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14 February 1975

MEMORANDUM FOR MR PLUMMER

SUBJECT: ITEK Pan Camera Design

The attached paper sets forth our thoughts on the ITEK Pan Camera design vis-a-vis a Block IV HEXAGON buy. At present we are not funding the ITEK work because we believe there is a low probability that there will be a Block IV HEXAGON competition.

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David D. Bradburn
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Major General, USAF
Director

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# HEXAGON-PAN CAMERA SYSTEM

## Considerations For An Alternate Design

## I. INTRODUCTION

A. In May 1973 SAFSP initiated a HEXAGON Sensor Subsystem design study at ITEK that was to have resulted in a competitive production proposal for the Block IV pan camera system. To date the system design has been completed, a film transport breadboard has been built on which some of the critical tolerances have been demonstrated and a full scale wooden mock-up has been built to refine the design layout. Subsequently, the Block IV procurement was slipped until 1977 causing SAFSP to discontinue the ITEK study effort.

The objectives of this paper are:

1. Consider the rationale for continuing a competitive design effort on the current schedule.

2. Highlight the differences between the Perkin-Elmer pan camera system and the ITEK design.

3. Compare long term costs.

## II. RATIONALE FOR COMPETITIVE DESIGN

A. There were three main factors that led to a decision to initiate the ITEK sensor subsystem design study.

1. Create a competitive environment for future negotiations with Perkin-Elmer, hopefully reducing the price of Block IV while maintaining the same high level of performance.

2. Provide ITEK the opportunity to conceive a similar pan camera design which would cost less to produce.

3. Create an environment for technological evolution.

B. The ITEK study effort was ended this year for two reasons.

1. The uncertainty of a follow-on buy has diminished the chances of a competition ever occurring.

2. Because of the delay of the Block IV procurement and the uncertainty mentioned above, it seems unwise to fund a study effort for two more years.

C. It would be reasonable to continue a competitive design effort on the current program schedule only if there is a high probability of a continuing HEXAGON program. This is based on preliminary cost estimates given in Paragraph IV which show that near term development costs could not be amortized before SV22. (FY 80-81)

III. TECHNICAL HIGHLIGHTS

The ITEK design was constrained so that Lockheed could integrate either design into the current vehicle utilizing the existing supply, forward section including take-ups, and even the same midsection mounting points. The approach ITEK used to lower the cost per camera was to simplify the design while maintaining a high reliability. This approach led to the following significant design differences.

| FUNCTION | ITEK | PERKIN-ELMER |
|---|---|---|
| Film Synchronization | Mechanical | Electro-mechanical |
| Image Motion Compensation | Mechanical | Electro-mechanical |
| Film Cage | Air Bearing | Rollers |
| Clutch | Air | Mechanical |
| Shuttle Capacity | Large | Medium |
| Metering Structure | Graphite Epoxy | Invar |
| Aperture | f 2.25* | f 3.0 |

*This smaller f number, and hence shorter exposure time, allows approximately a 10 percent increase in resolution on 1414 film and approximately a 50 percent increase in resolution on the experimental SO217/SO124 type film.

IV. COST CONSIDERATIONS

A. Preliminary cost estimates indicate that the ITEK development effort, together with larger sustaining costs on Block III, could be amortized over a follow-on procurement of not less than four pan camera systems. ITEK predicts a significantly lower recurring unit cost than Perkin-Elmer. As shown below, this would result in a savings to the overall program beginning FY 1981.

B. Block III estimates are based on our current budget, however, Block IV costs are based on contractor estimates in 1975 dollars. Inflation was omitted in order to minimize distortion in the comparison of follow-on costs.

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$ IN MILLIONS

SENSOR SUBSYSTEM COSTS

| | FY 76 | FY 7T | FY 77 | FY 78 | FY 79 | FY 80 | FY 81 | TOTALS |
|---|---|---|---|---|---|---|---|---|
| Perkin-Elmer Veh 1-18 | 42.1 | 10.4 | 39.0 | 30.5 | 21.9 | 21.0 | 10.5 | 175.4 |
| ITEK Follow-On (75 $) | 7.1 | .7 | 21.9 | 27.7 | 17.8 | 10.3 | 10.3 | 95.8 |
| | 49.2 | 11.1 | 60.9 | 58.2 | 39.7 | 31.3 | 20.8 | 271.2 |
| Perkin-Elmer Veh 1-18 | 42.1 | 10.4 | 32.9 | 21.8 | 17.9 | 16.8 | 9.3 | 151.2 |
| Perkin-Elmer Follow-On (75$) | 0 | 0 | 7.3 | 27.0 | 30.2 | 30.2 | 33.2 | 127.9 |
| | 42.1 | 10.4 | 40.2 | 48.8 | 48.1 | 47.0 | 42.5 | 279.1 |

NOTES: Block IV LMSC Integration cost ($20 Million) is added with ITEK costs.

