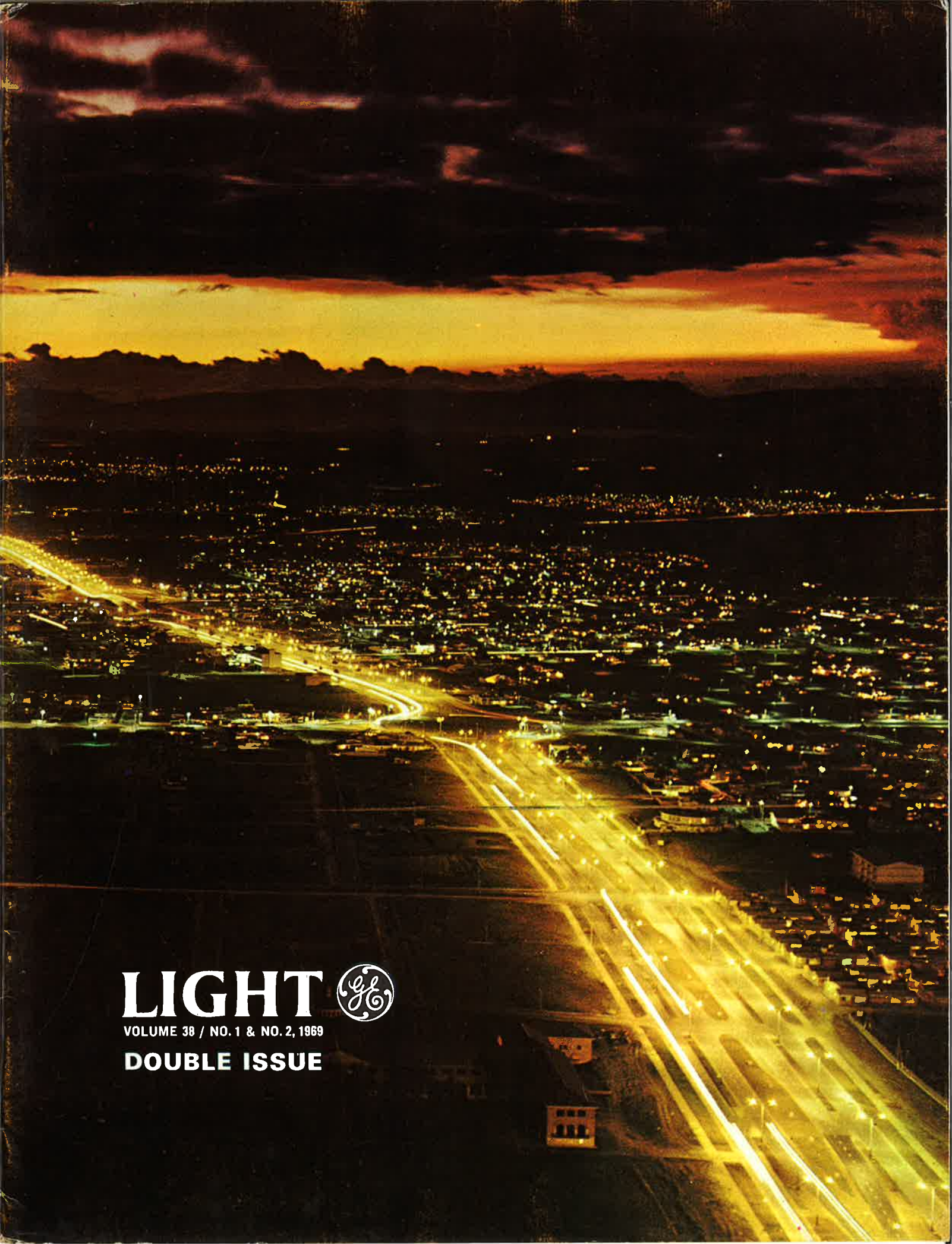


LIGHT

VOLUME 38 / NO. 1 & NO. 2, 1969

DOUBLE ISSUE

LIGHT

Published in the interest of the progress of sound lighting practices.

CONTENTS:

COVER

The panoramic cityscape on front and back covers combined is of Bogota, Colombia. The new street lighting, one of the major modernization projects in Bogota, is a dramatic visual symbol of progressive vitality in the South American metropolis. The metropolitan scale of the lighting project is illustrated in greater detail by the city map shown on pages 32 and 33. Cover photograph is by Dave Ulrich, Nela Park.

FRONTISPIECE

Paraphrased, "A partridge in a pear tree" comes out "A Lucalox in a spruce tree," describing the crowning ornament on the theme-feature tree of the 1967 decorations at Nela Park. Why Christmas in midsummer? Professional Christmas decorators work year-round. Doing preliminary on-site planning and ground work in midsummer, and planning major display pieces for early construction scheduling, do much to cut one of the major frustrations—the last-minute display—out of the Christmas-rush season. Photo by Vance Roth, Nela Park.

VOLUME 38, NUMBERS 1 and 2, 1969

Published quarterly by the Large Lamp Department, General Electric Company, Nela Park, Cleveland, Ohio. Distribution made through the GE Lamp Division Sales District Offices.

THE FUTURE

HIGH INTENSITY LAMPS IN THE THIRD AGE OF LIGHT by Dr. H. H. Marvin, General Manager, High Intensity and Quartz Department, GE Lamp Division

Clearly emphasized in the introduction of The Third Age of Light (Vol. 35, No. 1, LIGHT Magazine) was the importance foreseen for High Intensity Discharge and Quartz lamps in applications and markets of the future. In that introduction the author, Mr. R. T. Dorsey, Manager, Lighting Development, Nela Park, said, "We look forward to the Third Age of Light—the age of refinement. We have more lamps, more techniques than ever before. And . . . a public eager to use them."

The drama of growth and profound change in lighting practice that followed introduction of the Third Age concept has far exceeded the relatively conservative optimism we expressed then. Two years ago we began to organize our specialized interests in High Intensity Discharge (H.I.D.) lamps—Lucalox, Deluxe Mercury, Multi-Vapor — and in Quartzline lamps. Today that specialization is mandatory in the lighting market.

Implementation has grown with the need. Correlation of researches, product developments, manufacturing techniques, applications methods and light-control technology has focused the largest aggregation of the best minds and skills in the industry on the needs of the market we have been serving.

The Third Age introductory statements typified some of the major needs . . . more light and more comfortable light . . . increased vision research . . . integration of lighting, heating and cooling . . . more study of color . . . better shielding and utilization of light . . . greater sharing, with architects and engineers, of the awareness that lighting is related to their professional achievements . . . creation of environments with light . . . understanding and implementing interior designers' needs in terms of the appearances of interior spaces . . . development of computer programs that compare for lighting designers the economy and effectiveness of multiple lighting choices, each a complex of multi-variables. At the time those objectives were expressed in introduction of the Third Age of Light concept, it was not clear that they were virtually a bill of particulars for the commissioning of a new department within the General Electric Lamp Division.

Today the HI&Q Department of General Electric's Lamp Division exists as that new department. The brains, skills, and productive capabilities that have been focused on HI&Q products and services are now chartered to cope with a growth rate and pace multiplied far beyond early predictions. The needs have been foreseen and met; now the magnitude of those needs is being met.

Dr. Henry H. Marvin is manager of the new High Intensity and Quartz Department of the General Electric Lamp Division; he previously headed the GE Lighting Research Laboratory.

The new department he heads is responsible for the development, production and marketing of high intensity discharge lamps and tungsten-halogen incandescent lamps.

The HI&Q Department services will be rendered through Large Lamp Department Sales and Service District offices of the General Electric Lamp Division.

Several years of intensive specialization have preceded organization of the HI&Q department. Both Mr. Dorsey and I fully share the view that important guiding factors as to lamp use have been established, and that significant trends have pointed out much about tomorrow's application techniques and tomorrow's standards for effectiveness.

Leader among H.I.D. (high intensity discharge) lamps is the Lucalox lamp. Its high efficiency has proved to be the major determinant in an overwhelming number of lamp-choice decisions. With recent improvements this lamp is now at 115 lumens per watt, at minimum 25% higher than any other light source used for all types of general lighting applications. Many applications are typified on the following pages. Hundreds of miles of streets, traffic lanes and roadways, and hundreds of acres of parking lots and industrial plants are

now lighted with Lucalox — ample evidence of the popularity of this lamp as a proven lighting tool. This application response was really not unexpected, given the unprecedented efficiency of Lucalox lamps. Somewhat unexpected, although not so very surprising, was the wide range of building floodlighting installations, many of which are landmarks in their surroundings. Unexpected, too, is the new trend toward use of Lucalox in commercial spaces.

Now, another type of H.I.D. lamp—Multi-Vapor—is poised for major penetration of interior and exterior markets. As a result of significant improvements in lamp performance, the restriction that Multi-Vapor lamps be used only in enclosed luminaires has been lifted for all 400- and 1000-watt lamps designated for base-up operation — the type normally used indoors. With an efficiency of 80 lumens per watt, Multi-Vapor lamps now offer an attractive alternative to fluorescent lighting with the advantages of lower cost of light, easier maintenance, fewer lighting fixtures to install and better architectural appearance.

The third major type among H.I.D. lamps is Deluxe White Mercury. It has already found wide acceptance; has, in fact, become by far the most popular mercury lamp color. In test rooms viewed by 2,000 observers, Deluxe Mercury lamps were preferred by as many people as Cool White fluorescents—and Cool White fluorescent has long been a mainstay of lighting. In particular, Deluxe Mercury is of interest to supermarkets and other mass-merchandising establishments. Its advantages over any other product are many—very long life, proven performance, good uniformity of color, wide variety of sizes, good lumen maintenance, smallest variation between new and old lamps. The popularity of new Deluxe White mercury lamps has been brought about by color developments that have elevated the visible color of mercury lighting to a new high stage of acceptance. Deluxe White mercury lamps now compete with the lamps that have been most popular traditionally. And the fast growth of Deluxe White mercury usage in this competitive position has been solidly supported by the long strong history of performance behind the basic principles of mercury lamp design. Deluxe White mercury can be expected to have the greatest short-range impact on commercial and industrial interior lighting.

