

INTER-DEPARTMENT COMMUNICATION

The Martin Company

DATE: 7 December 1959

TO: J. Thompson, J. Putegnat, K. Roebuck, W. Clohessy, S. Kassy, C. Graham,  
R. Lea, J. Gaume, R. Gafford, Correspondence Control Center

FROM: L. G. Taigman MAIL NO. A-138 PHONE EXT. 2652/3313

SUBJ: Proposal for a Prototype Closed Ecological System (Misc. 18b)

ENCL: (1) CO-59-186, dated 4 December 1959; Subject: Proposal for a Prototype  
Closed Ecological System (Misc. 18b)

1. The enclosed proposal has not been mailed to the Aero Medical Laboratory. It is presented for your information at this time.
2. It is currently planned that the proposal will be handcarried to the Aero Medical Laboratory on 15 December 1959.

LGT:jb

*L. G. Taigman*

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L. G. Taigman  
Contract Manager  
Contract Requirements



4 December 1959

Refer to: CO-59-186

To: Commander  
Wright Air Development Center  
Air Research and Development Command  
Aero Med Lab  
United States Air Force  
Wright Patterson Air Force Base, Ohio

Attn: WULD, Colonel J. P. Stapp

Subj: Proposal for a Prototype Closed Ecological System (Misc. 18b)

Encls: (1) Technical Proposal  
(2) Preliminary Contract Statement of Work  
(3) Budgetary Cost Proposal

1. As a result of discussions between Colonel J. P. Stapp of Wright Air Development Center and Mr. J. Thompson of The Martin Company, this Contractor is pleased to submit herewith an unsolicited proposal covering the development and operation of a prototype closed ecological system.

2. Enclosures (1) through (3) present our Technical Proposal, Preliminary Contract Statement of Work, and Budgetary Cost Proposal. The elements of the proposal are broken down into four phases as follows:

- a. Preactivation research and development
- b. Acquisition of special tooling
- c. Activation of closed ecological system
- d. Operational research program

3. The Martin Company will be glad to enter into formal discussions to develop a mutually agreeable Statement of Work and price therefore. Please address your inquiries to The Martin Company, P.O. Box 179, Denver 1, Colorado, Attn: Mr. L. G. Taigman, Contract Manager, Contract Requirements, Mail No. A-138, Phone Ext. 2652/3313.

Very truly yours,

THE MARTIN COMPANY

W. G. Purdy  
Director  
Advanced Program Management

WGP/LGT:jb

Internal Dist: J. Thompson, J. Putegnat, K. Roebuck, W. Clohessy, S. Kassy,  
C. Graham, R. Lea, L. Taigman, J. Gaume, R. Gafford, File, CCC (2)



PRELIMINARY CONTRACT STATEMENT OF WORK

PROTOTYPE CLOSED ECOLOGICAL SYSTEM

4 December 1959

The Contractor shall conduct a best efforts research program to develop and utilize a prototype closed five-man ecological system for the purpose of establishing design criteria for a long time life support system for space programs. The program shall be performed as follows:

ITEM 1 Conduct a research and development program for the development of ecological subsystems. The Contractor shall complete research required to establish design criteria for system components and shall design, fabricate and or procure the following subsystems:

A. Atmospheric Control Subsystem

1. Algal Photosynthetic Gas Exchanger
2. Algal Harvester (Centrifuge)
3. Carbon Dioxide Concentrator
4. Catalytic Burner
5. Carbon Dioxide Reserve
6. Oxygen Reserve
7. Dehumidifier
8. Water Purification System
9. Water Storage
10. Activated Charcoal System
11. Heat Exchanger
12. Heat Pump
13. Heat Sink

B. Waste Processing Subsystem

- (1) Water Collectors
- (2) Homogenizer
- (3) Anaerobic Digestion
- (4) Gas Storage

- (5) Solids Separator
- (6) Pasteurizer
- (7) Incinerator
- (8) Scrubber
- (9) Processed Waste Storage

C. Food Production Subsystem

- (1) Plant Nutrient Storage
- (2) Hydroponics
- (3) Light
- (4) Temporary Storage
- (5) Plant Nutrient Adjustment
- (6) pH Adjustment
- (7) Growth Regulating Chemicals
- (8) Food Animals
- (9) Food Preparation
- (10) Algal Storage
- (11) Food Storage
- (12) Seed and Plant Storage

A summary report shall be submitted after completion of the development program. Acceptance of this report shall constitute acceptance of the work performed under this item.

ITEM 2 Design, fabricate, and or procure special tooling required to integrate the ecological subsystems developed under Item 1 and for conducting the test programs defined below. The special tooling shall include an inner spherical chamber, an outer vacuum shell, and support equipment.

Acceptance of Item 3 shall constitute acceptance of the work performed under this item.

ITEM 3 Activate the closed ecological system. During this phase the ecological subsystems developed under Item 1 shall be married to the special tooling and checked out. The ecological system shall be tested first with respect to gas exchanger and waste processing and finally as a completely closed system both at ambient and at reduced pressures.



A summary report shall be submitted after completion of the activation program. Acceptance of the summary report shall constitute acceptance of the work performed under this item.

ITEM 4 Prepare an operational research program plan. Conduct the operational research program in accordance with the plan through the period ending June 1964.

A summary report shall be submitted after completion of the research program. Acceptance of the summary report shall constitute acceptance of the work performed under this item.

#### SCHEDULE

<u>ITEM</u>	<u>COMPLETION</u>
1	December 1962
2	September 1963
3	April 1963
4	June 1964

4 December 1959

BUDGETARY COST PROPOSAL FORCLOSED ECOLOGICAL SYSTEM

	<u>FY - 1960</u>			<u>FY - 1961</u>			<u>FY 1962</u>	<u>FY 1963</u>	<u>FY 1964</u>	<u>TOTAL</u>
	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	--	--	--	--
PHASE I	\$16,100	\$54,900	\$103,400	\$148,900	\$171,400	\$173,400	\$369,000	--	--	\$ 1,037,100
PHASE II	12,000	35,200	67,200	101,300	81,200	12,200	106,800	\$16,300	\$12,200	444,400
PHASE III	--	--	--	--	--	--	307,300	241,400	--	548,700
PHASE IV	--	--	--	--	--	--	--	199,800	599,400	799,200
TOTAL	\$28,100	\$90,100	\$170,600	\$250,200	\$252,600	\$185,600	\$783,100	\$457,500	\$611,600	\$ 2,829,400

NOTE: The cost data presented above does not include facilities as follows:

Parking Area	\$11,200
Water and Building Utilities	11,000
Sub-Station	51,000
Equipment Enclosure	26,400
A & E	<u>9,960</u>
TOTAL	\$ 109,560