



**Jet Propulsion Laboratory**  
California Institute of Technology

# “What is Up at Jet Propulsion Laboratory?”

SAE AE-8 Meetings in San Diego, 8 October 2019

Presented by Ray Billig, Cable & Connector SME, 10/08/2019

© 2019 California Institute of Technology. Government sponsorship acknowledged.

URS286680, CL#19-5959

# Presentation Agenda

---

- Current Missions
  - InSight
  - Tempest-D
  - Mars Science Laboratory “Curiosity”
- Future Missions
  - Mars 2020
  - Europa Clipper
- Discovered a Circular Connector Mating Issue

# Some Current JPL Missions

# Project InSight, a Mars Lander

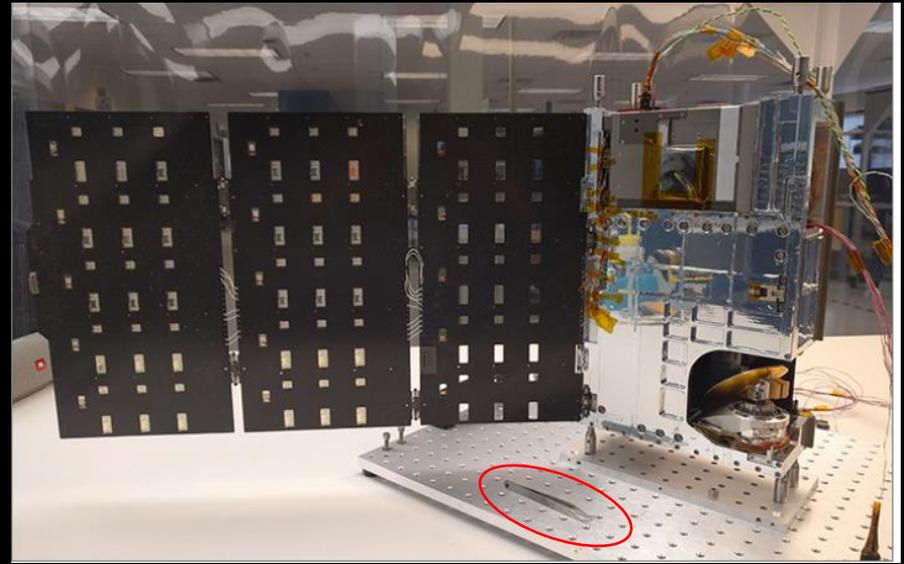
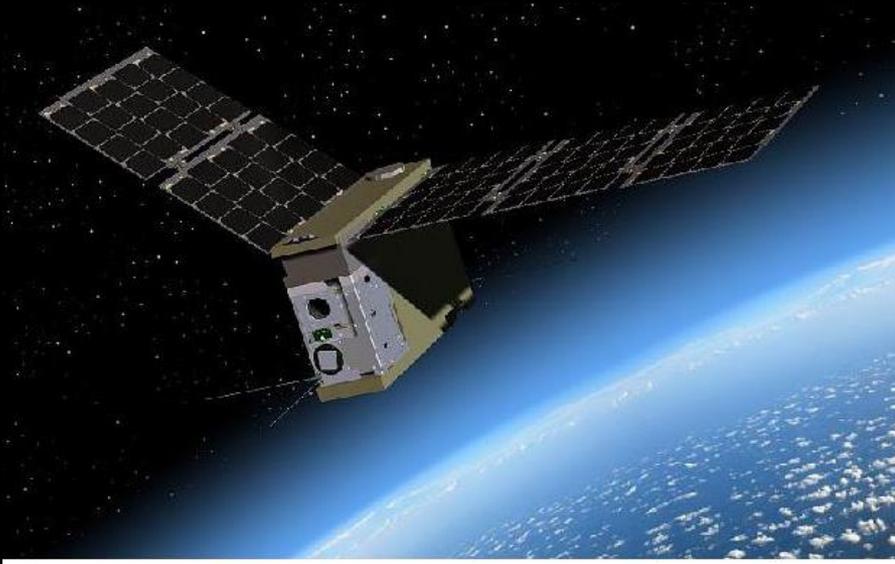
- Launched from Vandenberg AFB on 5 May 2018 on an Atlas V rocket.
- Landed on Mars 26 Nov. 2018.



