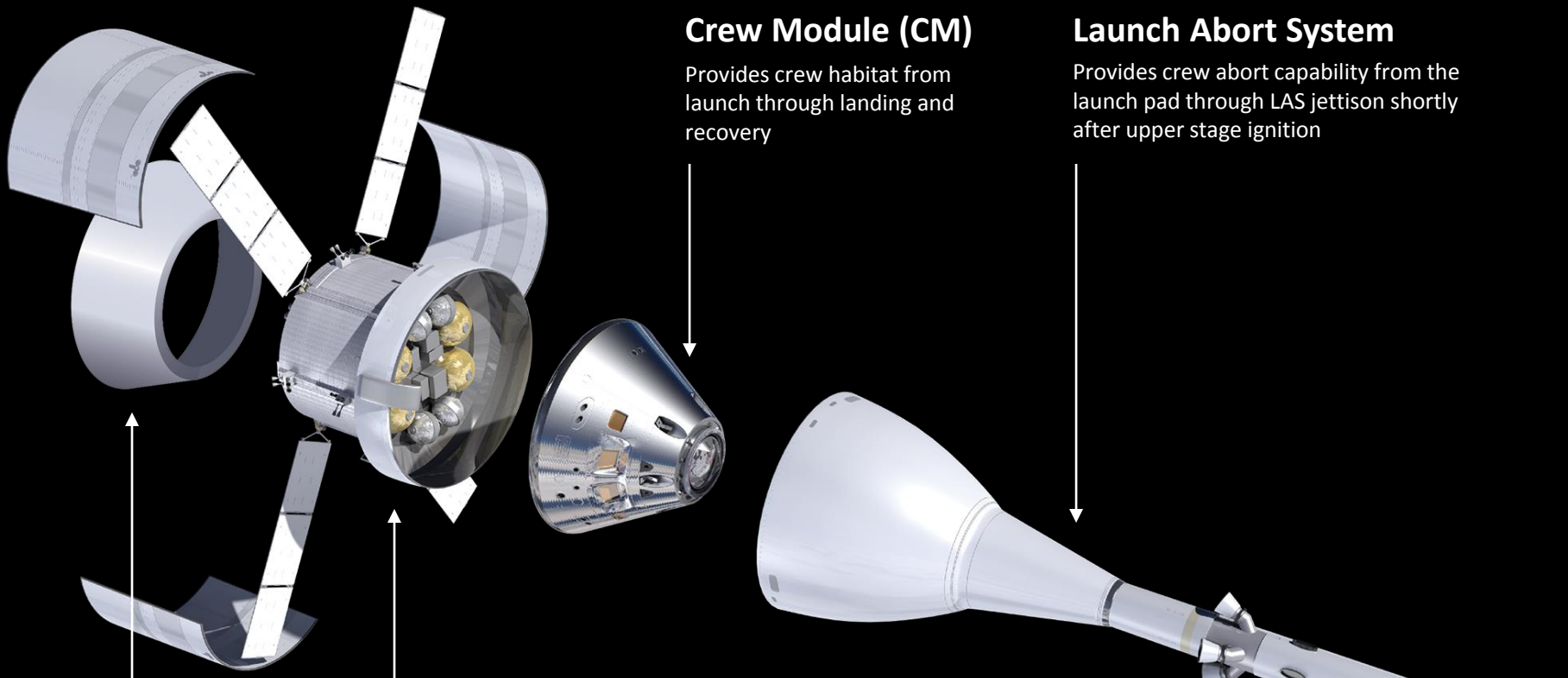

ORION
PROGRESS TOWARDS EXPLORATION MISSION-1

ORION MPCV SPACECRAFT OVERVIEW



Crew Module (CM)

Provides crew habitat from launch through landing and recovery

Launch Abort System

Provides crew abort capability from the launch pad through LAS jettison shortly after upper stage ignition

