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QUARTERLY REPORT
Contract [redacted]

Fourth Quarter FY-65

(12 March 65 through 4 June 65)

4 June 65

PREPARED BY:

[redacted]

APPROVED BY:

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Prepared at the Contractor's Facility
As Specified by
Contract [redacted]

Copy No. [redacted]

SECRET

PROGRAM OBJECTIVE

Through study, review evaluation, design, fabrication of engineering breadboard equipment and testing, to investigate new methods in photographic processing and printing techniques and practices pertaining to aerial reconnaissance, with special emphasis on the best means of exposing, processing and duplicating photosensitive materials, but excluding practices or techniques used solely for exploitation.

[redacted]

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SECTION I

INTRODUCTION

[redacted]

QUARTERLY REPORT

Contract [redacted]

Fourth Quarter FY-65

4 June 65

SUMMARY

1. Based on the customer's request for transmittal of the Quarterly Report at least two weeks before an early July CCB Meeting, this report covers the period from 12 Mar 65 through 4 June 65.

2. Detailed reports, covering progress on all active PARS are included in this report as listed in the Table of Contents.

[redacted]

[redacted]

4 June 65

DISCUSSION

3. PAR Status Index: A complete serial listing of PARs and Part XIX Items showing current status is included below:

PAR	Title	Status
1	10-20-40 Roll Holder	Complete Aug 64
2	3.6 Reduction Lens Design	Complete Jan 64
3	20X Color Lens	Complete Aug 64
4	Auto. Exp. Control Printer	Cancelled
5	Scanning Densitometer	Active
6	400-Watt Mercury Arc Source	Complete Oct 63
7	Commercial Components	Active
8	Frame Coding and Detecting	Complete Dec 64
9	Frame Detector and Counter	Active
10	Automatic IR Densitometer	Active
11	Testing Unsharp Masks	Complete Aug 64
12	Redesign MTR Camera	Active
13	Frame by Frame Printer	Trans. [redacted] Complete Oct 64
14	Modification of Mod. 5 Micro-D	Complete Nov 64
15	Reversal Processor	Cancelled
16-1	70mm Breadboard	Complete Jan 64
16-2	Viscous Developer Coating	Complete May 64
16-3	70MM Prototype Processor	Complete Apr 65
16-4	F x F 9.5-Inch Processor (Yardleigh)	Complete Apr 65

[redacted]

[redacted]

4 June 65

PAR	Title	Status
17	Bidirectional Printer	Trans. [redacted] Complete Oct 64
18	Color Printer	Trans. [redacted] Complete Jan 64
19	Exp. Control Criteria	Trans. to PAR 24
20	Advanced Components for Printer	Active
21	Phosphor Viewer	Cancelled
22	Trenton Rec. & Warning Device	Complete Jan 64
23	Processing Improvements, Printing Improvements	Complete Feb 65 Complete Mar 65
24	Red Dot Tests; Processing Red Dot Tests; Scene Luminance	Complete Nov 64 Complete Sept 64
23-5-1	Frame by Frame Printer	Active
23-5-2	Contact Print. & Optical Comp.	Active
23-5-3	Spray Process	Active
23-5-4	Improved Use of IR Denstiometer	Active
23-5-5	Measle Study	Active
23-5-6	Gold Treatment	Active
23-5-7	Clean and Protect Film	Active
23-5-8	Density and Contrast Study	Active
23-5-9	Dual Printing	Active
23-5-10	Multiple Generation Study	Deferred
24-5-1	Low Alt. Reconnaissance	Active
24-5-2	Color	Active
24-5-3	Night Photography	Active
24-5-4	Negative Contrast	Active
24-5-5	Exposure Criteria	Active

[redacted]

4 June 65

PAR	Title	Status
25	Image Analysis	Active
26	Effect of Radiation	Complete Jan 64
27	Mod. 6 Micro-D	Cancelled
28	Modular Processor	Cancelled
29	R&D Processor for QC	Cancelled
30	Test Waxing on Processor	Cancelled
31	Ultrasonic Cleaner	Complete Jan 64
32	Ultrasonic Splicer	Complete Oct 63
33	Mod. III Titler	Active
34	-	Not Issued
35	Travel FY-64	Complete
36	1000-Watt Source	Active
37	Improve Versamat Processor	Complete Oct 63
38	Adj. Slitter	Active
39	Light Source Test Fixture	Complete Aug 64
40	Grafton Conversion	Trans. [redacted] Complete Jan 64
41	Speltron	Trans. [redacted] Complete except for Final Report
42	Adv. Filter Components	Complete Mar 64
43	Heat Seal Splicer	Complete July 64
44	Sens. Edge Printer	Active
45	Mod. EN18	Cancelled
46	Ultra Thin Film Handling	Active
47	S&R Color Printer	Not Issued
48	Automatic Micro D-5	Not Issued
49A	Black Edge Titling	Active

4 June 65

PAR	Title	Status
50	Optical Add-On Titling	Active
51	S&R Color Printer	Active
52	S&R Drum Printer	Active
53	Auto. Exp. Control Study	Active
54	Viscous Proc. Study	Active
55A	Bimat Study	Active
56	Bimat No. 1 Proc.	Active
57	Bimat No. 2 Proc.	Active
58	Adv. Proc. Tech. Study	Completed 12 Mar 65
58-5-1	Wash Water Studies	Active
58-5-2	Viscous Developer Studies	Active
58-5-3	Viscous Washing Studies	Active
58-5-4	Viscous Coating Removal Study	Active
58-5-5	Film Drying Studies	Deferred
58-5-6	Solution Carrier Studies	Deferred
58-5-7M	Silver Recovery Study	Active
58-5-8	Viscous Coating Temperature Study	Active
58-5-9	Viscous Fix Study	Active
58-5-10	Long Length Bimat Film Study	Deferred
59	Flying Splicer	Active
60	Film Handling Tech.	Active
61	Improved IR Scanner	Active
62M	Central Control Study	Active
63	Inv. Raw Stock Cleaning	Active

4 June 65

PAR	Title	Status
64	Wide Film Handling	Deferred
65	Non-Photo Supply Inv.	Cancelled
66	Travel & Liaison FY-65	Awaiting Customer Action
67	Study Dist. of Niagara Printer	Cancelled
68	Ident. Printer	Active
69M	Ultrasonic Edge Detector	Active
70	Film Scanner Recorder	Deferred
71	-	Not Issued
72	B&W, S&R, Flat Bed Printer	Active
73	Administration FY-65	Awaiting Customer Action
74	Airborne Proc. Lab	Deferred
75	Airborne Insp. Work Center	Deferred
76	Upgrade Yardleigh Processor	Active
77	Processed Film Slitter	Active
78	Cross Frame Lacquerer	Active
79	Universal Titler	Active
80	Ion Exchange System	Deferred
81M	Versamat Water Reduction	Active
82M	Two-Strand Stereo Viewer	Active
83M	Versamat Rack Washer	Active
84M	Three Lamp Lamphouse	Active
85M	Airborne Proc. Layout Study	Active

4 June 65

Part XIX

Item	Title	Status
1	1000-Watt Continuous Printer	Deferred
2	Waxer-On Processor	Deferred
3	Movable Head Densitometer	Active
4	Two-Strand Film Viewer	Active
5	Automatic Recording Densitometer	Active
6	Galaxy Continuous Printer (Incl. Suppl. #1)	Active
7	Trenton Processor	Deferred
8	Lab Contact Printer	Cancelled
9	Yardleigh Coating Hoppers	Active

4. Progress Reports: Summary progress reports are furnished in Section II for all active PARs and Part XIX Items as shown in Table of Contents. This includes all active FY-64 PARs continuing in FY-65 and approved FY-65 PARs.

5. Contractor Recommendations: The following actions on specific PARs are recommended for discussion at the July 65 CCB meeting:

a. PAR 5, Scanning and Recording Densitometer - Complete Phase I and II at increased cost as outlined in contractor msg [redacted] 2 June 65.

b. PAR 20, Advanced Mechanical Components for Printers - The specific component under current investigation is the porous air roller. Due to discouraging results of tests to date and the resultant increase in printer complexity, it is recommended that the air roller investigation be terminated by the publication of a final report.

c. PAR 23-5-6, Permanence of the Developed Image in Stored Aerial Films - The effort planned for Phase I of this PAR has been completed. Since no evidence of image deterioration has been found, prepare and submit a report which will be an interim or final depending upon the customer's reaction to the included recommendations.

d. PAR 59, Flying Splicer - Based on review of in-house requirements and vendors experienced in high-speed material handling, it is recommended that this PAR be closed. This Quarterly Report summarizes the activity and is submitted in lieu of a final report.

SECTION II

PAR PROGRESS REPORTS

Contract [redacted]
Fourth Quarter FY-65

PAR 5
4 June 65

SUBJECT: Scanning and Recording Densitometer

TASK/PROBLEM

1. To design and fabricate a prototype scanning densitometer capable of reading stationary or moving film to aid in exposure prediction. The unit to be capable of scanning selected areas of 70mm to 9.5-inch wide film and providing recorded graphs of pertinent data.

DISCUSSION

2. Design layout work on the viewing illumination system, the air arch film support, and the densitometer lamphouse complex is about 80% complete. This design presently provides completely rollerless transport of the film between supply and take-up reels.

3. Design layout work is about 90% complete on the supply and takeup reel drives. These drives will be AC torque motor powered. Drive speed and direction will be controlled by a single handle.

4. The redesign of the mechanical drive portion of the densitometer scanning head is 95% complete. This redesign was undertaken to minimize gear and bearing noises which developed during extensive testing of the breadboard.

5. Design layout of overall arrangement and cabinetry has begun and is about 15% complete.

6. The complexity of the technical problems has been greater than anticipated at the time of the PAR submission. A revised estimate of the total cost of Phase I and II has been forwarded to the customer by msg [redacted], dated 2 June 65. The contractor has been advised that the customer will review and render a decision on this matter during the July 65 CCB meeting (customer msg [redacted] dated 3 June 65).

PLANNED ACTIVITIES

7. At the July 65 CCB meeting, the contractor's request for permission to complete the project will be reviewed. Therefore, the following planned activities are tentative, pending decisions of the July 65 CCB meeting:

a. Complete mechanical-optical design.

b. Begin mechanical fabrication.

Contract [redacted]
Fourth Quarter FY-65

PAR 7
4 June 65

SUBJECT: Investigation of New Components and Materials

TASK/PROBLEM

1. Purchase and determine, by tests, possible usefulness in our field of new commercial components and materials.

DISCUSSION

2. Studies of new commercial components or materials are carried on as individual investigations and are assigned separate sub-project numbers. As reported in Second Quarter FY-65 report, sub-projects 7-1 through 7-12 have been completed. During the subject report period no materials and/or components have been investigated.

PLANNED ACTIVITIES

3. Efforts, within the scope of remaining funds, will continue as the need arises.

Contract [redacted]
Fourth Quarter FY-65

PAR 9
4 June 65

SUBJECT: Frame Detector and Counter

TASK/PROBLEM

1. To develop and fabricate a frame detector and counter to detect frame lines, count and locate a given frame in a roll of negative.

DISCUSSION

2. Physically, the frame detector and counter consists of two units:

a. Control Chassis: A portable enclosure containing the major portions of the electronic circuits, the visual numeric display (frame count indicator) all operating controls and setup switches.

(1) The displayed frame count can be preset at any initial number and will add or subtract (depending on direction of film travel) with each detected frame.

(2) A separate indicator lamp will be energized when the frame count indicator arrives at a preselected frame number inserted into the system by the setup switches.

b. Detector Head: A scanning unit to detect frame lines. It is positioned over the film whose frames are to be counted.

3. Status:

a. Mechanical: As reported in last quarterly report authorization for procurement of parts, fabrication, and assembly of the detector head was issued 25 Feb 65. Delivery date is 15 June 65.

b. Electrical: As reported in the last quarterly report, further electrical work depends on receipt of the detector head 15 June 65. At that time, the photocells and lights will be installed and final check out conducted.

PLANNED ACTIVITY

4. Complete fabrication of detector head.

5. Test and check out unit.

Contract [redacted]
Fourth Quarter FY-65

PAR 10
4 June 65

SUBJECT: Automation of I. R. Densitometer

TASK/PROBLEM

1. Design, fabricate and test an automatic I. R. Densitometer which will scan 90 percent of a picture frame and base processing level of that frame on the absolute density minimum measured.

DISCUSSION

2. Introduction: The automatic I. R. Densitometer for the Trenton Processor will control the present I. R. scanner and dynac switch functions by means of a frame detector, stepping switch, weighted shift register and output logic to solution spray solenoid valves.

3. Progress:

a. Peak detector edge reference circuitry has been incorporated on the frame detector to provide memory function.

b. All hardware fabrication sketches including assemblies have been completed.

c. Installation/Modification sketches are 75 percent complete.

d. All fabricated parts have been received from shop.

e. All purchased parts have been received in-house.

f. Assembly of main electronics chassis and tachometer assembly has been started and is 25 percent complete.

PLANNED ACTIVITY

4. Complete fabrication, including sketches, of the I. R. Densitometer by 1 July 65.

5. Modification of the processor and installation of the I. R. Densitometer will be accomplished as soon after 1 July 65 as the schedule permits.

Contract [redacted]
Fourth Quarter FY-65

PAR 12
4 June 65

SUBJECT: Microscope Resolution Target Camera

TASK/PROBLEM

1. Design and fabricate an instrument to produce high-quality test patterns on roll films, 70mm to 9.5-inches wide, by optical reduction with microscope optics. Instrument to provide improvement over the present 20X Resolution Target Camera thus supplementing present in-house capability.

DISCUSSION

2. Fabrication has just been completed on the fluid injection pumps.

PLANNED ACTIVITY

3. The fluid injection pump installation will be completed. Preparation of the final report and the operation manual can begin shortly thereafter with expected publication about 30 July 65.

Contract [redacted]
Fourth Quarter FY-65

PAR 20
4 June 65

SUBJECT: Advanced Mechanical Components for Printers

TASK/PROBLEM

1. To investigate porous air rollers as a means to improve tracking and film handling.

DISCUSSION

2. We have breadboarded a Niagara printer using hollow pressurized sintered stainless steel guide rollers in an attempt to provide an edge guiding means which would improve film tracking and at the same time not hazard product safety.

3. Results to date have not been encouraging. While we note an improvement in lateral guiding, an absolutely safe air support has not been obtained and minor abrasions result. Major damage such as fold overs or tears has not been evident.

4. The problem of improving the airlift appears costly in terms of compressed air consumption, increases printer complexity by a large measure and is difficult to test except by actual scratch checks. It is doubtful that the reliability needed to print the required multiple copies from a single original can be obtained.

5. In view of the above, it is recommended that this project be terminated.

PLANNED ACTIVITY

6. Prepare and publish final report.

Contract [redacted]
Fourth Quarter FY-65

PAR 23-5-1
4 June 65

SUBJECT: Exposure Determination for Frame-by-Frame Printing

TASK/PROBLEM

1. Study the effectiveness of a multi-density print as a tool for the selection of exposure for each frame.

DISCUSSION

2. Additional experience has been gained in printing via the experimental tri-density system, with over 350 negative frames used to date. The tri-density method appears workable and fast. Printing exposures can be determined readily for most missions with the three density bands at 0.3 apart.

PLANNED ACTIVITIES

3. Complete a detailed comparison of time requirements and accuracy for the multi-density print method versus the maximum and minimum frame density measurements used currently in production.

4. Verify current findings with limited printing of a wider selection of negatives and write a final report.

Contract [redacted]
Fourth Quarter FY-65

PAR 23-5-2
4 June 65

SUBJECT: Study of Contact Printer Optical Components

TASK/PROBLEM

1. Conduct study of new contact printer optical components to determine effects on image quality.

DISCUSSION

2. Evaluation of the inconel type wedge attenuators for Niagara printers has continued. The test results indicate there is no difference in resolution between inconel wedges and the carbon-gel wedges currently used. Testing has been accomplished on Types 8430 and 5427 duplicating materials. It has also been found that inclination of the wedge from 0° to 7° does not affect printing resolution. Tests have not exceeded 7° since this is the maximum angle permissible in a Niagara lamphouse.

3. The DC power supply to be used for further testing of a 250-watt mercury arc lamp has been received and is being installed.

4. A new type of high contrast resolution target using twelfth root of two increments is being examined. This type of target should reduce the range of resolution variability within tests which may result from the sixth root of two increments currently used.

5. A request was received to determine a method of printing Types 4401 or 8403 onto 8430 duplicating material. Such a technique is needed to make use of a customer inventory of 5-inch Type 8430. A study is underway to examine several grades of diffuse transmitting materials which can eliminate measles and yet maintain acceptable resolution.

PLANNED ACTIVITIES

6. Evaluation of inconel wedges will be completed.

7. The new DC power supply will be installed and testing will resume on the 250-watt mercury arc lamp.

8. The study of an expedient method for printing Types 4401 or 8403 onto Type 8430 will continue.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 23-5-3
4 June 65

SUBJECT: Improvements to Spray Processing

TASK/PROBLEM

1. Evaluate certain photographic developers and experimental films aimed at improving existing spray processing systems.

DISCUSSION

2. An investigation was made to determine, by survey, the spray processors most applicable to the study. These were found to be:

a. Trenton: An interrupted development spray processor.

b. Yardleigh: An interrupted development part spray and part viscous processor.

c. Dalton: A single development stage spray processor.

It is expected almost all of the work in this study will be connected with these units.

3. Several tests were made on small conventional immersion type processors to determine if the photographic results produced by them were similar enough to those of spray processors to warrant their use in the study. The reasons for desiring to do this were availability and low operating cost.

4. The immersion processors considered for use and tested were an Eastman Kodak Versamat, an Eastman Kodak Immersion Sensitometric Processor and a Houston Fearless EH-6A. The results showed that of all the units, only the Versamat produced sensitometric results equivalent to the spray processor.

