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July 17, 1968

MEMORANDUM FOR RECORD

SUBJECT: NASA/MOL Meeting, July 10, 1968

A meeting was held in the MOL Conference Room on the afternoon of July 10, 1968 for the purpose of further identifying follow-on actions and studies to be accomplished on the general question of NASA use of MOL hardware. Principals present at the meeting were: General Stewart, Vice Director, MOL Program; Mr. Nevin Palley, Assistant Director, Space Technology, DDR&E; Dr. Michael Yarymovych, Deputy for Requirements, SAFRD; Mr. Harold T. Luskin, NASA, AAP; Mr. John Disher, NASA, AAP; Dr. B. P. Leonard, Aerospace Corporation.

The meeting began with Mr. Luskin reviewing the present NASA position based on the results of an earlier meeting with Dr. Newell on the general subject of AAP vs MOL. His remarks can be summarized as follows.

NASA feels that the AAP/MOL relationship puts NASA in a somewhat peculiar overlapping role. NASA acknowledges that operational military missions are totally a DOD responsibility, while NASA has a clear responsibility in the area of science, technology, and space explorations. However, the NASA charter in science and technology does not exclude the services from doing science and technology projects, if they relate to military needs. Luskin has been asked by Dr. Newell to look at NASA's roles and responsibilities from the viewpoint of how they may evolve and appear in the 1973 time frame and beyond. Mr. Luskin explained, that if NASA was unhindered by any external pressures, it is his opinion that both MOL and AAP should continue forward as planned without interference to each other but in close coordination. In NASA, there is the opinion that MOL will look a great deal more important, nationally, in 1973 than it does now

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because of its mission and its contributions to national defense. NASA is very aware of powerful support for the MOL Program and there is also support for MOL within NASA.

Mr. Luskin explained that AAP has gone through incredible changes in the recent past from a program contemplating 36 flights, including lunar exploration, to the present five-flight/three-mission program. The AAP is now expected to produce a sequence of flights extending the 14-day on-orbit experience of Gemini to 56-day on-orbit operations. AAP will provide extensive biomedical, space physiology, and behavioral (man/machine) data. It is anticipated, that from data on a previous flight, NASA can approve an attempt on the next flight to extend the on-orbit duration of that flight to twice the time in orbit of the previous flight. Mr. Palley asked Mr. Luskin if NASA could proceed on the five-flight AAP program with the reduced funding now available to AAP. Mr. Luskin indicated that sufficient money was available to do the five-flight program (in FY 69). Mr. Luskin explained that by the completion of the final three flights of the five-flight program NASA will have operated a space station of 110,000 lbs size (this figure was defined as the working portions of the space station, not expended hardware); conducted one 28-day and two 56-day manned flights; have had a space station in orbit for eight months; exercised man in a complex space station, in which man assembled major elements of the station in orbit and conducted extensive EVA activities. It is Luskin's opinion that the foregoing represents an accomplishment in AAP of major steps forward in manned space flight.

Dr. Yarymovych asked Mr. Luskin the question of whom will have been served by this effort. Mr. Luskin summarized by saying that solar astronomy purposes will have been served, 56-day space flights will have been accomplished, and man's viability and ability to assemble equipments in orbit will have been demonstrated. The accomplishments can be categorized as advancements in two areas of technology: hardware performance and operational demonstrations. Examples cited of operational demonstrations included rendezvous and docking with the workshop, the erection of equipments in orbit and the 56-day manned operation. All of these provide a technical environment for future advancements.

Mr. Palley then asked Mr. Luskin, if there were military requirements for these advancements and to what useful purposes could they be applied. Mr. Luskin cited lunar explorations, shelters on the moon, and seismic investigations of the moon.

In response to a question by Dr. Yarymovych as to whether or not Mr. Luskin felt that NASA had support from the scientific community for the very large expenditures involved with lunar exploration, Mr. Luskin expressed the opinion that if the money were available, the scientific support would follow. In the discussion that followed on the general subject of lunar and near planetary exploration it seemed to be the conclusion of the group that these activities would eventually probably occur but that decision would be largely political rather than scientific.

The discussion then returned to NASA/MOL with Mr. Luskin expressing the opinion that one of the problem areas in AAP was the fact that there were no unmanned qualification flights or backup hardware in case of a disaster. To attempt to minimize this, NASA has funded a backup wet workshop which includes an air lock and docking adapter. There is an additional S-IVB available along with three command and service modules. However, there are no backups to the solar science experiments and related equipments. The vehicle backups are scheduled so that they can be inserted into the schedule with a lag of 8-9 months and a cost of about $45 million.

