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TECHNICAL NOTE

Dye Fading Test for Mission Control
Operator Console Displays

Prepared Under

Contract NAS 9-11500

Prepared By

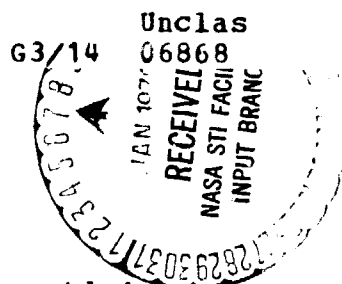
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Dye Fading Test For Mission Control
Operator Console Displays

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Dye Fading Test for Mission Control
Operator Console Displays

Introduction

A dye fading test of 40 days duration was conducted to determine the effect of mission control operator console and ambient lighting effects on a series of photographic products under consideration for use in mission console operator consoles.

Six different display samples, each containing 36 windows of several different colors, were prepared and placed in the mission control consoles for testing. The samples were:

<u>Number</u>	<u>Description</u>
1	Original film black letters with Wratten filter windows.
2	Original film black letters with colored tape windows.
3	Duplicate of number 1 on Ektachrome film
4	Duplicate of number 1 on Cibachrome film
5	Duplicate of number 2 on Cibachrome film
6	Duplicate of number 1 color windows on Cibachrome.

Purpose

The purpose of the fading test was to determine the effects of incandescent lamps used in the operator's consoles on dye stability in the samples. A comparison of sample number 2 which is currently used and the two film types, Ektachrome and Cibachrome, was of primary interest.

Ektachrome film was reported to have been tested previously with the result being objectionable dye fading. Cibachrome was tested to evaluate the fading characteristics of its reportedly more stable dyes. Photographic film was being evaluated because it offers definite advantages for efficient production of numerous copies for the displays.

Test Procedure

Two original samples were prepared and numbered one and two. Both samples had black alpha-numeric displays and frames as currently produced and used. The color windows in sample one were produced using photographic Wratten filters while the colors in sample two were produced using colored tape, the method in current use.

These originals were copied by contact printing on Ektachrome type 2447 and Cibachrome transparency film, both color reversal films. The results were processed using PTD facilities.

The samples were placed in a specified console in mission control and retrieved at varying intervals for density readings. Density readings from each of the 36 sample windows were taken in white, red, green and blue illumination using the PTD MacBeth TD-217 densitometer. The results were recorded.

A master sample duplicated on Cibachrome with no letters in the windows was stored with no exposure for use as a control.

Results

A tabulation of sampled results for each of the charts is attached here.

No change in density may be attributed to fading of dyes in any of the samples.

A change in some densities read and recorded between the first and successive weeks occurred in the green and in one case, the blue. This change is attributed to a mechanical problem with the densitometer.

Discussion and Conclusions

If 40 days is representative of the time duration for displays in the mission control consoles, these test results indicate that any of the products may be used.

If 40 days is not representative, the tests should be extended.

Chart #1

<u>DATE</u>	<u>5-Blue</u>	<u>18-Green</u>	<u>9-Red</u>	<u>10-White</u>
10/30/75	3.00	2.02	2.42	0.94
11/13/75	3.21	2.21	2.35	0.96
11/18/75	3.91	2.42	2.39	0.95
11/25/75	3.84	2.49	2.37	0.98
12/2/75	3.85	2.44	2.30	0.95
12/9/75	3.85	2.41	2.25	0.93

Chart #2
DENSITIES

<u>DATE</u>	<u>17-Blue</u>	<u>18-Green</u>	<u>13-Red</u>	<u>6-White</u>
10/30/75	1.66	0.94	2.29	1.16
11/13/75	1.62	0.99	2.28	1.19
11/18/75	1.67	1.05	2.28	1.20
11/25/75	1.66	1.06	2.26	1.21
12/2/75	1.66	1.05	2.26	1.20
12/9/75	1.66	1.04	2.26	1.19

Chart #3
DENSITIES

<u>DATE</u>	<u>12-Blue</u>	<u>19-Green</u>	<u>9-Red</u>	<u>4-White</u>
10/30/75	1.76	2.02	1.56	0.83
11/13/75	1.74	2.28	1.51	0.82
11/18/75	1.80	2.53	1.57	0.85
11/25/75	1.79	2.53	1.55	0.85
12/2/75	1.77	2.53	1.54	0.84
12/9/75	1.77	2.52	1.54	0.83

Chart #4
DENSITIES

<u>DATE</u>	<u>18-Blue</u>	<u>13-Green</u>	<u>4-Red</u>	<u>18-White</u>
10/30/75	1.33	1.85	1.80	2.11
11/13/75	1.38	2.12	1.76	2.09
11/18/75	1.35	2.39	1.81	2.13
11/25/75	1.35	2.38	1.79	2.13
12/2/75	1.34	2.39	1.80	2.12
12/9/75	1.35	2.38	1.80	2.09

Chart #5
DENSITIES

<u>DATE</u>	<u>7-Blue</u>	<u>6-Green</u>	<u>16-Red</u>	<u>1-White</u>
10/30/75	2.15	0.97	1.99	1.35
11/13/75	2.12	0.93	1.95	1.34
11/18/75	2.16	0.94	2.00	1.37
11/25/75	2.13	0.96	1.98	1.38
12/2/75	2.14	0.94	1.99	1.37
12/9/75	2.14	0.93	1.99	1.37

Chart #6
DENSITIES

<u>DATE</u>	<u>19-Blue</u>	<u>13-Green</u>	<u>9-Red</u>	<u>3-White</u>
10/30/75	1.35	2.21	1.95	1.14
12/9/75	1.45	2.32	2.03	1.23