



THE DEPUTY SECRETARY OF DEFENSE  
WASHINGTON, D. C. 20301

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MEMORANDUM FOR THE SECRETARY OF DEFENSE

SUBJECT: Readout Satellites

As you know, at the April ExCom meeting, we decided to develop the FROG as an interim system to be available in 1974, with EOI to follow about two and a half years later in 1976. After that decision, we ran into demands on the Hill to scale back our overall intelligence programs by [redacted] Senator Ellender has asked that we find some way to avoid developing two readout systems.

We believe that either FROG or EOI would satisfy most of our requirements for coverage of crisis situations, but EOI certainly has more capability as presently conceived and even more growth capability as technology advances. Unfortunately, it is more expensive. Because of its growth potential, we believe that we ought to begin to develop it soon and proceed on a reasonable schedule. All of the ExCom members agree with this broad statement. However, in addition to the cost problem there is the question of when it can be made available. There is the feeling on the part of some of the users, including the State Department, that we ought to get a readout capability as soon as possible. George Schultz has written me a letter (dated April 22, 1971) stating that the President would like a readout system "within his term of office."

During the past year, we have looked at a number of proposed systems for crisis capability. Only a few were of significant merit and of those we chose FROG. It can be available as soon as any of the others, will produce a much better product, and is based on a current system which it can partially replace. Therefore, if we are to have an early capability, we believe that FROG is the best way to get it.

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If we can wait for EOI, then we believe that an orderly development can be conducted for [redacted] to produce EOI by 1976. Our April decision, if followed through, would have produced FROG in 1974 and EOI in 1976. The budgetary issue has brought us to the two options shown in our proposed memo to the President. Option 1 - develop EOI only with an IOC of 1976. Option 2 - develop FROG with an IOC of 1974 and develop EOI later with an IOC of 1978. We feel it is important to solicit the President's views because we are not sure how critical he thinks it is to achieve earlier availability. Taking George Schultz's letter at face value, we must develop FROG. But taking account of the budget and our own desires to develop EOI eventually, we propose to modify the EOI development program so that after FROG development is behind us, we initiate EOI system development.

Ed David and I feel that the proposed memo fairly states the case and that it correctly leaves to the President the choice between Option 1 and Option 2.

Dick Helms feels the memo does not fairly state the case and does not give proper insight to the options. He believes that we should recommend Option 1. Failing agreement to recommend Option 1, he believes our proposed memo should state both his views and any differing views. I have decided in view of Ed David's and my belief that the proposed memo is a fair statement of the case, that we will submit this memo over Ed's and my signatures and Dick can submit his own memo. Attached are the two memoranda.

In view of the provisions of the ExCom charter (signed by the Secretary of Defense and Director, CIA in 1965) which call for referring disagreements to the Secretary of Defense for decision, we are soliciting your advice before going to the President.

David Packard, Chairman  
NRP Executive Committee

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THE DEPUTY SECRETARY OF DEFENSE  
WASHINGTON, D. C. 20301

MEMORANDUM FOR THE PRESIDENT

The attached memorandum gives our views on the issue of how to go about getting a readout capability for our satellite photographic systems.

It was our intention that this memorandum would be signed by all three members of our Executive Committee. However, Dick Helms has some trouble with the recommendations of this memorandum and with some of the other contents of the paper. Therefore, we have agreed to submit two memoranda to you, one signed by the two of us and another signed by Dick Helms.

Davis Packard  
Chairman

Edward Davis  
Member

Attachment

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Two Approaches

FROG. Up until recently, the only practical way of returning images frequently from space was to expose photographic film in the usual way, develop the film in the satellite, scan the pictures by electronic means, and send the data by radio link to a ground station which would reconstitute the picture. This is the technique which forms the basis for one of the proposed systems. It would provide for reading out a few times per day to an existing Air Force ground station in New Hampshire. Pictures would be available in Washington about 12-24 hours after passage of the satellite over the target. Such techniques were demonstrated in the Air Force SAMOS program in 1961 and in the NASA Lunar Orbiter in 1966. These systems were limited in quality or duration of coverage or both. Gradual improvements in both quality and coverage have become available so that a film-based system could now be built which would satisfy most but not all of our intelligence requirements, and could return data on a daily basis continuously at a reasonable cost. Such a system, which we call FROG (from Film Readout GAMBIT) is the initial system which would be developed in Option 2.

