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99826 5

July 19, 1965

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[redacted]

Re: Lamps for Rear Projection Viewers.

Enclosed is an advance copy of some data sheets, the summary tabulation, and the introduction and summary of ;the report.

In the summary tabulation I am thinking of quoting the luminence and heat on a "per input watt" basis. Do you think that would be more informative? The data sheets would then indicate both total luminence and heat as well as specific luminence and heat per input watt.

I don't expect to make the change for the first report but will revise the table and data sheets for the second report, if you think it desirable. The second report will also contain additional lamp data sheets and additional entries on the summary tabulation.

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Separate copy to Bob.

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TABLE I

SUMMARY TABULATION OF LAMP DATA FOR REAR PROJECTION VIEWERS

LAMP TYPE	COLOR TEMP.	LIFE - COST			LUMINENCE			HEAT					SCREEN ILLUMINATION				
		LAMP LIFE	LAMP COST	COST PER HR	TOTAL RADIATION	VISIBLE RADIATION	COST	RADIATION CONVERSION EFFICIENCY	HEAT DISSIPATED AT LAMP	TOTAL RADIATION .2 TO 42 μ	RADIATED POWER IN NON-VISIBLE	RADIATED POWER IN VISIBLE	COLLECTION AND FILTER FACTOR	POWER AT GATE	SCREEN ILLUMINATION	COST	PROJECTION LENS REQUIRED
	°K	HOURS	$	¢/HR	LUMENS	VISIBLE WATTS	¢ PER 1000 LUMENS PER HOUR	%	WATTS	WATTS	WATTS	WATTS	%	WATTS	FT-L.	¢ PER 100 FT-L PER HR.	RELATIVE APERTURE
1000 WATT																	
TUNGSTEN C-13																	
ASA # DPW	3200	50	9.80	19.6	28,000	45.1	0.7	80	200	800	672	128	10	12.8	242	8.1	f/1.1
ASA # DRC	3250	50	7.50	15.0	30,000	48.3	0.5	"	"	"							
ASA # DRB	3350	25	6.90	27.6	32,000	51.5	0.86	"	"	"							
TUNGSTEN C-13D																	
ASA # DRS	3325	25	6.75	27.0	28,500	45.9	0.95	80	200	800							
ASA # DFD	3375	10	5.75	57.5	30,500	49.1	1.89	"	"	"							
ASA # DGS	3375	10	7.25	72.5	33,000	53.2	2.20	"	"	"							
QUARTZ IODINE																	
ASA # DXW	3200	150	16.95	11.3	26,000	41.9	0.43	80	200	800							
ASA # DXN	3400	30	14.95	50.0	33,000	53.1	1.52	"	"	"							
XENON - MERCURY																	
D.C. HANOVIA 528B9	5500	1000	200.00	20.0	40,000	63.4	0.5	50	500	500	295	205	9.6	19.6	218	9.2	f/3
A.C. HANOVIA 537B9	"	"	200.00	20.0	50,000	80.5	0.4	50	"	"	"	"					
900 WATT																	
XENON																	
D.C. HANOVIA 538C9	5500	1000	200.00	20.0	35,000	56.4	0.57	50	450	450	344	106					
D.C. OSRAM XBO 900																	
870W. RATED VALUE	6000	1500	245.00	16.3	30,500	49.1	0.53	53	410	460	338	122	10.1	12.3	290	5.6	
1105W MAXIMUM VALUES	6000	2000	245.00	12.3	41,500	66.9	0.30	53	520	585	431	154	10.1	15.5	385	3.2	

PRELIMINARY DATA SUBJECT TO CHANGE, JUNE 1965

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MANUFACTURER	LAMP TYPE
OSRAM XBO 900 W	900 WATT XENON

Power required DC 22 VOLTS, 30 TO 50 AMPS

IGNITER: 33,000 VOLT SPARK GAP. PRICE: $180.00

LAMP COST: $245. WARRANTED LIFE 1500 HOURS

AVERAGE LIFE 2000 HOURS

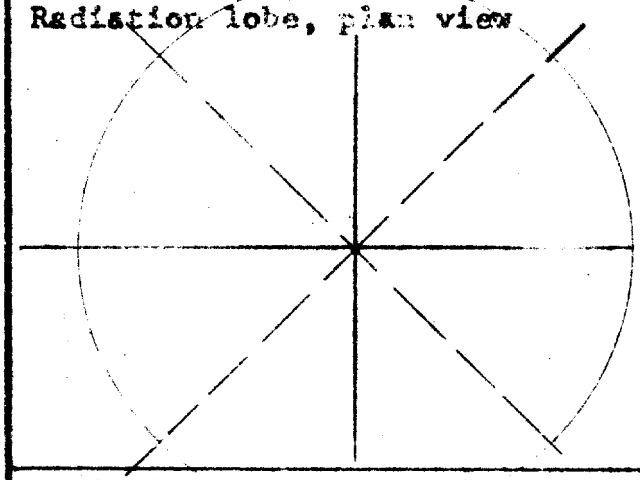
PHOTOMETRIC DATA:

	RATED VALUE	MAXIMUM VALUE
CURRENT	42 AMPS	50 AMPS
LUMINOUS FLUX	30,500 LUMENS	41,500 LUMENS
INTENSITY	3,300 LUMEN/STER	4,100 LUMEN/STER

