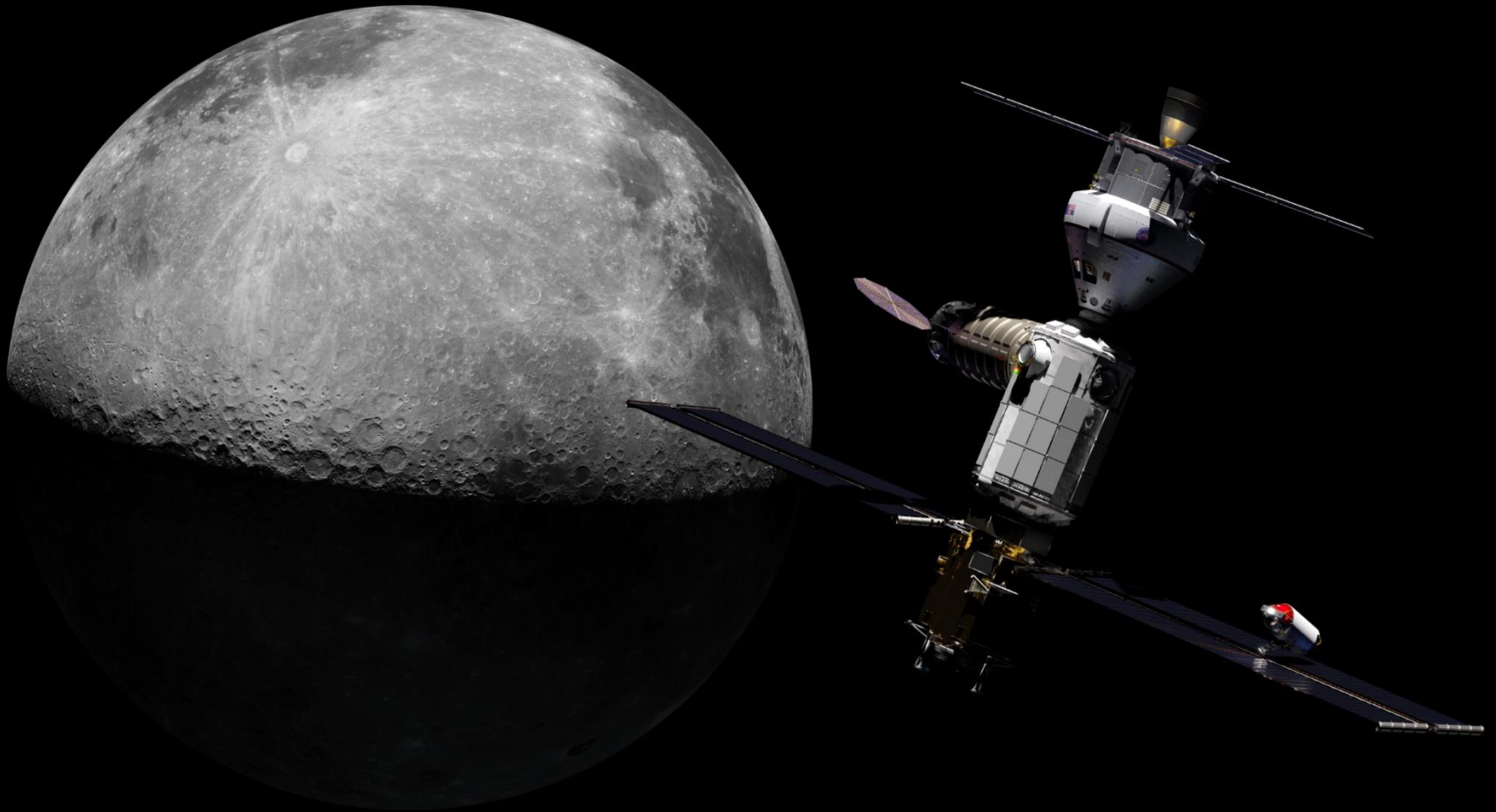


D I F F E R E N T F O R A R E A S O N

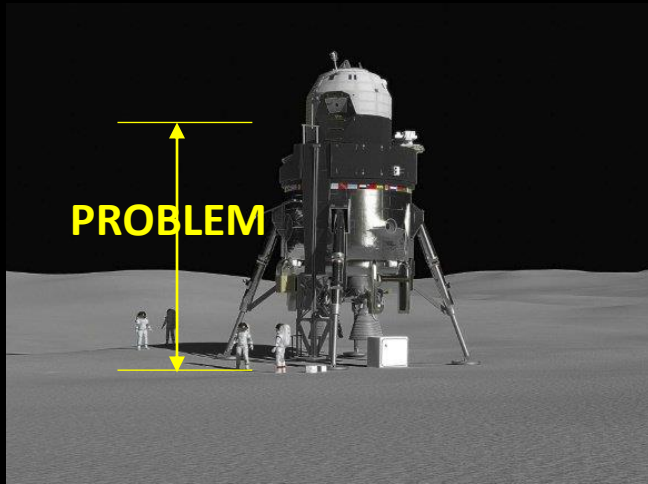


8-22-2020

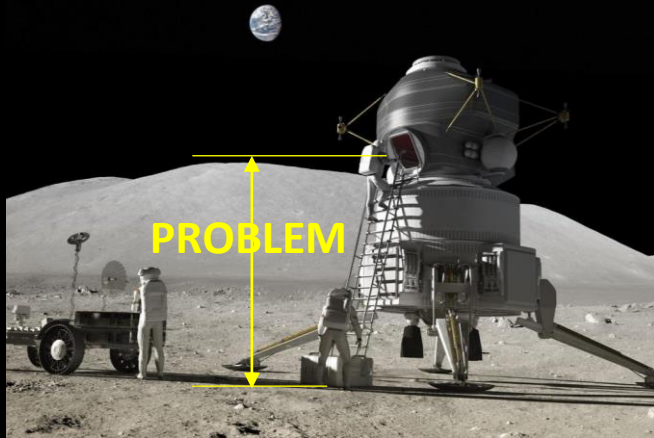
