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20 January 1965

MEMORANDUM FOR: Director of Central Intelligence**SUBJECT: FULCRUM Program and Funding Requirements**

1. This memorandum contains information you have requested on ITEK's participation in FULCRUM, essential information on the other FULCRUM contractors, and recommendations for your action in continuing the program and bringing it to an early decision in a national forum.

2. The FULCRUM program is at the crossroads. Without further funding, the entire effort will come to an end by 15 February 1965, and most of it by 1 February 1965. This is no surprise. The FULCRUM feasibility program was established with limited funds (5.33 million) which were judged to be just adequate for a six months' program, which in turn was considered adequate--with a special effort--to demonstrate the basic principles of the system for program go-ahead. That all elements of the program have stayed in step and will have completed their technical design and demonstration tasks by early February is a tribute to the CIA program office and to the contractors themselves. The only slippage has been in the ITEK camera, and this has been small--two weeks. This means that the series of basic feasibility tests which were originally planned to be over by 1 February 1965 will probably not be completed until 15 February. This slight overrun was anticipated and \$195,000 of the original sum set aside to cover the costs of the delayed testing. However, the real problem

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facing the program is that the rest of ITEK and all the other contractors will have to stop on 1 February 1965, and many of them are beginning to break up their design teams now so as not to overrun their contracts. Your questions to ITEK are extremely timely and reflect our concern for the entire program.

3. The specific answers to your questions to ITEK are given below:

2. Best Estimate of Time to Complete Appropriate Brassboard Testing in Demonstrating VOLKOH Feasibility

The camera feasibility test program as originally planned and agreed will be completed by 15 February 1965, and funds (195K) are available to cover this effort, as noted above. However, this has no pad for mishaps,* and we can be quite sure of completing all relevant testing by 28 February. The additional two weeks of testing would require an additional \$150,000.

To clarify, we do not intend to cease making measurements with the ITEK brassboard after this feasibility testing program is complete. From the beginning we had intended to use this device throughout the two-year development program and into the flight test phase as a basic design research and diagnostic tool. We have planned from the beginning to have adequate data by February, 1965, to respond fully to the Land Panel's concern and to support a vigorous claim for full program go-ahead approval. This is what we will have achieved within the next month.

*Neither has the rest of the program.

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b. Best Estimate of Costs to Maintain Key People in Project at ITEK

Of the 152 personnel assigned to FULCRUM by ITEK, we consider 77 to be essential to the integrity of the program and the absolute minimum number compatible with continuity of the effort. This would cost \$30,000 per week or approximately \$320,000 for the month of February. This does not include the possible add-on testing effort itself, which would run to an additional \$150,000 during the last two weeks of February. A minimum level continuous effort through the month of February would therefore be approximately \$470,000, and approximately the same for each month thereafter. While this would keep the heart of the team together, the actual FULCRUM launch date would slip at least two days for every day the program operated at this level prior to program approval.

c. Minimum Effort in Essential Areas Anticipating Program Go-Ahead in Near Future

We can maintain the full integrity of the program while reducing the manpower level at ITEK from 152 to 130. This would mean a day-for-day slip in the launch date for each day lost in the go-ahead decision. This level of effort would cost \$115,000 per week or approximately \$610,000 for February and each month thereafter, if one adds in the continued testing effort.

d. Best Estimate of Cost for a Program which Remains Poised for a Full-Scale Development Program and Lessons Slippage by the Procurement of Some Long-Lead Items

A one-month payment of \$1.1 million will permit us to retain the present level of manpower

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effort at ITEK, and also would provide \$250,000 for long-lead procurement of optical elements, as well as \$250,000 for necessary architecture and engineering associated with the camera facilities.

This option will lose no time and one can expect to launch the first FULCRUM on the same date permitted by a full program go-ahead on 1 February. It appears that long-lead time items on the camera are piling in the schedule, so that similar investments would not be needed for several months at the other contractors.

4. The other FULCRUM contractors have design teams established which must be completely disbanded on 1 February 1965 unless additional funds are provided. While they will have completed their basic feasibility designs by that date, we believe that it is essential to ensure their continuous interaction with ITEK and each other. This interaction is becoming increasingly important, as you noted Monday in connection with the film takeup in the reentry vehicle from the camera; and we are reluctant to proceed in one area without the decision balancing required by the others.

a. Spacecraft

(1) General Electric now has the responsibility for designing the basic FULCRUM ONE spacecraft using many of the GAMBIT components. This design effort is proceeding at a steady rate of \$140,000 per month, until later this spring when hardware commitments will be required.

(2) As I indicated the other day, we also have STL, as part of their over-all

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responsibilities, examining alternate spacecraft possibilities which would be adaptable to: (a) smaller radius launch vehicles (TITAN 3X or ATLAS AGENA at 5 ft.), (b) monocular coverage with one camera rather than two, (c) adequate survivability measures--decoys, jammers, etc., and (d) greater payload vehicles such as TITAN 3C. This effort runs about \$100,000 per month and should be vigorously pursued.

b. Reentry Vehicle

The reentry vehicle effort at AVCO is still primarily design work. It can and should continue at the present level of \$140,000 per month.

c. Systems Engineering

STL is providing systems engineering support to CIA on the FULCRUM program. This is becoming increasingly essential as the interactions between the contractors increase. This effort now costs \$120,000 per month and should continue so long as the program is under way.

