~~TOP SECRET~~

HANDLE VIA
BYEMAN-TALENT-KEYHOLE
CONTROL SYSTEMS JOINTLY

P&O A66
Sept 1974

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

THE NRO STAFF

MEMORANDUM FOR MR. PLUMMER

SUBJECT: HEXAGON Stretch Option in 1976 VS 1978

BACKGROUND

The message opposite is General Bradburn's response to our request of 23 August 1974 at TAB A. Our request addressed the technical and cost effects of:

A. One HEXAGON system per year starting in 1976.

B. Six-month, and 60 to 90-day backup capability.

C. Longer mission life.

D. Integrated HEXAGON/GAMBIT program.

E. Fixed launch dates for HEXAGON/GAMBIT with no backup capability available.

NOTE: General Bradburn's message states that he will address items D. and E. in connection with the October budget submission.

DISCUSSION

A summary of General Bradburn's response is:

A. One system per year would allow a one-shift operation and would be compatible with the six-month backup. Based on in-house estimates, this action gives the cost savings at TAB B. These savings do not become significant

HEXAGON GAMBIT KENNEN

until FY 1978, and result largely from the delay of procurement of Block IV.

B. Increasing the back-up capability to between 60 and 90 days requires more manpower to be available at a cost of $3M to $5M per year.

C. Technical limits on HEXAGON orbital life are as follows:

1. Through Mission 1211 - 120 days' duration.

2. Mission 1212 and up - 150 days to 180 days, depending on altitude flown and a series of modifications increasing on-board propellants.

[redacted]

E. In his opinion, film is not the life limiting consumable; however, an all mono mode would be possible by Mission 1213.

From an intelligence point of view, the gaps in search coverage prior to KENNEN would be serious with the one HEXAGON per year rate. Based on the technical considerations stated in the message, search gaps would run 245 days per year prior to the introduction of the longer life HEXAGON systems.

It is possible to develop a HEXAGON stretch-out schedule providing maximum gaps of 120 days per year and saving one vehicle by FY 1978. This approach has not been costed but would probably not differ materially in the near years from that given in General Bradburn's message. A 120-day gap with two GAMBITs during this time might be marginally acceptable to the Intelligence Community if the money saved is worth the drop in resources available.

RECOMMENDATIONS

1. Should you wish to pursue further the early one per year HEXAGON option, we should staff the proposal for an ExCom decision in November 74. However, the Staff position agrees with Gen Bradburn in that the proposed option significantly reduces imagery intelligence collection for very little savings in the near-term (FY-75/76). In addition, such a decision now may preclude later decision flexibility concerning a KENNEN vs HEXAGON area search capability in FY-77 and related studies during FY-75. Hence, the option does not appear promising for further consideration.

2. On the other hand, the option to extend HEXAGON life to 180 days is worthy of further investigation in view of the one per year HEXAGON transition objective when KENNEN becomes operational. The program office should therefore include a specific long-life option as an addendum to their budget submission for the November ExCom. Depending on the data and cost impact, this option might be presented to the November ExCom for decision.

3. With your concurrence in the above recommendations, I will send the message at TAB C.

HAROLD P. WHEELER, JR.
Colonel, USAF
Director

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~~T O P S E C R E T~~ 171300Z SEP 74 CITE CHARGE 7172.
PRIORITY WHIG
HANDLE VIA BYEMAN CHANNELS
SECTION ONE OF TWO
HEXAGON/GAMBIT
FOR MR. PLUMMER FROM GEN BRADBURN
SUBJ: ASSESSMENT OF HEXAGON STRETCH EFFECTIVE FY 1976.
REF WHIG / 119 AUG 74, CHARGE 4988 JUN 74 AND 5 SEP 74
TELECON MR. PLUMMER /GEN BRADBURN.
1. OUR ASSESSMENT OF THE TECHNICAL CONSIDERATIONS AND FUNDING IMPACT OF THE OPTION TO REDUCING THE HEXAGON PROGRAM TO ONE LAUNCH PER YEAR COMMENCING IN FY 1976 IS DISCUSSED IN PARAGRAPH 2 BELOW. THE QUESTION OF HEXAGON MONO OPERATION IS DISCUSSED IN PARAGRAPH 4 BELOW. THE HEXAGON/GAMBIT PROJECTS INTEGRATION AND THE OPTION OF TWO PER YEAR LAUNCH RATE OF BOTH HEXAGON AND GAMBIT REQUESTED IN PARAGRAPH 2 OF WHIG 1119 WILL BE PREPARED IN CONJUNCTION WITH OUR

