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ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

19 February 1969

ADMINISTRATION

MEMORANDUM FOR THE DEPUTY SECRETARY OF DEFENSE

SUBJECT: Budget Issues on MOL, HEXAGON and Drones

The Mayo paper reopens extremely complex issues which were addressed by the Director of Central Intelligence, the Director of the Bureau of the Budget, the Director of the National Reconnaissance Office and the Deputy Secretary of Defense individually and the ExCom collectively in arriving at the size of these programs and their funding in the FY 1970 budget.

By reopening these issues at the interdepartmental level, he has, as a consequence, reopened the issues within the DoD. As a result, you will be replowing the ground that Paul Nitze covered during the last formulation of the budget.

Accordingly, we have summarized the BoB paper and the previous positions of the appropriate elements of DoD on these issues in the attached paper. The comments contained therein were coordinated and updated at the staff level with the officer concerned.

The current budget is as follows:

	Total Approved Program FY 69-74 Launches/Vehicles	Costs ($M)
MOL	7 (1st launch FY71)	~~2515~~ 2315
HEXAGON	16 (1st launch FY 70)	1140
DRONES (FY 69-70)		
147-T	60	37.9
147-S	342	99.6
154	20	48.7 (estimated)

~~CORONA~~
~~DORIAN~~
~~GAMBIT~~
~~HEXAGON~~

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BoB proposes cutting three major program (TAB "A"):

1. MOL: Terminate, saving $800M in FY 69 and FY 70, with total saving of $2 billion.

2. HEXAGON: Terminate, saving $98M in FY 70, and $280-389 FY 70 - FY 74. (If CORONA and GAMBIT were held to 6 launches per year, there would be additional savings of $180M.)

3. Drones: Reduce number of 147-T (high altitude) and 147-S (low altitude) drones to be procured in FY 69 and FY 70, and terminate contract for 154 (new model high altitude) drones. Possible savings are $41.7M in FY 69 and $25.7M in FY 70.

DDR&E, ASD(SA), DNRO, and JCS have previously provided material on the subjects of the BoB proposals. Their positions are appended as TABS; brief statements of all parties' rationale follow.

~~DORIAN CORONA GAMBIT HEXAGON~~

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MOL

BoB (BYE 11700-69)

MOL's [redacted] design resolution does not provide enough additional intelligence to justify its very high cost.

1. GAMBIT-3 is competitive.

2. SIGINT provides highly important information.

3. Sizing of U.S. strategic forces is conservative, to gain an assured destruction, second-strike capability, and probably would not be affected in any significant way by MOL photography.

4. Other precise information required (radar characteristics, weapons yield, accuracy, refine rates, operational doctrine) can be provided only by SIGINT, RADINT, or HUMINT.

5. MOL's high costs ($3.213 estimated) require termination.

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DDR&E

- The value to DoD of MOL very high resolution photography combined with the mission flexibility of MOL justifies the expenditure of the remaining start-up costs ($1.8B) and estimated follow-on annual operating costs ($100 - 120 million per launch).

- Very High Resolution (VHR) imagery, when combined with engineering principles and applicable technology can provide high confidence answers to questions up to several years sooner on performance and characteristics of foreign weapons, systems, equipment, and facilities. The Director, DIA adds that, in addition to technical intelligence, VHR also can make a substantial contribution to the development of strategy and tactics for the employment of military forces.

- [redacted] can make a significant contribution to policing arms limitations agreements, and has some intelligence coverage potential during crisis periods.

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- Terminating the MOL program now will result in FY 70 savings of $576M (not $800M) and total savings of $1.8B (not $2.0B).

- There is an unmanned configuration in the MOL program; thus GAMBIT does not have a unique advantage.

- GAMBIT-3 photography does not provide a resolution capability very close to MOL photography; the MOL by virtue of its much longer focal length and larger aperture will provide photographic resolutions approximately [redacted] GAMBIT-3.