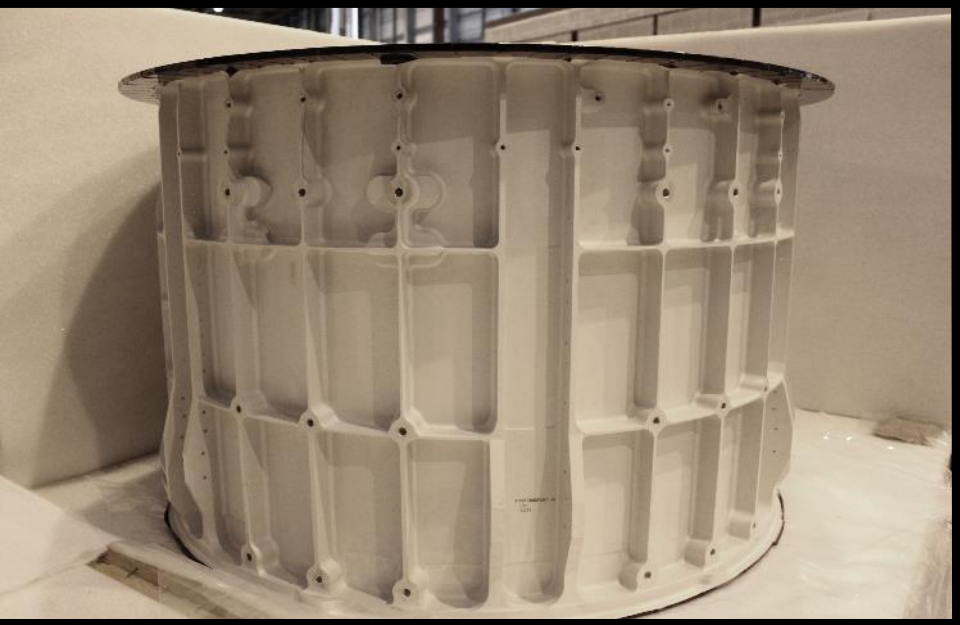
Spacecraft Adapter

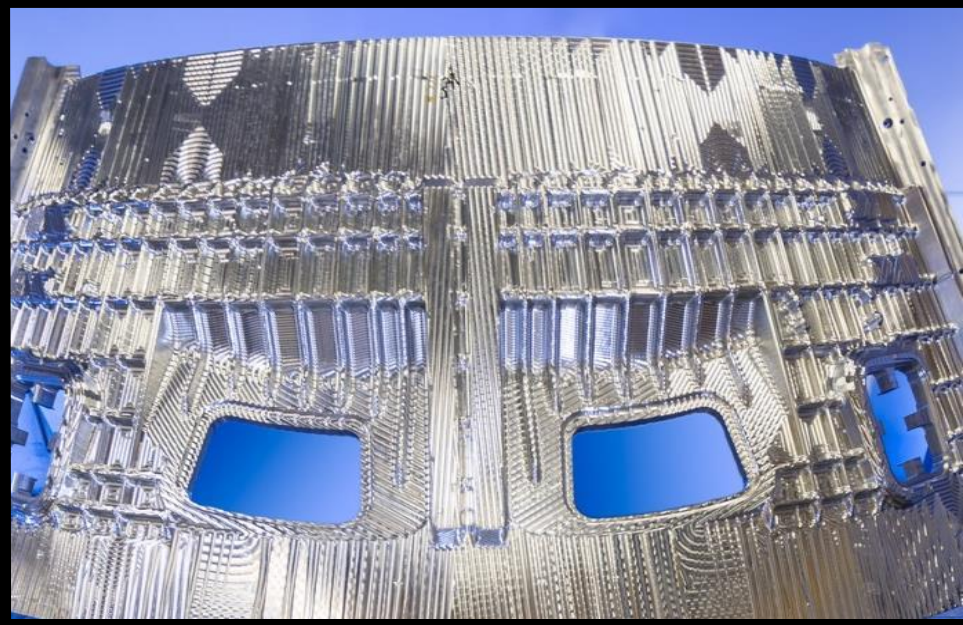
Provides mass efficient structural capability from launch through fairing jettison

Service Module (SM)

Provides electrical power generation, propulsion, thermal control and consumables storage until just prior to re-entry