- Primary mission instrument is the seismometer.
  - Seismometer checkout is complete. Now in data capture mode.
  - Needs a year's worth of seismic data taken on Mars for a data baseline.
- Secondary mission instrument is a heat probe that bores into the Mars crust.
  - Boring operation is in progress.
  - The vibrations made by the boring process will be picked up by the seismometer as part of its data collection.

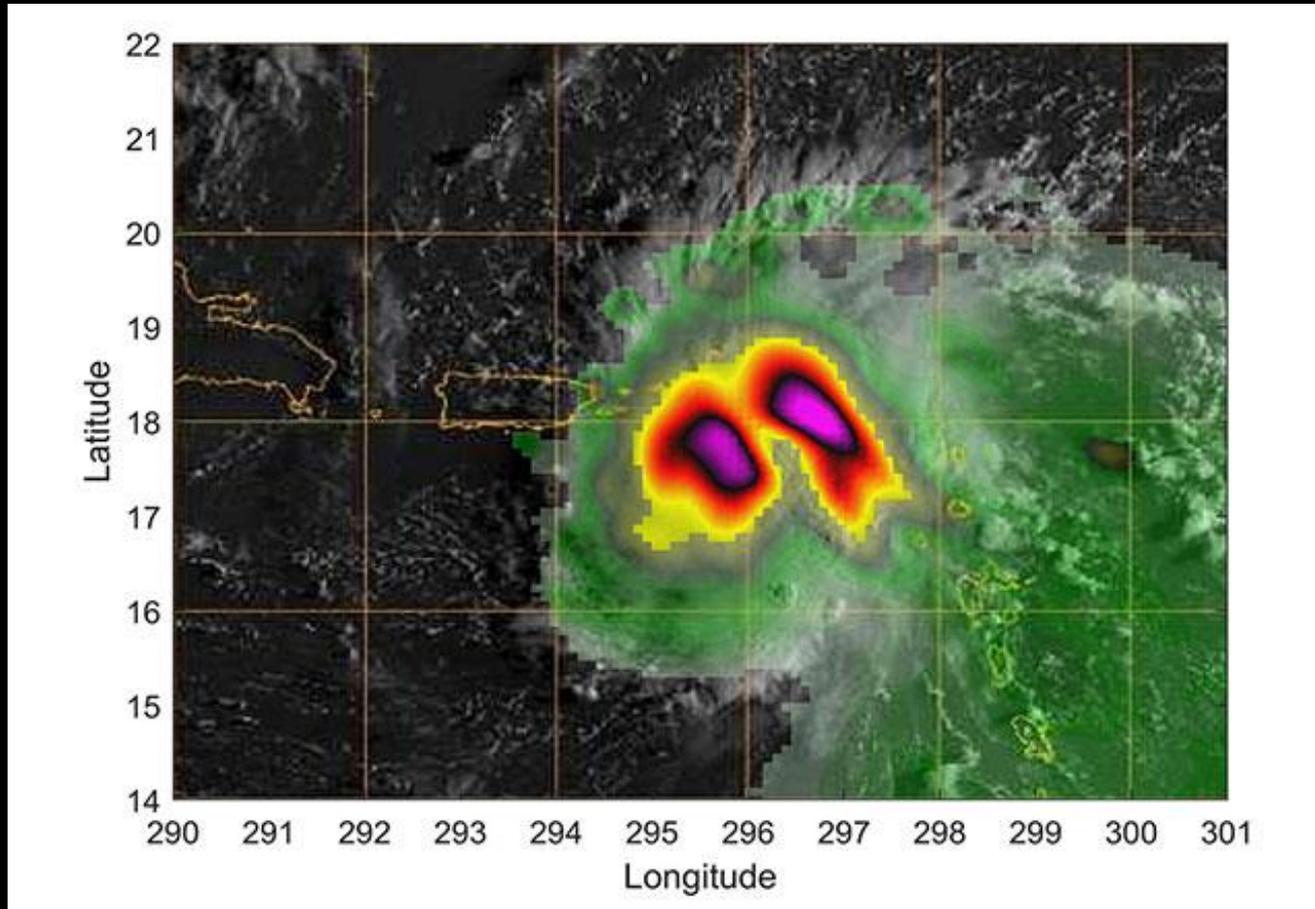
# Tempest-D, an Earth Orbiter

- Launched from Wallops Island, VA on 21 May 2018 on an Orbital Sciences rocket.
