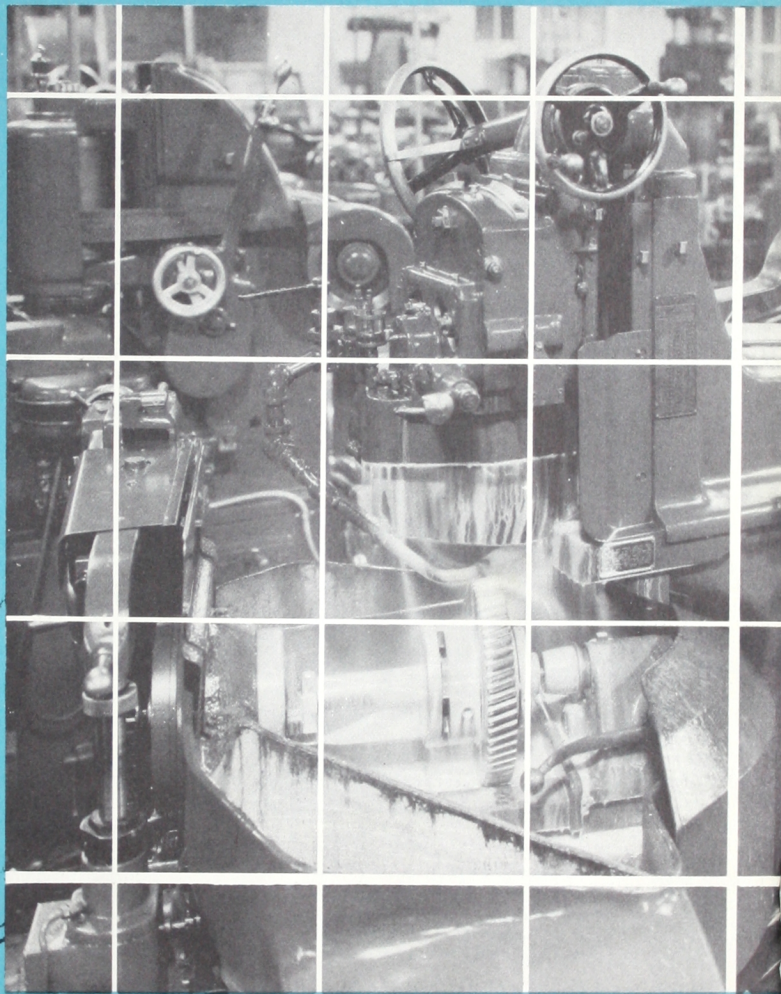


1645
43

Production Lighting for Today's Industry

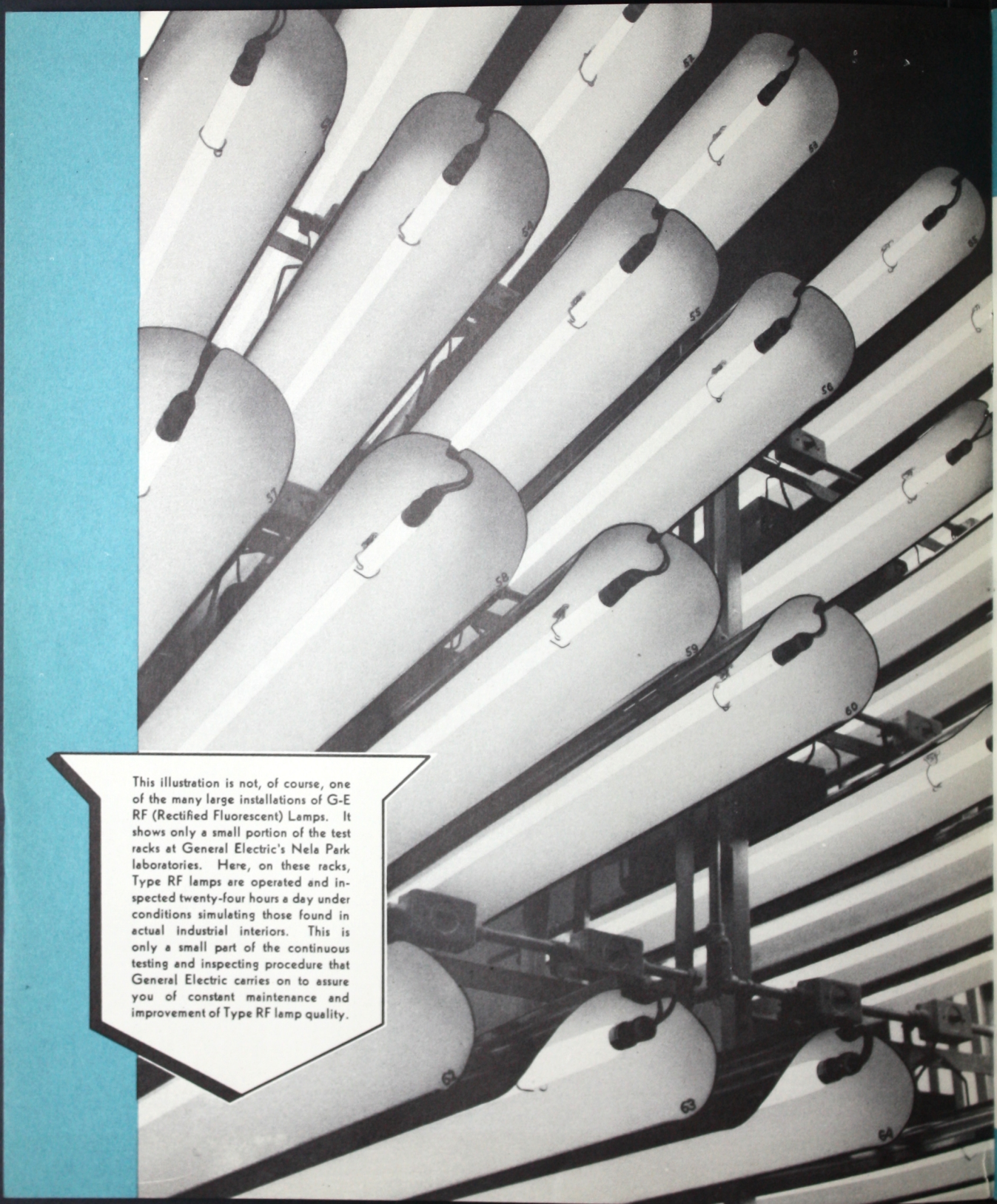
RF • FLUORESCENT LAMPS



Look to **GENERAL ELECTRIC LAMPS**
FOR "BETTER THAN DAYLIGHT" IN INDUSTRY

Efficient • Economical • Dependable • 24 Hours a Day

(C. 1940)



This illustration is not, of course, one of the many large installations of G-E RF (Rectified Fluorescent) Lamps. It shows only a small portion of the test racks at General Electric's Nela Park laboratories. Here, on these racks, Type RF lamps are operated and inspected twenty-four hours a day under conditions simulating those found in actual industrial interiors. This is only a small part of the continuous testing and inspecting procedure that General Electric carries on to assure you of constant maintenance and improvement of Type RF lamp quality.

G-E RF FLUORESCENT LAMPS AND LUMINAIRES MAKE SEEING EASIER

A COMPARISON OF SEEING*

IN THE SHOP

IN THE OFFICE

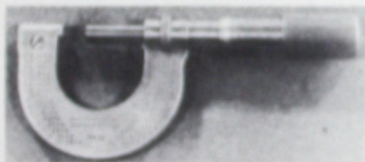
Here is presented a visual comparison between the relative visibility of the usual eye tasks found in the machine shop, and the most common eye task found in the office—reading. Note that it is just as important to have a good **QUALITY** of illumination as it is to have a sufficient **AMOUNT** of illumination.



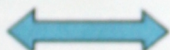
Reading this micrometer scale, properly lit by large-area sources, is just as easy (i.e., has the same relative visibility) as



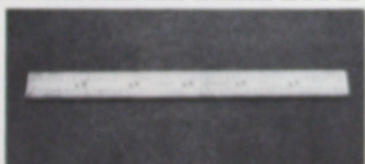
reading this size type (7-point) printed as you see here. More light, which seems to magnify size, would make reading of the micrometer scale still easier and surer.



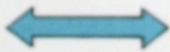