RADIATION DISTRIBUTION

UV 0.2 to .38 μ	3%
VISIBLE 0.38 TO 0.76 μ	14%
INFRARED TO 1.3 μ	22%
" BEYOND 1.3 μ	14%
ENVELOPE, LEADS & CONVECTION	47%
INPUT	100%

Radiation lobe, plan view

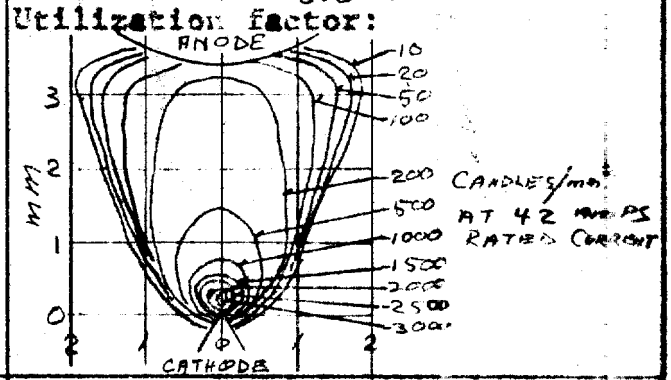


Source: XENON ARC

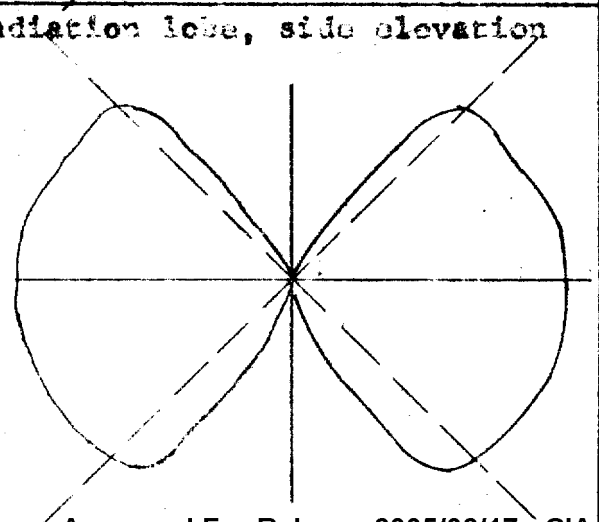
Brightness: 550 TO 730 cd/mm²

Area: 6.6 mm²

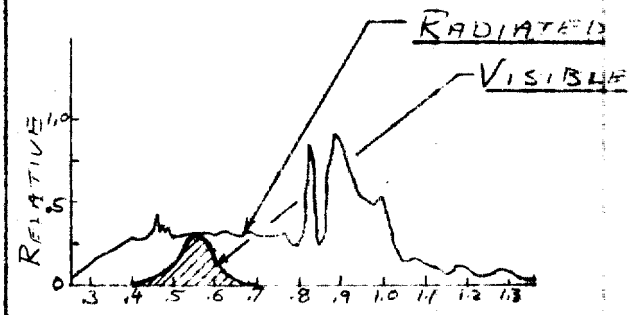
Utilization factor:



Radiation lobe, side elevation



Spectral distribution



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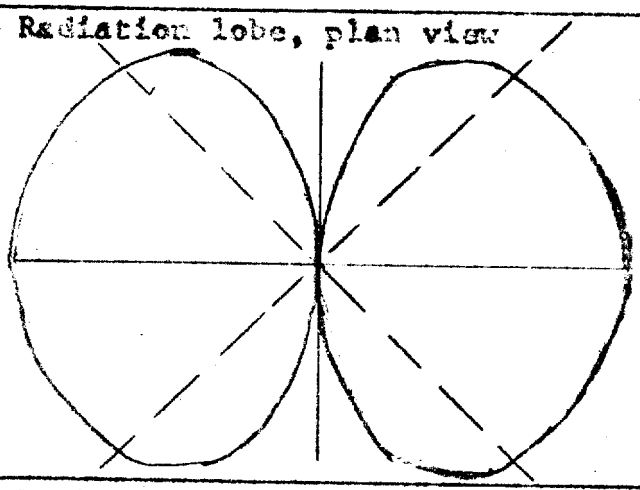
MANUFACTURER	LAMP TYPE
GENERAL ELECTRIC ASA*DPW SYLVANIA	1000 WATT TUNGSTEN FILAMENT TYPE C-13 AT 3200°K