While not technically a discharge lamp, Quartzline incandescent lamps are included among high intensity sources. Their high concentration of energy offers new opportunities for good optical control, sophisticated lighting techniques and innovations in luminaire design. The advantages of almost perfect lumen maintenance, double life at the same efficiency as other incandescent lamps, and a very wide variety of types and beam controls ensure that Quartzline lamps will be very much a part of the lighting picture for years to come.

I concur fully in Mr. Dorsey's statement that, "Today's lighting designer has at his command a potent and exciting list of lighting tools. And in contrast with usage of the sources of the age of incandescence and the age of fluorescence, the Third Age sources — incandescent, fluorescent and high intensity discharge lamps — will be used in a balanced approach with each type applied, individually or in combinations, to achieve the best in-service advantages. When one considers that the 1970's are assuredly going to be a decade of emphasis on quality in lighting applications, can anyone resist the conviction that the stage is set for new directions in lighting that will lead us far beyond our past achievements?"

This entire issue of LIGHT Magazine (one half of this double-issue edition) has been devoted to a comprehensive demonstration of the extent to which the High Intensity & Quartz lamps, and in particular the high intensity discharge types, are influencing lighting application trends world wide.—Editor's note.

THE USE OF LUCALOX LAMPS is spreading rapidly across the world. According to W. E. Davidson, General Manager, GE Overseas Lamp Dept., there are two apparent reasons: (1) Their efficiency, now at 115 lumens per watt, is today's ultimate in premium-quality performance and, with their distinctive appearance, their use signifies leadership in lighting applications. (2) That same efficiency and distinctive color produce sufficient benefits for countries less affluent than the U.S. to justify their use of Lucalox lamp systems.

LEGEND

- ● Locations outside the U. S. where HID lamps, mainly LUCALOX, have been used in significant installations. All are illustrated in this issue.
- ○ Countries in which LUCALOX lamps have been used or are now being installed in significant installations.
- ■ Locations of significant installations of LUCALOX or other HID lamps in the U.S. All are illustrated in this issue.
- □ Known locations in the U.S. of some major and significant installations of LUCALOX lamps.

H.I.D. LAMPS in industry

by Morgan Christensen, Lighting Development, Nela Park.

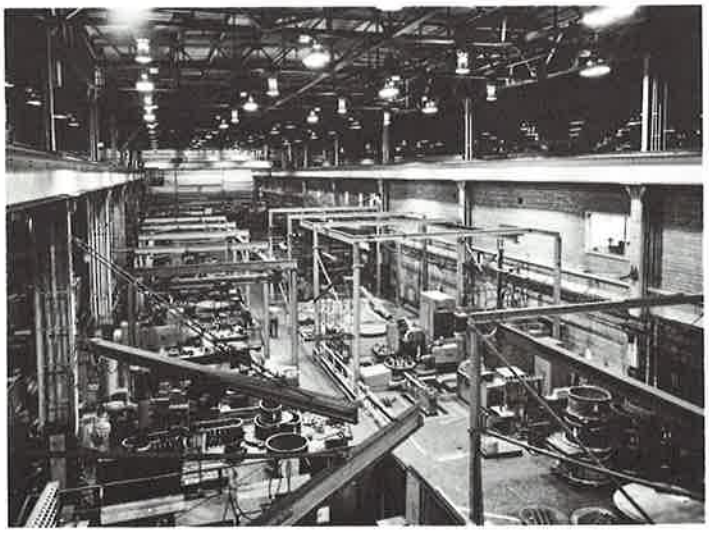
Multiple factors come to bear on the choice of lighting for industry—life and performance of lamps, economics, maintenance, footcandles, light distribution, color, interrelated with such factors as fixture design, electrical system design, labor cost, productivity. This complex of interrelated techniques, methods and effects precludes blanket recommendation of a single type of source for industrial lighting. Yet, H.I.D. sources—Lucalox, mercury, Multi-Vapor lamps—are frequently thought of and increasingly used as industrial sources.

In current simple generalized economic comparisons, Lucalox lamps rank first for industrial use. The large-area low-brightness fluorescent sources often rank second to Lucalox. Mercury and Multi-Vapor lamp economics frequently, but not always, equal those of fluorescent. Incandescent sources are least economical.

Comparisons of this sort give only a general frame of reference. The decisive factors lie in the diverse specifics of different seeing-task requirements: seeing the eye of a sewing machine needle; seeing to operate a crane in a steel mill; seeing to grade or inspect a product for color variations. Hundreds of footcandles may not be enough in one case; 100 fc extravagant in another; and lighting level may be less important than color rendering in still another. Costs for cleaning, relamping and generally maintaining the lighting system may vary considerably. Costs to buy and install lamps and luminaires in one case may be low, and electrical system costs high; or in another case vice versa. And costs for identical systems may be startlingly different in new construction as compared with renovations.

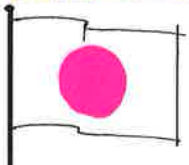
Considering that light serves specific purposes in given situations, some of the unique characteristics of lamps in the H.I.D. family can be pointed out as accounting for their popularity in industrial applications: all are highly adaptable to light distribution controls—highly directional beams, narrow to widespread; all are large packages of light—giving more light per bulb than other lamps, with fewer luminaires to be installed and serviced; some H.I.D. lamps are very efficient light producers—Lucalox lamps are outstanding; some are adaptable to color-sensitive applications — Deluxe White Mercury opens up new uses for H.I.D. lamps in industry.

The requirements for a high degree of color-rendering capability are not now met by H.I.D. lamps, but neither are they fully met by other types of lamps commonly used for general lighting service.



For economical relighting, a two-phase plan at Carrier Air Conditioning plant, Syracuse, New York, is replacing a mercury/incandescent system with a total system of higher-efficiency Lucalox lamps. Phase 1 is accomplished: replacement of 928 incandescent fixtures has resulted in a 5-plus to 1 advantage of Lucalox to gain the owners' objective of higher footcandle level. Mercury replacement by Lucalox will yield added advantage. Power feeder and distribution system is unchanged.

Photo courtesy Koito Industries, Tokyo, Japan



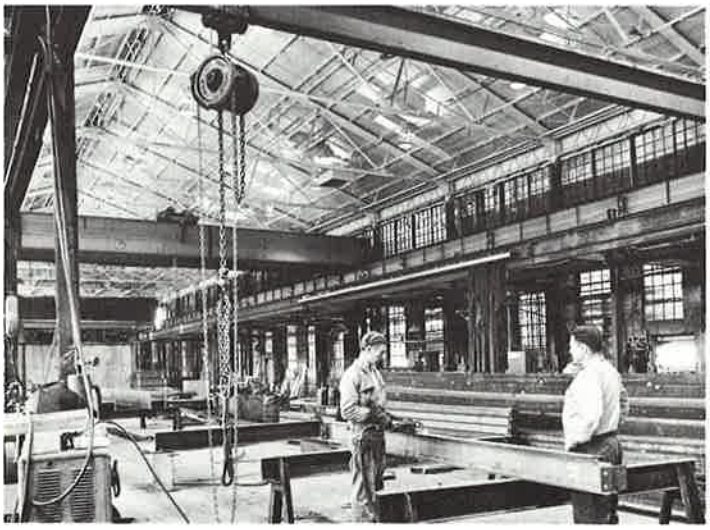
At the plant of General Air-Con Ltd., Nagano Prefecture, Japan, the assembly shop is lighted with 96 luminaires of Japanese manufacture using 400-watt Lucalox lamps. The area is 160 x 235 feet approximately, and the lighting level is 60 fc. (6 hlx).*

*Footcandle (fc) to hectolux (hlx) conversion reference: LIGHT, Vol. 37, No. 3, 1968.

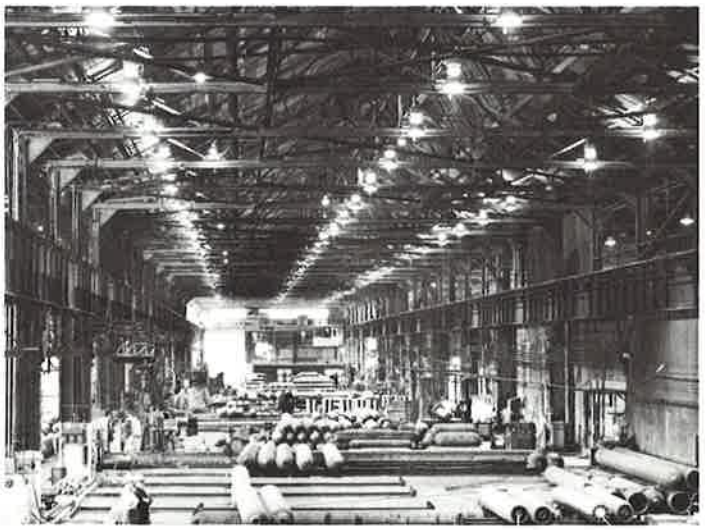
Chroma Line fluorescent lamps, designed expressly for color rendering, should be used where excellent color rendering is required. Most production areas do not require good color rendition—for example in the highly color-critical garment industry, the approach is to pre-select color matches in production materials under Chroma Line sources, thereby eliminating the need for color judgments in work rooms. Hence, the high efficiency, and excellent distribution of Lucalox lamps are used to economic advantage in production areas.

The larger objectives in designing lighting for industry are the same as the basic profit-oriented objectives of the industry to which they contribute: productivity and economy of operation. While H.I.D. lamps are not the only light sources that contribute, they are proving profitable both in the United States and abroad.