- Earth orbiting Cubesat (small, low-cost, commercial parts spacecraft)



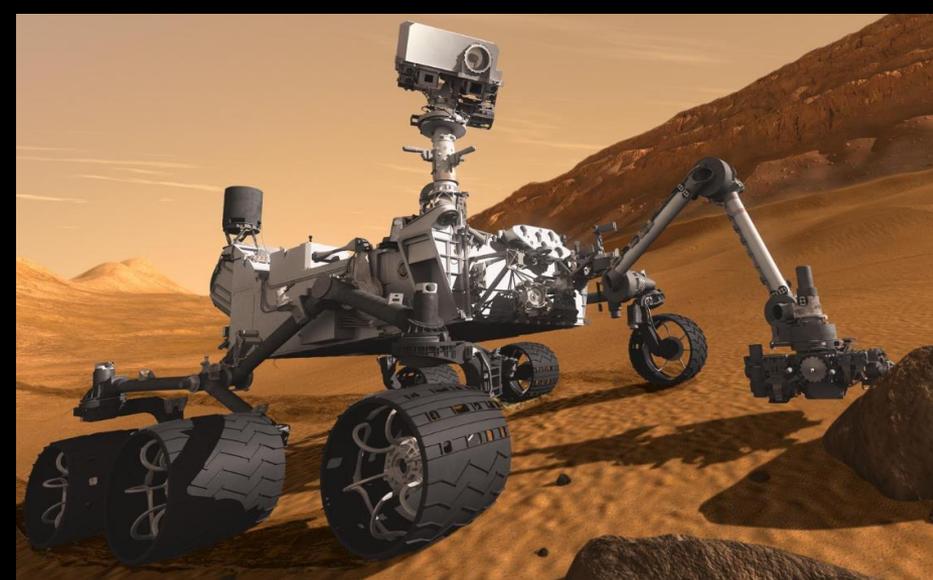
- **T**emporal **E**xperiment for Storms and Tropical **S**ystems – **D**emonstration
- A millimeter wave radar to look at weather on Earth.
- The solar panels are shown deployed in the photo.

# Tempest-D Usage for Hurricane Dorian



- Tempest-D observing Hurricane Dorian off the coast of Puerto Rico on 8/28/2019.
- 400 kilometers / 250 miles in altitude.

