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7 June 1965

MEMORANDUM FOR THE RECORD

SUBJECT: Trip Report

Topics of Interest:

- 1. Radar-Detail Correlator
- 2. Automatic Target Recognition With Holograms
- 3. Dry Film Research

1. Radar-Detail Correlator



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The radar-detail correlator, built by  for experimental use at NPIC, is essentially complete and ready for delivery. This correlator is a small, table-top, folded optical bench designed only for the purpose of investigating the utility and worth of a P.I. - operable radar image enhancement device. It is not to be confused with the large continuous-process correlators which originally process the radar data (e.g. The Michigan Correlator). The concept behind the development of this experimental device is based on the fact the large continuous process correlators operate at average focus, thereby printing some image areas at less than optimum quality. It is felt that a P.I., when interpreting this radar film may want to optimize the quality of small areas of high intelligence interest. To do this, he must re-correlate the Doppler History Record of that small area at it's optimum focus. Theoretically, this will allow him to separate and sharpen more of the radar "blobs" in the image.

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The device, as now constructed, is not an operational instrument but is a device which will allow experimentation to assess the value of detail re-correlation by the P.I.. Therefore, a small research project should be instituted at NPIC to accomplish this investigation. Ideally, this project should be performed by radar-trained P.I.'s in PID or PAG. To this end, a recommendation will be made thru the appropriate channels.

## 2. Automatic Target Recognition With Holograms



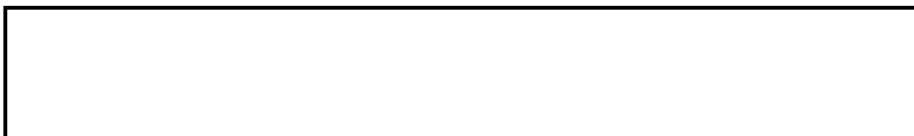
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The purpose of this project is to investigate the structure and variations of holograms and to determine their feasibility for use in an automatic target recognition system. The work is approximately 75% complete and will be completed by the end of August.

Experiments to date have been concerned with the quantitative evaluation of hologram recognition of images which have had their characteristics varied individually. For example, an image's shadow has been incrementally lengthened and subjected (at each increment) to recognition by a previously made hologram of the same image without shadow. Other image variables which have been investigated, in the same manner, are perspective, scale, orientation, multiple targets in the scene, and image detail. In addition to investigating the effects of image variables, certain parameters of the hologram system have been evaluated. Among these are vibration tolerance of the equipment, various types of recording media, the effects of liquid gates, effects of image alignment, etc.

The next major step of the investigation to evaluate the effects of combinations of image variables on recognition by prototype holograms. This will be performed with actual aerial photography (instead of models), on which the variables are not controllable. Little objective evaluation of the recognition capability of holograms can be made until this latter investigation is complete.

## 3. Dry Film Research



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This project is an experimental effort to develop a completely dry, black-and-white, continuous tone photographic system that overcomes the objectionable features of silver halide systems. Its primary purpose for NPIC would be rapid duplication of photographic materials. This is a three year effort which is about 1/3 complete. The concept being investigated is that a film can be developed which has a basic structure of bleachable dye molecule rather than conventional silver halide grains. These dyes are

bleached from dark tones to light tones (or colorless) by exposure to light, and then fixed by application of heat. There exist many hundreds of types of known dye molecules of different bleach characteristics. The initial effort of this project has been to examine these types, one by one in the laboratory, in order to find those which most nearly exhibit the required photographic characteristics. This phase is nearing completion and by about August a decision will be made as to which dyes are the most promising. The next step after that will be to change their molecular structures in order to maximize their photographic characteristics. This step is now funded for FY-66 and will be completed in mid-summer of 1966. It appears that the major photographic parameter yet to be achieved in any of the dyes investigated is that of light sensitivity (or speed).