BRAND GRIFFIN

AIAA LA/LV SPACE ARCHITECTURE

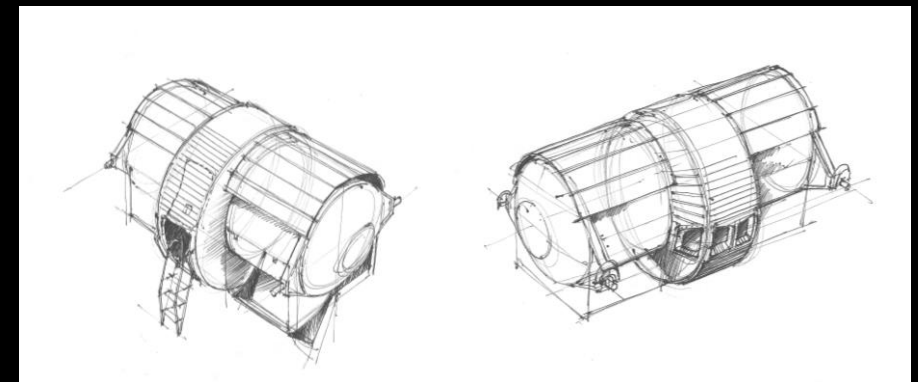
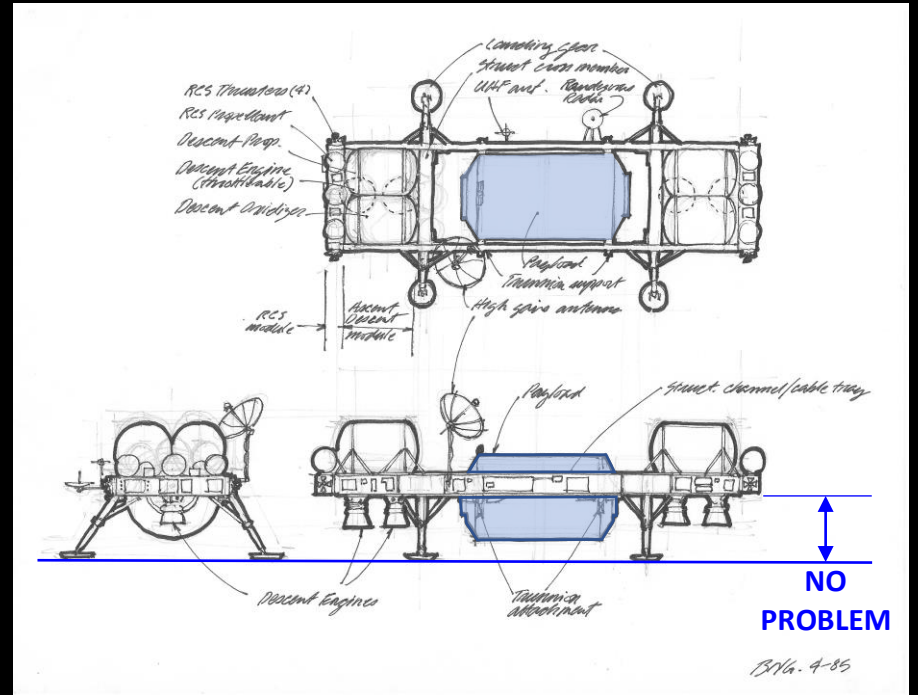
LUNAR LANDERS