LAUNCH ABORT SYSTEM





UTILIZING OUR NATION'S TOP MACHINE SHOPS

EM-1 CREW MODULE PRESSURE VESSEL WELDING

MICHOUD ASSEMBLY FACILITY, NEW ORLEANS, LOUISIANA

EM-1 CREW MODULE PRESSURE VESSEL

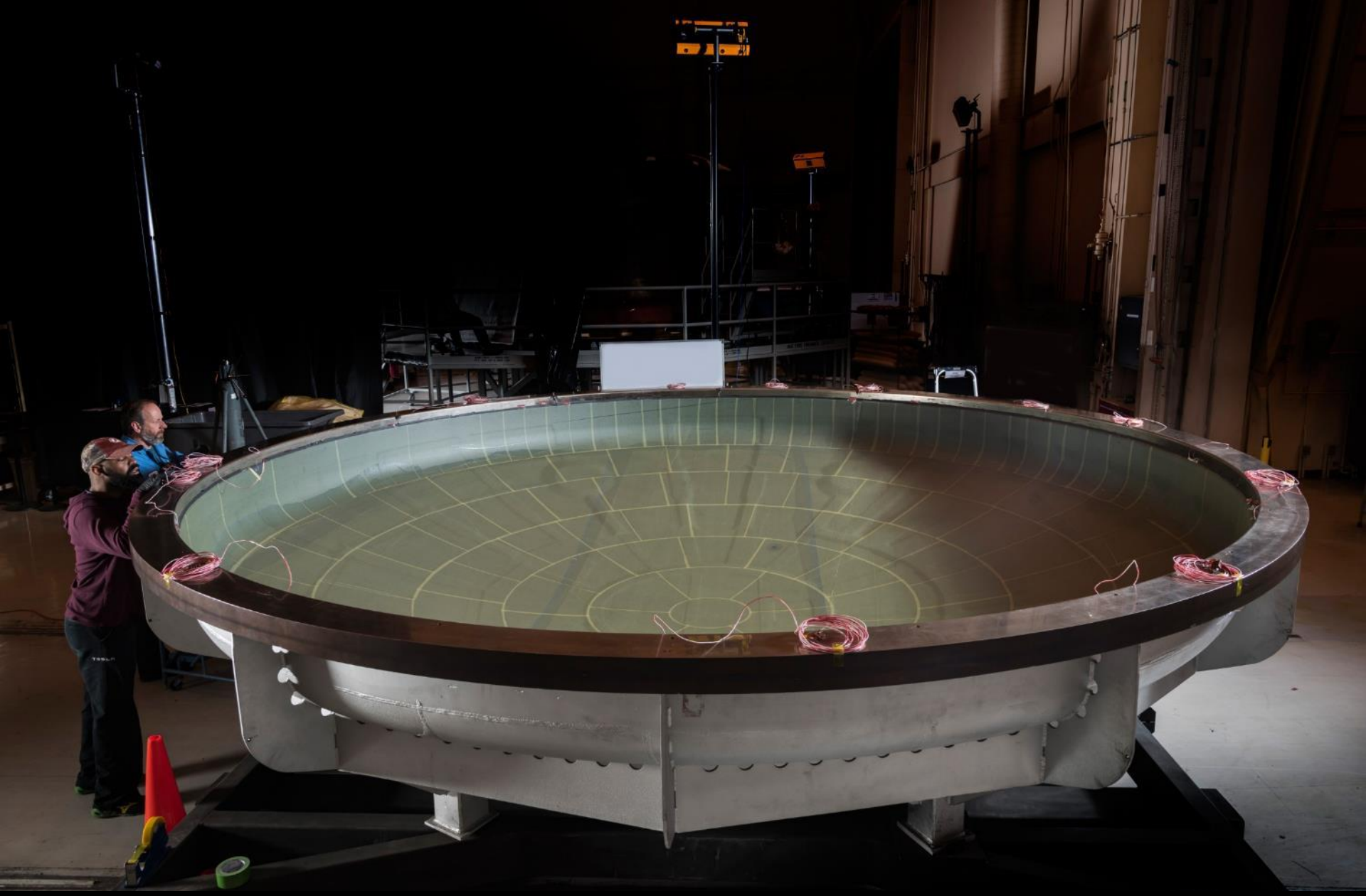
OPERATIONS AND CHECKOUT BUILDING, KENNEDY SPACE CENTER, FLORIDA

EM-1 LAUNCH ABORT SYSTEM

ORBITAL ATK, UTAH

HEAT SHIELD MANUFACTURING DEVELOPMENT UNIT

LOCKHEED MARTIN, LITTLETON, COLORADO

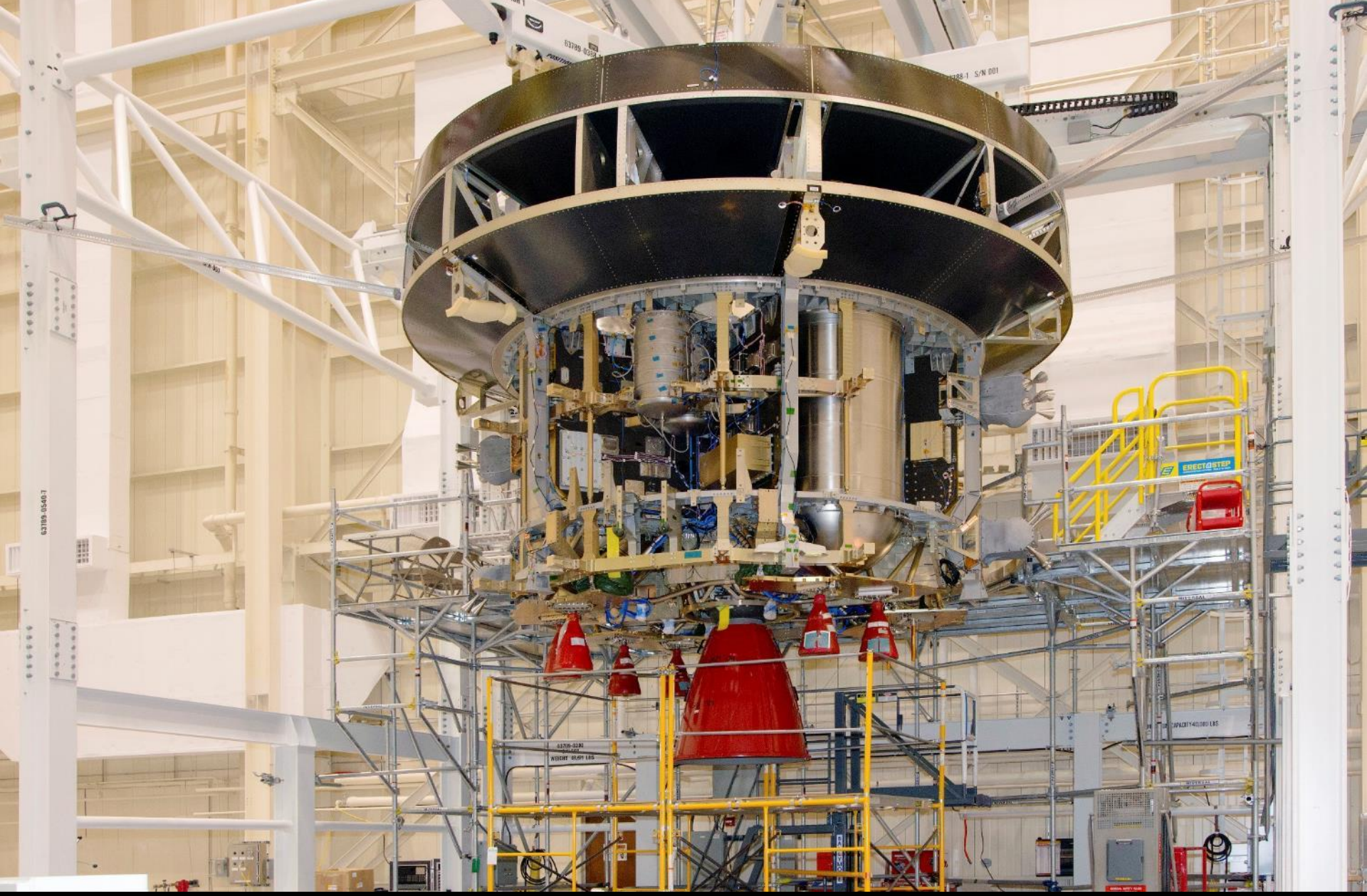