Power required 115-120 VAC LINE POWER, 8.7 AMPS

Radiation lobe, plan view

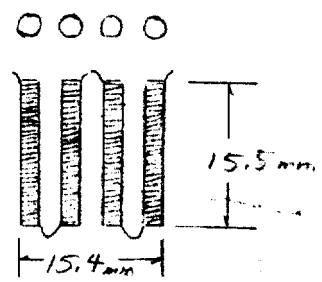


Source: MONOPLANE TUNGSTEN C

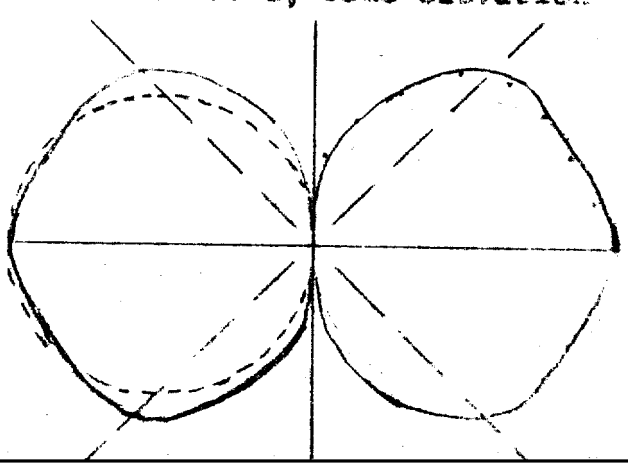
Brightness: 21.1 CANDLES/mm²

Area: 238 mm²

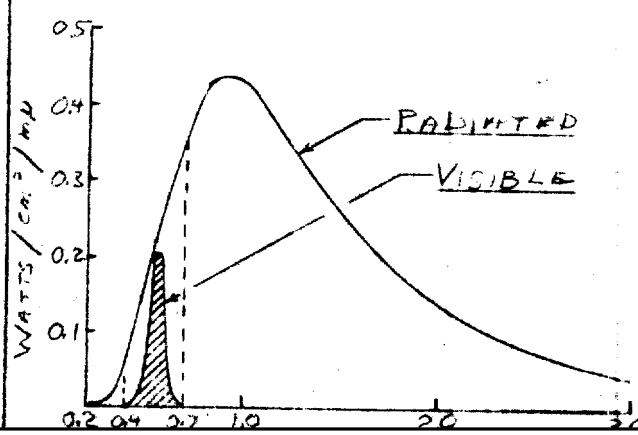
Utilization factor: 0.78



Radiation lobe, side elevation



Spectral distribution 3200°K



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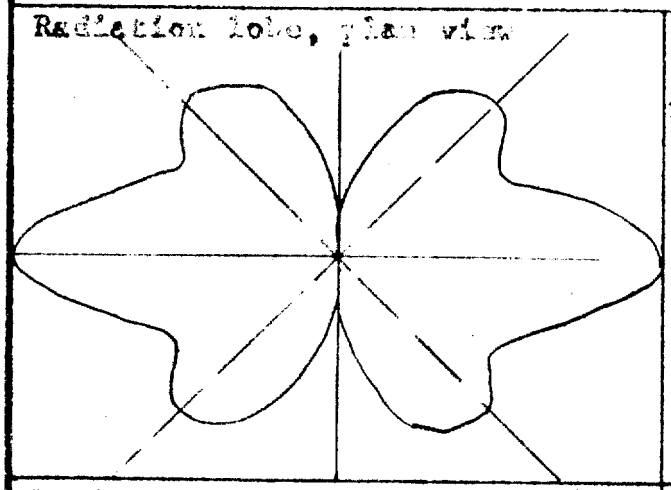
MANUFACTURER	LAMP TYPE
GENERAL ELECTRIC ASA * DFD SYLVANIA	1000 WATT TUNGSTEN FILAMENT TYPE C-13 D AT 3375°K

Power required 115 - 120 VAC LINE POWER, 8.7 AMPS

Radiation lobe, plan view

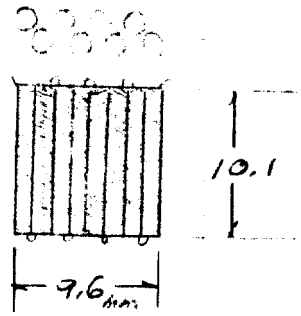


Source: BIPLANE TUNGSTEN COIL

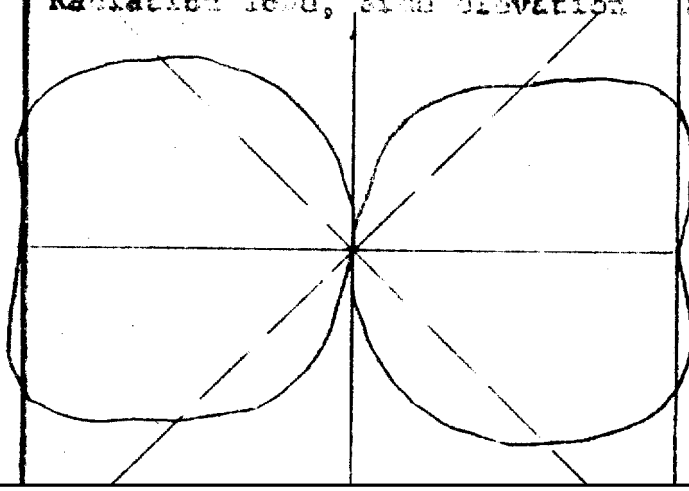
Brightness: 24 cd/mm²

Area: 97 mm²

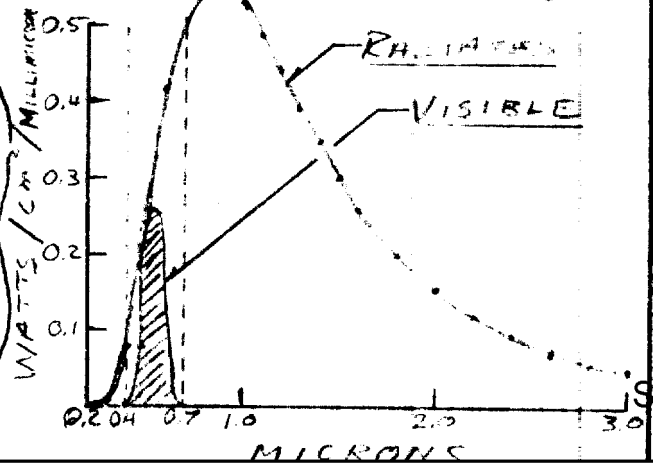
Utilization factor: .95



Radiation lobe, side elevation



Spectral distribution 3375 °K



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Task II, Item 5, First Technical Report

