

The image features the NASA logo, consisting of the word "NASA" in a bold, sans-serif font. A red diagonal streak, resembling a comet or a satellite trail, cuts across the logo from the bottom left to the top right. A white orbital path with an arrow at its end loops around the globe in the background. The background is a deep blue with a faint map of the Earth, white stars, and a circular grid of lines. The word "NASA" is centered horizontally and vertically, with the red streak and orbital path intersecting it.

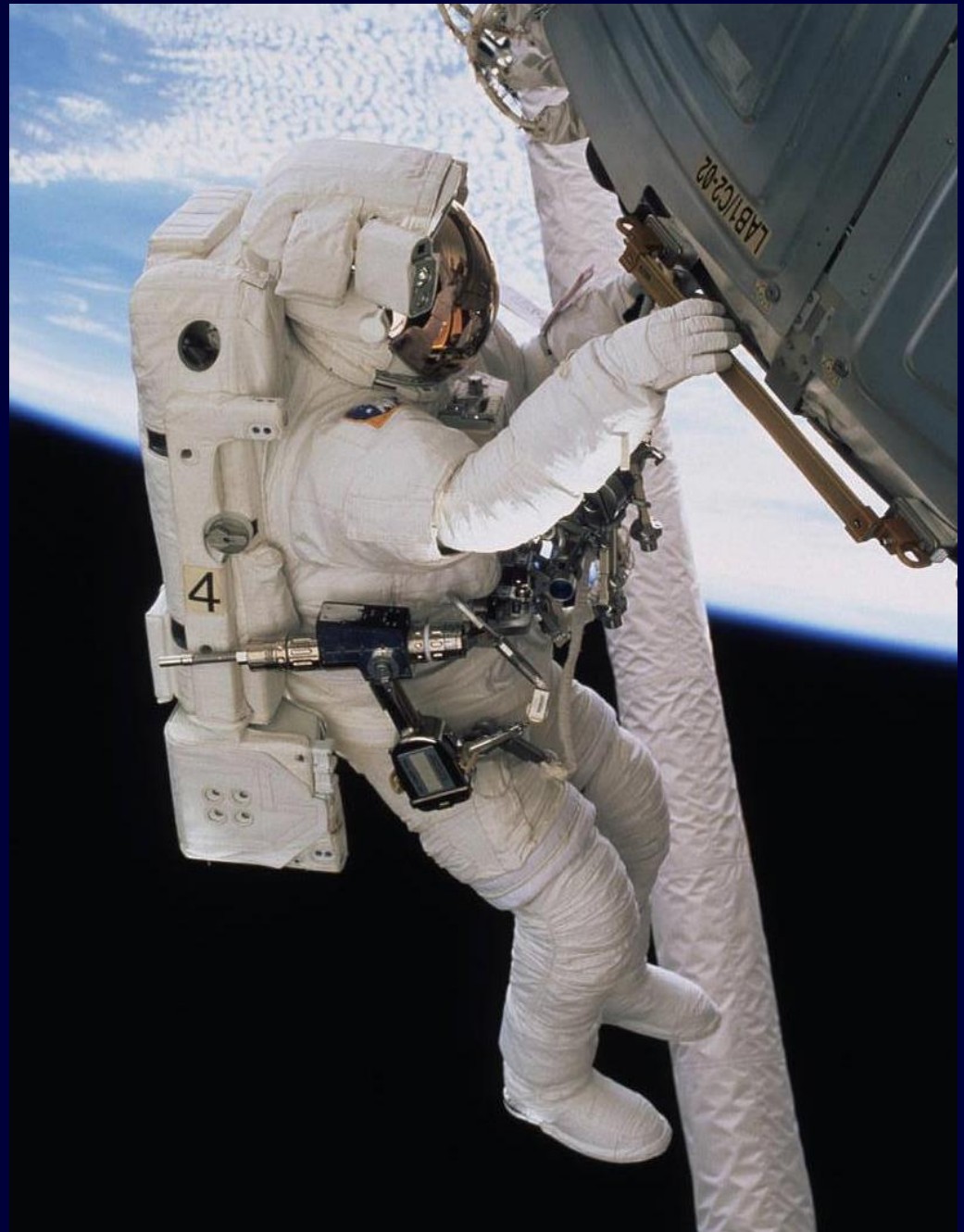
NASA

National Aeronautics and Space Administration

Spacesuit Evolution & EVA Overview

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EVA Office





Why do we Need a Space Suit

- To keep you alive in Space !
- To let you do your job like building a space station
- Lets you get close to the action!
- Lets you do what we call

EVAs !!!