EOI. The other and more exciting technical approach is what we call the EOI (for Electro-Optical Imaging) system. Somewhat over two years ago the progress being made in solid-state sensors encouraged us to begin component development work and systems studies leading toward an imaging system of a very intriguing nature. During the ensuing two years, we have spent about [redacted] carrying forward development and demonstration work on the essential components of a system which would capitalize on the new solid-state sensor arrays, and we have evolved a system design which we feel confident could meet our requirements for dealing with crises situations. Essentially the system consists of a very large telescope [redacted] long) which can be pointed at targets of interest. Light energy is focussed on an array of solid-state sensors (about [redacted] individual sensors). The resulting signals are processed and relayed to high altitude data communications satellites which would transmit the data to [redacted] where the pictures would be printed. By use of the data relay satellites, the picture can be read out [redacted] as the EOI satellite passes over a target on the other side of the world. The

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advantage of the EOI approach is obvious, in providing [redacted] [redacted] imagery. Another advantage of the EOI over the film systems is the broader dynamic range of the sensor elements themselves which make it possible to get better pictures than we now get under conditions of a [redacted] [redacted].

The EOI promises eventual growth to operation [redacted] as technology continues to improve. There is not much question that eventually we would want to go to the EOI approach; however, EOI is expensive, and although we have demonstrated all essential components of the EOI system, there is considerable work to be done to achieve a working system. Dr. Land has described this system to you and has stated that it could be available by late 1974. We believe that even if we tried for 1974, we are unlikely to achieve an operational system before 1976 at a cost of some [redacted]. This difference in views as to how rapidly an entirely new system can be made available is not surprising. Our record in the past contains enough examples of delayed systems that we do not want to promise too much. Thus our Option 1 provides for developing EOI on what we consider a reasonable schedule (available 1976). We would propose that the program, if chosen, be kept under close scrutiny and accelerated to the extent justified by the progress. An accelerated program would require no additional funding in FY 72 but might require funding substantially above [redacted] per year in FY 1973 or FY 1974. The desirability of accelerating the program should be considered on a year by year basis determined by the progress of the development.

If a readout system is desired early (as was stated in the George Schultz letter of April, addressed to the Chairman of our Executive Committee) then we believe that it is better to develop FROG now. Since FROG is based on our current GAMBIT system we believe it can be available in 1974. It is cheaper to develop than the EOI. Our estimate of development cost is about \$200M.

When our ExCom looked at the need for readout systems in April, we decided to develop FROG now for the immediate requirement and develop EOI essentially in parallel with it, to be available in 1976. In discussing our budget proposal,

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it has been clear that some members of the Senate believe that our intelligence programs cost too much and that significant savings should be effected. Because of Senator Ellender's insistence that we not load on to the budget two development programs at once, we have now decided that either we must forego FROG and wait for EOI in 1976, or we must delay EOI, develop FROG now, and once the development costs are behind us (in 1974), initiate development of what we feel is the more advanced system, EOI. Thus we present the two options.

Options

Option 1 - Develop EOI only. We believe that a reasonable program can be carried out for about [ ] per year. We would review the situation annually, adjusting funding up or down as may be prudent, depending upon technical progress and the evolving needs of the intelligence community. Such an orderly development could assure system availability in 1976. However, we would not arbitrarily delay the system and would of course prefer a 1975 availability if it could be achieved. FY 72 funds would be held to [ ] for this option.

Option 2 - Develop FROG now and upon completion of FROG development in 1974, initiate system development of EOI. We would continue EOI technology work and systems studies pending a system start. It is assumed that a two-year delay in system start could lead to up to two years delay in availability, but not necessarily, since technology work would have progressed significantly during the two-year holding period.

The choice between these options should consider the different availability dates between the options as well as the capability and cost differences between the two systems, EOI and FROG.

Advantages of Option 1.

1. Provides EOI in 1976 with some possibility of its being available earlier.
2. Avoids FROG development cost of about \$200M and some portion of FROG operational costs.