Lockheed/Martin



Boeing

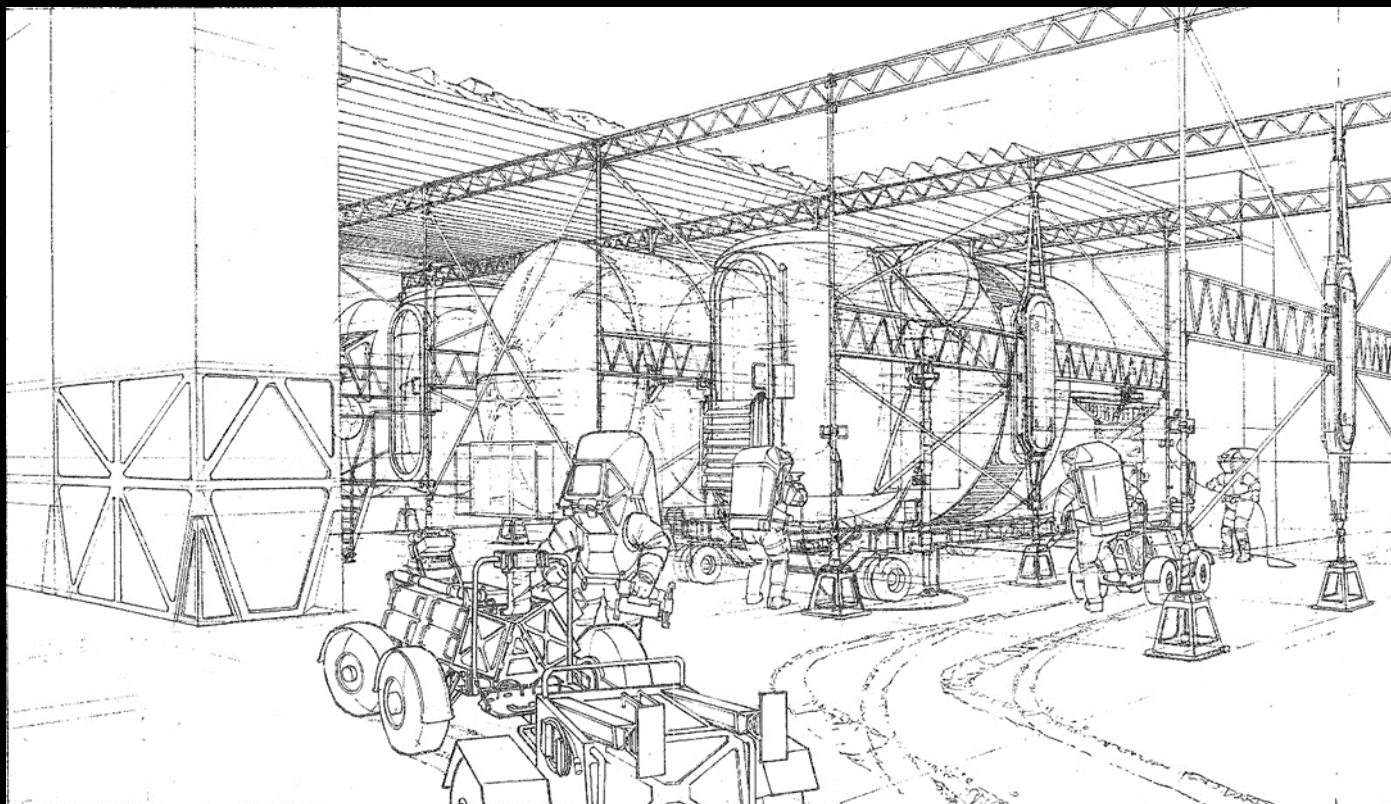
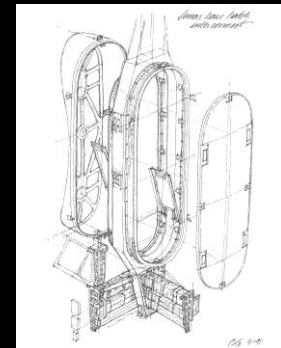
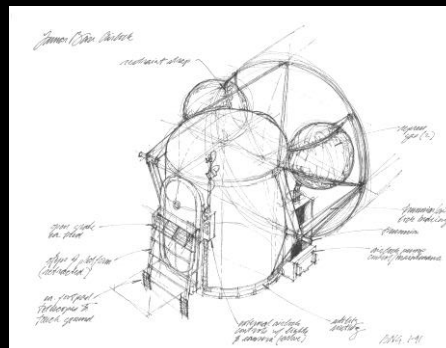
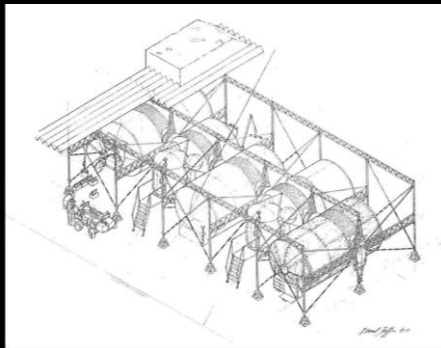