In cutting patterns traced on large sheets of heavy-gage metal, errors are costly. The former 10 fc (1 hlx) lighting level in the sea-going boat building plant of Marinette Marine, Marinette, Wisconsin, has been increased to 80 fc (9 hlx) with Lucalox lamps to reduce errors. Total owning and operating cost is slightly over 1¼ cents per hour for each of 69 fixtures serving 100 workmen at a total cost of 89¢, or less than 1¢ per man hour; 26% less than the alternative-choice system studied by Marinette's plant engineer. And the alternative system would have required added electrical-service capacity, a cost that is not a factor in the 26% difference.



The "instant" economy of lowest first-cost for lighting was rejected; and a cost analysis by the owners, Dayton Fabricated Steel, has justified the decision. The installation of Lucalox lamps lights 19,000 square feet to 70 fc (8 hlx). The plant engineer has pointed out, ". . . even though the total initial cost of the 400-watt Lucalox system is $2,000 higher (than a 1,000-watt mercury system) we can make this up in the first two years of operation and realize a substantial saving over the life of the system."



Existing 240-volt, three-phase circuits were used at U. S. Steel's Christy Park Works to operate new installation of Lucalox lamps and luminaires, multiplying illumination level by ten, to a 50 fc (5 hlx) level. The choice of lamps was based on a consulting engineer's comparison study that indicated 33% more light could be gained with Lucalox lamps as compared with alternative lamp choices. Installed, are 217 GE Filter-glow® high-bay units.

The hot rolling mill lighting at Eastern Stainless Steel Company, Baltimore, Maryland, has operated 24 hours daily for 11 months—9040 hours. First two lamps of their new Lucalox lighting system failed in the eleventh month. That's considerably above the average life rating of 8,000 hours then current (now 10,000 hours). Footcandle level initially was 45 fc (5 hlx); in 11th month, 41. That's also above the lumen maintenance rating of 90% then current (now 93%). Now that there is more lighting in this area, plant housekeeping can be done more thoroughly. Everything seems cleaner, brighter.

1. Sports clothing production at Brookvale Mfg., near Pittsburgh, is done under average of 130 fc (14 hlx) with Lucalox. Small-source reflections on sewing machine needles aid seamstresses' seeing. Pre-selection of color-matched materials eliminates need for color judgments in work room.

2. "Good lighting is representative of a good working atmosphere." Dave Marcus, Cincinnati Milling Machine Co. plant engineer, says. "We expect that the new lighting will better working conditions and help our people working with close tolerances and testing." Lighting, upgraded to 30-35 fc (3-4 hlx) in 1940, and now again to 50-75 fc (5-8 hlx), uses about 850 Lucalox lamps in both 275-watt and 400-watt sizes; it is expected to improve employee performance, and provide better working conditions—a matter of particular importance in keeping with a personnel record of almost 1 employee in every 6 having more than 25 years of service.

3. Adding to the best of earlier days, new Lucalox lamps have been installed in combination with a previous Power Groove fluorescent system to economically upgrade the lighting level. Incidental light-color mixture is effective on work plane.

4. New plant of Crown Door Corp., Tampa, Florida, has 100 Lucalox lamps, 400-watt; 20-ft mounting height; 20 x 25-ft centers; 40 fc (4 hlx) avg., for efficient production. Service areas have 20 x 40-ft spacings for 20 fc (2 hlx) avg.

1.

2.

Architect: J. James Fillingham, AIA., Monessen, Pa.

3.

4.

H.I.D. LAMPS in public auditoriums and sports

by H. G. Williams, Lighting Development, and R. L. Paugh, Special Lamp Applications, Nela Park.

Public events are show-biz but, not entirely show-biz—they are often more participatory than theatrical. Thus, the first function of lighting is to serve participants: the athletes at sporting events; attendees at trade and general-interest exhibits; the general public at recreation events. Show-biz glamour is a second function. Another important function is good viewing by spectators, compounded by rigid requirements for TV pick-up.

Logical requirements for light sources are high intensity illumination, light distribution control capability, acceptable color rendering, operating economy.

Developments in H.I.D. and Quartzline incandescent lamps have created a family of high intensity sources with potentials for public benefits not yet fully exploited. For example, to replace incandescent lamps watts-for-watts with Lucalox requires no rewiring, no added electrical load, produces no increase in thermal load or operating cost. New lamps and luminaires alone produce a 5-times increase in lighting level. The light source size in Lucalox lamps (diam. of arc tube by its lighted length) permits excellent light distribution control in well-designed luminaires.

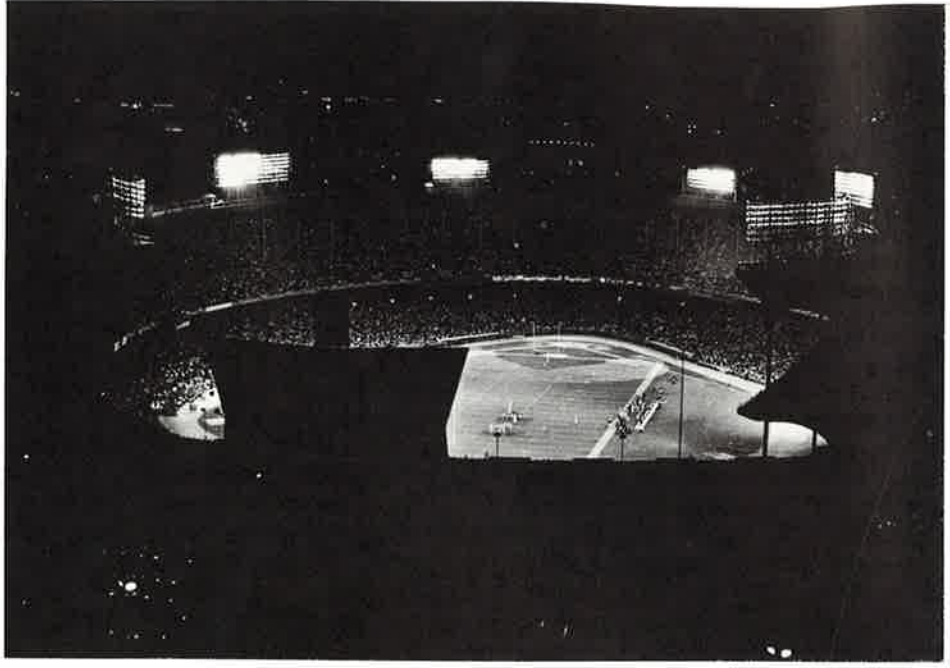
With Lucalox lighting, the image quality of TV pick-up for black-and-white telecasts is excellent, assuming illumination modeling effects are appropriate; color image quality is often acceptable. Acceptable color TV pick-up as well as good black-and-white can be had with Deluxe White mercury lamps or Multi-Vapor. For better color pick-up, add Quartzline lighting; mounted and aimed so as to increase lighting levels in the vertical plane —it is the plane in prime focus of attention of cameras as well as spectators.

Unexplored is the psychology of light color but, it tends to influence choices. For example, the cool color of Deluxe White mercury and Multi-Vapor seems preferred for night-play golf in warm climates; the warmth of Lucalox is sometimes preferred for winter sports at night. Light color subtly creates practical distinctions; warm color lighting defines a ski slope from adjacent areas lighted with cool color; or lighting with a selected color defines spectators' areas, while another color defines the playing field.

The active work/social day is stretching far into after-dark hours. Cosmopolitan sports and public events fill expanding leisure time in many countries of the world. H.I.D. lamps help people use their time pleasantly, and more safely.

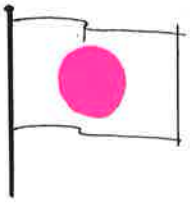
Photo courtesy Manila Electric, Philippine Islands.

On the grounds of the Lopez Administration Building compound, Manila, Philippine Islands, an array of lighting equipment using 1500-watt Quartzline lamps effectively lights a baseball field so as to make it adaptable for a variety of other sports activities.



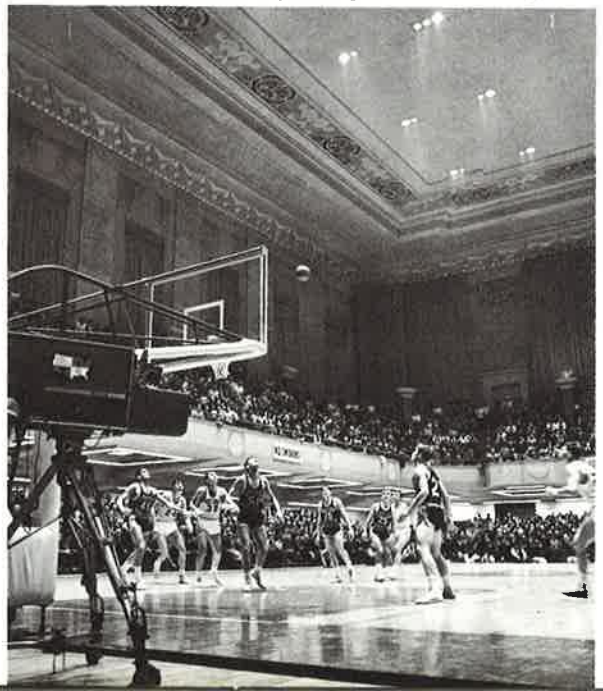
Upward revision of lighting standards for major college and municipal stadiums has been rapid to gain the advantages of capability for national telecasting of both baseball and football. Lighting renovation plans, as shown accomplished at Cleveland Municipal Stadium, are numerous. Several new major stadiums are under construction. Sources at Cleveland are Multi-Vapor and incandescent lamps. In the new Baltimore stadium lighting with Multi-Vapor lamps predominates 3 to 1 over the incandescent component. Vertical footcandles at the center of the field are 300 (32 hlx). The Multi-Vapor lamps are operated at a desirable 3200°K color temperature with the most favorable economics.