Here is the same micrometer scale inadequately lit by a typical general system of small size industrial reflectors. It is just as difficult for the machinist to read the scale under these conditions as it is for



reading this size type (7-point) printed as you see here. The large area and low brightness of the Type RF lamps and luminaires make them ideal for critical seeing in the shop. This is particularly true where many specular or shiny surfaces must be viewed.



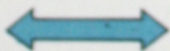
Reading a steel scale with $\frac{1}{16}$ " divisions is no trick at all when the lighting is right. In fact, it's just as easy as



reading this large 12-point type just as it is printed here. The large area and low brightness of the Type RF lamps and luminaires make them ideal for critical seeing in the shop. This is particularly true where many specular or shiny surfaces must be viewed.



But let the quality of the lighting be poor such as illustrated, and this seeing task is just as difficult as if



reading this large 12-point type just as it is printed here. The large area and low brightness of the Type RF lamps and luminaires make them ideal for critical seeing in the shop. This is particularly true where many specular or shiny surfaces must be viewed.

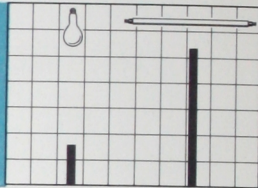
* These comparisons between seeing tasks in the shop and reading various sizes of type are not guesses. The comparison is reasonably accurate by means of measurement with the Luckiesh-Moss Visibility Meter. Remember that the comparison is not made between the visibility of the photographs (which are considerably reduced for publication) and type size, but rather between the actual reading of the micrometer and scale under actual lighting conditions in the shop and reading the type sizes as printed here.