LUNAR LANDERS



Painting: Paul Hudson

LUNAR OUTPOST



Drawing: Paul Hudson

Two Missions, Two Environments = Two Solutions

Suits (Planetary)



Lunar Surface



Mars Surface

SPS (Weightless)

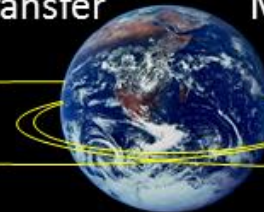


Lunar Transfer

Mars Transfer



Lunar Orbit



Earth Orbit



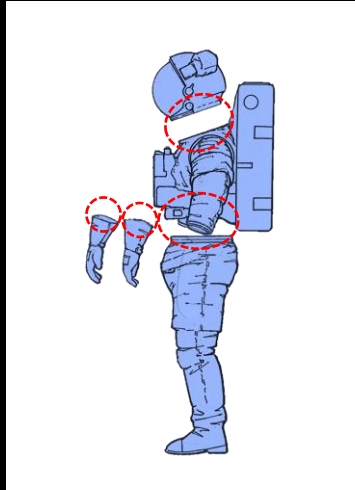
Mars Orbit

EVA



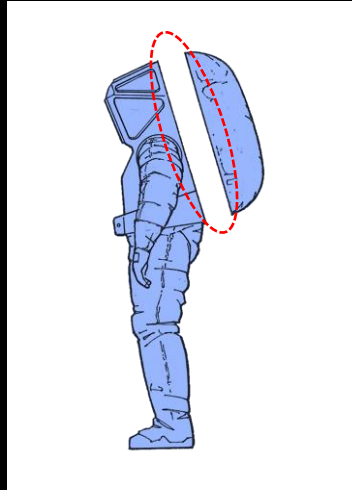
Lunar Dust Contamination

Current EMU



