

MAY 14 1968



MEMORANDUM FOR GENERAL BLEYMAIER

SUBJECT: May 6, 1968 PRC Meeting

Forwarded herewith are the official minutes
of the May 6, 1968 PRC meeting.

SIGNED

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

1 Atch
a/s

*Cy sent to
Gen. Bleymaier 15 May -68*

~~SECRET~~

Handle via BYEMAN
Control System

May 14-68

MEMORANDUM FOR RECORD

SUBJECT: May 6, 1968 PRC Meeting

An MOL Program Review Council meeting was convened at the MOL Systems Office on the afternoon of May 6, 1968. Principals in attendance were:

Dr. Flax General Bleymaier
General Ferguson General Martin
General Stewart

The agenda consisted of the Deputy Director's Report, a demonstration of the MOL Astronauts Pressure Suit, IVS Status, and a review of the EC/LS and the Gemini B dual gas system. A summary of the events and discussions for each of the agenda items follows.

Deputy Director's Report

General Bleymaier reviewed the current program financial status and outlook, projects EMILY and UPGRADE and future events and problems.

The present situation was reviewed against the December 15, 1967 decisions and good progress has been made. All FY 68 funds have been received and will be gainfully obligated by the first week in June. The contractors are being closely tracked to insure that their performance and progress is consistent with our agreements and schedules. FY 68 expenditures and fees will be 100% covered, and the non-cancellable commitment situation will be slightly better than forecast. We now expect to end FY 68 with program exposure reduced to something under \$35 million. In response to his question, Dr. Flax was assured that all the financial estimates now included the T-IIIM contracts. He expressed some concern with the very large difference between commitments and obligations as of 31 March, \$622.1 vs \$698.7 million, but was assured by General Bleymaier that this gap would disappear in the next few weeks.

In response to an earlier request from General Stewart, the Systems Office had examined the impact of a FY 69 NOA of \$520 million. In their judgment this level of funding would cause a five to six month slip, but would enable us to end FY 69 in a completely solvent financial position (i.e. no exposure). Dr. Flax asked how much turndown there would be in the expenditure rate for GE and McDac. The answer was \$30 million for McDonnell Douglas and \$27 million for General Electric. The non-cancellable commitments would come down slightly.

DORIAN

WORKING PAPERS

Handle via BYEMAN
Control System

~~SECRET~~

Page 1 of 7 pages
Copy --- of --- copies
SAFSL Control 68520-68

~~SECRET~~

Handle via ~~BYEMAN~~
Control System

Dr. Flax, during the current year financial status presentation, questioned the change to the T-IIIM financial position. Previously the estimate was that they would be exposed to about \$11.0 million. The current estimate was now \$8.4 million. General Bleymaier feels \$8.4 million is a good estimate which might possibly be reduced even further.

In his presentation of the FY 69 \$600 million NOA plan, General Bleymaier stated that the accumulated exposure at end FY 69 is estimated at approximately \$54 million, but that this estimate is based on the contractors' figures and the actual position should be better. Dr. Flax asked how much of the contractors' authorized FY 69 and total requirements is still unnegotiated. The reply was on the order of 15%, i.e., \$100 million for FY 69, and 50% for the total program.

General Bleymaier mentioned the Eastman Kodak Company requirement for a 20,000 square foot addition to building 101 for storage space. Dr. Flax asked if there wasn't any other available space, and if this was space they had identified before. In reply, General Bleymaier pointed out that EKC had requested the addition some time ago, but we had wanted further information before making our decision. He also stated that the FY 68 and 69 financial plans included money for possible additional facilities. Dr. Flax asked that we submit specific information on what is needed.

General Bleymaier then proceeded to a discussion of the status of Project UPGRADE. The detailed audit of all the documents, specifications, exhibits, CEI's etc. is now complete and the documents are compatible. On May 22 there is to be a meeting with all the program contractors at Huntington Beach. It is intended that by May 30, the contractors will all sign off on the update which will then be used as the negotiation basis. The cooperation and response of the contractors and Aerospace has been excellent.

Mr. Tennant of Aerospace carried on the presentation with a review of how the detailed specifications had been better defined. For example:

- The pointing capability requirement has been restated to describe picture taking capability. This is considered a better parameter since pointing does not describe resolution at the edge of the frame.
- Film quantity is now stated in number of frames rather than pounds.

DORIAN

Handle via ~~BYEMAN~~
Control System

~~SECRET~~

Page 2 of 7 pages
Copy --- of --- copies
SAFSL Control 68230-68

~~SECRET~~

Handle via DTEAM
Control System

- The orbit inclination parameter has been changed from 80°-100° required, 60°-125° design objective, to 80°-100° required. Dr. Flax agreed with the change, but wants to be sure that we keep sight of the fact that we may want to have the wider inclination flexibility.
- The contamination degradation capability has been specified at not more than 1% for camera optical resolution. In response to his question, Dr. Flax was told that this meant 99% of each picture would be clear, but the contractor was not happy with this constraint.
- Thermal effects degradation is now stated at not more than 3 lines/millimeter at any time during 6 target passes. This degradation is over and above the [REDACTED] resolution requirement.

