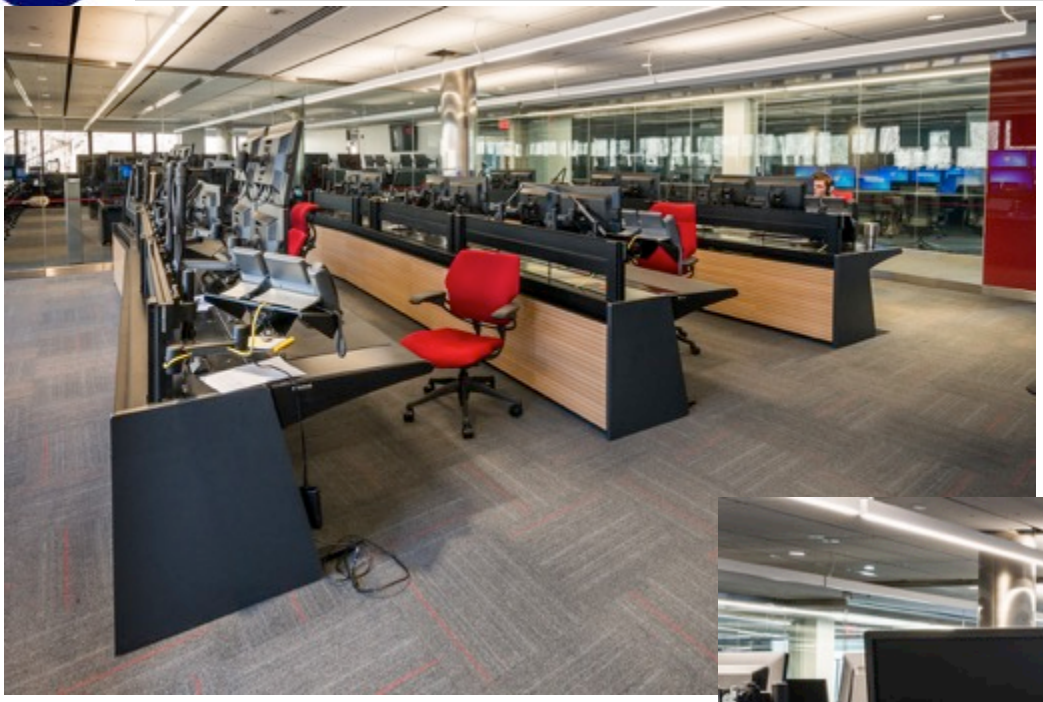
Commissioning Timeline

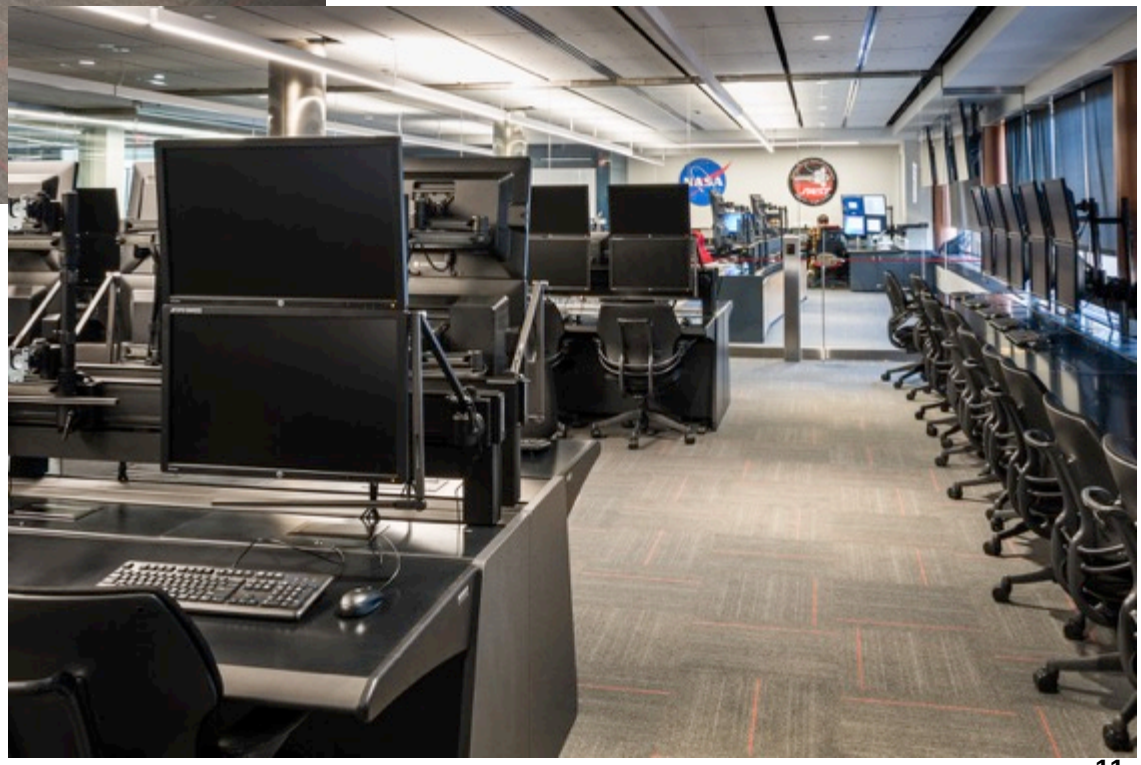
- Nominal timeline development well underway with monthly management reviews/training
  - Development of contingency operational procedures, tools, etc.

