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31 JUL 1967

MEMORANDUM FOR: Director of Special Projects

SUBJECT : Days and Film for J-1 and J-3

1. Recently a number of different proposals have been put forward for modifying the mission duration and/or the film loads for both the J-1 and the J-3 configurations. This memorandum is an attempt to develop a logical basis for establishing the relative value of these proposals.

2. The remaining J-1 systems have a maximum mission duration on the order of 14 days and a maximum film load of slightly over 6,000 frames per camera for the current configuration. This maximum mission duration is dictated both by expendable considerations and by the milar tape footage in the H timer. [redacted] has proposed to increase the mission duration by slowing down the H timer and by mounting additional expendables, particularly batteries, on the Agena aft rack. The timer can be slowed conveniently to two-thirds its current speed yielding a mission of 21 days, or half its speed yielding a mission duration of approximately 30 days.

3. As there is very little that can be done consistent with the J-1 hardware schedule to increase the J-1 film load by more than a few feet, the first question that must be addressed is whether or not there is enough film capacity to justify a 21-day mission. All work we have done to date by way of CORONA mission analysis indicates that at 14 days with the 6,000 frame capacity, the J-1 is not film-limited. We are in the process of completing a post-mission evaluation of 1038 for which the cloud forecasts were unusually favorable. Although, of course, all the film was expended during the 12-day mission, it was not necessarily expended in an optimum manner. For example, 33 percent of the

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film was expended against the mapping and charting requirement. The yield and useful coverage was less than one-half million square miles, which is something like 18 percent efficient. Although this may be the best that can be done against these particular high cloud cover areas, it means that for a few percent sacrifice in return for the mappers, substantial film is gained and could be employed elsewhere. It appears that the mapping expenditures are as high as they are simply because there is little else to do with the film, given the current utilization plan.

4. It also appears that the programming options are not being cut into the tape in a manner which takes full advantage of dual intermix programmer capability. Large quantities of film are being expended against the so-called high-priority test target complexes for relatively low returns. A post-mission study to determine the maximum possible film expenditure against 1038 holiday areas was conducted and led to the conclusion that even with the weather threshold set at 40 percent or more predicted cloud free, only 2,200 frames could be expended against the six-month holiday areas. And again 1038 was an unusually good mission from a cloud cover point of view. This is a further indication that J-1 does not appear to be short of film.

5. The conclusions of the above are that more days for J-1 is the right direction in which to move. However, in order to realize an advantage of increased days, the system utilization must be carefully modified accordingly. Also, slowing down the programmer to the two-thirds speed results in a four percent to six percent additional film wastage due to programmer limitations. Another factor which will in effect waste additional film is reliability. Not all missions will go 21 days, but film must be planned on the basis that any given mission will. More film will be wasted due to missions falling short of 21 days than is now wasted due to missions falling short of 14 days. This is the case because the probability concluding a 14-day mission as planned is higher than for a 21-day mission. We are generating estimates as to how much film this may involve.

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6. Another factor which impacts this situation is that we generally fall considerably short of the 81 percent objective to cover the portions of the Sino-Soviet Bloc. Even with the current mission durations, we could do better against this requirement by a different film utilization plan. This involves retaking areas before they reach five months since last coverage. This strategy, while yielding better performance against the stated requirement, would also require more film and would tend to bring the days versus film balance closer to optimum.

7. However, aside from all of the above considerations, the fact is that all of the remaining J-1 missions are planned to carry [redacted] satellites. With the [redacted] on the aft rack, the required additional expendables on the 21-day mission cannot be carried. Particularly given the [redacted] requirement, it is difficult to imagine that there is a very high probability of a J-1 launch without a [redacted]

8. One can summarize as follows:

a. The probability of having the weight available on a J-1 launch [redacted] required to support a 21-day mission appears low.

b. To gain an advantage from a 21-day mission with the constraints on total film would require a different and more optimum approach to film management, particularly in the face of the added film wastages associated with the 21-day mission.

c. Although the current methodology for operating the J-1 system does result in excess film for a 14-day mission, there are probably other film utilization methodologies that could result in better performance against the stated requirements within the constraints of the 14-day mission.

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In view of all of the above considerations, particularly a., it is difficult to see any logic in increasing the maximum J-1 mission duration capability. If the slow programmer were to be used on all J-1's, including those carrying [redacted] and therefore having 14- or 15-day mission durations, the increase of the mission life capability would clearly be the wrong thing to do in that the film wastage penalties would be paid for all remaining J-1 missions.

9. The J-3 configuration, aside from the first few launches, is planned for a 14-day mission duration with UTB film and with a more efficient programmer arrangement (the shift register). With 9,000 frames of UTB and the lower average operating altitude, J-3 will have sufficient film to cover a few percent more area per mission than the current J-1 configuration. In addition, it is planned to remove the horizon optics at some point gaining additional 3.6 percent of useful film. Furthermore, a preliminary examination of the shift register programmer indicates that some efficiency gains should be realized with the advant of this device.

10. In view of the above considerations and the conclusions with regard to J-1 being days-limited, not film-limited, it appears that J-3 must certainly be days-limited, not film-limited, at a 14-day mission. Therefore, one can conclude that:

a. Any increase in film weight with corresponding increase in systems weight is the wrong thing to do.

b. Increasing the film capacity of the 14-day J-3 is not an urgent requirement.

This would say, for example, that buying 12 percent added film by the addition of PIBS is not warranted. As in the case of J-1, some of this excess film can be applied towards improving the performance against the search requirements. Although this question requires further study, it does not appear that modifying the film utilization strategy in this direction will result in a days-limited rather than film-limited situation.

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11. The above conclusion raises the question of increased days for J-3. This would be accomplished at the expense of new launch vehicle development. Again we will have additional film wastages associated with programmer slow-down and reliability penalties. However, with substantially increased payload weight, the 25 pounds required by PIBS will no longer be a significant weight issue, and one can immediately gain something like 12 percent additional useable film by inclusion of PIBS. The question now is--what is the relative effectivity of a 21-day J-3 with slightly increased film capacity due to the additional PIBS, as compared to a 14-day J-3. There will undoubtedly be some increase in effectivity; however, this effectivity will not necessarily scale directly with the days. The increased effectivity must then be compared to the costs associated with the launch vehicle development and procurement, and a judgment made on the cost effectiveness of this course of action.

12. Of all the proposals that have been put forward with regard to the CORONA system, increasing the lifetime of J-3 appears potentially most attractive. The question which must be answered before the desirability of doing this can be addressed is--what increase in effectivity will result. We have underway two parallel approaches to this problem; one utilizing our simulation problem (Missim), and the other exercising J-3 in parallel with the current J-1 missions. It will probably take several months to get a good handle on the problem.

13. If it is decided to proceed with the new launch vehicle for the J-3 system with the primary objective of obtaining a [redacted] capability, then another set of questions must be answered. If, for example, an increased mission duration for J-3 can only be realized when [redacted] is not flown, then we must have some estimate of the frequency with which this will occur. On the other hand, if a 21-day mission can be achieved even with a [redacted] on board, then we probably

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should proceed with no further delay towards maximizing the film capacity and developing optimum utilization techniques for this configuration.

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