# Mars Science Lander “Curiosity”

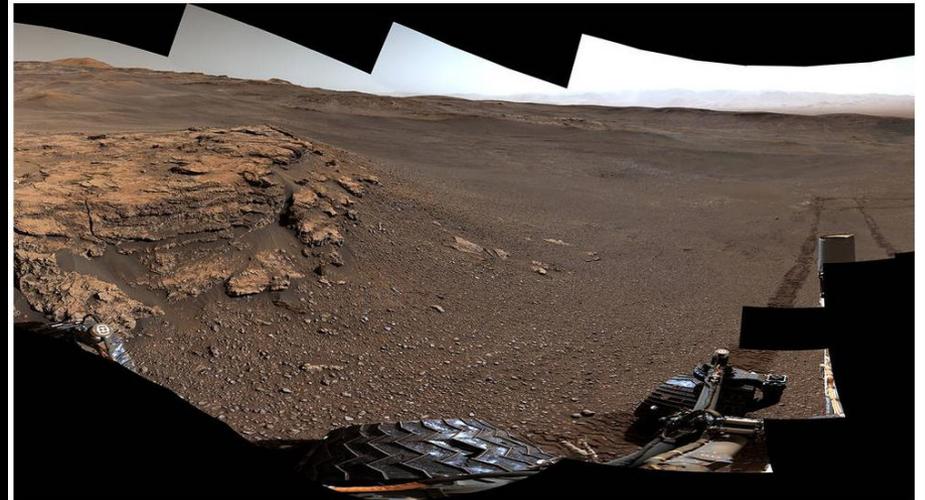


- Launched 26 Nov. 2011 at Cape Canaveral, FL.
- Landed 6 August 2012 at Gale Crater, Mars.
- (Seven earth years on Mars)

- Latest released photo from “Curiosity:”
- “Teal Ridge” captured on 18 June 2019 from the MASTCAM instrument.

Aug 5, 2019

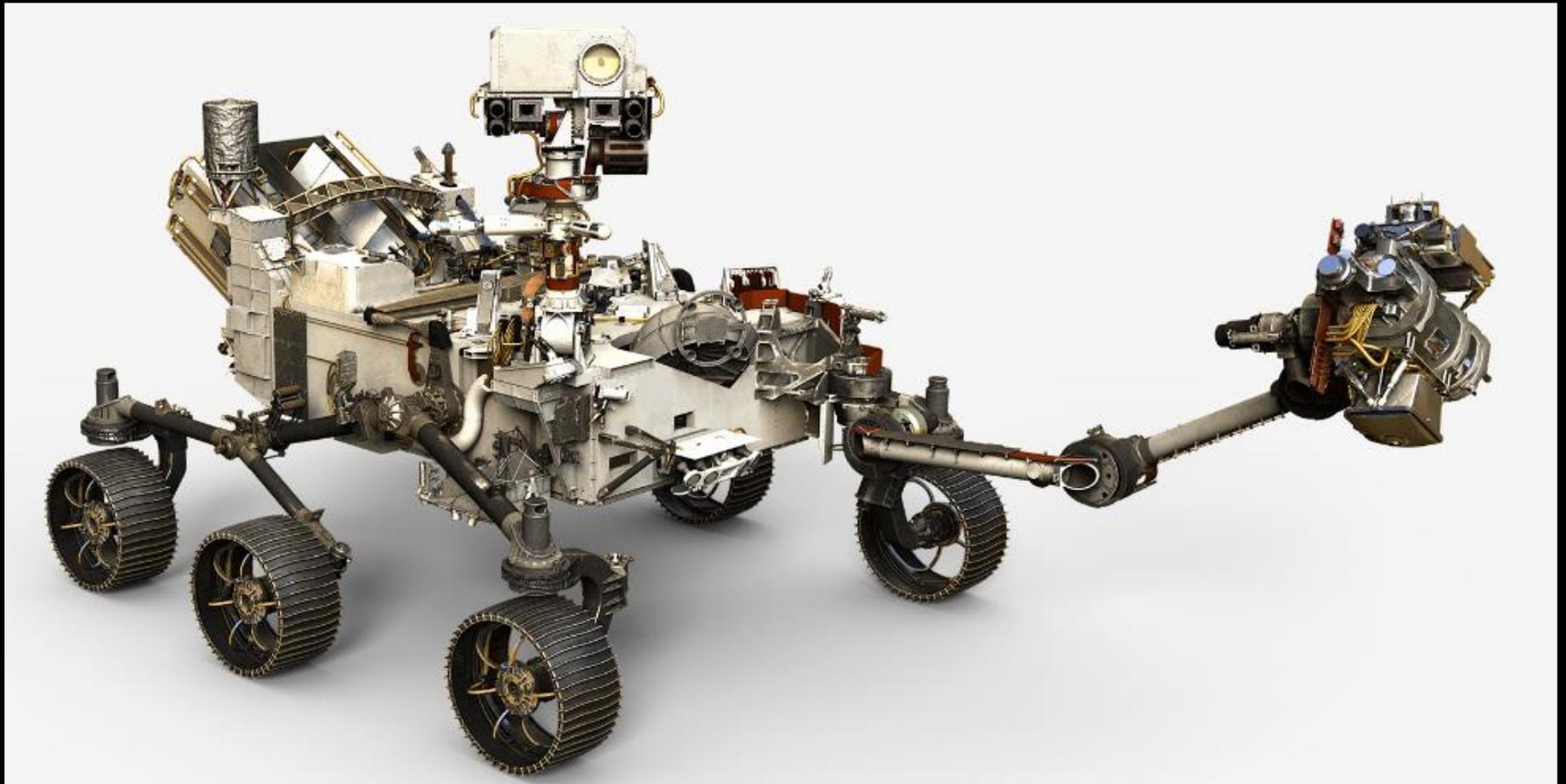
New Finds for Mars Rover, Seven Years After Landing