- In their brief statement on Soviet strategic forces influencing U.S. calculations, BoB neglects consideration of tactical systems and threats, ignores the Chinese Communist threat completely, and focuses on "precise radar signal characteristics" as a determinant. If this is so, then no photographic reconnaissance, only SIGINT, is required.

- BoB implies that all issues have not been considered prior to preparation of their paper, referencing the DCI's

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considered, and DDR&Es judgments and conclusions, set forth in the MOL DCP (5 Dec 68), were supported by the Secretary of the Air Force, the President's Scientific Adviser, the Director NRO, and ASD(C), and were approved by DepSecDef.

ASD(SA)

- Agree with BoB position as far as it goes, but offer that:

1. VHR photography development should continue as a future option for the NRP.

2. Other considerations than intelligence apply: appeal of man in space; large sunk costs in MOL. Terminating MOL unrealistic option.

3. An option involving MOL combined with the Apollo Applications Program (AAP) be considered; slowing down MOL optical development and cancelling Apollo Telescope Mount Solar observatory. Result is common

space capsule development, common launch system and an integrated flight schedule. VHR photographic capabilities introduced as developed and as national security needs dictate. This option would accomplish the most important near earth orbit manned flight objectives and provide more time to solve the optics developmental tasks left in MOL. Problems under this option are (1) agencies involved probably prefer separation, (2) domestic and foreign political aspects of combined military - non-military program, and (3) 1958 Space Act would have to be amended concerning NASA's responsibilities.

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HEXAGON

BoB (BYE - 11700/A-69)

- Photographic reconnaissance program includes two types of systems with overlapping capabilities.
  - Surveillance: GAMBIT-3 and MOL
  - Search: CORONA and HEXAGON
- Even after HEXAGON is operational there will be a need for 4 or 5 GAMBIT satellites each year for surveillance.
- Issue: given need for GAMBIT, does HEXAGON provide enough additional search to justify additional total costs?
- GAMBIT; CORONA combination is adequate to meet intelligence needs against Soviet/Chinese strategic force capabilities. Problem has thus narrowed to HEXAGON's unique capabilities against ground force targets.

1. G-3 is meeting 95-97 percent of ground forces target looks required annually and quarterly by USIB. If requirements increase, longer-life G-3 will be able to meet them.

2. G-3 provides high confidence estimates against static targets, but

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3. HEXAGON has clearest added value against mobile ground force targets.

4. HEXAGON may not provide an important, unique capability for understanding manning levels.

5. SIGINT and HUMINT provide complementary information about ground force targets.

6. There is a penalty paid in resolution by substitution of HEXAGON for some of the GAMBIT missions.

- Neither mix (HEXAGON/GAMBIT or CORONA/GAMBIT) has an advantage in timeliness for crisis management.

- HEXAGON's 280-mile swath width option is a significant advantage (CORONA's is 130-mile), but is costly in film consumption.

- For equal annual cost of $293M, 4 HEXAGON and 4 GAMBIT, or 7 CORONA and 8 GAMBIT can be launched. The latter option more than meets requirements, although 4 HEXAGON will produce much more area coverage annually than 7 CORONA and surveillance requirement coverages by GAMBIT will be reduced somewhat.

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DNRO

- DNRO does not justify requirements, since he receives these from the USIB (TAB "B"). These requirements were reaffirmed by USIB D46.4/27 of 4 Feb 69. He does, however, provide cost estimates and assessments of technical performance and program risks. The DNRO comptroller has provided corrected cost figures with the comment that many costs in BoB paper are incorrect. Based on a 1 March 1969 decision to terminate HEXAGON the following numbers apply: c/BoB pg 2.

	Annual Total Launches (FY 73)	FY 70 Budget Costs ($ In Millions)	FY 1970-74 Costs ($ In Millions)
ExCom Decision			
HEXAGON	4	376	1,643
GAMBIT-3	4		
Alternative			
CORONA	7	305	1,390
GAMBIT-3	7	-71 1/	-353 1/

1/ An additional savings of $27M accrues from prior year funding, resulting in a total of $98M.

