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CENTRAL INTELLIGENCE AGENCY
WASHINGTON, D.C. 20505

20 JAN 1971

BYE-107109-71
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MEMORANDUM FOR: Director, National Reconnaissance Office

SUBJECT : Phase II of Electro-Optical-Imaging Program System Definition

REFERENCES : A. BYE-13054-70, dtd 27 July 1970

B. BYE-108809-70, dtd 5 Nov 1970

C. BYE-13267-70, dtd 24 Nov 1970

D. BYE-12503-71, dtd 8 Jan 1971

1. In accordance with your July guidance (Reference A), we have proceeded with Phase I of the EOI System Definition activity. Final reports from the seven participating contractors were received on 15 December, and the evaluation of these reports has now been completed. The attachment (BYE-107036-71) to this memo summarizes the results of this evaluation. In accordance with your direction, two system configurations were carried through Phase I, a higher performance configuration and a lower performance, lower cost configuration. The principal issues at this time are a decision on which configuration to carry into Phase II System Definition and the release of of deferred Phase II funding.

2. The Configuration A system has been designed to provide a best image quality approximately equivalent to the best of GAMBIT-3. Based on experimental work performed by NPIC, we have concluded that an EOI system with a GSD of at a signal-to-noise ratio of five meets this condition. At the same time, Configuration A has been designed to provide a sufficient capacity to meet the warning/indications, crisis, and current intelligence coverage needs. Configuration B has

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been designed to a GSD of 18" which should provide sufficient image quality to meet the requirements of the July 1969 USIB requirement. Every effort was made to minimize the costs of Configuration B while keeping in mind the eventual upgrading of this system to a Configuration A capability. Therefore, in accordance with the July 1970 ExCom guidance, both systems have been designed around a diameter optical system although the specific design of the Configuration B optics is different from that of Configuration A.

3. After a careful assessment of all the contractor inputs, a detailed review of relative costs and in-depth studies on the capacity and image quality of the two Configurations, we have concluded that Configuration A is the recommended approach. The five-year Configuration B costs are approximately lower than the five-year Configuration A costs. However, the image quality performance penalty incurred by that cost savings is substantial. It is clear that the Configuration B image quality is not sufficient to support consideration of the replacement of the GAMBIT-3 program. The cost of upgrading Configuration B to a Configuration A capability would exceed the differential, and if the FY 72 through FY 76 costs are to be held to a minimum, the Configuration A capability would not be available until the late 70's.

4. We do propose to continue studying cost and performance trades for Configuration A during Phase II of System Definition. In particular, the Phase II contractors will be required to examine potentially favorable cost and risk reductions if specifications on key subsystems are relaxed for the first two or three flight vehicles with full performance not required until the third or fourth flight vehicle. We are extremely sensitive to the importance of configuring a development program with good cost and schedule controls and will use every technique available to us to achieve those ends. The Phase II proposals will be based on firm system design specifications and rigorous cost and schedule ground rules.

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5. The system cost estimates for Configuration A and B have not changed appreciably since the November interim report to you (Reference B). The development program costs are consistent with [redacted] cost guidelines (References C and D), although the FY 72 funding requirement exceeds the current budgetary planning by approximately [redacted] If this overage cannot be accommodated by a reprogramming from other line items, the program office feels that the current budget can be met by small adjustments in the program plan.

6. After an assessment of the progress made by the system contractors during Phase I, the program office has recommended that Phase II be shortened by two months. As you know, all contractors entered Phase I against a background of previously funded study activities as well as substantial company funding. All contractors have exhibited a sound grasp of the design requirements and progressed well beyond what we had anticipated from Phase I. In view of these Phase I achievements, the modified schedule will not detract appreciably from the maturity of the Phase II proposals, but on the other hand will better synchronize the overall program with the ongoing engineering development activities. In addition, the acquisition phase can be initiated two months earlier (1 Oct vs. 1 Dec) with a resulting earlier availability of the operational capability.

7. The only major system change during Phase I is in the data relay satellite segment. Based on the [redacted] Phase I study results, we are recommending that the base line data relay satellite be changed from two [redacted] satellites to one or two [redacted] relay satellites. This configuration change results in substantial cost savings at minor performance penalties. At the same time, the development risks are substantially reduced by elimination of the long cross-link between the two [redacted] satellites and by the use of existing [redacted] or alternatively [redacted] spacecraft hardware.

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8. Also included in the attached paper is a summary review of each of the engineering development programs being funded in FY 71. Progress in all areas is good with no critical performance or schedule deficiencies. We are now quite confident that by June of this year prototype solid state arrays from both [redacted] a prototype [redacted] optical system, and prototype control moment gyro configurations will be completed for a full pe. formance evaluation. In addition, appropriate breadboard and design activities will have proceeded as appropriate in each of the other key subsystem areas.

9. We are ready to proceed on 1 February with Phase II System Definition pending your decision on Configuration A vs. Configuration B issue. Before we can proceed with Phase II, we will also need the deferred [redacted] and your concurrence on the revised Phase II schedule.

CARL E. DUCKETT
Director
CIA Reconnaissance Programs

Att:
BYE-107036-71