5 Suit connections

CCPS



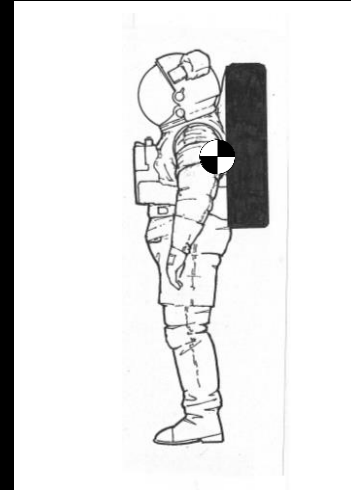
1 Suit connection



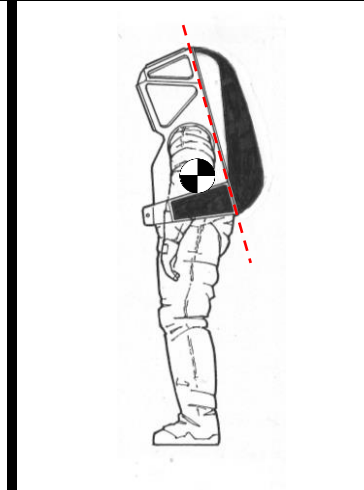
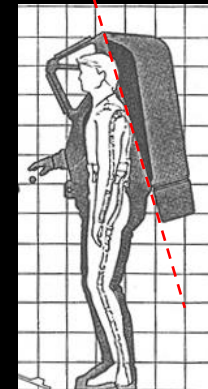
CCPS and ISS Space Suit

Center of Gravity

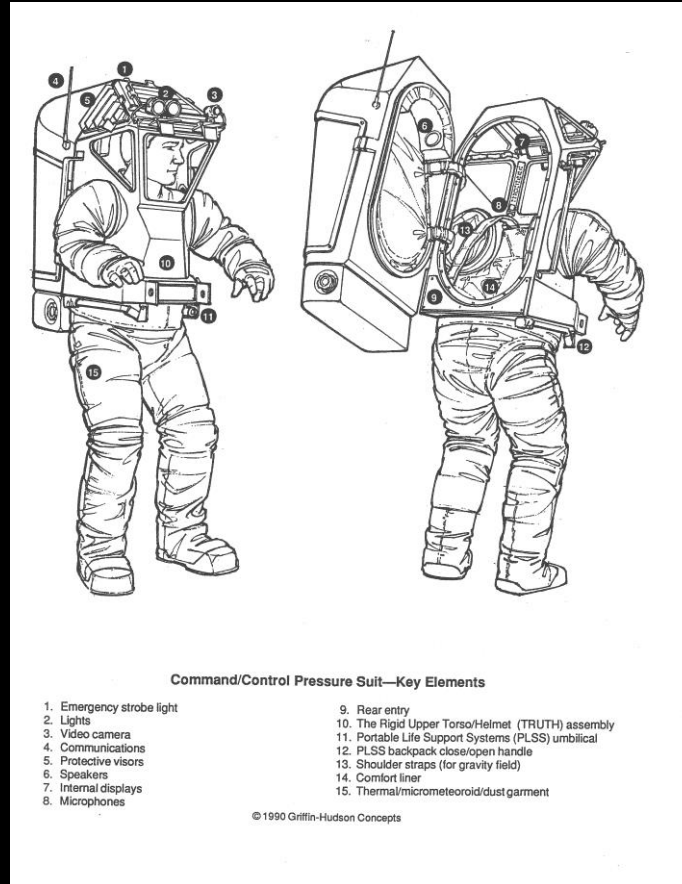
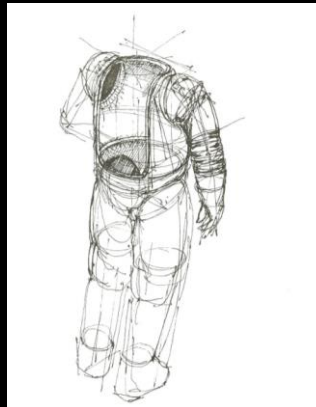
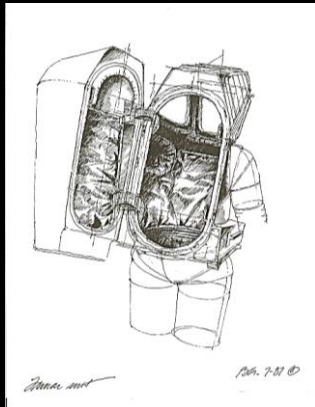
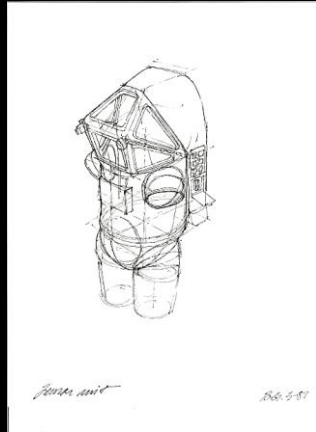
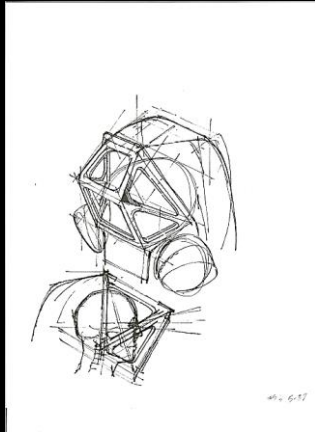
Current EMU

