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THE MAGAZINE OF

LIGHT

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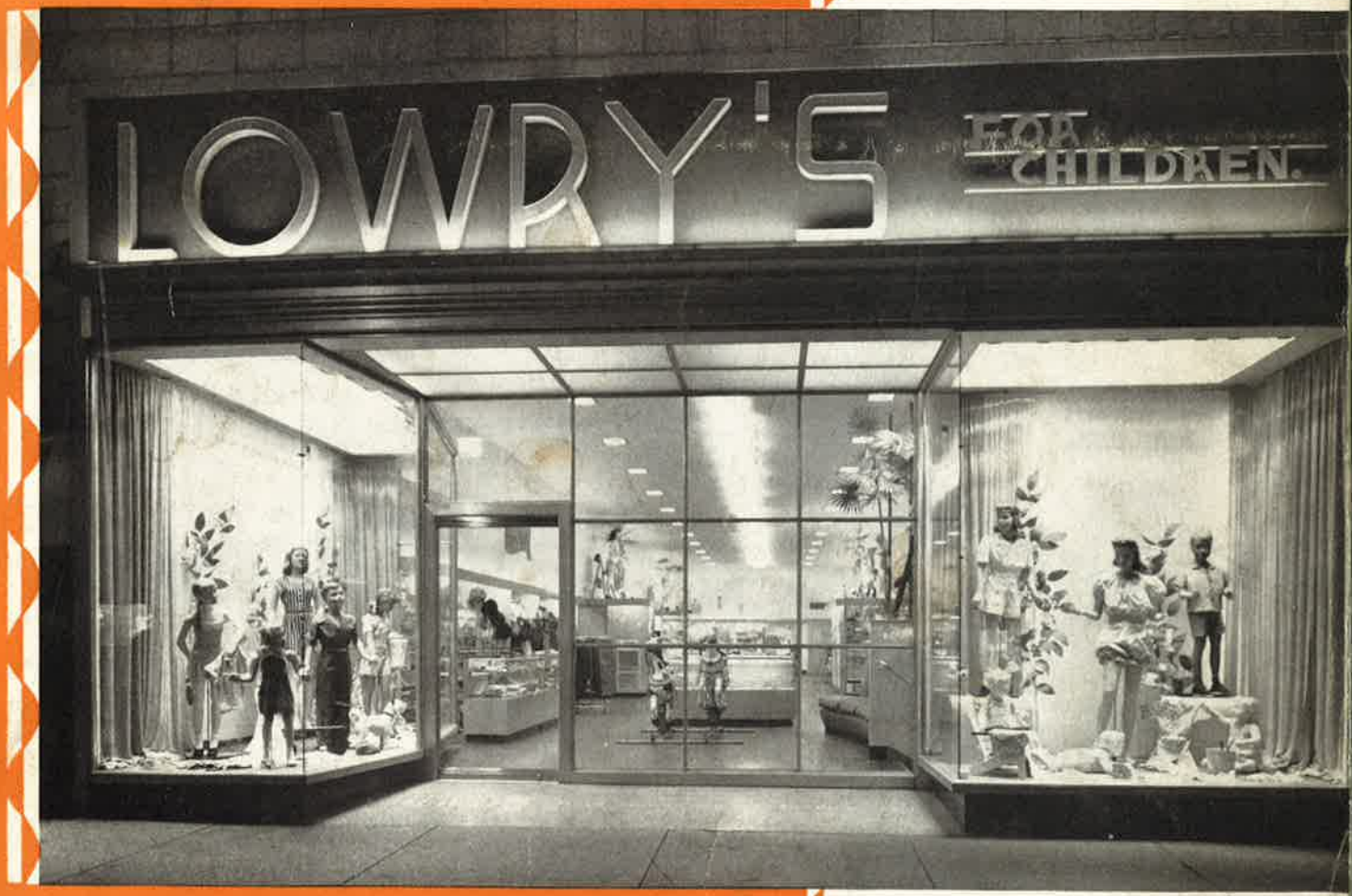
LAMP DEPARTMENT

GENERAL ELECTRIC

COMPANY



SEE PAGES 3 and 14

A.I.A. 31-F

"I want Fluorescent Lamps that Stay Brighter Longer!"

"We rely on G-E fluorescent lamps for general lighting. And we're going to use them over our bulletin boards, and in coves for lighting our lobbies and conference rooms."

Ever since General Electric developed the first practical fluorescent lamp, G-E lamp research has constantly been at work to make G-E lamps *Stay Brighter Longer!* Call your G-E lamp supplier today—ask him about all the newer lamps—G-E Slimline, Circline, Projector, Reflector and many others.

G-E fluorescent lamps cost so much less, last so much longer, and give so much more light, that they are actually about eight times better in lamp value today than they were back in 1938!

G·E LAMPS

GENERAL ELECTRIC

DETAILS OF LAMPS AND WATTAGE EMPLOYED IN LOWRY'S STORE FOR CHILDREN

LIGHTING SYSTEM	Number of Units	Lamps per Unit	Total Number of Lamps	Types of Lamps	Total Connected Wattage*
MAIN FLOOR—2700 Square Feet					
GENERAL—For Appraisal and Atmosphere					
Fluorescent	23	4	92	40WT12	4,400
Filament	24	1	24	300W	7,200
TOTAL	47	..	116		11,600
SUPPLEMENTARY—For Attraction and Atmosphere					
Counter Cases	10	..	8	30WT8	....
	..	..	2	20WT12	....
	..	..	8	15WT8	....
Perimeter Displays	Cont. row	..	39	40WT12	....
	..	..	2	30WT12	....
	..	..	7	20WT12	....
	..	..	8	15WT12	....
Spotlighting	..	..	1	300WR40†	....
	..	..	4	150WPAR38	....
TOTAL	..	..	79		3,753
TOTAL MAIN FLOOR	..	..	195		15,358
BASEMENT—1610 Square Feet					
General	26	3	78	40WT12	3,725
Perimeter Displays	..	..	23	40WT12	1,356
	..	..	7	30WT8	....
Stair Lighting	..	..	1	100W	100
TOTAL BASEMENT	..	..	109		5,181
SHOW WINDOWS—Total Area Approx. 100 Sq. Ft.					
GENERAL					
Fluorescent	..	..	32	40WT12	1,528
Filament	..	..	73	150WR40	10,950
Background Panels	..	..	8	40WT12	382
TOTAL SHOW WINDOW	..	..	113		12,860
STORE FRONT AND SIGN					
Soffit Panels	..	..	12	40WT12	573
Sign	..	..	..	4 rows tubing	750‡
TOTAL STORE FRONT AND SIGN	..	..	..		1,323
SUMMARY					
INTERIOR LIGHTING—Both Floors					
General	..	..	195		15,425
Supplementary	..	..	109		5,114
SHOW WINDOWS	..	..	113		12,860
STORE FRONT AND SIGN	..	..	12		1,323
GRAND TOTAL	..	..	429		34,722

* Including estimated wattage consumed by ballasts for fluorescent lamps.

† One 300-watt R40 Spot was the only lamp added to the initial installation before taking the photographs. It illuminated the feature display at the rear of the main floor to 200 footcandles.

‡ Total wattage, estimated.

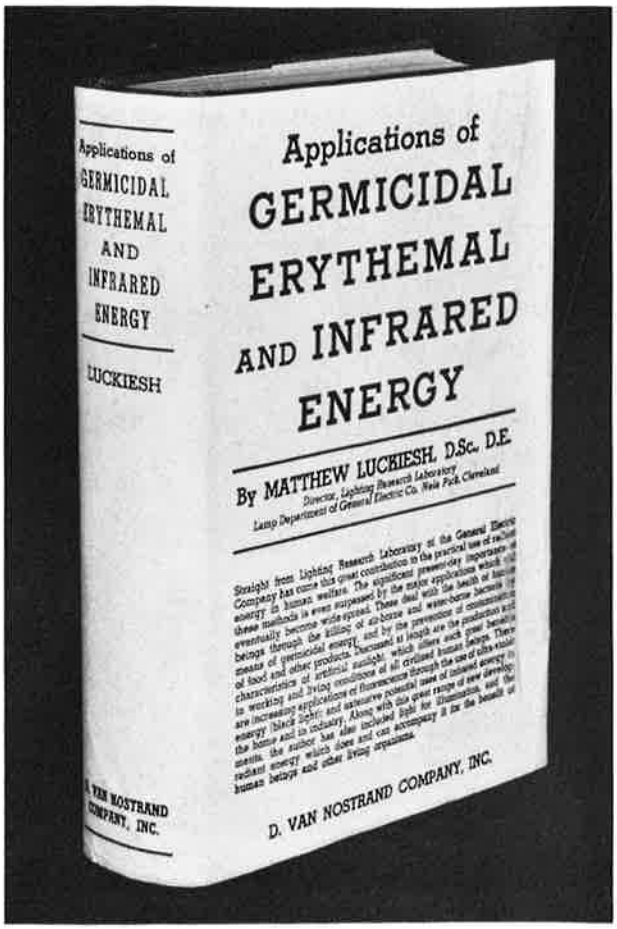
Just Published: "APPLICATIONS *of* GERMICIDAL ERYTHEMAL *and* INFRARED ENERGY*"

FROM Lighting Research Laboratory at Nela Park comes a new book by Dr. Matthew Luckiesh, director of the laboratory. The new text is a reference work written as a contribution to the practical use of radiant energy in human welfare. The significant present-day importance of growing interest in this field, with respect to methods and applications, has produced the need for a comprehensive volume. The new book is responsive to this need.

Among the subjects discussed is the protection of human health through the killing of air-borne and water-borne bacteria by means of germicidal energy. The production and characteristics of artificial sunlight is discussed at length. Other chapters are devoted to applications of fluorescence through the use of ultraviolet energy (black light) and to the extensive potential uses of infrared energy in the home and in industry.

A list of chapter titles follows:

Challenging the Sun
Sunlight and Skylight
Erythema and Tan
Units and Terminology for Biological Effectiveness
Germicidal Energy
Disinfecting Controlled Air
Infected Communal Air
Disinfecting Air in Occupied Interiors
Disinfecting Water
Artificial Sunlight
Fading of Materials
Ultraviolet Energy and Plant Life
Radiant Energy in Common Illuminants
Reflection and Transmission
Measurement of Ultraviolet Energy
Various Applications of Radiant Energy
Bibliography



* 480 pages, 6 by 9, illustrated, $5.50. D. Van Nostrand Company, Inc., 250 Fourth Ave., New York.

STORE LIGHTING FEATURES

THIS issue features several store lighting subjects. The major articles on this field will be available in reprint form as soon as requests from District Sales Offices of the G-E Lamp Department indicate the demand. The article by Wentworth M. Potter on the Lowry store installation; the discussion of Light and Sales by C. J. Allen, and the four-page review of notable Slimline installations in Detroit will be offered in separate reprints if the quantities indicated in each case are sufficient. Each of these three articles, treating important contemporary aspects of store lighting, can be very helpful in bringing the attention of local merchants to progressive new lighting practice.

NEW PRINTING OF THE LAMP BULLETIN

WITH the printing of LD-1 pages on Projection Lamps, Mercury Vapor Sunlamps and Glow Lamps (see pages 26 to 30) the MAGAZINE OF LIGHT has completed its serial offerings from the Lamp Bulletin. A new edition of this very-much-in-demand Bulletin is now off the press. For information about copies, get in touch with your Lamp Department District Sales Office.

