[redacted]

13 August 1964
GS:bb:375
(997-112)

FIFTH MONTHLY PROGRESS REPORT

JULY 1964

MICRODENSITOMETER CAPABILITY AND INTERPRETATION STUDY

This report covers activities through the fifth month of a study of microdensitometer capability and interpretation techniques, which has as its objectives: (1) the establishment of techniques which will enable a microdensitometer operator to use the instrument to its maximum capability and to interpret the data therefrom accurately, (2) a survey of existing instruments to study the most recent developments in microdensitometry, and (3) a study of the feasibility and effectiveness of various advances in the state-of-the-art.

Each of the three tasks has been continued through the reporting period. As of the end of the month, the percentage expenditure to date was 64%.

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I. Mensuration Procedures and Data Interpretation

The primary emphasis on Task I has been on mensuration procedures, resolution and light source coherence effects, and grain scattering effects on density determination.

The mensuration procedures are being written in the form of a handbook. Procedures for data acquisition, reduction, analysis and interpretation are being included.

The initial part of an investigation concerning the characteristics of the images of objects having finite edge widths has been completed. These results are currently being analyzed and will be reported when the analysis is completed.

The study of dependence of measured density on source and detector specularity was delayed when it was discovered that [redacted] instrument for measuring "diffuse density" did not do so. This is reported in Attachment 1 to this

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report. A call to the equipment manufacturer, reported in Attachment 2 of this report, obtained information concerning modifications which will be made to correct the equipment. The diffuse densities will then be measured and compared to densities measured at various numerical apertures. The results of the measurements other than diffuse are reported in Attachment 3 to this report.

II. Equipment Capability

STATINTL Three trips were made to equipment manufacturers during the reported
STATINTL period, one each to [redacted] Attachments 4, 5, and 6 to this report describe the results of these trips.

III. Feasibility Studies

The analysis of sine wave and edge test patterns is nearly complete and a memorandum is in preparation.

Work has been initiated on the investigation of the use of a laser unit as a light source for a microdensitometer. The results to date of this study are included as Attachment 7 to this report.

An investigation is being conducted of the improvements possible in the recording of edge traces by using narrow illuminating apertures. This investigation will include both coherent and incoherent sources. The use of coherent illumination in themicrodensitometer is being considered first.

Effort on the visual display was temporarily interrupted when it was found that analysis of the optical system of the [redacted] instrument required information from the optics manufacturer. A letter requesting the required information was sent to [redacted] As of the end of the month, no reply had been received and a follow-up letter was sent.

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ATTACHMENTS:

1. Diffuse Density and the MacBeth Densitometer, [redacted] HH:bb:359 7 August 1964

2. Contact Report, Telephone Call to [redacted] MM:bb:351, 3 August 1964

3. Variation of Density with Numerical Aperture, [redacted] HH:bb:362 31 July 1964

4. Trip Report to [redacted] MJM:bb:335-jg, 8-9 July 1964

5. Trip Report to [redacted] MJM:bb:341, 21 July 1964

6. Trip Report to [redacted] GN:bb:368 31 July 1964

7. Intensity Stability of Laser Sources, [redacted] WCT:bb:357, 7 August 1964

$\tan 9° = \frac{x}{51}$

$51(\tan 9°)$

36"

17 Aug 1964

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STATINTL Memorandum from [redacted] taken back to [redacted] for clarification. Subject of memorandum is "Precision Location of Edges from Degraded Images", dated 16 June 1964 (HH:66:279).