5. Preliminary tests were conducted to determine if the three spray stages of the Trenton could be used to produce four levels of development instead of the present three levels. No alterations were made to the processor. The results of one test indicate that a fourth level, approximately midway between the full and intermediate levels, might be obtained with film Type 4404

[redacted]

with changes in plumbing and temperature. More testing needs to be done to verify this conclusion and investigate practical possibilities.

PLANNED ACTIVITIES

6. Conduct further four-level-of-development processing tests on the Trenton processors to verify workability and write a final report.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 23-5-4
4 June 65

SUBJECT: Improved Use of Infrared Densitometry

TASK/PROBLEM

1. Collect and evaluate infrared densitometric data as a basis for improved calibration and control of interrupted processing equipment.

DISCUSSION

2. Activity on this PAR has been limited.

3. During one test period for the evaluation of Lektromesh screens a severe fall off (transmission response) occurred. The fall off was experienced on different screen samples and was not altered by reorientation of test samples. Although properly seated, the quartz lamp was found to be slighly askew, and it was necessary to elongate the lamp seating slot to correct the alignment. Because the orientation of lamp, slot and cells is done as a manufacturing responsibility, current check out tests are not aimed at lamp alignment. Thus, initial failure of the screens to correct fall off resulted in discovery of a significant equipment defect.

4. Preliminary to evaluation of settable counters, we have sought to determine as accurately as possible the film area (size) scanned by one cell. This will assist in evaluation of empirical testing. The scanned area per cell is a dimension of considerable interest whenever scanners or scanner operations are discussed. A testing apparatus for this measurement has been fabricated. The apparatus is designed to fit on top of the scanner cell block housing so that distance from the slot of test apparatus to the cell block is approximately equal to the distance of film plane to cell block. In this slot has been inserted a neutral density material used normally for check out of cells. The percent transmittance of this material, expressed in millivolts, is 200mv. The testing apparatus includes the

facility to move an opaque shield along the slit width in measured increments of sixteenths of an inch.

5. Initial measurements will be made on the center cell (cell #40). While precisely diminishing the width of the slit and simultaneously measuring transmittance voltage, the lateral limits of film area seen by one cell can be determined. This testing will be repeated several times for reliability analysis and carried out successively for groups of two, three, four and five adjacent cells.

6. When area scanned has been determined, various "number of cells" for a development signal can be evaluated.

PLANNED ACTIVITIES

7. Complete testing for determination of size of area scanned.

8. Initiate tests for comparative evaluation using settable counters.

9. Continue testing for evaluation of Lektromesh screens as suitable check material.

Contract [redacted]
Fourth Quarter FY-65

PAR 23-5-5
4 June 65

SUBJECT: Contact Print Mottle (Measles)

TASK/PROBLEM

1. Study causes and evaluate possible methods of eliminating mottle associated with contact printing on fine grain duplicating films.

DISCUSSION

2. The literature review investigating the measles problem is continuing. There are very few papers to be found on the subject but the material which has been studied describes the phenomena well.

3. The undesirable density patches, referred to as measles, are believed to result from a halftone effect in contact printing. This can occur when two conditions exist; first, when the exposing energy is specular and second, when the raw stock has the capability of resolving the grain of the negative image. Under these circumstances, if a separation occurs between the negative and the raw stock, the radiation incident upon the negative can undercut the silver grains before reaching the raw stock. When this situation occurs with a fine grain raw stock, a greater number of halide crystals become exposed as compared to a similar region of intimate contact. As a result, the area where poor contact exists yields a density greater than the surrounding area of better contact and the general appearance is the measle effect.

4. The presence of a base density speck frequently found within a measle boundary would support the halftone effect theory. These specks are believed to be foreign particles and therefore cause the contact imperfection.

5. The first breadboard experiments to investigate the measle problem have begun. Using a 4401 processed control strip as a negative, contact prints have been made onto 8430 after making various changes to the negative raw-stock interface.

6. It has been found that application of lacquer coatings does not influence the presence of measles. Several coatings of differing thickness were tried, but the measles continued to appear.

7. A more promising method of measle elimination is the use of liquid between the negative and raw stock. Experiments are being performed using tetrachloroethylene, a fluid whose refractive index closely matches that of gelatin. Application of this material in front of the pressure roller of a Niagara Printer has been found to eliminate measles on Type 8430 material. The effectiveness of this liquid with other types of duplicating materials and its effect upon resolution has not been examined.

PLANNED ACTIVITIES

8. Breadboard equipment will be built and experimental investigations will continue.

Contract [redacted]
Fourth Quarter FY-65

PAR 23-5-6
4 June 65

SUBJECT: Permanence of the Developed Image in Stored Aerial Films

TASK/PROBLEM

1. Inspect representative stored aerial negative films for evidence of image deterioration, attempt to produce accelerated image deterioration, and study possible inhibiting methods.

DISCUSSION

2. An inspection program was conducted at the customer's facility 5 Apr through 9 Apr 65. Samples of stored aerial films [redacted] were inspected for evidence of degradation associated with storage conditions. Evidence of aging blemishes or microspot formation was of specific concern.

3. A representative sample was inspected of stored film types 8402 (formerly 1188), 4400 (formerly SO-130) and 4404 (formerly SO-132). There was no evidence of deterioration associated with product keeping characteristics even though some of these films were processed as long ago as 1960.

PLANNED ACTIVITIES

4. Activity on Phase I of this PAR (Archival Search) will be terminated during the month of June. A report will be written at that time. Depending upon customer response to recommendations, that report may be regarded as either interim for Phase I, or final to close out the project.

[redacted]

Contact [redacted]
Fourth Quarter FY-65

PAR 23-5-7
4 June 65

SUBJECT: Cleaning and Protection of Original and Duplicating Films

TASK/PROBLEM

1. Investigate and evaluate improved methods for cleaning and protecting processed films.

DISCUSSION

2. Dirt Assessment:

a. The most important dirt with which we have to contend consists of film particles. These particles are generated at the edges of the film during the various handling operations. Such components of film handling equipment as flanges, edge guides, etc., readily abrade many of these edge particles from the film while, at the same time, generating new edge "dirt". This condition is typical of films of good commercial quality. Separated particles are objectionable when they migrate into the picture area.

b. Attempts to remove these particles by supersonic air blasts have met with no success. Also unsuccessful has been all effort to clean the film edge by controlled abrasion. Ultrasonic cleaning techniques have also been fruitless.

c. Figures 1 and 2 are 800X enlargements of typical dirt particles at the edge of the film.

d. Figure 3 (800X) illustrates the migration of separated edge dirt into the picture area where it will interfere with the acquisition of information.

e. The second most important sources of dirt are the supplementary film handling materials brought into the "clean" areas. Representative dirt of this type, obtained from a cardboard lined metal film can, is shown at 160X enlargement in Figure 4.

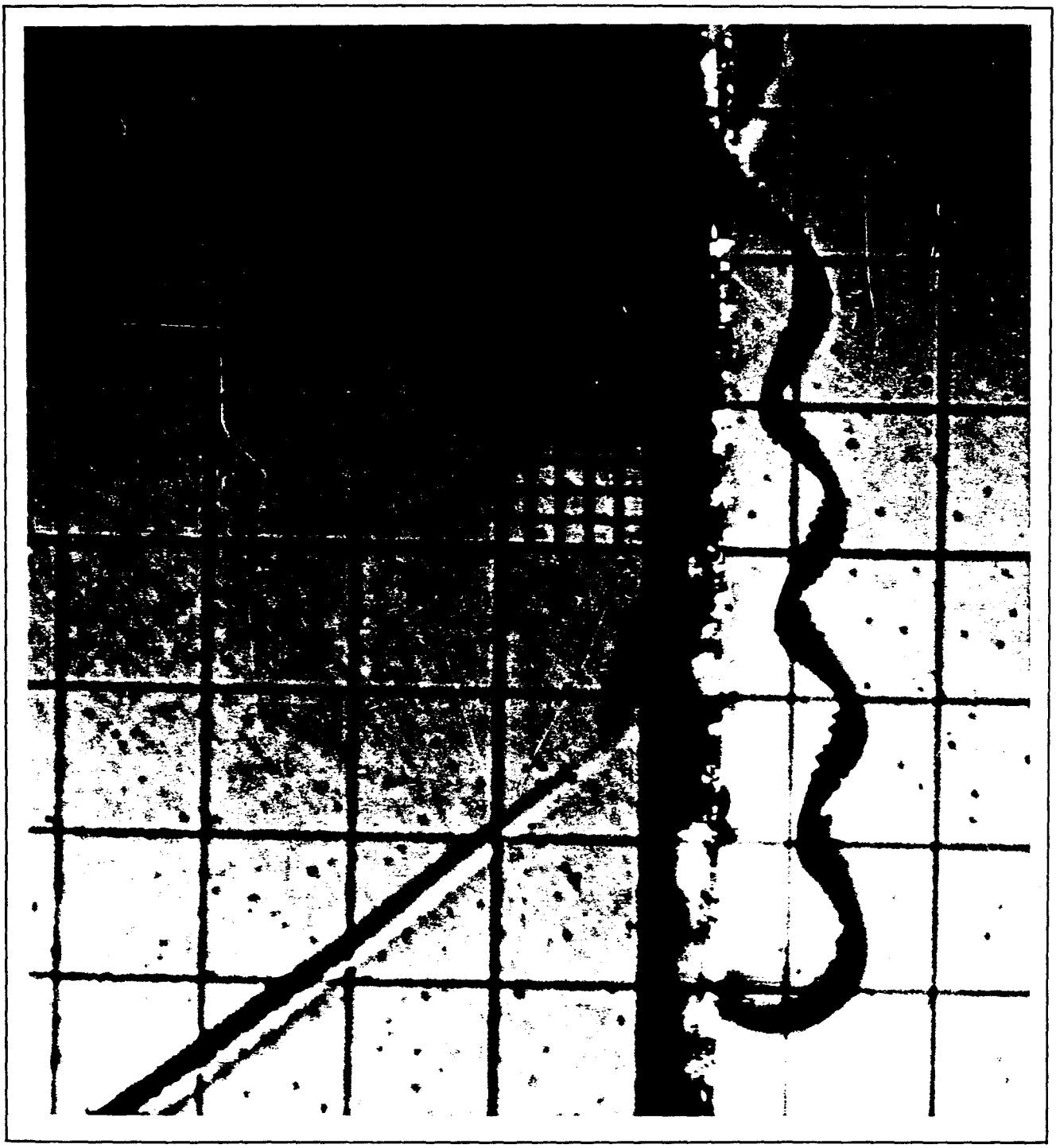


Figure 1
Film Sliver at Film Edge (800X)

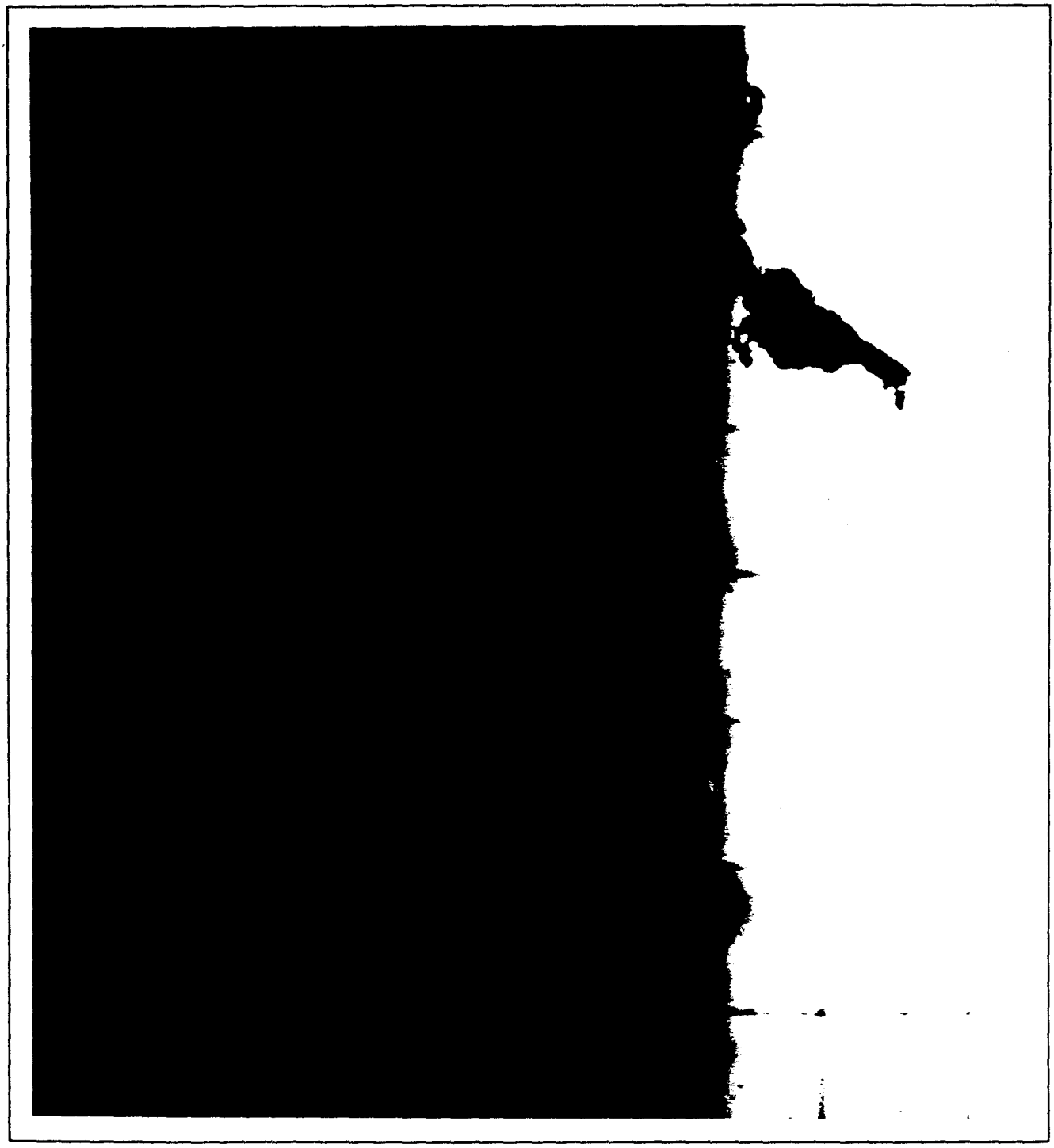


Figure 2
Fractured Film Particle at Film Edge (800X)

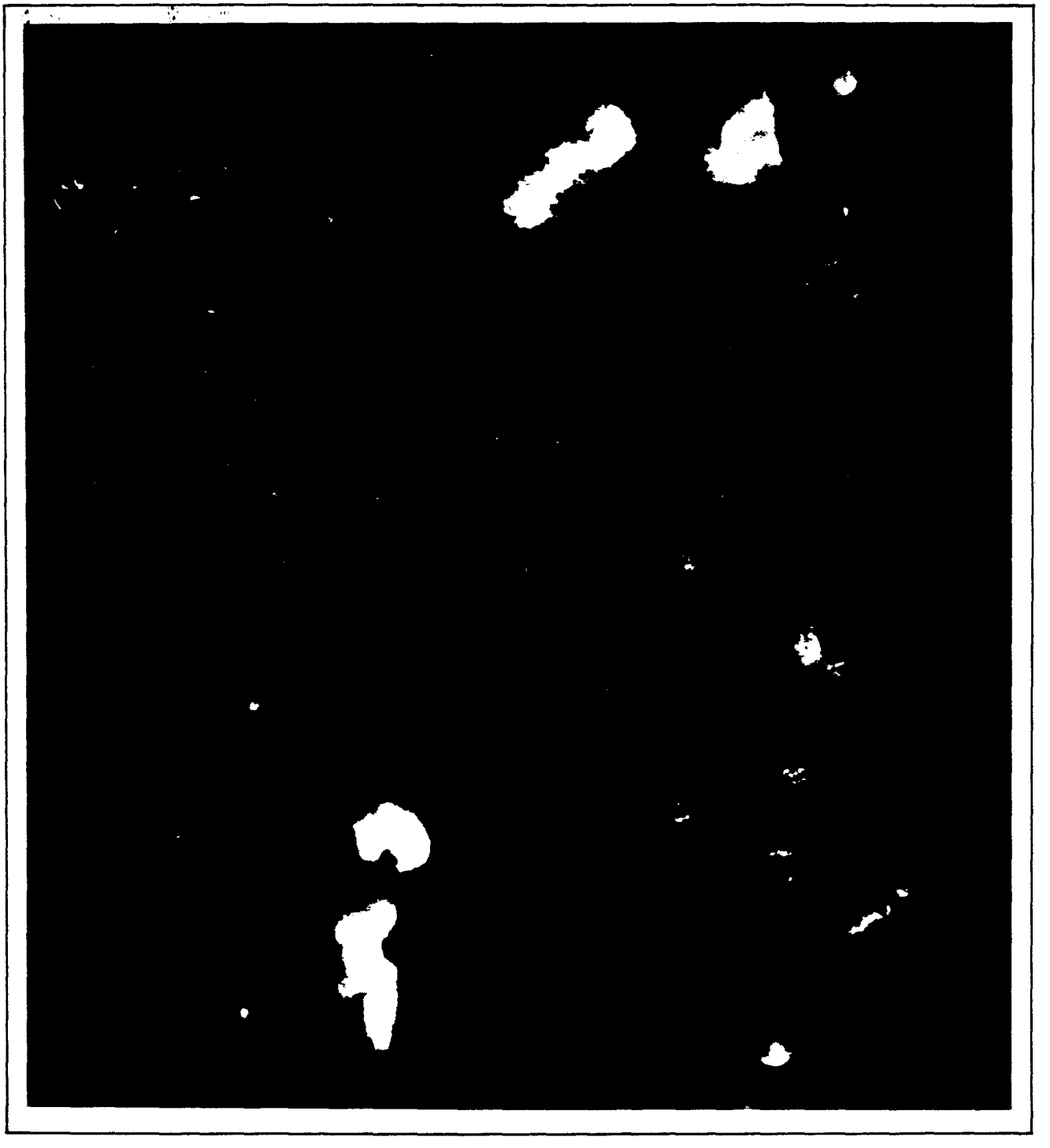


Figure 3
Displaced Edge Dirt in Image Area (800X)