Photo courtesy Koito Industries, Tokyo, Japan



The exhibition swimming pool at Tenri City, Nara Prefecture, Japan, is lighted generally to an average of 42 fc (5 hlx) with 44 Lucalox lamps, 400-watt, in luminaires of Japanese manufacture. As indicated by color, the spectator areas and stands are lighted with other types of H.I.D. lamps in a combination system. The use of available color casts among the various types of basically-white light sources to create subtle distinctions between related functional areas, is a lighting design concept being employed with increasing frequency. New and improved H.I.D. sources such as Lucalox and Multi-Vapor lamps have implemented the concept.

Lighting design: Thompson Engineering Co., Boston, Mass.



Combination auditorium/gymnasium in the Worcester Memorial Auditorium, Worcester, Massachusetts, has sports lighting from 400-watt Lucalox lamps in GE Filterglow® luminaires combined with 1,000-watt PAR quartz lamps recessed in the 65-ft high ceiling. Formerly, 16 suspended incandescent units used 24,000 watts; now, a total of 35,400 watts with Lucalox plus PAR lamps is a less-than-50% increase for maximum illumination of 160 fc (17 hlx), 5 times the former level. Lighting for auditorium functions can be switched, or dimmed, on PAR lamp circuits for lower lighting levels. Color telecasting from fully-lighted sports-floor area is reported good.

1.

1. Tennis in the cool of the evening is enjoyed on the private courts of a country club near Napa, California. Lighting is with four 1,500-watt Quartzline lamps per court. Fixtures are mounted on 30-ft high poles. Lighting level at extreme corners of the court is 5 fc (.54 hlx). At the top of the net and throughout the central area of the court the average level of illumination is 25 fc (3 hlx).

2. Realistic color rendition, a prime objective of lighting for trade shows and general public interest exhibits, is achieved with 700-watt Deluxe White mercury lamps in the Coliseum, New York City. The average lighting level is 150 fc (16 hlx) in exhibit areas from wide-distribution units recessed on 10-ft centers in the 32-ft-high acoustical tile ceiling.

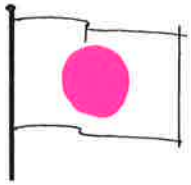
2.

3.

Photo courtesy Koito Industries, Tokyo, Japan

4.

3. For recreational tobogganing in a rustic setting, selected light sources thoughtfully applied at various locations preserve informality and charm, and implement seeing requirements for safety and convenience: at top and bottom of run, 1,000-watt and 250-watt Color Improved mercury; serving both yard of shelter house and run, 175-watt Deluxe White mercury in pole-top units; other key points are lighted with 150-watt PAR 38 flood lamps.



4. Skiing at the Ishiuch Maruyama Ski Slope and Ski Lift in Nigata Prefecture, Japan, is a popular nighttime sport. Warm color on the ski slope is from 400-watt Lucalox lamps. Cool color surrounding slopes is from 1,000-watt mercury lamps. Total number of lamps is 75; 20 are Lucalox. Luminaires are Japanese manufacture. Average illumination level is 3 fc (.32 hlx).

H.I.D. LAMPS in parking lots and vehicle facilities

by A. L. Hart, Lighting Development, Nela Park.

A threat or a welcome—most drivers have faced both experiences at entrances to vehicular facilities that are not public roadways. The lighting is sometimes reassuring, its absence is frightening; and it varies, from near-darkness intended to discourage visitors, to a welcoming fanfare of illumination with intent to display the property. The logical minimum, of course, is lighting adequate for safety. Sometimes even that is disregarded; but then the threat to the owner is as great as to the visitor.

Techniques and implementation for street and highway lighting are basic tools, of course. But, for full-scale effectiveness in lighting off-street vehicular facilities, combinations with some flood-lighting and some decorative lighting techniques are indicated. Street lighting techniques are not always adequate; they are rarely adaptable to the feature lighting, broad-scale display lighting, or functional work lighting typically required for vehicular facilities.

Creating a lighting design by combination of street, floodlighting, and decorative techniques is not a difficult problem when the designer bears in mind that, as with all other fields of lighting, the specific reason for providing the lighting is a dependable guide to a design plan. The purpose for lighting traffic and parking facilities in a shopping center, for example, is customer attraction; and it is different from that of providing functional work lighting in a trucking area; which, in turn, is different from that of lighting the roadways and grounds and dramatizing selected features in an industrial park. Hence, customer attraction, working efficiency, and corporate image enhancement are dependable guides to the use of various application techniques—either in combination with, or in lieu of, standard street lighting methods.

In terms of effective, dramatic and purposeful lighting for areas where vehicles are operated off the public roadways, the future of creative planning is bright. The many new and improved types of H.I.D. lamps have made it so for lighting planners who think beyond the ever-present temptation to transplant street lighting concepts.

Functional lighting for materials handling with mobile equipment, for truck operation, for the safety of dock workers and ships' crewmen—these are obvious purposes of general floodlighting on the dock of the Ninth Avenue Terminal at the Port of Oakland, Calif. In 25 GE Powerglow® units, 1000-watt improved-color type mercury lamps on 5 fifty-foot high poles light more than 100,000 sq. ft. of dock area (500 ft. x 225 ft.). Pole spacings are 125 ft. Lighting at ground level is 9 fc (.97 hlx) in truck lane, 3 fc (.32 hlx) at shipside. In apparent recognition of the benefit of good lighting on decks and at shipside, owners of the ship shown have invested in 400-watt mercury lamp lighting (also improved-color type) installed on the on-board crane. Supplement increased shipside illumination to 10 to 20 fc (1-2 hlx) at critical work point.

1.

1. Parking facilities for more than 20,000 cars, lighted with Lucalox lamps two-and-a-half years ago at Expo '67, are still in use by the City of Montreal. Four twin-lamp units on each sixty-foot pole incorporated innovative features now proven effective by experience. Illumination averages 2 to 2½ fc (.25 hlx). High poles, multiple mountings and controlled distribution, techniques now being explored for complex traffic-flow areas, are logical extensions of the planning concept applied at Expo.

2.

Architect: Lacy, Atherton & Davis, Harrisburg, Pa.

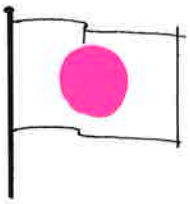
2. By combining several techniques for lighting the Potomac Edison Co. both invites and reassures visitors to their main offices in suburban Hagerstown, Maryland. Building floodlighting, walkway illumination on front and side entrance plazas, and roadway lighting blend into a visual unity effective for both display and utility purposes.

3. Parking lot lighting at Potomac Edison Co. offices is an extension of the roadway lighting, with poles spaced on 80-foot centers and 400-watt Lucalox lamps mounted 35 feet above the pavement.

3.

4.

4. Effective commercial display of Saks Fifth Avenue property in the new Phipps Plaza Shopping Center, Atlanta, Ga., is accomplished with Quartzline lamps in enclosed flood-lighting units at ground level on 6-foot centers 6 feet from the building faces. Parking area lighting with 400-watt Lucalox lamps dual-mounted on 35-foot poles, 100 feet apart provides a compatible visual environment for the building display.



On the driving testing course at Nagaoka City, Nigata Prefecture, Japan, average illumination is 5 fc (.54 hlx). Lamps are 400-watt Lucalox. Mountings are apparently near the 60-foot height. Six poles are each equipped with 10 luminaires of Japanese manufacture. Lighting uniformity over the convoluted testing routes is noticeably good. High mountings and lighting uniformity provide drivers with a panoramic view of the broad area of their driving environment.

Photo courtesy Koito Industries, Tokyo, Japan

Innovation in practices for safety and economy in protective surveillance of plant properties and parking areas at the Euclid Lamp Plant of GE, Cleveland, Ohio, is based experimentally on illumination designed for 10 fc (1 hlx) in the vertical plane—adequate illumination for video pick-up by TV surveillance cameras. Approximately 180,000 square feet of parking area are illuminated, ranging from 8 to 13 fc (.86-1 hlx), by 114 Lucalox lamps, 400-watt, at an average of only 0.29 watts per square foot. As demonstrated in the picture at right, the TV image response is adequate, and surveillance can be fully accomplished from the plant security office where guards have complete personal safety with immediate access to necessary communications devices and protective facilities.

Lighting design: J. S. Sirrene & Co., Greenville, S. C.

On the grounds of the Atomic Energy Division, GE, Wilmington, North Carolina, several separate manufacturing facilities make necessary the coordination of techniques for floodlighting, roadway lighting and parking area lighting to achieve economy along with effectiveness. On building parapets GE floodlight luminaires and 400-watt Lucalox lamps illuminate building surroundings, service approaches and adjacent roadways; connecting roadways are lighted with mercury lamps in street lighting luminaires; parking areas are lighted with GE Powerglow® luminaires and 1,000-watt mercury lamps, and the color difference from Lucalox, incidentally, gives a quick visual clue to parking area locations.

H.I.D. LAMPS in building floodlighting

by A. L. Hart, Lighting Development, Nela Park.

Practical virtues of floodlighting justify investments in lighting building facades and exterior areas today, far outweighing simple pride-of-ownership motivation. Attracting progressive tenants competitively to a visibly progressive property is a significant benefit of floodlighting. Defining the character and quality of architecture of a building during after-dark hours creates a visual advertising message often more expressive than words. And there is an added advantage in that the property location is firmly registered with the ever-increasing numbers of people who pass by at night. These benefits accrue to buildings designed either for private or tenant occupancy. The benefits in terms of security of building and property are obvious.

