U. S. ARMY ENGINEER RESEARCH AND DEVELOPMENT LABORATORIES
FORT BELVOIR, VIRGINIA

IN REPLY REFER TO
SEG-MDB

19 March 1962

SUBJECT: Potential Use of Change Detector for Mine Detection Problems

THRU: U. S. Army Engineer Research and Development Laboratories
ATTN: Chief, Electrical Department
Fort Belvoir, Virginia

TO: U. S. Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency
ATTN: Chief, Intelligence Division
Fort Belvoir, Virginia

1. The Mine Detection Branch, USAERDL, has an interest in the development of a device to display changes in similar photograph scenes taken at different times. Detection of a minefield on a photograph is often difficult because of inhomogeniety of background and poor tone contrast between the mine image and its background. Preliminary feasibility of a change detection system for Mine Detection has been demonstrated by using a set of photographs taken before and after mine burial in a desert environment. Examination of the pre- and post-photographs by a "change detector" clearly deliniates the minefield centerline and the individual mines. Minefield recognition features that might be observed as a change on other photographs are: vegetation damage, soil texture disturbance, soil moisture variation, foot paths, excess soil dump, variation of normal agriculture patterns, and deviation in normal human activity.

2. If such a device were available, the Mine Detection Branch would conduct studies to determine signal-to-noise ratios as a function of time and environment. If significant detection improvement resulted with the aid of such equipment, then the Mine Detection Branch would initiate action to have this equipment accepted by Intelligence organizations for the express purpose of improving remote detection of minefields. The Mine Detection Branch would supply the Intelligence Center with results achieved for inclusion in the Mine Detection P.I. Manual.

3. In addition to Mine Detection research, the Mine Detection Branch is (1) cooperating with the National Research Council on a program to use

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aerial photography for agriculture purposes and (2) with the Air Force Technical Applications Center on research to determine damage to vegetation caused by underground nuclear explosions. Photographic detection of both the agricultural and nuclear detection problems might be enhanced by use of change detector equipment.

FOR THE COMMANDER:

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Chief, Mine Detection Branch

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

MAR 12 1962

Director
U. S. Army Engineers
Geodesy, Intelligence and
Mapping Research Agency
Fort Belvoir, Virginia

Attention: Intelligence Division

Dear Sir:

The U. S. Geological Survey is making a study of remote sensing devices and the imagery produced by such methods as applied to geologic problems in general. In addition, we are investigating, on behalf of the AEC and ARPA, the geologic environment of nuclear test sites and problems related to the VELA UNIFORM program. Both of these related studies involve time sequence aspects that require evaluation of a series of images.

Semi-automated image evaluation devices, such as the "Change Detector" being developed for GIMRADA, may be quite helpful in our work. We would greatly appreciate having an opportunity to use this equipment whenever it becomes available.

Sincerely yours,

[redacted] STAT

Director

U. S. ARMY INTELLIGENCE BOARD
Fort Holabird, Baltimore 19, Maryland

Address reply to:
President

ACSIH-BD

6 March 1962

SUBJECT: Change Detector Development

TO: Director
U. S. A. Engineer Geodesy, Intelligence and
Mapping Research and Development Agency
Fort Belvoir, Virginia

1. Based upon discussions with personnel of your Intelligence Division, the study and review of reports, proposals, and requirements of combat intelligence, this Board desires to express its interest in the continued development of a change detector. Such a device would be used to analyze the output of various aerial photographic devices now under development or procurement. Its applicability to radar and infrared imagery is also of interest. Your Agency is encouraged to continue this development and to obtain one change detector for Army use.

2. A change detector is an item of distinct value to combat intelligence, for it will serve as a photo interpretation screening device capable of screening large quantities of imagery and identifying all areas of change. As such, it would be capable of revealing all changes that have taken place between two successive photo missions over the same area. From a combat intelligence standpoint, it would provide a means for ascertaining movement, into or out of an area, of troops, vehicles, weapons and equipment. It could be useful in the detection of minefields and many other items of interest to combat intelligence. It should constitute a useful addition to the tools of intelligence.

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Acting President