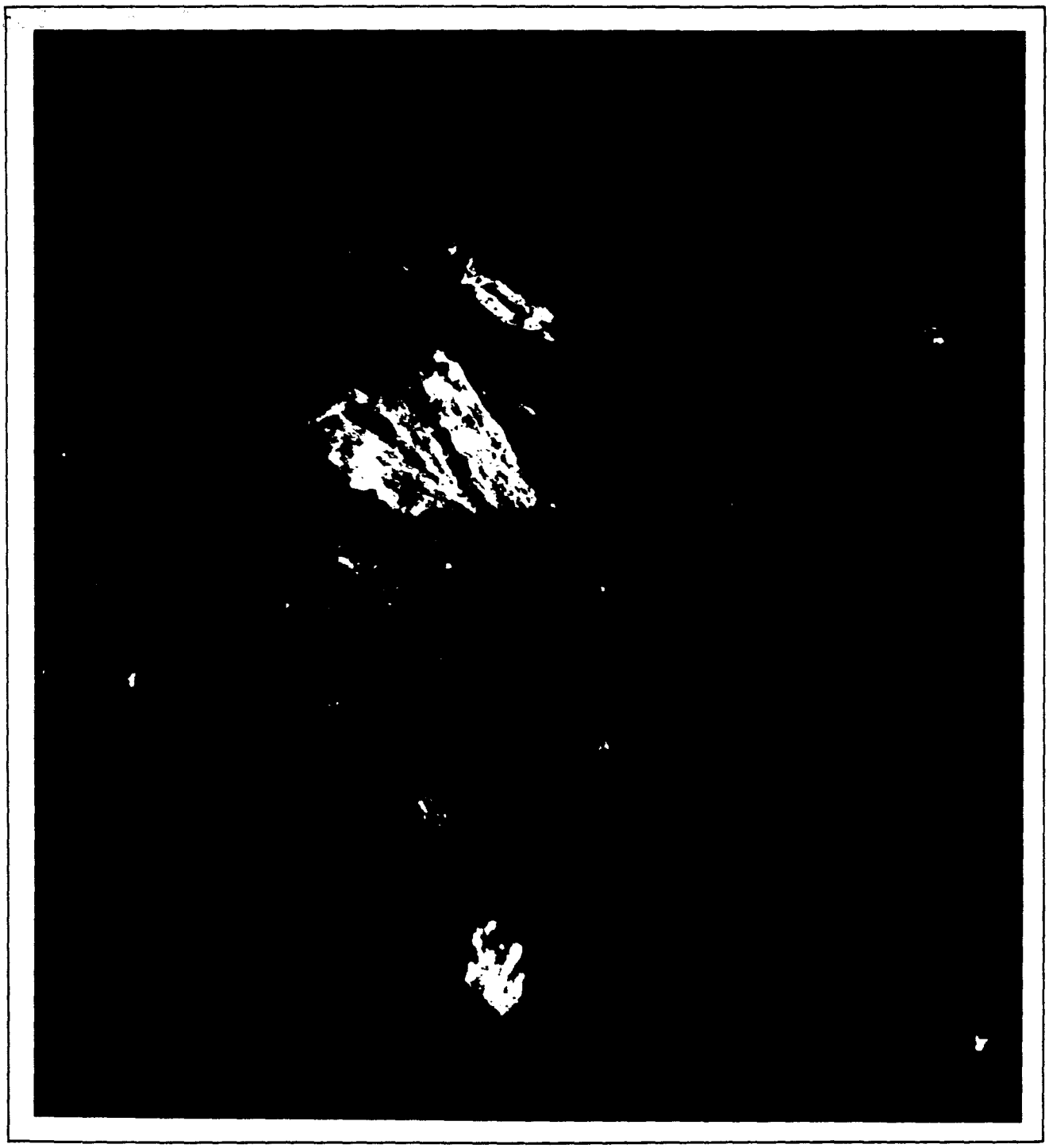


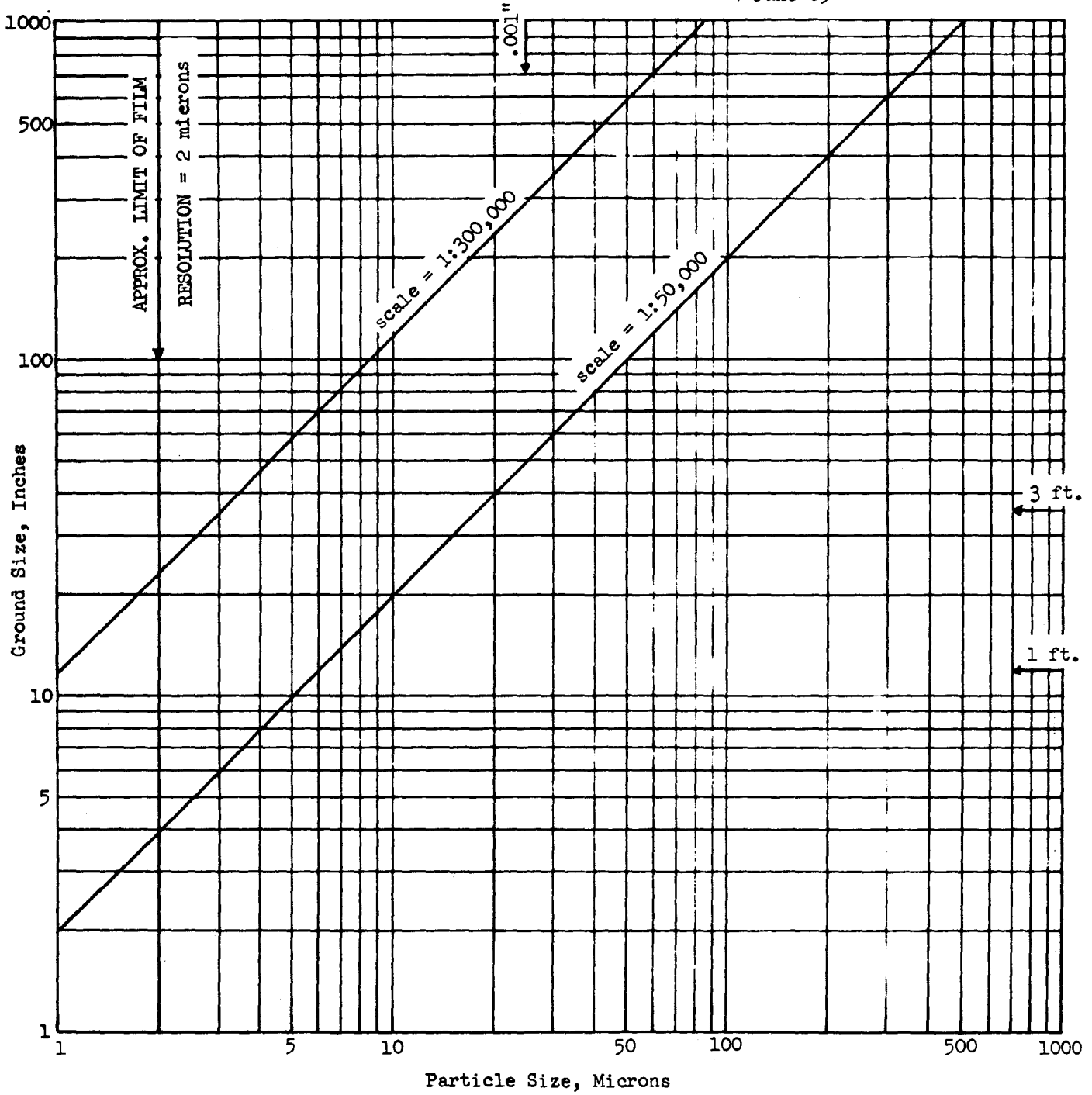
Figure 4
Typical Dirt from Film Can (160X)

f. The primary importance of dirt is its ability to interfere with the information content of the film in acquisition, duplication, or viewing. Figure 5 is a chart showing the information masking capability of dirt on film. For example, at a scale of 1:300,000 a 25 micron diameter dirt particle on the film will obliterate the image of an object whose actual diameter is 25 feet.

g. The extent and seriousness of obliteration of small detail by dirt on film whether in acquisition or in printing, depends, of course, on the size, frequency, and distribution of the dirt. Our observations indicate that particles smaller than 3.5 microns have no significance in this regard. At 200X, we are able to detect a 2.5 micron black particle in a clear surrounding. However, the limit of visibility is dependent on the matrix and viewing contrast and with a normal negative the grain interferes seriously with visibility of the particle. This is in keeping with the two micron resolution capability of Type 4404 film.

h. Foreign dirt particles may be deposited on film by settling from the atmosphere. In addition, small dormant particles are easily disturbed and thrown into the atmosphere where they may be attracted to the film by static charges. Larger particles settle rapidly and are less prone to be moved by transient drafts. Figure 6 shows the rate of settling of dirt particles as a function of size. These values were taken from calculations using Stoke's Law for particles from 1.0 micron to 200 microns in diameter, and Cunningham's Factor for particles from 0.1 micron to 1.0 micron in diameter. They indicate that even the smallest of the particles in which we are interested (3.5 microns) will not remain suspended in the atmosphere but tend to settle rapidly onto any exposed surface.

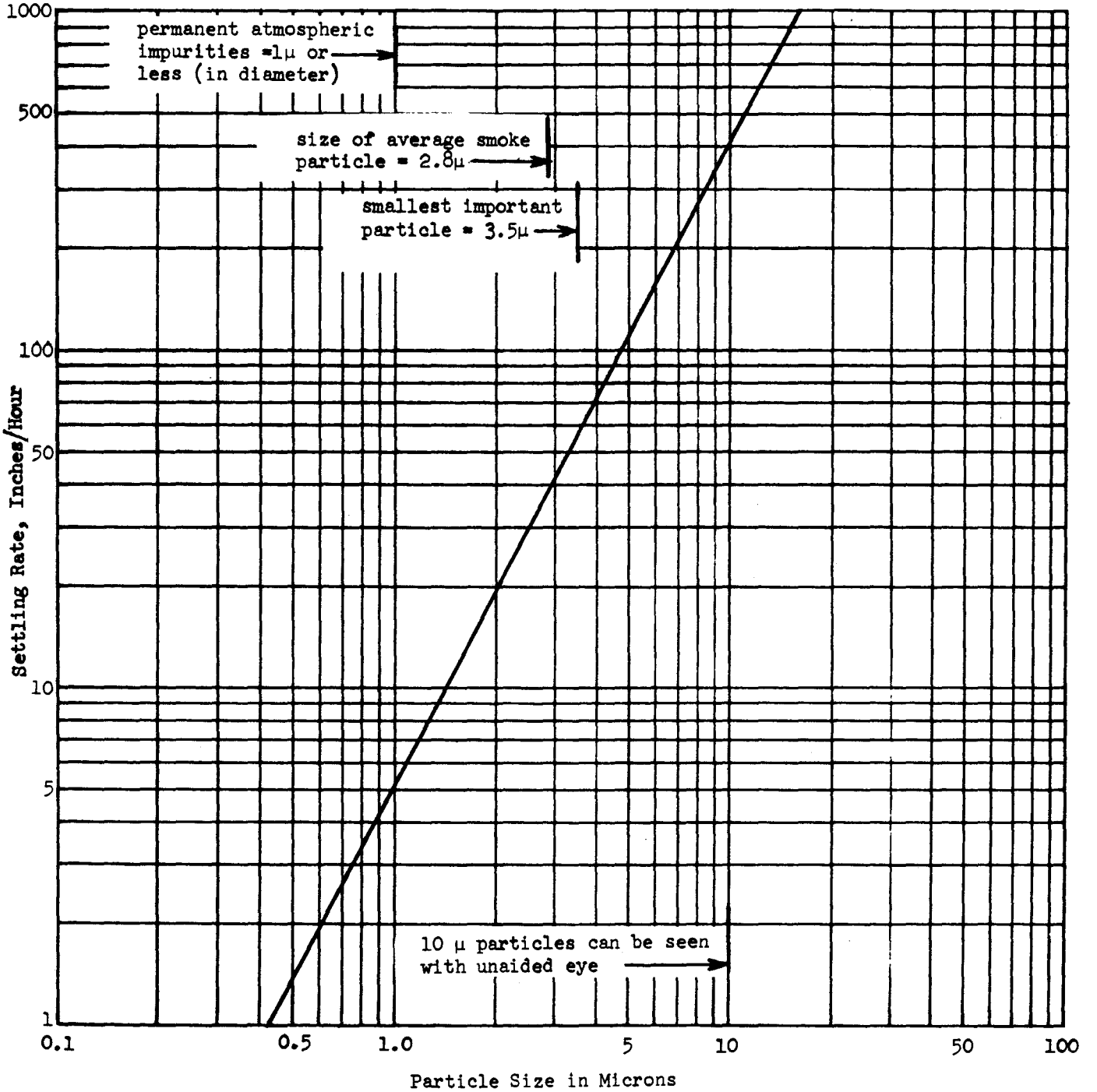
3. Cleaning: Particles of emulsion and other hydrophilic dirts are not easily removed from film surfaces by use of organic solvents. Techniques for cleaning film by immersion in or jet spraying of detergent in water solu-



INFORMATION MASKING CAPABILITY OF DIRT ON FILM

Figure 5

PAR 23-5-7
4 June 65



SETTLING RATE OF SPHERES OF 1.0 DENSITY
IN AIR AT 70° F.

Figure 6

tions have been used successfully in the motion picture field. Plans are in progress to jury-rig a Versamat to determine the applicability of detergent cleaning to aerial negatives.

4. Lubrication: Processed sensitometric strips coated one month ago with silicone show density values that do not differ from the original readings. This keeping test will continue.

5. Lacquering: We have been moderately successful in applying full width lacquer coatings to 70mm negative on the Clinton Cleaner Waxer. However, to date, we have only demonstrated the feasibility of the system and the properties of the coating. Experiments aimed at obtaining optically acceptable coatings are continuing.

PLANNED ACTIVITY

6. Study the cleaning of aerial negatives with detergent solutions.

7. Continue full width lacquer coating experiments to determine resistance to film cleaning solvents, removal techniques, interaction with titling, and intergration with other film handling processes.

Contract [redacted]
Fourth Quarter FY-65

PAR 23-5-8
4 June 65

SUBJECT: Density and Contrast of Duplicates

TASK/PROBLEM

1. Prepare from selected negatives an array of duplicate prints demonstrating the practical available range of contrast and density, collect and tabulate user reactions.

DISCUSSION

2. Through various film and process combinations, we have produced from Type 4404 negatives, assortments of duplicate positives with system gammas ranging from approximately 0.70 to 1.80. From these, duplicate negatives have been made, again adjusting the system gammas such that those initially too high were reduced while those initially too low were increased. Since this could become a rapidly escalating series upon series, we have exercised judgment in retaining only the more logical combinations. Following similar procedures, we are now preparing fourth generation duplicate positives to complete the study.

PLANNED ACTIVITY

3. Part of a series printed from Type 4401 negatives onto Type 5427 duplicating film was produced some time ago. Completion of this series follows the approach used in paragraph 2 above.

4. 10X positive enlargements will be made from selected third generation negatives for a comparison of the various contrast levels.

Contract [redacted]
Fourth Quarter FY-65

PAR 23-5-9
4 June 65

SUBJECT: Intraframe Density Variation in Mission Films

TASK/PROBLEM

1. Evaluate mission acquisition films which exhibit extreme intraframe density variation, reexamine criteria for dual printing and investigate alternate methods for making acceptable duplicates.

NOTE: IFDV (Intraframe Density Variation) is the term applied to J-mission Panoramic camera frames which show a visible density wedging effect within the length of a single frame.

DISCUSSION

2. A special interim report on the nature of IFDV is in preparation and will be published as soon as additional input from the customer on solar direction is available.

3. The report will discuss effects of:

a. Solar elevation and solar direction angles on specular and diffuse reflecting surfaces.

b. Orbit launch time on solar direction and its effects on IFDV.

c. Solar elevation on specular reflections from sea surfaces relating to "hot spots".

4. The last stages of this project will attempt to make use of a computer program for analyzing the assignment of printing densities; particularly as applied to dual printing. With the output from such a program, we hope to analyze the prevailing conditions in photographic images which require some groups of negatives to be printed at two density levels.

5. All of these data are derived from Missions 1007-1015 which were flown in 64 with solar declinations ranging from maximum north to maximum south.

PLANNED ACTIVITIES

6. Complete report on IFDV contingent upon additional customer output on solar direction.

7. Complete computer program and analyze output data on dual printing.

Contract [redacted]
Fourth Quarter FY-65

PAR 24-5-1
4 June 65

SUBJECT: Study of Photographic Films and Processes for Low Altitude Reconnaissance

TASK/PROBLEM

1. Study black-and-white film and processing needs of existing low altitude reconnaissance systems in terms of exposure conditions, processing and duplicating requirements.

DISCUSSION

2. An interim report is in preparation which includes an analysis of information gathered in discussions with the following tactical organizations:

a. TAC Headquarters.
b. 4444th Reconnaissance Tech Sq.
c. TARC Headquarters.
d. 363d Reconnaissance Tech Sq.
e. TAC Air War Center.
f. 5th Reconnaissance Tech Sq.
g. 1st Air Commando Group.

One more organization, a Naval facility, will be contacted before completion of the report.