10 91-B897 TCF

Check these Advantages of G-E RF FLUO

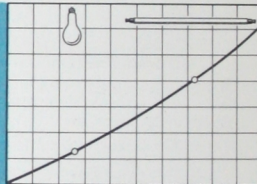
HIGH LIGHT OUTPUT

The G-E 85-watt RF (rectified fluorescent) lamp has a rated light output of 4,000 lumens. For general industrial lighting, this lamp may be used to obtain the higher illumination levels desirable for increased production and better employee welfare in the "factories of the forties".



HIGH EFFICIENCY

The G-E RF (rectified fluorescent) lamp has an efficiency of 47 lumens per watt and the complete luminaire has an over-all efficiency of better than 75 per cent. This combination of *high output plus high efficiency* makes it possible to achieve good general illumination with maximum economy. The power factor of the RF lamp is 83 per cent.



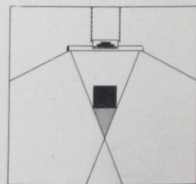
DUST-TIGHT AUXILIARY

The electrical equipment is contained in a dust-tight compartment. This, together with low operating temperature, makes the RF lamp admirably suited to dusty and lint-laden atmospheres.



NO DARK SHADOWS

Diffused light from a relatively large-area, low-brightness source such as the RF Fluorescent luminaire minimizes shadows and makes seeing easier. Glare is also minimized—operators do not have to waste time fighting against sharp reflections from bright metal parts.



FLUORESCENT LIGHTING

COOL LIGHTING

Psychologically cool, due to their distinctive colors, light from the RF lamps is also physically cool due to their high lumen output for the current consumed. Because of this, *light conditioning with RF lamps and air conditioning go hand in hand.*

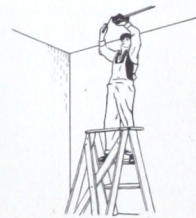
The 85-watt RF lamp is available in two colors—blue-white and "industrial white." These two lamps are interchangeable in any of the RF Fluorescent luminaires, permitting a choice of either color.

The blue-white lamp has a complete spectrum output which emphasizes the cooler end of the spectrum while still providing enough red and green to render most colors sufficiently pronounced for industrial purposes. The industrial white lamp also has a complete spectrum and will give a somewhat whiter light for manufacturing areas requiring a more natural appearance of materials.



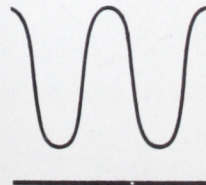
LOW INSTALLATION COST

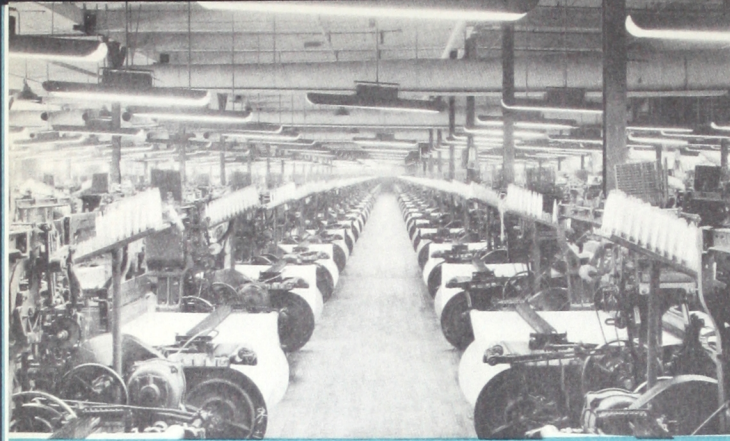
Installation costs for the RF Fluorescent luminaires will be low, as existing wiring will frequently prove adequate. The nearly normal starting current allows full use of branch circuit wiring and fuses. The complete luminaire is assembled readily. Suspension is easily and substantially fixed with the two-point hangers supplied as part of the luminaire. Taps for various voltage conditions permit operation of the lamp at prevailing supply line voltages.



FULL-WAVE RECTIFIED LAMP CIRCUIT

Because of the Cooper Hewitt full-wave rectifier-type circuit operating from an alternating current supply, the RF lamp furnishes a virtually steady source of light. This type of circuit, due to the use of a G-E Pyranol condenser, results in the better than 80 per cent power factor of the RF Fluorescent luminaires.





RAYON WEAVE ROOM

● Note the lack of shadows on the back of the reeds in this weave room. All the parts of the machinery are distinct and without troublesome shadows, allowing quicker and more accurate loom fixing which is vital to efficient operation. RF lamps provide over 35 footcandles of shadow-free illumination.

G-E RF FLUORESCENT LAMPS ENGINEERED TO



PEOPLES GAS CO.

● Fifty footcandles on these benches enable workers to repair meters quickly and efficiently. Elimination of shadows is important in this work since it is easier to repair the mechanism without complete disassembly of the meters.

MONARCH MACHINE TOOL

● No operation in machine tool building can overlook the importance of extreme accuracy. Monarch uses the two-lamp (CH-200) RF luminaire to illuminate this job of grinding castings.