Aft
(backpack)

CCPS

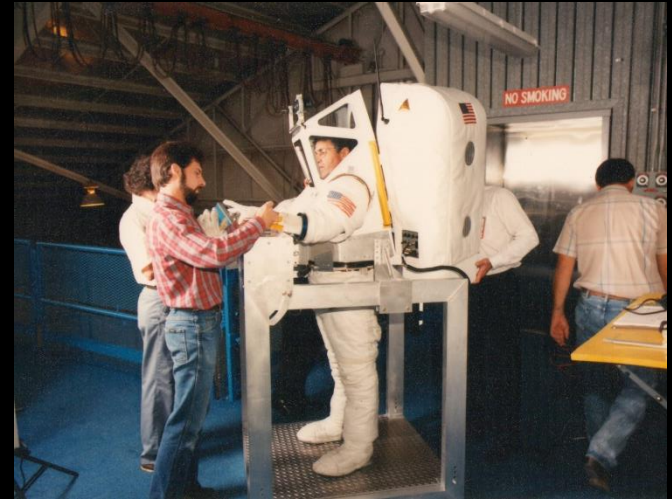
More forward (PLSS side packaging +
head in backpack cavity)

Cavity in Back pack for head





NASA's KC 135 (Vomit Comet)



Lunar gravity testing

Apollo 17 Astronaut Harrison Schmitt

E V A



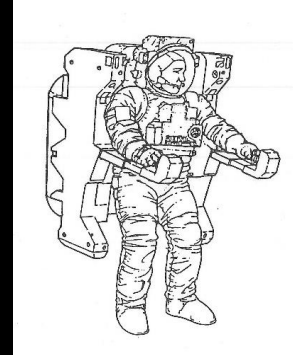
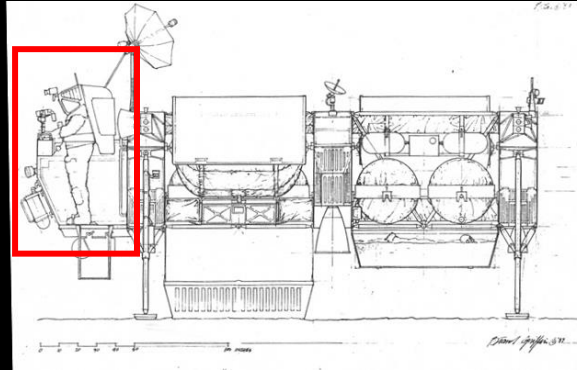
Smithsonian National Air and Space Museum