EM-1 HEAT SHIELD CARRIER STRUCTURE

LOCKHEED MARTIN, SUNNYVALE, CALIFORNIA

EUROPEAN SERVICE MODULE FLIGHT PRIMARY STRUCTURE

BREMEN, GERMANY

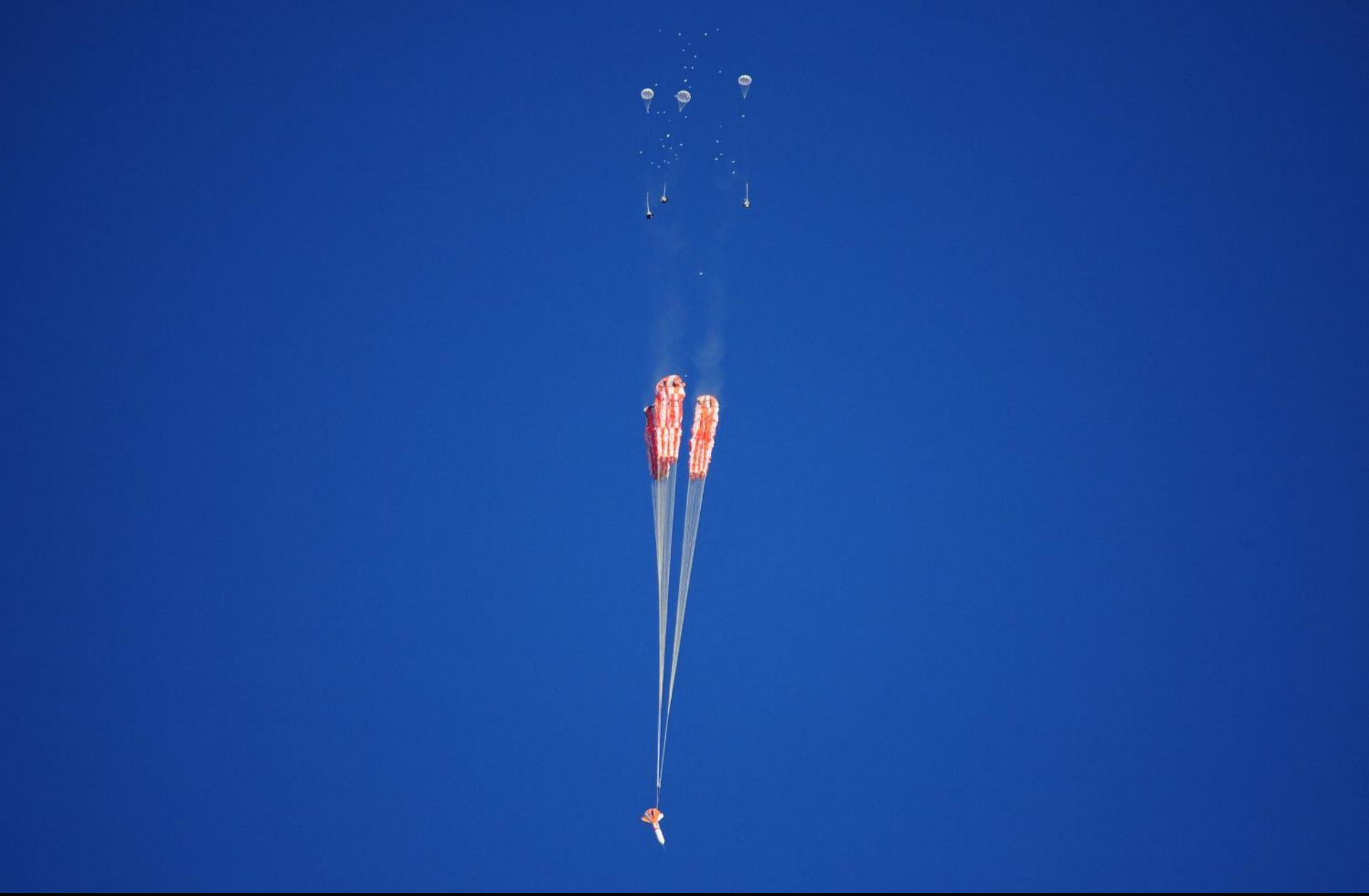


SERVICE MODULE STRUCTURAL TEST ARTICLE

GLENN RESEARCH CENTER PLUM BROOK STATION, OHIO

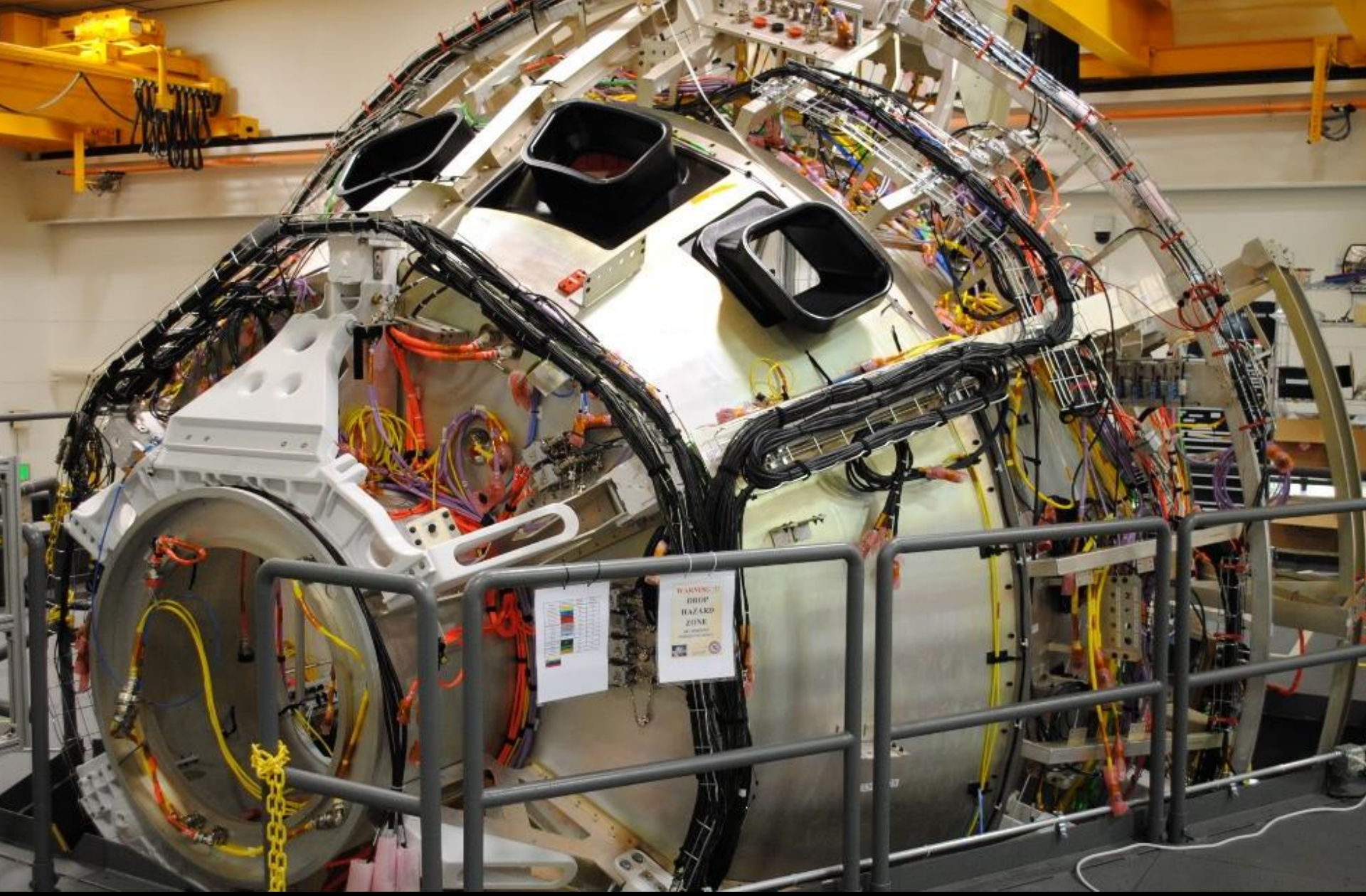
SOLAR ARRAY DEPLOYMENT TEST

GLENN RESEARCH CENTER PLUM BROOK STATION, OHIO



PARACHUTE DROP TESTS

YUMA, ARIZONA

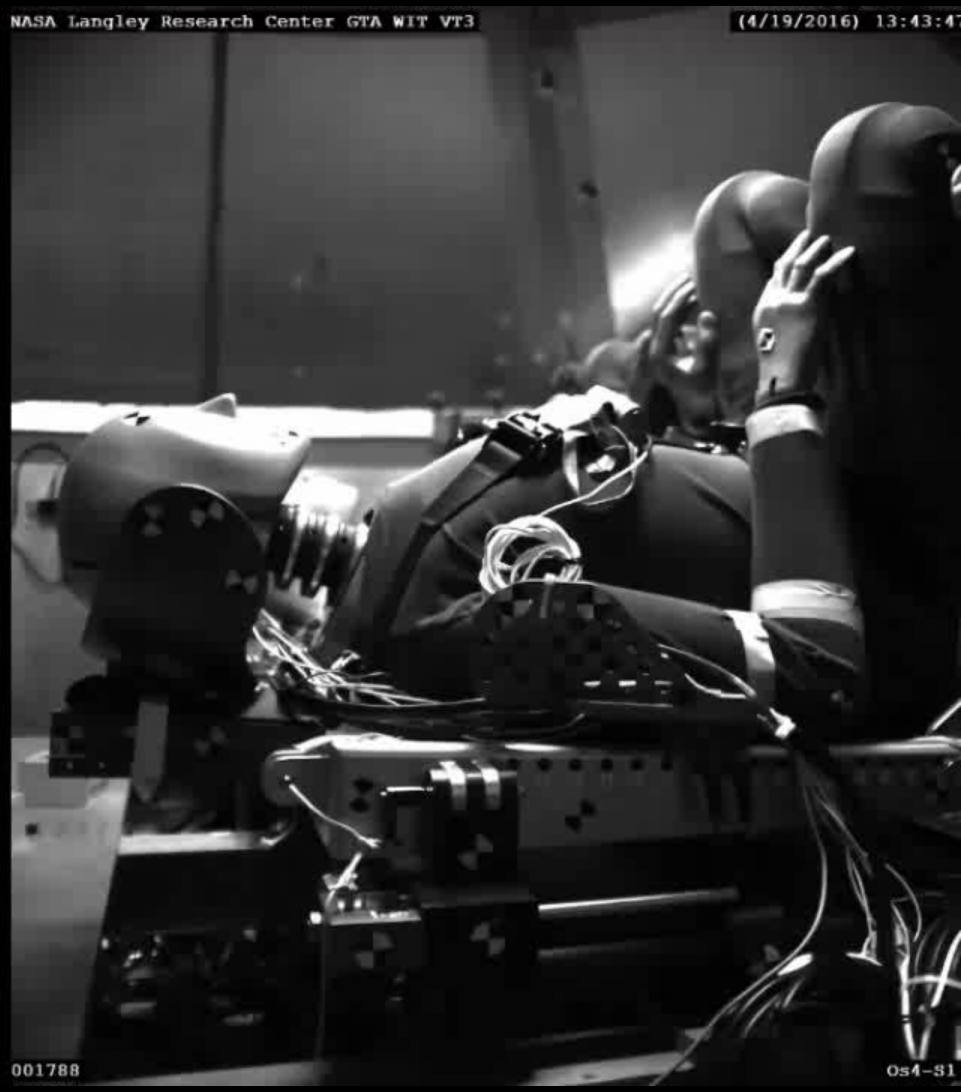