The MAGAZINE of LIGHT

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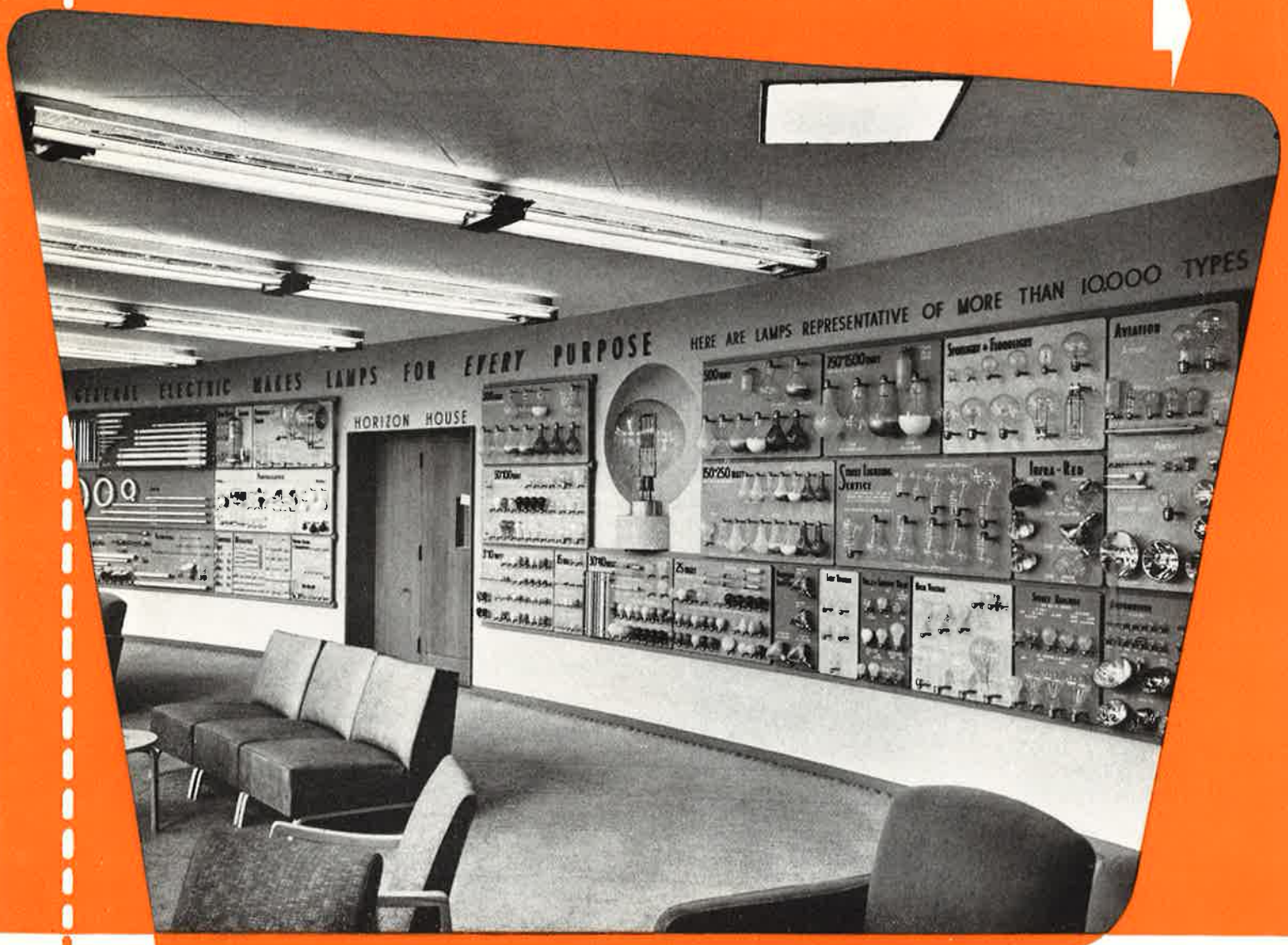
Contents

Published in the interests of current progress in the science, art and business of lighting by the Lamp Department of General Electric Company at Nela Park, Cleveland, Ohio. Only advertising of General Electric products will be accepted.



The Lamp Gallery in the new G-E Lighting Institute at Nela Park takes its name from the various panels of major lamp types displayed in the lobby area at the south entrance. In this one sweeping display visitors are enabled to observe the impressive scope of lighting services for which General Electric makes lamps.

NEW G-E LIGHTING INSTITUTE *Seen As A Bright Symbol*

From President C. E. Wilson's dedicatory address, Magazine of Light reprints important comments on current history.

THERE is much about our situation here, the reason we have assembled, and the make-up and prevailing interests of this particular group, to justify some such comment as this: Here we are again, after a few years of excitement and tragedy and destruction and confusion, ready to take up where we left off—if the world will only let us. This is not where we came in—it is where we went out, and put aside everything that contributes to normal existence, in order to fight a war. It would be comforting in a neat sort of way if we could bury, in our economic and emotional backyard, everything that transpired from Pearl Harbor to VJ Day, smooth the ground over it, and perhaps put there a little monument to the men, the opportunities, and the ideals that fell in World War II; if we then could square our shoulders and turn our backs and forge ahead with the world's business. But we can't. We can't even name the days when the war began and ended, so inextricably is it woven into the texture of our continuing lives and policies as a nation. That should be enough in itself to prove to us that there exists no great colloquium of international surgeons which can excise the rotten parts and the mortified parts of our world body, and sew us up as good as new, except for a few scars.

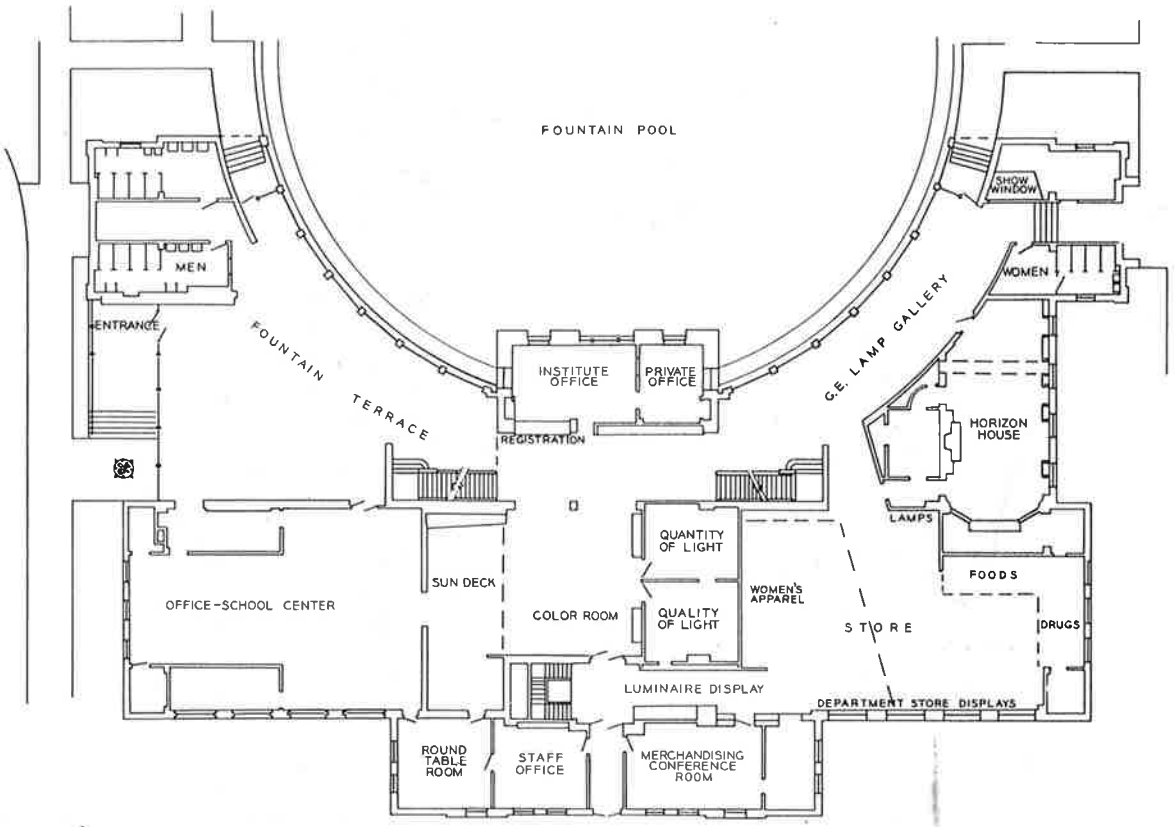
We have grown since Versailles, because we probably no longer dream of any such happy convalescence. On the contrary we are very cynical about it, and there are events abroad and at home, daily, which serve to beef up our low opinion of the human race. Discouraging as it is, we apparently cannot escape from bitterness and violence, from cheating and bullying, from conniving and conspiring. We have to live with it. We even make it easier in the halls of the United Nations by inventing new systems of interpreting and amplification, so that men who do not understand each other's language can be more immediately insulted and embroiled without having to wait for an old-fashioned translation.

This is a very dark picture, and there are many people more eloquent than I who will dwell on it and enlarge upon it for you. That is not why we are here, but at the same time we cannot escape it. Any bright and promising little segment of a plan for a better tomorrow, such as we honestly feel this Institute to be, would be as unreal as an ornament on a birthday cake, if we were not also men enough to consider it, measure ourselves against it, and offer it to you, with a full appreciation of the climate in which it must live henceforth.

It cannot surprise any of you very much to hear us say that light means a great deal to the General Electric Company. It is also a familiar quotation, over our name, that light means a great deal to mankind. This is something so universally true that we can keep on saying it for a long time, and always mean something new, and better, and exciting. If there are quiet sermons in stones, there are unde-

Befitting the rededication of an institution whose history begins with the invention of the incandescent lamp, Mrs. Thomas A. Edison graciously performed the official ceremony presenting the new G-E Lighting Institute to the industry and the public. Mrs. Edison is shown in this picture, taken during the rededication activities, with Vice President M. L. Sloan and President C. E. Wilson.

The main floor plan of the new G-E Lighting Institute indicates how completely the space has been reorganized and reoriented. Those who are familiar with the pre-war Institute will note such special new features as the G-E Lamp Gallery (see page 6) and the new north entrance opening on the Fountain Terrace overlooking the fountain pool (see back cover)



niably tremendous messages for the future in light, a word which symbolizes almost all of the progress that men have ever made. There is a great deal that is forever stimulating and satisfying in the continuing developments of the electrical industry and I have always felt that there was a particular satisfaction in being associated with the business of putting more light into the world. For one thing, there is no foreseeable end to the job; we can throw ourselves into it, as scientists or engineers or manufacturers or salesmen, and never approach a point of saturation. Nor can we foresee a point at which the quality and efficiency of light sources cannot be improved. I could almost say that we cannot foresee a point at which the cost of light cannot be lowered, but unfortunately—or perhaps fortunately—we are advancing towards absolute zero, and not towards infinity in that kind of calculation. Nevertheless, even here there is a great deal of ground to be covered before the cost of light reaches a final

Ohio's Governor Frank Lausche spoke at the rededication ceremonies. In the picture the Governor, right, is noting intently an institute demonstration which N. H. Boynton, General Manager, Western Sales, is viewing with him. Buckeye District Manager Charles Gray is seen at extreme left.

During the activities of the opening, Cleveland's radio station WGAR broadcast a tour of the new Lighting Institute with G-E President C. E. Wilson and Board Chairman Philip D. Reed. Announcer Sidney Andorn is shown holding the microphone for some remarks by Mr. Wilson while Mr. Reed looks on smiling.

Below: Home lighting in the new Institute is demonstrated in Horizon House. Entrance to this delightful area is from the Lamp Gallery. Note floor plan.

practical resistance-point, swift as has been our progress to date. In no field of human endeavor has the investment of scientific genius, manufacturing skill, and merchandising effort—those three tremendous tools which only a system of free enterprise has been able to coordinate and put to effective use—returned such vast and tangible dividends, to all concerned, as in the field of light. I am not referring here to the material rewards that have accrued to the lighting industry, but to the literally millions of human lives that have been touched and lengthened, of the billions of hours of human time that have been saved, of the countless tasks that have been eased and their performance perfected, by the instrument of light. And this is only a beginning.

