


May 9, 1969

STATINTL


Washington, D.C.


Subject: Project 6619

Dear John:

Enclosed are two (2) copies of Progress Report
No. 6 in accordance with the schedule of the subject
contract.

STATINTL

Sincerely,


Program Manager

WWM/mls
encl : As stated

Declass Review by NIMA/DOD

PROGRESS REPORT NO. 6

COLOR IMAGE ASSESSMENT

PROJECT 6619

by

[Redacted]

STATINTL

Period: April 1 through April 30, 1969

PROGRESS DURING THE PERIOD

The modulation transfer function phase of this project was initiated with delivery of three analytical color friskets on S.O.151 camera original emulsion. The emulsion had been "exposed out" to yield single analytical dye layers. Thus, of the three friskets, one was exposed only in the yellow dye layer, one in the magenta dye layer, and the third in the cyan dye layer. A description of the frisket was provided in the previous progress report.

The trace instructions were as follows:

1. Resolution readings should be visually taken from all resolution targets.
2. A scan across the micro-step wedge with a $1 \times 80 \mu$ slit should be performed with a 10μ sample interval.
3. All edges in the first row (all orientations and all contrasts) should be scanned with a $1 \times 80 \mu$ slit, using a sample interval of 1μ .
4. All edges in the fifth row (all orientations and all contrasts) should be scanned with a $1 \times 80 \mu$ slit using a 1μ sample interval.

Once these traces are received from the customer, utilization of the exposure table generation routines and the Fourier transform program will yield the analytical modulation transfer function.

The direction cosine routine has been utilized to generate polar plots of the S.O. 121 dye system and the S.O. 151 dye system. The results indicate that Beer's law holds for all combinations of the dye layers for each emulsion. The angle corresponding to the direction cosine computed in the program indicates the degree of independence with which one dye layer in a tripack absorbs relative to

either of the other two layers. Completely independent dye systems yield an angle of 90° and are termed orthogonal.

The following table lists by film the basic results of the direction cosine analysis:

Emulsion number 8443-71-3

Layers	Angle
YC	78.2°
YM	70.2°
CM	65.0°

Emulsion number 151-23-32

Layers	Angle
YC	76.0°
YM	69.5°
CM	66.7°

Emulsion number 121-41-31

Layers	Angle
YC	80.0°
YM	70.0°
CM	64.0°

The exposure generation routine has been completed and tested. Errors in the regenerated exposure table have appeared. Analysis of the output in order to determine the origin and nature of these errors is proceeding. One problem involves the generation of the variance - covariance matrix directly from a deviation matrix. This may be an incorrect procedure mathematically. A routine is presently being tested that removes both the neutral and the average deviation of the neutral from the set of analytical exposure tables. Also, a modification to the sets of exposure tables used in the VECTOR program appears to reduce exposure table generation errors. This

modification consists of fixing the value of the cut off point on the toe and shoulder of each exposure table to a constant exposure. This effectively reduces the dimensionality of the variance - covariance matrix in the VECTOR program.

Testing of the regeneration capabilities of a set of characteristic vectors for exposure tables generated from colors outside the original set of system color (colors in the original set of exposure tables used to generate the set of characteristic vectors) indicates that no problem exists. Non-system exposure tables may be regenerated with accuracy equal to system exposure tables providing the color domain of the original set of system exposure encompasses the domain of the set of nonsystem colors (i.e., the set of original system tables wholly encloses the set of non-system tables).

WORK PLANNED FOR NEXT PERIOD

Work during the upcoming month will include final testing of and criteria selection for the color exposure generation routine (SELGEN), running of the MTF routines providing satisfactory traces are received from the customer, and initial drafting of the final report for the contract. A trip to the customer's facility will be made to discuss possible problem areas in the implementation of the programs.