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3. Makes EOI system available sooner than Option 2.

Disadvantages of Option 1.

1. Provides very small probability of bringing in a readout system during term of current Administration.

2. Puts all eggs in one basket, i.e., provides no backup for possibility of excessive delay in EOI for unforeseeable reasons.

3. Does not provide the learning which could take place by using FROG before EOI is available.

Advantages of Option 2.

1. Increases probability of readout system availability during tenure of current Administration (estimated availability 1974)

2. Provides both early availability and possibility for eventual dual approach, if either system got into trouble. This option culminates in the "better" system in any case.

3. In event of further intelligence budget cuts, provides option of going FROG alone, an inherently less costly alternative than either of the proposed options.

4. Provides a system with which we have had some operational experience.

Disadvantages of Option 2.

1. Increases total intelligence expenditures over developing only one readout system.

2. Delays the EOI (potentially the most capable) system arbitrarily.

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It is very difficult to predict the effects of readout systems on the total intelligence budget. Our estimates of costs associated with FROG and EOI are shown in the attachment. We believe that either EOI or FROG will permit significant reductions in GAMBIT/HEXAGON launches, but these reductions cannot take place until about one year after the first availability of the readout system. We believe that the total annual cost associated with the readout system and other conventional systems will eventually settle out at about the current level of [ ] per year. Individual satellite costs are estimated at [ ] each for FROG and [ ] each for EOI. FROG is estimated to have a one year life (leading to about two launches per year) while EOI is estimated to have [ ] life [ ]

Recommendations

The ExCom recommends that if the most likely availability date of the EOI (1976) is acceptable, that Option 1 be selected. However, if a high probability of achieving a readout capability at an earlier date is desired, the ExCom recommends Option 2.

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READOUT SYSTEMS COST ESTIMATES

OPTION I EOI Only

	<u>FY72</u>	<u>FY72</u>	<u>FY74</u>	<u>FY75</u>	<u>FY76</u>	<u>FY77</u>	<u>TOTAL</u>
EOI Systems Cost							
Data Relay Satellite							
All other							

OPTION 2 FROG now, EOI development begins FY74

FROG	130	150	110	110	100	80	\$680M
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EOI System							
DRS							
All other							

EOI Total							
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EOI + FROG (sum of above columns)							
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These costs assume no credit for reduced GAMBIT flights in FY74-77. Actually we expect that FROG availability would reduce GAMBIT costs by [ ] EOI will reduce GAMBIT costs similarly, starting two years later.

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Attachment 1

EXECUTIVE OFFICE OF THE PRESIDENT  
OFFICE OF MANAGEMENT AND BUDGET  
WASHINGTON, D.C. 20503

April 22, 1971

Honorable David Packard  
Deputy Secretary of Defense  
The Pentagon  
Washington, D.C. 20301

Dear Dave:

Last July I expressed to you some questions I had about the development of a near real-time (NRT) READOUT system within the National Reconnaissance Program. Simply put, the issues were with the appropriate scope of the NRT system in light of the capabilities of all other presently operating or feasible intelligence collectors; and with the possibility of a substantial overlap of the NRT system concept with other photographic surveillance capabilities of HEXAGON and GAMBIT.

I am impressed by the diligence of the NRO in pursuing in recent months both the "systems mix" concept for meeting requirements in a cost effective manner and the interim approaches to an NRT system for crisis purposes, which would be more readily available and less costly.

The Executive Committee of the NRP will, I know, soon be considering some of these interim approaches. I should like to emphasize the President's interest in an NRT or crisis capability system. It would be desirable if such a system could be operational at an early date and at a reasonable cost. This desirability derives both from responsiveness to the President's present needs, and perhaps equally importantly from the experience we will gain from such a system which provides frequent, regular access to areas of potential high interest and which can return the imagery product within a reasonably short period of time.

I am sure the Executive Committee will address the optimum realization of an NRT/crisis capability. In doing so, I hope that you will give serious consideration to the procurement within NRP resources of such a system so that it could have appreciable utility during the President's administration.

Sincerely,

(Signed) George F. Moore

Director

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