It has not been my purpose here to heap congratulations upon ourselves in this industry for the wonderful job done over the years by the scientists and technicians, although I assure you that we do take great pride in that job, but to point out that in the unique universality of this thing—light—we see demonstrated a simple fact. Its very simplicity has made us heedless, in these times of mass markets, mass radio audiences, mass newspaper readerships, billion-dollar loans, mass migrations, and unhappily mass persecutions. It is this—every light burns for one man alone. It may be a night-light in a nursery, or a brilliant high-intensity spot that precedes a surgeon's knife, or an airport beacon, or a hundred miles of modern lighted highway, or a powerful searchlight, or only a lamp by a comfortable chair in somebody's home. It may be that a thousand men have slaved over chemistry, and metallurgy, and mathematics, and neurology, and cost analysis, and production efficiency for years on end to light that lamp. Their eventual success must be measured in the service to a single individual who has eyes to see, no matter what his station in life may be. If he is the most powerful ruler in the world, or the poorest child in school, he receives the same tribute and commands the same performance. Whoever he may be, he has the same need, so elemental, so critical, and so universal is the necessity for light.

PROFIT AVAILABLE FOR IMPROVED LIGHTING

Daily Earnings on Increased Sales of Given Percentages at Various Net Margins—For Store Doing $100 Business per Day

LIGHT *and* SALES

• • • By C. J. ALLEN

How much can I afford to spend on relighting? That very legitimate question is in the mind of every merchant who is considering the relighting of his store. He accepts as obvious truths that planned sales lighting increases sales, reduces returns, boosts "impulse items" turn-over, attracts more customers. In short, he agrees that it can greatly improve his merchandising effectiveness. But how much he can afford to pay for these worthwhile improvements is to him the $64 question.

To guide the merchant in considering this problem, the actual costs of the various types of equipment used in store lighting have been reduced to simple understandable figures as shown on page 12. For instance, an owner of a hardware store of about twelve hundred square feet could own and operate a system of louvered fluorescent semi-direct fixtures giving 50 footcandles of real merchandising lighting for $1.73 a day ($0.144 per 100 square feet), including amortization, current and lamps. His present lighting of ten 300-watt, semi-indirect fixtures, giving low-order lighting of 10 footcandles, now costs him about $0.75 per day for current and lamps alone. The added cost for a system giving five times as much illumination is thus only $0.98 per day.

Not all of the margin* on increased sales resulting from the improved lighting is available to offset the greater lighting cost, for there must be deducted such added expense as may be incurred for wrapping, delivery, and other items. In most types of store the merchant finds his over-all operating efficiency improved because of the quicker buying decisions and lesser returns of merchandise which come with improved lighting. These collateral benefits may in fact out-weigh the added expenses incident to a moderate increase in sales.

For the particular hardware store in question let us assume that sales have been averaging $100 per day, or approximately $30,000 per year. Further, that gross margin is 35 per cent and that of the margin on the increment in sales only one-half, or 17½ per cent, can be applied against the cost of the new lighting. It is evident that added sales of only 6 per cent ($6.00 per day) will yield $1.05, which is more than the additional daily cost for the 50-footcandle lighting.

In order to reap the full profits of modern lighting, he would want some high-lighting spots on his featured displays, some eye-appealing lighting in his showcases and some attention-attracting brightness for his wall cases. Note how low are the costs of using light to do these jobs: a 150-watt reflector lamp, less than $0.06 a day; a six-foot fluorescent showcase, $0.04 a day; fluorescent lighted wall cases, less than $0.05 a day per ten-foot length. Using six 150-watt reflector spots, two projector spots, four six-foot showcases and 40 feet of lighted wall cases, the hardware man's owning and operating costs are increased only $0.82 per day for all of these. Hardly as much as he pays a clerk for an hour or so, and for which he gains one of the most forceful and diplomatic sales stimulators available to the merchandising field.

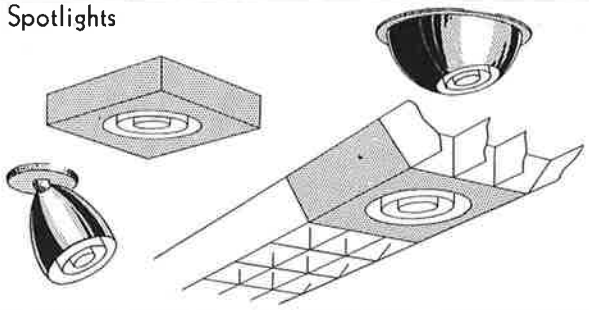
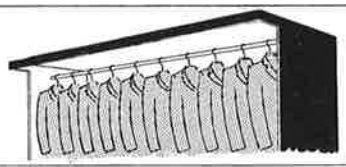
The increased cost of both the general and supplementary lighting for this hardware store would amount to $1.80 per day, which is less than the $1.93 net which would be realized from an increase of 11 per cent, or $11 in daily sales. The amount available to offset an increase in lighting cost for other percentage increases in business at various margins can be read from the chart on page 10. Conversely, the chart can be used to see what increase in business would be required at a given profit margin to pay for a given daily increase in lighting cost. The following figures of sales increases which followed relighting were certified by store owners in different parts of the nation and submitted by them to the Lamp Department of the General Electric Co. It will be noted that the increased cost of a complete modern general and supplementary lighting system in the case of the hardware store discussed above is paid for by a sales gain a little less than one-third that experienced by the hardware stores indicated. The gain beyond that required to pay for the new lighting is, of course, reflected in a greater over-all profit of the business.

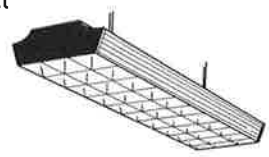
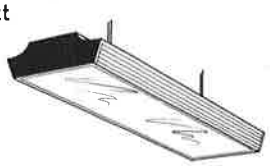
Kind of Store	Average Sales Gains After Re-Lighting
Apparel Shops	21%
Automotive Stores	19%
Drug Stores	24%
Food Stores	20%
Filling Stations	24%
Furniture-Household-Radio Stores	27%
General Merchandise	22%
Hardware Stores	40%
Jewelry Stores	37%

Not infrequently new competition or changes in business conditions require that a merchant relight to maintain the position he has already

* Margin is the spread between cost of merchandise and selling price as a per cent of selling price.

Gross Margin — Per Cent of Selling Price				
15	25	35	45	55
17.7	33.3	53.9	82.0	121
Markup — Per Cent of Cost				

SUPPLEMENTARY LIGHTING EQUIPMENT	DAILY OWNING AND OPERATING COST*	
Spotlights 	150W—R-40	$0.058 per lamp
	300W—R-40	$0.097 per lamp
	150W—PAR-38	$0.061 per lamp
Showcases 	1—64 T-6 Slimline	$0.039 per 6 ft. case
Wall Cases 	40W T-12	$0.044 per 10 ft. length

GENERAL LIGHTING EQUIPMENT 4500 White Fluorescent**	COST PER 100 SQ. FT.—50 FC. MAINTAINED		
	LARGE ROOM†	MEDIUM ROOM	SMALL ROOM
Exposed Lamp††  Six—96″T-8 (200 MA)	$0.084	$0.111	$0.146
43 Up / 52 Down — Six—96″T-8 (100 MA)	$0.101	$0.132	$0.176
Semi-Direct  Four 40W T-12 — 32 Up / 46 Down	$0.123	$0.144	$0.185
 Two 40W T-12 — 41 Up / 45 Down	$0.127	$0.154	$0.205
Semi-Indirect  Four 40W T-12 — 42 Up / 28 Down	$0.139	$0.169	$0.214

*Assumed Operating Conditions: 310 business days/yr; 8 hrs./day; 3¢ @ KWH; Amortization Rate 16⅔%/yr.

** Using the 3500 White Color, daily owning and operating costs would be approximately five percent lower for the Slimline lamp and ten percent lower for the 40-watt T-12 lamp.

† Large Room, Width = 4 x Height; Medium, W = 2 x H; Small, W = H. Room finish: Ceiling 75%; Walls and Shelves 30%.

†† While an exposed lamp system shows the lowest cost, it does not necessarily represent the best value. Comfort, seeing and appearance considerations must be taken into account in arriving at the system most appropriate for a given store.

Energy rates, burning hours, fixture costs, etc. can vary widely. The figures opposite accordingly represent typical average costs only. The formula (right) may be used to obtain the exact daily costs of an installation based on local conditions.

FORMULA FOR DAILY COST OF LIGHTING

Owning and Operating Cost per Day	=	Daily Owning Cost of Equipment (1)	+	Daily Cost of Current Consumed (2)	+	Daily Cost of Lamps Replaced (3)	
(1) Daily Owning Cost of Equipment	=	Cost of Luminaires Installed (less lamps)	×	Annual Owning Cost Rate (Usually 16⅔%) / Business Days Per Year			
(2) Daily Cost of Current	=	Total Kilowatts of Luminaires	×	Daily Burning Hours	×	Energy Rate ($ per KWH)	
(3) Daily Cost of Lamps Replaced	=	Number of Lamps in Installation	×	Daily Burning Hours / Lamp Life (hours)	×	Net Dollars per Lamp	

achieved. Here again the chart becomes useful in gaining some idea of the relationship of the lighting cost to possible losses or gains in business. The progressive merchants are those who continually analyze and apply those sales leverages which will improve their volume and profit. Can anything else offer these merchants so much for so little as does a well-planned functional lighting system?

USE THIS SPACE FOR WORKING OUT YOUR OWN RELIGHTING PROBLEM

TYPE OF EQUIPMENT	UNIT DAILY COST		AMOUNT OF EQUIPMENT USED	DAILY OWNING AND OPERATING COSTS
Spotlights: 150W—R40	$0.058	×	lamps =	
300W—R40	0.097	×	lamps =	
150W—PAR38	0.061	×	lamps =	
Showcases	0.039	×	6′ cases =	
Wall Cases	0.044	×	10′ lengths =	
TYPE OF GENERAL LIGHTING EQUIPMENT:				
*USE UNIT COST FROM TABLE ABOVE OR FROM ACCOMPANYING FORMULA	.....	×*	Hundreds of sq. ft. =	

NET MARGIN ON INCREMENT IN SALES	%	TOTAL DAILY OWNING AND OPERATING COST	
STORE'S DAILY NET SALES	$		
INCREASE IN DAILY OWNING AND OPERATING COST PER $100 DAILY SALES	$	PRESENT OPERATING COST	
PER CENT INCREASE IN SALES NEEDED TO ABSORB RELIGHTING COST	%	INCREASE IN DAILY OWNING AND OPERATING COST	

