

DEPARTMENT OF THE NAVY  
BUREAU OF NAVAL WEAPONS  
WASHINGTON 25, D.C.

*file*  
*W*  
IN REPLY REFER TO

Ser 00890

22 APR 1964

~~SECRET~~

From: Chief, Bureau of Naval Weapons  
To: Commander  
U. S. Air Force Systems Command  
Andrews Air Force Base  
Washington, D. C. 20331

Subj: Manned Orbiting Laboratory (MOL) Project; Navy funding  
requirements for (U)

Ref: (a) VCNO ltr ser 102P76 of 19 Feb 1964 to Commander, AFSC  
(b) Visit of Navy representatives to AFSC, SSD on 23-24 Mar 1964  
(c) Conference between BGEN J. S. Bleymaier, AFSC, SSD and  
RADM W. T. Hines, Acting Chief, BUWEPS on 7 Apr 1964  
(d) Preliminary Technical Development Plan for the Manned  
Orbiting Laboratory, April 1964, SSM-50, Secret  
(e) DOD Directive 3200.9 of 26 Feb 1964

Encl: (1) Summary of Navy Funding Requirements for the MOL  
Project, 13 Apr 1964, Secret

1. The Vice Chief of Naval Operations by reference (a) established the requirement for Navy participation in subject project. During reference (b) Navy personnel presented a proposed program for further coordination and discussed areas of Navy interest and desired contribution. Pertinent portions of text material describing the Navy program of interest were included in an Air Force preliminary Technical Development Plan for the MOL, reference (d).

2. Pending formal establishment and promulgation of a funding policy for the MOL project, it is considered desirable that material prepared and presented by the Air Force in seeking MOL project approval include the funding requirements for Navy participation. This matter was discussed in the conference of reference (c) and it was understood that Navy funding requirements would be recognized in future Air Force actions addressing the total dollar requirements for the project.

3. Enclosure (1) contains the preliminary estimate of funding support required by the Navy. With regard to the FY 1965 requirement for 4.0 million dollars:

a. An emergency funding request for 0.5 million of FY 1964 emergency funds (citing the DOD 10.0 million dollar emergency money

DOWNGRADED AT 3-YEAR INTERVALS

DECLASSIFIED AFTER 12 YEARS

DOD DIR 5200.10

~~SECRET~~

MSK 64-991 TAB A

~~SECRET~~

00890

Subj: Manned Orbiting Laboratory (MOL) Project; Navy funding requirements for (U)

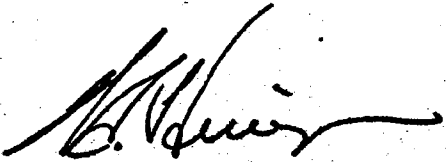
earmarked for the MOL) is being processed to cover Navy efforts and assistance during the pre-Project Definition Phase (pre-PDP) to September 1964.

b. A Program Change Proposal (PCP) is being processed which requests the additional 3.5 million dollars in FY 1965 from the DOD MOL funds being reserved under program element number 634 09 404, Manned Military Orbital Laboratory.

4. As indicated in enclosure (1), nominal funds required to sustain "in-house" Navy technical and administrative effort related to the MOL project will be included in the Navy budget program for FY 1966 and subsequent. Commencing with FY 1966 it appears that funding required for further PDP (if appropriate) and for those Phase II efforts related to experiments for which the Navy has cognizance should be consolidated and budgeted by the Air Force as DOD executive agent for military services on the MOL project. The PCP mentioned in Para. 2.(b). above therefore will reflect the enclosure (1) breakout.

5. Captain Harper Van Ness, USN, will report to the AFSC, SSD in the near future to assume duty as the senior officer in charge of a Navy Field Office for MOL. The Bureau of Naval Weapons is initiating a number of actions related to pre-PDP effort on MOL experiments of interest to the Navy with the purpose of meeting the intent of reference (d). Captain Van Ness looks forward to coordinating these actions and Navy requirements in detail with the Air Force personnel at SSD in order that plans for PDP and Phase II can be drawn which utilize the technical competence and mission understanding which the Navy has to offer to the MOL project.

