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DEPARTMENT OF THE AIR FORCE
WASHINGTON 20330

OFFICE OF THE SECRETARY

APR 22 1969

MEMORANDUM FOR DR. SEAMANS

SUBJECT: MOL FY 70 Program Options

In furtherance of our telephone discussion yesterday morning, I have "sharpened-up" (hopefully) a draft memorandum to the President on MOL.

The opposite page version attempts to objectively set forth the pertinent facts, factors, and intangibles which should be considered prior to deciding whether to continue the present MOL Program, only the camera, or terminate the total effort. The paper should support either a decision to continue the present program or only the camera system in FY 70 -- the choice depending on personal weighting of the various elements. For that reason, the recommendation at the end has been left blank.

I understand there was a brief discussion on MOL Friday afternoon -- apparently between Mr. Packard, Dr. McLucas and Dr. Tucker. I gather that prior to the meeting, Dr. Tucker sent Mr. Packard a copy of the draft memo attached as Tab A (Mr. Benington, DDR&E, and I had collaborated on an earlier version which I felt we had slanted toward rationalizing MOL termination).

I think the draft attached as Tab A is still slanted somewhat -- in overemphasizing various items, and overlooking or underplaying other aspects of both MOL and an unmanned VHR system; and further, it confuses the issue -- at least, to me -- with GAMBIT-3 considerations which are not pertinent to a choice between MOL and an unmanned VHR system.

A certain amount of pride of authorship undoubtedly influences my preference for the opposite page version -- however, in my opinion, it does include all of the pertinent information and is organized for somewhat easier reading. If you feel this paper would provide some useful background information to Mr. Packard, a proposed transmittal note along those lines is attached at Tab B.

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HANDLE VIA
BYEMAN-TALENT-KEYHOLE
CONTROL SYSTEMS JOINTLY

For your information, Gen Ferguson advised Dr. McLucas earlier this month that he was assembling a group (Gens' Ferguson, O'Neill, Stewart, Martin, Bleymaier, Cooper, Berg, and Miller) to review the status of MOL, what program adjustments would have to and could and should be made to accommodate to the anticipated FY 70/71 funding, etc. This review is now scheduled for April 24 in Los Angeles. . . I assume General Ferguson intends to report the results to the MOL Policy Committee in early May.

JAMES T. STEWART
Major General, USAF
Vice Director, MOL Program

Atch
a/s

cc: Dr. McLucas

DORIAN/GAMBIT
HANDLE VIA
BYEMAN-TALENT-KEYHOLE
CONTROL SYSTEMS JOINTLY

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THE SECRETARY OF DEFENSE
WASHINGTON

DRAFT
Aug 18

MEMORANDUM FOR THE PRESIDENT

SUBJECT: MOL

The Manned Orbiting Laboratory(MOL) development is intended to provide very high resolution photographic reconnaissance of the Soviet Union, China and other denied areas. In the light of the heavy pressure on the Federal Budget, I recommend a reorientation of this program as follows: We should continue to develop the MOL camera system as part of an unmanned, covert satellite system in the National Reconnaissance Program. We should cancel all elements of the overt Manned Orbiting Laboratory Program and announce that we are doing this partly to conserve funds, partly because the program has slipped 2 1/2 years since first started, and partly because we can now pursue many of the original objectives with less expensive, unmanned systems. If we redirect in this way, we will save at least $350 million of the $525 million now budgeted for MOL in FY 70, and $490 million more in the FY 71-74 period.

I believe that it is very important that we pursue very high resolution photography. This resolution would provide many critical fine details which would allow us to determine a number of performance characteristics of emerging Sino-Soviet weapons systems well in advance of any operational tests, field deployment, or public display in parades or shows. If we achieve an agreement on arms limitation, the resolution would greatly increase our confidence that the agreements were being observed or it would probably indicate suspicious activity.

Before the March reduction in the DoD budget, the MOL Program included development of both manned and unmanned versions, with emphasis on the manned version. At that time, we revised the program to include four manned reconnaissance flights of 30 days or more duration. This program deferred further development of the unmanned version but retained the option of later conversion to an unmanned configuration.

I have just reviewed in detail the following program options:

1. An accelerated MOL Program which includes a manned version only and which we would fund so as to minimize total development costs.

2. Our revised MOL Program of proceeding at this time with only the manned version. This is the program we have submitted to Congress.

3. A satellite system, optimized to be unmanned, using the MOL camera and maintaining the present development pace.

4. An optimized unmanned system proceeding at a slower development pace. This is the program I recommend.

5. Cancellation of all activity.

We also considered two other options but rejected these as much too expensive in the long run. One of these would slow down the present manned program to a sustaining level in order to reduce FY 70 costs. The other would proceed first with the unmanned version of MOL and maintain the option for subsequent development of a manned system. Another argument against this latter option is that a major motivation for including the man has been his contribution in checking out the system.