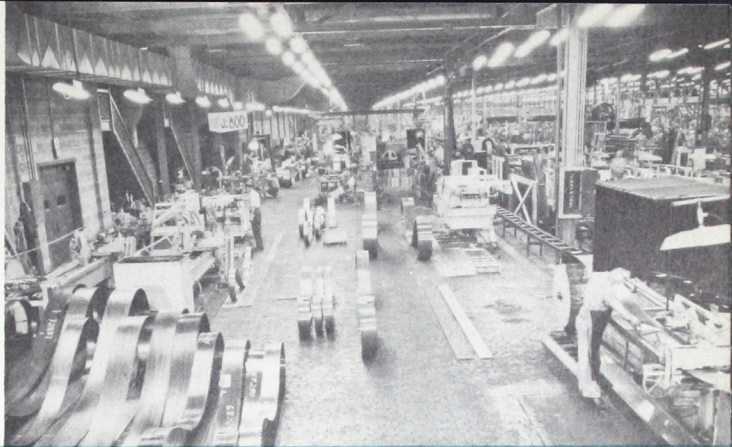


SOME PROMINENT USERS OF G-E

BOEING AIRCRAFT
BENDIX PRODUCTS
WESTERN ELECTRIC
SPERRY GYROSCOPE
DUPLAN SILK
AMERICAN VISCOSE
CHRYSLER MOTORS

SIMONDS SAW AND STEEL

● The modern concept of the "controlled-conditions" industrial plant finds the RF lamp completely at home when air conditioning and light conditioning must be absolutely satisfactory. The uniformity and high quality of RF lighting make this plant workable on one, two, or three shifts, with constant and easily controlled working conditions at all hours.



AND LUMINAIRES ARE FIT THE JOB!

GENERAL MOTORS

● High quality craftsmanship plus high quality lighting help to maintain rigid tolerances and reduce costly spoilage in this shop. This is another large installation of the two-lamp (CH-200) RF luminaire to provide 35 footcandles of illumination where high-speed production demands the best seeing conditions.



RODGERS HOSIERY

● Manufacture of fine hosiery requires a high level of shadow-free, detail-revealing illumination. RF lamps provide over 40 footcandles of this quality of light for these full-fashioned hosiery machines.

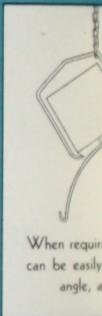
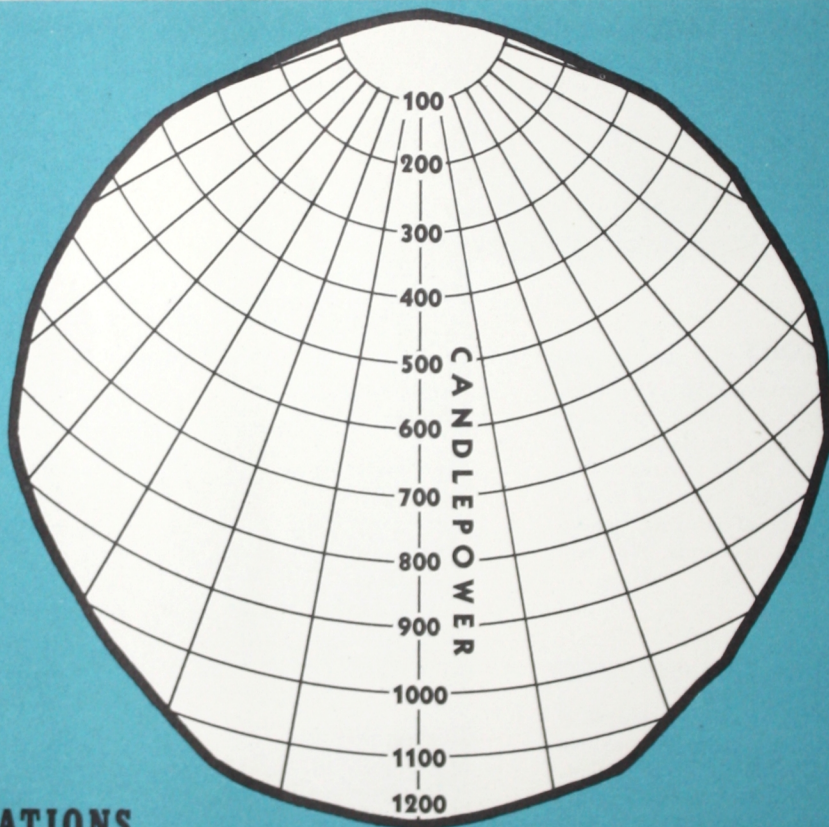
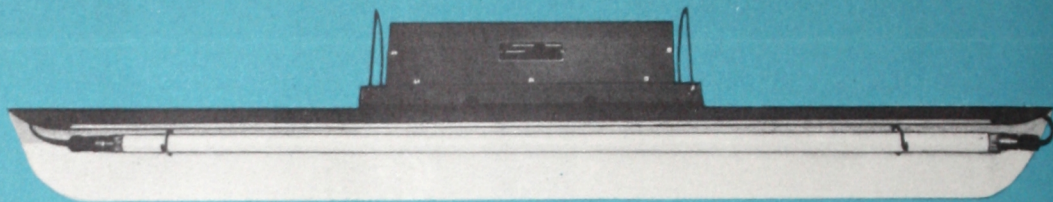


RF LAMPS AND LUMINAIRES

U. S. RUBBER
SKF INDUSTRIES
HERSHEY CHOCOLATE
AMERICAN CELANESE
INTERNATIONAL HARVESTER
R. K. LeBLOND
ALUMINUM COMPANY

CH-100 RF FLUORESCENT LUMINAIRE

Built Strong for Industry



RF Fluorescent luminaire on 115- or 230-volt, 60-cycle auxiliary equipment, the efficiency on either service.