This panorama of a location called “Teal Ridge” was captured on Mars by the Mast Camera, or Mastcam, on NASA’s Curiosity rover on June 18, 2019, the 2 440th Martian day, or sol, of the mission.  
Credits: NASA/JPL-Caltech/MSSS

# Some Future JPL Missions

# Mars 2020 – The Next Mars Rover



# Mars 2020 – The Next Mars Rover

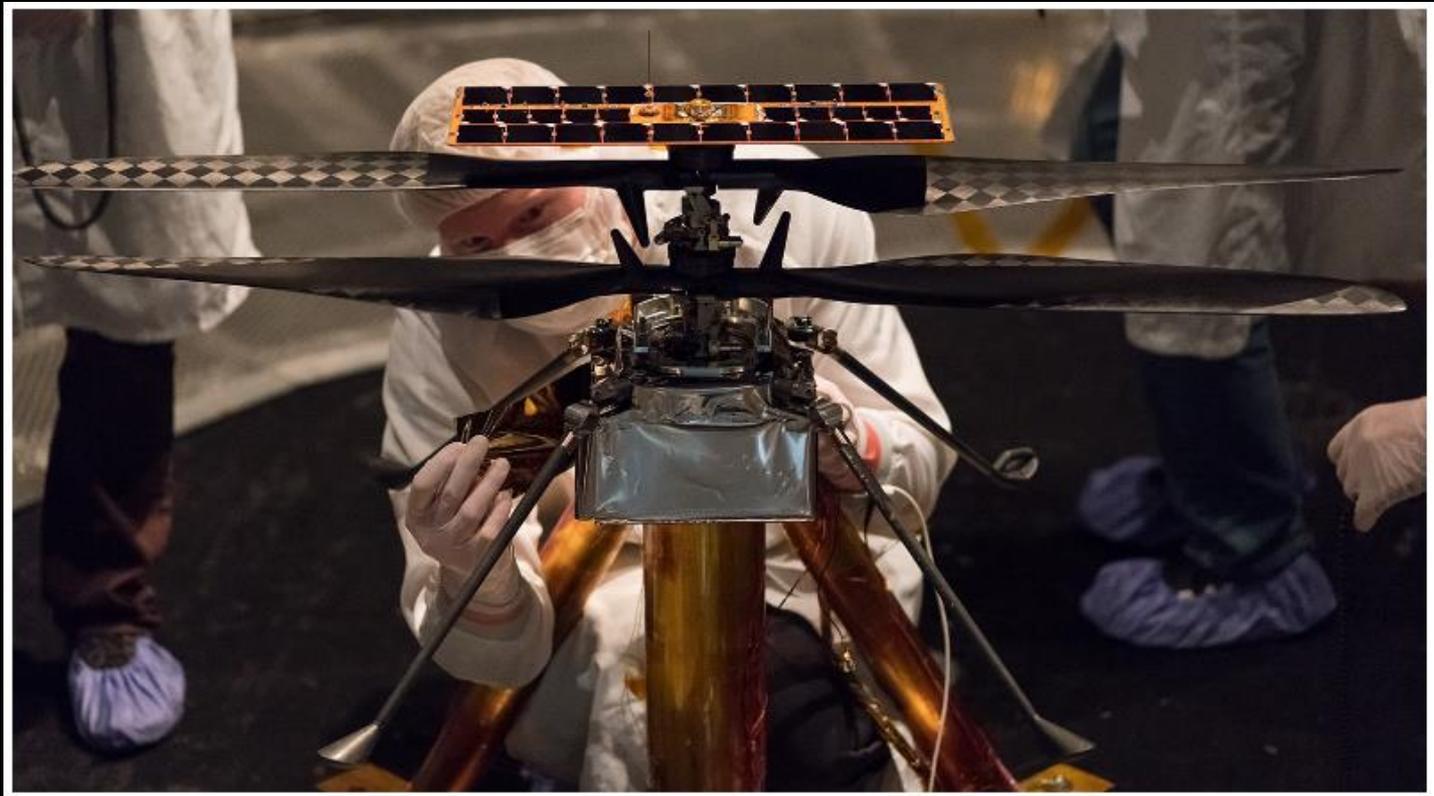
- Launch window 17 July – 5 August, 2020 from Cape Canaveral, FL.
- Lands 18 February 2021 at Jezero Crater, Mars.
- Mission Duration: At least one Mars year (~687 Earth days)
- Mars 2020 “Name the Rover” essay contest with K-12 students will name the Rover.
  - 52 finalists (one from each state or territory). Downselect to 3 finalists.
- Seven new instruments on the Rover, plus a helicopter as a demonstration unit.
- Primary Science: Gather rock & soil samples that could be returned to Earth by a future NASA mission.
- Project is on schedule! Updates on JPL’s YouTube channel.