For the five options that should be considered, the following table compares the schedules and remaining costs. Sunken cost to date is about $1200M.

Option	First Operational Launch	One-time R&D Costs to Go	Cost per Launch	FY-70
1. Accelerated MOL (manned only)	late CY 71	$985M	$130-140M	$590M
2. Present MOL (manned only)	mid CY72	$1140M	$130-140M	$525M
3. Optimized unmanned (present pace)	late CY 72	$600M	$70M	$260-275M

REVISED TABLE ATTACHED

REVISED TABLE ATTACHED

Option	First Operational Launch	One-time R&D Costs to Go	Cost per Launch	FY-70
4. Optimized unmanned (slower pace)	late CY 73	$650M	$70M	$150-175M
5. Cancel all activity	--	$25M	--	--

You will note that in both the manned and the unmanned case, slowing the program and reducing FY 70 funding (options 2 and 4) increases the total R&D cost compared with faster programs (options 1 and 3).

The costs of the unmanned system, both one-time and recurring, are lower because this system does not need to provide life-support systems for the astronauts. Instead, the film would be retrieved with reentry capsules as is done with other photographic satellites. The unmanned system would use the TITAN III-D booster and launch pad being developed for HEXAGON instead of the more expensive MOL/TITAN III-M facility. It probably would also use the HEXAGON spacecraft which has been kept compatible with the MOL camera and payload.

A manned MOL system would have certain advantages in both development and operation. During early launches, the astronaut can closely monitor photographic quality and continuously attempt to diagnose problems.

In order to achieve [redacted] resolution, a number of critical camera functions must be performed with great precision. We are more confident that these can be performed by the astronauts than by automatic systems we are developing. Such functions include:

1. Pointing the camera at a target with an accuracy of better than 2000 feet.

2. Tracking the target with the camera in order to eliminate smear in photographs.

3. Aligning and focusing the optical system on-orbit.

If all the automatic devices meet their specifications, the very best resolution of the manned and unmanned systems will be nearly the same

(approximately [redacted]. The manned system would always average about 10 percent better resolution at the aiming point, since accurate pointing is a simple task for the astronauts (the resolution degrades somewhat from the center of the picture toward the extremities). Specified and reliable performance for these automatic capabilities may take longer to achieve than would be the case with manned capabilities. However, we are confident we would achieve some [redacted] photography during the first flights of an unmanned system.

For both the development and operational phases, the astronauts would increase system reliability by 5-10%. The astronauts could repair certain malfunctions and could back up some of the automatic systems if they failed.

The astronauts have additional advantages during operational flights. They can adapt the reconnaissance to weather and activity observed on the ground. Since the camera only covers a circle on the ground about 1 1/2 miles in diameter per photograph, and since the satellite is moving at a rate of four miles a second, the system can only photograph a few installations on one pass over an area such as Moscow or a large missile test range. The astronauts could observe through separate viewing telescopes which priority targets are cloud-free and which ones have activity of unusual intelligence value. As a result, the manned system could photograph 10% more unique targets than the unmanned. More important, 5-10% of the photographs of the manned system will be of time-sensitive targets captured at a significant moment. Only 3% of the photographs of the unmanned system will be time-sensitive. Finally, the astronauts could visually reconnoiter ground targets [redacted]

In summary, the astronauts in a manned system would increase the likelihood that we will develop the highest resolution sooner, that we would photograph some important targets in a more timely manner, and that we would have flexibility not practical in an unmanned system.

The following table compares the performance of the manned system, a system optimized to be unmanned, and what we expect from GAMBIT, our current best high resolution system:

DORIAN GAMBIT HEXAGON

System	Best Resolution	Days on Orbit	Priority Targets/ Day	Cost/ Launch	System Reliability (initial/mature)
Manned	[redacted]	42	95	$130-140M	85/93%
Unmanned		45	80	$70M	65/85%
GAMBIT		20	90	[redacted]	90%

The cost per photograph of a significant target varies with many factors including target size, target clustering, weather, system reliability, and astronaut performance. The following estimates assume that development costs are written off over ten launches, and that the adaptiveness of the astronauts to photograph time-sensitive targets increases system effectiveness by 10%.