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   2.2 Visibility
3. Technical Discussion
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1. Summary

1.1 Introduction

In this first report, an attempt has been made to (a) gather basic data and representative information on several 1000 watt lamps; (b) define terms and calculate representative performance; (c) establish a format for presentation of the data. There are many gaps. For example, there is no good information on the conversion efficiency of Tungsten and it was estimated. Some of the arc brightness data appears to be inconsistent and needs further checking. We are not satisfied with the presentation of screen illumination data (especially the projection lens aperture) in Table I and will give it added consideration. With the further cautionary note that all of the data is preliminary and subject to revision, we submit this first report.

1.2 Discussion Summary

Photometry deals with the response of the eye to light. Thus radiant power from a source or a surface must always be multiplied by the luminosity function of the eye to obtain values in photometric units.

All tungsten lamps of whatever size and power when operated at the same color temperature have the same spectral distribution. The spectral distribution depends only upon the filament color temperature. Only two filament shapes, C13 and C13D are of general interest in projection work. The radiation lobe is approximately the

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same for all the tungsten lamps with these filaments.

The xenon high pressure arc lamps have the same spectral distribution regardless of wattage and the spectral distribution of other high pressure arc lamps depends on the gas used.

The conversion efficiency (radiated watts per input watt) of the compact high pressure arc lamps is approximately 50%. No good data is available for tungsten but the conversion efficiency is believed to be about 80%.

1.3 Data Summary

Lamp data is summarized in Table I for ready reference.

The color temperature, lamp life, and lamp cost are manufacturer's published data. Note that the color temperature of the compact high pressure arc lamps are only approximate correlations to black body radiation, disregarding spectral lines. The cost per hour is derived from the previous two columns. The luminence in lumens is from manufacturer's published data. The luminence in watts is lumens/621 and is the area under the visibility curve expressed in watts. Note that this is quite different from the watts radiated in the visible region of the spectrum. The cost per 1000 lumens per hour is derived from the previous columns.

The radiation conversion efficiency is an estimate for tungsten and is taken from manufacturer's data for

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the arc lamps. The heat dissipated at the lamps and the total radiation are derived from the conversion efficiency. The radiated power in the non-visible and the radiated power in the visible were measured on the black body spectral distribution curves for tungsten and were taken from the manufacturer's data for xenon and xenon-mercury lamps.

The derivation of the screen illumination data is discussed in Section 3. The filter factor in the collection and filter factor column is based on:

a) 76% transmission of visible region watts

b) 3% transmission of other radiation

c) 85% transmission of condenser optics.

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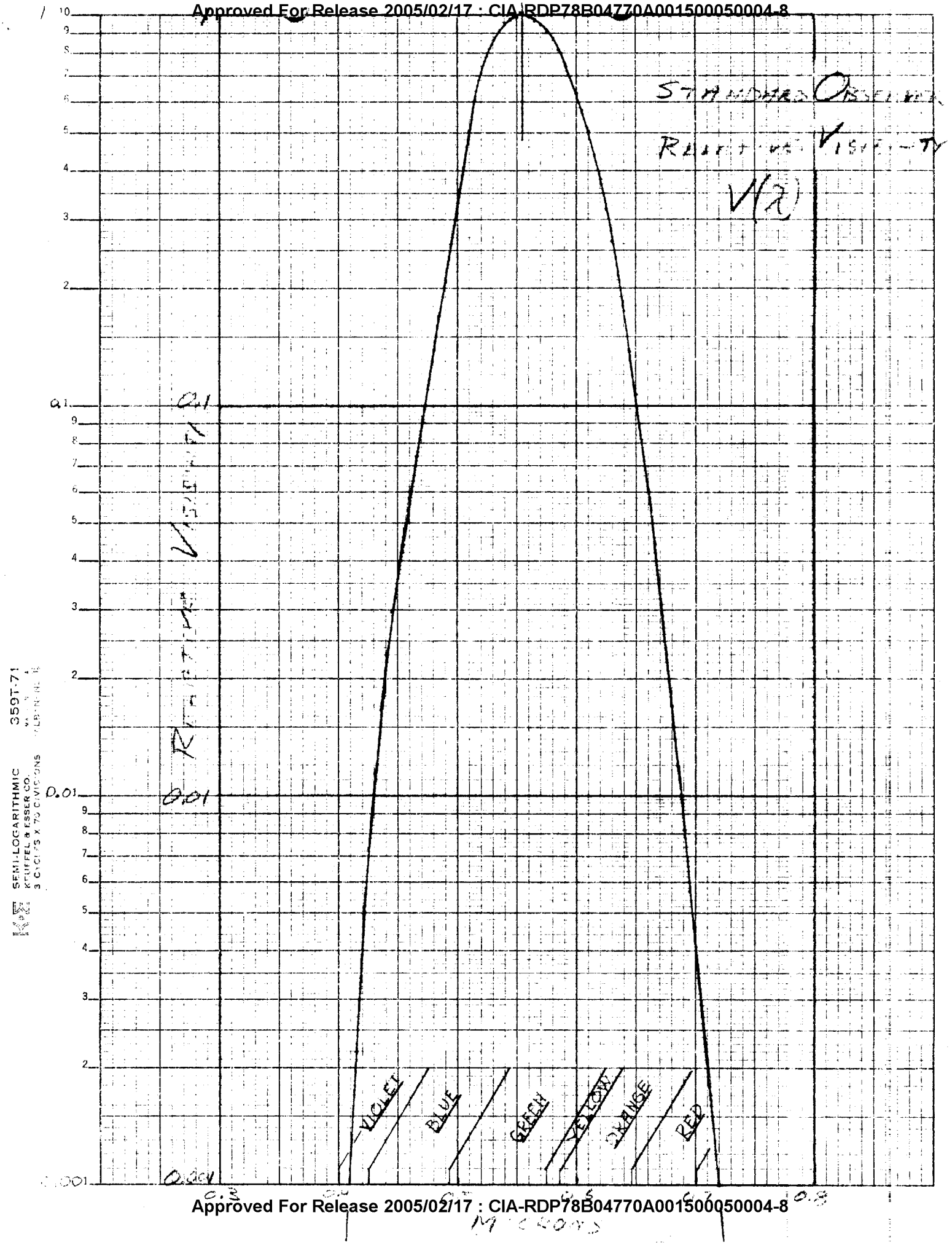

