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on
Interlaboratory Intercomparisons
of
60-Watt Incandescent Lamps

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U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

Interlaboratory Intercomparisons
of
60-Watt Incandescent Lamps

Abstract

A group of ten 120-volt, 60-watt, inside-frosted, general-purpose incandescent lamps was measured by each of ten laboratories. The voltage across each lamp was held at 120 volts while the luminous flux and current were measured. The results of the measurements by the individual laboratories and an analysis of the results are given in this report.

I Introduction

This intercomparison was undertaken to determine the uniformity of measurements on 60-watt incandescent lamps made, at the participating laboratories. The laboratories participating and the order of reading are as follows:

- I General Electric
- II Interlectric
- III Solar
- IV Champion
- V Sylvania
- VI Electrical Testing Laboratories
- VII Westinghouse
- VIII Duro Test
- IX Verd-A-Ray
- X National Bureau of Standards

The order in which the laboratories made their measurements was chosen to reduce shipment of the lamps as much as possible. Each laboratory followed its own customary procedure in making the measurements. In each laboratory the lamp voltage was held constant at 120-volts while luminous flux and lamp current were measured.

II Results of Measurements

The results reported by the individual laboratories are given in tables 1 through 3. The averages reported for each lamp and for each laboratory are given and the difference, Δ , between the average for each laboratory and the average for all laboratories for all lamps is also given.

III Analysis of the Results

An analysis of the results of the measurements has been made following a modification of the method described by W.J. Youden (1), (2), and (3). The modified method is described in National Bureau of Standards Report No. 6605 "Interlaboratory Intercomparisons of 32-watt T 12 Cool-White Circline Lamps" and Report No. 6698 "Interlaboratory Intercomparisons of 40-Watt T 12 Cool-White Fluorescent Lamps".

The analysis is shown on the following graphs. The point representing the measurements by an individual laboratory is designated by the first or first and second letter in the name of that laboratory. The point representing the average of all laboratories is designated by the letter A.

(1) Graphical Diagnosis of Interlaboratory Test Results, Industrial Quality Control Vol.XV No.11, May 1959.

(2) Product Specifications and Test Procedures, Industrial and Engineering Chemistry, Vol.50 page 914, October 1958.

(3) Circumstances Alter Cases, Industrial and Engineering Chemistry, Vol. 50, page 77A, December 1958.

Lamp No.	G.E.	Interl	Solar	Champ	Svl	Etl	West	Duro	Verd-A	NBS	Ave
1	864	863	868.4	861	874	870	878	872	868	867	868.5
2	858	857	842.9	846	855	858	861	862	856	857	855.3
3	865	871	870.0	859	866	876	875	870	863	869	868.4
4	878	871	886.9	876	880	883	883	880	876	885	879.9
5	849	849	850.0	849	855	861	871	864	858	861	856.7
6	850	854	856.3	855	855	856	857	859	841	861	854.4
7	838	838	829.6	833	834	839	841	832	836	838	835.9
8	852	863	846.3	848	857	859	865	859	863	858	857.0
9	842	846	844.6	844	849	851	853	849	851	849	847.9
10	868	874	865.0	872	881	882	885	877	882	878	876.4
ave.	856.4	858.6	856.0	854.3	860.4	863.5	866.9	862.4	859.4	862.3	860.0
Δ	- 3.6	- 1.4	- 4.0	- 5.7	+ .6	+ 3.5	+ 6.9	+ 2.4	- .6	+ 2.3	
%Δ	.42	.16	.47	.66	.07	.41	.80	.28	.07	.27	

Table II

Amperes

Lamp No.	G.E.	Interl	Solar	Champ	Svl	Etl	West	Duro	Verd-A	NBS	Ave
1	.522	.523	.522	.523	.5226	.5210	.5221	.522	.522	.522	.5222
2	.523	.522	.522	.521	.5226	.5210	.5206	.521	.521	.523	.5217
3	.524	.523	.525	.524	.5236	.5240	.5241	.524	.523	.525	.5240
4	.526	.523	.526	.525	.5246	.5240	.5243	.524	.5235	.527	.5247
5	.528	.524	.528	.527	.5276	.5275	.5286	.527	.527	.530	.5275
6	.524	.523	.525	.524	.5236	.5230	.5223	.523	.522	.525	.5235
7	.526	.528	.526	.525	.5246	.5240	.5236	.524	.523	.526	.5250
8	.521	.522	.522	.520	.5206	.5195	.5203	.521	.521	.522	.5209
9	.524	.523	.525	.523	.5236	.5230	.5229	.522	.523	.524	.5234
10	.526	.524	.525	.525	.5246	.5240	.5238	.524	.523	.525	.5244
Ave.	.5244	.5235	.5246	.5237	.5238	.5231	.5233	.5232	.5228	.5249	.5237
Δ	+0.007	- .0002	+0.009	.0000	+0.001	-0.0006	.0004	-0.0005	-0.0009	+ .0012	
%Δ	.13	.04	.17	.0	.02	.11	.08	.10	.17	.23	