WHAT KEEPS YOU ALIVE ON EARTH MUST BE PROVIDED IN A SPACESUIT!



Earth	Spacesuit
Air to Breathe Photosynthesis	Oxygen in a bottle
Air Pressure	Pressure Garment “bladder”
Sun and atmosphere to keep us warm	Insulation and cooling systems “Air conditioning”
Clothes / shoes to protect your skin / feet	Micrometeoroid Garment
Food / Water	Drink Bag
Gravity / Balance	Foot Restraints / Tethers
Hygiene “toilets”	Diapers “MAGs”

The History & Evolution of Spacesuits and Spacewalks

(Flight Programs Support)



Mercury



Gemini G5C



Gemini G4C



Apollo A7L



Apollo A7LB



Skylab



Space Shuttle & ISS

Space Suits Developed By NASA-JSC

(1961 - Present)



EIS-A



EIS-B



RX-Series
(7 Models)



AES-A



AES-B



ZPS MK. I



MK. III

(Advanced Technology Support thru 1990)



View of Wiley Post
wearing early pressure suit

NASA Photo S81-37202



Mercury
astronaut L.
Gordon Cooper
Jr., in Mercury
spacesuit

NASA photo
S63-01755
(May 1963)



Mercury full pressure suit
NASA Photo S63-11362



The Gemini spacesuit, AMU backpack, and the Extravehicular Life Support System comprises the AMU.

A full-body photograph of an astronaut in a white Gemini spacesuit. The astronaut is wearing a large, white, rectangular backpack (AMU) with various instruments and a red light on top. The astronaut is holding a small, cylindrical object in their right hand. The background is a solid light blue.

NASA photo S66-33167 (May 1966)



Gemini extravehicular suit assembly

A full-body photograph of an astronaut in a white Gemini extravehicular suit assembly. The astronaut is wearing a white helmet with a clear visor. The suit is white with various straps and equipment. The astronaut is holding a coiled yellow hose in their left hand. The background is a solid light grey.

NASA photo S65-27424

Front view of the Apollo
Lunar Surface EVA spacesuit
with Portable Life Support
System (PLSS) backpack

