

EOI PROGRAM ISSUE PAPER  
29 July 68I. Issue

What is the appropriate FY 70 funding level for the Electro-Optical Imaging Program? Specifically, should the FY 70 program in this area be oriented towards an aggressive systems definition and engineering development program which would support the initiation of subsystem acquisition beginning in early FY 71, or should the FY 70 program be held at a lower funding level component and subsystems advanced development activity.

II. Background

1. For the past several years the NRO has funded a technology program in Electro-Optical Imaging systems. The emphasis has been in solving the key technology problem, that of developing an adequate image transducer. In the last two years the emphasis has been placed on three transducer development activities: the CBS di-electric tape image tube, the Xerox STX material, and a class of solid state array imaging devices. The technology programs have now reached the point where it is possible to transition to the development of prototype devices. In general, breadboard test programs have been completed or are well along, and preliminary transducer design studies have been conducted.

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4. As a result of this series of Reconnaissance Panel reviews, Dr. Land was led in May of 1969 to recommend in the strongest terms that technology had then progressed to the point where energetic systems oriented activities should begin. Dr. Land further concluded that of the various transducer alternatives, the solid state array transducer offers the most attractive technical solution to this critical systems problem.

5. In July of 1969 USIB issued a preliminary requirement for a near real-time readout imaging system. This document formally established the critical need for an imaging system having both high resolution and rapid response characteristics. Specifically, the USIB document established the following guidelines:

- a. Nadir resolution approximately equivalent to the KH-7 system (2' image quality)
- b. Frame size of 3 x 3 nautical miles.

d. Continuous on-orbit availability of a fully operable system with an ultimate objective of daily access to the entire Sino-Soviet Bloc.

### III. Electro-Optical Imaging Program Technical Status

1. Breadboard test programs have now been completed for three alternative solid state array transducer configurations. In general, these test results are all significantly better than the performance predictions made at the start of the breadboard

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development programs. In each case, prototype transducer preliminary designs have been studied. The next step requires an engineering development program to build and test prototype devices. Given adequate funding, these prototype devices can be completed and tested within 12 months. It is planned to carry at least two alternative designs through prototype testing before selecting the specific approach for a full systems development program.

2. During FY 69 preliminary optical system design studies were also conducted. An optical system design approach has been selected which best meets the requirements of the solid state arrays along with the additional systems requirements of high image quality and of long lived imaging satellite vehicles. The required optical systems development program has been laid out and optical system fabrication ability established.

3. During the latter part of FY 69 a preliminary system design study was conducted based on solid state array transducers. The objective of this study was to establish a preliminary satellite vehicle configuration and to ensure that all the required vehicle subsystems were within the engineering system state-of-the-art. This study concluded that while engineering development would be required in several subsystem areas, there were no key feasibility problems from a systems viewpoint.

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recorded on silver halide film for examination by photo-interpreters.

5. The final image will be available in a matter of several minutes after the imaging satellite takes the desired target. The particular characteristics of the solid state array transducer provide a wide range of image processing techniques which can be applied. The use of these processing techniques will lead to much more uniform photographic quality than has been the current experience with recovered film.

#### V. Program Options

1. Two major program options have been prepared for EXCOM review. Plan A is the more aggressive plan, leading to initial operational capability in the fall of 1973. Plan A calls for [ ] of FY 70 funding. Under this plan the system definition phase would be completed by mid-FY 70 followed by a detailed design phase for the imaging satellite and the operations and processing facility. In the systems definition activity a vigorous engineering development program would be conducted in critical subsystems areas. Most particularly several alternative solid state array transducers will be pursued through the prototype phase. By the end of FY 70, a mature system design would be completed and engineering development activities would either be completed or sufficiently defined. At the end of FY 70 the EXCOM will have the alternative of either proceeding with the acquisition phase of the program or delaying the acquisition phase for either

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technical or programmatic reasons. Given a vigorous systems design activity in FY 70, the systems acquisition can be accomplished in about 35 months. The FY 70 costs of Plan A are contained in Table II and the costs for FY 71 through FY 74 are in Table III. More detailed information is available in OSP document BYE-7517-69.

2. Program Plan B calls for an FY 70 level of funding of

At this level of funding FY 70 would be reduced to an advanced development program with a majority of the emphasis going to prototype transducer development. Only a limited systems study activity would be carried forward to the extent necessary to support the subsystem engineering development activities. Plan B would delay initial operating capability until the fall of 1974. This plan leads to system definition in FY 71 and systems acquisition in the subsequent three years. The FY 70 funding requirements for Plan B are detailed in Table IV and budgetary estimates for subsequent years in Table V. More detailed programmatic information can be found in OSP document BYE-6414-69 as modified by Headquarters message PILOT 9183 dated 31 July 1969.

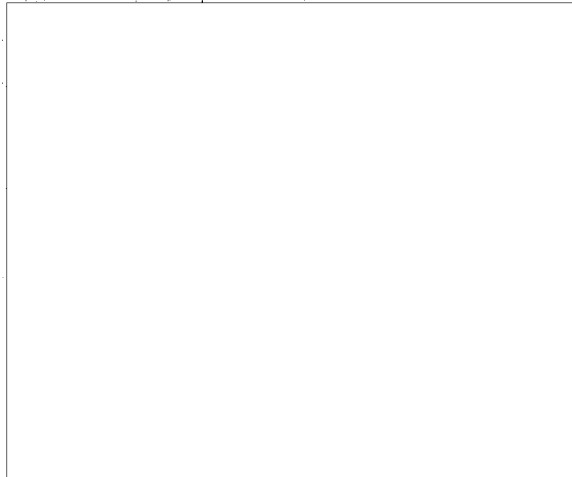
3. Plan A has the obvious advantage of maintaining an option to proceed with an early system acquisition program leading to an operational capability in four years. The price for preserving this

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TABLE III

PLAN A FY 71-74 ESTIMATE

Imaging Satellite  
Relay Satellite  
Ground Facilities  
Operations  
Follow-on



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