LIGHTING PLANNED FOR PROFIT

in Lowry's, La Grange, Illinois

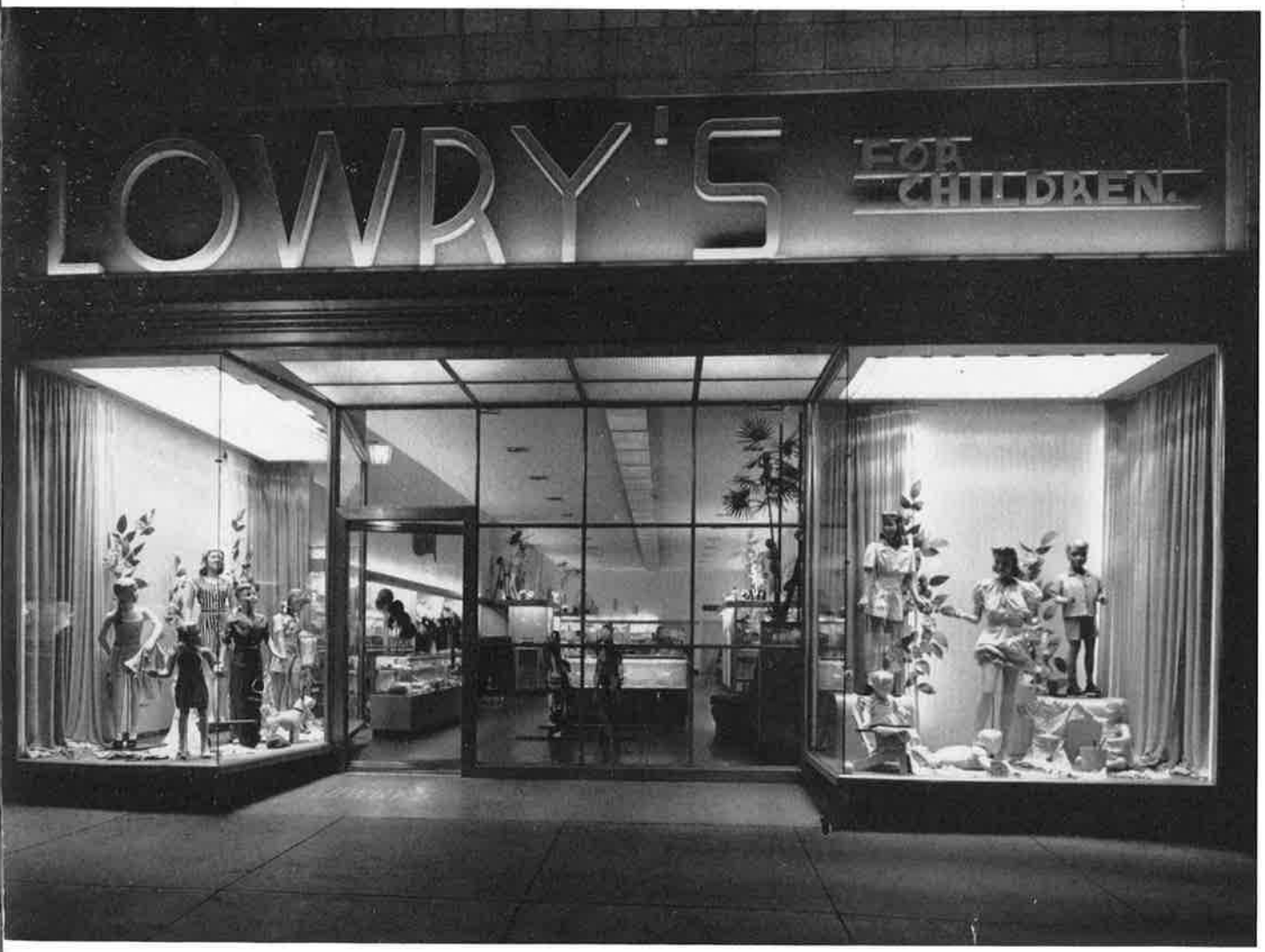
By WENTWORTH M. POTTER, Engineering Division, Lamp Department

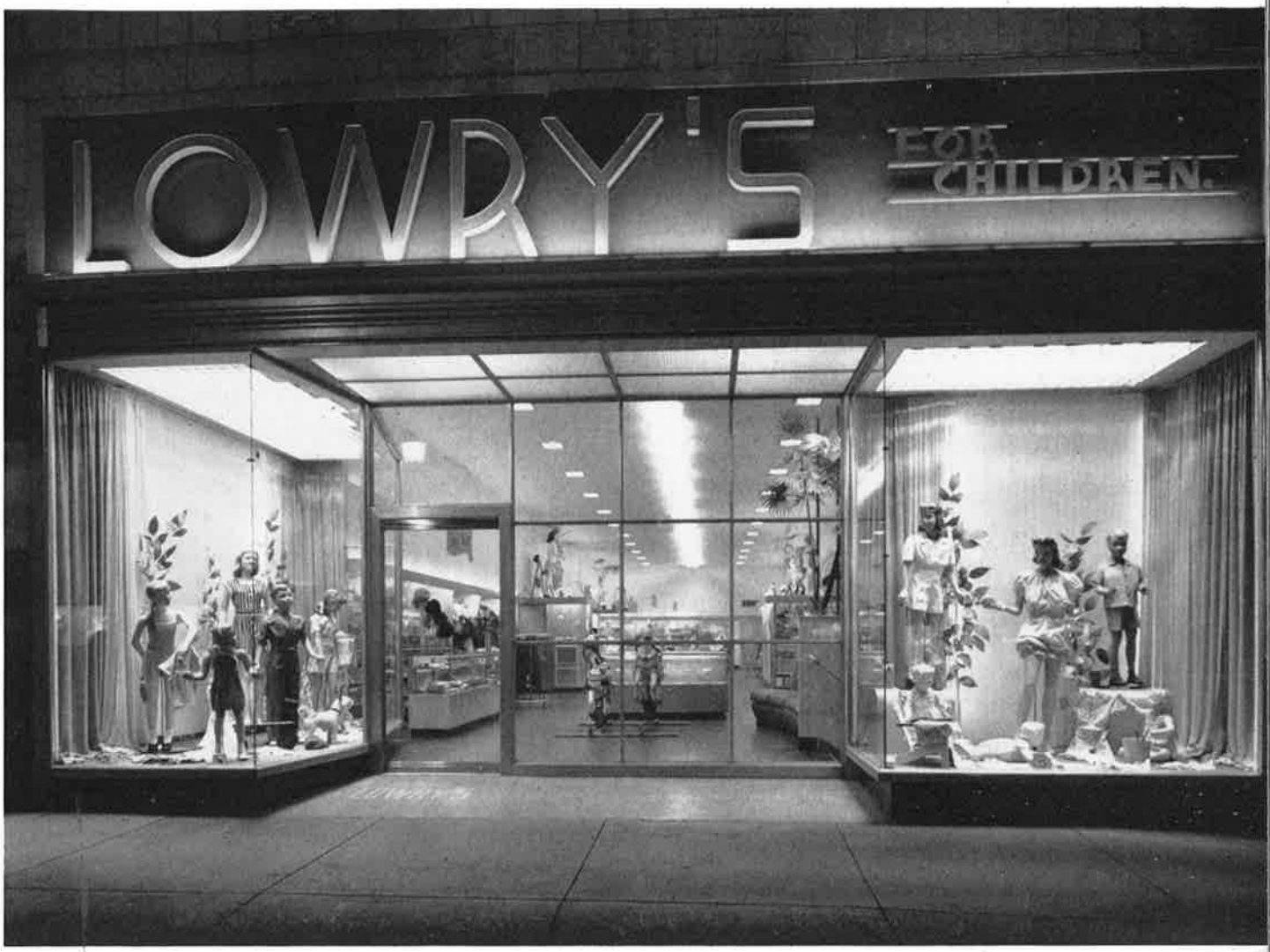
Richard W. Lowry

Mr. Lowry says:—"As a former consultant to many alert merchandisers, I learned that good lighting is one of the most potent sales aids a retailer can have. Therefore, I resolved to have the best lighting possible in my new store, fitted to its specific selling needs. I am very happy with the resulting installation. It is an investment that pays off in volume and net profit."

IT CLICKS! The appeal of the lighting in Lowry's stems from the fact that the system was so well planned, both to direct attention to merchandise and facilitate its sale and to present a brightness pattern in windows and interior which instantly attracts and creates a pleasant, gay atmosphere. These are characteristics of good lighting for selling equally available to the small town store and the exclusive metropolitan shop.

Lowry's Store for Children is at 15 S. La Grange Road, in suburban La Grange near Chicago. It exemplifies one way in which lighting can be adapted to the needs of modern retail merchandising. The owner, Mr. Richard W. Lowry, believes strongly in the effectiveness of lighting for building sales and profit. Hence, in planning this new store his





EXTERIOR WITH FULL INTERIOR LIGHTING

When open for business, the use of all interior lighting with its distinctive pattern reveals through the glass front not only specific displays but the whole atmosphere and individuality of the store.

The abundant illumination in the show windows is available for minimizing daytime reflections.

EXTERIOR WITH SUPPLEMENTARY INTERIOR

For outstanding display at the sidewalk, the two small windows are brilliantly lighted—to some 750 footcandles. In these about 13 KW are used—32 40-watt fluorescent lamps and 73 150-watt Reflector Spots, above louver-grid ceilings, and 8 more 40-watt F lamps transilluminating the background panels of corrugated glass. The sign is lighted by 4 rows of cold-cathode fluorescent tubing and the luminous soffit element of fluted glass contains a dozen 40-watt F lamps.

After store hours, the effect may be augmented by keeping on also the varied, colorful display elements of the lighting system.

architect, Mr. Raymond W. Garbe, with Mr. Ralph W. Milman associating, gave lighting the early and full consideration necessary for proper layout and coordination of all the elements. This planning insured that appropriate illumination values were produced and that they were so related as to control attention and fully capitalize every feature of store arrangement, decoration and appointments.

Located on the main street of La Grange, Mr. Lowry's store presents an inviting picture to passers-by. The brilliant show windows bringing featured goods close to the sidewalk are the focus of attention. They are supplemented by sign and soffit panel lighting. But with the open, plate glass front, the whole pattern of the interior lighting becomes a display effective in creating quickly the impression that here is an establishment of distinction, alert and equipped for superior service.

Inside, one finds the main floor space largely devoted to children's clothing, accessories and furniture. Its dimensions are about 27 by 100 feet with

(*Continued on page 18*)

FLUORESCENT GENERAL LIGHTING

One element of the foundation system is this diffused general lighting produced by a continuous row of fluorescent luminaires. There are 23 four-foot luminaires, consisting of banks of 4 40-watt T12 white fluorescent lamps, below which are mounted plates of lightly diffusing glass. Though the sides are open, the lamps are shielded from all viewing points. The average illumination therefrom measured about 25 footcandles at counter level. Note, however, two other important results: (1) Light from the open sides of the luminaire adds desirable brightness of the side walls, (2) When this system is used alone the light is so uniformly distributed as to result in a monotonous, uninteresting room appearance—a result typical of many exclusively general lighting systems even at higher illuminations. It's the same kind of lifeless effect found outdoors on an overcast day.

THE COMPONENTS OF A

FILAMENT GENERAL LIGHTING

The other foundation system produces about 15 footcandles, average, with entirely different quality characteristics. The twenty-four 300-watt recessed Controlens units supply a warmer color quality and the shadows, relief, and highlights that produce modelling and interest, better revealing form and texture of goods and materials. The system contributes little to the needed brightness of walls and ceilings.

ADD UP FOR SALES AS

COMBINATION OF FLUORESCENT AND FILAMENT GENERAL LIGHTING

Used jointly the two foundation lighting systems furnish about 40 footcandles of a color quality favorable for examination of goods. To cool, diffused illumination is added the punch, snap, relief of directed light — more nearly the stimulating quality of a sunny day.

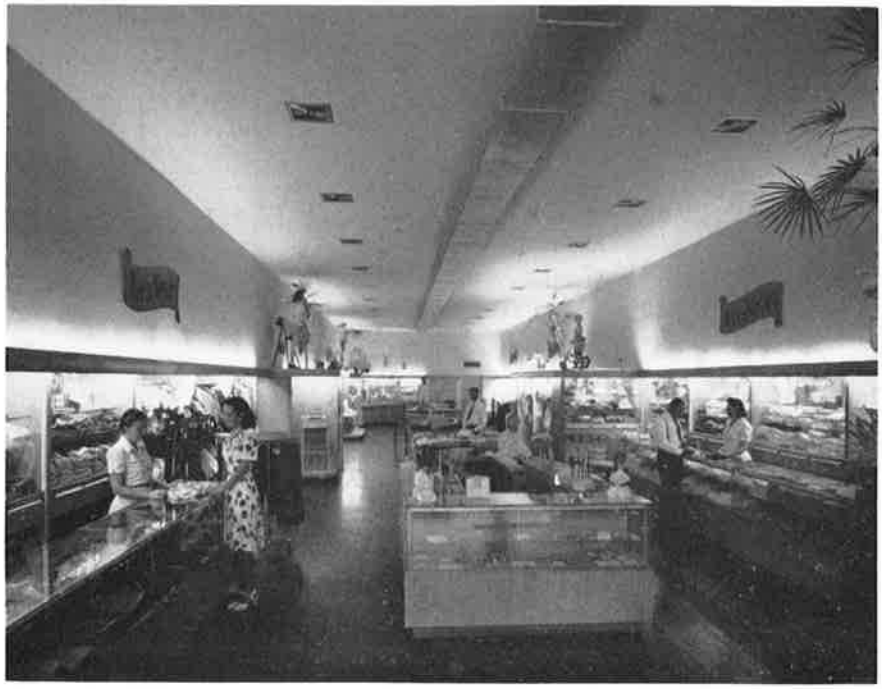
COUNTER CASE LIGHTING AND SPOTLIGHTING

But the foundation lighting, appealing though it is, provides none of the significant variations of brightness necessary to catch the shopper's eye and focus attention on featured merchandise. For this purpose here the higher steps of illumination are introduced with cases at 100 footcandles and up to 200 or more on the featured item at the rear. This display, without emphasis lighting, is present but scarcely noticed in the previous pictures. The counter cases are lighted with 30, 20 and 15 watt fluorescent lamps. Spotlighting is accomplished with the handy Projector and Reflector lamps; those for the case top displays are equipped with amber and red filters.