Copy to:  
OIC, Navy Field Office for MOL  
Los Angeles, Calif.  
Hqs, AFSC, SSD, Los Angeles  
CNO (OP-76)  
CNM (MAT-316)  
OSD (IDR&E)

  
W. T. HINES  
Acting Chief, Bureau of Naval Weapons

DOWNGRADED AT 3-YEAR INTERVALS  
DECLASSIFIED AFTER 12 YEARS  
DOD DIR 5200.10

2

~~SECRET~~

MSF 64-991

~~SECRET~~  
~~SECRET~~

Summary of Navy Funding  
Requirements for the MOL Project

1. The funds requested in the Navy PCP are restricted to those required by the Navy to support its participation in the MOL project. These funds are for efforts such as:

a. Pre-PDP activity related to initial feasibility and design layout studies; determination of basic engineering performance requirements and specifications; general engineering support from Navy RDT&E activities; formulation of technical and management plans; examination of experiment concepts in relation to hardware availability.

b. Support of the Navy Field Office for MOL at the AFSC, SSD.

c. Participation in PDP.

d. Construction of and investigation with breadboarded models and mock-ups to explore potentially critical engineering and functional problems.

e. Level effort support of selected Navy RDT&E activities to insure that all experiments of interest to the Navy are monitored and assisted with Navy resources as required.

All amounts are in millions

FY	<u>64</u>	<u>65</u>	<u>66</u>	<u>67</u>	<u>68</u>	<u>69</u>
	0.1 (1)	4.0 (2)	0.4 (3)	0.4 (3)	0.4 (3)	0.5 (3)
			16.6*	21.6*	15.6*	1.5*

(1) Provided by reprogramming within BUWEPS.

(2) See Para. 3. of covering letter.

(3) See Para. 4. of covering letter.

\*For information purposes. These estimates depend on further coordination and definition of the MOL project. The estimates represent initial planning figures for the cost of Navy experiment engineering, hardware, and hardware evaluation but not hardware integration and related engineering.

ENCLOSURE (1)

DOWNGRADED AT 3-YEAR INTERVALS

DECLASSIFIED AFTER 12 YEARS

DOD DIR 5200.10

~~SECRET~~

MSK 64-991



21 APR 1964

MEMORANDUM FOR THE SECRETARY OF DEFENSE

SUBJECT: Initiation of MOL Pre-Phase I

INTRODUCTION

Since the 11 December 1963 announcement of the MOL program, there have been numerous studies and discussions conducted on the basic issues surrounding the MOL experiments and the hardware implementation options for the program. These discussions have been held at various levels in the Air Force and the Under Secretary has been personally involved. The major effort has been applied to the determination of the experimental program, and this still needs more careful study before final decisions are made.

The Air Force has now submitted a Preliminary Technical Development Plan for MOL, but is asking for go-ahead approval and funds only for Pre-phase I at this time. The proposed schedule of major events during Pre-phase I and a tentative schedule for Phase I are given in Tab A. A detailed description of the experiments now regarded as primary are listed in Tab B. A memorandum to you under separate cover provides additional information.

PRE-PHASE I EFFORT

During the Pre-phase I, Air Force proposes to carry out a series of parallel and detailed contracted studies having the following objectives:

A. Experiment Studies

Six-eight studies to identify specific equipments, display hardware and preferred techniques for performing the primary MOL tests with high confidence. Some Navy in-house effort is also planned.

B. MOL Subsystems Studies

Six-seven studies of the major subsystems within the MOL (environmental control, power, stabilization, guidance, communications, possible radar). Each of these will identify major trade-offs on alternate approaches to

~~SECRET~~

DOWNGRADED AT 3 YEAR INTERVALS;  
DECLASSIFIED AFTER 12 YEARS.  
DCD DIR 5200 10

MSF 64-1009

~~SECRET~~

design modularization, and isolate the one or several solutions which make maximum use of already developed equipments.

**C. GEMINI-B**

McDonnell will perform a fixed price study contract to identify in detail the major interface problems with MOL and preferred solutions. These tasks will include crew transfer techniques, crew escapes during launch, retrograde and re-entry, rescue, structural-electrical-hydraulic interfaces with the laboratory, and launch site equipment requirements. The study will also identify the required modifications and deletions of subsystems presently aboard the GEMINI, and will provide program planning for Phases I and II.

**D. TITAN III Interfaces**

Martin will perform a fixed price study contract to identify in detail the interface areas and recommend detailed guidelines for MOL to minimize the interface problems. Tasks will include overall T-III compatibility review, application of T-III guidance to MOL in orbit, on-orbit uses of transtage propulsion, launch site implications, vehicle performance, crew safety, and program planning for Phases I and II.