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K+E 10 X 10 TO THE INCH 359-5
KEUFFEL & ESSER CO. MADE IN U.S.A.
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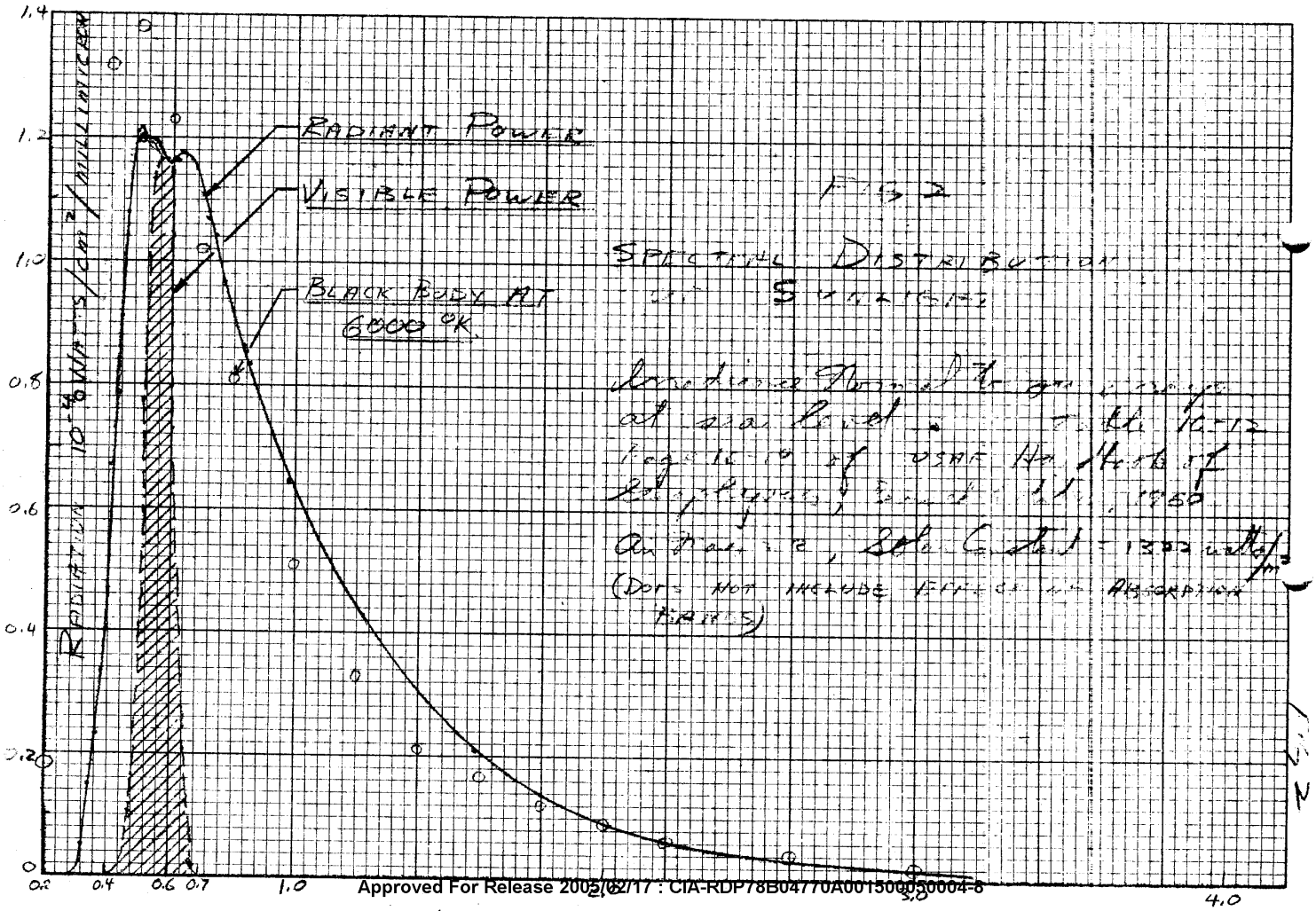

