



May 15, 1970

Attention: John C.

Dear John:

Enclosed for your files are three (3) copies of Activity Summary, /2201021-AS-4 and one (1) copy of Program Plan dated 12 May 1970.

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Sincerely,



PSC/c

Declassification Review by NGA/DoD



May 14, 1970

ACTIVITY SUMMARY

To: John C.

From: [redacted]

Subject: Contract Visit to Customer Facility
11, 12, 13 May 1970

[redacted]

Reference: [redacted] 2201201-AS-4

This is a summary of the activity performed at the [redacted] [redacted] May 11 - 13 by [redacted] personnel. The specific details and accomplishments for this trip are contained in the laboratory notebook [redacted] 2201201-LN#1. This trip was conducted by [redacted] on 11,12 May and [redacted] on 12,13 May.

During these three days the primary activities included laboratory and lecture efforts. The laboratory effort was directed to refinement of holographic filter fabrication procedures and to optimization of detection filtering output on the coherent processor. A series of tests were conducted demonstrating the improvements that were gained during this period of time. Present status is to test out the detected response as a function of the ratio of amplitude of the reference beam and Fourier transform beam in the interferometer. The best refinement is that procedure that will give the optimum detected signal. Care will have to be taken to maintain a clean optical system to preclude noise, and to set the detected output at proper focus for maximum detection signal.

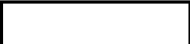
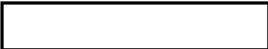


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The application of the holographic system to detection filtering will contribute to image processing activity in general. The interferometer provides a means for fabricating Fourier transform filters that can be used in image restoration as well as target detection. We therefore intend to emphasize target detection processes up to the point that the technique is fully demonstrable, and then to apply the technology to demonstrate its utility in the image restoration field.

One point that should be emphasized is the immediate need of a well operating laser for the coherent detection system as well as the need for pinholes, especially one of 10 μm diameter. These two items should be available for present work. Other requirements include components for high resolution operation of the interferometer and coherent processor.

The lecture was presented on the afternoon of 11 May, and included an analysis of optical components and their Fourier transformation capability. We will be analyzing the impact of each component of the system on the detected response, and include analytical capability for application of analysis to other similar systems.

Enclosed with this activity summary is the Program Plan, dated 12 May 1970, generated to direct laboratory activity during the interim period between  visits. Two copies were left at the laboratory on 13 May. The next trip is scheduled for 19, 20 May 1970 by 

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Two texts were delivered under thir program, they are

Principles of Holography
Howard M. Smith
John Wiley-Interscience, 1969

The Fourier Integral and Its Applications
Athanasios Papoulis
McGraw-Hill Book Company 1962

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Attachment

Program Plan

To John C.

STAFF
From



Subject:- Program plan for the interim period

Date: 12 May 1970

- At this time our primary task (short term task) is to refine the hologram detection filters and the coherent image processor in order to obtain a high signal to noise detected output. We have fabricated detection filters with moderate detection response, but need to improve on them. We will be doing this by cleaning up the interferometer wavefront (to delete the mottled output), optimize balance of the signal and reference beam amplitude, and optimize film processing. These steps are now in process and should be continued. The accomplishment of this task in a satisfactory manner will demonstrate a very important optical technique (optical target detection) and will provide a basis from which other optical image processing tasks can be performed. We should therefore apply ourselves to fabricating a restoration type hologram filter to demonstrate the principle of image restoration by holography. So we should try to conclude the target recognition tasks to also demonstrate the technique's utilization to image processing.

Program Schedule

Tasks

1. Test the filters fabricated on 12 May (p.m.) after interferometer improvement from speckling. Make sure that the lack of uniformity in the wavefront has been removed.
2. If test does not show a visibly good signal then review status of beam uniformity and improve it if necessary.
3. Perform a detailed series of filter fabrications where the only variable is the reference beam to signal beam amplitude, and test for optimum balance.
4. Repeat any of above as necessary, including systems alignment to improve signal to noise.
5. Begin to fabricate filters for other objects in target according to optimized process.

Schedule in days.

Tasks	May 13	14	15	18
1	x	x	x	
2		x	x	x
3			x	x
4				x
5				x

Following the above series, record the detected signal of the best test series and perform a sensitometric analysis to measure signal to noise ratio.