NASA Photo S69-19206



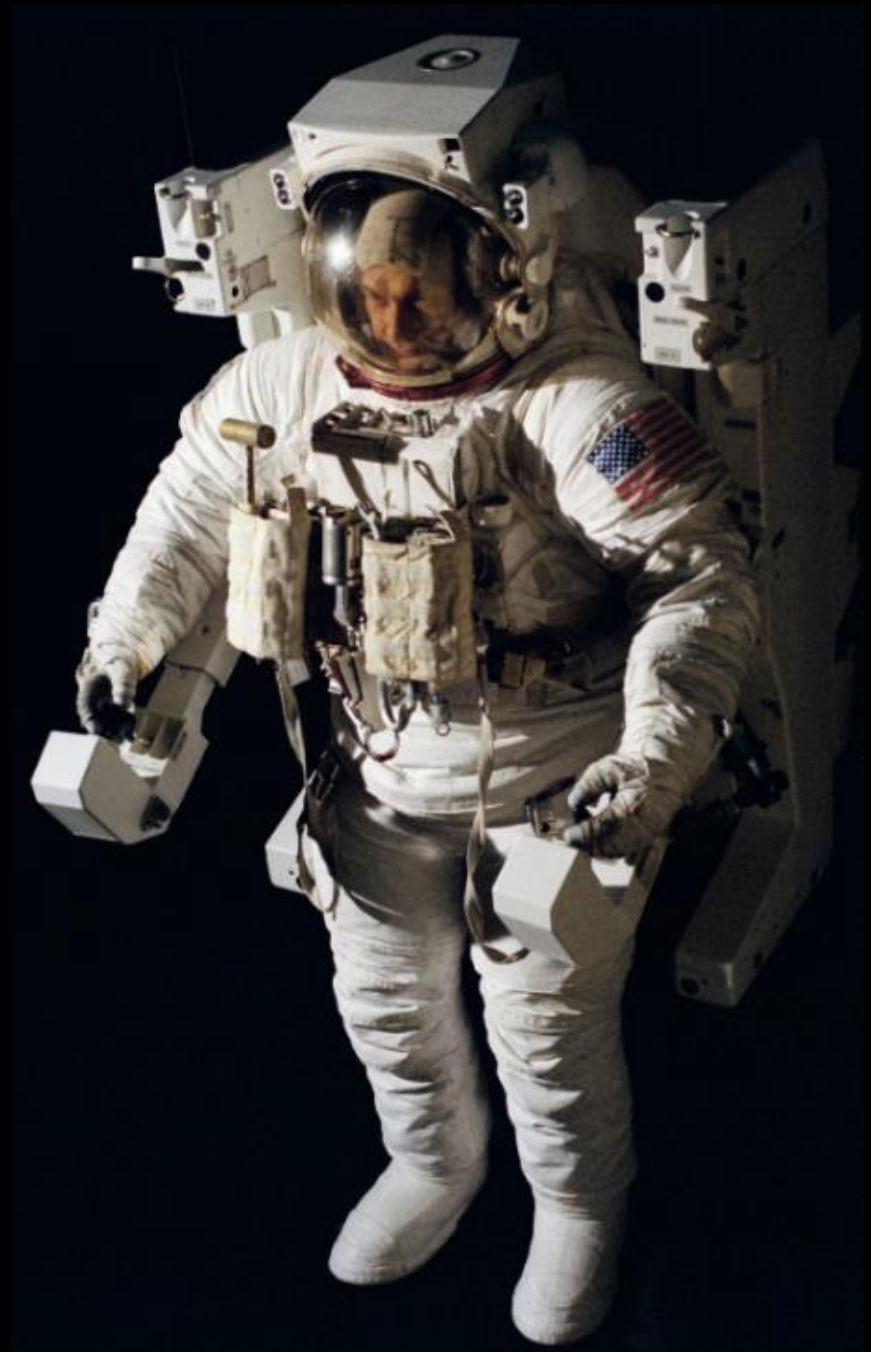


Astronaut Jack R. Lousma,
Skylab 3 pilot, practices
procedures for extravehicular
activity (EVA) in his
Extravehicular Mobility Unit
(EMU) spacesuit during Skylab
3 prelaunch training at
Johnson Space Center.

