Mr. V. C. Campbell

SYLVANIA TRIP REPORT
(3-7-52)

This trip was taken for the express purpose of obtaining light decay measurements on P7 and P14 phosphor screens, such data to be compared with measurements made on General Electric equipment. It was hoped that these comparisons would aid us in putting our persistence measurements on a sound basis. In addition, attention was to be paid to Sylvania methods and equipment used in making color and brightness measurements.

The following persons were contacted:

Messrs. J. Swan - Chief Engineer
F. Burrows - Section Engineer
E. Stone - Engineer
(Miss) C. Lingenfelter - Engineer

I LIGHT DECAY MEASUREMENTS

The entire Sylvania persistence measuring equipment consumes approximately twice the floor space of ours. It consists of a large cubicle, capable of housing at least a 20" rectangular tube, a seven foot rack for raster timer, standardizing controls, attenuator and power supplies, and a four foot rack for sweep circuits, pulse generator and power supplies. An outboard oscilloscope with a P7 screen completes the set up.

The photo-multiplier tube and its attenuator are mounted permanently on the front of the cubicle, such that all tubes are loaded and unloaded from the side.

During the afternoon's proceedings, no trouble was encountered with their raster timer. The timer is essentially the same as ours, using thyratrons and cam operated micro-switches for pulse selection. Occasionally it would skip from one sync. pulse to the next, but never missed pulsing. However, it was admitted that the timer had been giving considerable trouble until very recently.

The test tube raster is very poor, due to pronounced overshoot and fold-over in the horizontal sweep. Since Sylvania claims high accuracy (within ± 2CB) on all measurements, they feel that a good raster is not a prime requisite for accurate persistence measurements. Our sweep circuits provide a raster with practically no overshoot and only slight fold-over, leaving us with little concern on this point.

Measurements were taken on the following 5-inch cathode ray tubes:

P7 Standard #K-1281
P7 Standard #K-766
P7 Production #C05D1A017
P7 Production #C05D1A001
P14 Production #A08D1B017
P14 Production #L27C5A010
P14 R.C.A.

A tabulation of the measurements is attached, including values obtained in 1943 on the two standard tubes, Nos. K-1281 and K-766, by the Research Laboratory and by Dr. Nottingham at M.I.T. Examination of the data manifests the following observations:

1. Measurements taken with our light measuring equipment are reproducible to well within 1.0%.
2. In general, our readings on the two P7 standards agree most closely with M.I.T.
3. Our fluorescent readings on all tubes average 13 CB less than those of Sylvania and are approximately 20 CB under the Research Laboratory and M.I.T. on the Standard tubes.
4. All our readings are not consistently higher nor lower than those of Sylvania but show consistency in themselves.

CONCLUSIONS

1. Our readings agree closely enough with M.I.T. to put confidence in the accuracy of our equipment.
2. Our lowered fluorescent readings may well be due to aging of the standard tubes.
3. Additional substantiation of accuracy will come with the return of our standard tubes from the Navy Department.

RECOMMENDATION

1. That the entire equipment obtain its primary power through a voltage regulating transformer which will further enhance the reproducibility. (This has been done.)

2. That the equipment be shut down for a period of one week, so that the necessary components may be arranged in such a manner to facilitiate ease of operation. (This is to be done as soon as the Factory finishes some special tests which are now being done.)

P7 STANDARD #K-1281

	Research Lab. (1943)	Nottingham (1943)	G.E. (Three (3) Separate Readings)	G.E.	G.E.	Sylvania 3-7-52
$CB_{1.0}$	347	345	344	342	342	340
$CB_{5.0}$	418	412	411	413	411	403
CB_F	688	688	668	668	669	682
$G_{5:1}$	5.13	4.68	4.78	5.13	4.91	4.27

P7 STANDARD #K-766

	Research Lab. (1943)	Nottingham (1943)	G.E. (Three (3) Separate Readings)	G.E.	G.E.	Sylvania 3-7-52
$CB_{1.0}$	342	333	328	329	325	338
$CB_{5.0}$	429	421	414	416	413	413
CB_F	680	678	659	659	661	669
$G_{5:1}$	7.42	7.59	7.24	7.42	7.59	5.63

P7 PRODUCTION TUBE #C05D1A001

	Sylvania 3-7-52	G.E. I	G.E. II
$CB_{1.0}$	311	287	292
$CB_{5.0}$	407	401	405
CB_F	665	649	649
$G_{5:1}$	9.12	13.8	13.48

P7 PRODUCTION TUBE #C05D1A017

	Sylvania 3-7-52	G.E. I	G.E. II
$CB_{1.0}$	308	283	285
$CB_{5.0}$	401	396	398
CB_F	663	651	650
$G_{5:1}$	8.51	13.48	13.48

P14 PRODUCTION TUBE #A08D1B017

	Sylvania 3-7-52	G.E. I	G.E. II
$CB_{0.1}$	484 *	480	477
$CB_{1.0}$	424	419	416
$CB_{10.0}$	334 *	300	308
CB_A	60	61	61
CB_B	90	119	108
CB_F	648	637	636

* These values estimated from reading of $CB_{1.0}$. Not actually measured by Sylvania.

P14 PRODUCTION TUBE #L27C5A010

	Sylvania 3-7-52	G.E. I	G.E. II
$CB_{0.1}$	494 *	480	481
$CB_{1.0}$	428	429	428
$CB_{10.0}$	334 *	308	307
CB_A	66	51	53
CB_B	94	121	121
CB_F	664	650	650

P14 R.C.A. TUBE

	Sylvania 3-7-52	G.E.
$CB_{0.1}$	482 *	482
$CB_{1.0}$	400	400
$CB_{10.0}$	260 *	290
CB_A	82	82
CB_B	140	110
CB_F	681	671

* These values estimated from reading of $CB_{1.0}$. Not actually measured by Sylvania.

II COLOR AND BRIGHTNESS MEASUREMENTS

Sylvania's method of measuring brightness of cathode ray tube screens is essentially the same as ours, i.e., the brightness level is varied by adjusting the grid 1 control and measurements are made with a Weston Brightness meter. The only difference being that Sylvania accepts Weston's calibration, whereas we do not and have recalibrated our own instrument.

The colorimeter used at Sylvania consists of the three standard A, B, and C tristimulus filters mounted on a rotating wheel such that only one photocell is required for making color measurements. The photocell, in turn, is connected to a wall-type galvanometer. The use of only three filters to approximate the tristimulus curves for a standard observer introduces errors in color readings which are not present in the G.E. Colorimeter.

The Spectroradiometer in use at the Sylvania Plant has been enclosed in a metal cabinet with all power supplies, amplifiers, recording galvanometer, and switches conveniently located. The unit was not in use at the time of this inspection as there was some question as to its accuracy. The above mentioned equipment plus that used in making light decay measurements was located in a dark room devoted exclusively to light and color measuring equipment.

The values of the trichromatic coefficients determined at Sylvania for their own tubes indicate a closer approach to the black body line than the general run of tubes here at the Syracuse Plant. Any attempt on the part of Sylvania to get closer to the black body line produces a pinkish cast in the resulting screen color of their tubes. The development laboratory here has had the same experience, i.e., any further approach to the black body line produces a pink tube.

W. C. Purdy
F. F. Doggett
Engineering
CATHODE RAY TUBE

WCP:FFD/mb
3-28-52

cc: WH Buck
VC Campbell
GL Case
KC DeWalt
A Hendry
WL Jones
FJ Mayer
RT McKenzie
GF Miller
RG Millett
JH Newman
LE Record
JA Steele
GT Waugh
All Design Engineers