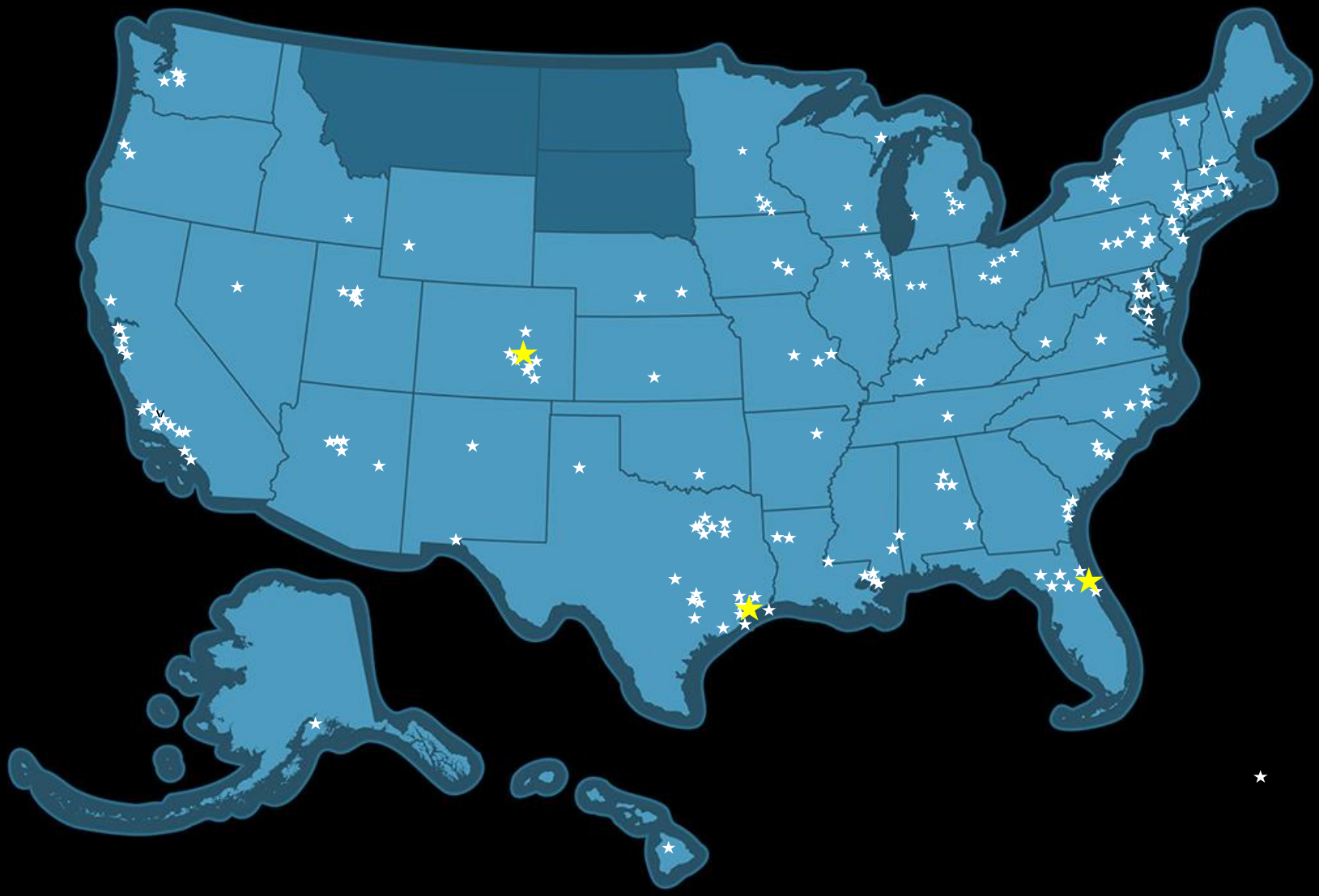
INTEGRATED TEST LAB

LOCKHEED MARTIN, LITTLETON, COLORADO

WATER IMPACT TESTING

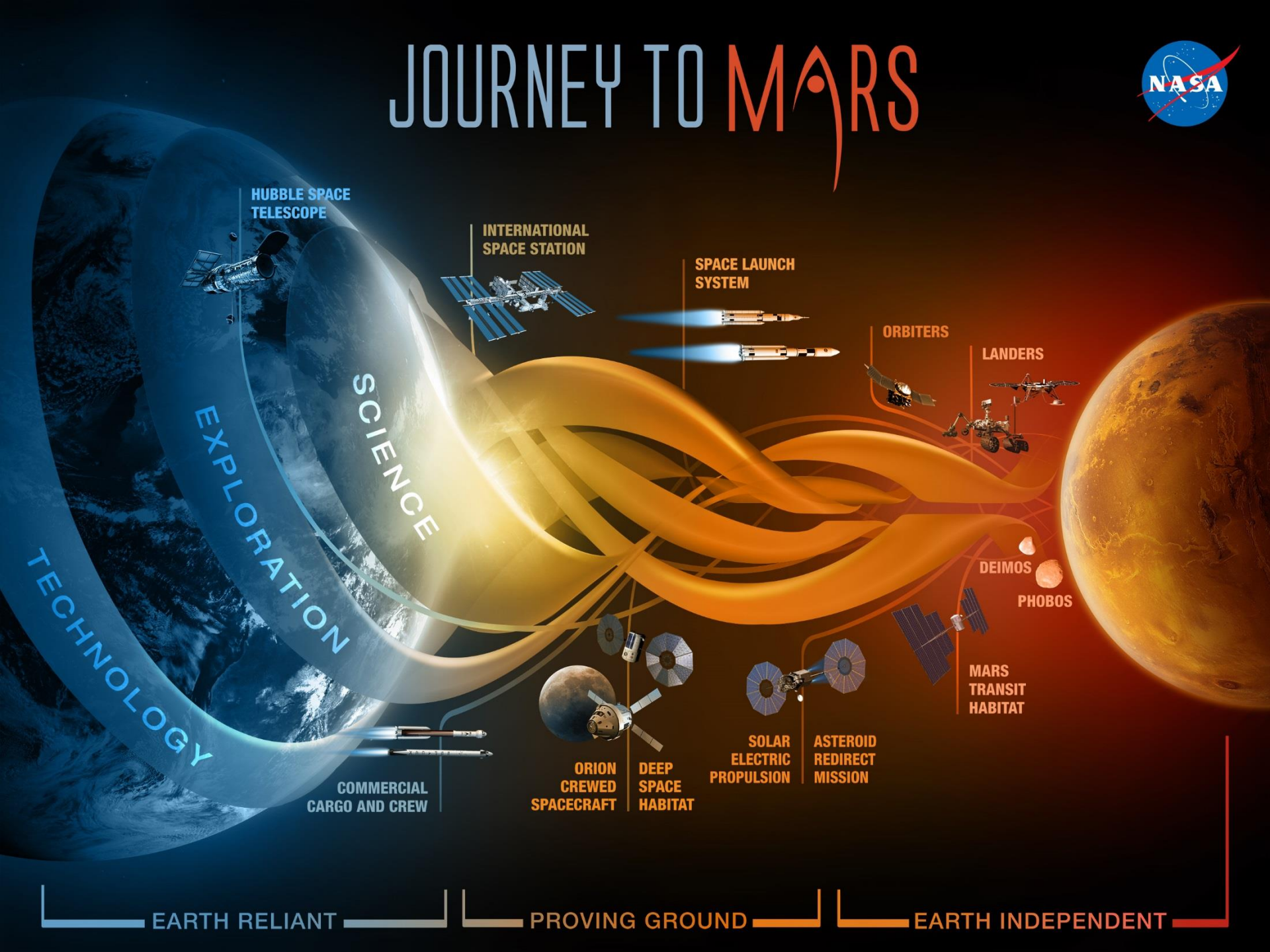
NASA LANGLEY RESEARCH CENTER, LANGLEY, VIRGINIA

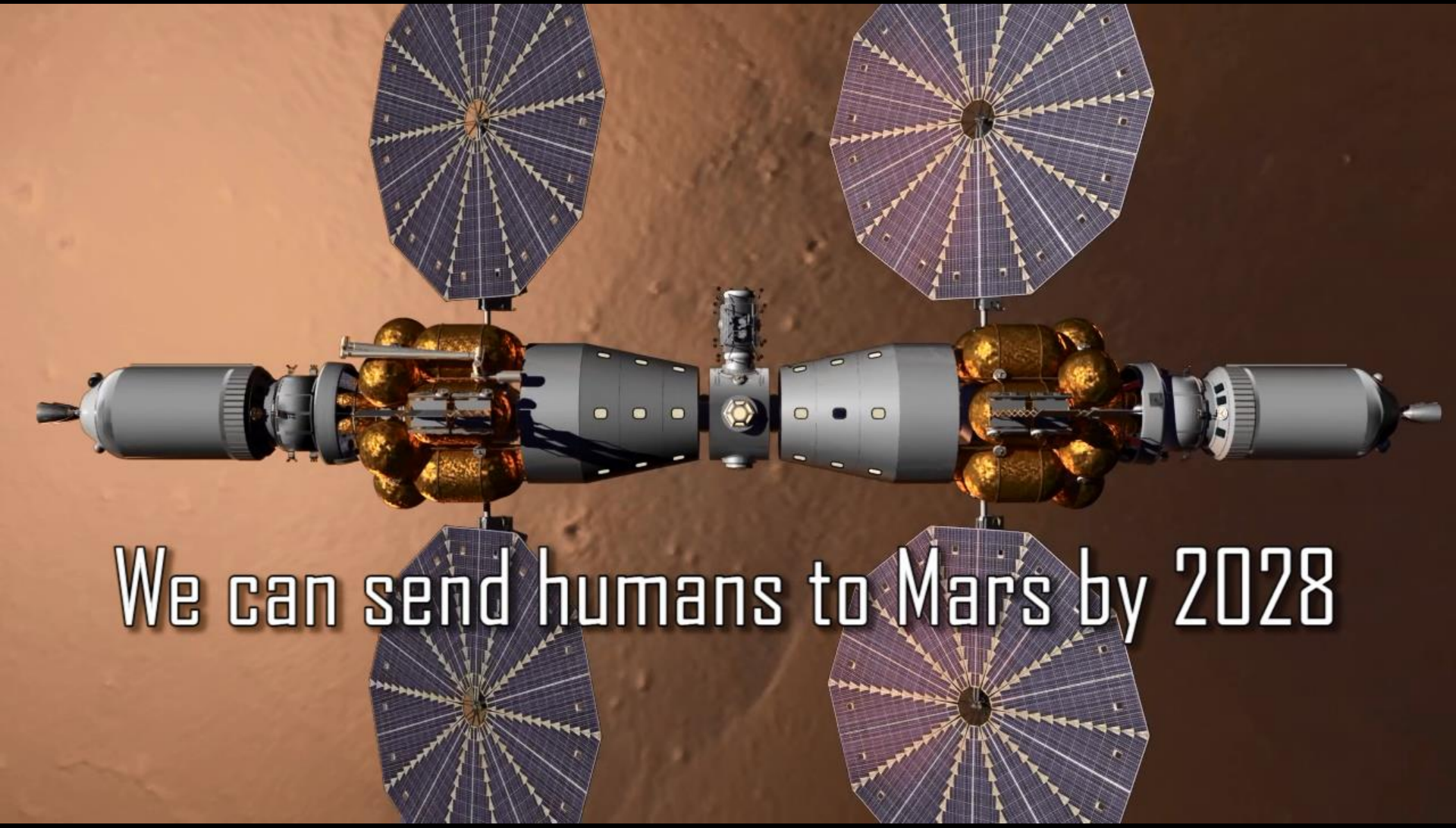




HUNDREDS OF SUPPLIERS IN 47 STATES MAKING ORION SUCCESSFUL

JOURNEY TO MARS




We can send humans to Mars by 2028

MARS BASE CAMP

PROPOSED BY LOCKHEED MARTIN

Mars Base Camp '28

The Mission

Bold and Achievable Plan
