NRO

DEPARTMENT OF THE AIR FORCE
WASHINGTON

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OFFICE OF THE UNDER SECRETARY

CORONA

20 JUL 1965

MEMORANDUM FOR DEPUTY SECRETARY OF DEFENSE
DIRECTOR, CENTRAL INTELLIGENCE AGENCY

SUBJECT: CORONA Improvement Program

Over the past several months, the NRO has carefully evaluated various possible improvements to the CORONA system. I have recently approved a series of modifications which will be incorporated into the system without interruption to the on-going operational program. The purpose of this memorandum is to provide you a brief summary of the CORONA Improvement Program which is being undertaken.

Two significant improvements had been approved previously for future inclusion in the CORONA system. These are: the Pan Reseau modification to the camera (a form of grid system imposed on the photographs to improve their mapping and charting value without impairing the intelligence product); and an improved Stellar-Index Camera (for both mensuration and mapping and charting purposes). Both of these articles will be flown in 1966.

In June, I approved initiation of development of a rotating scanning arm for the KH-4 camera. This device will reduce vibration (and resultant image smear), permit the system to be flown at lower altitudes (and thus improve resolution by the scale factor), and should improve overall camera reliability. It may also permit the use of Ultra Thin Base (UTB) film which, for the same total film weight, will increase coverage by approximately 30 percent. This device will be available for flight late in 1966.

In conjunction with the vulnerability reduction program, an Orbit Adjust System (OAS) has been developed for the

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CORONA. The OAS essentially represents the addition of small, auxiliary solid-rocket thrusters which can be used to increase or decrease the orbital period and change the apogee or perigee. The use of the OAS will be necessary (as a drag make-up device) if circular orbits and/or lower altitudes are flown. The first such kit (which can be added at R-9, and removed as late as R-2, in the countdown) will be test flown this Fall.

Unfortunately, all of these improvements add weight to the present system. Equally unfortunate is the fact that the present Thrust-Assisted THOR/AGENA CORONA is operated with virtually nil on-orbit weight margin. If all of these devices were incorporated into the present system, a compensating equivalent weight of batteries and control gas would have to be removed from the spacecraft, and lifetime (now 8 to 11 days, depending on inclination flown) would be reduced by as much as three days. This would be very undesirable, since orbital lifetimes actually should be increased somewhat for more efficient use of the present system. Thus, we have had to consider ways and means of improving booster performance for increased on-orbit payload weight.

We have analyzed all possible and practical boosters which could be used with the AGENA vehicle: the THORAD/SERGEANT (a THOR with increased fuel/oxidizer tankage plus the present strap-on solids); the THOR/SENIOR (the present THOR with much larger strap-on solids); the THORAD/SENIOR; and the ATLAS. These combinations would increase the on-orbit payload from 400 to several thousand pounds over the present TAT/AGENA.

Initially, the ATLAS/AGENA possibility was most appealing, since this combination already is used in the [redacted] Program, and its orbital payload capability would permit the inclusion of almost any conceivable modification to the present CORONA system. However, to be cost-effective, since a launched ATLAS costs approximately [redacted] more than the THOR, the lifetime of the system should be increased to more than 20 days, film capacity increased by a factor of about two (requiring a new RV sub-system), and redundancy added to the command and control and stabilization systems,

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etc. The end result, for all practical purposes, would constitute an entirely new system--of unknown reliability and offering only slight improvement in resolution over the present CORONA J.

Reluctantly, therefore, I disapproved the proposed change-over to the ATLAS booster. I ruled out the THOR/SENIOR and THORAD/SENIOR because they represent virtually new booster developments and, due to different flight characteristics, might induce payload problems. Thus, I have decided to use the THORAD/SERGEANT as the CORONA booster, starting 1 July 1966.

The CORONA Improvement Program will be accomplished in two major block changes as follows:

1. On 1 July 1966, the NRO will begin launching the CORONA J-2 model. The J-2 will utilize the THORAD/SERGEANT booster, have a 14-day AGENA on-orbit lifetime, include the Pan Reseau modification and new Stellar-Index Camera, and possess the capability to employ a solid rocket OAS kit when desired.

2. In December 1966, the NRO will begin launching the CORONA J-3 model. The J-3 will differ from the J-2 by the incorporation of the rotating scanning arm camera (which also requires an increase in the diameter of the spacecraft payload section), and UTB film (assuming tests verify the feasibility of its use in the KH-4 camera). The J-3 may also include an improved camera programmer; a decision will be made in this regard in the next month.

The CORONA improvement program will require a one-time investment of approximately [redacted] in engineering/development costs in FY 66. However, the number of CORONA launches will be decreased by at least two per year starting in FY 67; and at the same time, both quality and quantity of the intelligence product will be increased.

The NRO will continue to maintain an adequate reserve of CORONA systems on hand, at all times, even during the

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block changes. I assure you there will be no decrease of operational flexibility or capability as the improved models are introduced into the program.

Brockway McMillan
Director
National Reconnaissance Office

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