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K+E 10 X 10 TO THE INCH 359-5
KEUFFEL & ESSER CO. MADE IN U.S.A.
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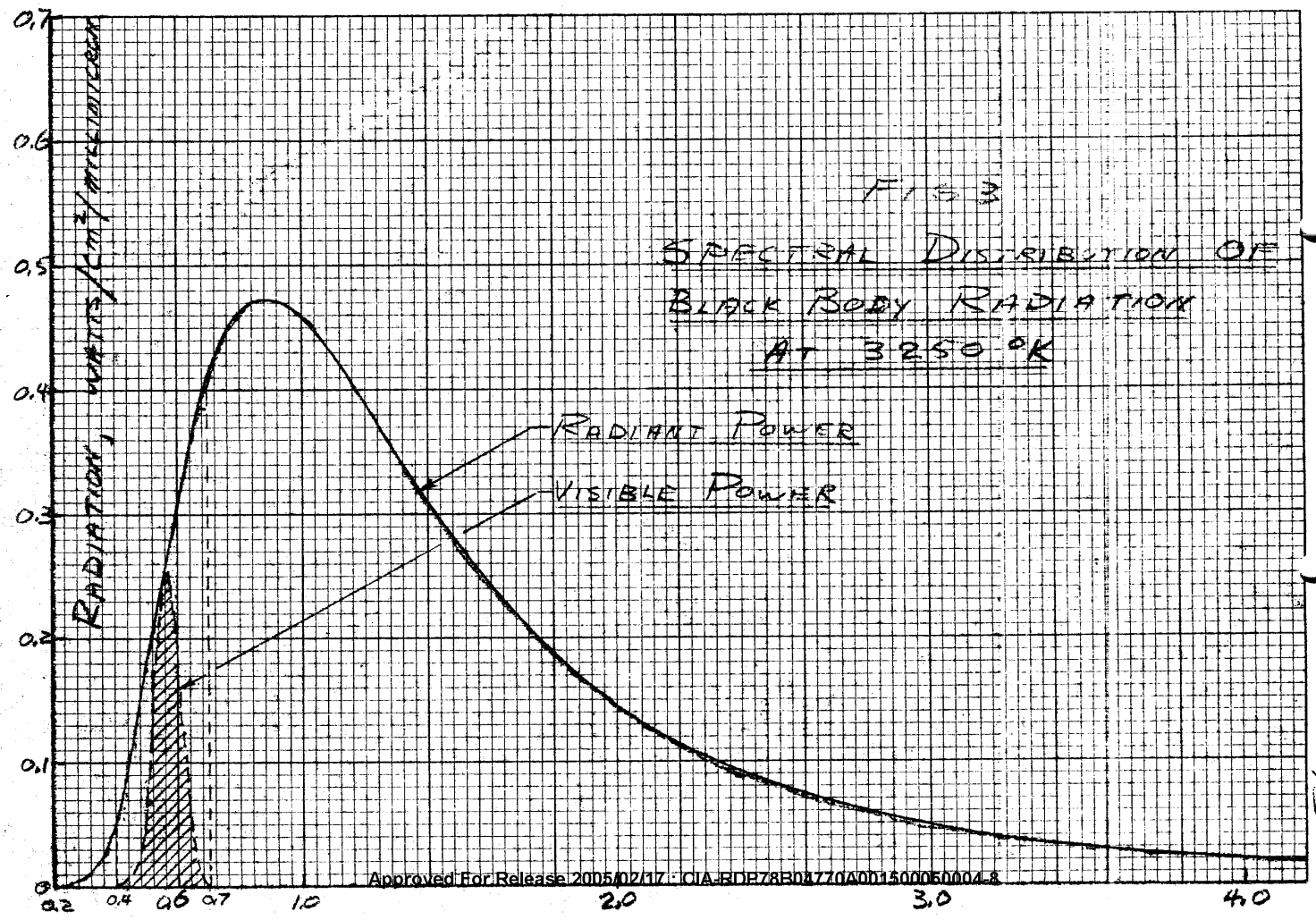

