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~~(S)~~ NATIONAL RECONNAISSANCE OFFICE  
WASHINGTON, D.C.

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OFFICE OF THE DIRECTOR

November 19, 1970

MEMORANDUM FOR DR. EDWARD DAVID

SUBJECT: Film Readout and Tape Storage Camera System  
Concept Studies

This is in response to your November 12, 1970, memorandum in which you asked that the film readout and tape storage camera studies be discussed at the forthcoming ExCom meeting.

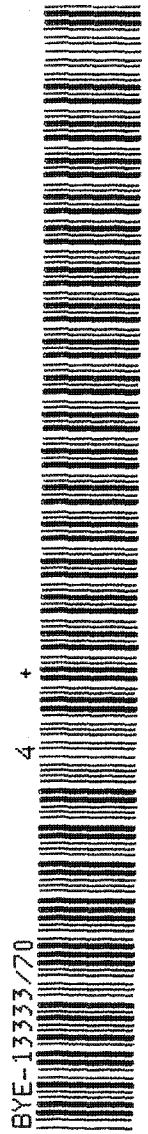
These studies were initiated with the goal of providing the ExCom with creditable backup alternatives to the EOI approach to the near-real-time need. The studies are restricted to lower cost approaches using existing hardware to the maximum extent practical.

I will be prepared to discuss the appropriateness of these studies and would welcome any suggestions the ExCom might have for altering their content, goals, or timing. To provide background for such a discussion, I am attaching a paper which describes the current status and scope of these efforts, their objectives, and the dates when results will be available.

*John L. McClucas*  
John L. McClucas

Attachment  
Film Readout and Tape Storage  
Camera System Study

cc: Mr. Packard  
Mr. Helms



GAMBIT HEXAGON

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SYSTEM STUDY**Objectives.

The general objective of this study is to produce low-cost, high confidence near-real-time system designs based on both the film readout and tape storage camera transducers.

The study will result in the following products:

- a. Detailed system descriptions including alternatives which have reduced capability and cost.
- b. A system acquisition plan.
- c. System cost estimates.
- d. Partial demonstration of critical subsystem hardware.

Tentative Study Ground Rules.

1. GAMBIT CUBED 175-inch focal length optical design will be used.
2. One design will be based on film with "bimat" processing and laser scan readout initially, with provisions for later conversion from film readout to the tape storage camera.
3. A second design will incorporate the tape storage camera from the beginning.
4. Either the Agena or the HEXAGON orbital control vehicle will be used as the basic spacecraft.
5. Either the Titan IIIB/Agena or Titan IIID booster will be used.

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**ATTACHMENT**

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6. Data return will be via X-band analog data link directly from the imagery satellite to existing SCF ground stations with relay to Washington alternatively via Program 777 Comsat or aircraft.

7. The imagery satellite design life will be 18 to 24 months.

### Study Contents.

1. Eastman Kodak will perform system definition of a film readout/laser scanner payload module compatible with GAMBIT CUBED optics.

2. Eastman Kodak will perform system definition of a tape storage camera payload module compatible with GAMBIT CUBED optics.

3. Eastman Kodak will build a film readout module which will demonstrate image acquisition, "bimat" developing, video signal generation via laser scan and image reconstruction via laser recorder. The same equipment will also be used to perform a life test of the critical laser scanner components.

4. Eastman Kodak will develop an imaging chain math model which will provide for assessment of image quality based on effects introduced by the laser scanner, the data link, and the ground reconstruction device.

5. Eastman Kodak will continue their "bimat" experiments which have been ongoing for a number of years and will conduct a study to determine the characteristics of film processed by "bimat" and its response behavior to laser scanners.

6. CBS will develop a tape storage camera conceptual design optimized for GAMBIT CUBED optics. The design will be in sufficient detail to permit an accurate performance analysis.

7. Lockheed will prepare a preliminary design of an orbital control vehicle (provides attitude control, power, propulsion, telemetry, systems control, and tracking) which will be applicable to either a film readout or a tape storage camera system.

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8. Lockheed, in conjunction with Eastman Kodak, will examine system approaches which minimize cost. Since the optics and other major system components are specified, the optimization will dwell largely on the trade between non-recurring and recurring costs which results from the capability to build in longer life by spending more developmental (non-recurring) dollars.

9. A contractor, yet to be selected, will define the data link subsystem, including necessary interface requirements. This is a low key effort since [ ] analog channels will meet the system requirement and a [ ] capability has already been demonstrated.

10. SAFSP/Aerospace will compile the results from the participating contractors and will prepare an appropriate range of options for consideration by the ExCom.

#### Status and Schedule.

Final approval for these studies was given on November 9, 1970. All contractors except Lockheed should be on contract by the end of November, with the Lockheed contract being finalized near the first of the year.

The level of detail addressed and the effort expended in this study will be roughly comparable to the system study effort performed by the EOI contractors during the spring of 1970. However, the time required to go from the completion point of this study to a film readout system acquisition decision should not be as long as in the EOI case, since this study has been deliberately constrained to use existing hardware and technology.

Interim results will be available in late June 1971, and the final results will be available in early November 1971.

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