PLANNED ACTIVITIES

3. Complete consultations.
4. Submit recommendations.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 24-5-2
4 June 65

SUBJECT: High Altitude Color Acquisition

TASK/PROBLEM

1. Through investigation, local flight test and evaluation, attempt to determine optimum exposure requirements and color balance criteria for high altitude color reconnaissance photography. Duplicate selected areas of each color high altitude flight accomplished in FY-65 and evaluate against findings of preliminary test results.

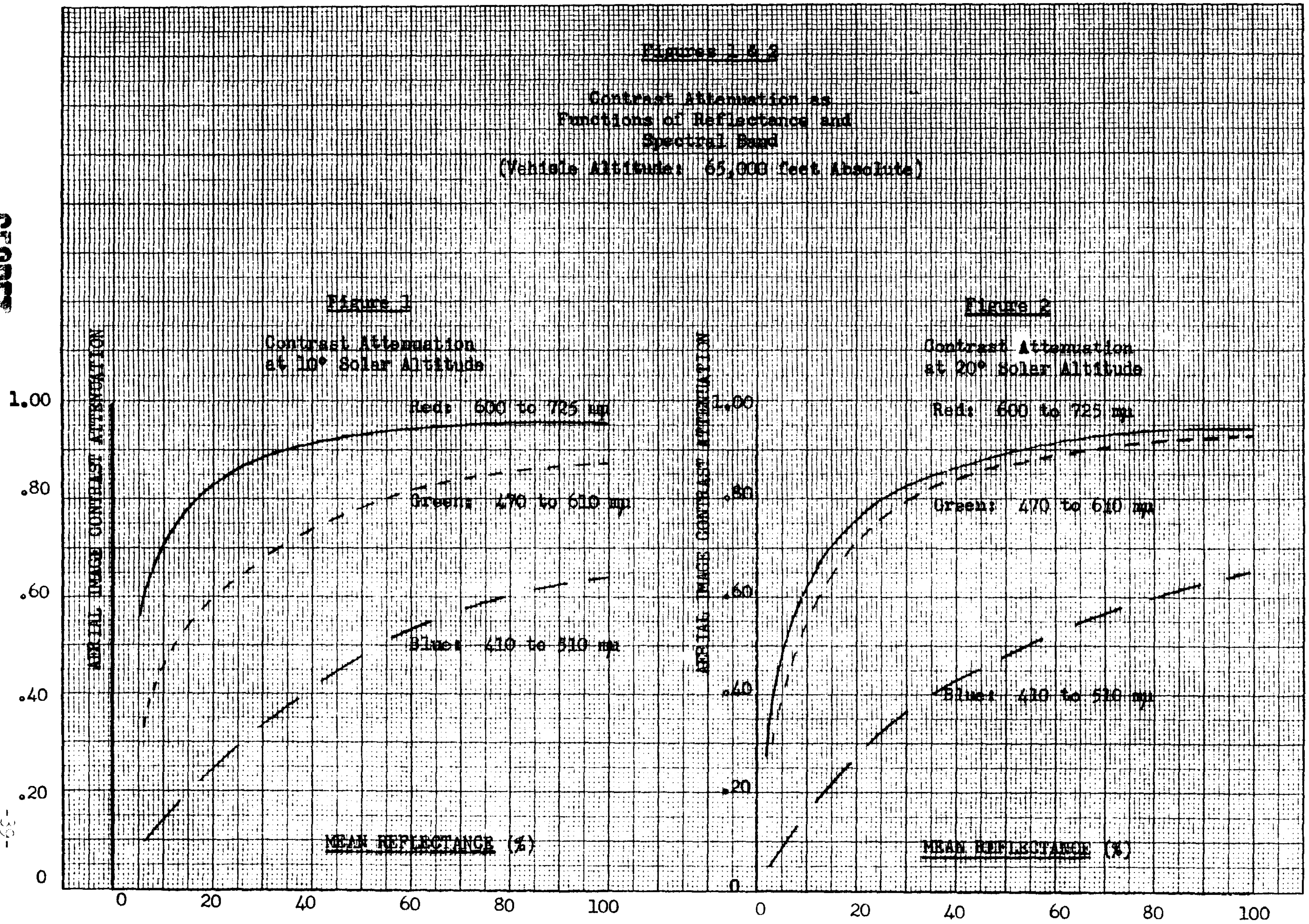
DISCUSSION

2. Test 24-5-2-3 (contrast attenuation by the atmosphere series) was flown over Winnemucca, Nevada, in the Northern Basin, during the middle of March. The test was flown in the I vehicle, at an absolute altitude of 65,000 feet using the modified A-2 configuration (three vertical stations).

3. Evaluation of Test 24-5-2-3 indicates an increase in green contrast between solar altitudes of 10° and 20°, a slight decrease in red contrast (probably experimental error), and no change in contrast in the blue region of the spectrum. The lack of change in blue contrast can probably be attributed to the high rate of growth of the blue component of haze luminance relative to the growth rate of the blue component of illumination incident on the subject.

4. Figures 1 and 2 indicate the contrast of the aerial image for the three spectral bands analyzed, plotted against the mean target reflectance. The bands analyzed are indicated below:

a. 410 to 510 mμ, peak response 440 mμ.
b. 470 to 610 mμ, peak response 525 mμ.
c. 600 to 725 mμ, peak response 660 mμ.


Figures 1 & 2
Contrast Attenuation as
Functions of Reflectance and
Spectral Band
(Vehicle Altitude: 65,000 feet Absolute)
Figure 1
Contrast Attenuation
at 10° Solar Altitude
Red: 600 to 725 mμ
Green: 470 to 610 mμ
Blue: 410 to 510 mμ
Figure 2
Contrast Attenuation
at 20° Solar Altitude
Red: 600 to 725 mμ
Green: 470 to 610 mμ
Blue: 410 to 510 mμ
AERIAL IMAGE CONTRAST ATTENUATION
AERIAL IMAGE CONTRAST ATTENUATION
MEAN REFLECTANCE (%)
MEAN REFLECTANCE (%)
1.00
.80
.60
.40
.20
0
0
20
40
60
80
100

Unfortunately this test provided data over a range of solar altitudes much smaller than originally planned, due to intervening cloud cover. Tests 24-5-2-4 (identical to 24-5-2-3) was cancelled due to higher priority assignment of the vehicle.

5. Spectral transmission, as well as other optical measurements, were performed on one of the A-2 lenses to make more accurate measurements from the data possible.

6. Test 24-5-2-2 (GT-65-77) was a color test using Type SO-121 film in the Delta II configuration. Two of the major test parameters were the effects of low solar altitude on the information level, and the effects encountered for a mission involving a rather high range of solar altitudes.

7. The range of solar altitudes was from 52° down to 23°. The camera exposure was aimed at correctly recording objects at the high solar altitude. The predicted exposure excursion was 1.10 stops, and the actual mission exposure excursion was within 0.10 stops of that figure. A 0.33 stop partial exposure correction was made in flight by switches through the modes.

8. No substantial change in information level was detected which could be directly attributed to the differences in solar altitude.

9. An increase in resolution for this mission was noted over that obtained for Mission GT-64-148. Mission GT-64-148 employed an inconel-on-glass neutral density filter to obtain the additional attenuation necessary to compensate for the high speed of the SO-121. The current Mission GT-65-77, employed an aperture stop of f/7, provided by the camera vendor. It is believed that the resolution increase is probably attributable to this difference in the manner of obtaining the additional attenuation.

10. Four passes were made over and parallel to the EAFB target array, one at the beginning of the mission and three at the end. The conditions under which the test was made were similar to the test in GT-64-148 except that an apparently higher haze level existed and the range of solar altitudes was considerably greater.

11. The results (see Table 1, which is a comparison between the two missions) show that although the maximum resolution remains the same, the average resolution of GT-65-77 is somewhat higher. Of significance is the side by side comparison of the percentage of readings of the two highest resolution values. Certainly this improvement is not due to greater vehicle stability on the day Mission GT-65-77 was run, as there is more pitch, roll and yaw evident in this mission than in Mission GT-64-148.

12. An examination of the average resolution pass by pass in GT-65-77 shows the last three passes to have higher average resolution than the first. Since there is an exposure decrease equivalent to approximately half a stop during the last three passes, it suggests that greater optimization of exposure for the targets has contributed to higher resolution. This exposure optimization is not necessarily true of the surrounding terrain, which has a somewhat lower reflectance than the target bars.

13. One curious aspect of this mission is that resolution transverse to the line of flight is higher than resolution in the direction of flight, while the opposite is true of GT-64-148. The reason is not known, but it is unlikely the film has contributed to this anomaly, because films have no special resolution characteristics related to direction across or along the web.

PLANNED ACTIVITIES

14. A color mission, using the B-configuration, over targets selected by the customer is planned for late June or early July.

15. A contrast attenuation test using the modified A-2 configuration is being planned for early July.

Table 1

Comparison of Two Missions, Resolution on SO-121 Color Film

	Mission GT-65-77		Mission GT-64-148	
	Lines per mm t/d	Ground Res. t/d	Lines per mm t/d	Ground Res. t/d
Best resolution recorded:	60/53	21"/24"	53/60	24"/21"
Average resolution, pass by pass:				
Pass #1	47/38	28"/34"		
Pass #2	51/42	25"/30"		
Pass #3	48/44	27"/29"		
Pass #4	52/44	24"/29"		
Average resolution, all passes	49/42	26"/30"	39/45	33"/29"
Average resolution for:				
High Contrast Targets	51/43	25"/30"	41/48	32"/27"
Medium Contrast Targets	49/41	26"/31"	39/42	34"/31"
Low Contrast Targets	31/30	42"/43"	26/30	50"/43"
Percentage of target readings 60 lines per millimeter	9.3%		1.2%	
Percentage of target readings 53 lines per millimeter	15.7%		11.9%	

t = resolution transverse to direction of flight

d = resolution in the direction of flight

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 24-5-3
4 June 65

SUBJECT: Night Photography

TASK/PROBLEM

1. Prepare test program, arrange and monitor flight tests to provide materials for the study of exposure levels of black-and-white films exposed at night in high altitude systems over artificial lights. Evaluate and report on results.

DISCUSSION

2. No activity.

PLANNED ACTIVITY

3. None, pending report from customer on test 24-5-3-1.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 24-5-4
4 June 65

SUBJECT: Contrast of Original Negatives

TASK/PROBLEM

1. Through test, investigation, and study, determine if original, small scale, aerial negatives processed to low contrast retain more reducible intelligence data than those processed to high contrast. Prepare, arrange for, and monitor a flight test program that will provide materials as required to allow effective evaluation by the intelligence community.

DISCUSSION

2. A series of resolution targets of varying contrasts was exposed and processed at four different levels to determine the extent to which processing conditions affected resolution. The discussion details the procedures and results of the test.

3. Twelve resolution targets of the following contrast values were used to expose test film:

Target No.	Target Contrast	Log T.C.
1	10.2:1	1.01
2	8.1:1	.91
3	4.8:1	.68
4	4.4:1	.64
5	4.0:1	.60
6	3.4:1	.53
7	2.9:1	.46
8	2.4:1	.38
9	2.0:1	.30
10	1.8:1	.25
11	1.6:1	.20
12	1.2:1	.08

[redacted]

4. From each target of a given contrast value, eleven (11) exposures were made varying by 0.10 Log E increments, except for two extremes of greatest and least exposure which varied by 0.20 Log E from its adjacent increment.

5. The exposures were aimed to produce a film density of approximately 1.0 at the center of the exposure series for the particular test film and process condition. Figure 1 shows sample layout of targets.

6. The film used for the test series was Kodak High Definition Aerial Film (Estar Thin Base), Type 4404-71. Figure 2 shows the curves for each of four processes and the points on the curve corresponding to the exposure series. These data are tabulated in Table 1. From Figure 2 and Table 1 note that the aim density of approximately 1.0 has not been realized in this test series, the actual density being approximately 0.50 less than aim.

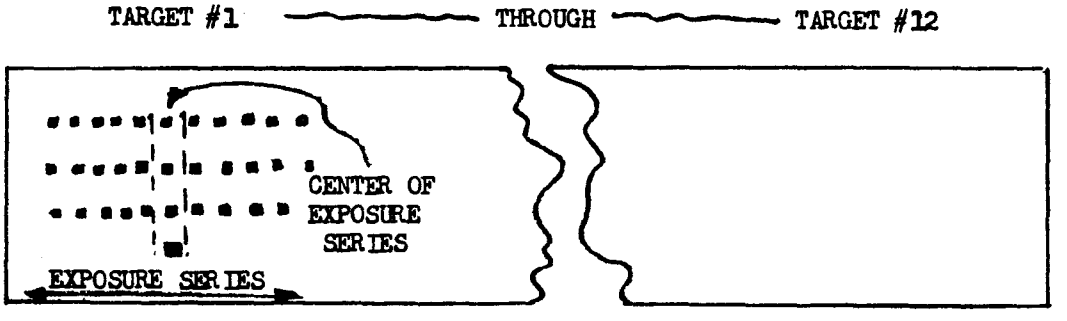
7. The effect of underexposure has been to place some of the targets in the extreme toe area of the curve and render resolution data in that area of doubtful value. Because of the underexposure, this test is being repeated for better exposure, and also to cover a greater range of process gamma values.

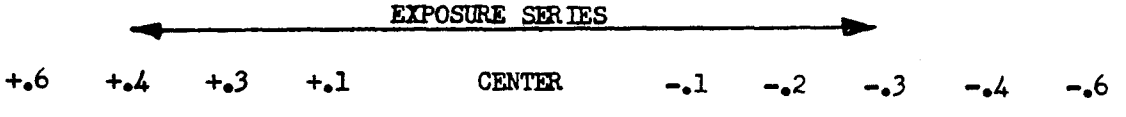
8. The results of the test are shown in Figures 3 and 4:

a. In Figure 3, the maximum resolution for any exposure is plotted against target contrast for each process shown in Figure 2. Note that these data indicate that, regardless of the processing conditions shown, the maximum resolution is about the same. Processes 2 and 3 (the two middle processes) show a slightly lower resolution than processes 1 and 4 (the two extreme processes). This requires some repeat evaluation. It should also be mentioned that results depend on subjective measurement, and for two readers to be ±1 target is common. Some observers may even allow a two target separation. On the average, processes 2 and 3 read about 2 targets lower than on processes 1 and 4 for the lower contrast targets.

b. Figure 4 indicates that resolution is density dependent. From the family of curves, note that regardless of process conditions shown in

FIGURE 1





CHANGE IN LOG E FROM CENTER
OF SERIES

Emulsion 4404 FIGURE 2

EXPOSURE $\log_{10}$ T=.98 T11-15 DAYLIGHT

Development [illegible]

Exposure Time 1/5"

PROCESSING P-695 70F

PROCESS	TIME	γ	G&K SPEED	FOG
1	2'15"	1.90	T.36	.14
2	2'30"	1.90	T.56	.12
3	2'45"	1.89	T.63	.13
4	3'00"	1.93	T.74	.11

A AVERAGE TARGET DENSITY (MIDDLE EXPOSURE)