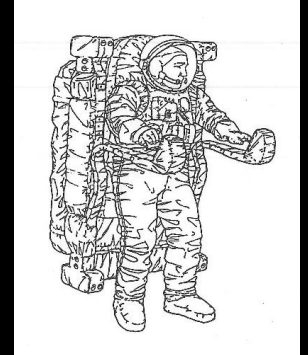
LEM flown
standing up



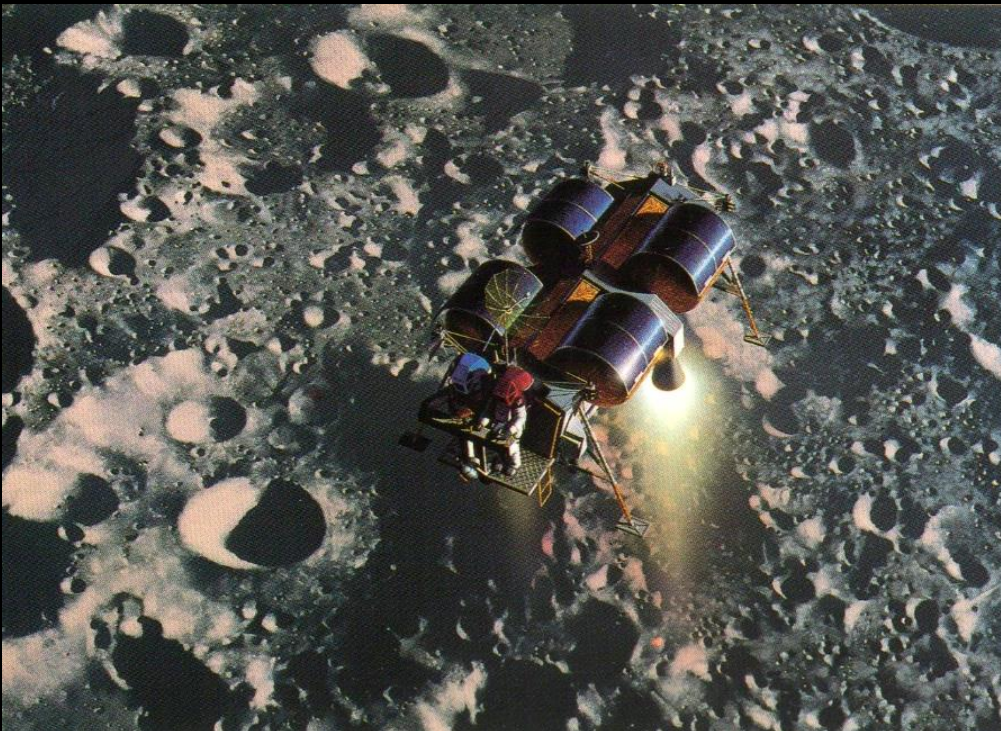
Thin skinned-low
pressure cabin



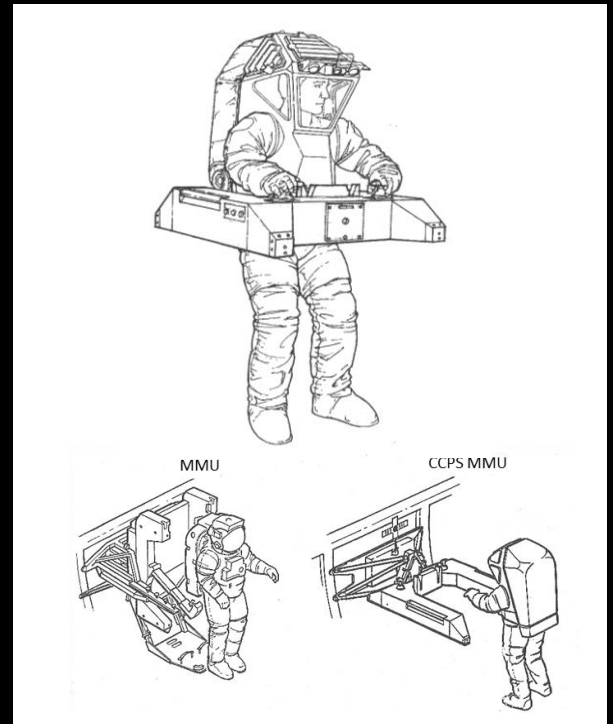
US Manned Maneuvering Unit



Russian Manned Maneuvering Unit



Painting: Paul Hudson



CCPS Horizontal MMU

EVA



Painting: Paul Hudson

E V A



Painting: Paul Hudson

G A T E W A Y

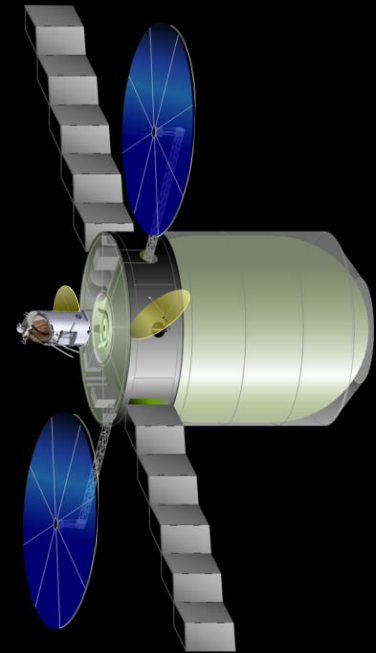
Cygnus ISS resupply



Lunar Gateway 4 plus deliveries



Single Launch Gateway