WORKING COPY

PAGE 2 CHARGE 7172 ~~T O P S E C R E T~~
OCTOBER BUDGET SUBMISSION.
2. TECHNICAL CONSIDERATIONS:
A. PIPELINE VEHICLE - OUR BASIC GROUND RULES FOR TREATING THE REDUCTION IN HEXAGON LAUNCH RATES TO ONE PER YEAR ARE:
(1) A SIX MONTH BACKUP CAPABILITY
(2) IN THE EVENT THE BACKUP IS USED, THE CAPABILITY TO MOVE ALL SUBSEQUENT LAUNCHES SIX MONTHS EARLIER AND MAINTAIN A ONE PER YEAR LAUNCH RATE FROM THE LAUNCH DATE OF THE CALL-UP VEHICLE.
(3) A REDUCTION FROM A TWO SHIFT TO A ONE SHIFT OPERATION AT THE INTEGRATING FACILITY WITH RESULTING INCREASE OF THE TIME SPAN FOR SYSTEM LEVEL TESTING FROM THE PRESENT 12 MONTHS TO 24.
UNDER THESE GROUND RULES, THE MANPOWER LEVELS REQUIRED BY THE INTEGRATING AND ASSOCIATE CONTRACTORS IN SUPPORT OF THE INTEGRATION EFFORT CAN BE REDUCED TO ONE-SHIFT LEVELS. THIS COUPLED WITH THE INCREASED TEST FLOW SPAN OF 24 MONTHS WILL SUPPORT A 6 MONTH BACKUP CAPABILITY AT NO INCREASED COSTS. IF IT IS

DESIRED TO SHORTEN THE BACKUP CAPABILITY FROM SIX MONTHS TO THREE MONTHS OR LESS, ADDITIONAL MANPOWER MUST BE RETAINED FOR THE REQUIRED ACCELERATION EFFORT IN THE EVENT OF BACKUP VEHICLE CALL-UP. OUR ESTIMATE OF INCREASED COSTS TO PROVIDE A TWO TO THREE MONTH BACKUP CAPABILITY IS BETWEEN $3 AND $5 MILLION PER YEAR FOR FY 75 THRU FY 80.

B. INCREASED ORBIT LIFE

(1) MISSION LENGTH BASED UPON CURRENTLY APPROVED BASELINE.

(A) SV-9, 10 AND 11: MAXIMUN ACTIVE ON-ORBIT LIFE FOR THESE VEHICLES IS 120 DAYS EACH BASED UPON POTENTIAL FAILURE OF PYRO AND LIFEBOAT BATTERY.

(B) SV-12 AND SUBSEQUENT: VEHICLE CAPABILITY IS AT LEAST 150 DAYS.

(2) ORBIT OPTIONS. THE OPERATIONAL LIFE OF THE HEXAGON SYSTEM IS CURRENTLY LIMITED BY AVAILABLE ON BOARD PROPELLANT. THE CURRENT BASELINE IS 3200LBS IN THE ORBIT ADJUST (OA) TANK PLUS 400LBS TOTAL IN FOUR

RCS TANKS. BEGINNING WITH SV-9, APPROXIMATELY 100LBS OF ADDITIONAL PROPELLANT WILL BE "STUFFED" INTO THE RCS TANKS. SV-13 AND SV-14 WILL CARRY AN ADDITIONAL 260LBS IN THE OA TANK. STARTING WITH SV-15, A TOTAL OF 4000LBS WILL BE CARRIED IN THE OA TANK. NO FURTHER INCREASE IN ON-BOARD PROPELLANT CAPACITY IS CURRENTLY PLANNED. THE FOLLOWING TABLE REFLECTS CASES THAT CAN BE FLOWN WITH THE PRESENT SYSTEM AND THOSE ANTICIPATED WITH PROPELLANT INCREASES PROGRAMMED FOR VEHICLES SV-13 AND SV-15.