FINE STORE LIGHTING JOB

PERIMETER VALANCE LIGHTING

The perimeter lighting unit is a simple shield for a continuous row of fluorescent lamps. It illuminates goods in the wall cases, makes the room more cheerful by reason of the brighter walls and ceiling edges and adds something to the illumination of vertical surfaces in the space generally.



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COMBINED DISPLAY LIGHTING

The several elements are here combined to form the complete supplementary lighting system whose primary purposes are ATTRACTION and ATMOSPHERE. Merchants find it good business to invest in this plus lighting to get shoppers to notice and to buy more things.

The Components Add Up to Functional Lighting for Merchandising

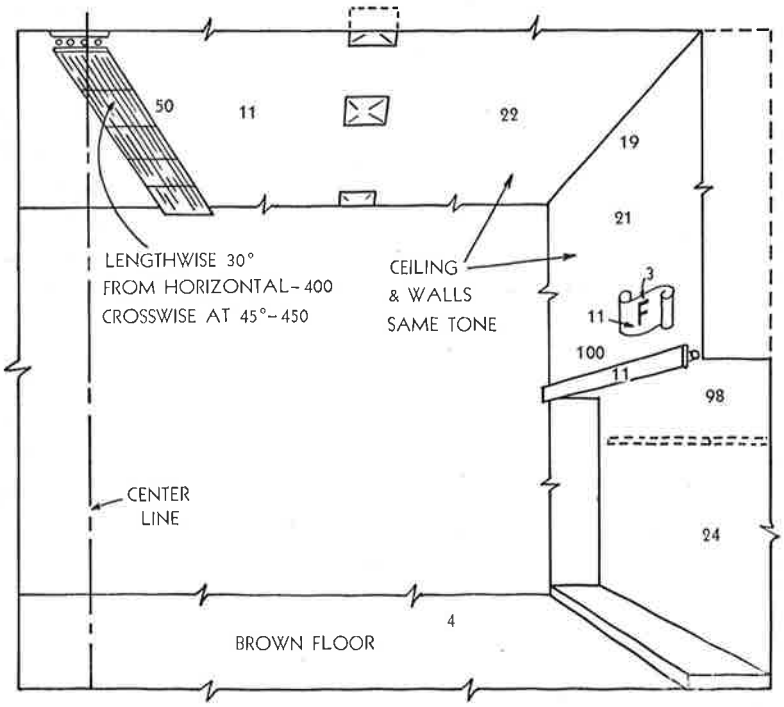
FULL LIGHTING

When foundation and supplementary systems are combined, well-rounded lighting for selling results, making every part of the store and its appointments fully effective for moving merchandise. Note that the important steps 3-5-10 of the 1-3-5-10 store-lighting formula are employed; since aisles are narrow circulation space does not come in for separate treatment. Total wattage—75 per cent greater than would have been required for 50 footcandles of general fluorescent lighting alone.

(*Continued from page 15*)

a ceiling height of 14 feet. The floor is a dark variegated brown tile. Wood cases and counters have light natural finish and upper walls and ceiling are a very light tint of mulberry. Sign backgrounds are a dark mulberry in tone. A stair leads downward at the right front and the left wall curves into the rear.

The objective of the lighting plan for this room was, as it should be for every store, the most effective utilization of light as a merchandising force. Hence, not only was illumination adequate in quantity and appropriate in quality required for



TYPICAL BRIGHTNESS VALUES
IN FOOTLAMBERTS

RIGHT SIDE OF ROOM,—REAR
ENTIRE LIGHTING SYSTEM OPERATING

Lowry's Basement Sales Depend Upon Planned Lighting Too

accurate appraisal and quick buying decisions, but an attention-compelling and stimulating brightness pattern had to be developed.

In Lowry's several lighting provisions, simple in themselves, are skillfully coordinated. A pictorial analysis of this lighting by its components and their combinations shows clearly what each element contributes and how they build up to an effective selling ensemble. The accompanying illustrations tell this story, subject to the limitations of photography and printing.

General illumination averaging 35 to 40 footcandles on the tables is provided by 26 louvered and recessed troffers, each containing three 40-watt T12 white fluorescent lamps. With this system alone the room lacks cheerfulness.

Here again specialized display lighting plays its important role of drawing attention to the perimeter displays. As on the main floor, the brightness of vertical surfaces is far more noticeable to the shopper than that of equally illuminated table displays. Here 30 additional fluorescent lamps, about 1360 watts, are profitably utilized for a definite sales need.

Here's how the basement lighting systems combine to enliven the room and make it serve its function more effectively.

The smaller basement sales area is devoted to toys and games and measures about 24 by 67 feet, with a seven-foot ceiling of acoustic material. In this space, a simple but effective lighting plan comprising general and display lighting is employed.

Mr. Lowry and his architect have in this store given us an example of a thoroughly rational lighting scheme, intelligently developed and integrated both structurally and functionally.

The finished plan for the lighting was checked by Mr. Edward J. Krok of Belson Manufacturing Co., the manufacturer of the lighting equipment. Installation was made by Horton Electric Co. of La Grange, electrical contractor. The store fixtures were manufactured by Gregor Cabinet Works of Brookfield, Ill.

MERCHANTS CHOOSE SLIMLINE TO SELL CARS OR CLOTHES

Motor City Retail Establishment Seeks Modernizing Appearance Value and Efficient Sales Appeal of these Lamps

In Janet's Shop located in an outlying business district of Detroit the 96T8 Slimline (120 ma.) lamps supply 50 footcandles maintained throughout the store. The outside rows were planned to help direct the eye to the rear of the store. All clothes racks are lighted with General Line F lamps concealed in projecting valances. The total interior wattage is 7300 watts — 3600 of which is for general lighting and 3700 is for supplementary. Merchandising area is 50 feet wide by 60 feet deep, ceiling height is 12 feet.

SHOWROOM

POWERS MOTOR COMPANY DETROIT

In this open-front type display room of the Powers Motor Co., Detroit the two continuous units employing 96T8 Slimline (120 ma.) lamps attract attention. The reflections of these extended light sources in the metal surfaces of the cars accentuates the lines and contours of the bodies and their decorative trim. The reflection of the light ceiling helps to brighten the surfaces between the highlights. The level of illumination is 75 footcandles.

SLIMLINE BEAUTY SCORES FOR THE ARDEN SHOP

The owner of this store feels that the general and supplementary lighting systems produce an effective merchandising atmosphere, highly conducive to building customer confidence, sales volume, and repeat business. Note the illumination on the vertical surfaces of walls and cases which contribute to appearance.

Popular Detroit Women's Store Builds Sales Appeal With Well-planned Lighting

◀Lighting for Attention is well illustrated in this view of the supplementary lighting features. The eye-attracting power of this well-planned perimeter and island display lighting assures Mr. Samuel Glass, owner of this modern store, that his customers are giving their full attention to his featured merchandise. The lighting in the wall cases, showcases, window curtain and drapery displays and overhead spots total 3000 watts.

The continuous rows of exposed 96T8 Slimline lamps are operated at 120 ma. The brightness of the lamps is then about 70% of the standard 40-watt T12. An average of 45 footcandles is maintained over a store area of about 2000 sq. ft. The room is 72 feet long, 27 feet wide and 12 feet high. General lighting wattage — 3200 watts.

PLANNED LIGHTING *Gave Us What We Wanted*

By M. M. ALLON, Nolla Shops, Pittsburgh, Pa.

WHEN it was decided to modernize our store in Pittsburgh, we found that the lighting proved to be one of the most difficult problems. We were confused with the many questions which faced us. Should we use filament lamps or fluorescent lamps, or a combination of both? If we chose fluorescent lamps, what size and type and color quality? What type of fixtures, shielded or unshielded, suspended, flush-mounted or built-in; should they be installed crosswise or lengthwise to the room? How about applications of Circline or Slimline? There were many other questions that needed answers before we could be confident we were choosing wisely, making a worthwhile investment in a new, modern lighting system.

We decided that the options among today's lighting systems are too complicated and technical for laymen. We did not care to leave to chance what our illumination would do for us. Perhaps a casually assembled system would produce light. It probably would not be good sales lighting.

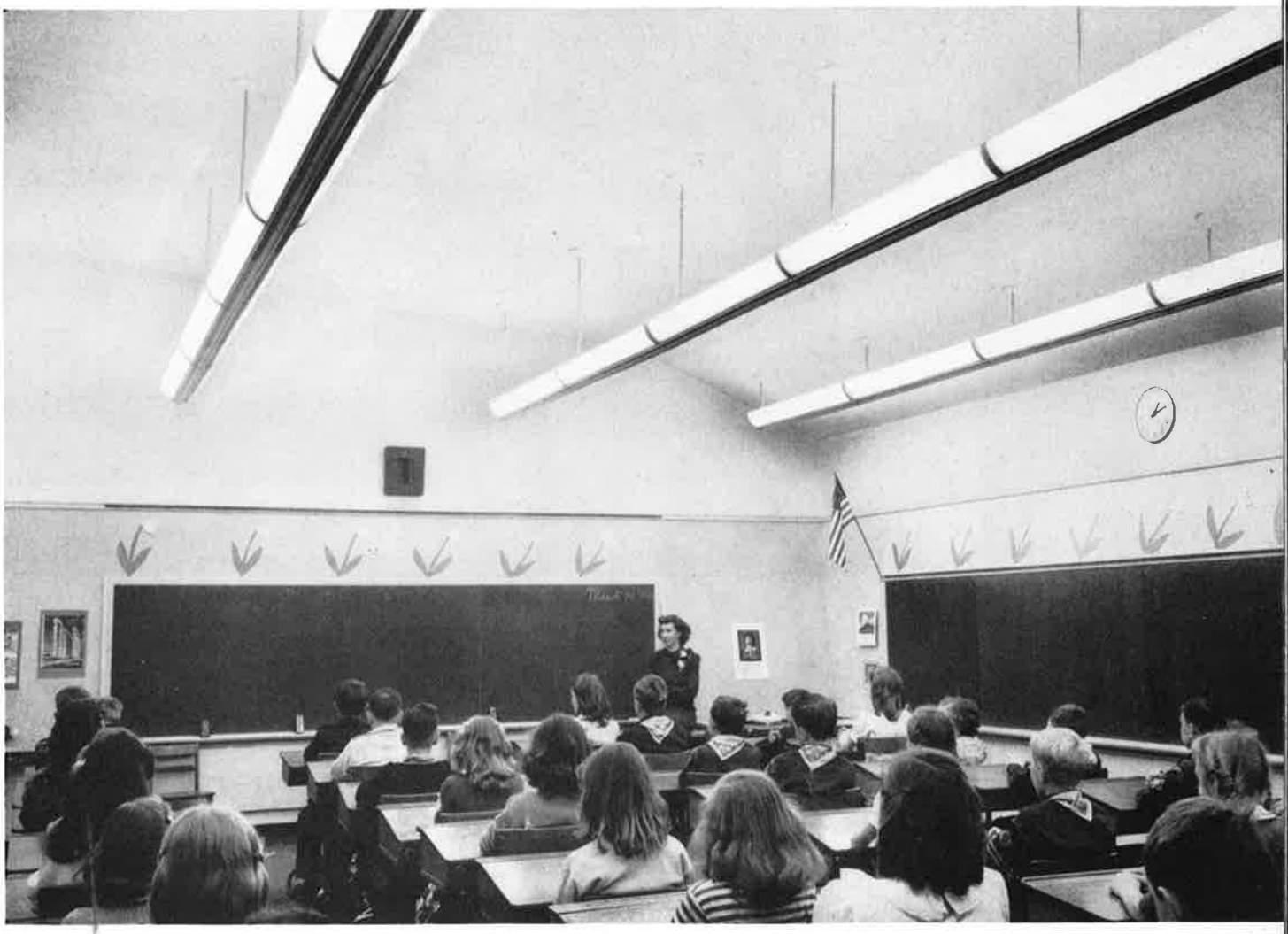
We could have installed a lighting system we had seen in another store. But no two stores are identical. They vary in size, interior finish, surroundings and in the kind of merchandise sold. Besides, we desired individuality and an illumination tailored to our store, our pocketbook and our merchandise.