EXPOSURE INCREMENT

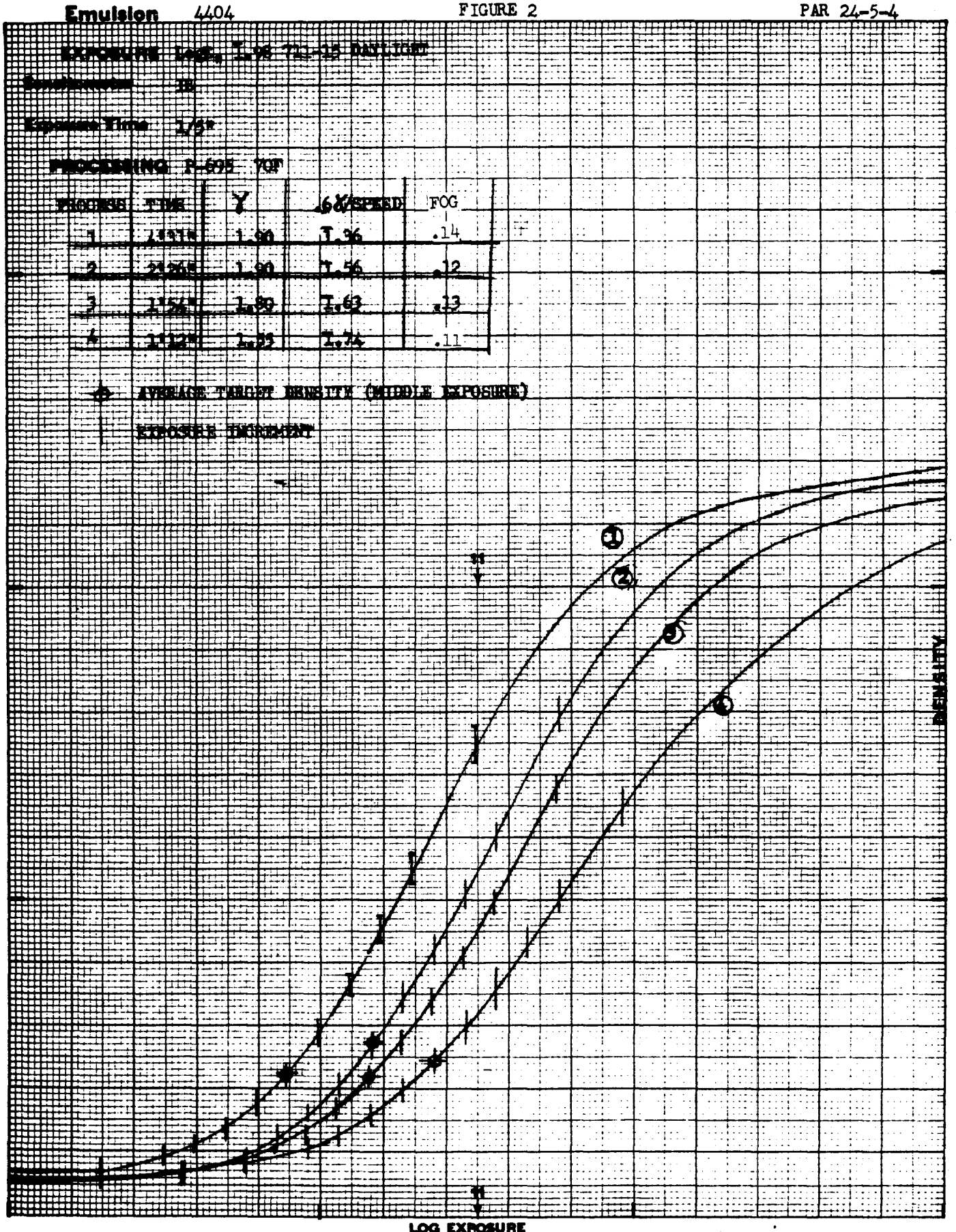
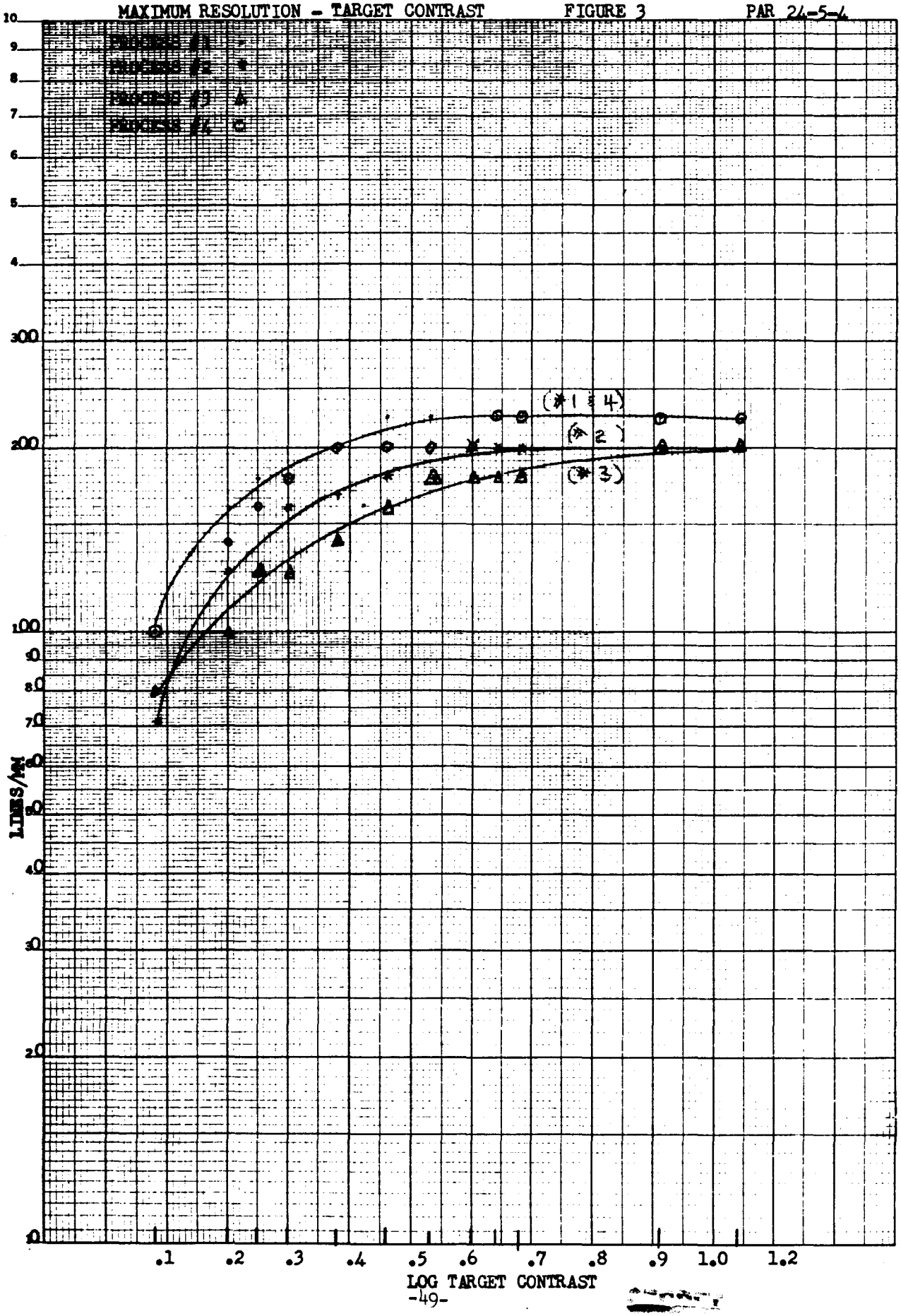


Table 1

	N.D. Filter	ABSOLUTE LOG E Process 1	2	3	4	ABSOLUTE DENSITY Process 1	2	3	4
	0.0	$\bar{1}$.98	.24	.24	.44	1.50	1.60	1.37	1.32
	0.2	$\bar{1}$.78	.04	.04	.24	1.13	1.20	1.01	1.01
	0.3	$\bar{1}$.68	$\bar{1}$.94	$\bar{1}$.94	.14	.94	1.02	.85	.86
	0.4	$\bar{1}$.58	$\bar{1}$.84	$\bar{1}$.84	.04	.75	.84	.71	.73
	0.5	$\bar{1}$.48	$\bar{1}$.74	$\bar{1}$.74	$\bar{1}$.94	.59	.68	.58	.60
Middle Exposure	0.6	$\bar{1}$.38	$\bar{1}$.64	$\bar{1}$.64	$\bar{1}$.84	.45	.55	.44	.49
	0.7	$\bar{1}$.28	$\bar{1}$.54	$\bar{1}$.54	$\bar{1}$.74	.36	.42	.35	.39
	0.8	$\bar{1}$.18	$\bar{1}$.44	$\bar{1}$.44	$\bar{1}$.64	.28	.32	.27	.32
	0.9	$\bar{1}$.08	$\bar{1}$.34	$\bar{1}$.34	$\bar{1}$.54	.22	.25	.22	.26
	1.0	$\bar{2}$.98	$\bar{1}$.24	$\bar{1}$.24	$\bar{1}$.44	.18	.20	.18	.22
	1.2	$\bar{2}$.78	$\bar{1}$.04	$\bar{1}$.04	$\bar{1}$.24	.14	.14	.14	.17

MAXIMUM RESOLUTION - TARGET CONTRAST FIGURE 3 PAR 24-5-4



RESOLUTION - DENSITY FIGURE 4 PAR 24-5-4

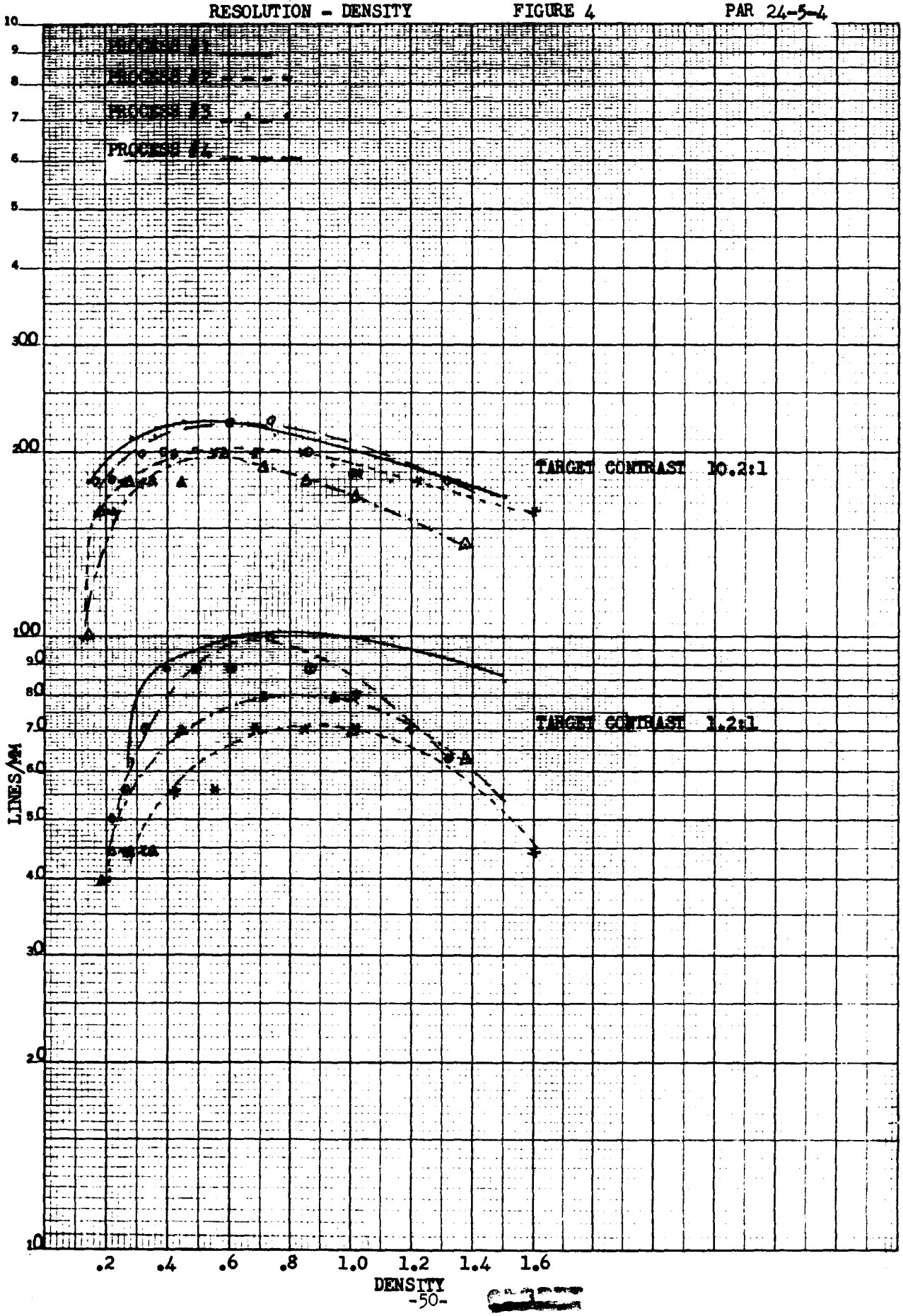


Figure 2, the peak resolution obtains at about the same density level. This is true for high and low contrast targets. The abrupt fall off in resolution at the low density levels can, no doubt, be accounted for by the underexposure. One observation which should be considered is the possible shift in density for peak resolution on the low contrast target. Possibly this needs to be investigated more carefully. From the limited plots available, it appears that low contrast targets require a slightly higher film density for best resolution than higher contrast targets.

PLANNED ACTIVITIES

8. Make repeat exposure series to obtain better optimum density for center exposure.

9. Process resolution targets between 1.0 and 3.0 gamma, if possible.

10. Obtain more reliable data on process contrast variations (more extreme) and their effects on resolution. The higher process contrast is also being done for work in conjunction with PAR 24-5-5 Exposure Criteria.

***** NOTICE OF REMOVED PAGES *****

Pages 52 through 74 of CORONA, ARGON, LANYARD programmatic information are not provided because their full text remains classified.

Contract [redacted]
Fourth Quarter FY-65

PAR 33
4 June 65

SUBJECT: Mod III Titler

TASK/PROBLEM

1. Develop, design and fabricate a development model of an automatic command titler.

DISCUSSION

2. The Mod III titler consists of two units:

a. The film transport and titling unit.

b. Electronic control.

3. The unit can be used to title a fixed field of characters coupled with an automatic sequencing of a frame or identification number.

4. After accumulating one-half million cycles, the Model III titler was disassembled to examine the various parts for wear. Photographs of the parts were taken for later inclusion in the final report. A few minor parts, in particular the stop dogs, were severely worn and will be repaired using materials having improved wear resistance. In general, the condition of the major parts was good.

PLANNED ACTIVITY

5. Upon repair of the worn parts, the Model III titler will be re-assembled and submitted for production trials.

6. A final report is scheduled for completion in August.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 36
4 June 65

SUBJECT: Investigate 1000-Watt High Pressure Mercury Arc Lamp for Printers

TASK/PROBLEM

1. Design, construct and test a DC power source capable of driving a 1000-watt mercury arc light source. The control circuits are to have a photocell feedback servo control which will maintain a constant light intensity.

DISCUSSION

2. All required tests have been accomplished for the 1000-watt lamp investigation. Analysis of data from the latest of these tests on lamp stability is in progress.

3. Drafting of the final report was started for those parts of the project which have been completed.

PLANNED ACTIVITIES

4. Complete the analysis of recent test data.

5. Submit the final report. This report is expected to be favorable for the new lamp. At the present stage of analysis, it appears that the advantage of higher intensity for the 1000-watt lamp can be had with stability comparable to the standard 100-watt lamp used in the Niagara printer.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 38
4 June 65

SUBJECT: Adjustable Slitter

TASK/PROBLEM

1. Develop and design an adjustable slitter to provide emergency capability for slitting all standard width materials of larger sizes.

DISCUSSION

2. Design activity has been completed and work is continuing on the assembly drawings.

3. Eighty percent of fabricated parts have been ordered. Purchased parts are being ordered at this time.

PLANNED ACTIVITY

4. Complete fabrication, assemble and test.

Contract [redacted]
Fourth Quarter FY-65

PAR 44
4 June 65

SUBJECT: Sensitometric Edge Printer for Processor

TASK/PROBLEM

1. Design and build one experimental edge printer that will print a step wedge along the unexposed negative edge prior to processing.

DISCUSSION

2. The Sensitometric Edge Printer will be positioned at the head end of a Trenton Processor to provide a local calibration for evaluation of exposed material. The local calibration will be effected by flashing nine different densities on the unexposed material prior to processing. The density wedge used for this purpose has nine steps of 0.3 Log E densities each and will expose an area 1/8-inch wide x 1-inch long.

3. The design is complete. Parts have been fabricated and assembled.

4. The unit has been set up (independent of the processor) and simulated tests have been run. The calibration of the pneumatic system has been accomplished.

5. Tracking test and system response tests have been run with varying film conditions and sizes. Due to unstable results from edge curl, it was determined that additional rollers were necessary to shorten the span of the web as it passed the edge sensor.

6. Lamp life and repeatability tests have been continued with the E.G.G. flash tube. Preliminary results have shown this lamp to be superior to any other that has been tested.

7. The lamp holder was redesigned to accommodate the E.G.G. lamp.

PLANNED ACTIVITIES

8. Install rollers on either side of leading edge sensor. (Parts have been fabricated). To be accomplished by the middle of June 65.

9. Test the above installation.

10. Install lamp holder in lamp house to accommodate the E.G.G. lamp by the end of June 65.

11. Continue lamp repeatability tests.

12. Install unit on a Trenton Processor when redesign is complete and satisfactory results are obtained.

Contract [redacted]
Fourth Quarter FY-65

PAR 46
4 June 65

SUBJECT: Investigation of Ultra Thin Base Film Handling

TASK/PROBLEM

1. To thoroughly investigate and conduct tests in order to determine the handling characteristics and problems associated with handling Ultra Thin Base Films. The investigation is to include simple breadboard equipment in an attempt to determine the magnitude of effort required to overcome the problems.

DISCUSSION

2. Testing of ultra-thin materials was very limited during the report period because of the lack of material. However, with limited material on hand, testing has continued on motor-driven tables with no apparent trouble.

3. Due to the inability to obtain good heat seal splices on ultra-thin material, an investigation has been initiated which will use pressure-sensitive tape for splices. Preliminary layouts for the application of this tape have been started.

PLANNED ACTIVITIES

4. Testing will continue when additional materials are available.

5. Breadboarding of a pressure sensitive tape splicer will continue.

Contract [redacted]
Fourth Quarter FY-65

PAR 49A
4 June 65

SUBJECT: Black Edge Titler

TASK/PROBLEM

1. Design and fabricate a prototype self-tracking edge flasher for exposing a longitudinal border on reversal materials to permit subsequent opaque titling of this edge.

DISCUSSION

2. Authorization to proceed was received by the contractor on 14 Apr 65.

3. During the preliminary design investigation, it became apparent that changes will have to be made in camera design in event of full scale color operation. At the present time, flashing of the edge to permit titling can remove fiducial marks and other coded information placed in the border.

4. The intended design will be capable of varying the width of flash in from either edge.

PLANNED ACTIVITY

5. Complete the design and start fabrication.

Contract [redacted]
Fourth Quarter FY-65

PAR 50
4 June 65

SUBJECT: Optical Add-On Titling

TASK/PROBLEM

1. Investigate various methods by which the title might be applied to film by optical means, thereby, eliminating any possibility of distortion.

DISCUSSION

2. Diazo:

a. A developed diazo title is not easily removed if such removal is necessary for correction. Treating the image with a 10% solution of tartaric acid (a proposed bleach) converts the dark blue color to a dark brown stain. The same effect is obtained by recoating a developed diazo title with the diazo solution.

b. The transmission window for the diazo material we have been testing is at a wave length of about 360 millimicrons. This makes it quite transparent to the Niagara Printer light with the probability of poor reproduction. There is no true, dense, opaque black available to us. The best blacks are mixtures of dyes giving a very dark color which appears black on an opaque base print, but does not have the density of a silver material.

c. Diazo has the disadvantage of very low sensitivity. With silver systems, the image is formed from a latent image by chemical reactions which themselves put energy into the system. With diazo this is not the case and all the energy needed to form the image must come from the light energy.

d. The image forming properties of diazo coatings are destroyed by exposure to tungsten illumination at normal room levels. The yellow color of a light sensitive diazo coating was bleached after a few days exposure to 60 foot-candles of tungsten illumination. After receiving this exposure the

the coating was not capable of development to an image.

e. A developed image, exposed to the same level of illumination for three weeks, showed no color shift nor density decrease.

f. In a more severe test, using a 375-watt tungsten lamp at a distance of twenty-inches from a developed diazo image, only a slight color shift and an insignificant density loss occurred in the image. The exposure lasted two hours and was equivalent to 4.5×10^7 meter-candle-seconds.

g. Estar Film does not absorb the diazo dye solution uniformly so a uniform image is not obtained.

h. The maximum density obtainable with our diazo solution is approximately 1.50.

