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

OFFICE OF THE DIRECTOR

February 2, 1970

MEMORANDUM FOR THE NRP EXECUTIVE COMMITTEE

SUBJECT: Adequacy of the CORONA/HEXAGON Overlap

The HEXAGON Review Committee, chaired by Bob Naka, has conducted two reviews of the HEXAGON Program since the report to the Executive Committee on June 20, 1969. Both times the Review Committee has concluded that no new order for CORONAs should be placed. Their reports of November 4, 1969 and January 22, 1970 as well as Bob's memorandum to me are attached for your information. I believe we should accept their recommendation that there be no additional purchases of CORONA systems, and I will appreciate your concurrence.

John L. McLucas

Attachments
BYE-12566-70, Jan. 28, 1970
BYE-13478-69, Nov. 4, 1969
BYE-12546-70, Jan. 22, 1970

Approved:

BYE-12567/70 1 3

~~CORONA HEXAGON~~

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

OFFICE OF THE DEPUTY DIRECTOR

January 28, 1970

MEMORANDUM FOR THE DIRECTOR, NATIONAL RECONNAISSANCE OFFICE

SUBJECT: Second and Third Reports
of the HEXAGON Review Committee

I have been reporting to you on a weekly basis the progress of the HEXAGON Program. The probability of the contractors' meeting the initial launch date of December 1970 has deteriorated markedly since October 15, 1969, the time I undertook a "mid-term" review by my Committee. Nevertheless at its recent review of the Program, the Committee concluded that the probability it ascribed last June to a delay in the initial launch was still correct. Hence the conclusion was still valid: Although there is a finite risk of a reduction in collection satisfaction during the one year overlap period with CORONA as explained last June, no new CORONA vehicles should be purchased.

Bob

F. Robert Naka

Attachments
BYE-13478-69, Nov. 4, 1969
BYE-12546-70, Jan. 22, 1970

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November 4, 1969

SECOND REPORT OF HEXAGON REVIEW COMMITTEE

Background

At the NRP Executive Committee meeting of June 20, 1969 the HEXAGON Review Committee recommended that:

1. The HEXAGON Project be funded to the minimum level necessary to meet the December 1970 initial launch date.

2. The CORONA launch schedule be revised to provide for

5 launches in FY 1970
5 launches in FY 1971
2 launches in FY 1972.

3. The need for a buy of additional CORONA vehicles be reviewed in December 1969.

These recommendations were accepted.

Statement of the Problem

Although the recommendation was to review the CORONA buy decision in December, I felt that a mid-term review would be very useful. Therefore, I reconvened the same review group* in Los Angeles on October 13 and 14 and in Danbury, Connecticut on October 15 to accomplish the following:

*Dr. F. Robert Naka, DDNRO
[redacted] CIA/OSP
Col. Lewis S. Norman, Jr., Vice Director, SAFSP
(when the Committee was set up)

1. Determine the optimum date to make a final decision on whether or not to procure additional CORONA vehicles.

2. Reassess the validity of the HEXAGON Review Committee's June recommendations to the NRP Executive Committee.

3. Determine the feasibility of providing additional "insurance" to the planned one-year overlap of the CORONA/HEXAGON launches.

Sources of Data

Agendas were prepared and submitted in advance of the Committee's visits to the Director, Program A and to Perkin-Elmer, the sensor subsystem manufacturer. Copies of the agendas are attached. In general, each HEXAGON associate contractor's current and projected schedule status, anticipated reliability (based in part on current failure mode analysis), estimated cost to complete (by fiscal year), and current problem areas were evaluated. The two CORONA Program Offices presented coordinated data on the minimum time from "go-ahead" to "launch" if there were a reorder, the cost (by fiscal year) of additional reorders, the cost savings estimate if CORONAs were not launched during the overlap period, and the impact on reliability of the phasing out of the CORONA Program. Finally, the GAMBIT "HIGHBOY" configuration was presented from the point of view of what changes had to be made to the current GAMBIT design to permit it to operate at a significantly higher altitude and what would be the resultant costs.