**Mars Helicopter Installed on Mars 2020 Rover:** Engineers attached NASA's Mars Helicopter to the belly of the Mars 2020 rover on Aug. 27, 2019, at the Jet Propulsion Laboratory in Pasadena, California. Image Credit: NASA/JPL-Caltech. [Full image and caption >](#)

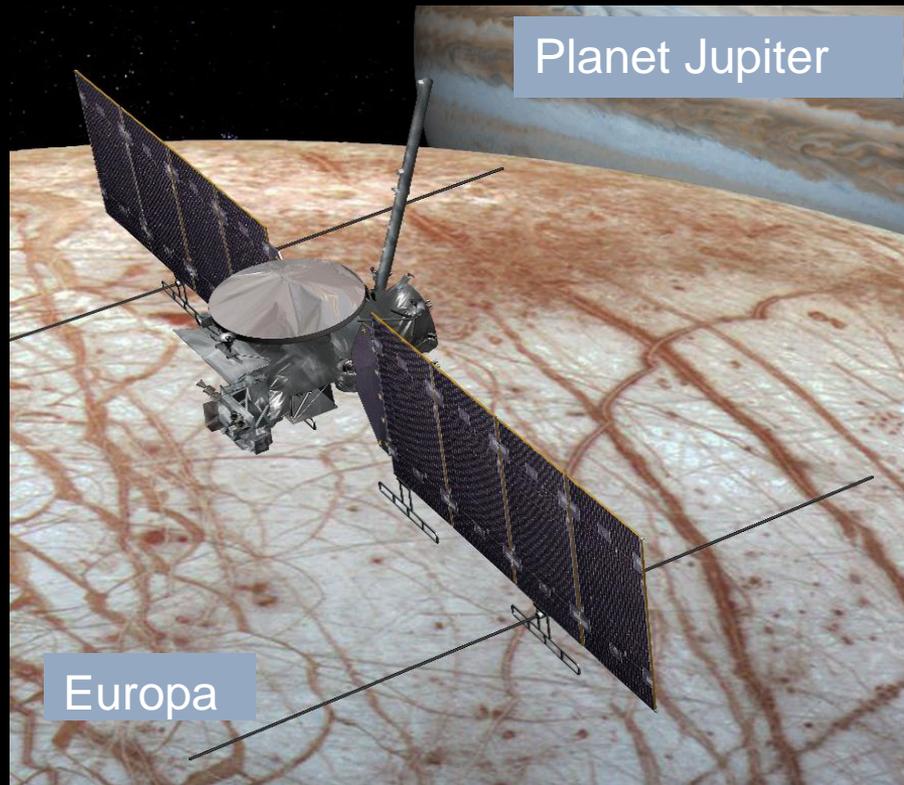
# Mars 2020 – The Next Mars Rover

- Helicopter is a high-risk, high-reward mission on the bottom of the rover.
- No science instruments on the helicopter.
- Demonstration only – Learn best usage for future missions.