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The difference in FY 70 savings from the BoB figures is due to BoB's use of figures relating to a 1 December 1968 decision to terminate. Note that the above figures include in assumption that no improvements will be made in CORONA. It should also be noted that any decision to delay HEXAGON results in a need to buy more CORONAs with likely costs higher than potential HEXAGON savings.

DDR&E (BYE 78418-68)

- Three options available:

1. Cancel HEXAGON, use seven GAMBIT and seven CORONA per year. Save $183-234 million FY 68-70, and $500M FY 69-73. Lose significant benefits of HEXAGON in 1970's.

2. Austere HEXAGON. Three HEXAGON and four GAMBIT per year. Save $17M in FY 70, and at least $154M in FY 68-73 costs. Operating costs less than Option 1, but intelligence value much higher.

3. Planned HEXAGON. Five HEXAGON and five GAMBIT per year. Costs $74M more per year in outyears, but produces 30% faster and additional reconnaissance.

- DDR&E recommends Option 2:
  - Better intelligence than Option 1.
  - Costs less than Option 3.
- Development costs for major improvements to CORONA would be roughly the same as those remaining for HEXAGON.
- HEXAGON resolution (2.5 - 4 ft) markedly more productive than CORONA (7 - 10 ft).

1. DIA, CIA, and NPIC studies indicate there is a "breakpoint" in resolution productivity in 3 - 5 ft range.

2. More than half of targets covered by GAMBIT could be adequately covered by HEXAGON.

- Three major intelligence contributions unique to HEXAGON:

  1. More thorough search of Soviet Union/China to detect new activity or provide confidence that suspicious activity is not under way.

  2. Improve intelligence on ground forces through better and faster understanding of force readiness, logistical support, and major redeployment.

  3. Enable detection and assessment of certain mobile forces such as ICBM's, IRBM's, tactical offensive and defensive missiles.

- We are unable to predict fully the expected value of radical new systems such as HEXAGON; GAMBIT, for example, provides intelligence on ground forces, although it was not originally designed for that. HEXAGON may be able to make such unexpected, significant, contributions.

- HEXAGON is in its third year of development, and development risk has been diminished. High risk areas are identified and under control.

- HEXAGON will present more options for mixes of reconnaissance systems:

1. HEXAGON plus MOL may allow termination of GAMBIT.

2. HEXAGON could carry MOL-DORIAN optics; development would be $150-200M above and beyond current MOL development.

3. HEXAGON can be modified, or more vehicles launched, to keep a vehicle aloft 90% of the time. This would provide crisis coverage within a week or several days.

ASD(SA)

- HEXAGON/GAMBIT program differs little in operating costs from BoB-proposed CORONA/GAMBIT program. Adding one additional annual GAMBIT launch to BoB program would make ExCOM program and BoB program equal-cost options in out-years. Thus issue is whether or not to spend about $330 million in start-up costs for HEXAGON ($160M in unexpended FY 68-70 funds) in order to change our satellite photography mix.

What does $330 million buy for us?

1. Search. Four HEXAGON will cover 60-80 million square nautical miles annually; seven CORONA cover 54-63 M sq. N. Mi. HEXAGON search at higher resolution, but generally, task of searching for new systems would be performed equally well by both.

2. Surveillance. Commencing July 1969, longer-life (14-18 days) GAMBIT will provide 40-80% more camera actions per mission, and can provide required coverage with four or five of the longer missions. It appears that current surveillance mission could be performed equally well by either option (4 HEXAGON/4 GAMBIT or 7 CORONA/4 or 5 GAMBIT).

3. Intermediate-Resolution Surveillance. Difference between the two options is thus whether it is worth $330 million to have HEXAGON perform a new task (while simultaneously searching) rather than have that same task performed by two to three long-life

GAMBIT missions not needed for the current surveillance task.