Detailed data are on file at the National Reconnaissance Office. (BYE-13479-69, November 4, 1969)

Conclusions

The HEXAGON Review Committee reached the following conclusions:

1. From the standpoint of HEXAGON alone, confidence in achieving mission success naturally rises as time passes. The earliest date prior to launch of passing significant milestones is May 1970. By May 1970 the all-up development model SDV-III will have had an integration test and the

first sensor subsystem flight article will have been shipped from Perkin-Elmer to Lockheed.

2. From the standpoint of CORONA alone, a decision to buy must occur 24 months prior to launch. The last launch of the 5, 5, 2 schedule is on November 10, 1971. Hence the next launch could be in early February 1972. Therefore, the decision to buy CORONAs must occur about mid-January 1970 to allow for a potential one month slip in the new CORONA buy schedule.

3. Because of the foregoing, the period of December 1969 to February 1970 becomes critical in the HEXAGON schedule. On February 5, 1970 the sensor subsystem development model is scheduled to complete the Chamber A (final) test and be shipped to Lockheed on February 17. Unfortunately, February is marginal for a CORONA buy decision.

4. On December 31, 1969 the electromagnetic interference test will be completed on the development model. This should be the first indication that the sensor subsystem can operate with itself.

5. As a result of the Committee's deliberations, the program offices and the contractors have arranged to accelerate electronic failure mode analysis and test the calculations by interconnecting certain key boxes during December 1969.

6. The results of Items 4 and 5 above are the only milestones one can apply to obtain confidence of HEXAGON mission success. This is somewhat, but not much, better than noting the incremental progress on the schedule.

7. The idea of initiating a CORONA buy with the intent of cancelling in May was examined to see how little cost could be incurred. The notion was, for example, to order Agenas but plan to buy no CORONA-peculiar items and to use the Agenas on GAMBIT. That cost was $2.4M, hence too high.

8. The GAMBIT "HIGHBOY" concept was reexamined. The cost of a permanent modification to permit GAMBIT to fly from 65 n.m. to 170 n.m. was $1.5M. The cost

of a kit to apply to a particular GAMBIT mission was lower, but the decision to fly such a mission had to be made nine months in advance. Therefore, the dollar cost was too high and the scheduling not compatible.

9. The June 1969 assessment that the probability of successfully meeting the December 1970 launch date within one month (50 percent), within three months (75 percent), and within six months (95 percent) has increased slightly as a result of this Committee's current evaluation.

10. Management attention should be focused on assuring that associate contract interfacing problems do not get out of hand to a point where the objectives of the program are jeopardized. This is not, however, considered a major problem at this time.

Recommendation

As a result of its mid-term study, the Committee recommends that the HEXAGON schedule be reviewed in January 1970 instead of December 1969.

F. Robert Naka

F. Robert Naka
Chairman
HEXAGON Review Committee

Attachments

Recommended LMSC Agenda

13 October Briefing

I. SBAC Schedule Status

- A. Mid-Section
- B. Aft Section
- C. Forward Section

II. SVIC Schedule Assessment

III. SBAC Reliability and Failure Mode Analysis

IV. SBAC/SVIC Estimated Cost to Complete (by FY)

V. SBAC Test Results (STV, DTV, SDV-1, etc.)

VI. SBAC Problem Areas

- A. Forward Section Active Thermal Control
- B. Master/Slave PCM MUX Subcontractor
- C. Solar Panels/Power Requirements
- D. Orbit Adjust Engine

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Recommended Agenda

13-14 October Briefing

I.	McDonnell-Douglas (MWC)	SAFSP
	A. Schedule Status	
	B. Reliability and Failure Mode Analysis	
	C. Estimated Cost to Complete (by FY)	
	D. Test Results	
	E. Problem Areas	
II.	General Electric - Command Programmer Status	SAFSP
III.	TRW - Software Contractor Status	SAFSP
IV.	VAFB - Launch Pad Status	SAFSP
V.	CORONA	CIA and SAFSP
	A. Each Contractor's Estimated Cost to Complete (by FY)	
	B. Minimum Time from "Go-Ahead" to "Launch," if a Reorder	
	C. Cost Estimate (by FY) of Additional Reorders of 3 and 6 Units	
	D. Cost Savings Estimates if Vehicles Are Not Flown in Calendar Year 1971 (by Vehicle)	
	E. Impact on Reliability of Phase-Down	
VI.	GAMBIT	SAFSP
	A. Modifications and Costs (by FY) to Implement "HIGHBOY"	
	B. Launch Facility Impact of Additional GAMBITs	