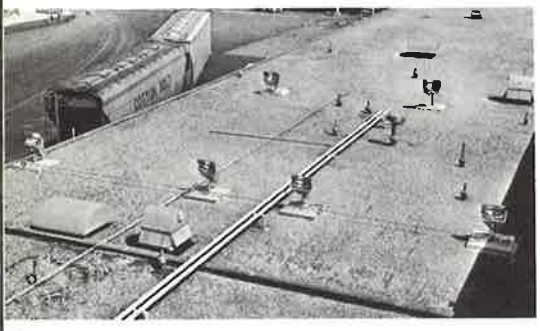
Investments in the services of respected architects and building designers are often justified in terms of corporate image enhancement. These investments are void of return after dark. It is during the after-dark hours when the best opportunity is available to feature a building—to visually interpret its architecture with lighting and make a unique contribution to the visual character of the community; to dramatically enhance the owners' corporate and commercial image within the community. The new and improved high intensity light sources—particularly the H.I.D. sources—available today, offer potentials many times greater than were available as recently as five years ago. Inherent color of illumination, color rendering capabilities, distribution control capabilities, and economic advantages are all among the better, broader-ranged characteristics. And today they make possible new creative approaches to nighttime visual rendering and interpretation of architecture, with visual integrity appropriate to the architectural design.

The fenestration in a building facade, the dark and light pattern of windows, the color effects emanating from interiors, all tend to establish a dynamic visual pattern at night. Unrelated to the context of building's exterior design, the pattern is abstract; related through application of floodlighting, it exemplifies and identifies the active progressive functioning of a specific corporate or commercial enterprise.

Lighting on the exterior of the Beneficial Plaza Building, Wilshire Boulevard, Los Angeles, is with 12, Multi-Vapor 1,000-watt, lamps mounted 65 feet apart from the building face. Two banks of units 160 feet apart flood the 270-foot-wide building facade. Note the ideal concealment niche (lower photo) built into the retaining wall along the auto ramp to subterranean entrance.

Utilizing differences in "whiteness" of white-light sources is a growing trend in floodlighting applications. Combination of source-colors on the Dayton County, Ohio, courthouse effectively interprets architecture. Portico space, "colored" by six Quartzline sources, is visually opened and defined by contrast with outer facades "colored" by 7 Multi-Vapor, 400-watt, sources. Reversed color —cool portico, warm outer facades—would interpret architecture differently; cool portico might tend to appear more austere, less inviting, along with a tendency to create the illusion of increased portico depth.

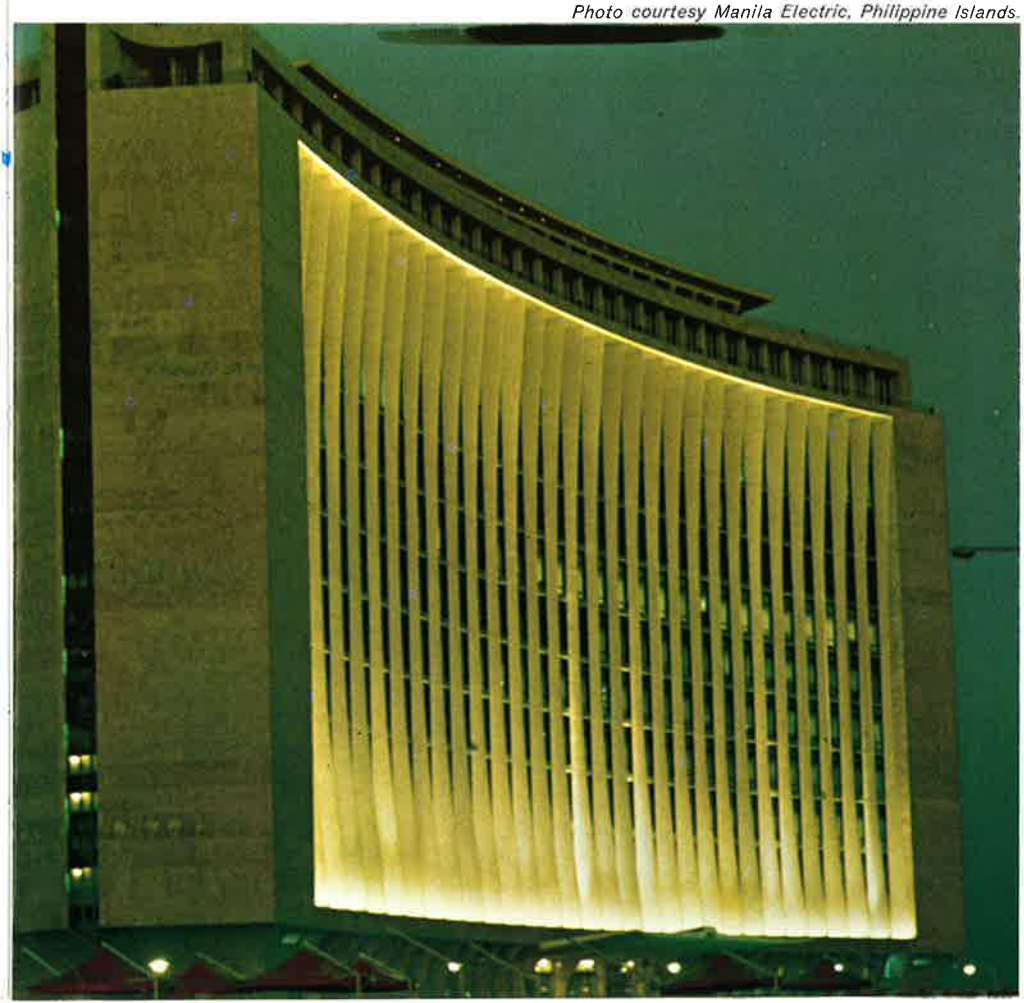
Mixture of color tints of white-light sources for selective color rendition, a recent floodlighting refinement, is applied at Busch Gardens at the Anheuser-Busch, Inc., plant, Tampa, Florida. Full floodlighting coverage for both building faces from 4 Multi-Vapor, 1,000-watt, sources is overlaid entirely with lighting from an 8-unit system of 400-watt Lucalox, effectively producing additive display brightness and daylight-like color effect. Busch Garden guests and passing motorists experience the same visual effect at night as in daytime — a planned effect achieved with great satisfaction. Installation is shown below.



White light output of mercury lamps with different color correction, which differ subtly in color shadings of whiteness, light the Central Heating and Cooling Plant of the City Water Board, San Antonio, Texas. Different shades of whiteness create a subtle distinction between interior and exterior as two dimensions of a total luminous concept. Color Improved mercury 400-watt lamps illuminate the exterior; Deluxe White mercury 400-watt lamps light the interior. The growing practice in the use of inherent differences in color-shading of white light sources for subtle planar distinctions, color contrasts, color emphasis and color delineation of spaces is highly effective with high intensity lamps but, is not limited to those types.

Built-in facilities for lighting the building facades of the Potomac Edison Company's offices, Hagerstown, Maryland, illustrated below and at left, reflect an architectural trend toward conception of structures as entities visible 24 hours a day. Conception of lighting with structure assures relevance of lighting to architectural design. Lighting for building facades, built into outer window sills, is with 2 Quartzline lamps, 1 Deluxe White mercury, 175-watt, per window. Penthouse wall under roof overhang has lighting from Quartzline lamps. Lighting techniques for roadway, building facades and entrance plaza are notably compatible with each other, and together have visual unity with the site and structures, exemplifying the merit of conceiving the lighting design as an integral part of the site-and-structure plans.

Architect: Lacy, Atherton & Davis, Harrisburg, Pa.
Photo courtesy Manila Electric, Philippine Islands.



One massive rectangular design element with vertical ribbing unifies and screens fenestration of the front of the Lopez Administration Building in the Philippine Islands. Built into the design element is a system of 400-watt Lucalox lamps in Powerspot® luminaires. Illumination of the interspaces between ribbing, from luminaires at top and bottom, is effective use of the principle and unique architectural feature as the keynote for identification and display of this building.

1. Charming setting of Nossa Senhora da Gloria Church is above the busy streets of Rio de Janeiro. Bold straightforward floodlighting has unusual merit: total structure is rendered as focal point of a remote and charming setting. Apparent viewing distance from busy streets precludes use of subtle lighting for architectural details. Christ of Corcovado statue on far hill, long Rio's landmark, still has a 1,000-watt incandescent lamp system originated by GE.

2. The Chateau Champlain Hotel, Montreal, Canada, built in a cruciform shape, has lighting on the blank walls of the void corners of its shape. Selective floodlighting with 400-watt Lucalox lamps discretely identifies and separates the structure from surrounding buildings. Intrusions of floodlighting through guest room windows are judiciously avoided.

2.

3. Clean efficient simple lines of twin buildings of Oak Brook Executive Plaza, Chicago, Illinois, are emphasized with floodlighting by 1,000-watt Multi-Vapor lamps concealed 50 feet from building faces at ground level. A subtle and visually interesting color change, with 250-watt Color Improved mercury lighting on penthouses, effectively caps both structures.

4. The capitol buildings of many states are dramatically floodlighted, marking respected public monuments, as the Capitol of Minnesota at St. Paul. The high intensity light sources are: 24 Quartzline lamps, 500-watt, with effects confined to the dome and rotunda walls; and 32 Multi-Vapor lamps, 1,000-watt, for cool-color effects that overlap the Quartzline illumination and light the lower facade. Illumination colors are subtle, interpret relationship of architectural masses.

1.

3.

Lighting design: R. G. Burkhardt, Chicago, Ill.

4. *Lighting design: Don Pates, AIA., Thorsen & Thorshov, Inc.*

H.I.D. LAMPS in churches, schools, colleges

by W. S. Fisher, Lighting Development, Nela Park.

Economy and sound practical lighting values have long been the overwhelming requirements for institutional lighting. Increasingly important are lighting considerations that bear on both visual and thermal aspects of environment.

Upgrading both qualitatively and quantitatively the practices in institutional lighting—increasing illumination levels, improving light distribution, and applying environmental principles—have all been largely contingent on maintaining basic economy; upgrading has been steady, seldom dramatic. But, recently H.I.D. lamps have implemented notably dramatic upgrading of institutional lighting applications. Study facilities, religious sanctuaries, libraries, public meeting facilities are now being equipped with H.I.D.-lamp system.