Neither system includes costs for a mapping capability.

The quantity in the follow-on buy is not defined; therefore, no phasedown of costs is assumed in conjunction with Block IV.

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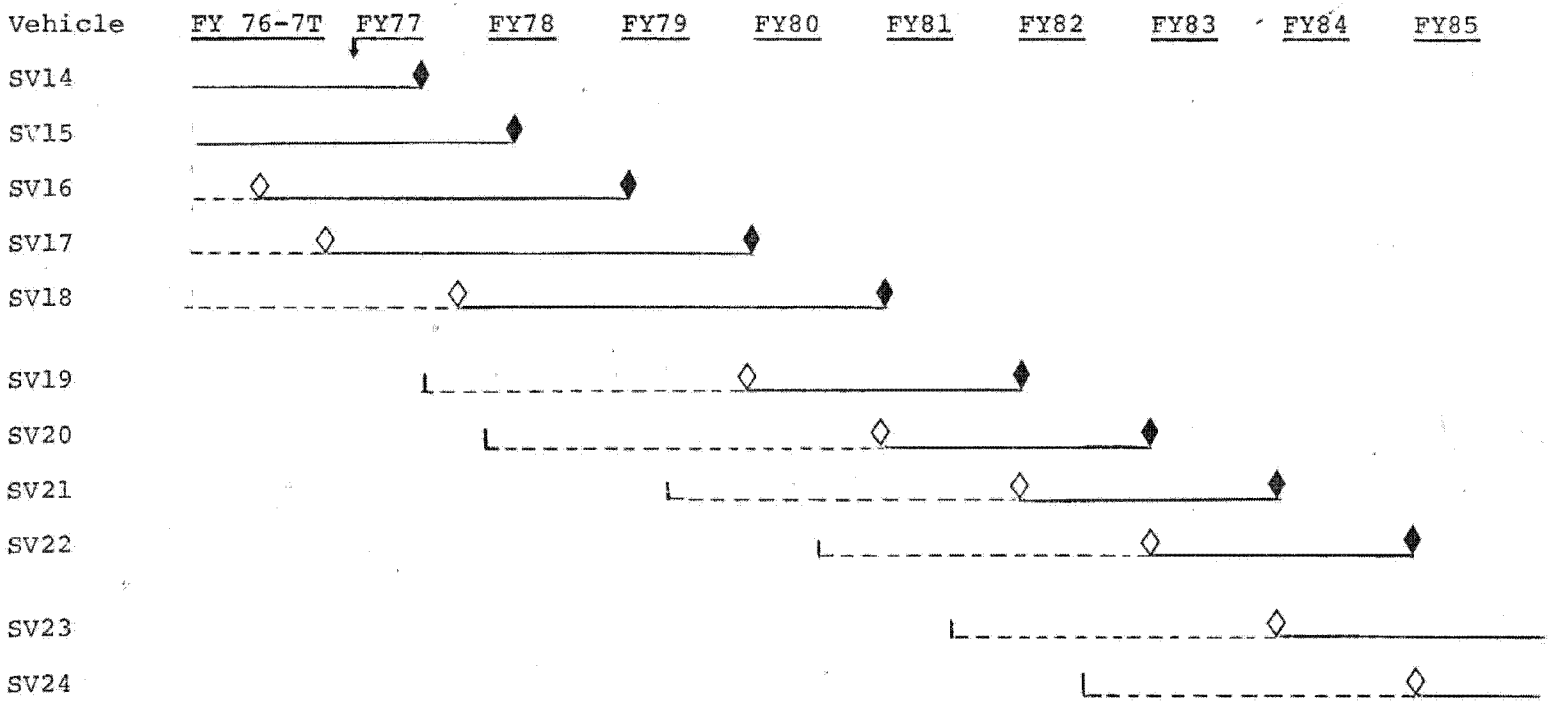
HEXAGON SCHEDULE




NOTE: Schedule based on a 54 month pipeline.

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