FIG 3
SPECTRAL DISTRIBUTION OF
BLACK BODY RADIATION
AT 3250 °K

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K+E 10 X 10 TO THE INCH 359-5
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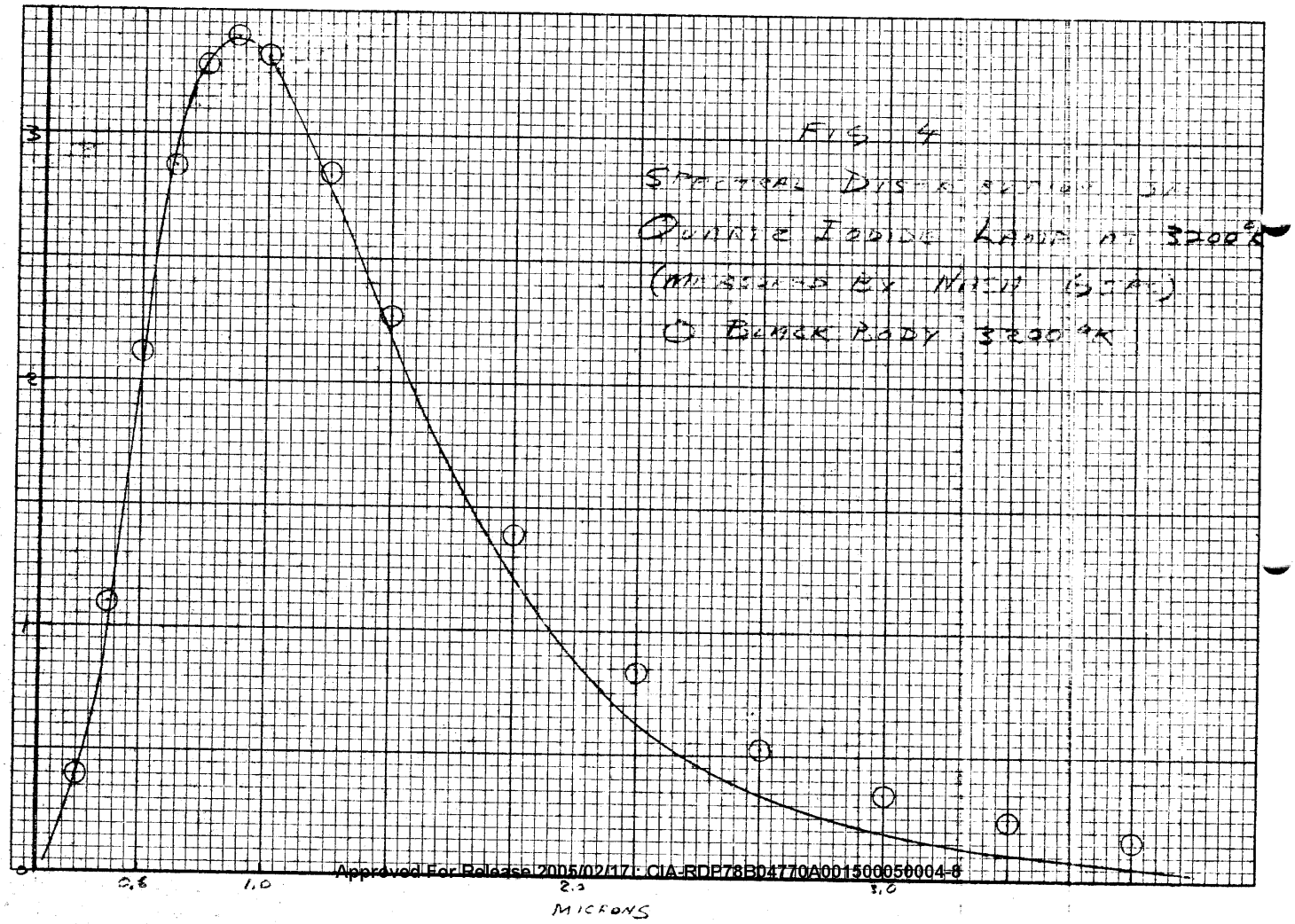

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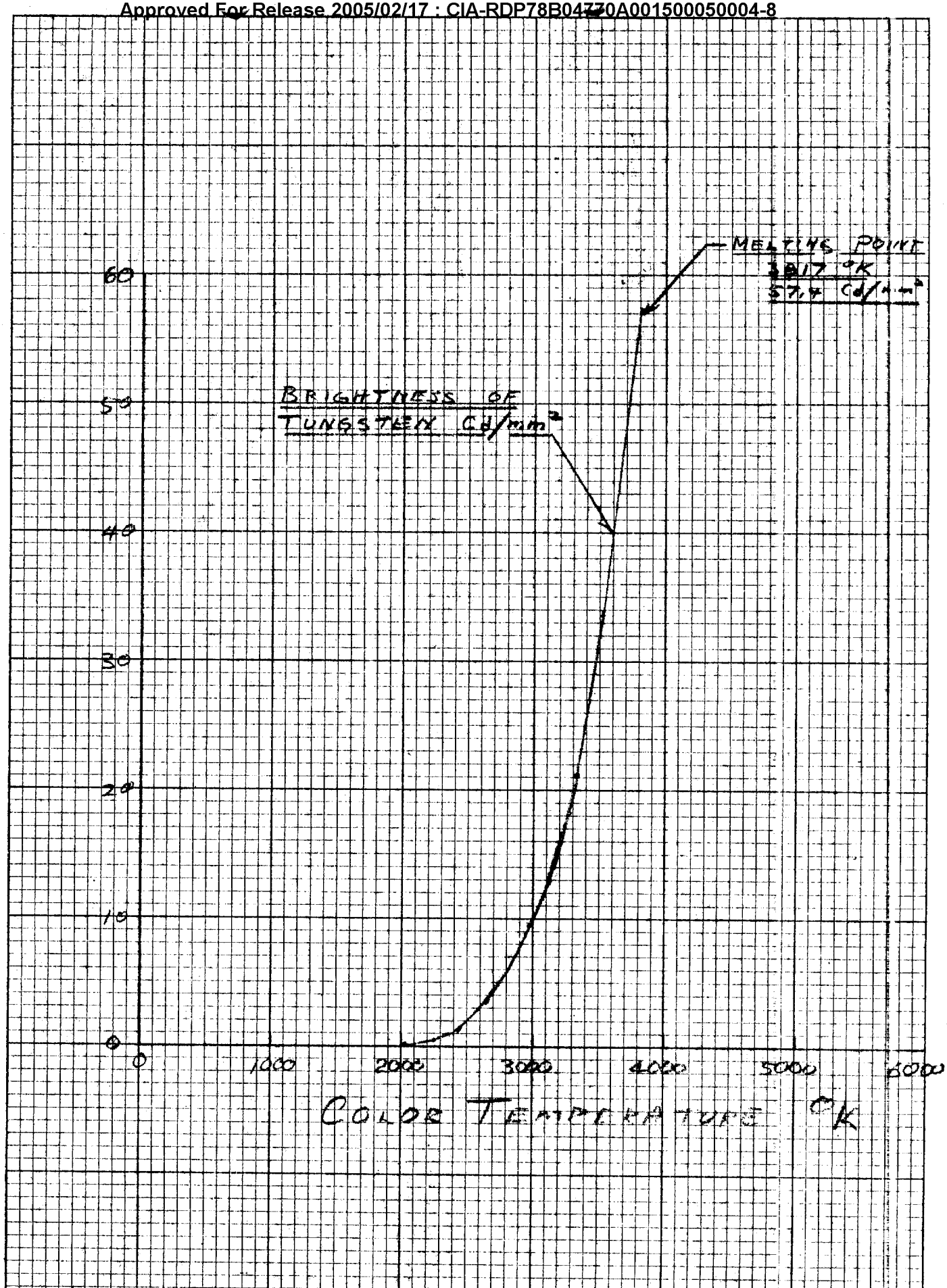