Fifty-cycle RF Fluorescent on special order.

Auxiliaries of the RF luminaire equipped with convenient switches, permitting easy change for maximum operating efficiency on existing supply line voltage.

SPECIFICATIONS

Number 85-watt RF (Fluorescent) Lamps Required per Luminaire	1
Supply Line Voltage	105-125, 208-250
Catalog Number (60 cycles only)	
105-115 Volts	WF-1A14
115-125 Volts	WF-1A14B
208-230 Volts	WF-1B14
230-250 Volts	WF-1B14B

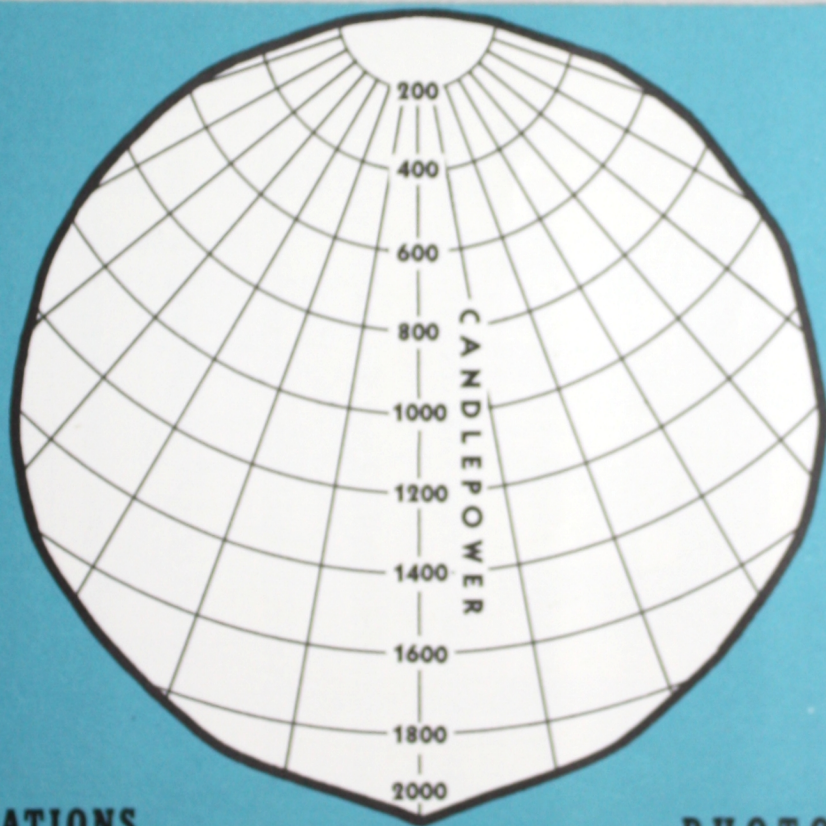
Power Factor at Rated Volts	83%
Reflector Surface (White)	Porcelain Enamel
Reflector Shielding Angle	20°
Luminaire Dimensions (approx.)	64" x 11"
Clearance Required	12" below Ceiling
Unit Price without Lamps (f.o.b. Hoboken, N. J.)	\$17.50

PHOTOMETRIC DATA

Total Average Watts	100
Bare Lamp Lumens	4000
Total Downward Lumens (approx.)	3200
Lumens per Watt (Downward)	32
Luminaire Efficiency	80%

CH-200 RF FLUORESCENT LUMINAIRE

Built Strong for Industry



RF Luminaires
suspended as
illustrated.

are designed for operation
cycle service; using similar
lamps have equally high
efficiency.

luminaires are available

fluorescent luminaires are
available with tap-changing toggle
switch for setting of transformer taps
to obtain maximum efficiency in accordance with
requirements.

SPECIFICATIONS

Number 85-watt RF (Fluorescent) Lamps	2
Required per Luminaire	2
Supply Line Voltage	105-250
Catalog Number (60 cycles only)	
105-115 Volts	WF-1A15
115-125 Volts	WF-1A15B
208-230 Volts	WF-1B15
230-250 Volts	WF-1B15B

Power Factor at Rated Volts	83%
Reflector Surface (White)	Porcelain Enamel
Reflector Shielding Angle	20°
Luminaire Dimensions (approx.)	63½" x 15½"
Clearance Required	12" below Ceiling
Unit Price without Lamps (f.o.b. Hoboken, N. J.)	\$33.50

