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13 FEB 1967

MEMORANDUM FOR GENERAL MARTIN

SUBJECT: Comments Related to the Benefits of the Presence of Man

1. The following paragraph pertaining to the benefits provided by the presence of man to the effective accomplishment of the reconnaissance mission of the MOL Program was contained in a directive from Dr. Flax entitled "Policy Relating to MOL Astronauts", dated 28 Dec 66.

"The nature of the primary mission of the Department of Defense MOL Program, which is the acquisition of high resolution reconnaissance photography, is such, that the on-board presence of man, as an integral part of the intelligence collection system, is intended to provide benefits to the effective accomplishment of this mission not technically possible through the use of an unmanned satellite. Initial studies suggest that the inclusion of man will enhance such benefits with respect to providing: (1) a manual backup for complex automated functions especially in the development phase; (2) manual repair or adjustment of sensor elements, controls and displays during on-orbit operations; (3) a greater percentage of cloud-free photography; (4) a possible quick reaction intelligence readout capability; and (5) target selectivity."

2. One cannot disagree with the opening statement of the above paragraph because it is only a pronouncement of the intended role of man in the MOL mission of high resolution reconnaissance photography. That is, the man in the "loop" is intended to provide benefits to the effective accomplishment of this mission (high resolution photography) not technically possible through the use of an unmanned satellite. Following are comments on each of the five examples given as areas of mission enhancement provided by the man.

a. "a manual backup for complex automated functions especially in the development phase": It is correct to state that the man provides a manual backup to the automated reconnaissance functions. That is, in the early days of the program he was the only source of optical alignment, target acquisition and centering and target tracking. In the current baseline these functions are done automatically by an alignment sensor, by programmed aiming made possible by a more precise navigation and

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control system plus across the format IMC, and by a tracking (V/R) sensor. However, the man can still take over and manually perform these functions in the event of failures. Of course, this is not to say that one could not build in considerable or complete redundancy for these functions in an unmanned approach. One can argue that in the development phase the availability of manual backup provides more data from early flights thereby speeding system maturity.

b. "manual repair or adjustment of the sensor": Obviously the man on board has a much shorter screwdriver than the engineers in the SCF and we are making every attempt to exploit this repair and maintenance benefit in the areas that it appears feasible and within the system weight constraints. Actual repair of the sensor will be minimal. However, there will certainly be meaningful trouble shooting and health checks which can be performed and limited black box replacement possible in the laboratory.

c. "a greater percentage of cloudfree photography": All targeting studies have shown an improvement in percentage of cloud free photography when the man is used as a weather sensor working essentially the manual mode. This improvement seems to be about 20%. In the active target indicator mode the main optics is programmed completely automatically and all weather sensing, if any, must be done by the V/R sensor. In this mode the basic "take" of a man and unmanned system would be the same, disregarding the active target improvement factor in the manned case.

d. "a possible quick reaction intelligence readout capability": In the present baseline the manner of incorporation of readout has been based on the presence of man because he is there. It is certainly within the technology to completely automate a readout capability if quick reaction is a requirement.

e. "target selectivity": In the active target indicator mode the MOL/Dorian system actually has the capability to access three targets simultaneously. That is, as one target is being photographed at [REDACTED] resolution by the main optics the two astronauts are each visually examining a target at 3' to 10' resolution with the acquisition scopes (Big Eye). Based on this examination the astronaut may elect to interdict the program of the main optics and acquire photo coverage of a more active target.

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