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16 MAR 1967

Adm - 10.6

MEMORANDUM FOR: Comptroller, DD/S&T
ATTENTION: Col. William A. Seward
SUBJECT: NRO Addendum, Program Description

1. As requested, a program description for the NRO Addendum to Optics Division's Agency Program Call follows. The addendum is prepared in two charts: the first chart covers items already NRO funded and indicates forecasts of future budgetary needs; the second chart covers new programs and on-going programs for which NRO funds were not provided. This program description follows this format.

2. NRO Funded Programs

a. Infrared Imaging. This category includes:

(1) Research Scanner. This scanner incorporates unique design features to permit separation of emissive and temperature contributions toward IR image formation. In addition, the unique recording system will permit recording images over selected 8 bands of information. Use and tests will be conducted over the next five years to obtain empirical data to support research and new concepts toward applications.

(2) 1/10 (Formerly 1/2) Milliradian Viewer. This item is in response to the important need for real time viewing during hours of darkness in Vietnam. The 1/2 mrad viewer represents the present state of technology, although the design and development of a 1/10 mrad is presently visualized. The increases in 1968 and 1969 are for flight tests of the 1/2 mrad viewer and initiation of the development of a 1/10 mrad viewer, which is required to see objects smaller than trucks and sampans.

(3) 1/10 Milliradian IR Scanner. NRO provided [redacted] toward the completion of the operational prototype. That prototype has been completed and is undergoing U.S. tests. Upon the completion of the tests [redacted]

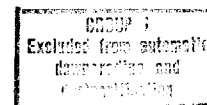
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BYE-1907-67
Page 2

[REDACTED]

[REDACTED] No FY 68 fund request was made in FY 66

For this item. In view of the latest requirement, it is requested that funds be granted to provide the necessary modifications and maintenance to utilize this equipment in the field, and for other applications through FY 70.

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b. [REDACTED] FY 68 is the "year of truth" where equipment, techniques, and procedures developed under this program to estimate crop yield will be applied to the wheat fields of North Dakota. FY 69 and 70 work covering rice fields in Taiwan and sugar cane in Puerto Rico, for confirmation under operational environmental conditions, is predicated on success over North Dakota. An operational system is foreseen in FY 1970, when work will cease unless otherwise directed.

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c. Low Light Level Reconnaissance Systems.

(1) Channel Image Intensifier. This is basic work in microchannel plates to increase the resolution and light amplification above present day image intensifiers. Intensifiers capable of resolutions from 50 lines per millimeter to 300 lines per millimeter are feasible to produce with gains in light amplifications up to 100,000. Microchannel plates also offer the possibility for transmission of the data, which will also be investigated. Present image intensifiers have resolutions approximating 25 lines per mm.

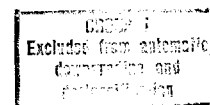
(2) Image Intensifier Driftsight. This is an application of the above image intensifier to provide the pilot with a view of the world (at night with 1/4 moon or better) that he has in daytime through his driftsight, for navigation purposes.

d. Image Processing/Data Reduction

(1) IR Image Scanning Processor. The utilization of IR imagery in a stereo mode has provided a technique where three dimensional presentation has permitted identification of targets not identifiable from non-stereo imagery. However, the scan lines are a source of fatigue, and an optical means of removing the scan lines has been developed. The work remaining is the development of an operational prototype.

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BYE-1907-67
Page 3

(2) IR Imagery Study. The work to be accomplished is the preparation of predictive models for various potential IR targets of greatest interest, to provide a mission planning guide for the operational officer.

e. Materials Research

(1) Hi Resolution IR Matrix. This work is directed toward production techniques of microminiaturizing multiple-detector matrices and arrays for a framing type IR camera.

(2) IR Electrophotography. This is a basic study and development toward obtaining a true 8-14 micron infrared film which will lead toward a conventional type camera operating in the long IR wavelength region, with the possibility of obtaining silver halide resolutions. The successful research and development of this material will revolutionize the infrared concepts.

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3. New Programs Requested for NRO Funding

a. Infrared Imaging. The war in Vietnam has focussed the importance of seeing and recording activities occurring in the dark. IR is the only passive means available to accomplish this, and increased resolution is required to acquire information on targets smaller than a truck or sampan.

work represents progress in our IR work, and the high cost is understandable.

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b. Image Processing/Data Reduction

(1) High Speed Isodensitracer. Increasing use of the isodensitracer for readout points to the importance of this program, which will increase the rate of readout 60 times faster than present equipment. It is used with black and white, and IR transparencies. Monies requested are to complete, install, and test the equipment.

(2) Automatic IR Data Reduction. It is expected that by FY 69 there will be a need for the automatic reduction of IR data, such as there is a need for automatic data reduction for conventional photography. IR imagery is unique in that it is formed by the emissivity and temperature of the target. The

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SECRET

BYE-1907-67
Page 4

research scanner has the capability of separating the contributions of emissivity and temperature, and thus provide data whereby an automatic system can be devised.

c. Material Research

(1) New Photosensitive Material. Previous research has produced a film with resolution beyond 2000 lines per millimeter with a speed rating of ASA 1.5, which places it beyond films presently available. Funding was not forthcoming in FY 67, and the request for funds is toward the development of production equipment and techniques to produce this material in quantity and quality for operational usage.

(2) Phosphor Film. Most real time displays utilize a cathode ray tube similar to that of a TV tube, because electron beam writing requires a vacuum environment. The development of new devices such as microchannel plates whose output does not require electron beam writing can utilize a simple non-vacuum device for viewing. It will also require higher resolution phosphors to meet the forthcoming resolution requirements. This project is toward the development of higher resolution, color contrast phosphors, and the design and development of non-vacuum real time viewing devices.

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d. [redacted] Systems. This program basically upgrades the [redacted] systems on a periodic basis. The request for [redacted] in FY 68 is for [redacted]. It utilizes experiences gained, and new developments since the inception of [redacted]. It will also include requirements obtained from the field commanders, [redacted].

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[redacted] The sums requested for [redacted] are for continuing research and development of [redacted].

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Office of Research and Development (b)(3)

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