PHOTOMETRIC DATA

Total Average Watts	200
Bare Lamp Lumens	8000
Total Downward Lumens (approx.)	6100
Lumens per Watt (Downward)	30
Luminaire Efficiency	76%

GENERAL ILLUMINATION LAYOUT

(Approximate Two-Lamp Luminaire Coverage in Square Feet*)

Room Width	Foot-candles Desired	MOUNTING HEIGHT ABOVE FLOOR—FEET									
		8 to 8½	9 to 9½	10 to 11½	12 to 13½	14 to 16½	17 to 20	21 to 24	25 to 30	31 to 36	37 to 50
SQUARE FEET PER TWO-LAMP LUMINAIRE											
24'	25	§154	154	146	132	132	116	106	86	86	86
	30	130	130	122	110	110	98	90	72	72	72
	35	110	110	104	94	94	84	76	62	62	62
	40	96	96	90	82	82	72	66	54	54	54
	45	86	86	80	74	74	64	60	48	48	48
	50	78	78	74	66	66	58	54	44	44	44
36'	25	166	158	158	154	146	132	126	116	106	86
	30	140	132	132	130	122	110	106	98	90	72
	35	120	114	114	110	104	94	90	84	76	62
	40	104	100	100	96	90	82	76	72	66	54
	45	92	88	88	86	80	74	70	64	60	48
	50	84	80	80	78	74	66	64	58	54	44
42'	25	166	166	158	154	154	146	132	126	116	106
	30	140	140	132	130	130	122	110	106	98	90
	35	120	120	114	110	110	104	94	90	84	76
	40	104	104	100	96	96	90	82	76	72	66
	45	92	92	88	86	86	80	74	70	64	60
	50	84	84	80	78	78	74	66	64	58	54
50'	25	168	170	158	158	154	146	132	132	126	106
	30	142	142	132	132	130	122	110	110	106	90
	35	122	122	114	114	110	104	94	94	90	76
	40	106	106	100	100	96	90	82	82	76	66
	45	94	94	88	88	86	80	74	74	70	60
	50	84	84	80	80	78	74	66	66	64	54
60'	25	170	170	166	158	158	154	146	132	128	116
	30	142	142	140	132	132	130	122	110	108	98
	35	122	122	120	114	114	110	104	94	92	84
	40	106	106	104	100	100	96	90	82	80	72
	45	94	94	92	88	88	86	80	74	72	64
	50	86	86	84	80	80	78	74	66	64	58
75'	25	170	170	170	166	166	156	150	138	132	122
	30	142	142	142	140	140	130	126	116	110	102
	35	122	122	122	120	120	112	108	100	94	88
	40	106	106	106	104	104	98	94	86	82	74
	45	94	94	94	92	92	86	84	78	74	68
	50	86	86	86	84	84	78	76	70	66	62
90'	25	170	170	170	170	166	158	154	146	132	126
	30	142	142	142	142	140	132	130	122	110	106
	35	122	122	122	122	120	114	110	104	94	90
	40	106	106	106	106	104	100	96	90	82	76
	45	94	94	94	94	92	88	86	80	74	70
	50	86	86	86	86	84	80	78	74	66	64
100'	25	170	170	170	170	170	166	158	154	146	132
	30	142	142	142	142	142	140	132	130	122	110
	35	122	122	122	122	122	120	116	114	104	94
	40	106	106	106	106	106	106	104	100	96	82
	45	94	94	94	94	94	94	92	88	86	74
	50	86	86	86	86	86	84	80	78	74	66

§ Shaded portions of this table indicate coverages with the two-lamp luminaire which will generally result in unsatisfactory lack of uniformity of illumination at the given mounting heights.

HERE'S HOW TO USE THIS TABLE

SUPPOSE you want to illuminate a room about 40 feet wide and 20 feet high to a level of 50 footcandles. Simply look down the "Room Width" column for the width closest to 40 feet (42'). Then follow to the right with your finger from "50 footcandles" in the "Footcandles Desired" column to the column showing a mounting height of 17-20 feet. In this column you will then find the figure 74 which means that one two-lamp RF luminaire should be provided for every 74 square feet to provide approximately 50 footcandles of general illumination.

To determine the correct spacing, a little mental arithmetic is then necessary. The product of the two spacing dimensions will be equal to the square feet to be illuminated by each luminaire. For example, with 74 square feet to be illuminated, the luminaires might be spaced 9' x 8'.

* For single-lamp luminaire approximate coverage, divide the above values by two. For instance, a single-lamp luminaire in the above example would illuminate 37 square feet (½ of 74) to a level of approximately 50 footcandles.

DATA AND ILLUMINATION TABLES

THE table on the opposite page indicates the approximate relation between the illumination which is desired and the number of square feet per luminaire required to produce that illumination. There are several factors which can vary this relation. For example:

Room Size

The greater the width and length of a room with respect to the mounting height, the higher is the utilization of light in the room. Also, the width of the room is generally more important than the length. For this reason, the table on the opposite page was calculated with an equal room length for the room widths indicated. For room lengths considerably greater, a slight increase in room efficiencies of from 5 to 8 per cent will be obtained.