Cost/significant target

	First five flights	Next five flights	Subsequent flights
Manned system	$73K	$66K	$34K
Unmanned system	$60K	$44K	$23K
GAMBIT		[redacted] (already developed)	

As you can see, once development costs are written off, the cost of the unmanned system is comparable to GAMBIT. Two successful unmanned flights per year would provide 4500-600 target looks, even in the early phases of the program. If HEXAGON and a very-high-resolution are successfully developed, this number of target looks would probably allow us to phase out GAMBIT and still provide much better technical intelligence and surveillance than we have today. The manned system, because of its higher reliability and adaptiveness, would have a 30%-50% higher target capacity. However, there is a question as to the value of the additional capacity.

The manned system could have significant advantages compared with the unmanned system:

1. It could be operational two years sooner.

2. We are confident that it would achieve high resolution and high reliability in fewer launches.

3. After both were mature, it would have slightly better resolution, flexibility, and capture more time-sensitive targets.

4. It would provide us operational experience and technical data on a man in space continuously performing complex tasks for 30-42 days.

These are important advantages, whether or not we reach an agreement on arms limitation. However, I reluctantly conclude that we should pursue an optimized unmanned configuration. For the past year and a half, the MOL development has been at the stage where annual investments of over half a billion dollars must be made to realize progress. An unmanned development would reduce FY 70 expenditures by at least $350 million and FY 71-74 costs by perhaps $490 million more. The lower cost of this unmanned very high resolution system and the deployment of HEXAGON might allow us to phase out the GAMBIT system once the two new systems achieve their desired performance and reliability levels.

If we proceed at our current development pace with a system optimized to be unmanned, we should achieve a first launch by the fall of 1972. Slowing down somewhat may delay first launch by six months or so, but will reduce development risks and allow us to further refine the technical design of the unmanned system. Accordingly, I recommend the slower pace.

If we do pursue the unmanned option I have recommended, a number of contractors will have to lay off personnel. I have listed below the major contractors, their role in the program, and the probable lay-offs which would result. One consequence is that overhead costs on other Defense contracts will be increased.

There are currently four major contractors working on MOL:

1. McDonnell-Douglas in Huntington Beach is developing the basic spacecraft and in St. Louis is developing the Gemini B astronaut recovery system. 4300 people and 1200 people would be laid off, respectively.

2. Martin in Denver and several associate contractors are developing the TITAN III-M booster. 2600 people laid off.

3. General Electric in Valley Forge, Pennsylvania is developing the camera controls needed for both manned and unmanned systems. 1000 people laid off.

4. Eastman Kodak in Rochester, New York is developing the camera and optics. This is a covert activity. 300 people laid off.

Additionally, perhaps 2500 1st-tier Sub-contractors in various areas of the country would be terminated. In all, about 12,000 people would be laid off. The greatest impact probably would be on McDonnell-Douglas in California and General Electric in Valley Forge where there is little other Air Force or NASA work to take up the slack.

The estimated savings of an unmanned system assume a decision on 1 May. Currently, we are spending $45 M per month on the MOL program. If we delay the decision, the savings erode at a rate of about $1.25 million per day.

Since the unmanned option is a public termination of MOL and either cancels or reduces several major government contracts, some public announcement would be needed. There would be two broad options:

1. Announce that the manned component of MOL has been terminated but that we will retain a program and perform a number of experiments in unmanned systems. In this case, we would announce the actual saving of roughtly $350 million in FY 70.

2. Announce that the entire program has been terminated and that savings will be about $500 million in FY 70. Under this option, we would need to hide $150-175 million in other FY 70 budget elements.

I recommend the second option. This will better protect the security of the National Reconnaissance Program.

Just prior to or coincident with a press release, I would advise the Chairmen of the appropriate Committees, and our Legislative Liaison people would notify the Congressmen from the States most seriously affected. The press release, which can be made from either the White House or my office, should make the following points:

1. We have terminated the MOL Program with savings close to $500 M in the forthcoming Fiscal Year.

2. We have terminated because of delays and cost increases in the program and because, in the meantime, technology has given us the option of achieving many of our objectives with lower cost, unmanned systems.

3. We will conduct some of the experiments planned for MOL in other unmanned Defense spacecraft that we have or are developing.

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Draft

MOL PROGRAM OPTIONS

Option	First Operational Launch (Mature)	One-time R&D Costs to Go	Cost per Launch	FY 70 (Current Progra $525 M)
1. Accelerated MOL (manned only)	Jan 72 (Jul 73)	$1045M	$130-140M	$590M
2. Present MOL (manned only)	July 72 (Jan 74)	$1140M	$130-140M	$525M
3. Optimized unmanned (present pace)	Oct 72 (Mar 75)	$600M	$70M	$260-275M
4. Optimized unmanned (slower pace)	Jan 73 (Jul 75)	$680M	$70M	$175M
5. Cancel all activity	--	$25M	--	--

This table should replace the table starting on page 2.

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