Dr. Flax cautioned that we must be careful how we write the specifications, to recognize what the objectives are, and what the losses will be. There are two entirely separate techniques necessary to restate or adjust specifications from those which already exist. Thus, for example, in the present specification, the ATS resolution in no way has the stature of, or is comparable to the [REDACTED]. Mr. Kirk asked if the specifications would provide a basis for determining system performance since it would be nice if we could use the specifications for this purpose. There was some discussion on this subject and it was concluded that at the CEI level, the SP/DR requirements reflect the performance parameters.

The Deputy Director summarized his presentation as follows. We are tracking our progress against the November/December decisions. The financial controls and agreements have proven effective thus far. About \$5 million remains to be put on contract. The total program exposure is expected to be \$31-\$33 million. No major financial problems are foreseen.

Suit Demonstration

An excellent visual display and demonstration of the MOL and Gemini/Apollo suits was provided, and very effectively demonstrated the suit differences. The MOL suit requirements are almost identical to the NASA suits except for the increased mobility requirement, and the self donning and doffing capability. The MOL suit is the first one having a hip-waist joint which makes use of a molded rather than a pressure convolute. Suit donning and doffing time is 5 minutes or less.

DORIAN

Handle via DTEAM
Control System

~~SECRET~~

Page 3 of 7 pages
Copy --- of --- copies
SAPSL Control 68520-68

~~SECRET~~

Handle via ~~EVERMAN~~
Control System

Dr. Flax asked what the normal suit pressure was. Answer 3.7 psig, but can go up to 5 psig. In response to his next question he was informed that there will be only one suit per man carried on the MOL flights. During the demonstration, Dr. Flax expressed concern with the similarity between the suit input/output valve connectors which he regarded as a potential hazard. He observed that there is a fundamental rule that if something can be connected the wrong way, someone will do it. The briefer indicated that the valves on the suits to be used as flight articles would be not only color coded but also physically different.

IVS Status and Evaluation

Dr. Malkin, GE/MOL Program Manager, presented a review of the RDT&E plan for the IVS, the lessons learned and recommendations for proceeding with the IVS work.

Based on their very recently completed competitive open-loop tests, GE recommends that the Itek work be terminated, and that the Hycon and Goodyear contracts be continued and the final vendor selection be made, if possible, in January 1969. He described the test procedures and apparatus, reviewed in very brief detail the different technical concepts employed by the competitors and the deficiencies and solutions to these deficiencies for each contractor. Stated as simply as possible, the conceptual differences are as follows. The Itek system uses a "wobulator" flat glass plate through which the scene image passes onto a vidicon where it is scanned by an electron beam. Image modulation provides information for the direction of image motion. The Goodyear systems uses a "correlatron". The initial sighting of targets is stored on a grid, and subsequent sightings of the target are superimposed on the original image. The beam is shifted to obtain a match, and the rate of the shift is proportional to the image velocity. The Hycon system uses a chopper disc rotating at a very high rpm past the image. A matched square wave signal produced by a photoelectric cell matches the zero crossings which are moving as the image moves. The rate of motion of the matched square wave which follows, is proportional to the image velocity.

The presentation was accompanied and followed with considerable dialogue. Dr. Flax stated that from a technical standpoint he did not have particularly high confidence in either the Hycon or Goodyear concepts. The problem is a very fundamental one since the IVS is critical to the manned, as well as the unmanned system. He asked if Itek agreed with GE's analysis of the Itek system. He didn't want them coming in at a later date crying foul. Dr. Malkin responded that the contractors were kept very close to the GE test program and Itek did not argue with the results. Dr. Flax then asked if we

DORIAN

Handle via ~~EVERMAN~~
Control System

~~SECRET~~

Page 4 of 2 pages
Copy --- of --- copies
SAFSL Control 68250-68

~~SECRET~~

Handle via ~~DREMAN~~
Control System

should consider another approach. Dr. Malkin answered that GE had a high confidence in the ability of Goodyear to correct the correlatron problems, and in the ultimate promise of the Hycon system. General Stewart stated that Hycon has a long history of coming up with a good idea, but then failing to deliver reliable and useable hardware.

There was then some discussion about whether we had thoroughly looked over the field for ideas and contenders. For example, EKC, Perkin-Elmer, Wright-Patterson, etc.

Dr. Flax asked if the Systems Office had reviewed the GE recommendations. Dr. Leonard of Aerospace, stated that they had and they agreed with the GE recommendations. He did admit that we are probably facing a tough problem.