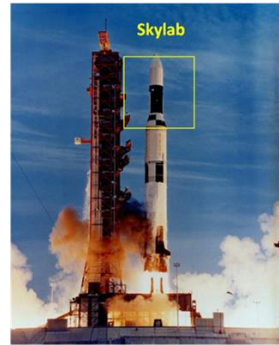
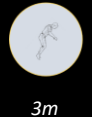
Skylab II



ISS Module



Gateway

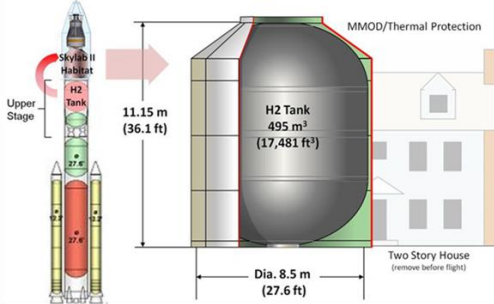


Saturn V

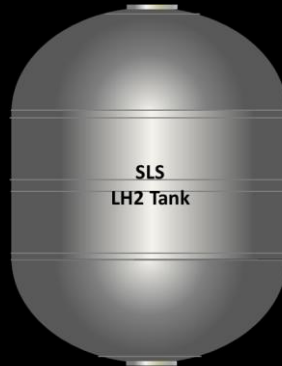


Space Launch System

SLS H2 Propellant Tank



Made From Space Launch System Propellant Tank



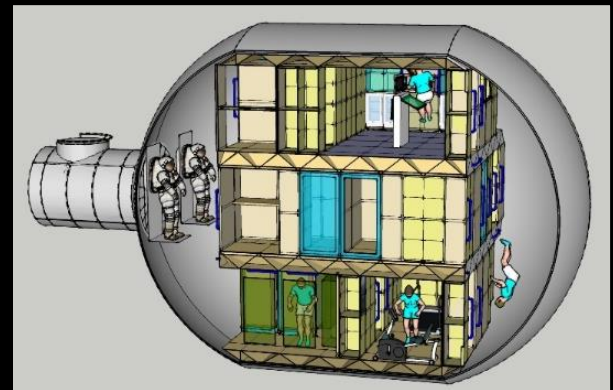
4200 kg
(9,240 lb)

Sport Utility Vehicle
2631 kg (5800 lb)



5262 kg
(11,600 lb)

Tank weighs less than 2 SUVs



Internal Layout

G A T E W A Y