3. Print Out: A literature search has disclosed a photographic process that yields print-out image through irradiation of carbon tetrabromide. We are currently engaged in studying the literature on this subject.

4. Photo Resist: Several materials are available whose solubility characteristics are affected by exposure to light energy. These include such items as Kodak Photo Resist, bichromated gelatin, bitumen, etc., each of which will form an image after exposure and processing. However, all have a low sensitivity to light and require processing techniques that are hazardous to the photographic image on the film.

5. Effort on this PAR has been directed primarily toward the investigation of optical systems. This approach is now almost complete. However, because the objective is a titling system that will avoid distortion of the film, some mechanical and photomechanical methods have been scanned.

6. Pressure Sensitive Characters: Letraset and Press-Type are trademarked, pressure sensitive, die cut symbols used for drafting and technical illustration. The characters are printed with opaque, black ink and are adapted to photographic reproduction. In use, the characters are pressed firmly onto the base material to which they adhere because of a pressure sensitive

adhesive backing. Once the characters are in place, the carrier sheet is stripped away leaving the title on the film. Letraset adds 0.0004" to the film thickness whereas Press-Type adds 0.001". Each of these products shows roughly the same solubility characteristics as our current titling tape.

7. Photomechanical: We have obtained a small quantity of Kodalith transparent Stripping Film which is designed for strip-up and layout work in the graphic arts. This film features a high contrast emulsion that has been coated on a thin plastic skin. The skin, in turn, is attached to a thicker base material by a water soluble adhesive. After exposure and development the image bearing skin is stripped from its support and transferred, by lamination, to the desired surface.

8. Mechanical:

a. 35mm Motion Picture Negative Films are printed with footage numbers at the perforators during film manufacture. The number is impressed on the travelling web by inked, hard-faced type. The ink is supplied to the type face by transfer rollers. Distortion of the film is avoided by supporting it on a rubber cushion at the time of impression. Inks in black, red and yellow are available.

b. The Flexographic Process is designed for high speed printing on rolls of plastic films. It is a method of rotary letterpress printing which employs flexible rubber plates and fast drying inks. The process permits a roll of material to be printed in a continuous web at speeds as high as 1,000 ft/min. It features the lightest possible contact between the plate and the web in transferring the ink to the web. The printing cylinder, which is readily changeable, is of a circumference determined by the printing repeat required.

c. The modern flexographic presses are precision machines equipped with variable temperature drying ovens, ink viscosity controls, infeed and rewind tension controls, web guides, flying splicers, web scanners, and other

mechanical devices for insuring top quality production. Quick changes in print are made by slug changes at appropriate stations.

PLANNED ACTIVITIES

9. Conclude the investigation of optical titling systems with completion of the carbon tetrabromide tests.

10. Evaluate mechanical and photomechanical methods as the most promising alternative approaches.

Contract [redacted]
Fourth Quarter FY-65

PAR 51
4 June 65

SUBJECT: Step-and-Repeat Color Printer

TASK/PROBLEM

1. Design and construct a three color, flat-bed, step-and-repeat printer. Electronic controls will be provided as required to permit discrete manual changes in color balance without altering overall print density and to permit changes in print density without altering color balance.

DISCUSSION

2. Mechanical: The cabinet has been received. Fabrication of the mechanical parts and the procurement of the related commercial hardware for the raw stock drive mechanism and the air bag mechanism are complete.

3. Design and detail mechanical drawings of the color light source are approximately 90% complete. Layout work on the dark slide mechanism has been started. The design of the mechanism plate will be started when the dark slide design concepts are frozen.

4. Electrical: The construction of the electronic light control circuits in a temporary relay rack has been started. This model will be used for testing purposes and is 60% complete.

PLANNED ACTIVITIES

5. Mechanical: Design of the mechanical elements of the color light source, dark slide mechanism, and the mechanism plate will be completed. The release of parts for fabrication and the procurement of the related commercial hardware will be carried concurrently with the availability of the design drawings.

6. Electrical: Design work including drawings of the power drive and control electrical circuits will be completed during the next quarter. The fabrication of the various electrical chassis and the procurement of

related commercial hardware will be completed during the next quarter.

7. General: The assembly of the printer will proceed with the availability of components.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 52
4 June 65

SUBJECT: Step-and-Repeat Drum Printer

TASK/PROBLEM

1. Develop and fabricate a drum printer with a step-and-repeat capability. The printer will be designed in a manner that the negative material can be reciprocated across the print drum in an effort to enjoy all the advantages of the drum printer (i.e., high resolution, elimination of dirt, etc.). Design goal should include the ability to automatically locate specific frames, step off the required number of prints and be able to respond to frames of any length including those of such length that flat bed printing is not feasible.

DISCUSSION

2. Mechanical:

a. Densitometer mount details are complete and fabrication of parts is in progress.

b. Lamphouse detailing approximately 75% completed.

c. Design layout of metering roller drive 95% completed.

d. Design layout of printer cabinet approximately 25% completed.

3. Electrical:

a. Electronic console design which includes the frame code detector logic, densitometer logic, and the printer control logic is 95% complete.

b. Electronic console fabrication and assembly is 90% complete.

c. Electronic console check out is 50% complete.

d. Electrical design of printer motors, printer lamp and associated control circuitry is 75% complete.

e. Printer control panel electronics circuit design 50% complete, layout 25% complete. Fabrication is not started but 50% of parts have been ordered.

[redacted]

PLANNED ACTIVITY

4. Complete the design phase and continue fabrication, assembly and check out.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 53
4 June 65

SUBJECT: Automatic Exposure Control Study

TASK/PROBLEM

1. To develop, design and fabricate an automatic exposure control system that will scan film continuously on a frame-by-frame basis, and automatically furnish data to set the required exposure for each frame. Design objective will be to scan film, establish exposure and punch a paper tape that can be used on a Galaxy frame-by-frame printer. Necessary means and/or controls will be provided to change various criteria in an attempt to establish optimum parameters for automatic exposure printing.

DISCUSSION

2. Introduction:

a. Under present printer operating procedure, the proper exposure for a negative frame is determined manually by operators choosing and measuring the density of selected areas of the frame. These manually measured values, used in combination with nomographs, predict the proper printing light intensity to produce the optimum print. With the introduction of frame-by-frame printing, the task of individually measuring each frame, determining the proper exposure and recording this information becomes a time-consuming operation.

b. The subject PAR is concerned with the design and demonstration of a workable automated frame-by-frame density measurement system in breadboard form.

3. Electrical:

a. System logic diagrams have been completed and preliminary detailed circuits have been breadboarded. Engineering sketches have been completed for the chassis layouts and actual fabrication has started. Rack panel and

[redacted]

cabling requirements are being considered. Approximately 85% of the required material has been ordered and approximately 50% has been received.

b. Power and motor control wiring schematics are in process. Interface problems between the power and motor control wiring and logic wiring still need some study.

5. Mechanical:

a. Sketches are completed for the mechanical design of the film transport and photocell scanner assembly with light source and have been released to the shop for fabrication. Estimated delivery date is early September.

b. The film transport will have a metering roller type drive designed to move the film at the required 20 ft/min., maintaining constant tension by means of weighted dancer rollers which will control, through variacs, the braking of the supply roll and the drive torque on the take-up roll. Therefore, acceleration forces on the film are kept at a minimum regardless of supply and take-up spool sizes.

6. Provisions will be made to release the metering roller brake to allow positioning of the leading frame line for each frame over an index being provided in the scanner light assembly head. To assure minimum tracking errors, two aligning rollers will be installed.

PLANNED ACTIVITY

8. Complete the basic electrical and mechanical design efforts.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 54
4 June 65

SUBJECT: All Viscous Processor Study

TASK/PROBLEM

1. Conduct tests and studies to determine the feasibility of using viscous primary developer, stop bath, and fixing solutions for an all viscous interrupted processor.

DISCUSSION

2. Modulation transfer function, acutance and high and low contrast resolution tests are in progress to evaluate image structure of material processed by all-viscous techniques.

PLANNED ACTIVITY

3. Complete the above image structure evaluation tests.

4. Prepare and publish the final report.

[redacted]

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 55A
4 June 65

SUBJECT: Preliminary Investigation of Special Applications of the Bimat Process

TASK/PROBLEM

1. Through investigation and study, determine the feasibility of using the Bimat Process to satisfy special and/or unique processing problems of the intelligence community.

DISCUSSION

2. A number of Air Force tactical organizations have been visited to review their photographic reconnaissance requirements in an effort to determine where the Bimat Process might assist in fulfilling these requirements. Valuable insights into the operational concepts and limitations such as the "bare base concept" were obtained. In general, it seems that the Bimat Process would be most welcome in applications requiring quick access to a positive image. The most frequent criticism of the Bimat Process was the poor handling characteristics of the films after processing. The preparation and storage procedures for the Bimat Film also drew some criticism.

3. One of the requirements described by Air Force Personnel in the above mentioned visits was for a Bimat Processor to be operated by non-photographic personnel to process gun camera films. The Bimat positive is desired for immediate projection to evaluate mission effectiveness and for assistance with first phase intelligence. Some preliminary thinking has been done in this direction. Although some mechanical problems are anticipated such a device appears to be technically feasible.

PLANNED ACTIVITY

4. The information gathered in the above visits will be analyzed more fully and related to existing and future PARs. Additional contacts with appropriate members of the community will be arranged.

[redacted]

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 56
4 June 65

SUBJECT: Bimat Processor No. 1

TASK/PROBLEM

1. Investigate, design and demonstrate the feasibility of processing short lengths (up to six (6) feet) of Plus-X, Tri-X and Royal-X type films in 16-, 35-, and 70mm widths on a variety of cores. Unit to be designed for operation under adverse conditions; i.e., no darkroom, water, etc. Design objectives will be directed to small size, light weight and simplicity of operation.

DISCUSSION

2. The 70mm breadboard Bimat Presoaker-Processor has been completed in the shop. Some minor design changes were necessary to improve mechanical operation of the device. All of these changes have been completed by the shop and the processor is being used daily for testing purposes.

3. Initial exploratory processing tests with "best guess" presoaking conditions gave incomplete clearing of the negative. This condition is generally due to insufficient imbibant in the Bimat Film. These experiments emphasized the need for a systematic investigation of the presoaking conditions.

4. During this quarter the breadboard device has been used almost exclusively for determining proper presoaking conditions and techniques. A satisfactory technique of presoaking has been developed. The proper presoaking conditions for the three imbibants selected for this program are being determined. Data is being accumulated on the amount of imbibant absorbed by the Bimat Film as a function of presoaking temperature and time. A very limited amount of processing of sensitometric exposures has been done.

[redacted]

PLANNED ACTIVITY

5. Within a short time actual processing tests can be resumed. Undoubtedly, there will be related problems to be solved. Both aerial and amateur versions of the Task/Problem film types will be tested. Since available processes have been specifically designed for the aerial films, it is expected that the best results will be achieved with them. Adapters for 35- and 16mm film will be designed at a future date.

Contract [redacted]
Fourth Quarter FY-65

PAR 57
4 June 65

SUBJECT: Bimat Processor No. 2

TASK/PROBLEM

1. Investigate methods and demonstrate the feasibility of processing and making available for prompt use in remote field installations up to 400 feet of 9.5-inch wide aerial film by means of the Bimat Process. The system will be planned for occasional use by non-photographic personnel under adverse conditions; i.e., no darkroom, but water and electrical power as normally found in remote sites. In addition, consideration will be given to the processing of 70mm and 5-inch wide films through the use of spool adapters or similar means.

DISCUSSION

2. Part of the effort under this PAR is aimed at providing some treatment for Bimat film to make it convenient to use following processing and prior to archival treatment. Recent visits to Air Force tactical organizations confirmed the importance of this approach. Possible techniques of providing temporary protection for the processed Bimat film have been reviewed with company research personnel. Some preliminary thinking has been done on how these techniques might be incorporated into apparatus for use at remote sites.

3. Currently no equipment for continuous presoaking of 9.5-inch wide Bimat film is available. For the purpose of this PAR, it is proposed to employ rewind type presoaking. A Morse B-5 Processor and a Zeiss Rewind Processor have been obtained for possible use on the program. The problems associated with feeding the dry Bimat film into these devices and with winding and removal of the final roll necessitate additions or changes if they are to be used for presoaking. After preliminary testing and study,

it appears wise to build a new device specifically for rewind presoaking rather than attempt to adapt or modify these units.

4. Initial plans called for the use of the wrap-up mode of processing. Recent emphasis on quick access to the positive image has led to a reconsideration of the advantages and disadvantages of the different modes of Bimat processing. Rough sketches of possible processor configurations and preliminary analyses of time to view and time to complete processing for various film lengths have been made. The continuous, quick-positive, mode of processing provides the fastest access to part of the imagery while the wrap-up mode employs simpler equipment.

PLANNED ACTIVITY

5. Means for presoaking up to 400 feet of 9.5-inch wide Bimat film by the rewind technique will be provided.

6. The appropriate mode of Bimat processing will be selected and a suitable processor will be designed.

7. Preliminary experiments will be conducted on various methods of providing temporary protection for processed Bimat film.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 58-5-1
4 June 65

SUBJECT: Wash Water Studies

TASK/PROBLEM

1. Investigate ion exchange and other systems of water treatment to determine their ability to remove hypo and other accumulative salts in used wash water. Acquire and assemble laboratory apparatus required to carry out the investigation.

DISCUSSION

2. Work is continuing using the five-column system described in the previous report.

3. Paper prints washed with water processed through the system show no tendency to degrade after two months keeping at room ambient. Moist incubation tests on these prints and on control prints show complete obliteration of the image on the control print by mold growth after two weeks while the print washed in treated water shows very little mold growth or image degradation after two months.

PLANNED ACTIVITIES

4. Incubation tests will be continued using both papers and film products. A survey of vendors will be continued and new resins will be evaluated as they become available.

5. As instructed by the CCB, the contractor has been attempting to learn more about the SAC ion exchange system before resubmitting PAR 80, Ion Exchange System. To date, the contractor has been completely unsuccessful in obtaining any more than advertising blurbs -- no design data, no useful information.

[redacted]

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 58-5-2
4 June 65

SUBJECT: Viscous Developer Studies

TASK/PROBLEM

1. Conduct tests and studies to determine the feasibility of using viscous developers. Design and build necessary breadboard equipment.

DISCUSSION

2. Much of this reporting period has been devoted to mechanical changes described in PAR 58-5-4.

3. Some work was done on the aspects of coating developer onto dry film, however, no conclusions have been reached.

PLANNED ACTIVITY

4. Work will continue on the aspects of coating developer onto dry unprocessed film when the mechanical changes have been completed.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 58-5-3
4 June 65

SUBJECT: Viscous Washing Studies

TASK/PROBLEM

1. Investigate washing techniques for removing residual fixer from viscous fixed film emulsion. Develop, fabricate and test necessary breadboard equipment.

DISCUSSION

2. This PAR has been inactive during much of the period covered by this report due to mechanical changes reported under PAR 58-5-4. The changes include the addition of pumping and coating equipment to permit study of pelloid washing as well as emulsion washing.

PLANNED ACTIVITY

3. Tests will continue upon completion of the mechanical changes. Pelloid washing and antihalation dye removal studies will be included in future work.

Contract [redacted]
Fourth Quarter FY-65

PAR 58-5-4
4 June 65

SUBJECT: Viscous Coating Removal Study

TASK/PROBLEM

1. Investigate dry cutoff techniques for removal of viscous processing solutions. Develop, fabricate and test necessary breadboard equipment.

DISCUSSION

2. Much of this reporting period has been devoted to mechanical changes in the breadboard equipment. These include changes in the belt material on the fix and wash stations from canvas web to mylar and changes in the geometrical arrangement.

3. Spray boxes have been added to the fix and wash stations.

4. Tension sensing devices and control networks, necessary to measure and control web tension, have been installed on the breadboard equipment. The controls have been checked out and are performing well.

5. Other changes in the equipment include rearrangement of the pumping systems to enable better control of the developer and wash coating stations.

6. The mechanical changes have been completed and the breadboard equipment is now capable of a complete non-interrupted process rather than one-station-at-a-time operation.

PLANNED ACTIVITY

7. Testing will continue on the removal of viscous coats. Particular attention will be directed toward the application of viscous chemicals. Some effort will be directed toward the development of a satisfactory splice for mylar belts.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 58-5-7M
4 June 65

SUBJECT: Study of Silver Recovery

TASK/PROBLEM

1. To determine the economic feasibility of recovering silver from our in-house Trenton and Dalton Processors as presently used.

DISCUSSION

2. Based on actual and projected production records with current rates of hypo consumption, we are computing the estimated potential silver recovery. Chemical analyses for silver content have been requested.

3. Various silver recovery methods have been investigated, such as chemical, electrolytic and metallic replacement. There does not appear to be any single method that will satisfy our needs. The chemical recovery method is not practical for a large scale industrial system as yet. A combination electrolytic-metallic replacement system appears to be the most promising at the moment.

4. There are several manufacturers of electrolytic recovery equipment. These vary considerably in price, complexity and the need for support equipment. In this class the predominant unit on the market is of the low current-density type, such as the Hickman Model 1B and Model No. 2. The high current-density units are relatively new on the market and testing programs are still being conducted.

