OG Human Factors and Habitability

• Overview
• Required Crew Volumes
• Human Physiological Adaptation to 0G
• Workstation Design
• Restraint Design
• Ideal Cabin Layout
• Stowage
Gemini 4 Crew Cabin
Apollo Spacecraft (Rescue Configuration)
Required Habitable Volume

From Nicogossian et. al., *Space Biology and Medicine, Vol. II: Life Support and Habitability*, AIAA, 1994
OG Neutral Body Posture

From Nicogossian et al., *Space Biology and Medicine, Vol. II: Life Support and Habitability*, AIAA, 1994
OG Restrained Reach Envelope

From Nicogossian et. al., *Space Biology and Medicine, Vol. II: Life Support and Habitability*, AIAA, 1994
OG Workstation Layout

95 PERCENTILE MALE, 20 INCH EYEPOINT

5 PERCENTILE FEMALE, 15 INCH EYEPOINT

From Nicogossian et. al., Space Biology and Medicine, Vol. II: Life Support and Habitability, AIAA, 1994
Skylab Chair Restraint

Skylab Table Restraints

Isogrid Flooring Design


Human Factors and Habitability
Principles of Space Systems Design
Cleat Restraint System

EVA Foot Restraints

Skylab Exterior Configuration

General characteristics
- Conditioned work volume: 12,700 ft³
- Overall length: 117 ft
- Weight (including CSM): 199,750 lb
- Width (of orbital workshop including solar array): 90 ft
Skylab Orbital Work Shop Interior
Skylab Multiple Docking Adapter Layout


Human Factors and Habitability
Principles of Space Systems Design
Skylab Living Quarters Layout

ORBITAL WORKSHOP
CREW QUARTERS INSTALLATIONS

WASTE MANAGEMENT
COMPARTMENT 30 SQ FT

WARDROOM
100 SQ FT

EXPERIMENT
COMPARTMENT
180 SQ FT

M171 GAS
ANALYZER

M131 GAS
CONTROLLER

M131 STOWAGE
CONTAINER

M131 CHAIR
CONTROL

SLEEP COMPARTMENT
70 SQ FT

M131 ROTATING
CHAIR

ELECTRICAL POWER
CONTROL CONSOLE

MO92 LBNPD

ESS
Skylab Wardroom Layout

Skylab Waste Management Compartment
Stowage

- Number of items stowed proportional to volume, crew size, duration, complexity of mission
  - Mercury: 48 items
  - Gemini: 196
  - Apollo: 1727
  - Shuttle: 2600
  - Skylab: 10,160
  - ISS: >20,000
- After you stow it, how do you find it?
Psychosocial Issues

- Scheduling and planning
- Recreation
- Command structure
- Issues affecting crew morale
  - Environment
  - Food and drink
  - Exercise
  - Hygiene
  - Noise
  - Lighting
International Space Station
A Tour of ISS