5. We also have a backup camera development program at Perkin-Elmer which is most encouraging. This now runs about \$60,000 per month, and we would propose to continue this cheap term insurance through February pending final feasibility demonstration of the ITEK camera. Thereafter, we would propose to convert the Perkin-Elmer effort into the research program we have on a general ZOSTER class of readout satellite systems, using other funding sources.

6. The funding needed to carry the FULCRUM program forward during February and succeeding months under various penalty options is best summarized in the following chart.

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<u>COMPANY</u>	<u>ACTIVITY OPTION</u>	<u>FEB.</u>	<u>MARCH</u>	<u>APRIL</u>
ITEK	Minimum Hold (77 men)	470	470	470
	Sustaining Program (Day-for-day slip)	610	610	610
	Piecemeal Commitment*	1.100	1.750	2.550
Perkin-Elmer	Continue Development of Back-up Camera Subsystems	60	--	--
GE	Spacecraft Design	140	140	140
AVCO	Reentry Vehicle Design	140	140	140
STL	Alternate Spacecraft	100	100	100
STL	Systems Engineering (SEAC)	120	120	120

TOTALS

Minimum Hold	1.030	970	970
Sustaining Program (Day-for-day slip)	1.320	1.110	1.110
Piecemeal Commitment*	1.810	2.250	3.050

*(includes procurement of
critical long-lead items)

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Examination of these figures shows that the difference between retaining 130 and 77 people at ITEK makes very little percentage difference in the total cost to continue the total program. There is a significant difference between holding the present pace (130 at ITEK) on a day-for-day slippage basis and committing to long lead time optical item procurement which preserves the original flight date in spite of decision delays. This difference becomes larger as the months go by, since one is committing piecemeal to the full camera development which is already well advanced. The economic justification for such a course is that each month of program slippage will eventually cost the program seventeen million dollars, and we can take out an option against this loss now at a monetary increase of less than one million dollars. What we risk is that the program may not be funded. If we are confident of eventual go-ahead, we should go ahead with the piecemeal program now—or at least in March.

7. It is interesting to compare these figures with the funds that would be required during the rest of FY 1965 to support a full program go-ahead. If such an approval were obtained on 1 February 1965, we could fly the first FULCRUM in January, 1967. We would request the following funds for the remainder of FY 1965.

CAMERA	10.0
SPACECRAFT	9.0
RECOVERY VEHICLE	3.0
BOOSTER	3.0
LAUNCH FACILITIES	6.2
SEAC	1.8
FILM	1.0
	<u>34.0</u>

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This funding level reflects the phase of the program we are now entering. From here on the costs rise at an accelerating pace, primarily because we have already done rather quickly the basic feasibility work at bargain prices.

8. The status of NRO reimbursement for CIA funds expended thus far on FULCRUM is as follows. On 23 December 1964, [redacted] requested 4.5 million dollars with the usual 1080 forms. The NRO Comptroller, [redacted] responded on 4 January 1965 requesting additional information on "General coverage of each contract, milestones, and progress against milestones and time period objectives thru the completion of Phase I." Such a response has been drafted and is ready for forwarding. However, several elements of CIA are now concerned over the principle of providing such a justification, with the implied option of disallowals by the NRO Comptroller. The basic question is whether we have a valid commitment of resources and program authority from the NRO EXCON to do this program or whether we must subsequently justify the accomplishment to [redacted] before we are reimbursed. This is a matter of basic principle which we should like to discuss with you at your earliest convenience. However, whatever our position on this matter, we can state that we have not received any FULCRUM money from NRO and frankly expect a great deal of delay and debate before our 4.5 million is recovered.

9. RECOMMENDATION:

In view of the above data and our tremendous confidence in the FULCRUM system, now backed by a working camera prototype, we recommend that you take the following actions to bring FULCRUM to an early decision:

- a. Choose the sustaining option for FULCRUM and provide CIA funds in the amount of 1.320 million for continuation of the basic FULCRUM

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design program during February. Also be prepared to commit like funds of 1.110 million for March so that the contractors will not begin to decelerate during mid-February if a decision is not forthcoming until late February.

b. Seek later to recover CIA funds previously committed to FULCRUM plus these incremental monthly fundings from NRO in a manner which is consistent with a policy decision on how we shall conduct our fiscal affairs with NRO.

c. Establish, with Mr. Vance, a small group of eminent national stature to review all competitive systems meeting the FULCRUM requirement and advise you on which system should be pursued. We should like to see this panel sit for several days no later than 28 February, as we are confident that we will then have in hand the experimental data that will support a vigorous claim by CIA to proceed with FULCRUM. We believe that the composition of this panel is critical and cannot be removed from your control. We want neither Air Force, nor CIA dependents, and feel that there is little merit in differentiating between DOD and Air Force at this point. We recommend a small group, composed of Land, Killian, Garvin and [redacted]. One could also include Drell, [redacted] or Donovan as a next layer, since they were in on the original FULCRUM decision.

d. If McMillan is unwilling to bring his counterproposals to such a court and engage in

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a healthy technical competition, we would support you most enthusiastically in a direct appeal to Congress to obtain the necessary funds.

ALBERT D. WHEELON
Deputy Director
for
Science and Technology

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