Approved For Release 2005/11/21 : CIA-RDP78B05171A000500020021-0
SECRET
25X1

[redacted]

May 29, 1970

Dear John:

Enclosed please find three (3) copies of [redacted]/2201201-TPR-1 dated May 28, 1970. 25X1

25X1

Sincerely,

[redacted]

Senior Staff Scientist

PSC/c
Enclosures

THIS DOCUMENT IS UNCLASSIFIED
WHEN SEPARATED FROM CLASSIFIED
ATTACHMENTS.

Declassification Review by NGA/DoD

Approved For Release 2005/11/21 : CIA-RDP78B05171A000500020021-0
SECRET

Approved For Release 2005/11/21 : CIA-RDP78B05171A000500020021-0

[redacted] 135a 25X1

SECRET

25X1

Copy No. a of a-e

[redacted]

May 28, 1970

To: John C.

25X1 From: [redacted] 25X1

Subject: Technical Progress Report No. 1

Reference: [redacted]

This is the first monthly report on Contract No. [redacted] 25X1 (5500-6076) 70R, covering the period from 20 April 1970 to 19 May 1970. The primary aspects of the effort covered during this period of time include activity at the [redacted] 25X1

25X1 [redacted] in support of the in-house laboratory program and activation of the research and development program at [redacted] 25X1

25X1 [redacted] on the microscope image processing system. Accomplishments during this first month of the program have included attainment of the objectives of the initial phase of the laboratory program, where the holographic interferometer and the coherent optical processor have been set-up and activated. The initial objectives of fabricating hologram detection filters and performing detection filtering on the coherent processor, with good detection characteristics, have been attained. The research and development effort to implement image processing on the microscope has been initiated with the equipment received and two microscope configurations for the first experiments designed and set-up. During the coming month we will conclude the initial phase of the holographic

GROUP 1
EXCLUDED FROM AUTOMATIC DOWNGRADING AND DECLASSIFICATION

Approved For Release 2005/11/21 : CIA-RDP78B05171A000500020021-0

SECRET

NOTICE
THIS MATERIAL CONTAINS INFORMATION AFFECTING THE NATIONAL DEFENSE OF THE UNITED STATES WITHIN THE MEANING OF THE ESPIONAGE LAWS, TITLE 18, USC, SECS. 793 AND 794, THE TRANSMISSION OR REVELATION OF WHICH IN ANY MANNER TO AN UNAUTHORIZED PERSON IS PROHIBITED BY LAW.

25X1

SECRET
Approved For Release 2005/11/21 : CIA-RDP78B05171A000500020021-0

system application and initiate image processing activity on the partially coherent system (Beck bench). We will also be performing initial tests on the microscope processor using direct access to MTF control of the imaging optics. This initial experiment is directed to provide contrast and frequency controls as discussed in the proposal. It will be evaluated and other experiments will be initiated, as discussed below.

Laboratory Program

Delivered with this monthly progress report is a carbon copy of the laboratory notebook used by [redacted] and [redacted] as a record of activity at the customers facility. The carbon copy is complete except for original photographs that are placed on the master pages. The details of experiments, namely film output from the interferometer and coherent processor, exposure times used, etc. are included in the contract monitors notebook.

The primary objectives of the first phase of the laboratory program were obtained during the first month. The following is a summary of these accomplishments:

1. Set-up of holographic interferometer
2. Implementation of near field holography
3. Set-up of coherent image processor
4. Target fabrication for demonstration
5. Critical systems alignment
6. Filter fabrication for target recognition
7. Completion of interferometer refinements and demonstration of holographic target recognition
8. Record of results

Approved For Release 2005/11/21 : CIA-RDP78B05171A000500020021-0
SECRET

25X1

Approved For Release 2005/11/21 : CIA-RDP78B05171A000500020021-0

SECRET

The systems and some results are shown in the following illustrations. Figure 1 is a photograph of the coherent image processor used for the application of holographic filters. The laser source is at the far end, with the output viewer at the near end. Up to this time, we have used the system for detection filtering and are presently in the process of an image restoration demonstration. Figure 2 shows the holographic interferometer set-up with the laser source positioned to the left rear of the isolation table, and the holographic output at the right rear. A detailed discussion of these systems will be available in the first quarterly report. System details are presently available in the lab notebook.

Data demonstrating several examples of target recognition are given below. These illustrations show a special target used for the recognition demonstration in Figure 3, with prints of a holographic recognition filter and a detection signal output given in Figure 4. Figure 4(a) is a print of a holographic detection filter for the large arrow in the target positioned at the intersection of the second column and 5th row. The detected output is shown in Figure 4(b) as the brightest point. The brightness of the point is directly related to the correlation between target and filter. The other outputs show lower correlations, namely that they differ from the desired target to which the filter is matched. The detected output appears at the location of the target in the format and therefore locates the target position as well as its "likeness". Other demonstrations have been performed and are being recorded.

To conclude this phase of the program we will collect illustrations that can be used as briefing material and for laboratory demonstrations. We will also gather final data

Approved For Release 2005/11/21 : CIA-RDP78B05171A000500020021-0

25X1

SECRET

to demonstrate system utility in the area of image processing. These final objectives will be met during the first weeks of this coming month. A tentative schedule for briefing these initial accomplishments is set for the week of July 6 at the customers facility.

During the past month [redacted] personnel conducted a trip each week to the customers facility with a total of 11 man-days applied to the laboratory effort. This schedule is intentionally higher than the projected average schedule in order to gain initial emphasis required for laboratory system activation, and to gain timely results. 25X1

Microscope Processor

25X1 The [redacted] laboratory program to develop microscope processing capabilities was activated during this first month. Two Spindler & Hoyer micro-optical benches were received and one has been set-up as a microscope with capability for special design condenser assemblies. This set-up is shown in Figure 5. The condenser consists of a folded optical path designed to project a circular incoherent source onto the pupil of the microscope objective. The source diameter is controllable, and the objective of the set-up is to analyze microscope MTF controls during viewing. Reference to our proposal [redacted]P-70-5 dated February 6, 1970, p 36 illustrates the MTF response related to the controls designed into this system. 25X1

We have also initiated a second micro-optical set-up on the optical bench to study the process of mixing coherent and incoherent illuminants. Image processing will be performed along the coherent source axis, and incoherent light added to provide the continuous tone quality needed in an operational instrument. A photogrpah of the set-up is shown in Figure 6.

During the coming month we will analyze the potential applications of these systems. We will also initiate optical processing using phase filters that will not reduce illumination

levels but will provide noise filtration. Because of our involvement with several microscope configurations we recommend that the second Spindler & Hoyer micro-optical bench be temporarily retained at [redacted] so that the microscope developments can be more efficiently set-up and evaluated.

25X1

PSC/c