These new directions for H.I.D. lamps in institutional lighting have a high potential for economic advantages, sustaining the long experience with H.I.D. lamps in upgrading school and college sports facilities.

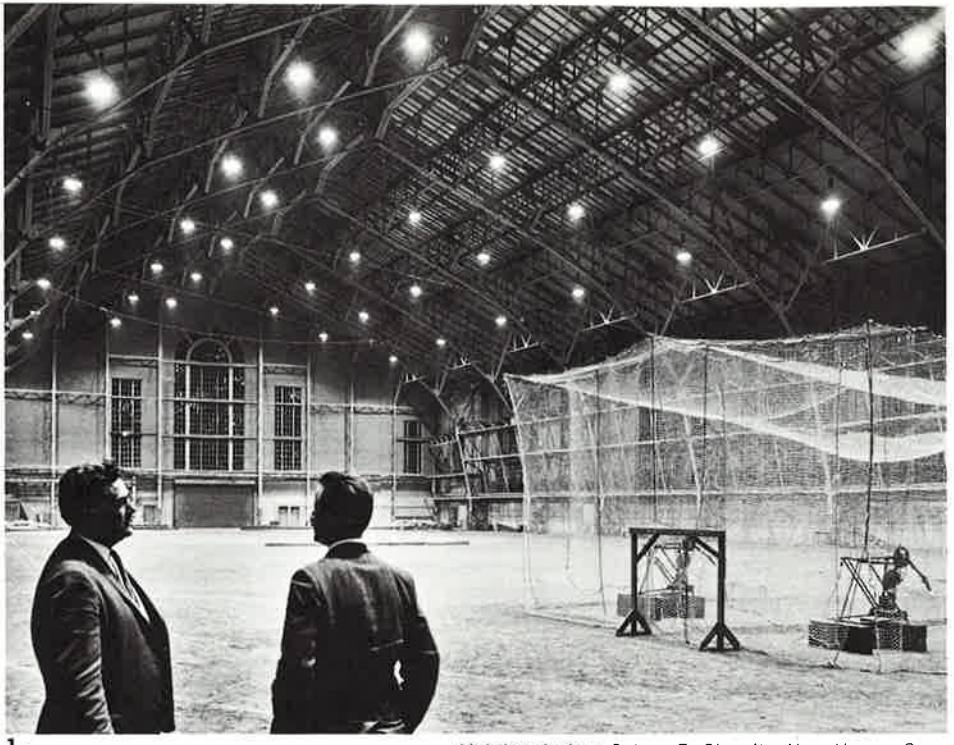
2.

3.

2. & 3. Architectural integrity of the Holy Cross Library, Worcester, Massachusetts, has been preserved, the architectural detailing revealed, the study facilities have been greatly improved, and the lighting level is 130 fc (14 hlx) in the central reading area. Original lighting pendants, a charm retained, have been relocated to accommodate arrangement of 16 recessed units with 400-watt Lucalox lamps. Also, the general appearance of the reading room has been enhanced by elimination of the reading lamps formerly used on the study tables.

1. Lighting in Coxe Cage Field House, Yale University, dated back to days of incandescent dominance. Fixture-by-fixture replacement to a 1,000-watt Deluxe White mercury lamp system made a multiple increase in lighting level providing capability for TV pick-up of sports events.

2. & 3. Stained glass windows transmit daylight luminance inward; or they transmit interior luminance outward, but only when surfaces behind the windows are adequately lighted. Original solution for controlled interior luminance at the Methodist Church of Wilmette, Illinois, using 10 incandescent lamps, 500-watt, has been replaced with 2 Multi-Vapor lamps, 1,000-watt. Highly satisfying are reduced operating costs, longer lamp life and good color rendering of window design. Note, in photo below, that window lighting units are portable, removable when services are being held and window lighting is unnecessary.

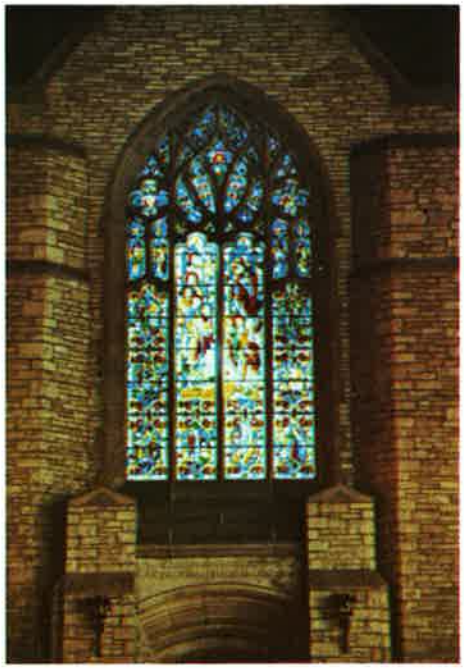


1.

Lighting design: Sylvan R. Shemitz, New Haven, Conn.

2.

3.



4.

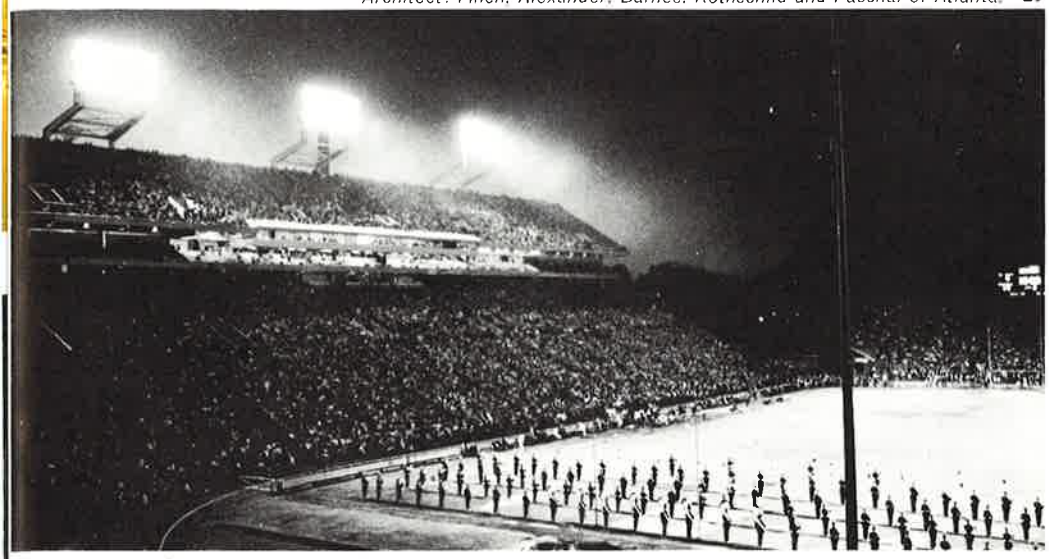
Architect: Fred T. Houweling

4. Filtered through the stained glass panel at the roof-structure apex, light from 6 Lucalox lamps, 400-watt, gives the impression that constant sunlight suffuses the sanctuary of Our Lady of Mount Carmel Church, Mill Valley, California. Lighting level is 10 to 15 fc (1-2 hlx). Natural wood tones are richly rendered. Lighting at 50 fc (5 hlx) on altar from PAR-lamp units on ceiling beams, and perimeter lighting with F40/CW-lamp valances are tastefully applied visual changes-of-pace.

5. The currently-used half of the available sanctuary space (far half unused) in the Synagogue, B'Nai Israel Congregation, Tampa, Florida, has a touch of symbolic sunset color added to the sunburst ceiling design and increases sanctuary lighting to a range of 25 to 50 fc (3-5 hlx). Six added lighting units (2 visible) have 1 Lucalox lamp, 400-watt, each. Valance facings for concealment are under discussion. Ark and pulpit have 100 fc (11 hlx) from F40/CW lamps in rows on 1-foot centers in luminous ceiling, which also adds visual variety.

5.

Architect: Finch, Alexander, Barnes, Rothschild and Paschal of Atlanta. **1.**



1. Grant Field, Georgia Tech, Atlanta, is a leader in lighting among national collegiate football stadiums. A system of 396 floodlights with 1,000-watt Multi-Vapor lamps replaces a 1,500-watt incandescent lamp system of 144 floodlights. West stands (illustrated), where all telecasts originate, have 270 floodlights on three towers, 90 each; east stands have 126 floodlights, 42 on each of three towers.

Lighting design: Erickson-Ellison, Minneapolis, Minn. **2.**

2. Gym, auditorium, chapel space in St. Stephen's School, Minneapolis, Minnesota, has 24 Lucalox lamps, 400-watt, on 14 ½-ft centers. Four 500-watt incandescent lamps separately switched provide low-level lighting as needed, enable on/off switching for movie showings, and are safety lights to span discharge-lamp recycle time after power interruption.

Lighting design: Thompson Engineering Co., Boston, Mass. **3.**

3. Using unchanged the electrical system that supplied a 500-watt incandescent lamp system for 30 fc lighting (3 hlx), 54 Lucalox lamps, 400-watt, were installed on existing outlets as replacements in the field house of Middlebury College, Vermont. The average illumination now, nearly tripled, is 85 fc (9 hlx). Two lamps over each goal for 120 fc (13 hlx) are additional. TV and motion-picture capabilities have been implemented.

H.I.D. LAMPS in retailing and commerce

by F. A. Dickey, Lighting Development, Nela Park.

Five years ago, when lighting was discussed in chain store meetings, questions almost invariably narrowed down to the proper orientation of strip lighting fixtures relative to aisle-ways. Many objected to using fixtures that exhibited brightness control because they were expensive, hard to maintain, and above all didn't produce the sensation of having enough light. However, things are changing fast.

By the end of 1969, more than 500 major commercial installations with general lighting systems employing H.I.D. sources are likely to be recorded. More than 100 will be stores and they will utilize shielded fixtures as well as liberal amounts of display and environmental lighting.