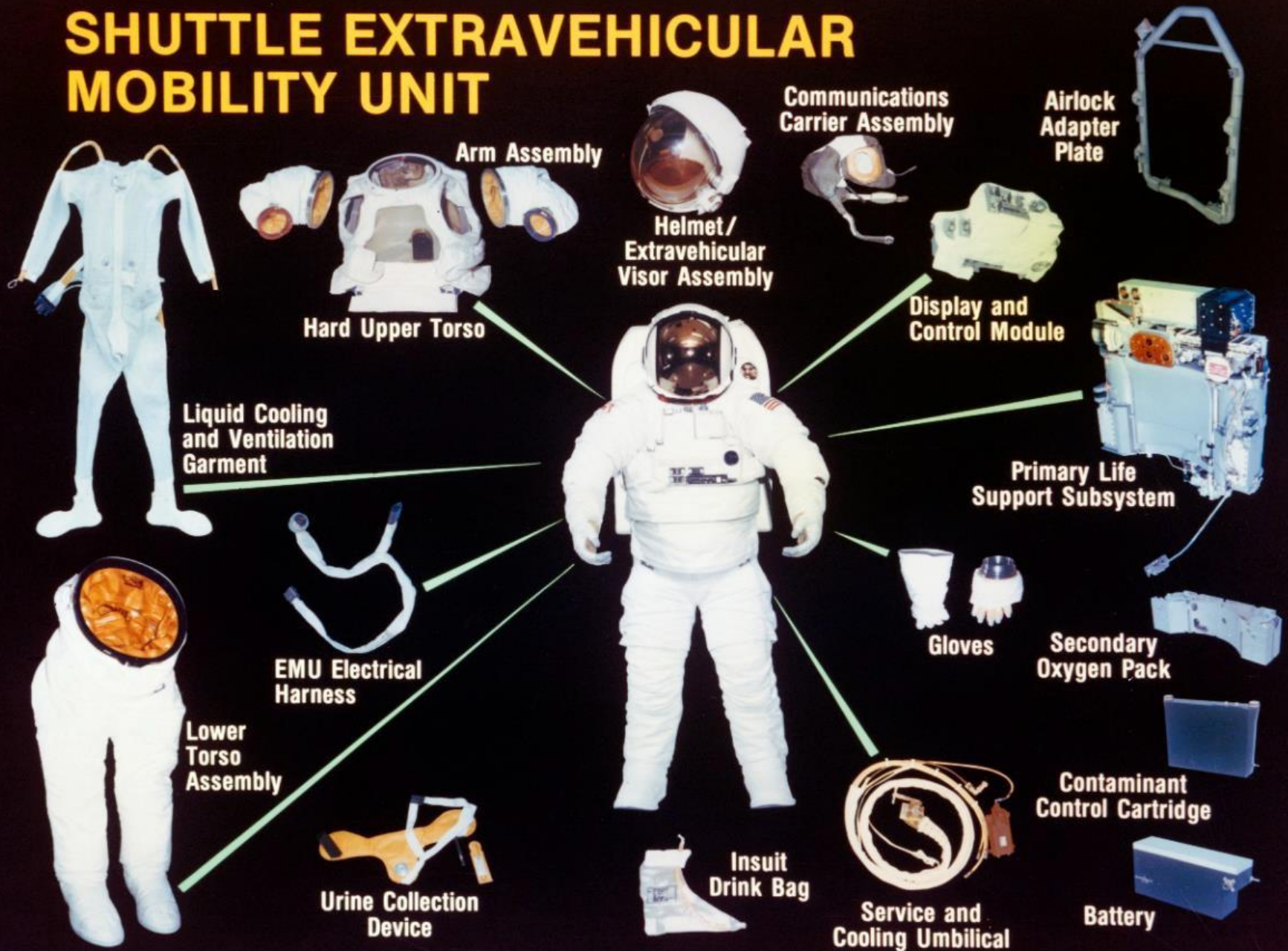
S73-31323 (30 June 1973)

Astronaut Bruce McCandless II in
NASA's Extravehicular Mobility
Unit (EMU) and Manned
Maneuvering unit (MMU) at the
Johnson Space Center (1982)