to get Humans to Mars Orbit

The Vision

Transport scientist-astronauts from Earth to the moons of Mars to answer the fundamental science questions and prepare for a human Mars landing

Our Solar System's 1st Orbital Base Camp

The Path to Mars Base Camp

2027: Pre-Departure MBC System Tests

2026: Pre-Deploy Mars Surface Assets

2025: Shakedown of Interplanetary Config

2024: Cis-Lunar Science with Lab and Prop

2023: Advanced Solar Electric Propulsion

2022: Next Mars Orbiter Comm Relay and Remote Sensing

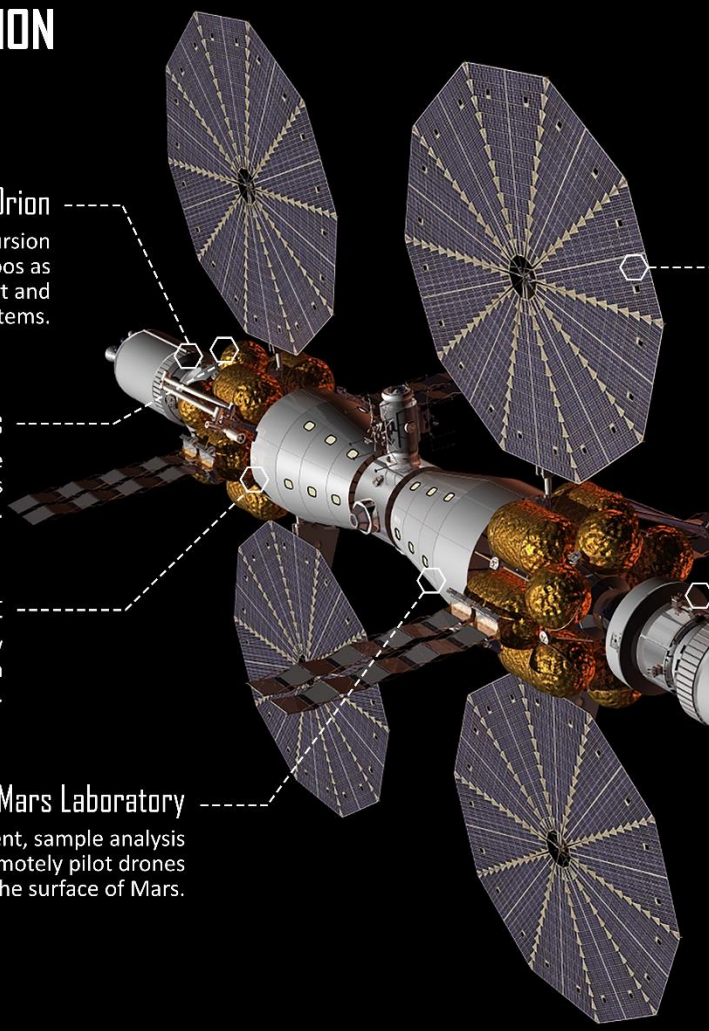
2021: Start of Cis-Lunar Outpost Assembly

2020: Mars Rover Surface Studies and Site Selection

2019: Ascent Abort System Cert

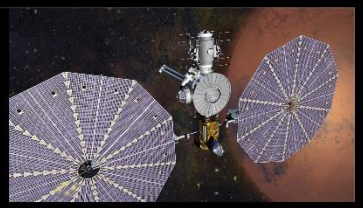
2018: SLS and Orion Deep Space Exploration Cert

MARS ORBIT CONFIGURATION



Pre-Positioned Lab

A Solar Electric Propulsion-powered lab is launched ahead of the Mars Base Camp spacecraft and docks with the full ship in Mars orbit.