Table III

Lumens per Watt

Lamp No.	G.E.	Interl	Solar	Champ	Syl	Etl	West	Duro	Verd-A	NBS	Ave
1	13.79	13.75	13.86	13.72	13.94	13.92	14.03	13.92	13.87	13.84	13.864
2	13.67	13.68	13.46	13.52	13.63	13.73	13.77	13.79	13.69	13.66	13.660
3	13.76	13.88	13.81	13.68	13.78	13.93	13.91	13.84	13.74	13.79	13.812
4	13.91	13.88	14.05	13.91	13.98	14.04	14.07	13.99	13.95	13.99	13.977
5	13.40	13.49	13.42	13.42	13.50	13.60	13.73	13.66	13.43	13.54	13.519
6	13.52	13.61	13.59	13.61	13.61	13.63	13.67	13.69	13.43	13.67	13.603
7	13.28	13.23	13.14	13.22	13.25	13.34	13.36	13.23	13.33	13.28	13.266
8	13.63	13.78	13.51	13.60	13.72	13.79	13.85	13.74	13.80	13.70	13.712
9	13.39	13.48	13.41	13.43	13.51	13.55	13.58	13.55	13.55	13.50	13.495
10	13.75	13.90	13.73	13.83	14.00	14.02	14.09	13.95	14.04	13.94	13.925
AVE	13.610	13.668	13.598	13.594	13.692	13.755	13.806	13.736	13.683	13.691	13.683
Δ	.073	.015	.085	-.089	+.009	+.072	+.123	+.053	.000	+	.008
% Δ	.53	.11	.62	.65	.07	.52	.90	.39	.00		.06