Initial Footcandles vs. Maintained Footcandles

Initial footcandles measured when lamps are new and

when equipment is clean will be higher than the average footcandles maintained in service. To allow for this, a maintenance factor of .75 was included to obtain the values shown. For this reason, the initial illumination will be approximately one-third greater than the designed value. The inclusion of a maintenance factor does not permit neglect of the lighting system, however. A scarcely perceptible film of dirt and dust will decrease illumination 20 to 30 per cent and therefore a regular and adequate system of maintenance must be observed.

Formula

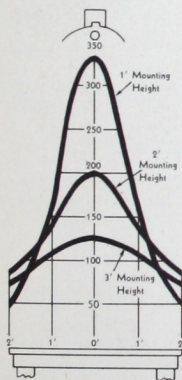
The formula for computing illumination values is as follows:
Footcandles =

$$\frac{\text{Lamp Lumens} \times \text{Coef. of Util.} \times \text{Maintenance Factor}}{\text{Area in Square Feet per Lamp}}$$

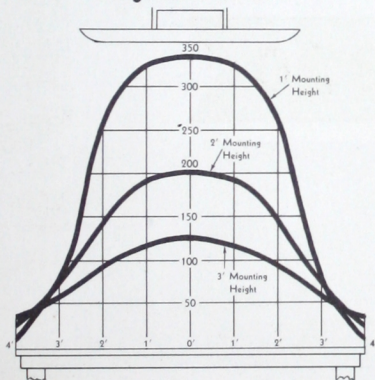
SUPPLEMENTARY ILLUMINATION

SINGLE LUMINAIRE

Cross Section



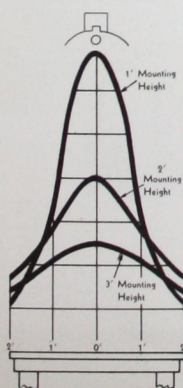
Lengthwise Section



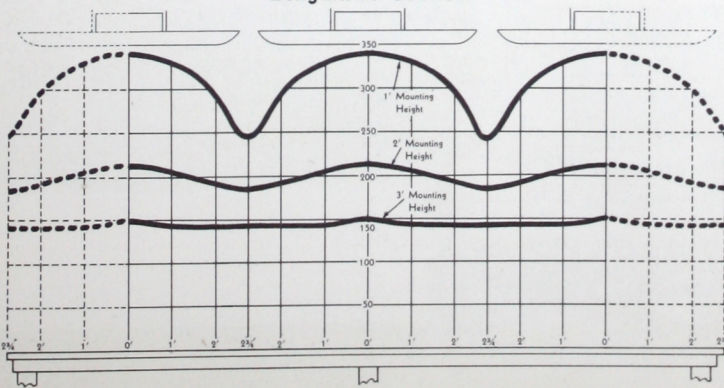
The illustrations below show how much light will be produced at various mounting heights above the work plane by the CH-100 RF luminaire when used specifically to illuminate difficult seeing tasks that require supplementary lighting to provide the high levels of illumination necessary.

CONTINUOUS ROW OF LUMINAIRES

Cross Section



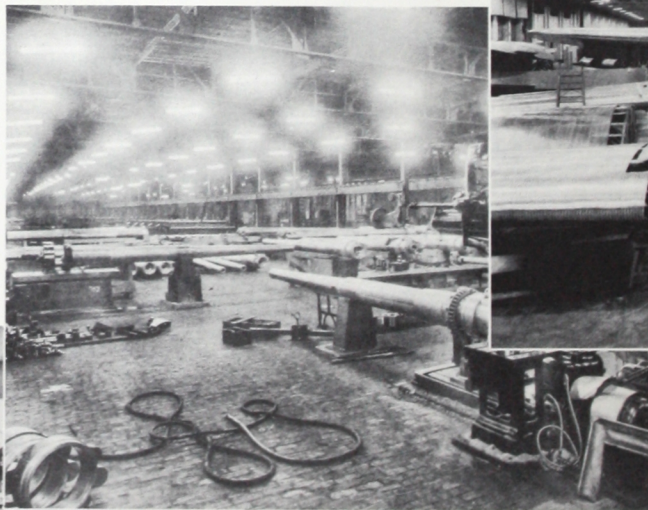
Lengthwise Section



**OVER 30 YEARS OF
EXPERIENCE WITH INDUSTRIAL
LIGHTING ARE BEHIND THE
RF LAMP AND LUMINAIRE!**

1920

1910





1940



1930

RF LAMPS AND LUMINAIRES

RF (rectified fluorescent) lamps and luminaires are made by an organization that has been devoted for over 30 years to the design, manufacture, installation and servicing of mercury vapor light sources for industrial lighting. The RF lamp and luminaire are the most recent outgrowths of this continuous and intimate experience with the lighting requirements of industry.

RF lighting is designed specifically for industrial lighting needs. Today, the RF system of lighting—built ruggedly, easy to maintain, and providing an excellent quality of lighting—is an outstanding contribution to the efficiency of the "factories of the forties."

