

INTERDEPARTMENTAL COMMUNICATION

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FROM: R. H. Edgerley

SUBJECT: Statement of Work for Construction of a Prototype Sealed Cabin
for Use with Animal Subjects.

1. Authorization - Engineering Study Authorization Number 516. This project will be performed on Company overhead with minimum manpower.
2. Purpose - To construct a small sealed cabin to be used for
 - a. physiological experimentation and
 - b. development and testing of equipment for manned space cabin atmosphere control, and for physiological monitoring. The atmospheric control system will include equipment for:
 - 1) supply and monitoring of oxygen.
 - 2) absorption and monitoring of carbon dioxide.
 - 3) absorption and monitoring of water vapor.
 - 4) supply and monitoring of inert gas.
 - 5) temperature regulation in range 15° to 30° C.
 - 6) control and monitoring of noxious gases.

Physiological monitoring will include measures of total activity, oxygen consumption, carbon dioxide production, water production, heart activity, respiratory movements, etc.

3. Requirements -
 - a. An inner chamber surrounded by a vacuum chamber. The inner test chamber should be equivalent to a cylinder 30 inches in diameter and 48 inches long. This should be mounted on thermal insulating material in a vacuum chamber having a total volume at least 10.4 times that of the inner chamber.
 - b. A sealable port in the end of the inner chamber should be 24 inches in diameter. The access port in the outer chamber should be in line

with the inner port and preferably should be sufficiently greater in diameter that all maintenance and modifications of the inner chamber can be made from this location.

- c. Provision should also be made to allow leakage into the vacuum from the inner chamber through various sized openings up to 1 square inch in diameter. This will allow simulation of meteor hits.
- d. Construction should permit maintenance over several months of a constant pressure in the inner chamber of up to 15 psi over the vacuum space. The vacuum should be maintained at 20 mm. of Hg. pressure or less. It is of extreme importance that leakage of the inner chamber be reduced to the absolute minimum.
- e. Air will be circulated through the inner chamber by blowers placed in external piping. These external pipes must allow a flexible arrangement for the purpose of testing various types of air conditioning equipment, for removing air samples, for introducing gases, for flushing the inner chamber with gas mixtures, and for continuous monitoring of the circulated air.
- f. Provision must be made to circulate 30 to at least 150 ft.³ (adjustable) of air (STP.) through the external piping even if the air pressure is reduced to 3 psi. Air movement through the chamber should be maintainable in the range of 20 to 30 feet per minute.
- g. A system to allow continuous viewing of the animals inside the chamber is required.
- h. Provision for electrical connections in top of inner chamber for various kinds of physiological and other sensing equipment.
- i. Provision for removing urine, blood samples, etc. through bottom of chamber.
- j. Atmospheric control system requirements.
 - 1) Cooling capacity of 11,730 Btu/day. Temperature regulated through range of 15 to 30° centigrade and maintainable at $\pm 0.5^{\circ}$ C.
 - 2) Carbon dioxide level to be maintained at various levels from 0.2% to 5% (of 1 atmosphere). Carbon dioxide production to be allowed for will be a maximum of 520 liters per day (= 2.26 lbs./day).
 - 3) Oxygen level at any pressure from 3 to 15 psi to be maintained at ± 1 mm.Hg. Provision for measuring oxygen input to nearest ± 100 ml./day.

- 4) Relative humidity from 10 to 99%. Water removal capacity for a maximum of 3 lbs./day.
- 5) Monitor atmospheric pressure to ± 1 mm.Hg.
- 6) Continuous recording for all the above measures.

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