Attachment to
T̶S̶S̶G̶/T̶A̶D̶-084/68
TSSG/PPS-152-68

June 6, 1968

STATINTL
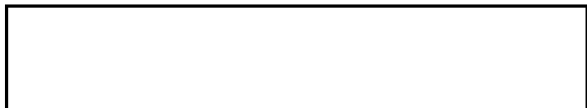
Dear Ray:

Enclosed is a detailed breakdown on man-hours and cost for
our proposal no. 6927-59. (Microdensitometry Support). Some of
these are essentially continuations of previous work (Task 1,
Task 4, and Task 5). Tasks 2, 3, and 6 are additional efforts.

The work statement submitted to you earlier covers the
documentation that will be provided with the computer programs.
I have enclosed a copy of it for your convenience.

If you have any questions, please don't hesitate to call.

STATINTL

Sincerely,

Scientific & Engineering Applications

WWM:mls
encl

MICRODENSITOMETRY SUPPORT

Statement of Work

STATINTL   1. [   ] will provide technical assistance, as

required, to establish operating procedures which will produce valid

STATINTL output from the [   ] 1032T trichromatic microdensitometer. This

work will include an investigation to determine proper location of

filters.

STATINTL   2. [   ] will provide information processing routines

for automatic data reduction of the microdensitometer output. These

routines will facilitate technical and intelligence analyses of single

and multilayer emulsion films. The documentation furnished in support

of these routines will include:

        a. Complete listing of the deck for each FORTRAN program.

        b. Documentation for each FORTRAN program consisting of:

            1. Block diagram of the program showing the exact

flow of this data and operation preformed on it.

            2. Detailed description of all input data such as;

range and number of data values; purpose, definition and values of

all constants; settings on the NPIC Microdensitometer that are peculiar

to the program.

            3. Detailed description of all output data such as:

range of values; what the cause could be if the values are out of

range (assuming the program is in production status; what assumption

and conclusion can be drawn from the output.)

            4. Detailed description of all mathematical analysis

methods in the program, equations and relevant diagrams.

STATINTL   3. [_____] will provide test targets and test routines for establishing the validity of any scan or series of scans made on the microdensitometer.

STATINTL   4. [_____] will provide technical assistance, as required, in the general areas of photoscience, electronic engineering, computer programming and optical analysis.

STATINTL   5. [_____] will investigate the application of various lens combinations to reduce focus depth effects when scanning multi-layer emulsions with various wave length of light.

STATINTL   6. [_____] will provide analytical and experimental support in the development of image analysis and image processing techniques unique to the exploitation field. Particular emphasis will be placed on the deduction of fundamental object properties, e.g., brightness contours, from the recorded image. In those cases wherein the deduction of such data is not possible, the failure of physical description will be identified and recommendations made as to future courses of action.

STATINTL   7. [_____] will provide monthly status reports on the work accomplished and the funds expended. These reports will be submitted within two weeks after the end of the reporting period.

STATINTL   8. [_____] will provide a final report on the work accomplished. The rough draft of this final report will be submitted thirty days before contract termination date, and the final copies will be delivered to the customer thirty days after approval of rough draft.

5.   Description of any option in the program and any

other uses the program might have.

6.   Glossary of terms.

c.   Complete set of test data for each program including

intermediate calculations and the output. Whenever possible all input

data to any program will be combined on magnetic tape in the format

generated by the microdensitometer. The only exception might be

when input to one program is output of another.

I <u>COLOR EXPOSURE TABLE GENERATOR</u>

This task is the completion of the effective exposure table selection and generation. Without this capability, the effective exposure principle cannot be used in the computation of color MTF. This task has five subtasks as follows:

a. Completion of the characteristic matrix program

b. Scalar array computation and regression fitting to generate the equations relating image color to scalar array

c. Programming of the exposure table generator and exposure selection procedure

d. Testing of the final color exposure generator

e. Reporting and Documentation

STATINTL

TASK 1	HOURS
Executive Engineer	50
Physicist	
Analyst	
Photoscientist	85
Programmer	180
Photographic Technician	
Technical Writer	20
Publication Clerk	40
Illustrator	10

TOTAL

Engineering Overhead (100%)

TOTAL

MATERIAL

Computer Charges

Travel

TOTAL

G & A at 9%

Profit

TOTAL

II COLOR GRANULARITY STUDIES

This task compares the granularity of color materials with that of black and white materials on the basis of the mathematical characteristic. The investigation takes the form of examining the noise properties of color materials using three different techniques. The following sub-tasks are required:

    a. Record and sample preparation

    b. Study of classical gaussion properties as they relate to color materials. (Selwyn's law etc.)

