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~~(S)~~ NATIONAL RECONNAISSANCE OFFICE

WASHINGTON, D.C.

OFFICE OF THE DEPUTY DIRECTOR

March 3, 1970

MEMORANDUM FOR THE HEXAGON REVIEW COMMITTEE

SUBJECT: Discussion Section for the Second Report of the HEXAGON Review Committee

REFERENCE: Second Report of HEXAGON Review Committee, BYE-13478-69, dtd November 4, 1969

The attached Discussion Section for the Second Report of the HEXAGON Review Committee is transmitted for your records. You will note that this is the document cited under "Sources of Data" on page 2 of the reference.

The discussion section to accompany the Third Report of the HEXAGON Review Committee (BYE-12546-70, dated January 22, 1970) has been issued under separate cover by [redacted]'s office as BYE-7524-70, dated February 27, 1970.

F. Robert Naka
Chairman
HEXAGON Review Committee

Attachment
BYE-13479-69, Same Subj.

Distribution
1 Col. Norman
2 [redacted]
3 Gen. King
4 Mr. Crowley
5 NRO

BYE-12676/70

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November 4, 1969

MEMORANDUM FOR FILE

SUBJECT: Discussion Section for the Second Report of the HEXAGON Review Committee

REFERENCE: Second Report of HEXAGON Review Committee, BYE-13478-69, dtd November 4, 1969

Of the copious amount of data made available to the HEXAGON Review Committee, the following are some of the key items impacting on the conclusions:

1. LMSC (SBAC/SVIC)

a. Schedule. Many key milestones due to have been completed since last June have been met on their scheduled completion dates. Others, like the static test vehicle and the dynamic test vehicle, have slipped from three weeks to seven weeks but have not impacted on the initial launch date. Although Phase I of the satellite development vehicle (the system qualification and pad checkout unit) is about three weeks behind schedule, LMSC felt that the third and final phase would be on schedule. The delivery of the midsection for the first flight unit will probably be two and one-half weeks late, but again LMSC felt that the time was recoverable. The black box qualification program showed an extremely heavy concentration of effort during the October 1969 time period. The SDV-3 aft section module showed also a heavy assembly and test impact during the October to November 1969 period as did the first flight unit's aft section module during December 1969 and January 1970. The current two-shift operation at LMSC was felt to be adequate for this work load.

b. Reliability. LMSC reported the following status on their reliability analysis:

(1)	Parts Stress	80% Complete
(2)	Failure Mode & Effects	70% Complete
(3)	Worst Case	20% Complete

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~~JN CORONA GAMBIT EARPOP~~

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c. Problem Areas. The following includes both Committee and LMSC suggested problems as of this time:

(1) The active thermal control in the forward section was introduced into the system design at a fairly late date and was the result of Perkin-Elmer's end-to-end gradient requirement to avoid film sticking. Qualification of the temperature control electronics assembly is due to be completed in February 1970 and is clearly the pacing element of the SDV-3 forward section.

(2) The master/slave PCM multiplexer subcontractor (Spacecraft, Inc.) had exhibited difficulties to date in meeting performance and schedule. LMSC feels that this Q. A. problem has now been solved.

(3) The orbit adjust engine had experienced I_{sp} degradation during the deboost burn. Redundant heaters have been added for flight use to provide heating of the propellant; testing of this change is currently underway.

(4) The high failure rates of a certain solar array diode caused all of these diodes to be replaced with newer ones using improved techniques and processes. The new board design has been requalified and is now in reliability testing.

2. GE (Command Programmer)

a. Utica has solved the super flat pack production problem.

b. The minimal command system (MCS) is ahead of schedule. The extended command system (ECS) for SDV-3 had a minor low temperature problem but is due for delivery to SVIC on November 20, 1969. The ECS for the first flight unit is due for delivery on December 15, 1969 for a January 1970 need date.

3. TRW (Software)

a. A satisfactory Milestone 2 (preliminary design) was achieved on September 30, 1969 and contract awarded October 1, 1969.

b. Initial operational configuration is scheduled for September 25, 1970 with final operational configuration on September 10, 1971.

4. VAFB

a. The service tower has slipped three months, causing an equivalent slip in the beneficial occupancy date from October 31, 1969 to January 30, 1970.

b. Despite this fact, SP-7 feels that all the remaining key dates can be met:

(1) SDV-3 arrives at the pad on September 17, 1970 and is there for 54 work days.

(2) The launch complex acceptance is December 3, 1970.

(3) The first flight unit is on the pad ten days prior to the December 17, 1970 launch date (the booster has been at the pad since July 20, 1970).

5. McDonnell-Douglas (MWC)

a. The main parachute (made by Goodyear) is not as good as that used with the MK-5 RV. The ballute failed its deployment test (the requirement is a 60 to 70 percent probability of catch on the first pass), but the problem appears to be a Q. A. problem (and a difficult one) and not a design problem.

b. The B-52 and balloon drop test program is slightly behind schedule.

c. There is a relatively minor problem with access through the thermal "tent."

6. Perkin-Elmer (SSC)

a. Schedule.

(1) All of the tests scheduled for the engineering model have been satisfactorily completed except for those pending tests associated with Chamber "A," although completed later than originally scheduled.

