

Important Problems to be worked on in FY '59

I. Biological Satellite Laboratories and

Manned Space Vehicles

Consultant support ^{to Astronautics Section} in Human Factors

Ballistic Re-entry vehicle

F.O.V. (AM 5)

Large Sat. Lab. (AM-8)

Completed or
in progress

Dec + for specific
proposal NASA will come
out a P.R.

Multiman Space Vehicles

(including multi-man satellite station) Pre-design Support

Early '59 Jan-Mar.

Strategic Orbital System - Support to Astro Sect.

II. Simulator Development

A. Reaction Control Simulator - in proposal form
by 1 Oct. '58.

B. Lunar Housing Simulator - in proposal form
by 15 Oct. '58.

C. Reentry vehicle Simulator?
Support to Astronautics Section ??

III. Photosynthetic Exchange Systems.
Design & test of ~~two~~ ^{two greatly independent} models of gas exchangers.
Test of exchangers in closed system with small animals.
Preliminary design of a centrifugal exchanger.
~~methods of waste~~ Waste processing for suitability as algal nutrients & as higher plant nutrients.
Water recovery from atmosphere & wastes, for reutilization.
Food value of various suitable algae.

IV. Preliminary investigation of feasibility of converting two battleship tanks (when available as surplus) into a multiman space cabin simulator, which would be a ^(5-7 psi) low pressure ~~chamber~~ ^(5 mm Hg) surrounded by a higher vacuum area. Could be accomplished by placing a Stage 2 LOX tank into a Stage 1 LOX tank.

If preliminary study indicates feasibility, a detailed design study would be made by GBS for Space Medicine. ~~Chamber~~ ^{Facility} To be used as a research tool for the physiological, & psychological staff, & engineering staff of Space Medicine.

V. Physiological Research (check ESAs)

Physiological effects of ionized air
Mechanisms of the effects.

Effects of inert gases such as neon on animals

Check ISAs submitted

VI Hydroponics

Cultivation of selected food plants in nutrient solutions, Nutrients derived from wastes.

Determination of ~~elements~~ ^{by each plant} required to supplement nutrients supplied from wastes.

VII Medical Electronics

Development of new medical instrumentation.

VIII Psychology Research

Optimal display & controls

Design of optical conditions

3-dimensional presentations

IX Areas where outside support is required ^(dependent on contract acquisition)

A. Reaction Control Simulator See P.A. & proposal

B. Lunar Housing Simulator See P.A. & proposal

1. Important Basic Problems

A. CABIN ENVIRONMENT COMPOSITION & CONTROL

O₂, CO₂, N₂(He) or both, CO, O₃, AIR IONIZATION
T°, R.H., Total pressure. (Air conditioning)

Cabin structural design

Radiation protection

B. WATER RECOVERY & REUTILIZATION

From Cabin air, ~~body~~ ^{biological} wastes, ~~mechanical~~ & chemical wastes

C. WASTE HANDLING

Collection methods for 0-g flight

Storage procedures

Processing methods for storage in long term flight
" " for recycling systems.

D. Atmospheric regeneration

Physico-chemical regeneration

Photosynthetic regeneration

25-
25
100,000

E. Food Problems

Types of foods - palatability

Preservation

Storage

Packaging

Preparation

Disposal

F. Visual Problems

Adaptation to visual background

Distance perception - size, shape of objects (space craft, satellites, meteors, asteroids, etc.)

Visual acuity

Ophthalmic protection