By 1975, more than 15,000 stores can be expected to be using some form of H.I.D. lamp with the total installation of all commercial applications running into millions of square feet. This represents a real revolution in use of H.I.D. sources in commercial applications.

In looking ahead to the future our major challenge with H.I.D. sources is going to be in developing methods of application that fully utilize their smallness of physical size and good optical control. The doors are now open for the development of lighting systems that were impractical before. The chances for this kind of development appear to be good — look at what has already taken place in the H.I.D. revolution.

Differences in attraction character, differences in apparent quality of the shopping environment, mark the contrast between the lighting in Loblaw's supermarket, Syracuse, New York, and the bare fluorescent lighting typically used in self-service type stores. With H.I.D. lamps in downlighting systems, the attention-attracting brightness is shifted from the ceiling into the shopping environment and onto the merchandise.

Stiff competition in prime market areas has led the larger self-service type chains to a greater interest in environment and something new and different for lighting that environment, as in this National Tea Co. store, Chicago, Illinois. Parallel with this greater interest came the development of Deluxe White mercury lamps, which represents a substantial improvement in the color rendering of mercury sources. Being new as well as effective, Deluxe White mercury sources attracted the attention of chain store people who were looking for a new way to give their stores a distinctive identity.

H.I.D. lamps are far brighter sources than fluorescent lamps but, being directional when used in downlighting systems, appear less bright, more comfortable and less distracting. Their much greater brightness directed onto merchandise increases its sparkle by reflections; their directional characteristic produces sharper contrasting shadows giving merchandise better three-dimensional rendering; and the reduction of clutter and distracting brightness on the ceiling markedly reduces visual competition overhead to put merchandise at the focus of attention. The net effect stimulates exploitation of the sales appeal of merchandise.

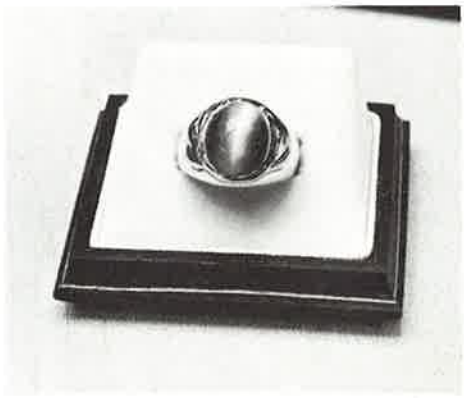
Sometimes not clearly seen is the tremendous advance that has been made by lighting toward better selling environments. For example, Deluxe White mercury lamps applied in recessed equipment, as in Kappy's Package Store, Medford, Massachusetts, take up a much smaller portion of the ceiling area leaving wider expanses available for acoustical control or other environmental systems. Since most H.I.D. lamp fixtures are symmetrical, they tend to give a non-directional appearance to ceilings.

1.

2.

3.

4.



1. Perhaps the most delightful results of the mercury store lighting systems are their effects on merchandise appearance. Because of the relatively narrow distribution of light downward, packages are brighter on their tops than on their sides making them look more three-dimensional. The overall sculptural quality of Deluxe White mercury downlighting is apparent in the illustration of Milgram's, Kansas City, Missouri.

2. Another aspect of H.I.D. lamp systems is the customer attracting sparkle of glass-packaged merchandise clearly apparent in the stacked display illustrating the effect in Loblaw's, Syracuse, New York.

3. The three-dimensional sculptured affects apply similarly in produce departments. Stronger shadows due to the brighter mercury sources make produce look rounder, plumper, and highlights it in ways that reveal skin texture and state of ripeness. This produce department is also in Milgram's, Kansas City, Missouri.

4. By nature some merchandise is ideally suited to the display characteristics of the small bright H.I.D. sources. Gems and precious stones spectacularly demonstrate the suitability whether they sparkle with starry asterism or gleam with chatoyant color and opalescence. Roger's Jewelry, Columbus, Ohio.

These windows, in Roger's Jewelry, Columbus, Ohio, are lighted with 100-watt Deluxe White mercury lamps which produce relatively the same optical effects as do the "Daylight" incandescent lamps commonly used in jewelry store windows but, at 4 times the efficiency and 10 times the life. Parabolic wedge louvers over the window display control the light distribution and insure that the merchandise has the highest brightness and greatest visual significance in the window area.

Downlighting systems are commonly applied in large public areas. In the First-Citizens Bank and Trust Company, Gastonia, North Carolina, 100-watt Deluxe White mercury lamps were used in place of more conventional incandescent sources. This had the effect of greatly extending maintenance cycles. Use of the more efficient mercury lamps has a positive effect on air conditioning load, too.

Architect: J. N. Pease Co.

Frequently, downlighting systems are employed in relighting projects for older banking spaces, in order to retain their architectural character. Office lighting levels are a requirement to sustain the many difficult visual tasks that are found in this type of room. The Lucalox lamp was employed here because of its very high efficiency, its good life and maintenance characteristics, and because it enhanced the appearance of the magnificent teakwood-paneled walls.

H.I.D. LIGHTING on streets and highways

by R. L. Paugh, Special Lamp Applications, Nela Park.

Traffic's pace and volume mounts swiftly; street and highway design concepts develop accordingly; and lighting system practices keep pace as the high light output and high efficiency of H.I.D. lamps inspire new and improved lighting techniques.

Gains in light output and efficiency in H.I.D. lamps—notably Lucalox, now at 115 lumens per watt—have made available economical compact large-package-of-light sources. The barrier of adequacy has been broken; sufficient light output and economy of operation are available to end the practice of lighting streets and highways as ribbons surrounded by dark voids in which hazards and uncertainties are bound to lurk. New concepts are based on growing awareness that significant visual clues from beyond the highway confines make daylight driving safer than night driving. And when the same clues to driving can be as easily observed and interpreted at night as well, night driving will be less hazardous.

A fast-developing related concept is that of installing high poles—100 feet or more—for multiple-unit mountings to floodlight highway interchanges economically; to give drivers the advantage of full illumination across complex high-speed traffic distribution areas; and to eliminate from the driver's field of view the current confusion of criss-crossing strings of roadway lights.

Another link in the developing chain of concepts is that of using lamps of distinctive color—Lucalox or Multi-Vapor, for example—to floodlight interchange areas. Thus drivers will be clued far in advance of a highway complex that demands undivided attention.

The emphasis in street and highway lighting, no longer keyed simply to illumination on the roadway, is now keyed to time—the drivers' time, necessary for sound decisions—and to his visual comfort. The intent is to add minutes or substantial fractions of minutes to drivers' time for decisions, and to minimize visual annoyances and confusion. The new techniques are many but, the prime purpose is singular and undisputable: safety.

1. On the 100-ft-wide through-traffic section of the Avenida del Generalisimo, Madrid, Spain, 400-watt Lucalox lamps provide an average 5.3 fc (.57 hlx) over a distance of approximately two miles. Mounting height is 40 ft. Pole spacings are 75 ft. Parallel marginal roadways are visually set apart and identified by the different color of mercury lamps.

2. & 3. Calgary (2) and Camrose (3), Alberta, show western Canada trend to Lucalox street lighting. MacLeod trail, first of several installation projects in Calgary, exploits design advantages of higher mountings (48 ft): fewer poles, wider spacings, better uniformity, better glare control. Camrose business center relighting has attracted record numbers of evening shoppers; an outgrowth is an annual late-November Light Festival that has become a popular pre-Christmas community social event.

1.

Photo courtesy Fabrica Electrotecnica Chamartin, S. A., Madrid, Spain

2.

3.

The city of Titusville, Florida, is centered on a 6.5-mile section of the divided roadway of U. S. Highway #1. Economical installation of dual units, each with 400-watt Lucalox lamp, at 40-ft height on poles 180 ft apart in median strip is effective for illumination ranging 2½ to 8 fc (.27-.86 hlx). Through business district, two one-way streets have single unit per pole at drivers' left curbside; illumination is similarly effective.

Photo courtesy P. S. O., Helsinki, Finland.

Leaving Helsinki, Finland, motorists bound east or northeast to destinations along the Russian border find their routes at an interchange where a unique and progressive floodlighting system lights the total interchange area to an average level of 4 fc (.43 hlx) with 400-watt Lucalox lamps. Finnish-made floodlighting units totaling 250 are on very high mountings (estimated 120 ft) at the tops of 20 poles. The interchange incorporates underpasses, overpasses, entrances and exits; car and subway traffic. The decision favoring the floodlighting plan followed careful economic calculations. The absence of visually confusing criss-crossing strings of roadway lights is clearly apparent.

Bloor Street in the heart of metropolitan Toronto, Ontario, Canada, relighted with 400-watt Lucalox lamps, is the first step in a major city-relighting project. General community opinion favors Lucalox color, considering it similar to the home-like color of incandescent lighting. Mounting height is 40 feet, and pole spacings vary with street width.

1. Swiss highway N2 crosses the Lake of Lugano on Melida Dam where 275-watt Lucalox lamps are dual mounted on 35-ft poles on approximately 100-ft spacings in the median strip between 35-ft wide roadways. Highway illumination is 4 fc (.43 hlx) with notably good uniformity along axis of traffic lanes. This roadway is the approach to the north portal of Maroggia Tunnel from the city of Bissone. See photos 1 and 2 next page for entrance portal and interior of tunnel.

1.

Photo courtesy Novelectric A. G., Zurich, Switzerland.

2.

2. & 3. The Kloten Airport highway N1b, has 400-watt Lucalox lamps, single and dual mounted as needed, on 65-ft-high poles. Uniform lighting over highway and surroundings gives visual clarity comparable with daylight visibility. Black unfinished road surface in foreground is visible evidence of need to consider roadway reflectances when planning illumination level specifications.

3.

Photo courtesy Novelectric A. G., Zurich, Switzerland.