Flight Operations Team

- FOT members have completed required classroom training
- Preparations underway for first Operational Readiness Exercise in May

JWST Mission Operations Center





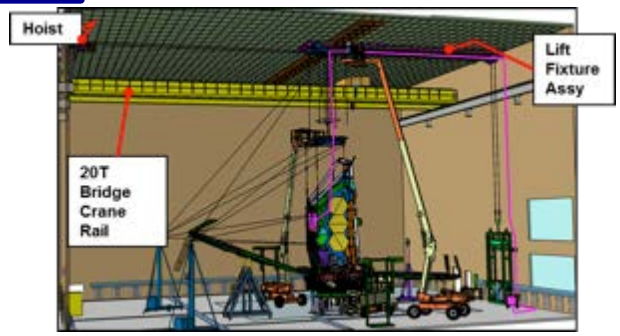
WHAT'S AHEAD

JWST Road Ahead

- ✓ OTIS Vibration (3 axes)
- ✓ OTIS Acoustics
- OTIS Deployment (7 different deployments)
- Optics Testing
- OTIS Cryogenics (93 day cryo-vacuum test)

- SCE Integration
- SCE Electrical test
- SCE Thermal Vacuum test
- SCE Deployment (7 tests)

Observatory Integration

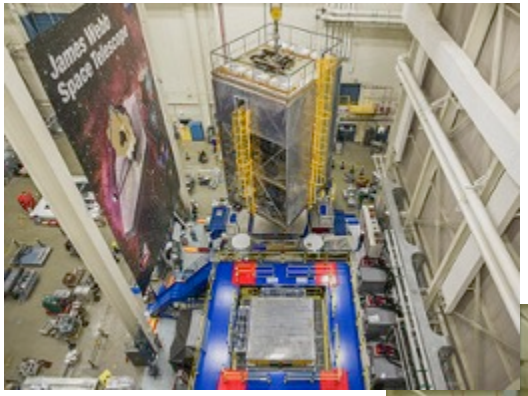


- Observatory Vibration (3 axes)
- Observatory Acoustics
- Observatory Deployment (all deployments retested)

OTIS Vibration and Acoustics

- **Vibration Testing**
  - Largest and most dynamically complex structure ever tested at GSFC
  - First time a deployable telescope of this size been through vibration testing
  - Required 2 new shakers for performing vibration
    - One is for lateral axes
    - One for vertical axis
  - Required nearly a decade of planning

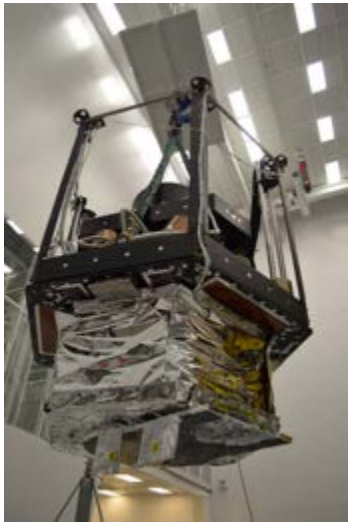
- **Acoustics Testing**
  - Structure is exposed to sound of launch
  - Sound Pressure Level was ~140 dB
    - Rock concert is ~110 dB



Cryogenic Testing of OTIS At Johnson Space Center

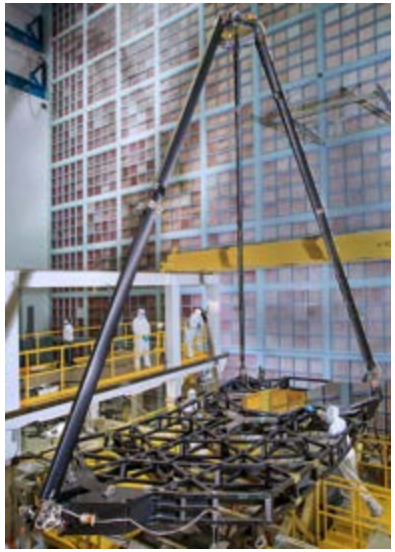
- **Preparations for OTIS Testing included**
  - Development of Worlds Largest Cryogenic Chamber
    - 55’ in diameter, 90’ tall

- **Development, installation, and test of complex optical ground support equipment**

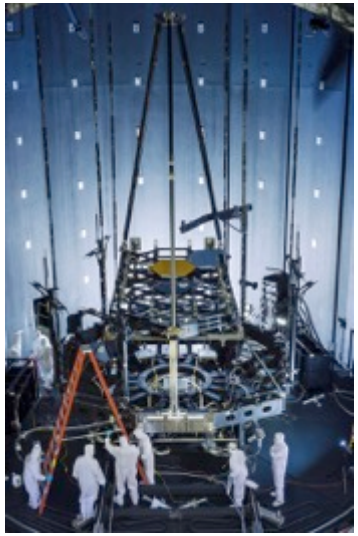


Cryogenic Testing of OTIS At Johnson Space Center

Risk Reduction Testing



Telescope Pathfinder



Pathfinder test 1

Pathfinder test 2

Aft Optics System Installed

Pathfinder test 3

Thermal hardware installed

93 Day Flight OTIS Test This Summer!

Closing Remarks

Outstanding Progress Continues To Be Made, But The Road Ahead To Launch Is Complex And Challenging