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3

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FROM: Dir, NRL

DATE OF MATERIAL: 5 June 1968

BRANCH IDENT. SYMBOL: [redacted]-RDM:sr

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[redacted] M. RYEMAN

SUBJECT: Mission 7107; supplementary costing details for NRL effort on [redacted]

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5 June 1968

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From: Director, Naval Research Laboratory, Washington, D. C. 20390
To: Director, National Reconnaissance Office (Attn: [redacted] Comptroller)

Via: (1) Director, Program "C" (CAPT Moffit)

Subj: Mission 7107; supplementary costing details for NRL effort on

Ref: (a) Meeting at NRO on 31 May 1968
(b) NRL ltr of 7 Feb 67, BYE 26904-67
(c) NRL ltr of 6 Mar 67, BYE 26906-67
(d) NRO ltr of 21 Mar 67, BYE 52212-67
(e) NRL ltr of 18 Apr 68, BYE 51903-68
(f) Msg cite MARGO 617-8 of 112055Z April 68 (#384)

INTRODUCTION

Reference (a) requested a further breakdown in funding information on Mission 7107 regarding the POPPY Program. The following answers have been prepared, using the same numbering sequence as specified in reference (a).

1. Reference (b) proposed a detailed design plan for Mission 7106 and a design concept for Mission 7107. Reference (c) provided an estimate of costs for the effort. Reference (d) authorized the Naval Research Laboratory to commit $640 K to protect the acceleration of Mission 7107 but contained no decision on the concept for this mission. NRL has attempted to proceed with certain advanced concept developments for Mission 7107, however, it has been handicapped by not having a firm plan for this mission. Reference (e) is a resubmission of cost estimates for Mission 7107 and reflect the experience obtained during the intervening thirteen months since the previous cost estimate (reference (c)). The great similarity between the concept for Mission 7107 and that of Mission 7106 now under active production at NRL, has provided an

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excellent basis for determination of the costs. The primary reasons for the increased costs for Mission 7107 are that the increased demands for data improvement to support the [redacted] problem have led to development and ultimate deployment of new and improved systems into the POPPY Program both in the payload and in the overseas data collection sites. This accelerated evolution of the operating systems has given rise to additional costs both now and in the future. The payload costs rise directly in proportion to their increase in weight and sophistication. It is also true that there have been several informal discussions with members of the NRO staff on the technical requirements to enhance the basic POPPY design, resulting in an increase in the sophistication of the payload and an increase in the cost of the Mission.

In view of the past experience at the Naval Research Laboratory in the production of similar satellites it is not possible to consider completion of Mission 7107 payloads in a period less than eighteen months following the launch of Mission 7106.

2. In answer to the questions of how much is included in FY 69 for [redacted] where and why - costs for [redacted] included in the estimate are as follows:

(a) A new interrogation system to cover the new command frequencies was included $35 K. (The older system will be retained to cover the satellites in orbit.)

(b) New Azimuth/Elevation Antennas for both interrogation and data collection are proposed for this site, $75 K. This will provide continuous tracking at the station on overhead passes without the voids in data which results from the existing antennas which are not steerable in elevation. The delayed commands for following orbits also require the elevation tracking antennas.

(c) Temperature-humidity control for the operating areas, $15 K. The high humidity at the site has demonstrated the need for controls to give satisfactory operation of the magnetic tape systems and to reduce the maintenance demands caused by the high humidity.

(d) Analog-to-Digital conversion system, $395 K. This item was included per the request included in NSA message, reference (f).

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With the field digitizing system, it will be possible to monitor all four satellites simultaneously by utilizing one of the ground station receiving-antennas to collect data from two satellites spaced within 50 miles from one another and at the same time use the other ground station antenna to simultaneously monitor the data from the other two satellites . Thus, it will be possible with the deployment of the field digitizing system to collect and digitize in real-time the data from all four satellites simultaneously. This technique will allow the full frequency and azimuth capability normal to POPPY, to be extended

3. With regard to the FY 68 and FY 69 estimates - - -

(a) NRL salaries and overhead are directly related to the amount of Engineering and Model Shop demands. During the production phases of the various satellites, this labor cost does normally rise appreciably as reflected in the figures of reference (e). With the slippage of the launch schedule this increase in labor cost will be delayed until after the beginning of FY 69. The average monthly labor and overhead cost experienced during the first eight months of FY 68 was $134 K with the actual cost for February being $137.3 K This labor cost will remain fairly constant until the four month period beginning in August during the peak period of Payload construction and pre-flight tests. Then the average labor cost will approach the $160 K/month estimated in reference (e).

(b) The funding at NRL for the remaining two months of FY 68 (our fiscal reporting lags about one month) is $1,927 K. The ten month average cost per month is $666.1 K which would leave us an estimated carry-over of about $500 K. NRL should have the new funds in hand prior to 1 August.

(c) The estimates for miscellaneous materials, travel and shipping are estimated higher than FY 68 to support the planned updating of both the . The new systems for interrogation and data collection will require extra travel to effect the installation. Operating spares and continuing logistic support for the additional installations are covered. Shipping costs to areas will be approxi-

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mately three times as expensive both in dollars and in time as that experienced during the past year in the deployment of the advanced analog to digital system into the

(d) Investment in ground stations continues to be high because of refinements in the satellite technology which require complimentary ground station support. In addition, as the operational capability of the program is further developed to contribute in the areas of it is essential that the performance capability of and timeliness of the program be enhanced accordingly. For this reason a more sophisticated quality control complex has been advocated. As the data is converted in real time from its received (analog) format to the digital format with the addition of a precise time notation on each pulse, it has been vitally necessary that the quality control of data be examined continuously. The trend of these investment costs in ground stations is downward as reflected by this summary of the FY-68,-69,-70 totals:

FY 68 - $2930 K
FY 69 - $2290 K
FY 70 - $1965 K

Facility costs likewise reflect the need for changes occasioned by the changing nature of the satellite configurations. Better understanding of total satellite performance both prior to and after launch, dictate improved observation and measurement facilities. These costs are decreasing as reflected in the estimates below:

FY 68 - $557.8 K
FY 69 - $426.2 K
FY 70 - $375.0 K

(e) Requirements for Operational Field Assistance in FY 69 will be greater as the result of the installation of the digitizing equipment at the . Two additional resident field engineers will be necessary to provide the technical support, programming and computer expertise needed to support these installations.

SUMMARY

As pointed out in reference (e) the costs and schedule have usually been defined first and then at some time later the operational and technical goals have been filled in by the community. Such procedures result in

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either poor compromises of operational capability or they result in a significant adjustment to the cost and schedule elements in order to meet the operational goals which are imposed. This Laboratory therefore requests an early resolution to the definition for Mission 7107 concept and design detail plan.