Orion

One of two Orions will serve as the excursion vehicle that explores Deimos and Phobos as well as a backup for critical life support and safety systems.

Solar Arrays

Generate all the power for spacecraft operations and the Solar Electric Propulsion stages.

Liquid Oxygen/Liquid Hydrogen Tanks

These reinforced tanks hold fuel for the journey to and from Mars and serve as radiation shielding for the crew quarters.

Radiators

Keep sensitive electronics and living quarters cool.

Habitat

Along with Orion and the crew quarters, the habitat provides extra living and working space.

Orion

The command-and-control heart of the orbiting spacecraft, housing vital navigation, communications and life support for 1,000-day missions. Also keeps astronauts safe on re-entry through Earth's atmosphere.

Mars Laboratory

Houses scientific equipment, sample analysis tools and workstations to remotely pilot drones and rovers on the surface of Mars.

Cryo Stage Propulsion

Generates high-powered thrust to get the spacecraft from lunar orbit to Mars and lets astronauts conduct excursions around Deimos and Phobos.

www.lockheedmartin.com/marsbasecamp

LOCKHEED MARTIN

Mars Base Camp: Addressing the Big 3 Science Questions:

- ***Where did we come from?***
- ***Where are we going?***
- ***Are we alone?***

Human Excursions

Sample collections for orbital lab analysis and curation

Reconnaissance, direct investigation, and sample return from Deimos and Phobos

Telepresence

The Robot Partners

Rapid exploration, sampling and measurement of Mars surface regions and diverse surface sites with telepresence and sample return

images courtesy of NASA


WHY WE WORK ON ORION
#JourneyToMars

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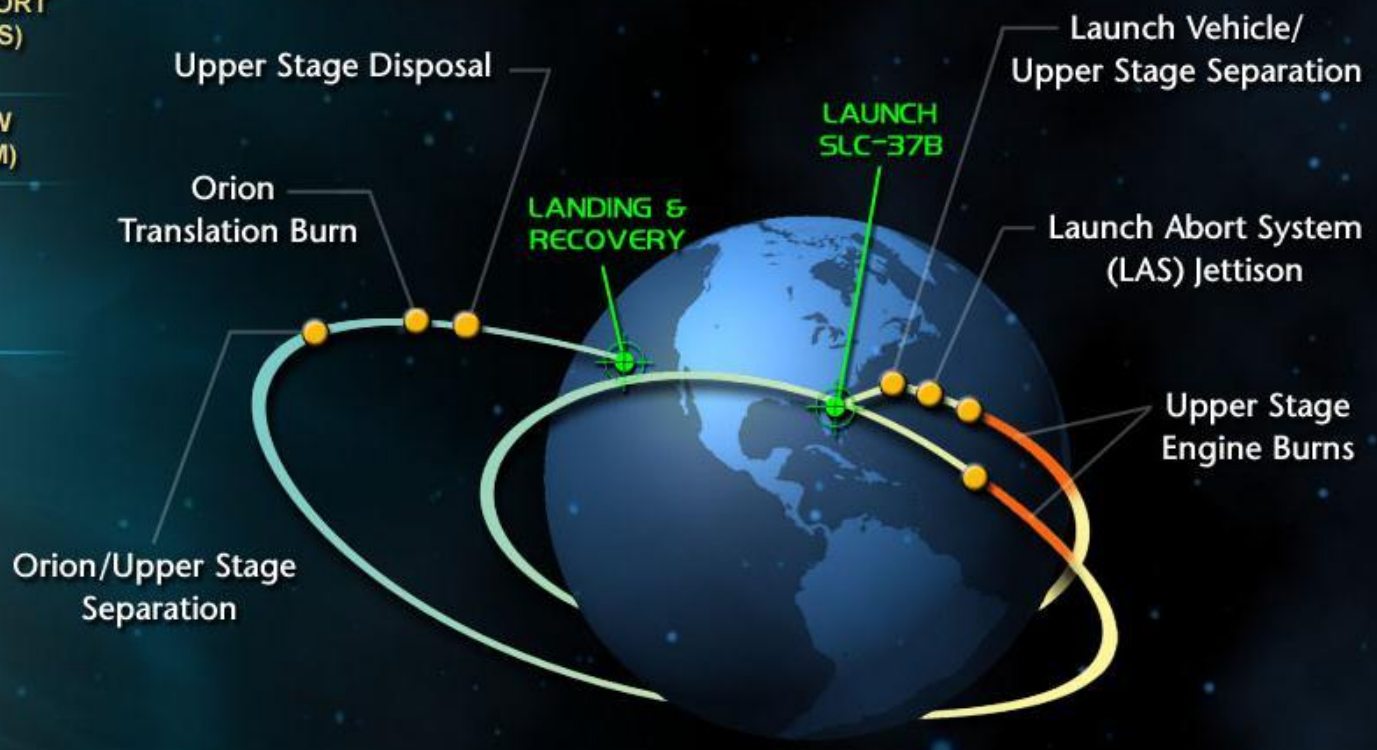
BACK UP

EXPLORATION FLIGHT TEST ONE

OVERVIEW

TWO ORBITS ◈ 20,000 MPH ENTRY ◈ 3,671 MILE APOGEE ◈ 28.6 DEGREE INCLINATION

LAUNCH CONFIGURATION



EXPLORATION FLIGHT TEST-1 (December 5th 2014)

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