DAYS	HP(SV-9-SV-12)	HP(SV-13&SV-14)	HP(SV-15 & SUBSEQUENT)
90	82	82	82
120	86	85	83
150	91#	89	86
180	95#	93	91

SUBJECT TO LIMITATIONS OF PARA 2B(1) ABOVE

(3) FURTHER POSSIBLE INCREASES IN PROPELLANT CAPACITY ARE OUTLINED BELOW:

CHANGE	EFFECTIVITY	DELTA PROP	DELTA DAY INCREASE	ROM COST
(A) ADD 2 RCS TANKS	SV-13	250LBS	8	$5M

(B)	REDESIGN RCS TANKS	SV-14	325LBS(4TANKS) 735LBS(6 TANKS)	10 23	$4M
(C)	INCREASE OA TANK DIAMETER	SV-17	1100LBS	35	$5M
(D)	LENGTHEN OA TANK	SV-17	2300LBS	74	$8M

THE LAST TWO OPTIONS INVOLVE MAJOR REDESIGN OF THE VEHICLE AFT SECTION. THE LAST OPTION ALSO INVOLVES FACILITY, TRANSPORTER AND LAUNCH BASE MODIFICATIONS. THE COLUMN TITLED "DELTA DAY INCREASE" IS BASED UPON AN SV-8 ORBIT WHERE PROPELLANT USAGE WAS 311BS PER DAY.

[redacted]

[redacted]

3. THE RESULTS OF OUR IN-HOUSE ASSESSMENT OF DOLLAR IMPACT ARE SHOWN BELOW. THIS DATA WILL BE REFINED AS TECHNICAL ASSUMPTIONS ARE CLEARIFIED AND BUDGET ESTIMATES FOR OUR CURRENT BASELINE ARE RECEIVED FROM THE CONTRACTOR. THE ESTIMATES FOR THE CURRENT BASELINE, ONE HEXAGON PER YEAR STARTING IN FY 1978, ARE NOT CHANGED FROM THOSE IN CHARGE 4988 BUT ARE CONVERTED TO THE NEW FISCAL YEAR BASIS. FOR CONSISTENCY, THE ESTIMATES FOR A PROPOSED PROGRAM STRETCH STARTING IN FY 1976 ASSUME A FOLLOW-ON PROCUREMENT IS DELAYED

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GUARD PASS WHIG

~~T O P S E C R E T~~ 171800Z SEP 74 CITE CHARGE 7172.
PRIORITY WHIG
HANDLE VIA BYEMAN CHANNELS
FINAL SECTION OF TWO
HEXAGON/GAMBIT
FOR MR. PLUMMER FROM GEN BRADBURN
SUBJ: ASSESSMENT OF HEXAGON STRETCH EFFECTIVE FY 1976.
REF: WHIG 1119 AUG 74, CHARGE 4988 JUN 74 AND 5 SEP 74
TELECON MR. PLUMMER/GEN BRADBURN.
TWO YEARS. THE RESULTANT FUND REDUCTION IN THE FY
1975 - FY 1980 PERIOD IS CONSIDERED A NOT LESS THAN NRP
SAVINGS. OFF SETTING INCREASES IN OTHER PROGRAMS WERE
ADDED FOR ALLOCATION CHANGES IN OVERHEAD AND 3080
SUPPORT.

	FY 75	FY 76	FY 77 (TRANS)	FY 77
CURRENT BASELINE	180.4	147.0	33.1	122.2
FOLLOW-ON (BLOCK IV)	-	-	-	18.8
TOTAL	180.4	147.0	33.1	141.0
PROPOSED STRETCH-START FY 76	180.4	145.8	29.9	115.2
FOLLOW-ON (BLOCK IV)	-	-	-	-
TOTAL	180.4	145.8	29.9	115.2
IMPACT ON OTHERS	-	.3	.8	6.4
NRP FUND REDUCTION	0	.9	2.4	19.4

PAGE 2 CHARGE 7172 ~~T O P S E C R E T~~

	FY 78	FY 79	FY 80	TOTAL
CURRENT BASELINE -	79.2	41.7	43.4	647.0
FOLLOW-ON (BLOCK IV)	81.3	105.0	143.5	348.6
TOTAL	160.5	146.7	186.9	995.6
PROPOSED STRETCH-START FY 76	100.7	65.9	69.5	707.4
FOLLOW-ON (BLOCK IV)	-	18.8	81.3	100.1

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TOTAL	100.7	84.7	150.8	807.5
IMPACT ON OTHERS	-	-	-	7.5
NRP FUND REDUCTION	59.8	62.0	36.1	180.6

4. HEXAGON MOND CAMERA OPERATIONS

A. FILM IS NOT THE LIFE LIMITING CONSUMABLE, THEREFORE PERFORMING MOND OPERATIONS (RATHER THAN STEREO) DOES NOT EXTEND VEHICEL LIFE. FILM IS USED AT A RATE DICTATED BY ANTICIPATED LIFE REMAINING, WEATHER, GROUND TRACE, TARGET ACCESS, PRIORITY, ETC.