At this point, Mr. Palley raised the question of the consequence of DOD and NASA proceeding on their separate ways. He pointed out that one of these consequences, among others, produced residuals of hardware and capabilities in the inventories of each of the agencies for which, logically, there should be some subsequent application. To this Mr. Luskin proposed three possible alternatives to a combined program. The first possibility is that the MOL Program proceed, NASA cancel AAP, and NASA experiments be carried on MOL vehicles as piggy-back experiments. He stated that this approach would be totally unacceptable to NASA in view of the operational constraints and the fact that NASA would not be able to carry on effectively in the new technology role. The second case would be to cancel MOL and do MOL piggy-back on

AAP. Again that solution is impossible. Thirdly, develop a proposal which is acceptable to Mr. Webb, Mr. Clifford and Dr. Foster. To be acceptable, a plan would have to provide the ability for both programs to achieve most of their objectives and each would have to give some ground. This could be done by NASA giving up AAP as conceived and abandon the AAP flight hardware but not give up AAP goals. In turn, this would require the DOD to give up something. NASA would also support the joint program with funds.

General Stewart stated that the present August 1971 date with the first manned flight is based on the technical constraints of the MOL experimental military equipments, the rest of the system (e.g. flight vehicles, ground environment, etc.) could probably be made available at an earlier date if the funding constraints on these elements were relieved. However, due to the very sensitive relationship between schedules and FY 69 funding, prompt action would be required to recoup any schedules. The MOL contractors are in the process of being bent back to the established FY 69 NOA of $515 M. Therefore, if serious consideration is to be given to advancing the flight hardware schedules appreciably, money will be required almost immediately.

Mr. Luskin stated that a goal of the combined program should be to keep the Air Force schedule from slipping and to avoid an extended gap in the NASA manned space flight schedule. He then posed the question of how NASA vehicles could be inserted into the present MOL schedule. A discussion then followed in which various schedules were discussed. One example included a schedule of: two unmanned qualification flights; a NASA/MOL 30-day flight, with biomedical and habitational objectives; the first Air Force all-up manned flight; a NASA 60-day flight in support of a long duration MOL; alternate Air Force/NASA flights with NASA eventually achieving a duration of 70 to 90 days on orbit. Joint usage of WTR launch facilities and the AFSCF tracking and control network was assumed.

Mr. Luskin also indicated NASA's desire to conduct solar astronomy experiments and demonstrate rendezvous and docking

using MOL hardware. The question of mixing NASA hardware and MOL hardware was also discussed and it was generally concluded that these mixtures were poor compromises (e.g. S-IVB with MOL orbiting vehicle).

At the conclusion of the meeting I was instructed to prepare ground rules and tasks which could be used as part of a study to examine schedule alternatives for a combined program. A draft of the guidance and tasks is attached. A copy was provided to Mr. Luskin on 12 July for his use at NASA.

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GUIDANCE AND TASKS (Plan I)

The purpose of the ground rules to follow is to establish a reference schedule and certain planning factors to the degree that they are known in order to provide a framework for the conduct of the study.

A. General Assumptions

1. A minimum of two DoD MOL launches a year.

2. A minimum of two NASA/MOL launches per year.

3. No degradation to the MOL experiments capability or vehicle performance.

4. Maximum utilization of AAP experimental hardware.

5. Contractor go ahead on a combined DoD NASA program of 1 October 1968.

6. MOL funding at an FY 69 NOA of $515M and an FY 70 NOA of $600M with MOL baseline program content.

B. Schedules

1. The following will be used as a reference for purposes of costing and facility acquisition.

a. Additional costs resulting from the inclusion of NASA vehicles into the program will be identified as Delta cost to the MOL baseline program.

Specific fiscal ground rules are included in the fiscal section.

b. Reorient work to accomplish the first two MOL hardware qualification flights as early as possible on a routine basis.

c. Qualification flights will be followed as early as possible by a NASA (FV-N1), 30 day manned flight.

d. The first DOD all-up experiments mission (FV-3) will follow the first NASA flight at not less than a four-month interval. However, the date of the first DOD manned launch shall not be later than the date established for the FY 69 $515M program.

e. The first DOD all-up experiments flight will be followed by the remaining vehicles on three month launch centers in the following order:

(1) NASA (FV-N2), 60 day manned flight;

(2) DOD (FV-4), 30 day all-up experiments mission;

(3) NASA (FV-N3), 60 to 90 day manned flight;

(4) DOD (FV-5), 30 day all-up experiments mission;

(5) NASA (FV-N4/N5), dual launch, rendezvous, and solar astronomy experiments.

(6) DOD (FV-6), second generation experiments mission and DOD (FV-7) second generation experiments mission.

2. Task: This schedule should be examined from the facilities viewpoint to determine if additional production facilities are required to maintain the three-month launch interval and if an additional launch pad is also required prior to the dual launch.

C. Hardware and Production Facilities for NASA

1. Basic baseline MOL vehicle consists of Gemini B, Laboratory Module, Mission Module, and T-IIIM, less experiments hardware. There will be no change in vehicle structure or subsystems (e.g., ECS, power, ACTS, telemetry, etc.). Incorporation of NASA experiments into space available and into power distribution system will be limited to strap down fixtures and patch panels.