Our problem required the counsel of lighting experts who would consider the lighting of our store in both technical and commercial aspects. The answer came in a letter from the Commercial Department of the Duquesne Light Company in Pittsburgh. That letter convinced us and it is reprinted here for the benefit of those who may have problems similar to ours. The letter accurately anticipated what we needed and we quickly took advantage of the offer of a "Planned Lighting Service" free from the "Man Who Plans."

When the "Man Who Plans," Eugene Dunlap of the Duquesne Light Company, called, we were impressed with the way he sized up our requirements. We agreed at the beginning that the modern lighting system best suited for us should strive to (1) attract more customers to the store, (2) aid the customers in their appraisal and selection of merchandise as to color, quality and value, (3) create an individuality and atmosphere conducive to shopping and buying, (4) be harmonious with the kind of store we operate.

Of course, detailed information on the store layout, dimensions, arrangement of counters and wall cases and location of display niches, figured in Mr. Dunlap's recommendations.

When the plan was complete, each detail of it was thoroughly explained along with the reasons for it. Our lighting system was installed exactly according to the plan. After months of service we feel that we have made an investment in modern lighting which is definitely to our advantage. "Planned Lighting" is the means by which a merchant can get what he needs and should expect of a modern installation which follows modern sales strategy and of the new techniques in the art and science of illumination. The planning services of light and power companies, manufacturers, dealers and electrical contractors should be made known to all their customers. Such services, as were rendered to us by the Duquesne Light Company, are really appreciated.



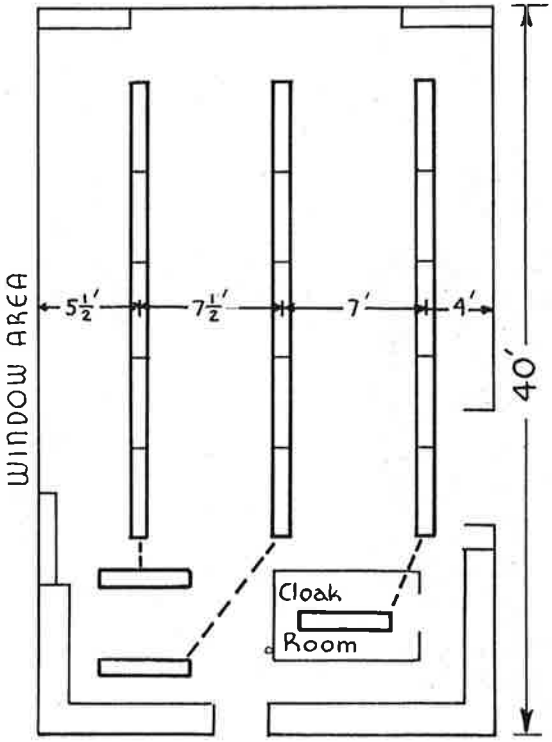
ROSS SCHOOL, ROSS, CALIFORNIA

School administrators and school boards are giving increasing attention to improved standards of classroom lighting. A good example of the growing concern for the protection of young eyes is indicated in a new installation at Ross Elementary School, reported by John S. Walsh, Pacific Gas & Electric Company.

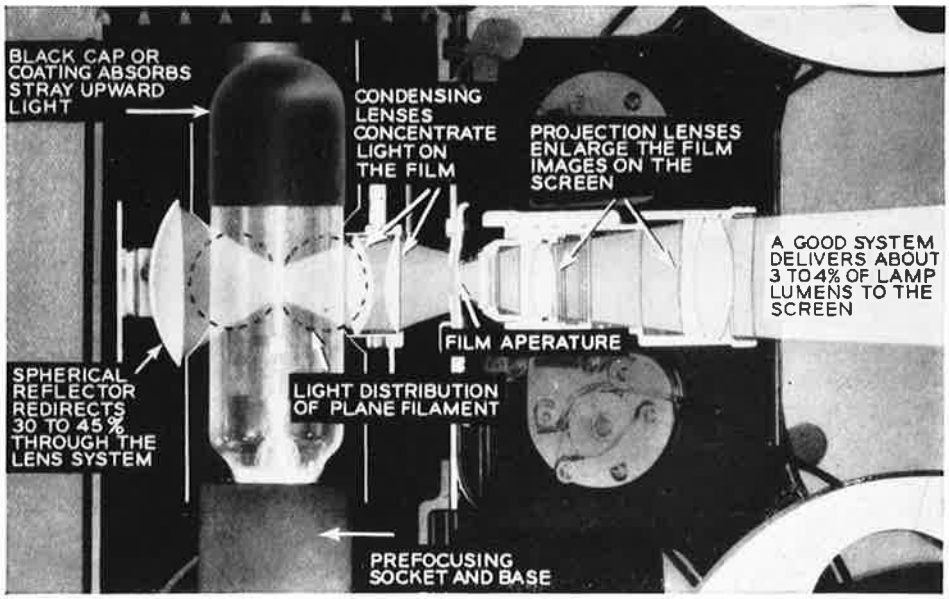
The new system for this 24 by 40-foot room consists of three rows of Guth-Cadet units, five units to the row plus three separate units at one end of the room. Each unit is equipped with two 100-watt fluorescent lamps. Foot-candle readings after nearly 1000 hours of service averaged 55 on the desks. Units are 10 feet above the floor.

Walls are light blue-gray, and the ceiling, which slopes from 12 feet over the windows to 10 feet at the opposite wall is a lighter tint of the same color. Venetian blinds, plus light shades provide shielding for window lighting.

The lighting was designed by Gilbert Trosper of Pacific Gas & Electric Company. J. E. Barnes of the same company, worked with Tamalpais Electric Company of San Anselmo on the installation. The school officials and the community are so pleased with the new lighting they are planning to relight three more classrooms with similar systems.



LAMPS FOR LIGHT PROJECTION



One form of optical system, typical of the small portable motion picture projectors that have made home movies both practical and popular. A glance at the picture shows that good projector performance must inevitably mean close collaboration between projector manufacturers and lamp makers. It is this co-ordination of lamp and optical system design that has made possible a sustained increase in screen brightness.

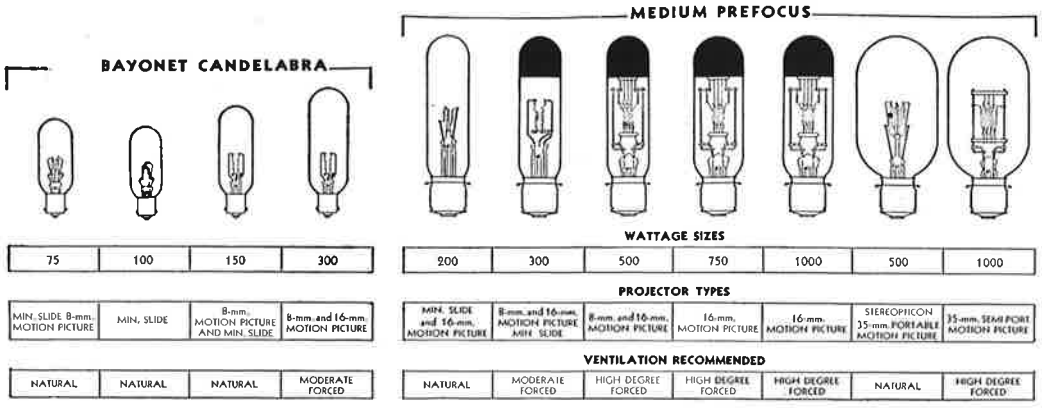
Lamps for Light Projection

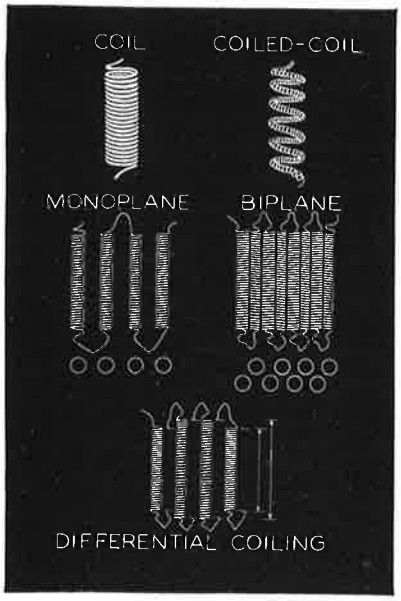
Light sources used in picture projection systems represent extreme precision in lamp making. Light must be accurately controlled in the interest of efficiency and compactness. Filaments must be accurately located at the focal points of the optical system by extreme care in positioning the filament with respect to prefocusing bases. Highly concentrated monoplane and biplane filaments accurately regulated as to horizontal and vertical dimensions are employed. Tubular bulbs allow the spherical reflector and condensing lens to be placed close to the filament to intercept all possible light. A lamp with a 750-watt filament operating at a temperature of 5300° F and only three-quarters of an inch away from the glass envelope which has a maximum safe operating temperature of 975° F must dissipate as much energy as a one-horsepower motor. Forced ventilation of lamp housings is necessary in many cases to keep glass from softening.

RECOMMENDED LINE OF PROJECTION LAMPS

Most modern projectors are designed around the fourteen types of lamps listed below. This line of lamps gives an adequate range of sizes from 75 watts to 2100 watts. The group of seven lamps with medium prefocus bases from 200 watts to 1000 watts represent 80% of the demand, with approximately 10% each for both the lower and higher wattage group.

It will be noticed that this recommended standard line exhibits only focusing types of bases in candelabra or bayonet, prefocusing and bipost which assure accurate light positioning. Early models of projectors, almost universally, used screw bases. This aspect alone doubles the number of lamp types. The early use of non-standard voltages further multiplied the line several fold.



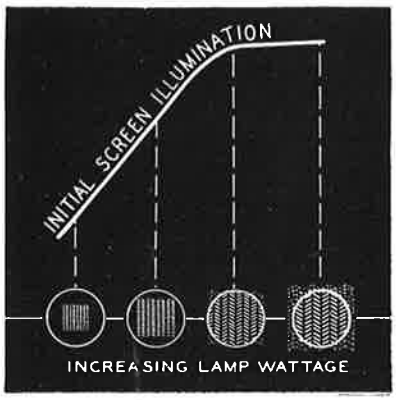


Lamp Filament Forms

The amount of incandescent filament that can be included within a given source area depends upon the filament construction employed. All filaments for projection lamps are first concentrated by coiling. For some, further concentration is obtained by coiled-coiling (the coil is coiled upon a second mandrel). These coiled filaments are then arranged in one or two planes so that most of the light from the coils goes directly either to the condensing lens or to the spherical mirror for redirection to the condensing lens. When all the coils are in one plane a monoplane filament construction is the result and when they are arranged in two planes the construction is biplane. These are the two constructions which are essential to efficient utilization by projection systems.

Differential Coiling

The sketch shows what is meant by differential coiling of filaments. The life of a lamp is determined by the temperature of the hottest part of the filament, while screen illumination depends upon the average temperature (brightness) of the filament. When coils are equally spaced in all segments, the middle ones become hotter than those at the sides and the center coils fail sooner. By differential coiling (using different spacings in different segments) the heat disposition in each is equalized at a higher average temperature, or brightness—thus screen illumination is increased for a given design life.