B. VEHICEL LIFE IS A DIRECT FUNCTION OF QUANTITY OF PROPELLANT AND THE PARTICULAR ORBIT FLOWN, SINCE,

1

FOR ANY ONE VEHICEL THE PROPELLANT LOAD IS FIXED, LIFE MAY BE EXTENDED BY RAISING THE ORBIT. THE OPTIONS AVAILABLE ARE IDENTIFIED IN PARA 2B ABOVE. ONCE A MISSION LIFE IS PICKED, FILM USAGE IS PROGRAMMED AT SOME NOMINAL RATE SUCH THAT (IN THE IDEAL SITUATION) WE RUN OUT OF FILM WHEN WE RUN OUT OF LIFE.

C. THE EL

K 11 (SV-7 THRU SV-12) SENSOR SUBSYSTEM WAS DESIGNED TO OPERATE IN A MOND MODE WITH ONLY ONE OPTICAL BAR ROTATING. THE INCREASED VEHICEL DISTURBANCES RESULTING FROM THIS TYPE OF MOND OPERATION (ONE OPTICAL BAR AND ONE SUPPLY/TAKE-UP ROTATING) SERIOUSLY AFFECT THE RCS THRUSTER DUTY CYCLE AND CAUSE INCREASED PROPELLANT USAGE. THIS MODIFIED THRUSTER DUTY CYCLE WILL RESULT IN THRUSTER LIFE DEGRADATION BUT THE EXTENT IS UNKNOWN. INCREASED PROPELLANT USAGE IS MINOR (APPROX 240 LBS/MISSION) AND COULD BE COMPENSATED FOR BY A ONE AND ONE HALF NM INCREASE IN ORBIT ALTITUDE.

D. PNEUMATICS ARE REQUIRED FOR THE AIR BARS AND FILM PATH PRESSURIZATION FOR BOTH STEREO AND MOND

OPERATIONS. A MOND OPERATION CONSUMES THE SAME QUANTITY OF GAS AS A STEREO OP ASSUMING THE PRESENT SCAN MODE MIX, THERE IS SUFFICINET PNEUMATICS TO PERFORM ONLY 750-800 OPERATIONS (STEREO OR MOND) THRU SV-10. AN ALL MOND MISSION WOULD REQUIRE APPROXIMATELY 1500 OPERATIONS. EFFECTIVE SV-11 AND UP THE PNEUMATICS SUPPLY WILL BE DOUBLED, THUS PROVIDING A 1500 OPERATION CAPABILITY.

E. THE BLOCK III (SV-13 THRU SV-18) SENSOR SUBSYSTEM HAS BEEN MODIFIED TO PERMIT MOND OPERATION WITH BOTH OPTICAL BARS ROTATING AND ONE FILM PATH OPERATING. THIS SIGNIFICANTLY REDUCES THE VEHICEL DISTURBANCE IMPACT OVER THE BLOCK II MOND CAPABILITY. IN ADDITION THE BLOCK III RCS THRUSTERS HAVE BEEN REDESIGNED TO PROVIDE INCREASED LIFE. THE INCREASE IN PROPELLANT USAGE FOR THIS MOND MODE IS APPROX 2% PER MISSION, WHICH

IS INSIGNIFICANT.

F. SUMMARY:

(1) AN ALL MOND MODE MISSION IS NOT FEASIBLE WITH

SV-9 AND SV-10 DUE TO PNEUMATICS LIMITATIONS.

(2) THE POTENTIAL FOR AN ALL MOND MODE MISSION EXISTS FOR SV-11 AND SV-12 WITH A ONE AND ONE-HALF NM ALTITUDE PENALTY AND A MISSION DURATION UNCERTAINTY DUE TO THRUSTER DEGRADATION.

(3) AN ALL MOND MODE MISSION IS FEASBILE FOR SV-13 AND UP.

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~~S E C R E T~~ 232204Z AUG 74 WHIG 1119.
CHARGE INFO WAHOO.
HEXAGON/GAMBIT/SECUR
FOR GEN BRADBURN FROM GEN KULPA [redacted]
1. TO MAXIMIZE RETURN ON THE NRP INVESTMENT, MR. PLUMMER HAS REQUESTED SAFSP DEVELOP ESTIMATES FOR REDUCING THE HEXAGON PROGRAM TO ONE LAUNCH PER YEAR COMMENCING IN FY-76. THIS IS A SEPARATE SUBJECT FROM THE IMPLEMENTATION OF THE JULY EXCOM DECISION ON THE GAMBIT AND HEXAGON PROGRAMS. REQUEST YOU DEVELOP A PROCUREMENT, PRODUCTION, AND OPERATIONAL PLAN IN-HOUSE FOR A ONE-HEXAGON SYSTEM, ADDRESSING THE FOLLOWING FACTORS:
A. PIPELINE VEHICLE - A REALISTIC PIPELINE CONCPT SHOULD BE CONSIDERED, I.E., VEHICLE AVAILABLE APPROXIMATELY SIX MONTHS PRIOR TO PLANNED LAUNCH. ALSO, THE