Dr. Flax then discussed the possibility of using $\frac{V}{H}$ information for the IVS. He suggests using $\frac{V}{H}$ of the scene we are looking at as a rough approximation of the $\frac{V}{H}$ scene that the IVS is looking at. The idea is considered to have possibilities and will be looked at by GE and Aerospace.

Dr. Flax then asked if in the selection of the IVS contractors we are leaving ourselves with the possibilities that will work. Is there a new approach worth looking at? Dr. Malkin responded to the first question with an unequivocal yes. Dr. Leonard responded to the second question with a no.

General Martin then remarked that by requiring the IVS to function at a light level less than that required to get [REDACTED], we are asking for something which is more stringent than the camera requirement. By limiting the light requirement to that required for [REDACTED] the IVS problem may not be so severe. All principals agreed that a first order of business is to look at the stated light level requirement for the IVS.

Dr. Flax then asked that the analyses and recommendations on the IVS be provided to him for presentation to Dr. Brown. No further termination action on Itek is to be taken until this is done. The Systems Office and GE are to provide the Program Office and Dr. Flax with complete information. Furthermore, a separate ad hoc group probably will be convened to review the requirements, technology, ideas, competence, etc. General Stewart was requested to explore this latter item with the principals.

DORIAN

Handle via ~~DREMAN~~
Control System

~~SECRET~~

Page 5 of ? pages
Copy --- of --- copies
SAFSL Control 6853068

~~SECRET~~

Handle via BYEMAN
Control System

EC/LS and Crew Systems

Mr. Barry Moss of Aerospace presented a detailed review of the individual EC/LS subsystems.

On the subject of Helium/Oxygen vs Nitrogen/Oxygen, he indicated Helium provided a weight saving of 50#. Dr. Flax pointed out that saving 50# doesn't impress anyone. We must be sure that the use of Helium is based on at least equal medical and safety considerations. Colonel Karstens restated the reasons for selecting, and confidence in, a Helium/Oxygen system.

A current minor problem is expelling approximately 40#/day of accumulated water without introducing a high isp when the water is vented overboard. In response to his question General Stewart was advised that the water line pressure is 80# psi in the panel cooling lines. He then asked why we're not using the same tanks for both H₂ and O₂ as NASA does. The answer was that tank design and size had been arrived at by optimization of the tank size best suited to each gas.

Mention was made of a problem with the mass measurement (weight scale) device. Aerospace considers the McDonnell-Douglas (HB) concept unacceptable. The Aeromedical Division concept is favored at this time but a place for stowage of the device is yet to be identified.

General Stewart raised a question as to whether or not it is true that we are buying a new astronaut transfer van. The answer was no at this time, but that we will need to get one somewhere. Dr. Flax asked about the possibility of using the SR-71 van. Mr. Kirk suggested we should first determine whether a van will be available, or if we will have to buy one. The Systems Office will work this problem.

Gemini B Dual Gas System

Mr. Pittman of Aerospace made the last meeting presentation in which he briefly reviewed the dual gas system constraints, and operation on pad, in ascent and early orbit.

General Stewart pointed out that NASA was removing the N₂ as rapidly as possible and wondered why. Colonel Karstens responded that he thought it was because they want to go onto 100% O₂ as early as possible in the mission so that they can start the operational phase of the flight ASAP.

The presentation concluded the May 6 PRC meeting.

DORIAN

Handle via BYEMAN
Control System

~~SECRET~~

Page 7 of 7 pages

Copy --- of --- copies

Control 68522-68

~~SECRET~~

Handle via ~~DTEMAN~~
Control System

Summary of Action Items

a. Details of storage space facility addition to building 101 are to be provided to Dr. Flax.

(Systems/Program Office)

b. Information regarding the basis for GE's recommendation for termination of the Itek IVS work is to be provided to Dr. Flax for presentation to Dr. Brown.

(Systems/Program Office)

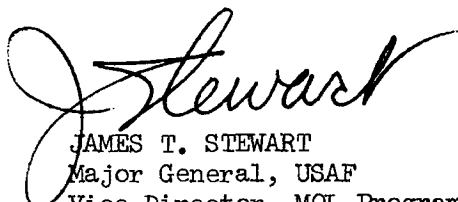
c. A group is to be formed to investigate all aspects and possibilities for resolving any potential IVS problems and thus avoid a critical problem at a later date. This action is to be completed if possible by May 31 and recommendations available for the next PRC meeting.

(Program Office)

d. The requirement for an Astronaut Transfer Van is to be investigated to insure the cheapest possible solution.

(Systems Office)

Copies of the briefing charts used at this meeting are on file in SAFSLP.


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

DORIAN

Handle via ~~DTEMAN~~
Control System

~~SECRET~~

Page ___ of ___ pages
Copy ___ of ___ copies
SAFSL Control _____