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Recommended Perkin-Elmer Agenda

15 October Briefing

I. Overall Schedule Status (Showing any changes since May 1969)

- A. Engineering Model Status
- B. Development Model Status
- C. First Flight Model Status
- D. Second Flight Model Status

II. Manpower

- A. Current Workload, by Skills
- B. Impact of Additional Overtime, if Needed

III. Costs

- A. Overtime Impact on Cost
- B. Estimated Cost to Complete (by FY)

IV. Reliability

- A. Catastrophic Failure Modes
- B. Impact of Non-Hi-Rel Parts
- C. Model Effectivity of Mission-Critical ECOs

V. Tour

VI. Test Results (Engineering Model and Development Model)

VII. Problem Areas

- A. Folding Flat
- B. Qual Test Program
- C. Others

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January 22, 1970

THIRD REPORT OF THE HEXAGON REVIEW COMMITTEE

References: A. BYE-13146-69, June 20, 1969: Report of the HEXAGON Review Committee

B. BYE-13478-69, Nov. 4, 1970: Second Report of the HEXAGON Review Committee

Background

At the NRP Executive Committee meeting of June 20, 1969 the HEXAGON Review Committee recommended that:

1. The HEXAGON Project be funded to the minimum level necessary to meet the December 1970 initial launch date.

2. The CORONA launch schedule be revised to provide for

5 launches in FY 1970
5 launches in FY 1971
2 launches in FY 1972.

3. The need for a buy of additional CORONA vehicles be reviewed in December 1969.

These recommendations were accepted.

The HEXAGON Review Committee then reviewed the contractors' progress on October 13, 14, and 15. It also determined that the best time to decide on whether or not to buy additional CORONAs was in January 1970.

~~CORONA HEXAGON~~

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Sources of Data

The Committee met at Perkin-Elmer on January 5, 1970; at Lockheed on January 20, 1970; and in executive session at the Satellite Test Center on January 21, 1970. A report supporting the findings below is being prepared for file at the National Reconnaissance Office.

Conclusions

The HEXAGON Review Committee reached the following conclusions:

1. The estimate of system reliability and confidence in meeting schedule remains as stated on June 20, 1969.

2. Since the scheduled launch date is only eleven months away, the program managers have high confidence that the system will function properly on orbit. Although the specifications are being met for the nominal (expected) on-orbit conditions, the system's ability to meet performance requirements at the extreme design environmental ranges is still unknown. Thermal tests at 40 degrees and 100 degrees F, previously scheduled in early February 1970 on the sensor subsystem development model, have now been postponed until late April on the first flight unit.

3. Most of the scheduled events (as of June 20, 1969) have slipped as much as a month. However, discretionary time (e.g., three shifts, longer shifts, 7-day work weeks) and changes in test plans have been employed to maintain the major milestone dates. Perkin-Elmer has no discretionary time remaining against their ship dates to the integrating contractor, whereas Lockheed is working only a 2-shift, 8-hour, 6-day week on their critical path only. An examination of the remaining schedule until launch reveals a few weeks available to absorb any delays which could arise from integrated testing or unexpected events.

4. Unexpected events will likely occur. However, these will probably cause delays of no

more than two weeks each. Accordingly, the estimated 50 percent probability of delay in launch of not more than one month, the 75 percent probability of not more than three months, and the 95 percent probability of not more than six months is still valid.

Recommendations

Therefore, the HEXAGON Review Committee recommends no additional purchases of CORONA systems.

F. Robert Naka
Chairman
HEXAGON Review Committee

NOTE: HEXAGON Review Committee

Dr. F. Robert Naka, DDNRO
[redacted] CIA/OSP
Col. Lewis S. Norman, Jr., Vice Director, SAFSP
(when the Committee was set up)