2. Security requirements will not be a consideration in establishing fabrication, assembly, test or check-out

facilities at either Huntington Beach or the launch base for NASA work. Any additional facilities must be identified with technical needs or production conflicts.

3. The five NASA vehicles will be in the following configuration (all less MOL mission equipment).

a. FV-N1 - 30 day MOL baseline as initial vehicle.

b. FV-N2 - MOL baseline with minimum modifications for 50 to 60 day on-orbit manned operation.

c. FV-N3 - MOL baseline vehicle with minimum modification to extend 60 day on-orbit life 70 to 90 days. Do not attempt to do engineering analysis to describe vehicle configuration. Use available data from LDO study.

d. FV-N4/N5 - Dual launch mission in which the first vehicle is an unmanned vehicle which will transport a version of the NASA Astronomical experiment into orbit to be rendezvoused and docked with the second vehicle, a manned NASA/MOL. The configuration of the unmanned vehicle, FV-N4, will be jointly determined between NASA and the Air Force. Principal design constraints for the unmanned vehicle configuration will include the launch capability

of the T-IIIM, NASA experiments requirements and minimum modification to basic MOL hardware.

e. Task: This mission requires an examination of the need for a second launch pad at WTR and an examination of the alternative course of action for a minimal turnaround time on a single launch pad. For the minimal turnaround option it will be assumed that the unmanned vehicle can be left dormant in orbit during turnaround operations.

D. Launch Facilities

1. There will be full joint use of VAFB facilities. Security will not be a condition in establishing facility requirements.

2. Task: Examine, on joint usage basis, launch of four vehicles per year, two Air Force and two NASA.

3. Task: Determine need dates and identify additional resources (AGE, fuel storage, etc.) and construction schedules for a second MOL launch pad in the SLC-6 Complex controlled by the present block house.

4. Task: Examine cost and schedules associated with minimum launch pad turnaround time on a crash basis to support NASA FV-N4/N5 dual launch from a single launch pad.

E. Mission Control and Operations

1. Assume NASA joint use of AFSCF network for mission control.

2. Assume that no more than one AAP or MOL mission is in orbit at any time.

3. Security will not be a condition for establishing facility requirements.

4. Task: Examine AFSCF capacity to accommodate NASA/MOL flights assuming AFSCF is modified to accommodate AF MOL. (NOTE: Overall NASA/DoD space tracking and control facilities are the subject of a separate study).

F. Fiscal

1. Task: Cost schedule in B above showing costs due to NASA involvement as delta costs to the present MOL program.

2. Task: Cost NASA/MOL vehicles based on MOL recurring costs for additional baseline vehicles less MOL mission experiments.

3. Task: Identify NASA nonrecurring costs for a 60 day and extended 60-to-90 day on-orbit capability where possible.

4. Task: Identify FY 69 additional funding required and FY 70 budget estimate to relieve schedule constraints imposed by Air Force FY 69 NOA of $515M to improve flight schedules as much as possible on a non-crash basis.

5. Assume MOL experiments are adequately funded to meet the earliest availability date of AF FV-3.

6. No provisions will be made for backup vehicles for either the DoD or NASA program.

7. Costing of NASA experiments and experiment integration is not required.

G. Plan 1, Option A

Task: Cost schedule in B above with launches centered on a four-month interval in lieu of three-month intervals and show savings or deferrals in facilities and resources.

GUIDANCE (Plan II)

A. General

1. Guidance for Plan II remains consistent with Plan I except for:

a. Flight schedule. (Minimum of two DoD launches per year is unchanged).

b. One NASA/MOL launch per year or as required.

c. NASA dual launch (FV-4N/5N) has primary mission of rendezvous and resupply with selected scientific experiments as a secondary goal.

2. In Plan II the sequence of DoD/NASA flights are arranged to:

a. Allow adequate control between DoD flights for detailed mission evaluation and engineering feedback.

b. NASA flights scheduled to be compatible with DoD/NASA needs for technical, biomedical and performance data.

c. Vehicle configurations are the same as Plan I.

B. Schedule

1. Qualification flights as soon as possible.

2. First NASA (FV-N1) as soon as possible.

3. First DoD all-up flight (FV-3) follows first NASA manned flight by a three to four month interval depending upon both technical and operational considerations.

4. Remaining vehicles on four to six or more month launch centers depending on technical capabilities and requirements (assume non-uniform intervals):

a. NASA (FV-N2)

b. DoD (FV-4)

c. DoD (FV-5)

d. NASA (FV-N3)

e. DoD (FV-6)

f. DoD (FV-7)

g. NASA (FV-N4/N5)

C. Fiscal

Task: Examine cost, schedule, resource requirements and conflicts associated with the Plan II schedule.

D. Other

Task: Comment in narrative form on Plan II concept and schedule desirability.