Major debate about HEXAGON's effectiveness turns on its utility for photographing ground forces, their installations, and their movements.

1. Important during crisis periods.

2. A few low-priority Soviet/Chinese ground force targets are not now covered by seven short-life GAMBIT missions.

3. GAMBIT now covers 1964 major ground force targets: 1083 annually and 322 quarterly.

4. A few large ground force installations cannot be covered by GAMBIT in one pass; thus HEXAGON could offer some improvement in, say, vehicle counts (although vehicle counts are thought to be quite good already).

5. HEXAGON can provide more coverage of ground force units than GAMBIT, but at a lower resolution. It is

not clear whether this will be more positive than negative in assessing manning levels, since HEXAGON sees indicators more often than GAMBIT, but not as clearly.

6. HEXAGON is clearly superior to GAMBIT for detecting unit movements, crisis or otherwise, but information is not available to decision-makers for several days, and cloud cover can be a problem for a satellite. Drones are available for crisis reconnaissance.

Finally, using four HEXAGON and four GAMBIT launches annually, there will be only 175 days of coverage versus 230 days of coverage with seven CORONA and seven GAMBIT annually. To have a 90% probability that a HEXAGON would be aloft when a crisis began would require seven launches annually.

HEXAGON might produce coverage of small, mobile ICBM's, which CORONA could not. But these could be detected by GAMBIT sampling of railroad yards and other transportation modes; a mobile ICBM in any significant

numbers would require one or more large support bases. HEXAGON would allow more precision about the number of such weapons, but this information would be marginally valuable to force planners. Photograph of a mobile system would not be useful since it could not be targeted.

Recommendation. If savings in FY 70 are necessary, HEXAGON's 1970 costs and its marginal utility make it a likely candidate for termination. Crucial U. S. intelligence objectives suffering from its termination are hard to find. The FY 68-74 costs are about $330 million. If FY 70 savings are not crucial, the conservative decision would be not to terminate, since HEXAGON may conceivably yield intelligence whose value we do not yet recognize.

DRONES

BoB (BYE 11699-68)

- Terminate the 154 drone as soon as possible and save $25M, rather than buying the 20 now scheduled (with delivery of last drone in November 1970).

- Buy 12 147-T drones in FY 70 vice 24 and save $6.8M, while providing full reconnaissance coverage of North Viet Nam through FY 70, even if SR-71 flights are suspended. Buying 12 (instead of 24 new scheduled) will avoid an excessive inventory if hostilities end.

- Buy 120 147-S drones in FY 69 vice 186 programmed and 90 in FY 70 vice 156 programmed, at a savings of $35.8 million. This will provide for 100 percent coverage of NVN if manned tactical reconnaissance (RF-4's) is continued, and 90 percent coverage if manned reconnaissance is discontinued, and avoids building an excessive inventory.

Secretary of the Air Force: (BYE 66791-68)

147-T: Buy 36 drones in FY 70.

Current SR-71 sortie rate appears to be maximum attainable due weather. Therefore impractical to expect increase to 110 sorties annually.

147-S: Buy 240 drones in FY 70.

Provides least costly means to build a hedge against loss of manned tactical reconnaissance south of 19°N, and builds inventory during hostilities.

154: Keep program alive; buy 12 drones per year after delivery of 20 now contracted for.

Program should be kept alive (better camera, better survivability, growth potential); continued production for at least 2 years is required to give reasonably flexible force level.

Chairman, Joint Chiefs of Staff: (JCSM 728-68)

147-T: Buy 36 drones in FY 70.

Weather limits SR-71 sorties to about 68 per year, therefore planning on increasing SR-71 sorties over

NVN to 110 per year is impractical. Therefore only feasible option is to plan on current high altitude drone sortie rate, with losses of 24 per year.

147-S: Buy 240 drones in FY 70.