**E. APOLLO Applications (Note my reservations later)**

North American will perform a study to determine the potential of the APOLLO to perform the MOL mission.

**F. One-Man GEMINI (Note my reservations later)**

McDonnell will perform a study to identify the degree to which the GLV-launched GEMINI, modified for one astronaut operation, can perform MOL experiments.

These studies, plus in-house effort utilizing Aerospace Corporation, will be completed on 31 August 1964. Shortly thereafter, the Air Force will come forward with a revised PTDP, RFP's for the Phase I effort, and a request for our approval of Phase I.

~~SECRET~~

MSC 64-1009

~~SECRET~~

For the present, we are only speaking of proceeding with the Pre-phase I effort, for which the Air Force requests the following FY 1964 funds:

6 Experiment Study Contracts - USAF (to industry)	\$1.0 million
1-3 Experiment Studies - Navy (in-house)	\$0.5 million
6 Support Studies of Lab Subsystems	\$1.2 million
GEMINI B Detailed Study - McDonnell	\$1.0 million
TITAN III Interface Study - Martin	\$1.0 million
APOLLO Applications Study - NAA	\$0.2 million
One-Man GEMINI Applications Study - McDonnell	\$0.1 million
Aerospace Corporation Support	<u>\$1.0 million</u>

FY 1964 TOTAL \$6.0 million

### MOL EXPERIMENTS

We have all been most concerned these past months with the process of selecting experiments for MOL that are substantive and fundamental to judging man's utility in space. This job is not completed, and the OSS studies plus some of the other Pre-phase I contracts will reach more deeply into the subject. For the moment, we believe that sufficient care has been taken in selecting mission scenarios and identifying man's functional participation, that we must now proceed to detailed experiment "designs".

So that you may know the spectrum and detail of experiment selection tentatively prepared by Air Force, I have attached as Tab B the entire section on MOL experiments from the PTDP. These were selected as primary and secondary experiments from a collection of some 430 candidate experiments. Some of the criteria used in making this selection were:

- a. The MOL is a space laboratory, not an operational vehicle.
- b. The experiments should focus on man's role and utility rather than on specific equipment.
- c. The proposed experiments may consider the entire spectrum of possible military applications.
- d. Photography of reconnaissance quality will not be used to record or varify experiments.

~~SECRET~~

- e. Maximum use of ground simulation, aircraft tests and existing space programs for testing will be made.
- f. Selected experiments should be those achievable only in MOL, or which constitute proof test of experiments primarily done in ground or aircraft simulation.
- g. Maximum use will be made of existing equipments in order that costs may be kept to a minimum.
- h. Where modified or new equipment is required, a solution, with minimum technical and schedule risk, must be found.
- i. Experiments which contribute to development of military technologies of science of national import may be candidates as secondary experiments, especially those which assess man's utility

To give you an abbreviated story on the tentatively chosen experiments, I will list below their titles and basic objectives:

Primary Experiments

P-1 - Acquisition and Tracking of Ground Targets. To evaluate man's performance in acquiring preassigned targets and precisely tracking them to an accuracy compatible with the requirements for precise IMC determination.

P-2 - 

P-3 - Direct Viewing for Ground and Sea Targets. To evaluate man's ability to scan and require land targets of opportunity, to scan and detect ships and surfaced submarines, and to examine ships and surfaced submarines for classification purposes.

P-4 - Electromagnetic Signal Detection. To evaluate man's capability for making semianalytical decisions and control adjustments to optimize the orbital collection of intercept data from advanced electromagnetic emitters.

P-5 - In-Space Maintenance. To evaluate man's capability to perform malfunction detection, repair, and maintenance of complex military peculiar equipments.

P-6 - Extravehicular Activity. To evaluate man's ability in the performance of extravehicular operations peculiar to future military operations, including external spacecraft maintenance.

P-7 - [REDACTED]

P-8 - Autonomous Spacecraft Position Fixing and Navigation. To evaluate the capability of a man using various combinations of equipment to act as a spacecraft navigator and provide autonomous navigation.

P-9 - [REDACTED]

P-10 - Multiband Spectral Observations. To evaluate man's ability to detect high radiance gradient background events and missile signatures using multiband spectral sensors and to provide additional measurement data on backgrounds and missile signatures.

P-11 - General Performance in Military Space Operations. To obtain reliable and valid measures of man's more basic performance as it relates to applied mission functions and physiological changes occurring during the stresses of the MOL flights.