NASA photo S82-27596



SHUTTLE EXTRAVEHICULAR MOBILITY UNIT

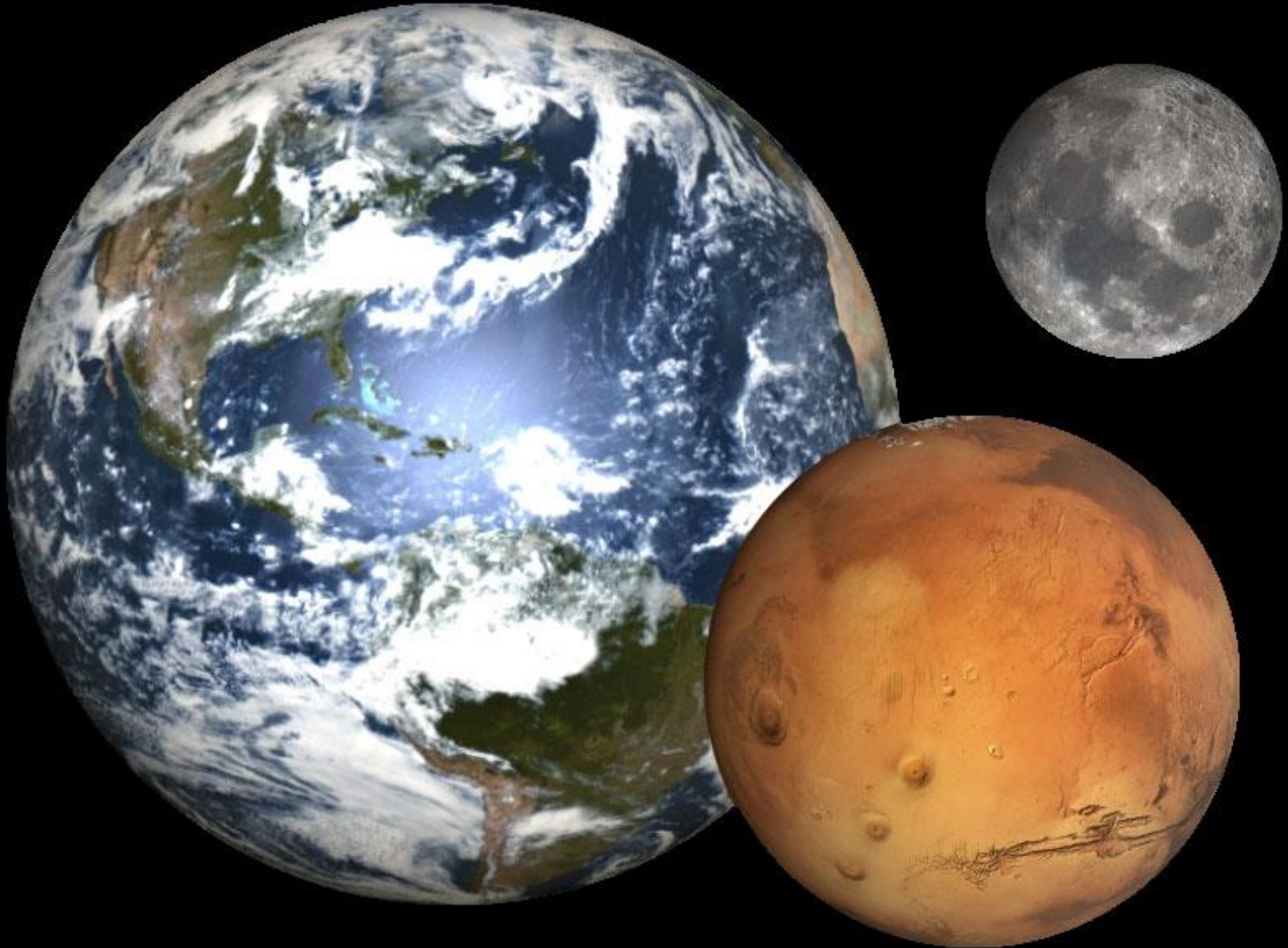


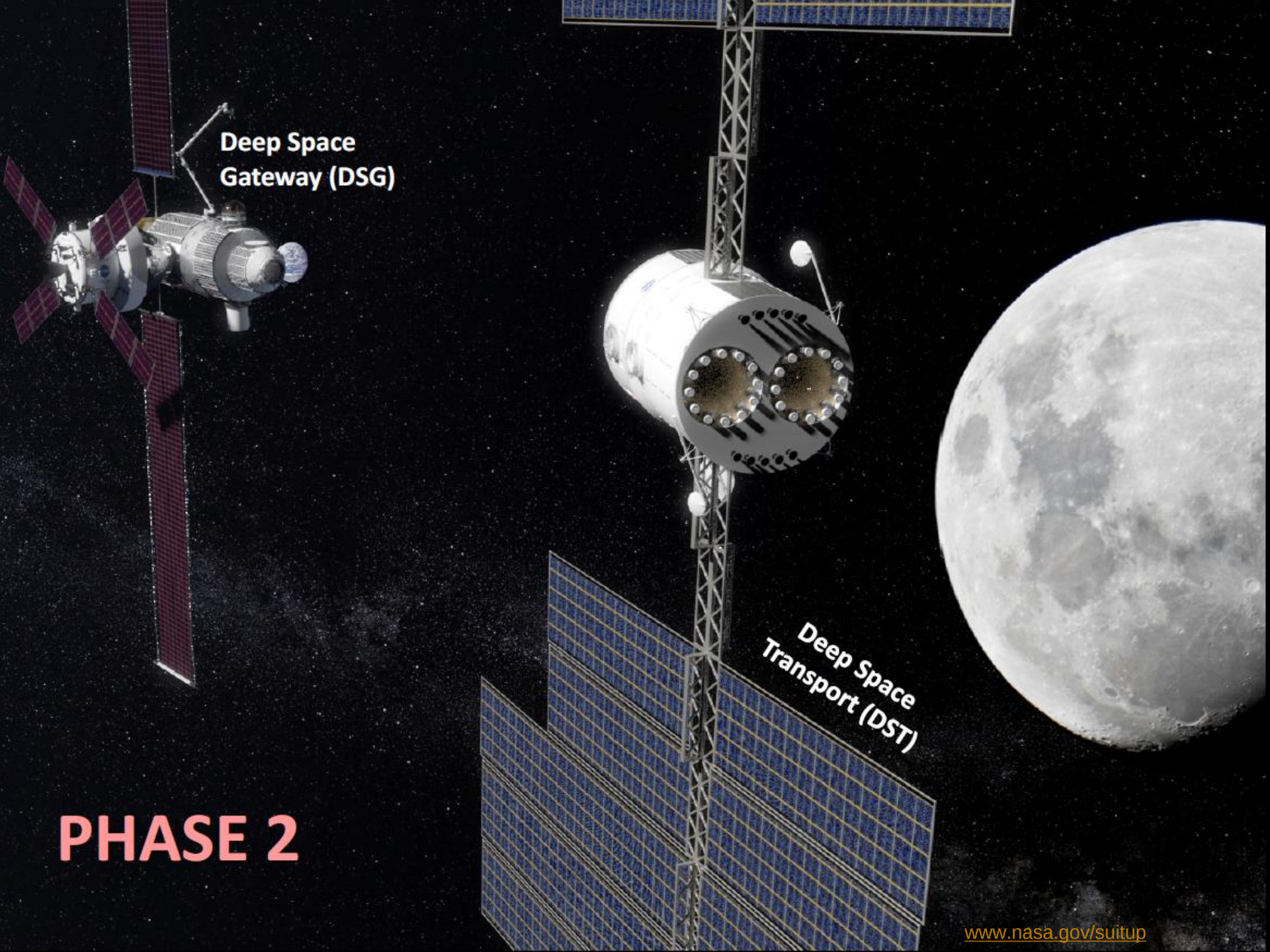


Astronaut John L. Phillips
Expedition 11 NASA ISS
science officer, prepares
for an Extravehicular
Mobility Unit (EMU)
spacesuit fit check at the
Johnson Space Center
(JSC).

NASA Photo
jsc2004e48741

Human Space Exploration



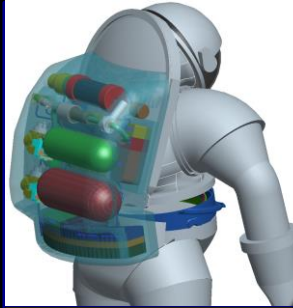


Deep Space
Gateway (DSG)

Deep Space
Transport (DST)

PHASE 2

Suit Development Using the Scientific Method



Concept
Development



Component Testing



System
Testing



Integrated
Testing

Concept: Imagine the answer.

Build: Try to build what you imagine!

Test: See if it works???

Does it work? Yes: Great !

No: Learn and try again !!!!

xEMU ISS Demo vs xEMU



xEMU ISS Demonstration

xEMU Demo	Feature	xEMU
4.3 psi	Operating Pressure	8.2 psi
LEO Microgravity	Design Environment	Deep Space Microgravity Surface
Upper Torso + Min. Lower Torso	Mobility	Upper Torso + Full Lower Torso
Scarred for future upgrade	Crew Autonomy	Graphical Display

xEMU Deep Space EVA For Gateway and Mars Transit





ISS EMU
NASA Photo
jsc2004e48741



Z-2 prototype spacesuit
NASA photo JSC2014-E-
035315 (14 April 2014)



Prototype spacesuit at
Remote Field
Demonstration Test Site
JSC2004-E-39665 (19
August 2004)

Questions?

