

SPACE MEDICINE

Introduction:

Brief description.

Book coming out (Ronald Press)

*Moon shot -
night board*

Open. Benjamin: I recently saw a television space program in which the astronauts walked about on the surface of their spaceship to the noisy "clank-clank" of their magnetic shoes on the ship. What was wrong with this scientifically? I'm sure you know that in space there are no air molecules to transmit the sound and thus no clank would be heard. Today Dr. Berry is going to discuss some of these environmental problems posed by man's first encounter with space. Dr. Berry, what is the status of man's battle with this new environment--space?

Berry: It might surprise you to know that space is not exactly a new environment for man. In fact in the United States Air Force we have been actually flying in space with several current aircraft and the research craft such as this X-15. It depends on whether you use the physical definition of space roughly starting at 600 miles above the earth's surface, or the physiological definition where space becomes a series of space equivalent altitudes determined by man's physiological tolerances. The background chart (slide) outlines these critical altitudes, and it can readily be seen that man has long been exposed to a partially space environment as far as his physiological functions are concerned. It is most important in discussing man's tolerances to a space environment that we all realize man must have these various environmental variables maintained at near comfort values and not just within his tolerance limits, for he must

slide 1 background - chart.

function - perform capably under these conditions and not be merely struggling to stay alive. This makes the engineer's job that much more difficult.

① - CHART - SPACE EQUIV. ALT.
I

Benjamin: It appears that oxygen problems start at a pretty low altitude.

OXYGEN

Berry: Yes, the total pressure decreases with increasing altitude and thus the partial pressure of oxygen also decreases.

might think - hypoxia

Explain pO₂ and man's need for adequate level.

Describe hypoxia--onset 5,000 feet with

Say film which shows early symptoms of O₂ lack

Night vision decrease.

Anoxia at 50,000 feet and why. P = 87 mmHg.

Methods of protection.

Ha 47
CD 40
8-15 sec long to burn

Mask.

25 constant
35 minutes
43 Pressure
- suits.

will all Pressure suit (actual suit or slide). Film?

slide 1

Sealed and pressurized cabin (limiting altitude). Hg

② Pressure Benjamin: You mentioned total pressure awhile ago. Are there any particular effects from reduced total atmospheric pressure?

Berry: Yes indeed.

CHART II

Dysbarism--define--examples. Demo & EVOLVED.

TO GRAVITY

film

Ebullism--define--film clip--blood boiling.

TO LAST

③ Benjamin: During World War II we heard of aircrews freezing and wearing electrically heated suits, etc. Is temperature a problem?

TEMP.

Berry: Yes, it could be an environmental hazard for it is cold in space, but heat is a bigger problem.

orbit satellite - can control by orientation

CHART - I

slide 5

Reentry problem--Dyna-Soar.

x-15 1200°F
2-3x this

Hg 150°F

Control methods.

film (4)

450°F.
not 100°F/min

Outside

Inside.

(4)

Benjamin: Recent articles keep emphasizing the radiation hazard in space flight. Is this a limiting environmental factor?

Berry: Our views on this subject have been changed by the acquisition of satellite data. We originally thought cosmic radiation would pose very little hazard for proposed flights.

Electromagnetic radiations.

170 m Cosmic rays.

Solar flares--Discoverer data.

Trapped Radiation--Van Allen Belts.

Benjamin: We have talked about many of the physical environmental

hazards of spaceflight, but are there any created by the vehicle or propulsion system? Acceleration has always interested me, etc--expand as desired.

Berry: Yes, the background shows weightlessness and loneliness or isolation as problems created by the vehicle and propulsion system.

Acceleration levels--necessary to achieve orbit. - 8289 seconds
1152 g seconds for escape

Acceleration effects on man--

Types--Positive, Negative, Transverse, Zero g.

Methods of study and limits.

Centrifuge.

Aircraft. Zero g film clip.

Benjamin: As a physician are you worried about your astronaut being so far from the bedside where you can examine him. I understand you are a monitor on Project Mercury.

Berry: Yes. Outline monitor duties.

Problems in monitoring and guidance.

New field of medicine.

Civilian medical science applications.

Close: Man's presence in space is vital to our understanding of this medium. Aerospace medicine must assure he can function in this alien and hostile environment.