5. The area required for installation of this equipment varies with the system and the particular manufacturer selected. This will be a pertinent factor in the economic justification.

PLANNED ACTIVITIES

6. Determine the costs of the applicable units and associated equipment being considered for recovering silver.

[redacted]

7. [redacted]

8. Evaluate the cost of equipment, [redacted] operating requirements in selecting the most practical unit [redacted]

9. Prepare proposed installation drawings.

10. Present an economic justification based on:

    a. Total cost of equipment.

    b. Probable maintenance costs.

    c. Operating costs.

    d. Space availability.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 58-5-8
4 June 65

SUBJECT: Study of Temperature Control of Viscous Coatings

TASK/PROBLEM

1. Investigate and evaluate the feasibility of controlling secondary development by inducing temperature changes in a viscous solution coating hopper at the point of application. Build and test necessary breadboard equipment.

DISCUSSION

2. An experimental hopper capable of modulating the coating temperature of viscous developer between 60°F and 100°F has been designed and built on company sponsored funds.

3. Preliminary tests on the operating characteristics of the hopper indicate that an imposed voltage, ranging from one volt to 2.5 volts across a heater in the lips of the hopper can modulate the temperature of the coated developer between a range of 63°F and 101°F when 60°F developer is fed into the coating hopper.

4. Density measurements across a uniformly flashed test strip of Type 3404 film resulted in density measurements of .16, .17, .18, .17 and .17 density units measured across the 70mm coated width at 20 amperes (one volt). An increase to 50 amperes resulted in corresponding measurements of .23, .23, .23 and .24 density units. The 60°F developer with no power across the heater resulted in measurements of ten density units across the 70mm strip of film.

5. As amperage was increased beyond 50, significant temperature and density changes from center to edges were noted. A typical measurement at 65 amperes resulted in density measurements of .47, .42, .38, .40 and .53 density units across a 70mm strip of Type 3404 film. These measurements

[redacted]

correspond to a temperature profile across the delivery slot of the hopper of 151°F, 123°F, 111°F and 143°F. Flow measurements taken across the slot varied inversely with the temperature measurements.

6. As a result of these tests, the hopper was altered to permit tailoring the flow across the delivery slot to a uniform pattern. When this was done, the temperature changes across the lips of the hopper were decreased considerably. A typical measurement at 40 amperes varied from 93°F to 103°F. No density measurements have been made under these conditions.

PLANNED ACTIVITIES

7. Density and uniformity tests will continue. It is anticipated that the heating element will require tailoring to permit differential heating from center to edges in order to deliver developer at a uniform temperature across the width of the coating slot.

Contract [redacted]

Fourth Quarter FY-65

PAR 58-5-9

4 June 65

SUBJECT: Viscous Fix Studies

TASK/PROBLEM

1. Conduct tests and studies to determine the feasibility of using viscous fix solutions in dry cutoff removal applications.

DISCUSSION

2. This PAR has been inactive during the period covered by this report due to mechanical changes reported under PAR 58-5-4. The changes include separation of the fix and wash pump drives. These pumps previously shared a common drive.

PLANNED ACTIVITY

3. The fix and wash tests will be conducted in concert and will be reported as a fix-wash system when testing is resumed.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 59
4 June 65

SUBJECT: 9.5 Inch Flying Splicer Study

TASK/PROBLEM

1. Investigate possible means of splicing traveling photographic films under darkroom conditions. Intended use is to accomplish a high-speed splice for continuous uninterrupted feed to high-speed film processing machines.

DISCUSSION

2. Activity on this project has been limited to an investigation of outside sources for possible subcontract.

3. A review of the submitted quotations from vendors experienced in high-speed material handling indicates an unusual degree of complexity, a very high cost, and no directly applicable experience with darkroom operation.

4. With this in mind, we again conducted a review of in-house requirements for a flying splicer. We find that by means of conventional elevators providing the time delay for manual splicing, we can adequately accommodate machines up to 100 feet per minute. Since operation at higher speeds would require a complete redesign of [redacted] basic production equipment, we do not feel that further effort on a flying splicer can be justified.

5. We recommend, subject to customer approval, that this PAR be closed.

PLANNED ACTIVITY

6. Close PAR. No final report required.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 60
4 June 65

SUBJECT: Film Handling Technique

TASK/PROBLEM

1. Design and fabricate a breadboard film dryer to investigate film handling techniques using air support as a means of reducing film abrasions, tracking problems, etc.

DISCUSSION

2. A combination floating loop air dryer tube has been fabricated and tested using dry 9.5-inch wide film and 70mm film to prove the system. Initial observations showed the tendency of the web clearance to reduce at the entrance and exit points of the film due to venturi effect. This condition was apparently overcome by decreasing the angle of wrap of the film. Some data was accumulated on running clearances and pressures.

3. Design of a new breadboard, to provide for running the film in a wet condition and drying it by incorporating more turns over additional air dryer tubes, is 95% complete.

PLANNED ACTIVITY

4. During the first quarter of FY-66, it is planned to:

a. Complete breadboard design.

b. Fabricate assemble and test breadboard equipment.

c. Prepare and submit final report by 30 Sept 65.

Contract [redacted]
Fourth Quarter FY-65

PAR 61
4 June 65

SUBJECT: Improved IR Scanner

TASK/PROBLEM

1. To design and fabricate an improved IR scanner that will scan the negative image area as film passes between the primary and secondary development in a Trenton processor. The unit will be designed to scan the width of the image area in the film being processed, through a series of .020 x .020 inch spots and will be capable of determining the D min for any exposure in the roll of film with an accuracy of plus or minus .03 density.

DISCUSSION

2. The improved IR scanner uses 320 cells spaced .025" apart and feeding through operational amplifiers into a 100KC multiplexer. The sampled output is compared to preset D min trigger levels and these outputs are accumulated in preset registers. The register outputs indicate required processing.

3. Electronic Status:

a. Design effort is complete.

b. All purchased parts are on order or have been received in-house.

c. All circuit board drawings have been completed.

d. Assembly drawings for electronics chassis are in progress.

e. Scanner and decade boards have been released to subcontractor for July delivery. Drawings for these boards have been checked and approved.

4. Mechanical-Optical Status:

a. Design of the air arch integrating bar assembly has been completed and fabrication is underway on all optical and mechanical parts.

b. Design layout of the light source assembly is complete.

c. Considerable difficulty is being experienced in the fabrication of the optical integrating bars. The processes necessitated by the diminutive

size of these parts are inherently slow. Consequently, considerable more time than originally anticipated will elapse before their completion.

PLANNED ACTIVITIES

5. Electronics:

a. Complete chassis assembly drawings in June 65.

b. Complete installation and cable drawings in June 65.

c. Complete all subassemblies and fabricated parts in July 65.

d. Assemblies to be completed in August [redacted]

6. Mechanical-Optical:

a. Complete detail drawings for light source assembly and release for fabrication.

b. Complete fabrication of optical and mechanical parts for the air arch integrating bar assembly and start assembly of the optical elements.

Contract [redacted]
Fourth Quarter FY-65

PAR 62M
4 June 65

SUBJECT: Study of Negative Processing Centralized Controls

TASK/PROBLEM

1. Conduct study to determine desirability and feasibility of a single location of controls, indicators, and recorders used for negative processing equipment such as the Trenton Interrupted Processor.

DISCUSSION

2. No activity to date.

PLANNED ACTIVITIES

3. Work will be initiated on this PAR in approximately two months. This is in accordance with current project priorities.

Contract [redacted]
Fourth Quarter FY-65

PAR 63
4 June 65

SUBJECT: Raw Stock (Film) Cleaning Investigation

TASK/PROBLEM

1. Fabricate and test a breadboard device and study its effectiveness in removing minute dirt particles from duplicating film.

DISCUSSION

2. Activity, to date, has been limited to engineering design of a box-type cleaner and a film handling mechanism and ordering standard purchased items.

a. The cleaner design consists of a box containing two brushes both rotating in a direction opposite to that of the film passing between them. Filtered air from a blower is circulated over the film and brushes. This same air, returning to the blower, is used to vacuum the brush. The cleaner is of clear plastic construction for easy viewing of the cleaning process and is designed to handle film from 70mm to 9.5-inches wide.

b. The film handling mechanism consists primarily of a motor driven splicing and viewing table which will be the base for mounting the cleaner. This unit will contain the drive motor for the cleaner brushes, blower and ducting system and plastic cover to enclose the cleaner, brush drive motor and clean film takeup reel.

3. Standard and/or stock parts are being used wherever possible. Seventy-five percent of purchased hardware has been ordered and received.

4. Initial design, including detail drawings, is 90% complete.

PLANNED ACTIVITY

5. Complete design, fabrication of parts, and begin assembly of breadboard equipment.

Contract [redacted]
Fourth Quarter FY-65

PAR 68
4 June 65

SUBJECT: Identification Printer

TASK/PROBLEM

1. Develop, fabricate and test a breadboard printer for production of thin base and standard base identification leaders and trailers.

DISCUSSION

2. The contractor received authorization to proceed with the quantity of one breadboard Identification Printer as stated in the above Task/Problem (customer msg [redacted] dated 1 June 65).

PLANNED ACTIVITIES

3. Start and complete design phase.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 69M
4 June 65

SUBJECT: Ultrasonic Edge Detector

TASK/PROBLEM

1. Breadboard and test a film edge guiding device operating on the ultrasonic principle.

DISCUSSION

2. Engineering effort began 26 Apr 65 to obtain manufacturers' data relating to ultrasonic transducers. Contacts were made with users of ultrasonic equipment for establishing what operating environment problems would be encountered.

3. Two frequency matched sensors, for transmission in air, with a control amplifier were obtained. Ultrasound energy from the transmitting sensor passes through a 1/4-inch opening and is transmitted over an angle of 100°. The beam was narrowed by inserting a conical shaped plastic tube over the opening which increased the transmitting signal intensity. As material is inserted into the beam, the amount of ultrasound energy received at the pickup varies according to edge position in the beam. Data obtained with this arrangement indicates that amplitude sensing of ultrasound intensity will not provide the required repeatability and stability for film edge control.

PLANNED ACTIVITIES

4. Investigate a manufacturer's ultrasonic web edge detector which relies on diffraction of ultrasound waves at the edge of the web. This device measures the time required for a pulse of ultrasound energy to travel to the edge, be diffracted and then travel to the receiving sensor. Time will be proportional to position of the web edge within the beam. A ±DC signal is provided for indicating direction and magnitude of changes in web edge position.

5. Select servo components for positioning an edge tracking mechanism.

[redacted]

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 72
4 June 65

SUBJECT: Black-and-White, Step-and-Repeat, Flat Bed Printer

TASK/PROBLEM

1. Design and fabricate two (2) black-and-white, step-and-repeat, flat bed contact printers capable of printing format sizes from 2 1/4 x 2 1/4 inches to 9 x 18 inches. (Format requirements were changed to include format sizes from 1.7 to 5 inches by customer direction).

DISCUSSION

2. Two cabinets have been received. The fabrication of the mechanical parts is 98% complete. Related commercial hardware for two (2) printers has been received.

3. The fabrication of the various electrical chassis and the procurement of the related commercial hardware have been completed and received for two (2) printers.

4. The assembly of the first printer is nearing completion. The installation of the mechanical subassemblies is 95% complete. The various electrical chassis have been fitted to the cabinet. The point to point machine wiring is being carried on at this time concurrently with the final mechanical assembly work.

5. The assembly of the second printer has been started.

PLANNED ACTIVITY

6. Complete assembly and evaluation testing.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 76
4 June 65

SUBJECT: Upgrade Yardleigh Processor

TASK/PROBLEM

1. Develop modifications to the Yardleigh Processor to improve reliability, accuracy and performance.

DISCUSSION

2. Design and detail drawings for the following have been completed and fabrication has been started:

a. Redesign of magnetic tape control cabinet providing redundancy, discrete signals for hopper motion and improved tape handling techniques. Cabinet design and manufacture have been subcontracted to meet design specifications covering these items.

b. Redesign of basic machine drive to isolate viscous cabinet from external influences which may effect accuracy of transport. The viscous portion of the machine is isolated between a positive pacer roll and a position sensitive elevator.

c. Develop technique for minimizing hopper skips or removing the effect of same. A manually-operated slider is incorporated in the design to clear the hopper mouth.

d. Add additional controls as manual backup in the event of electronic failure. A positively driven paper tape, with distance markers has been incorporated. The frame positions are marked on the tape manually and as they pass predetermined points for full and intermediate secondary development, the operator causes that hopper to be activated.

e. Investigate and develop a simplified coating hopper mechanism. Lateral tracking of the hoppers has been eliminated by coating viscous solution wider than the product with hoppers being built on Part XIX, Item 9.

PLANNED ACTIVITY

3. Delivery of all items is expected in late August 65. Installation will then proceed on schedule dictated by available Yardleigh downtime.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 77
4 June 65

SUBJECT: Processed Film Slitter

TASK/PROBLEM

1. Design, fabricate and test equipment to slit triple-printed and processed 9.5-inch film into three (3) 70mm wide strips.

DISCUSSION

2. Authorization to proceed on the subject project was received by the contractor on 14 Apr 65.

3. No work other than design concept and organizational planning has been started.

PLANNED ACTIVITY

4. Complete design concept and start overall layout.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 78
4 June 65

SUBJECT: Cross Frame Lacquerer

TASK/PROBLEM

1. Investigate and test means of applying lacquer uniformly to a one-inch by 3.5-inch strip across film up to 9.5-inches wide to cover and protect between-frame titles (cross-titles). Fabricate necessary breadboard equipment.

DISCUSSION

2. Authorization to proceed was received by the contractor on 15 Apr 65.

3. A search of manufacturers of spraying equipment was made.

4. Preliminary investigations of spray and wheel type lacquer applicators have been made. Based on these investigations, the wheel-type applicator was selected for initial testing. The breadboard design is complete and parts are currently being fabricated. The wheel type applicator breadboard equipment will be mounted on an existing printer mechanism to avoid the necessity of building film spool and film guiding and driving mechanisms.

5. Brush, roller and spray type lacquer applicators are still being considered. The breadboard equipment (paragraph 4 above) was designed for relatively simple adaptation to other applicators.

6. Initial study of electrostatic application of lacquer to films, including some basic laboratory testing, have led to the conclusion that the task of proving feasibility is beyond the time and money allotments of this project. The random generation of static electricity in film handling equipment makes it extremely difficult to place a desired charge in a discrete area without first finding the cause of and eliminating the random charges.

PLANNED ACTIVITY

7. Complete breadboard fabrication, assemble and test wheel type applicator.

8. Continue breadboard design modifications necessary to investigate other applicator systems.

9. Test other systems.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 79
4 June 65

SUBJECT: Universal Titler

TASK/PROBLEM

1. Design, fabricate and test two (2) universal titlers capable of accepting standard longitudinal heads, binary titling heads and transverse titling heads as well as an arbor head in which all type will be self-contained on manually settable wheels.

DISCUSSION

2. In order to be sure that the new design would handle all formats, a review of present titling requirements was conducted:

a. Certain formats will require a special head for index numbers.

b. The use of such a head will require programmed indexing rather than once per frame.

c. Preliminary layouts of the various titling heads have been made and are being studied for possible use of common structural parts. (This approach appears feasible).

d. Some overall sketches indicating size, human engineering problems etc., have been made and are being studied.

PLANNED ACTIVITIES

3. Continue design studies.
4. Complete head layouts.
5. Start general overall layout.
6. A major design review is scheduled for early July.

[redacted]

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 81M
4 June 65

SUBJECT: Versamat Processing, Water Usage Reduction Investigation

TASK/PROBLEM

1. Investigate and test means of reducing the quantity of fresh water required for Versamat processing.

DISCUSSION

2. Three (3) Versamat water distribution header assemblies have been modified and installed to provide laboratory flexibility with respect to the Versamat wash stage.

3. The fabrication of the water supply and drain system (consisting of a small sump pump and motor, two Fisher and Porter flowrators and the necessary plumbing) has been completed.

4. A test plan has been completed.

PLANNED ACTIVITY

5. Start testing immediately.

[redacted]

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 82M
4 June 65

SUBJECT: Two-Strand Stereo Viewer

TASK/PROBLEM

1. Design, fabricate and test a prototype binocular microscope viewer for two photographic stereo images existing on two different strands of roll film, 70mm to 9.5-inches wide.

DISCUSSION

2. This project as outlined in the Task/Problem was deferred by the CCB at the 7 - 8 Apr 65 progress review meeting. However, to take advantage of a temporary favorable price (40% savings), the contractor was authorized to purchase, as a minor project, one Modified Versatile Stereoscope. An order has been placed for this item.

PLANNED ACTIVITY

3. Unless otherwise directed by the customer, no further work will be done on this minor project. Delivery of the Modified Versatile Stereoscope will be in Feb 66. A final report will not be submitted for the subject minor project.

[redacted]

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 83M
4 June 65

SUBJECT: Versamat Rack Washer

TASK/PROBLEM

1. Study cleaning methods and techniques for cleaning Versamat Racks. Build simple breadboard equipment as required.

DISCUSSION

2. Two concepts for a Versamat rack washer were considered:

a. Use a standard Versamat three-tank section, a drive mechanism for the racks, a solution recirculation system and perhaps a drip tray attached to the end of the equipment. Cleaning would be accomplished by soaking a dirty rack on one tank filled with systems cleaner and then spray rinsing, soaking and final rinsing with water in the other tanks.

b. Use the approach common to most domestic and commercial cleaning equipment. A single tank would be equipped with spray jets, a pump, a rack driving mechanism, plumbing and valving to allow for the delivery to the jets of either cleaning solution or water and perhaps an automatic cycling mechanism. The equipment would accept at least two racks and four crossover assemblies. (See attached sketch).

3. Concept (b) in paragraph 2, above, offers many advantages over concept (a):

a. Simpler solution mixing. (The dry systems cleaner could be added directly to the sump.)

