DEPARTMENT OF THE AIR FORCE
OFFICE OF THE SECRETARY

MEMORANDUM

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January 14, 1970

MEMORANDUM FOR THE RECORD

SUBJECT: Alternative CORONA System Configurations of Possible NASA Interest

On December 18, 1969 NASA received from Lockheed a presentation of alternative configurations of the CORONA system as a means to satisfying NASA's desires for a [redacted] (b)(1) (b)(3) Following this presentation NASA indicated informally that a configuration which would modify the CORONA system to include three index cameras would come closest to satisfying its requirements and asked our assistance in evaluating the Lockheed proposal.

Two of the proposed Lockheed configurations would incorporate three index cameras: Configuration C, consisting of three Fairchild DISICs with the two standard CORONA pan cameras, and Configuration D, consisting of three EK APTCs with the two standard CORONA pan cameras. The Lockheed pricing of a two-vehicle buy for these configurations was $26.4M and $35.9M, respectively.

On December 24, we asked our Program Office to evaluate the Lockheed proposal for both configurations and to provide us an assessment of

1. the validity of Lockheed's cost estimates

2. any problems anticipated in resurrecting cold production lines

3. the technical feasibility of the two proposed configurations

4. the true cost differences between the Fairchild DISIC and the EK APTC

5. the ability of a system so reconfigured to satisfy NRO needs should we require extended CORONA system availability

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6. the necessity of a funded definition of any such proposal for system reconfiguration.

The assessment of these questions is contained in the following paragraphs:

1. The total of $26.4M for Configuration C neglects the costs for a redesign and requalification of the "B" reentry capsule, which is estimated at $.6M. An additional $6M should be added for the two boosters and booster launch support for a grand total of $33M.

For Configuration D, the allocation of some of the costs is questionable; however, the total of approximately $36M is a reasonable estimate. The additional $6M for booster costs would increase this estimate to a total of $42M for a two-vehicle buy.

2. No insurmountable problems are anticipated in the resurrection of any of the production lines. Key contractor personnel are still available. Lockheed's presentation does make allowance for restart in terms of both cost and schedule.

3. Configuration C is technically feasible. Power usage would obviously be greater than the standard CORONA configuration, but the proposed minor modification to the solar array would probably suffice. If not, a third battery could be added. It may be necessary, however, to start the cameras sequentially to minimize current surge. (This comment also applies to Configuration D.)

Configuration D is technically possible but it does not appear to be cost effective. The suitability of the APTC for the NASA earth resources mission is questionable. LMSC has misinterpreted the specification data on the APTC and therefore has given the impression that the APTC has superior performance compared to DISIC. This is not true. The two cameras yield essentially equal resolution but the DISIC has an anti-vignetting filter which yields equal exposure across the format. The APTC does not have this feature. (Note: A visit to NPIC to compare actual products would be more beneficial than comparison of spec data.) Furthermore, redesign of APTC to operate without pressure and active thermal control would be a large unknown.

It would probably cause extensive redesign of the lens, film path, and electrical components. Conversely, redesign of the CORONA payload to provide pressurization and active thermal control of the APTC appears impractical.

LMSC has suggested the use of UTB in the APTC. The Program Office does not recommend this because of excessive non-linear distortion. The APTC with STB has a capability of 4220 frames, or 125.6 million square nautical miles with 10% end and side overlap. DISIC with STB has 5280 frames, or 157 million square nautical miles with a 10% overlap. (The Lockheed data is obsolete.)

The exact configuration of the payload, especially the reentry capsules, cannot be firmed up until the operational concept has been better defined. For example, the "A" capsule can hold 8000 feet of STG from each pan camera, plus 1100 feet of DISIC terrain and 660 feet of stellar photography. If the two added terrain cameras are operated simultaneously, they will feed a total of 2200 feet of 5" film into the "B" capsule in the same time period. However, there would not be room for the pan camera take-ups in the "B" capsule, so the second half of the mission would have to be operated without the pan cameras. (This mode of operation may not be suitable for the NASA mission.)

The compatibility of the DISIC or the APTC with infrared film is unknown.

4. In the Program Office's judgment, the recurring cost of hardware and field support for APTC should be only slightly higher than DISIC (roughly, $500K per unit vs $400K per unit). The significant difference is in the major redesign and requalification of the APTC to operate without pressure or active thermal control. The Program Office estimates that the APTC non-recurring costs would be somewhere between $4M and $5M. This, together with the vehicle redesign and incorporation of APTC of about $3M accounts for $8M of the difference between the two configurations.

5. Configuration C could readily be reconfigured to satisfy CORONA requirements. Configuration D could be flown without an index camera or with a single APTC, recognizing that the APTC is not fully suitable as a DISIC substitute for the CORONA mission. Obviously, configuration C is much more desirable than Configuration D from an NRO standpoint.

6. The Program Office does not believe that a funded definition phase is necessary; however, a more specific definition of NASA requirements would be needed. Moreover, some additional study of tradeoffs involved in arriving at a firm vehicle configuration would be required. These studies could be accomplished informally as a part of proposal preparation.

This assessment of the Lockheed proposal has been provided to NASA. We are awaiting a statement of NASA interest before proceeding with further NRO action.

William R. Yost

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