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Microdensitometry

NPIC/TSSG/PPS-192-68
27 June 1968

MEMORANDUM FOR: Director, National Photographic Interpretation Center

SUBJECT: Proposed Contract With [redacted] for Microdensitometric Support 25X1A

1. This memorandum requests approval for the commitment of funds for a contract. The specific request is in paragraph 7.

2. In keeping with the Center's attempt to develop an objective capability for image evaluation the [redacted] Trichromatic Microdensitometer was purchased by the Systems and Image Evaluation Branch, TID, and delivered to NPIC on 30 November 1966. This equipment is the most advanced and versatile available for image quality assessment. It has the capability of measuring and recording on magnetic tape extremely small increments of distance and tonal change -- including those occurring in color photography. Possession of this instrument and technologists who are capable of properly using it provide two fundamental components of a modern image evaluation system which is capable of producing analytical information conforming to established state-of-the-art techniques. In addition, this equipment is currently being utilized, in concert with the work being done by [redacted] of DD/S&T, to verify and apply his digital image restoration program (derived from our [redacted] contract) to a specific high resolution imagery exploitation problem. 25X1A 25X1A 25X1A

3. Two additional components which are necessary to complete the image evaluation system are a large capacity digital computer and appropriate analytical computer programs. When the microdensitometer raw data, recorded on magnetic tape, is processed by these components, the output -- in the form of analytical tables and graphs -- will provide a precision in image-quality assessment commensurate with objective state-of-the-art analysis and measurement techniques.

SECRET

SUBJECT: Proposed Contract With [redacted] for Micro-densitometric Support 25X1A

4. In order to achieve the complete system, TID/SIEB contracted with [redacted] 25X1A to train personnel in these advanced techniques; to recommend computer system design of the support system; to supply existing programs and help in their integration-conversion to the 490/494 UNIVAC environment; to develop a quality control analysis program for the micro-densitometer; and to develop analysis techniques for color microdensitometry. [redacted] 25X1A was selected as a sole source because it had already accomplished much of the work in black-and-white microdensitometry for the Special Projects Photographic Facility at Westover. By this contract, which was let in FY-67 and completed in October of FY-68, several significant analytical computer programs were supplied. They were:

a. SNERN -- A standard deviation granularity analysis for black-and-white imagery.

b. EXPGEN -- An exposure table generator. The table is used by all other black-and-white programs (except SNERN) for converting microdensitometer data to exposure (brightness) information.

c. MTF -- To determine the modulation transfer function or percent response and line spread function by analysis of edge trace from black-and-white imagery.

d. SINC -- A Sine Target Transform program to compute the MTF from multiple traces of a special sinusoidal-type target.

e. CORN -- A program to produce statistically valid comparisons between two sets of data obtained from similar imagery.

Of these programs, the first two were converted by IPD to run in the 494 UNIVAC environment. Other programs which required research and development were partially completed. They were:

SUBJECT: Proposed Contract with [redacted] for Microdensitometric Support

25X1A

f. Color Exposure Table Generator -- These tables will be utilized by other program handling data obtained from multispectral imagery to obtain exposure (brightness) information.

g. Direction Cosine and Color Tripack Calibration -- A program designed to provide the calibration of multispectral materials with the microdensitometer.

h. Color Microdensitometer Quality Control -- This program will provide an automatic, computer-oriented, quality control for the microdensitometer. It includes the design and fabrication of a special test target plate.

Additional programs which entered the initial phases of design only were:

i. Color Granularity Studies -- To compare tripack materials with black-and-white materials on the basis of noise properties, using classical gaussian properties, binomial distribution studies, and cross-and auto-correlation programs.

j. Color Modulation Transfer Function -- To provide a means for MTF generation and analysis of imagery on tripack materials. This would include the [redacted] transform method.

25X1A

5. Of the above partially completed programs, f, g, h, and j are of the highest priority, since they are needed to provide an objective capability for quality assessment of color photography and may be used to assist the photointerpretation of detailed imagery. Completion of these can be accomplished for approximately [redacted]

25X1A

SUBJECT: Proposed Contract With [redacted] for Micro-densitometric Support 25X1A

6. This proposed contract has been coordinated with PSG/AID through several memoranda and conferences. A mutually satisfactory understanding of the technical monitoring roles and the form of the end-products has been obtained.

7. It is requested that approval be granted for negotiations with the [redacted] to conduct the above described program at a cost not to exceed [redacted] 25X1A 25X1A 25X1A

[redacted]
Chief, Technical Services & Support Group, NPIC

Attachment:
[redacted] Proposal 25X1A

[redacted] 25X1A
APPROVED: _____ 28 JUN 1968
ARTHUR C. LUNDAHL DATE
Director
National Photographic Interpretation Center

Distribution:
Orig. -- NPIC/DIR (NPIC/TSSG/SSD, After Approval), w/a
1 -- NPIC/TSSG/SSD/LB, w/a
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25X1A NPIC/TSSG/PPS [redacted] cl [redacted] (27 June 1968)