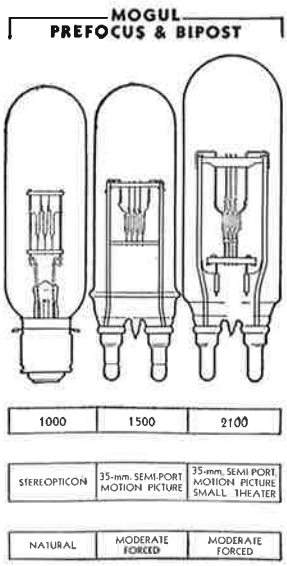


Lamp Wattage and Screen Illumination

Even when the most concentrated filament constructions are employed, there is a limiting wattage of lamp for each type of projection system. The circles in the diagram represent the space at the source plane from which light is utilized by projector optical systems. The area on the filament image increases with the lamp wattage, and larger wattage lamps can be used with corresponding increases in screen results only until the filament size equals the limiting dimensions of the optical system. Beyond this limit increased wattage yields little improvement in the picture brightness and adds to the problems presented in carrying the extra heat away from the lamp, film, and projector.

G-E Lamp Ordering Abbreviations:

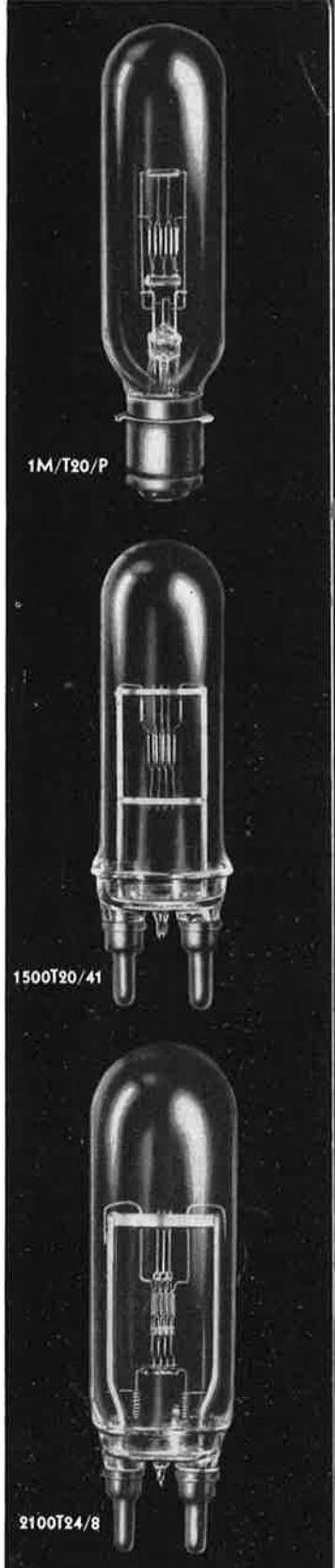
The lamps shown on these pages are identified by their "ordering abbreviation." All G-E large lamps are similarly identified. Some such scheme was necessitated by the thousands of different types of lamps available. In general, the ordering abbreviation includes the wattage (amperes), the bulb size and shape, perhaps the base or some following letter or number which refers to color or finish of the bulb or special characteristic so that it may readily be identified in the catalog listings.



Photocell Exciter Lamps

These are small, precision-made lamps of special design for use with sound reproduction systems. They are used to illuminate the sound track on motion picture films. The sound track regulates the amount of light transmitted through the film, the variations of which are picked up by a photo-sensitive cell and in turn are transformed into electric impulses which produce the sound.

Exciter lamp recommendations for any projector should be limited to the lamp or lamps listed for that model. The optical systems for sound reproduction are designed with special consideration for the dimensions and shape of the filament of the exciter lamp. Substitution of other lamps having different filament shapes or dimensions almost invariably impairs the effectiveness of the sound reproducing system, either because the dimensions of the scanning beam at the film are altered or because the quality or amount of illumination in the beam is changed. In addition, substitution of other lamps is usually impracticable because the electrical supply will not readily furnish the proper voltage and current to a lamp of different rating.



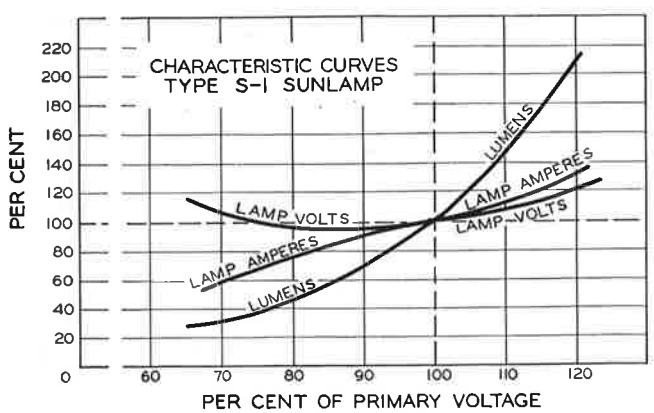
MERCURY-VAPOR SUNLIGHT LAMPS

The bulbs of these lamps are made of a special glass which transmits ultraviolet radiation having a wavelength of more than 2800 angstroms and absorbing shorter wavelength radiations harmful to the eyes. These sunlight lamps emit considerable energy in the 2900-3100 angstrom ultraviolet region, which radiation is most effective in producing erythema (reddening of the skin). In general, the radiations causing reddening of the skin also produce sun-tanning.

Type S-1

The Type S-1 sunlamp is designed for uses where a combination of ultraviolet radiation and visible light is desired. It consists essentially of a mercury arc between tungsten electrodes, with a tungsten filament in parallel with the electrodes to facilitate starting. The visible light is a combination of the mercury lines and continuous spectrum. In the Type S-1 a small amount of mercury and some argon gas are placed within the bulb, and when the lamp is first turned on, the tungsten filament is heated to a very high temperature and becomes an excellent electron source. The electrons travel between the upper ends of the filament, or more probably, from each end of the filament to the opposite electrode, since that gives a shorter path with the same voltage drop. There is sufficient voltage to produce ionization of the argon and an arc is started; the bombardment of the electrodes makes them hot enough to furnish electrons for the arc. As soon as this happens the arc moves up between the electrodes. The mercury vaporizes quickly, the voltage drops and the current rises to normal. The mercury discharge partially shunts out the filament, the filament temperature dropping several hundred degrees when normal operation begins. Like the other mercury-vapor sources discussed, all G-E sunlight lamps except the RS lamp will not operate on ordinary lighting circuits, but require properly designed equipment to produce the correct starting and operating voltage.

Lamp failure is caused by filament burnout (usually near an electrode because the discharge on starting is from each end of the filament to the opposite electrode) and wearing out of the electron-emissive material on the electrode.



The maximum ultraviolet output from S-1 lamps is obtained when they are operated vertically base-up. The approximate relative ultraviolet output at other angles is as follows:

Angle	Relative Ultraviolet, Per Cent S-1
0 (Vertically Base-up)	100
22.5	78
30	70
45	56
67.5	43
90	40

Type S-4 and RS-4

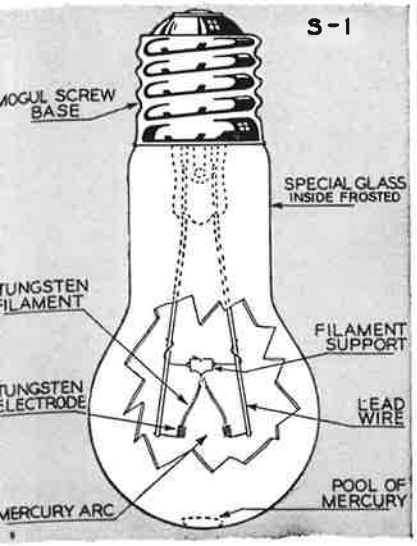
The S-4 sunlamp is a capillary mercury source of low wattage and relatively high ultraviolet output. The operating principles are covered in the discussion of the type H-4 lamp. The RS-4 lamp uses the same capillary mercury element as the S-4 but in a reflector type bulb of proper spectral transmission characteristics.

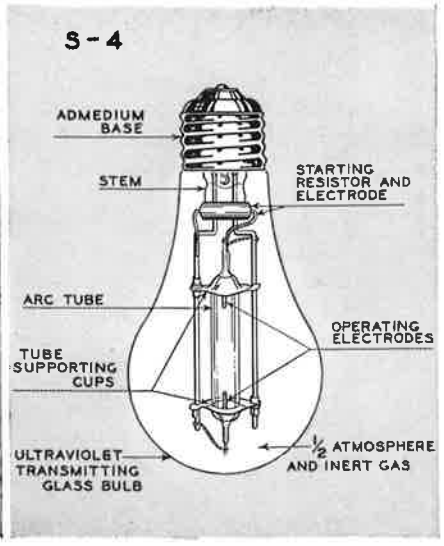
Because it requires an external ballast (any of the Type H-4 transformers can be used) the RS-4 is made with the admedium screw base and therefore, it cannot be inserted in the common household socket. Because it was designed principally for poultry and animal husbandry applications, the RS-4 has a heavy frosting at the end of the bulb to give a wide distribution of energy and reduce the number of units required to irradiate the birds or animals. The erythemally effective intensity at 60 degrees from the axis of the lamp is 50 per cent of the maximum, indicating the degree to which the heavy frosting spreads out the radiation. Because the birds move around considerably and the feathers absorb part of the ultraviolet, the recommended exposure time is 1 to 3 hours when the lamps are mounted several feet above the floor.

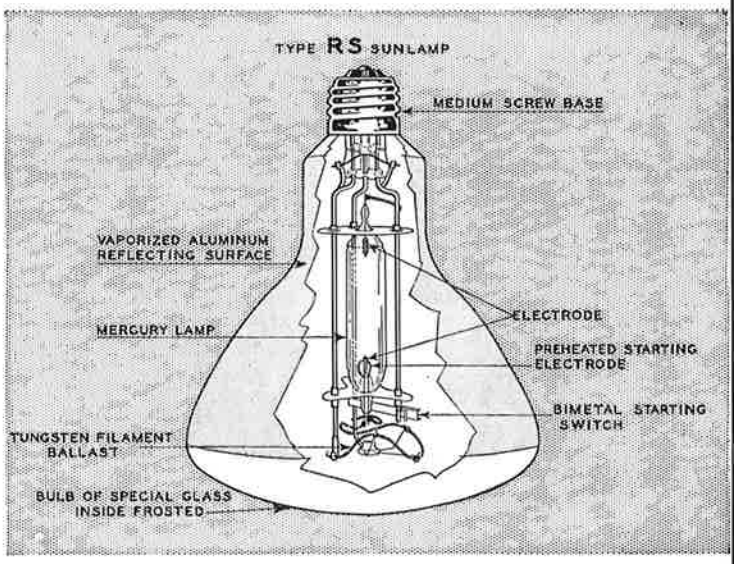
Though the ultraviolet output of the S-4 depreciates rapidly when the lamps are new, after the first few hours of burning the depreciation is comparable with the S-1. The S-4 exposure periods should be reduced when an old lamp is replaced with a new lamp.

Type RS

As mentioned, the RS sunlamp is a self-contained unit with a mercury discharge element and a tungsten-filament resistance ballast incorporated within an ultraviolet-transmitting, reflector-type bulb. The integral bimetallic starting switch first allows current to pass through the filament ballast and an auxiliary starting electrode which brings the latter up to emitting temperature. The switch is so oriented that in several seconds the heat from the filament ballast causes the bimetallic switch to open and the full line voltage starts the mercury element. The temperature of the filament then is reduced because it is in series with the mercury arc rather than the lower resistance







value represented by the starting electrode. During operation the heat from the filament ballast is sufficient to hold the starting switch open. The starting switch is similar in operating characteristics to thermal-type starters used for fluorescent lamps.

The RS lamp takes around 3 minutes to reach full light output on starting and approximately 5 minutes for restarting. Part of this time is required for the bimetallic switch to cool down and close, and no light is produced during that period. RS lamps may "blink" before becoming stable, particularly on restarting. Direct-current operation is not recommended because arcing at the contacts of the built-in thermal switch results in short life. The life of the RS lamp on normal a-c circuits in household use has been estimated as approximately 400 applications.