Good Lighting IS LESS EXPENSIVE than Poor Lighting

NOTE from the charts on either side of this page that, on the average, good lighting represents less than one per cent of production costs and perhaps two per cent of total plant investment. *With light so cheap and the benefits of light so valuable, modern plants cannot afford to be without the best lighting.*

1 The best lighting system represents but a small percentage of the total plant investment. For example, it amounts to less than 1 per cent of the investment in plant equipment for production.

2 An automobile industry estimate indicates that by saving 10 per cent on lighting costs they might save one cent per car. But if they apply 10 per cent more toward good lighting, production would be increased—resulting in a saving of 25 cents per car.

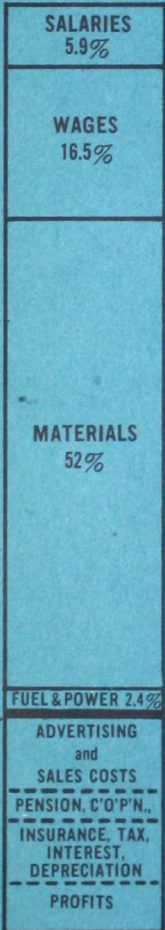
3 The average cost of power for operating a two-lamp RF unit is approximately $\frac{1}{4}$ cent per hour.

4 The average life of the RF lamp is 3,000 hours—if operated 8 hours per day, the cost of the lamp per day is less than 1 cent.

5 The total cost of lighting, including current, lamp renewal, and cleaning is approximately 1 cent per hour or 8 cents per man per day.

6 With proper lighting costing about 8 cents per man per day, its cost approximates the time it takes to get a drink of water and is just as refreshing.

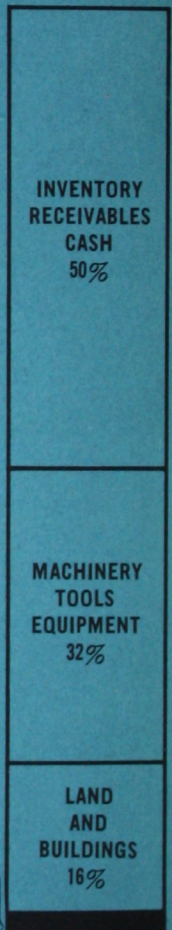
PRODUCTION COSTS



LIGHT 0.5%

LIGHTING INSTALLATION 2%

PLANT INVESTMENT





EYES CONTROL INDUSTRY!

HUMAN eyes are industry's most critical control devices . . . for this reason, if for no other, their well-being is a matter of vital concern.

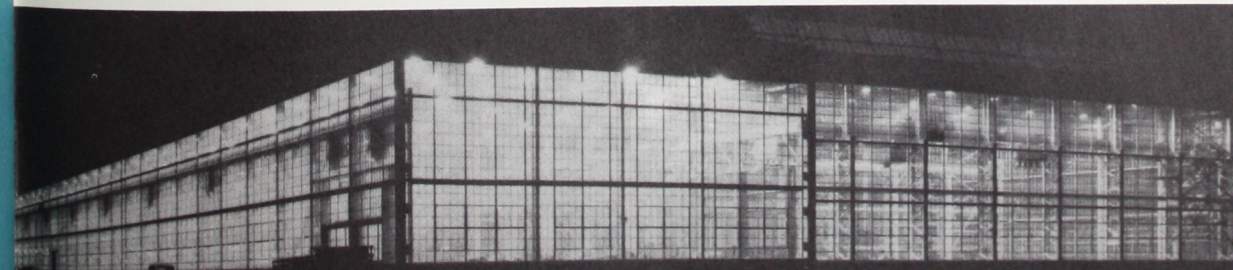
When an employer hires a worker he really hires a brain for thinking, a pair of hands for doing, and a pair of eyes for seeing. Help the eyes and you help the brain and hands to do their work more efficiently.

Good lighting is the chief aid to working eyes . . . it helps to conquer visual strain, makes work safer, makes surroundings cheerier,

reduces costly spoilage, and reduces wasteful nervous tension (a non-productive expense of energy often caused by eye-strain). At the end of a shift in a well-lighted plant, employees leave their work still clear-eyed and visually fit.

In the trend to a better standard of seeing in industry, the G-E RF (Fluorescent) lamp is playing a significant part . . .

for here is a lamp designed specifically for industrial needs by industrial lighting specialists to provide sight-saving lighting at a cost well justified by industrial gains alone.



ESSENTIAL DATA

G-E RF (Rectified Fluorescent) LAMPS

	Industrial White	Blue-white
Average Lamp Watts	85	85
Average Initial Lumens	4000*	4000*
Lumens per Watt	47*	47*
Rated Average Laboratory Life (hours)	3000	3000
Maximum Over-all Length (less prongs)	57½"	57½"
Length of Light Source (approximate)	52"	52"
Diameter of Light Source (approximate)	1¼"	1¼"
List Price**	\$4.25	\$4.25

* After 100 hours' operation.

** Applicable on Large MAZDA Lamp Contracts.

LAMP DEPARTMENT

GENERAL  ELECTRIC

NELA PARK, CLEVELAND, OHIO