# Europa Clipper Project – Orbits Jupiter

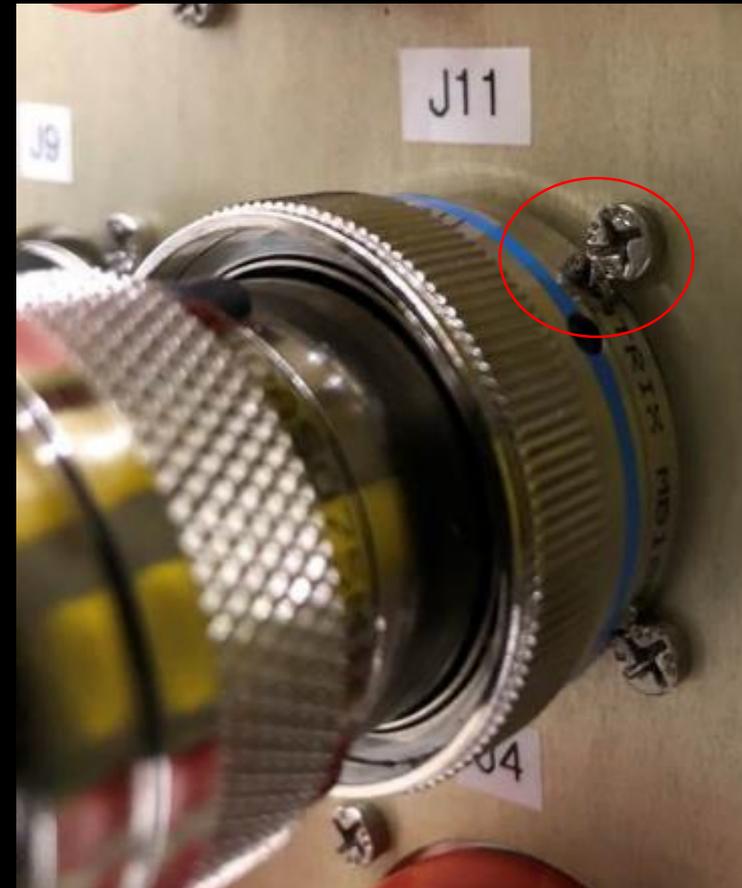
- NASA's Europa Clipper to conduct detailed study of Jupiter's moon Europa and investigate whether the icy moon could harbor conditions suitable for life.
- Radiation-tolerant spacecraft in a long, looping orbit around Jupiter to perform repeated close flybys of the icy moon Europa.
- Nine science instruments.
- Launch date mid-2020s.



# Discovered a Circular Connector Mating Issue

# Coupling Ring O.D. Different Between MIL Mfgs.

- Connectors per MIL-DTL-26482, Series II.
- Receptacle connector was rear-panel mounted.
- Receptacle connector on a flight box.
- Flight cable plug (Amph-Matrix) coupling ring interferes with receptacle mounting hardware.
- Test cable plug (Corsair) mates without interference.



# Coupling Ring O.D. Different Between MIL Mfgs.

Corsair version reduces to a smaller diameter at the mating interface which allows it to clear the screw heads



MB18R-1626S-880  
Matrix

MS3475L-16-26S  
Corsair

**(Fits)**

Smaller outer diameter with the same interior mating interface results in the visibly thinner wall on the bayonet channels.