E-Viton Rating of Sunlamps

In specifying safe "doses" of radiations from sunlamps, the term "footcandle minutes for MPE" (Minimum Perceptible Erythema) was formerly used. Thus, any meter for measuring light intensity could be used in determining the footcandle portion of the "footcandle minutes for MPE" specification. But this method cannot be used with sources that allow the ultraviolet to pass but filter out the visible radiation. Therefore the unit "E-viton" (Erythemal viton) has been developed and is now used to measure the energy which produces sun-tanning of the skin. The E-viton is that amount of radiant energy which will produce the same erythemal effect as 10 microwatts of 2967A wavelength.

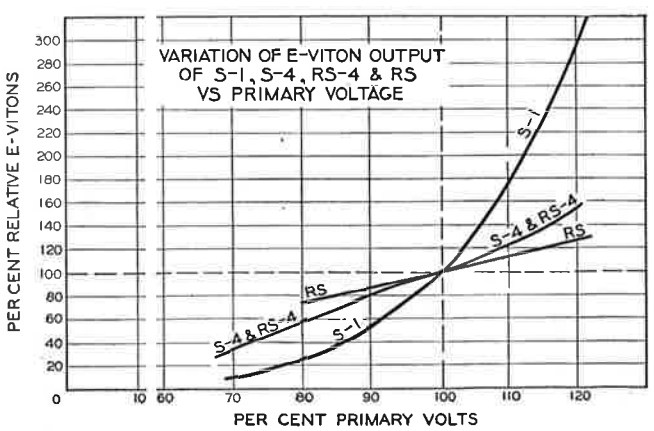
The following table gives nominal E-viton outputs of the sunlamps just described:

Lamp		E-vitons
S-1	(without reflector)	68,000
S-4	(without reflector)	50,000
RS-4	(Reflector type)	35,000
RS	(Reflector type)	25,000

Exposure times vary with individuals and it is difficult to give recommended values which are effective and satisfactory for all people. Too, the exposure can be increased as a person becomes accustomed to the radiation. A value of approximately 225 E-viton minutes per square inch is considered the average value to produce a minimum perceptible erythema of untanned human skin. In general, an exposure of 5—10 minutes at a distance of 30 inches from new lamps will produce a mild sunburn on untanned skin.

While the total E-viton output of the RS lamp is lower than that for the RS-4, the energy is delivered in a more concentrated beam, so that the erythemal effectiveness along the axis (equivalent to end-on candlepower) is over twice that of the RS-4. The intensity for the RS at 30 inches is around 25 E-vitons per square inch, as compared to approximately 12 for the RS-4. Comparable values for the S-1 and S-4 will depend on the contour and efficiency of the reflector used with these lamps.

The ultraviolet output of sunlamps is significantly a function of primary voltage as shown by the curves below. The relative E-viton output increases rapidly if S-1 lamps are operated over-voltage. Lamp life will, however, be reduced by over-voltage operation.



GLOW LAMPS

It has long been known that if sufficiently high voltage is applied to electrodes that are sealed within a bulb containing an inert gas (neon, argon, helium, etc.) at the proper pressure, light is produced at the negative electrode or cathode. For this reason glow lamps are sometimes called "negative-glow lamps" since all the glow takes place at the negative electrode. This is evident on direct current, but on alternating current the reversal of polarity is so rapid that both electrodes appear to glow. This phenomenon was early associated with high voltage, but later methods have been developed for so sensitizing electrode surfaces with free electron materials that the voltage for initiating a discharge in these rare gases has been reduced to as low as 60 volts on direct current and 42 volts on alternating current. Glow lamps are now practicable for use on standard commercial lighting circuits. Various sizes and types of glow lamps are now available ranging from about 1/25-watt to 3 watts in power consumption.

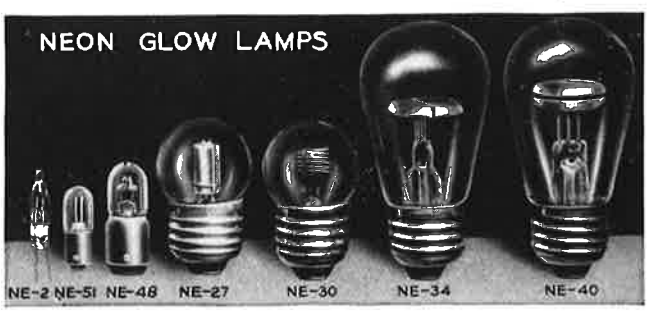
Neon gas is most generally used in glow lamps, and produces an efficiency of about .3 lumens per watt. Since the light output of glow lamps is not great, they find only limited use as sources of illumination; they are valuable, however, as signals, pilots, night lights and indicators of live circuits and by intensity of glow give some hint as to the applied voltage.

Glow lamps are finding a great variety of uses in these applications because of their low current consumption and wide voltage range, insignificant heat, reliability and ruggedness and long life.

The low current consumption is indicated by the current range which is from only 0.0004 ampere for the smallest to 0.030 ampere for the largest lamp as now manufactured.

These lamps are extremely dependable. Unlike other lamps, they do not suddenly fail at the end of some definite period, but rather, slowly decrease in light output during a period of some 3000 hours. During this time, slow disintegration causes the walls of the bulb gradually to darken, and this is accompanied by an increasing cathode drop, so that after 3000 hours use and light output has dropped to 70 per cent of its initial value.

This process continues until the lamp is no longer useful as a light-giving device. Unless the lamps are broken or subjected to a mechanical shock sufficiently violent to short-circuit the electrodes, they will not suddenly fail. This reliability recommends them for many unusual uses.



Performance Characteristics

Glow lamps are not affected by voltage variations to the same degree as filament lamps. Their light output varies in almost direct proportion to the current, while life varies, roughly, inversely as the cube of the current. It is, therefore, apparent that ordinary fluctuations experienced on commercial circuits will have but a small influence on either the life or light output.

There are two separate and distinct voltages to be considered when discussing supply voltage at which glow lamps will start and operate, viz., (1) breakdown voltage and (2) maintaining voltage.

Breakdown voltage is that voltage at which the gas becomes ionized and begins to pass current. Below this starting voltage the lamp cannot be made to light since current will not pass.

Practically all glow lamps that start under 90 volts direct current have electrode surfaces so sensitive that they emit electrons photoelectrically when light falls on them. This current emission aids in reducing the breakdown of the lamp.

Maintaining voltage is the voltage at which the lamp will remain lighted after having started. On alternating current the maintaining voltage is practically the same as the breakdown voltage, while on direct current it is approximately 15 volts lower. There is, therefore, a considerable difference between the supply voltage and that at which the lamp will remain lighted. This is absorbed by a ballast resistor which serves to stabilize the lamp.

Volt-ampere Characteristics

Glow lamps, like all electric discharge lamps, have a negative or "run away" characteristic. Because of this characteristic, if the lamp were connected directly across a source of voltage sufficiently high to ionize the gas, the current would immediately rise to such proportions as to destroy the lamp. It is therefore, essential that a limiting resistance be used in series with the lamp. In screw base lamps this resistor is incorporated in the base; in the case of bayonet base lamps, which are manufactured without a resistor, the proper resistance must be supplied externally in the circuit by the user.

The Nature of the Radiation from Glow Lamps

Neon glow lamps give an orange-red glow since they radiate mainly the red and yellow rays. There is some radiation in the infrared. There is very little visible radiation in blue or violet. The glass bulb absorbs whatever small amount of shorter wave ultraviolet radiation may be generated in the discharge.

Argon glow lamps, which consist of a mixture of gases, radiate mainly blue, violet and in the near ultraviolet region. The negative glow appears blue-violet. The fact that there is strong radiation in the near ultraviolet region can be demonstrated by the fluorescent effects produced on uranium glass and many phosphorescent and fluorescent substances. Commercially, therefore, the argon glow lamps are used to some extent as convenient ultraviolet sources.

GLOW LAMPS—105-125 Volts

Order Designation	Watts (Nominal)	Bulb	Base	Maximum Over-all Length, Inches	Approximate Starting Voltage A.C.	Approximate Starting Voltage D.C.	Approximate Series Resistance Ohms*
NE-2	1/25	T-2	Unbased (Wire Term.)	1 1/16	65	90	200000 EX
NE-51	1/25	T-3¼	S. C. Bay. Min.	1 3/16	65	90	200000 EX
NE-48	1/4	T-4½	D. C. Bay. Cand.	1½	65	90	30000 EX
NE-45	1/4	T-4½	Cand. Screw	1 5/8	65	90	30000 IN
NE-27	1/2	G-10	Medium Screw	2 1/16	105	†	3500 IN
NE-30	1	G-10	Medium Screw	2 1/16	60	85	4800 IN
NE-32	1	G-10	D. C. Bay. Cand.	2	60	85	4800 EX
NE-34	2	S-14	Medium Screw	3 3/16	60	85	3500 IN
NE-36	2	S-14	SK. D. C. Bay. Cand.	3¾	60	85	3500 EX
NE-40	3	S-14	Medium Screw	3 5/16	60	85	2200 IN
NE-42	3	S-14	Sk. D. C. Bay. Cand.	3¾	60	85	2200 EX

* EX—external; IN—internal.

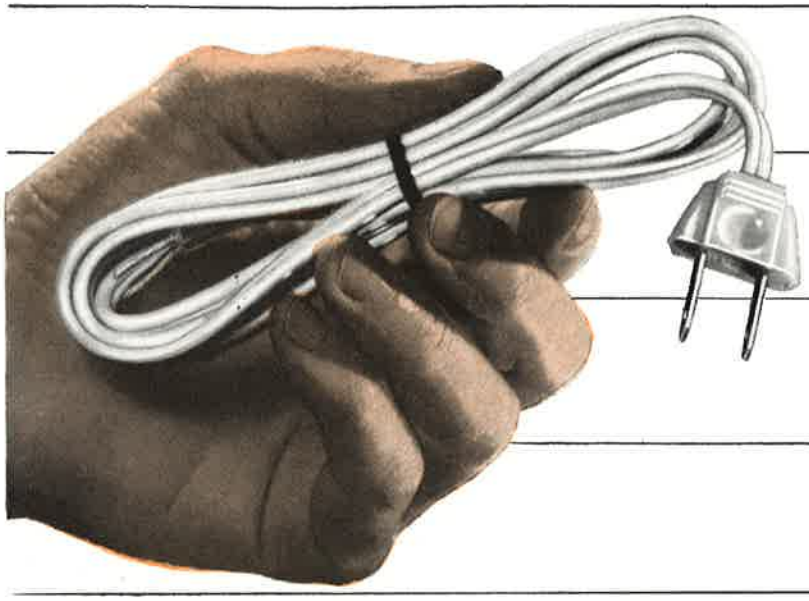
† Not recommended for d-c service.

NE-56 is similar to NE-30 but designed for 210–250-volt circuits.

THIS NEW

FLAMENOL*

ONE-PIECE CORD SET



ADDS...

BEAUTY

SERVICE

AND

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There's a smart finishing touch for lamps of all types in the new G-E Flamenol cord set. The smooth, clean, pleasant-to-feel finish helps sell the product. It adds a note of high quality and long-lived rugged construction.

Developed by General Electric, the patented molded-on plug increases strength at soldered connections to assure long use. It's built to withstand wear and tear. Fabricated in one piece, the G-E Flamenol cord set is almost indestructible. The cord resists water, oil, acid, alkali, and will not deteriorate or crack in sunlight. It won't bloom or peel.

In manufacturing — assembly and inspection operations are reduced by installing this complete, factory-tested cord set. Made at present in ivory and brown. For information on G-E Flamenol Cord Sets, write Section Q19-9101, Appliance and Merchandise Department, General Electric Company, Bridgeport 2, Connecticut.

Trade-mark Reg. U. S. Pat. Off.

GENERAL ELECTRIC

The new G-E Lighting Institute at Nela Park offers many beautiful views incident to its main purpose as teaching center of the University of Light. A much admired view is the one above with a fountain pattern seen against the curve of the new east facade. The same scene has different beauty at night when the fountain illumination tints the spray. An early issue of the Magazine of Light, will be entirely devoted to the Institute, will show many scenes from the demonstration rooms with discussion of their lighting story.