Build inventory at rate of seven per month during hostilities, which provides hedge against loss of manned tactical reconnaissance south of 19°N by March 1970. Lower cost ($104.8M) than Option 3 ($150.8M), which provides hedge by August 1969.

154: Keep program alive. Buy 12 drones per year after first 20 delivered.

Case for or against continued production of 154 drone should not be based only on predicted attrition and replacement costs. Analysis assumes that target coverage from 147-T or 154 is equally satisfactory/useful to photo interpreter. This is not valid since 154 optical bar camera has twice as good resolution as 147-T camera. Precise identification (discrimination within target type of known types) and target description (exact size and

dimensions, detailed layout, analysis of components, construction details) each require one-foot resolution, which 154 provides and 147-T does not. Growth potential of 154 is high, adding possibility of improvement in survivability. Consideration of above factors makes it appear logical to continue production at present rate until operational experience is gained and program can be reviewed.

DDR&E

Needs to know if 147-T camera can be replaced by 154's optional bar camera, and needs examination of TAGBOARD program to determine whether or not it will be used in actual operations. Cannot make valid choices of options until this data received.

Submits following comments:

147-H losses over China may all have been caused by MIG's, which raises 147-T attrition factor. Much better camera in 154 provides 100% of precise identification requirements and 61% of description requirements, while 147-T provides

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61% and 4% respectively 154 thus much more effective and hence more cost-effective. 154 also has greater swath width (45 nm) than does 147-T (25 nm). The 154 has greater growth potential, while 147 series has been modified and improved to its practical limit. Cost figures shown ($1.5 M per unit) are too low; $2.0M is probably better figure, giving 147-T decided edge over 154 in cost per target covered. If it is assumed that 154's will not be replaced, however, 154 system becomes least costly of all systems. If an SR-71 is shot down, a re-evaluation of use of entire SR-71 system will be required.

ASD(SA):

147-T: Buy 24 drones in FY 70.

Increased SR-71 sortie rate results in fewer drone losses; builds up inventory during hostilities as hedge. BoB option builds lower inventory, thus allowing fewer for special missions and new contingencies upon loss of manned tactical reconnaissance in NVN.

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147-S: Buy 156 drones in FY 69 and FY y0 each.

Does not add to inventory already provided by conversion of 52 147-NC drones. Provides smaller hedge against loss of manned tactical reconnaissance south of 19°N than approved program, but larger than BoB proposal. BoB proposal results in zero inventory if 100% coverage in current operations in maintained.

154: Terminate program after 20 drones now on order are delivered.

Nothing has happened which should change last year's decision to discontinue 154 production. The drone is currently planned for use only against South China. If Air Force attrition estimates are correct, then 20 drones now programmed will provide 2 1/2 years of effort. If Air Force estimates are incorrect, then 147-T drones are more cost-effective, but 40 per year would be required for South China. The 154 is more adaptable to changes in air defenses, but these changes aren't expected prior to the late 70's. If changes occur sooner, then the production line can be re-opened.

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Further investigation is required to ascertain amount of cost over-run, size of savings, and number of drones lost through early termination of contract. No recommendation can be made on early termination until these facts are known.

Director, NRO: (BYE 13589-68)

147-T: Buy 36 drones in FY 70. Rationale is same as Secretary of the Air Force.

147-S: Buy 240 drones in FY 70. Rationale same as Secretary of the Air Force.

154: Continue program at 12 per year after first 20 are delivered.

It is not sound to use a single point value, assumed valid for all time, for drone and aircraft attrition. Experience shows how variable attrition can be. Does not concur that only interceptor capability to be considered is that encountered in China (essentially MIG-19s). Against advanced interceptors 154 could well remain invulnerable.

while 147's probability of survival could drop to 0.5 or lower; advanced interceptors are in production in Soviet Union and may be expected to be encountered anywhere it suits the Soviets. 154's camera has higher resolution and swath width. 154 is less vulnerable to SAM attrition. Finally, must consider a plausible range of tactical and political situations, not just one fixed situation.

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