MB18R-1626S-880  
Matrix

MS3475L-16-26S  
Corsair

**(Fits)**

# Coupling Ring O.D. Different Between MIL Mfgs.

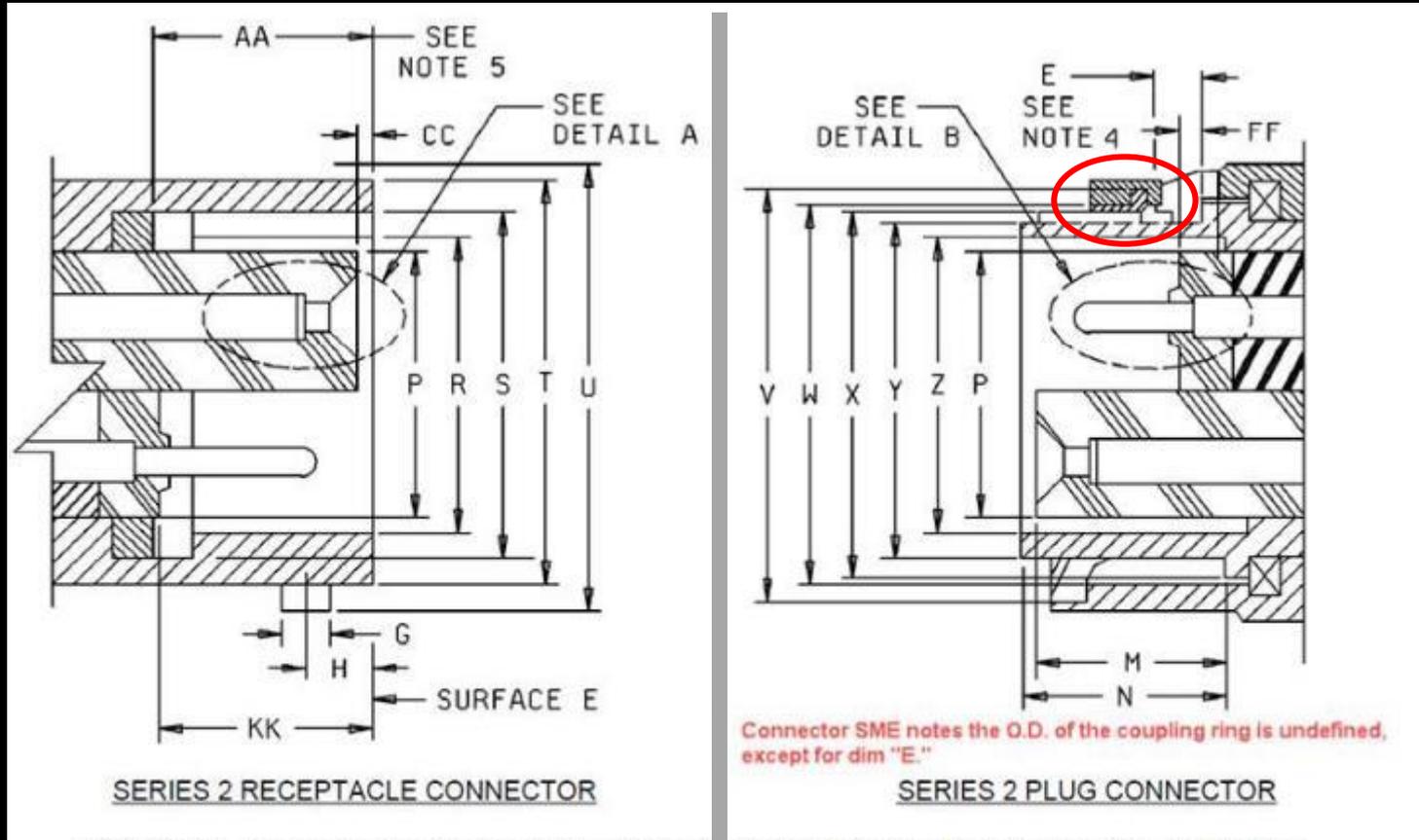


FIGURE 5. Connector intermateability control dimensions (series 1 and series 2) - Continued.

(MIL-DTL-26482H)

Plug Coupling Ring O.D. is not controlled in the specification.



**Jet Propulsion Laboratory**  
California Institute of Technology

---

[jpl.nasa.gov](http://jpl.nasa.gov)