Figure 1

Lumens

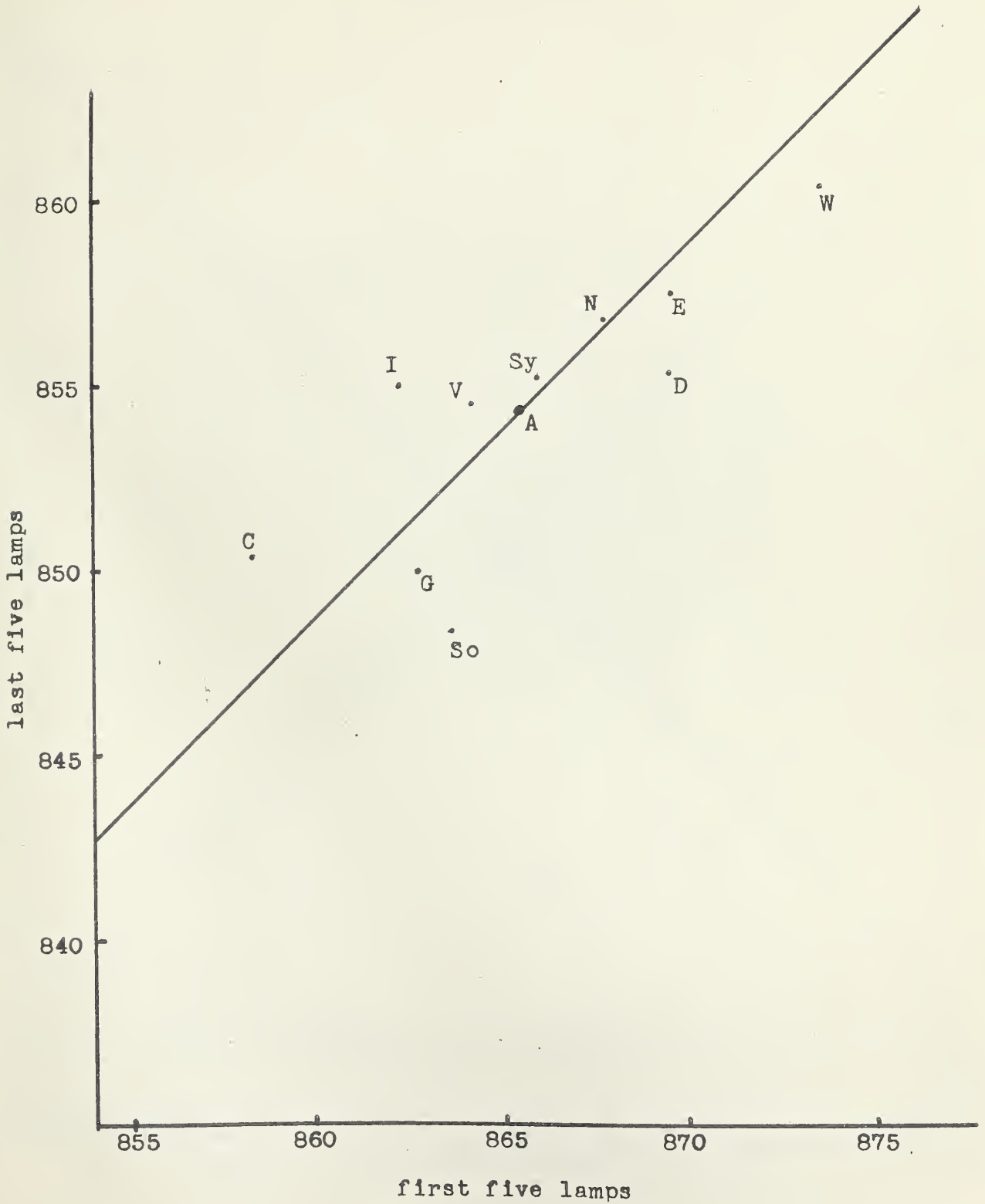


Figure 2

Amperes

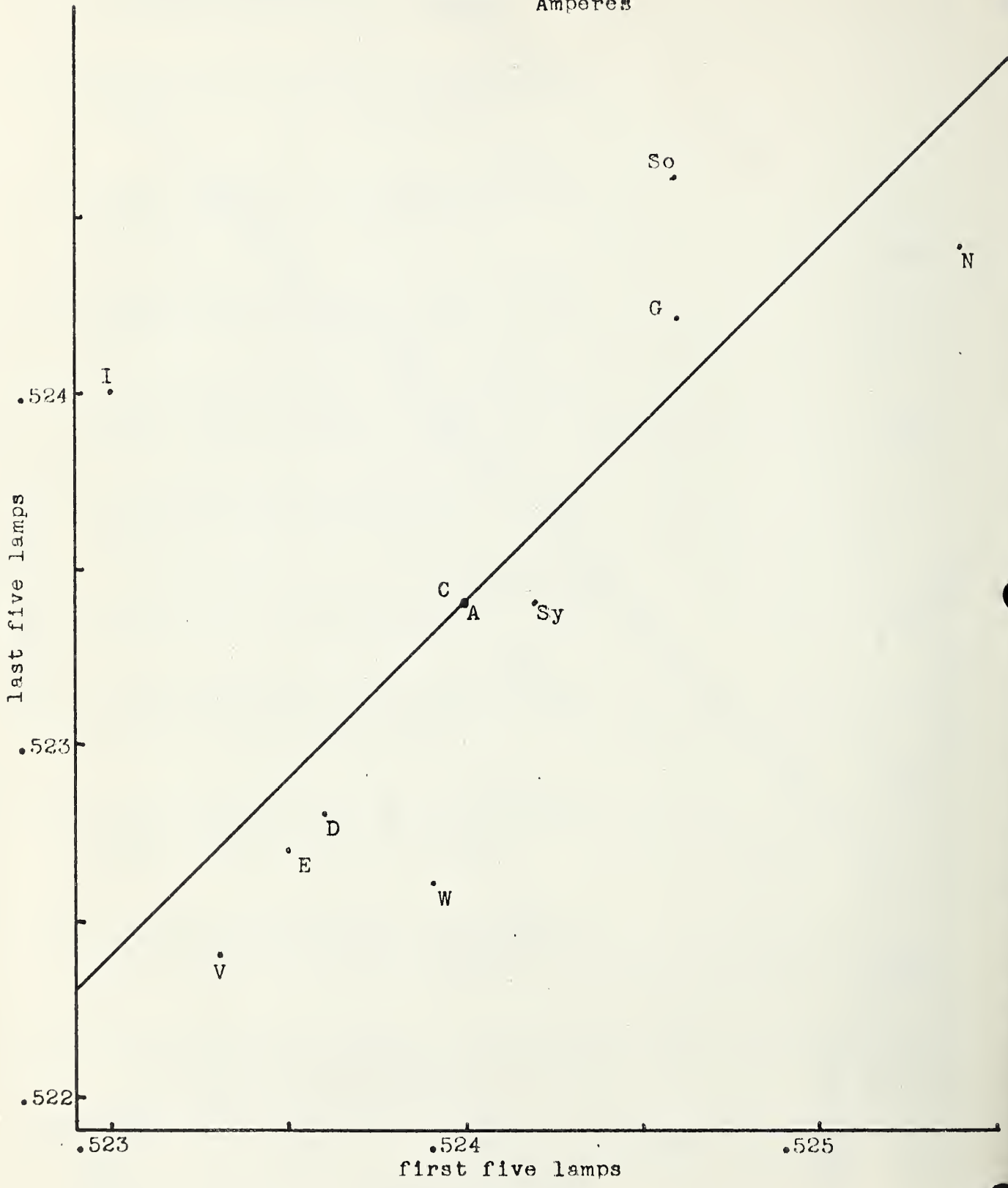


Figure 3
Lumens per Watt