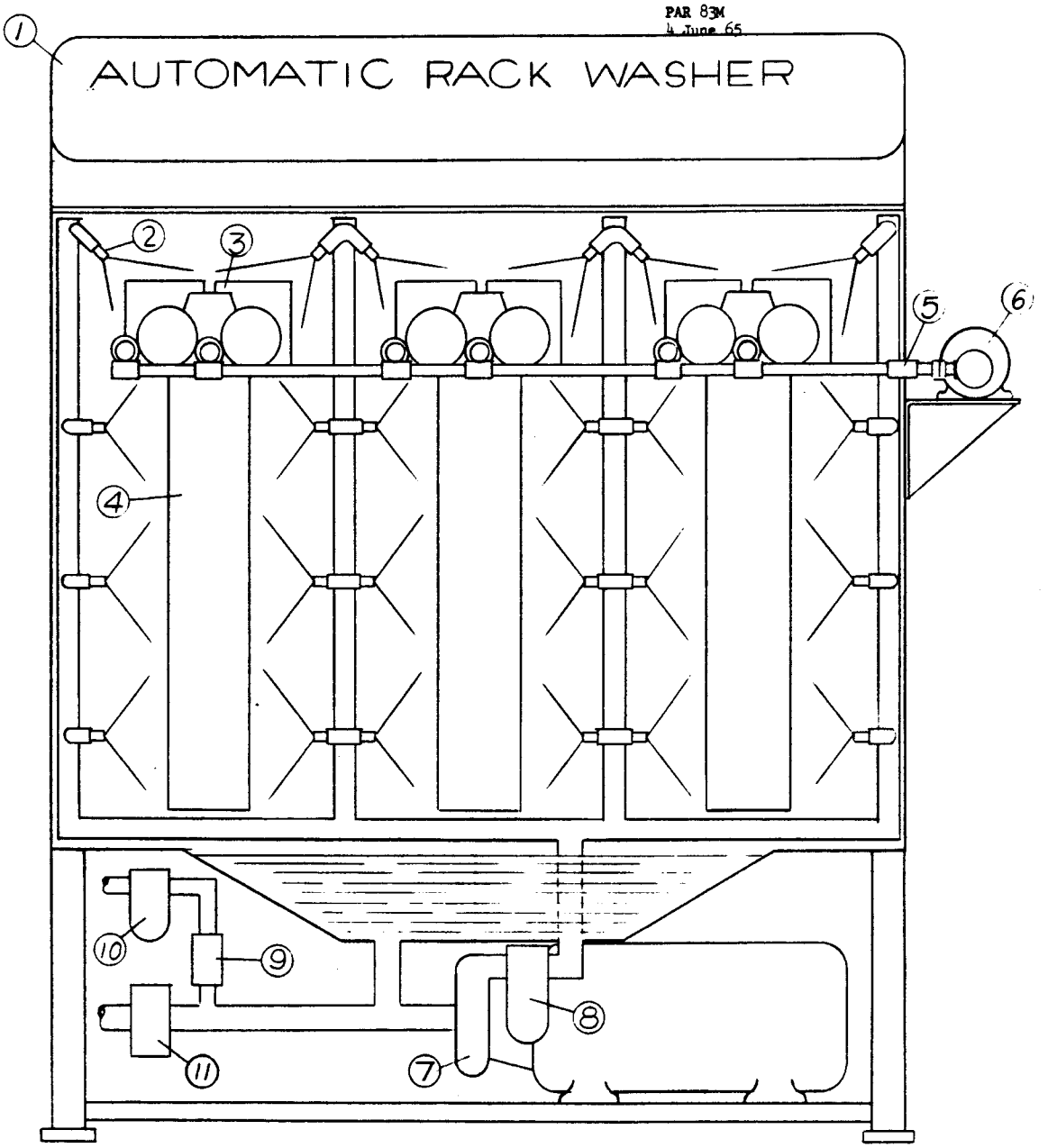
b. Easily automated to minimize rack handling.

c. Size -- it could be quite compact.

d. Less risk of seepage of cleaning solution past roller gudgeons.

4. The effectiveness of the cleaning method described in paragraph 2.a. is well known since it is similar to existing methods of cleaning the racks in

[redacted]



1. TIMERS, RELAYS & WIRING.
2. NOZZLE - WIDE ANGLE, SQUARE SPRAY.
3. TWO CROSS OVERS OR ONE SKIP RACK.
4. VERSAMAT RACK.
5. CRANE SHAFT SEAL.
6. GEAR HEAD DRIVE MOTOR.
7. EASTERN PUMP - MODEL W17C
8. MESH STRAINER.
9. GOLDEN ANDERSON SOLENOID-HYDRAULIC VALVE.
10. MESH STRAINER.
11. KEYSTONE MOTORIZED BUTTERFLY DRAIN VALVE

a Versamat. To determine how effective the other method (paragraph 2.b.) would be, a simple test was designed and conducted. A dirty rack was suspended in the developer spray cabinet of a Trenton Machine equipped with spray nozzles similar to those that might be used in a rack washer. The rack was then sprayed with Kodak Developer System Cleaner at about 100°F. Every thirty seconds the spray was turned off and the position of the rollers changed by manually advancing the drive mechanism. This rack was very clean in less than seven minutes and required no hand scrubbing.

5. Based on the advantages listed in 3. above and the test described in 4. above, it was decided to build breadboard equipment using the automatic spray concept.

6. A material corrosion test was conducted using Kodak Developer System Cleaner. Several materials were tested. They were:

a. Versamat rollers (all varieties).
   (1) Plastic.
   (2) Synthane.
b. Nylon gears.
c. Polyvinyl pipe fitting.
d. Red brass pipe fitting.
e. Bronze pipe fitting.
f. Stainless (316) steel fitting.

7. All materials were half immersed in a standard solution of Kodak Developer System Cleaner for a one week period (168 hours). Solution temperature was 110°F ± 5°F. This solution was changed very twenty-four hours. Test results indicate that:

a. Versamat rack materials, nylon gears and rollers remained unaffected by the Kodak Developer System Cleaner except for stain on the nylon and synthane parts. The dimensional stability of these parts remained constant throughout the tests and there was no evidence of corrosion to the stained parts.

b. The polyvinyl and stainless steel (316) fitting examination indicated no corrosion.

c. The red brass and bronze fitting examination indicated some evidence of corrosion. More extensive testing of the red brass is necessary before these metals could be recommended.

8. In view of the above results, the material of construction chosen for the prototype washer for all parts coming in contact with Kodak Developer System Cleaner will be either stainless steel (316) or polyvinyl plastic.

9. Engineering sketches required for the breadboard have been completed, parts to be purchased have been ordered and subassemblies are being fabricated.

PLANNED ACTIVITY

10. Continue fabrication of breadboard.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PAR 84M
4 June 65

SUBJECT: Three Lamp Lamphouse for Belair Printer

TASK/PROBLEM

1. Fabricate and test a lamphouse for three color additive printing on the Belair Printer.

DISCUSSION

2. Effort on the subject minor PAR commenced on 16 Mar 65. Progress to date:

a. The pressure roller casting assembly will be the same as used on the present Belair Printer except that it shall be modified to contain a two-inch wide printing slit. It will also include a dark shutter which will be painted white on top and be used to monitor the color balance. The design on this section of the lamphouse is now complete and the details are 95% complete.

b. The design layout of the upper portion of the lamphouse which contain the lamp, filters and quantalog monitor probe is now 90% complete. Detail drawings are 25% complete.

PLANNED ACTIVITY

3. Complete design and fabrication and start testing.

[redacted]

[redacted]

Contract [redacted]

Fourth Quarter FY-65

PAR 85M

4 June 65

SUBJECT: Study Alternate Layouts for Airborne Processing

TASK/PROBLEM

1. Study and prepare alternate schematic layouts for an airborne processing laboratory in the C135B aircraft.

2. Define operational features of each schematic layout. Results of previous investigations and principles of human engineering will be utilized.

3. List general system and equipment parameters of weight, space and power.

DISCUSSION

4. A first examination of the problem has shown that the airborne laboratory logically consists of three sections whose primary functions are:

a. Pre-process operations, post-process breakdown and examination.

b. Processing.

c. Reproduction.

5. An evaluation of assumed mission characteristics was made on a time, results desired, and equipment-needs basis.

6. From the results of the basic mission study, a preliminary listing of equipment needs was evolved. This equipment was arranged into several basic layouts that could be accommodated in the Type C135 aircraft.

7. A series of patterns showing traffic and material flow have been made on the equipment layouts.

8. From the various layouts, it would seem that one plan appears to hold the most promise. A weight and power summary of the equipment in this plan has been made indicating 45,000 pounds and 20KVA power requirements.

9. A listing of preliminary vehicle space and facility questions has been prepared.

[redacted]

10. A study of the mission requirements has been made to determine in more detail the printing and processing requirements for the reproduction section. In addition, a study has been made to balance the equipment payload weights and moments about the longitudinal axis of the vehicle cargo space.

11. Fold-away and portable viewing stations have been added to the plan to give maximum PI viewing and examination facilities.

12. Based on the original ground rules, and this preliminary study, the problem appears capable of reasonable solution.

PLANNED ACTIVITY

13. Prepare and publish final report in first quarter FY-66.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PART XIX
Item 3

4 June 65

SUBJECT: Moveable Head Densitometer

TASK/PROBLEM

1. Design, fabricate and test one (1) prototype model spot densitometer providing convenient, two-direction movement of a low-mass reading head over the photographic sample.

DISCUSSION

2. Preliminary design studies by the subcontractor have proceeded through an optical breadboard of a densitometer illumination and pickup system using fiber optics. The light level and photometer response appear adequate for measuring apertures down to 0.5mm diameter for B&W densitometry. The system showed departure from ASA diffuse geometry and so it will be necessary to use an opal glass diffusor at the sample end of the pickup fiber bundle. Light level and photometer response must be reevaluated after this change.

3. Tests of two commercial slide assemblies, specifically a ball bushing and a nylon pad dovetail unit, have shown them to be unsatisfactory as supports for the low-mass moveable C-frame head assembly. Other similar mechanisms are being considered.

PLANNED ACTIVITIES

4. Install opal glass diffusor in the optical system breadboard and retest the unit for light level and "optical geometry".

5. Continue studies and breadboard tests of the head assembly movement mechanism.

[redacted]

Contract [redacted]

Fourth Quarter FY-65

PART XIX
Item 4
4 June 65

SUBJECT: Two-Strand Film Viewer

TASK/PROBLEM

1. Design, fabricate and test a mechanism to handle two independent strands of film in a synchronous manner over a viewing surface. Mechanism to accept all film sizes from 70mm to 9.5-inches wide.

DISCUSSION

2. Design of the two-strand breadboard viewer is complete. All purchased material has been ordered and 90% has been received.

PLANNED ACTIVITY

3. Complete fabrication and assembly and start testing.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

PART XIX
Item 5
4 June 65

SUBJECT: Automatic Recording Densitometer

TASK/PROBLEM

1. Provide two densitometers and the necessary associated equipment for making density readings with automatic D/log E curve plotting from sensitometric control strips. Capability for both black-and-white and color materials is required.

DISCUSSION

2. Fabrication of the densitometers, including filters, is progressing normally.

3. A proof of the chart paper for the densitometer has been approved and returned to the manufacturer to provide chart paper for testing the densitometers when they are assembled.

4. Preliminary discussions on the sample trimming unit have pointed out that our planning for use of the hot-wire technique does not make provisions for paper-based samples. The problems of building and maintaining shears or punches for polyester base have lead us to keep the hot-wire approach and propose that the relatively smaller quantity of paper-based samples be cut on a trimming board.

5. Special wedges for the 1b sensitometer have been ordered which combine a density wedge (ΔD = .015/mm) with step-tablets (10mm steps, ΔD = .15/step, 21 steps). It appears that such an assembly has not been made before. There is confidence it can be made but it must be tried. This design is suitable for B&W testing.

6. For color testing, it has been suggested that a sensitometer modulator assembly be provided to:

[redacted]

a. Provide wedge and step exposures as for B&W, except as photographic silver densities rather than cast carbon-gel.

b. Provide six short step-tablet exposures filtered red, green, blue, cyan, magenta, and yellow respectively.

No action on procurement of the special modulator has been taken, nor was provision made for it in our cost estimates.

PLANNED ACTIVITIES

7. Begin design of the sample trimming unit.

8. Continue monitoring of the densitometer fabrication.

9. Monitor development progress of the combination wedge and step-tablet assembly.

10. Explore the need, feasibility, and cost of the special sensitometer tablet for color materials.

Contract [redacted]
Fourth Quarter FY-65

PART XIX
Item 6
4 June 65

SUBJECT: Galaxy Continuous Printer, Model II

TASK/PROBLEM

1. Design, fabricate and test Galaxy Continuous Printer, Model II.

DISCUSSION

2. The Galaxy Printer, Mod. 1, designed and built under PAR 13, Contract [redacted] was developed to solve the problem of printing reconnaissance photographs where the optimum exposure varies greatly for consecutive frames. The design was accomplished by providing alternate light paths and filter arrangements so that exposure level for each frame could be programmed prior to actual frame printing. The lamphouse and its electronic controls can accomplish this rapid exposure change entirely within the frame interspace without interruption in printer capacity. Model II electronics provides the capability to compare the frame number with the tape exposure data for each frame thus maintaining synchronization. It also has the capability to accommodate the 2 3/8" short frames.

3. General:

a. Recent tests have indicated that the light level is approximately .13 log E below the Niagara.

b. The design aim for printer speed is 45 ft/min. This speed will enable the present standard 100-watt mercury lamp to be used. Provisions to reduce speed to 22.5 ft/min. will be incorporated.

c. An analysis was made of time required to actuate neutral density (N.D.) filters. High-speed movies have indicated the N.D. filters will actuate in the required time, and the bounce can be controlled with a special "dead" rubber material.

d. High-speed movies have also shown that the printer can mechanically accommodate the 2 3/8" camera advance.

4. Frame Identification:

a. Mechanical:

(1) The detection system will use three solar cell assemblies to read the binary-coded decimal frame digits printed on the edge of the film. The three cell assemblies will consist of a single head of sixteen active solar cells for readout and two heads containing four active solar cells each for reference readout. Due to tolerance accumulations in titling and in cell construction, it is necessary to use two reference readout cell heads that will be adjustable in the direction of film travel.

(2) Development and breadboard work has been conducted with .130 inch long cells. It was felt that this was a minimum cell size to insure positive identification of the binary-coded marks. Furthermore, signals of this strength are required for reasonable amplification of the electrical input signal without electrical filters or shielding.

(3) An analysis was made of various film formats that would be encountered, and it was found that the binary-coded marks cannot exceed .190 inch in length without overlapping the image. In order to insure that the solar cells do not "read" over the ends of these marks, it will be necessary to maintain an alignment between the edges of the film and the edge of the cells within .030".

(4) The use of some type of a film guidance system or an air follower was investigated, but found to be objectionable due to complexity, noise or air requirements. A simplified approach is being evaluated where the solar cell readout head would be transported to any one of a number of preselected stops. To correct for film tracking problems, an adjustable override would be provided on the location of the head. This approach depends on the film following a constant path on any given run. An investi-

gation into the feasibility of this approach has indicated that a printer will track within .025" to .030".

(5) In addition to the override adjustment being provided, the use of a smaller cell size will be evaluated to allow greater misalignment in film tracking. This requires the use of smaller identifying characters and increased lamp signal. The reduction in character size and increased lamp signal must be proportional to the reduction in cell size.

b. Electrical:

(1) A conference was held with the manufacturer of the magnetic storage drum. At this meeting, mechanical and electrical details were finalized. Formal request for quotations is being prepared.

(2) For convenience in discussion and planning, the electrical system can be divided into the following three general areas.

(a) Film Address Code Reader Assembly: Cell readout amplifiers, validating circuits, and general logic control design are 50% complete. Packaging and detailed layout are still to be considered.

(b) Logic Control Assembly: System logic design is approximately 50% complete including engineering drawings. Suppliers and types of purchased subsystems such as tape readers, logic modules, power supplies etc., have been selected. Initial packaging studies have been made. The logic system timing diagram indicated that filters must move in or out (and be free of bounce) in less than 125 ms. High-speed photographic studies of the Galaxy I indicated this to be a problem area. Further photographic studies were made (see 3.c.) which indicate the problem can be overcome.

(c) Printer Control Modifications: Nothing more than basic consideration has been done in this area to date.

PLANNED ACTIVITIES

5. Mechanical:

a. Complete design and detailing of frame identification assembly.

b. Complete design and detailing of lamphouse using the 100-watt mercury lamp with provisions to use 250-watt mercury lamp if required.

c. Proceed with overall printer layout.

d. Complete design of cabinet.

6. Electrical:

a. Continue design of film address reader assembly.

b. Continue design of logic control assembly and start purchase requests for long lead items.

c. Proceed with system packaging and detailed layout studies for logic assembly.

[redacted]

Contract [redacted]
Fourth Quarter FY-65

Part XIX
Item 9
4 June 65

SUBJECT: Viscous Developer Coating Hoppers for Yardleigh Processor

TASK/PROBLEM

1. Design, fabricate, install and test viscous developer coating hoppers to process 5-, 6.6-, and 8-inch wide film on the Yardleigh Processor.

DISCUSSION

2. One hopper has been completely fabricated and checked out. Some hand finishing was required to obtain even flow across the hopper width. With this satisfactory check out all remaining hoppers have been released for fabrication.

PLANNED ACTIVITIES

3. Complete hopper fabrication, test and install on Yardleigh Processor as schedule permits.

[redacted]

SECTION III

FISCAL SUMMARY

***** NOTICE OF REMOVED PAGES *****

Pages 140 through 142 of CORONA, ARGON, LANYARD programmatic information are not provided because their full text remains classified.