PAGE 2 WHIG 1119 ~~S E C R E T~~
PROS AND CONS AND ADDED COST REQUIRED FOR A 60 TO 90 BACK-UP CAPABILITY SHOULD BE INCLUDED.
B. ON-ORBIT LIFE - CONSIDER VARIOUS WAYS OF INCREASING THE ORBITAL LIFETIME OF THE VEHICLE SUCH AS HIGHER ALTITUDE, [redacted] OR SYSTEM MODIFICATIONS.
C. HEX/GAMBIT PROGRAM INTEGRATION - EMPHASIS SHOULD BE PLACED ON INTEGRATING ALL ASPECTS OF THE TWO PROGRAMS CONSISTENT ~~WITH~~ LAUNCH SCHEDULES AND PIPELINE CAPABILITIES.
2. IN VIEW OF THE REDUCED HEXAGON AND GAMBIT LAUNCH RATES AND THE CONTINUING REQUIREMENT TO RETAIN A PIPELINE CAPABILITY, IT APPEARS THAT SIGNIFICANT COSTS MAY BE ATTRIBUTABLE TO THE REQUIREMENT TO MAINTAIN EXTENDED PIPELINE CAPABILITIES FOR BOTH SYSTEMS. AS AN OFF-SETTING TRADEOFF AGAINST THE FURTHER REDUCTION IN THE HEXAGON LAUNCH RATE, REQUEST YOU EXAMINE AN ADDITIONAL ALTERNATIVE. THIS ALTERNATIVE CONCEPT INVOLVES ESTABLISHING FIXED DELIVERY AND LAUNCH DATES FOR BOTH THE HEXAGON AND GAMBIT PROGRAM AT TWO PER YEAR. HENCE, IF A FAILURE SHOULD OCCUR, THE RESULTING GAP IN COVERAGE WOULD BE ACCEPTED. THIS APPROACH SHOULD ALLOW MORE EFFECTIVE IMPLEMENTATION OF THE INTEGRATED GAMBIT/HEXAGON PROGRAM CONCEPT.
E-2 IMPDET
~~S E C R E T~~
BT

COST TABLE FOR ONE HEXAGON PER YEAR STARTING IN FY-76

	FY-75	FY-76	(Trans) FY-77	FY-77	FY-78	FY-79	FY-80	TOTAL
CURRENT BASELINE	180.4	147.0	33.1	122.2	79.2	41.7	43.4	647.0
FOLLOW-ON (BLOCK IV)	-	-	-	18.8	81.3	105.0	143.5	348.6
TOTAL	180.4	147.0	33.1	141.0	160.5	146.7	186.9	995.1
STRETCH IN FY-76	180.4	145.8	29.9	115.2	100.7	65.9	69.5	707.4
FOLLOW-ON (BLOCK IV)	-	-	-	-	-	18.8	81.3	100.1
TOTAL	180.4	145.8	29.9	115.2	100.7	84.7	150.8	807.5
IMPACT OF STRETCH ON OTHER PROGRAMS	-	.3	.8	6.4	-	-	-	7.5
NET NRP FUND REDUCTION	0	.9	2.4	19.4	59.8	62.0	36.1	180.6

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ACTION: PRIORITY

INFO:

DTG:

FROM: WHIG

TO: CHARGE

SPECIAL INSTRUCTIONS

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~~SECRET~~ CITE _____

HEXAGON

FOR F. HOFMANN/R. ANDERSON FROM H. WHEELER/

REFERENCE: CHARGE 7172, 171800Z SEP 74

REQUEST YOU SUBMIT A HEXAGON LONG-LIFE OPTION AS AN ADDENDUM TO YOUR OCTOBER BUDGET SUBMISSION. THIS OPTION SHOULD BE YOUR CHOICE AMONG THOSE DESCRIBED IN THE REFERENCE TO ACHIEVE OPTIMUM COST/RISK IMPLEMENTATION FOR APPROXIMATELY 180 DAYS OF ON-ORBIT LIFE EFFECTIVE SV-15, ASSUMING AN OCTOBER 1977 LAUNCH. E-2 IMPDET.

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DRAFTER

TYPED NAME AND TITLE: LT COL HUTCHISON

PHONE: 71817

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