E-SCIA-163-60

AK-147-W

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HANDLE VIA BYEMAN CONTROL SYSTEM

25 OCT 1963

BXE-15057-63

DIAMC-[redacted]/73645/dw/22 Oct 63

MEMORANDUM FOR THE ASSISTANT DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING

SUBJECT: Proposed Combination Satellite System

1. At a recent orientation briefing by the Army staff for Mr. Hawkins, Assistant Secretary of the Army (R&D), on the subject of utilization of satellite photography for mapping and geodesy, the Secretary inquired whether an analysis had ever been conducted on the feasibility of flying a combination of camera systems consisting of a single 24" panoramic camera, a 12" focal length frame terrestrial camera and a 6" frame stellar camera. Such a system had not been analyzed.

COORD: DIAMC-

2. Army personnel have completed a preliminary analysis of such a system and this office has requested the (S) National Reconnaissance Office to complete a detailed technical evaluation. The results of that evaluation will be furnished you when received.

3. In the interim, attached is an extract from the Army report to Mr. Hawkins. Request that you attach this as an addendum to the 1 October 1963 study furnished you by DIA on the same subject.

FOR THE DIRECTOR:

[redacted]
Colonel, USAF
Deputy Assistant Director for
Mapping, Charting and Geodesy

1 Atch
Memo for File, same subj,
dtd 22 Oct 63

M/R: Not required; self-explanatory. Ltr prepared by [redacted]

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HANDLE VIA BYEMAN CONTROL SYSTEM

22 October 1963

BYE-15050-63

MEMORANDUM FOR DIAMC:

SUBJECT: Proposed Combination Satellite System

1. On 9 October 1963 the Army staff briefed Mr. Hawkins, Assistant Secretary of the Army (R&D), on the utilization of satellite photography for mapping and geodesy. This briefing covered a number of different camera systems that were analyzed for use either singly or in combination. During the briefing, Mr. Hawkins inquired whether a combination using a single 24" panoramic camera, a 12" focal length frame camera, and a 6" focal length stellar frame camera had ever been analyzed for feasibility. No such study had been made.

2. The Army staff has undertaken a preliminary evaluation of this proposed system and the following comments from that study are considered pertinent:

a. The proposed system would be suitable for medium scale mapping purposes because the 12" focal length frame camera would directly provide the control and approximately 90% of the planimetry required for mapping purposes. The 24" panoramic camera would provide the additional planimetric detail required for complete military medium scale mapping purposes. It would be marginal for the 100' contour interval currently specified for the 200 Series target chart.

b. The proposed system will meet the control and planimetric requirements for 1/250,000 scale mapping and 200 Series target charts provided that a sound geodetic net is available in accessible areas. Such a net is currently scheduled to be established in a separate conventional program utilizing optical angle measuring techniques, BC-4 cameras, and electronic distance measuring techniques (SECOR) to produce a world-wide 40 station primary net and a 400 station secondary net. The accuracy of these nets will be 15 meters absolute horizontal position with reference to the World Geodetic System while the vertical positions will be better than 15 meters absolute. Development of the proposed system cannot and should not await the completion of the ground control net. (As a DIAMC observation we recognize the need for such a world-wide geodetic net by one or more of the systems cited above, and we are presently analyzing long range plans to acquire such a net. This analysis is necessarily incomplete due to non-availability at present of comparative data for the several potential systems.)

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c. Based on limited information available to the Army, the weight and volume of the proposed combination appears to be well within the limitations for current vehicle systems, however, final determinations of this should be made at an early date by NRO.

d. Substitution of a single (mono) panoramic camera for the double (stereo) panoramic cameras has certain disadvantages, i.e., stereo can provide more ready and accurate identification of detail, easier placement of contour lines and probablysome-what more detail under cloud fringes due to angular view. Stereo can also provide mensuration data on vertical dimensions of structures, etc. These advantages are primarily of interest to the targetter and photo-interpreter for intelligence purposes. From the standpoint of the cartographer and geodesist they fall more in the "nice-to-have" than the "must have" category when considering medium-scale mapping rather than larger scales. The obvious advantage of this combination over the hither-to considered separate stereo pan and longer focal length frame is the tremendous savings in the number of launch vehicles and the fact that this system can be programmed to maximize its output for cartographic requirements, rather than to accept mapping data as an outfall from primary reconnaissance missions. (As a DIAMC observation on this preliminary analysis, if satellite flights are approved outside the Soviet Bloc area to meet mapping and charting requirement, it appears from this preliminary analysis that materials from this payload would be far more usable and useful for mapping and charting than would materials from the TR-4 payload. Overall total number of launches would not be reduced by adopting this concept but would be less than would be required if separate additional missions were flown for MC&G purposes. We recognize, on the other hand, that materials from this payload would yield no stereo panoramic photography and hence would be of lesser value for surveillance and reconnaissance exploitation.)

3. In summary, the proposed cartographic satellite system will meet current DoD requirement for production of base maps at medium scale. Although this payload may not satisfy all intelligence and reconnaissance requirements, it will most economically provide a base topographic map that will fulfill stated DoD medium scale mapping requirements. Recommend that this data be furnished to DDR&E for his information on an interim basis, and to NRO for technical evaluation.

[redacted]
Colonel, USA
Chief, Advanced Systems Office

1 Atch
Table Listing Capability
of Proposed System

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A. Number of missions required

(1) 100 pounds of film recovered (3 N or single casset system)

(2) 200 pounds of film recovered (J ~~or double casset~~ 5

B. Film length frame only - 8000 (4000) foot (J system)

C. Normal orbital alt (NM) 200

D. No. of models per 10^6 square miles - frame 150

E. Production Accuracy

Horizontal - 130 ft to 260 ft

Vertical - 56 ft to 112 ft

F. Production contour Interval 140 ft to 280 ft

G. World-wide Geodetic position (Absolute) 420 ft

H. Man-hours required for compilation of manuscript per 10^6 square miles - 170,000

I. Man-hours required for Technical support per 10^6 square miles - 170,000

J. Acquisition development costs - 3,500,000

K. Payload costs each - 1,700,000

L. Operational costs per mission (less payload) - 7,500,000

M. Earliest operational date - April 1965

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Attachment 1