    c. Binomial Distribution Studies

    d. Cross and auto correlation programs

    e. Reporting and Documentation

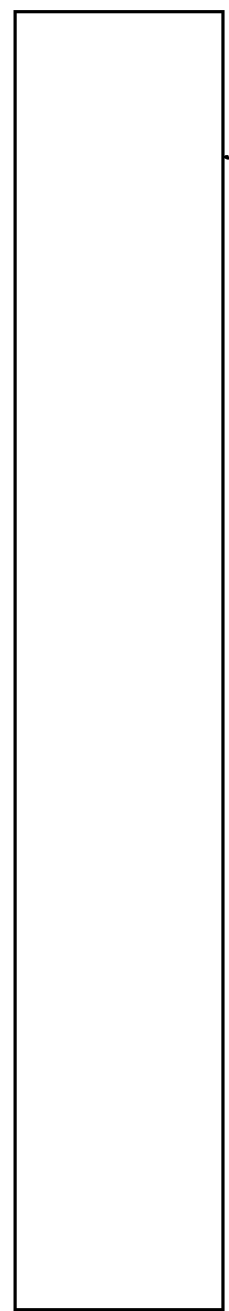|	HOURS
TASK 2	
Executive Engineer	50
Physicist	
Analyst	100
Photoscientist	270
Programmer	245
Photographic Technician	145
Technical Writer	20
Publications Clerk	40
Illustrator	10
TOTAL	
Engineering Overhead (100%)	
TOTAL	
MATERIAL	
Computer Charges	
Travel	
G & A at 9%	
TOTAL	
Profit	
TOTAL	

III COLOR MODULATION TRANSFER FUNCTION

This phase initiates the study of the properties of MTF of color emulsions. Its objective is to provide a means for MTF generation and an analysis and interpretation of their value and meaning of such measurements in the color situation. The study will be composed of the following five sub-tasks:

a. Color target generation

b. Cooley-Tukey transform methods (edges, combs)

c. Standard transforms (edges, combs)

d. Analysis

e. Reporting & Documentation

STATINTL

TASK 3	HOURS
Executive Engineer	50
Physicist	
Analyst	100
Photoscientist	415
Programmer	390
Photographis Technician	450
Technical Writer	20
Publication Clerk	60
Illustrator	20

TOTAL

Engineering Overhead (100%)

TOTAL

Material

Computer Charges

Travel

G & A at 9%

Profit

TOTAL

IV <u>DIRECTION COSINE AND COLOR TRI-ACT CALIBRATION</u>

      This task completes work required to implement the calibration procedure established under previous efforts. The methods are well defined and all programming is completed and in operation. The following tasks remain to be accomplished to make this an operational procedure.

    a. Spectrophotometric work

    b. Direction Cosine

    c. Micro-D calibration

    d. Reporting and Documentation

TASK 4	HOURS
Executive Engineer	50
Physicist	
Analyst	100
Photoscientist	60
Programmer	10
Photographic Technician	340
Technical Writer	20
Publication Clerk	40
Illustrator	20
TOTAL	
Engineering Overhead (100%)	
TOTAL	
Material	
Computer Charges	
Travel	
G & A at 9%	
Profit	
TOTAL	

STATINTL
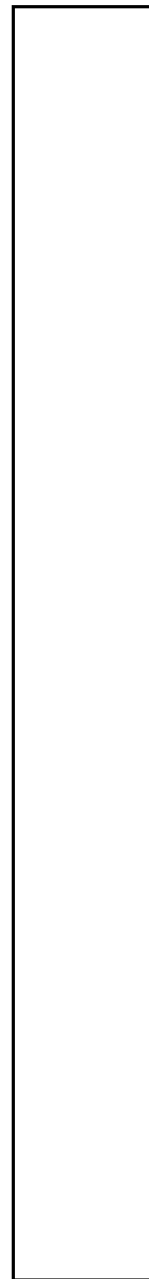
TASK 5	HOURS
Executive Engineer	50
Physicist	
Analyst	100
Photoscientist	170
Programmer	340
Photographic Technician	250
Technical Writer	20
Publications Clerk	60
Illustrator	20

TOTAL

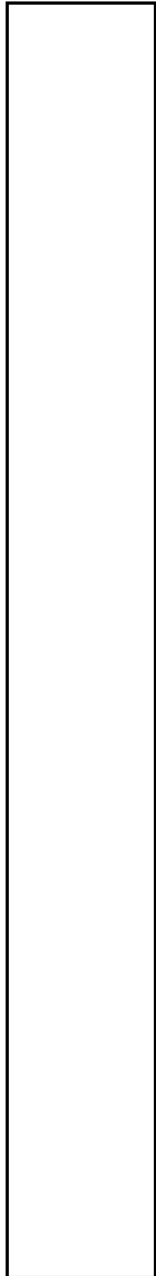Engineering Overhead (100%)

TOTAL

Material

Computer Charges

Travel

G & A at 9%

Profit

TOTAL

VI MICRO-ANALYZER OBJECTIVES ASSESSMENT

Discrepancies have been noted in the selection of objectives for the current color micro-densitometer. Achromat objectives, designed for metallographic use are not suitable for the precise location of focus of the micro-densitometer with respect to the orientation of the layers of a classical color tripack. This program will evaluate the chromatic abberation and focus plane characteristics of current apo-chomat and planapo-chomat objectives.

STATINTL

TASK 6	HOURS
Executive Engineer	150
Physicist	250
Analyst	
Photoscientist	
Programmer	
Photographic Technician	500
Technical Writer	20
Publications Clerk	30
Illustrator	20
TOTAL	
Engineering Overhead (100%)	
TOTAL	
Material	
Computer Charges	
Travel	
G & A at 9%	
Profit	
TOTAL	

COMBINED TOTAL HOURS AND COST

STATINTL

	HOURS
Executive Engineer	400
Physicist	250
Analyst	400
Photoscientist	1000
Programmer	1165
Photographic Technician	1685
Technical Writer	120
Publication Clerk	270
Illustrator	100
TOTAL	
Engineering Overhead (100%)	
TOTAL	
Material	
Computer Charges	
Travel	
TOTAL	
G & A @ 9%	
Profit	
TOTAL	