K+E 10 X 10 TO THE INCH 359-5
KEUFFEL & ESSER CO. MADE IN U.S.A.

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Fig 5

K+E 10 X 10 TO THE INCH 359-5
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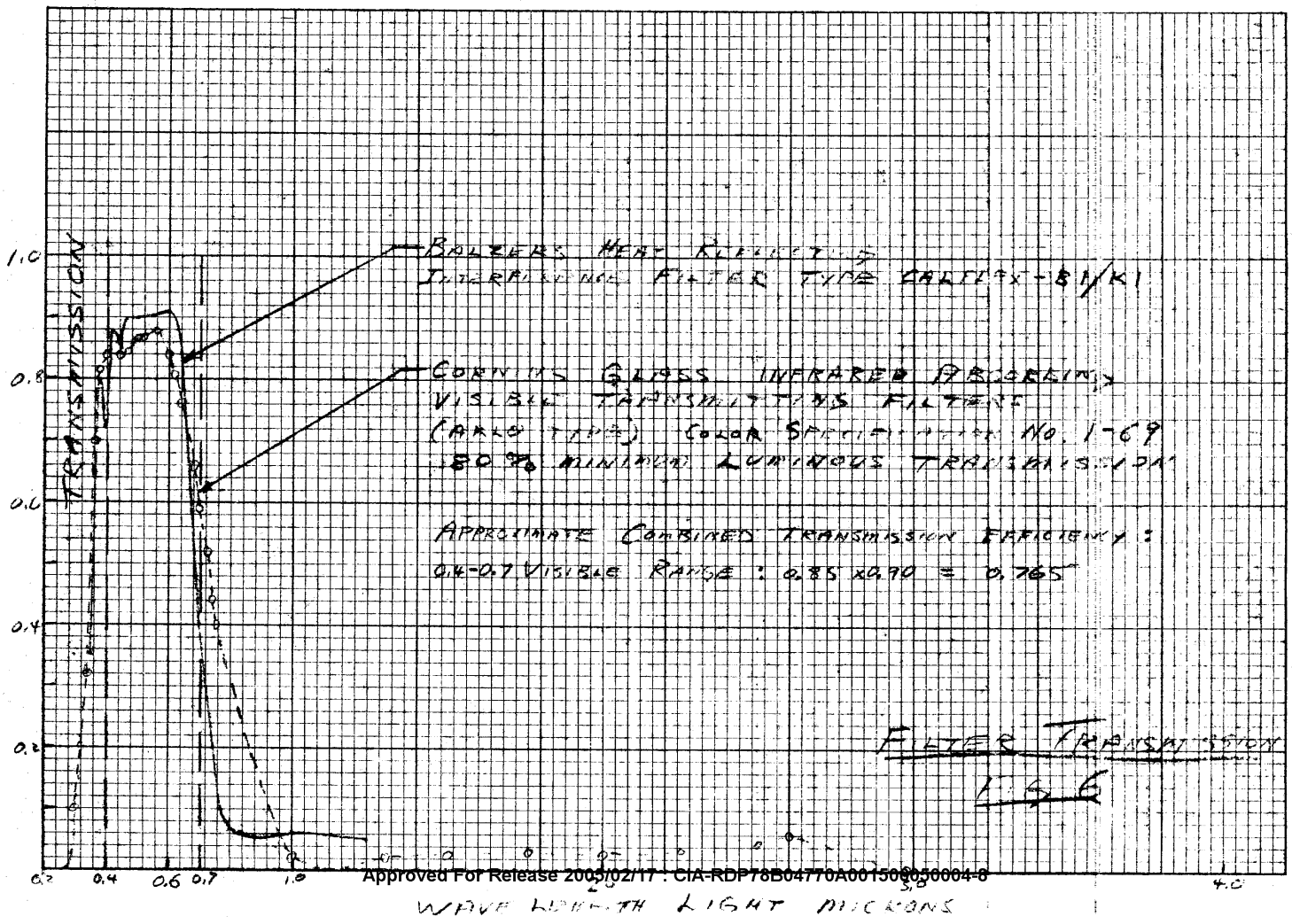

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