(2) Completion of two-camera assembly testing on the development model is on schedule for November 19, 1969. The DM is plus eleven days against the scheduled February 20, 1970 ship date

because of the current 6-day, 10-hour per day work week. Many problem areas which have had schedule impact, like late delivery of key electronic boxes and compatibility problems with test equipment, have been solved through "work arounds."

(3) The first flight unit is on schedule to a January 27, 1970 completion of two-camera assembly testing and is also plus eleven days against its scheduled ship date to SVIC on April 21, 1970. Astigmatism caused by the folding flat has, in all probability, been resolved as was the longitudinal color problem on the first two sets of glass. Overtime and shortening of several remaining assembly and test cycle times, based on development model experience, would allow additional pad if there are any unforeseen schedule slip problems.

b. Reliability. About 2,000 electrical/mechanical functions and more than 30,000 items at the parts level have been evaluated to date. Only two or three truly random electronic failures have occurred to date on the engineering model. Catastrophic failure mode analysis has been extensive.

c. Problem Areas.

(1) The optical bar torque motor may be undersized because of the excessive friction of the rubbing optical bar seal needed for film path pressurization. The corrective action will be to use double commutation of motor windings as are now used in the drive capstans.

(2) Thermally induced local deformations in the folding flat, as well as the previously mentioned gravity-induced astigmatism, have caused some concern with regard to camera performance, but neither appears critical.

(3) The electronic box qual test program calls for an extremely concentrated effort in the November 1969 through March 1970 time period. Qual of four of the six brushless motors and the six encoders in the sensor subsystem between now and February 1970 is also tight.

7. CORONA

a. Current problems related to the reliability of UTB to be flown on future missions and the impact on reliability of the phase-down of the program.

b. The cost estimate for three additional systems if there were a reorder is as follows, assuming all three would be launched in FY 1972:

FY 1970	FY 1971	FY 1972	FY 1973	TOTAL
$ 8.5M	$17.5M	$14.7M	$ 0.7M	$41.4M

based on a December 1969 go-ahead.

c. The minimum lead time from "go-ahead" to "first launch" of a reorder was as follows:

Main camera	23 months
DISIC camera	14 months
Agena	24 months
Thorad	24 months

d. Assuming a February 15, 1970 "go-ahead" for a February 15, 1972 launch (three months after the "last" CORONA) and a May 15, 1970 termination, about $2.4M would be non-recoverable.

e. The cost savings of not having to launch current CORONA vehicles during the planned one year of overlap is as follows:

Delete	Cumulative Cost Savings
CR-8 (Nov 71)	$ 3.051M
CR-8, 16 (Sept 71)	$ 9.288M
CR-8, 16, 15 (May 71)	$12.379M
CR-8, 16, 15, 14 (Mar 71)	$15.380M
CR-8, 16, 15, 14, QR-2 (Jan 71)	$18.276M

8. GAMBIT "HIGHBOY"

a. The following changes would have to be made to the existing GAMBIT configuration in order to fly in the "HIGHBOY" mode:

(1) Photographic Payload System.

(a) Film drive speed change affecting the metering roller diameter, the gear ratio, and the motor speed drive output.

(b) The drive range of the slant range compensator.

(c) The slit widths in the slit plate.

(d) The frequency of the ground scene modulation in the focus sensor.

(e) Additional thermal analysis which might require additional heaters.

(2) Satellite Recovery Vehicle. Change the backup timer.

(3) Satellite Control Section. Additional thermal analysis which might require additional battery capacity.

b. The following launch and delta cost options were presented, including both modifications and schedule revision effects:

Option	Launch (FY)			Cost (FY)			
	70	71	72	70	71	72	Total
1	0	1	0	$1.2M	$ .3M	$ 0	$1.5M
2	0	2	0	$2.0M	$4.7M	$ 0	$6.7M
3	0	1	1	$1.2M	$3.4M	$4.7M	$9.3M

If the combined GAMBIT and [redacted] missions do not exceed twelve per year, there will be no launch facility impact.

March 3, 1970

BYE-12676-70. March 3, 1970.

Discussion Section for the Second
Report of the HEXAGON Review Committee

Attachment: BYE-13479-69, Nov 4, 1969
Same Subj.

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~~TSI~~ 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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~~CORONA HEXAGON~~

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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)

~~TOP SECRET~~

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.

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)

February 2, 1970

BYE-12567-70. February 2, 1970.

Subject: Adequacy of the COR/HEX Overlap

Attach: BYE-12566-70, Jan 28, 1970
McL fm Naka: Second and Third
Reports of the HEX Review Committee

BYE-13478-69, Nov 4, 1969
Second Report of HEX Review Com

BYE-12546-70, Jan 22, 1970
Third Report of the HEX Review Com

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3 PresSciAdv (DuBridge) via Martin
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7 Gen. King, SAFSP
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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

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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

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F. Robert Naka

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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

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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

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5 launches in FY 1971
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*Dr. F. Robert Naka, DDNRO
[redacted], CIA/OSP
Col. Lewis S. Norman, Jr., Vice Director, SAFSP
(when the Committee was set up)

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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

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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:

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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
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)