P-12 - Biomedical and Physiological Evaluation. To evaluate those effects of weightlessness which can potentially compromise mission success. Sufficient data are required to validate supporting measures employed, devise improved methods, if necessary, and afford plausible estimates of biomedical status for missions longer than 30 days.



Secondary Experiments (Representative Only)

- S-1 - VLF Communications - Propagation
- S-2 - Narrow Band Secure Communications
- S-3 - LASER Propagation
- S-4 - High Frequency Ionospheric Ducting Communication
- S-5 - [REDACTED]
- S-6 - Expandable Structure Techniques
- S-7 - Antenna Deployment, Align, Point
- S-8 - [REDACTED]
- S-9 - [REDACTED]
- S-10 - Mapping and Geodesy of Specific Surface Areas
- S-11 - Mass Determination
- S-12 - H<sub>2</sub> Reduction Atmosphere Regen. System
- S-13 - Vapor Compression Distillation - Water Purification
- S-14 - Passive Propellant Settling Systems
- S-15 - Coherent E-M Propagation and Antenna Loading
- S-16 - Solar X-Ray Warning System
- S-17 - Materials Degradation and Malfunction Analysis
- S-18 - Astronomical Photography

SUMMARY

I believe that there are two principal possibilities now apparent which hold the most promise for the utility of a man in a space vehicle.

- a. The ability to recognize patterns and interpret them in real time and report the results.

b. The ability to point a sensor (e. g., a telescope-camera) and provide image-motion compensation so that a very narrow field of view can encompass the area to be examined.

The questions are whether these abilities will either allow things to be done which cannot be done at all by unmanned systems, or whether adding the weight of a man and his required support will allow better results than an unmanned system of the same increased weight. The answers to these questions are not now known, but the experiments proposed for the MOL should, when their results are fed into design studies, produce those answers.

While many questions still remain about specific details of the MOL experiments and the preliminary plans for Phases I and II, I feel we must acquire the detailed analyses of the Pre-phase I studies in order to address those questions and to provide an adequate basis for deciding on Phase I. Unless you object, I therefore intend to release \$6. 0M of deferred FY 64 funds for immediate go-ahead on these studies. I do intend to ask the Air Force for some changes in Pre-phase I as follows:

- Delete [REDACTED] experiment P-9 from consideration
- Apply additional emphasis during Pre-phase I on the role of simulation.
- Defer the APOLLO and GEMINI applications studies (E and F above) until a detailed work statement agreeable to me is submitted.

SIGNED

Harold Brown

Attachment

cc:  
DepSecDef  
DDR&E  
DD/Space  
OAD/ST  
ORS Records

SJColby/emv/13Apr 64  
AD/ST/S-72467

Rewritten:  
Harold Brown/emv/21 Apr 64

7

MSF 64 - 1009

~~SECRET~~

Tentative Schedule of Major Events - MOL Pre-Phase I and Phase I

- Dec 1963 - Apr 1964
  - Experiments identification and ranking
  - In-house Pre-PDP effort.
- Apr 1964 - Aug 1964
  - Performance of Pre-phase I study contracts (3-OSS, 5-3 on specific experiment designs, 6-7 on lab subsystem trade-offs, GEMINI B trade-offs, TITAN III interfaces, APOLLO applications, and one-man GEMINI applications).
  - In-house and Aerospace Corp. studies of MOL range and ground support options, integration of above study efforts, and preparation of RFP for Phase IA.
  - In-house study of management and procurement options for Phases I and II.
- Aug 31, 1964
  - Termination of all study contracts wherein firms involved are candidates for MOL Phase I contract.
- Sept 1964
  - Final preparation of RFP's for Phase I and confirmation at Hq USAF and OSD of Phase I TDP.
- Oct 1964 - Nov 1964
  - Industry response to RFP's on MOL lab. vehicles, GEMINI B, TITAN III, and selected experimental hardware concepts.
- Dec 1964 - Jan 1965
  - Evaluate proposals, approve source selection, negotiate contracts for Program Definition Phase.
- Feb 1965 - Jul 1965
  - PDP contract performance.
- Mar 1965 - Aug 1965
  - Evaluate contractor efforts, prepare PSPP, review and approval for Phase II.
- Aug 1965
  - Go ahead for Phase II.
- 1965
  - First flight of MOL

~~SECRET~~

MSF 64-1009