4.

4. Much of the length of the Dallas North Tollway, Dallas, Texas, is depressed roadway. Lighting units with 400-watt Lucalox lamps are 35 feet above roadways; many units are equipped with glare shields for comfort of nearby residents. Pole spacings are on average 110-foot centers, staggered for the noticeably good uniformity.

5. *Photo courtesy Novelectric A. G., Zurich, Switzerland.*

5. Viamala Tunnel on Swiss highway N13, at the north side of the San Bernardino Pass, has threshold zone of illumination of 90 fc (10 hlx) on 25-ft-wide roadway from 400-watt color-improved mercury lamps in twin unit mountings at 14½-ft clearance height. Note excellent maintenance of tunnel wall reflectance—a vital factor in preservation of tunnel lighting effectiveness.

1.

2.

1. The portal of the half-mile-long Maroggia Tunnel on Swiss highway N2 between Bissone and Maroggia is clearly apparent because the distinctive color of interior fluorescent lighting is contrasted with the color of exterior 400-watt Lucalox lighting. Unit mountings on approach roadway are on 35-ft poles.

2. Interior lighting for threshold zone of the Maroggia Tunnel is with 40-watt White fluorescent, high on side walls, combined with 400-watt Lucalox lamps overhead. Both types are mounted on the same spacings staggered. Illumination for threshold zone visual adaptation is 130 fc (14 hlx) on the roadway. Overhead clearance is 19.5 ft. Roadway width is 25 ft. Beyond threshold zone, lighting is with 40-watt White fluorescent.

"The Golden Route" through the business district of Burlington, Ontario, Canada, has lighting that is spectacular for its 9 fc (.97 hlx) level and its near perfect uniformity. Unit mountings are 35 feet high. Poles are on 50-ft centers staggered. Lamps are 400-watt Lucalox. Color is considered a great improvement over former clear mercury. Under consideration is a plan to extend lighting improvement to the nearby Queen Elizabeth Way to attract highway travelers into Burlington's "sunny" business district.

One of the world's busiest streets, New York's famous Avenue of the Americas, has been relighted with 400-watt Lucalox lamps replacing a mercury system. The illumination level was more than doubled by unit-for-unit replacement. Power consumption was not increased. Uniformity was improved by adding davit-arm extenders to existing poles to gain 35-ft mounting height.

Customer accounting office of the Ohio Power Company, Canton, Ohio, is on a mezzanine adjoining the high-ceiling lobby on the main floor—see large photo page 31. Ceiling is contiguous with that of the lobby. Downlights, selected primarily for visual compatability with downlights in lobby ceiling, give space an appearance more pleasing than the usual types of office lighting.

Office Lighting, a new direction

by Howard Oldenburg, American Electric Power Service Corp., New York, New York, and H. G. Williams, Lighting Development, Nela Park.

Downlighting in general office? Lighting engineers have usually said "no". Their reasons have been 1) sharp shadows are produced that will at best be distracting, at worst will obscure parts of the seeing task, and 2) bright reflections occur in anything shiny, including the seeing task.

In the Ohio Power Company's Canton, Ohio, division office, downlighting seemed the best solution. The choice of lighting for the office area was made primarily for its visual compatibility with the ceiling of the lobby. However, the downlighting here again demonstrates its capability to give a space an appearance more pleasing than from a fluorescent system. The low-brightness downlights use 175-watt Deluxe White mercury vapor lamps.

This departure from usual office lighting is now possible because of the new high intensity discharge sources. Using incandescent lamps to supply the 150 fc (16 hlx) of maintained desk-top illumination would have produced objectionable radiant heat.

While the lighting engineer has usually said "no" to downlights in offices, architects and interior designers see downlighting as a way to render spaces and the objects in those spaces in an interesting and even dramatic manner. Downlights emphasize form in three-dimensional objects, enhance textured surfaces and produce sparkle in shiny surfaces. Highlights and specular reflections resulting from large area, diffuse light sources are by comparison, large and dull. In other words, it is the very ability of downlights to produce distinct shadows and bright reflections that make them desirable for creating interest and, at the same time, make them seem undesirable for lighting detailed visual tasks.

At least, so it has seemed. Let's take a closer look. On the one hand, fluorescent lighting does not produce completely shadow-free illumination; form is defined even with luminous ceiling lighting. On the other hand, a downlighting system with overlapping distribution—as we find in the Ohio Power installation—will fill in most shadows, producing sharp edges but few deep shadows. Employees in the Ohio Power office made no comments concerning shadows (see Fig. 1).

Reflections in the seeing task will be brighter with downlights than with larger area fluorescent units, but only when a downlight is reflected in the task (Fig. 2). A downlight reflection is easier to avoid, by moving the task or the eye (Fig. 3), than the reflection of a large area source. With a luminous ceiling the reflection would not be very bright, but it could be impossible to avoid. While some seeing tasks will produce reflections that are obvious, as in very specular surfaces (Figs. 2 and 3), others produce effects that are subtle; for example, even type-

1.

2.

3.

4.

5.

6.

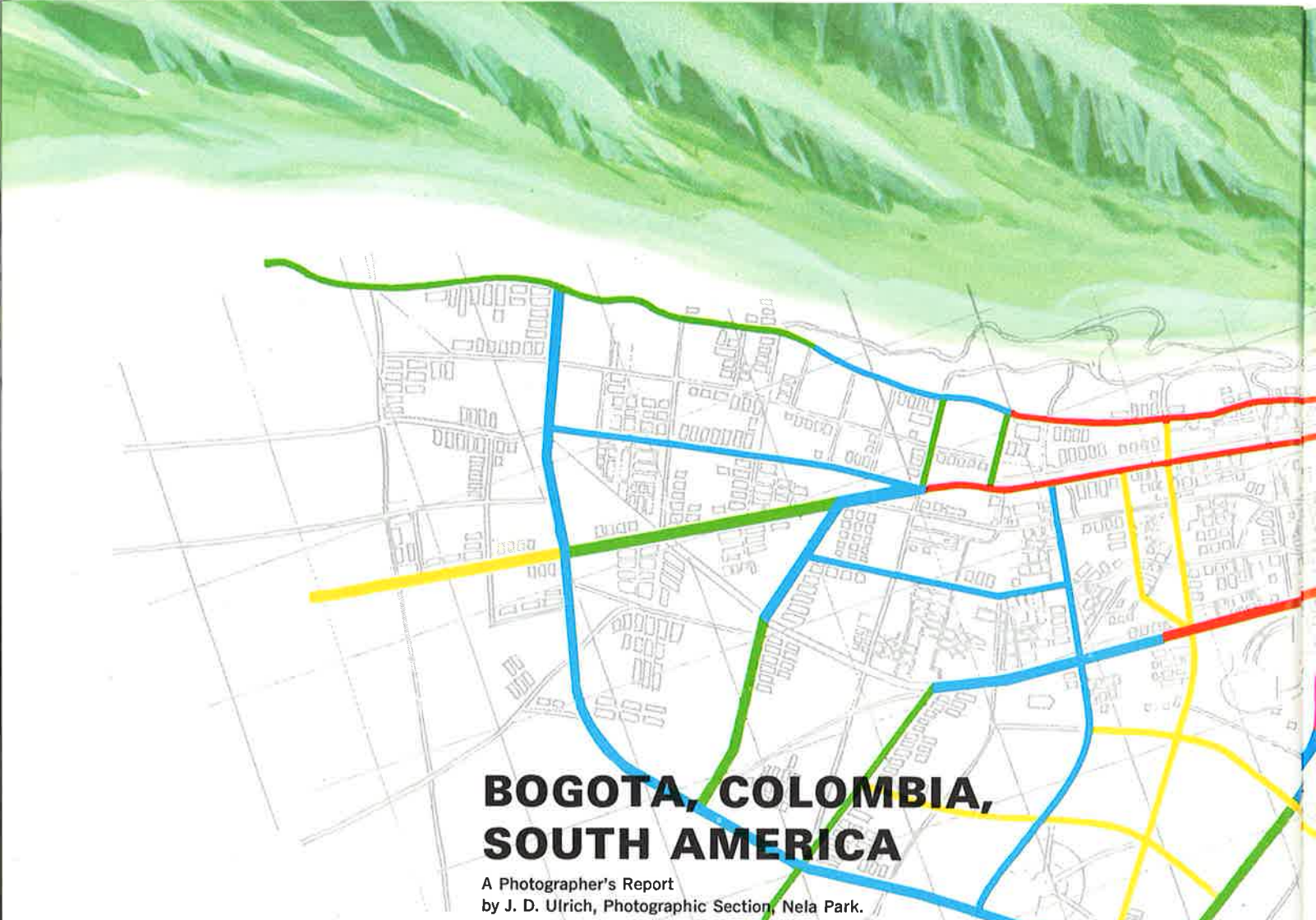
7.

writing on bond paper has some specular qualities. Between these two extremes is the kind of reflection that occurs in pencil writing.

In Fig. 4, a downlight is reflected in a set of pencil marks; in Fig. 5 the paper has been moved so that the marks have minimum specular reflection and appear blacker. The difference in contrast between pencil marks and paper is fairly obvious because the downlight is very bright and the pencil mark is large. Using lower brightness fluorescent sources and looking at ordinary pencil writing, the reduced contrast caused by specular reflections would be difficult to recognize but would still be present and would have a significant effect on the visibility of the writing.

Reflections in obviously shiny surfaces including the seeing task can be distracting as well as reduce visibility. The best solution is the use of matte surfaces instead of shiny ones. Large flat areas such as desk tops and room surfaces also need to have matte finishes. Typewriters and business machines can present visually large flat areas of specular reflection. Reflections in the finish of the machine in Fig. 6 come from a downlight and can be eliminated by moving the machine or the eye or by deglossing the surface. Reflections in dished keys of machines are difficult to avoid by changing position (Fig. 7); however, some manufacturers of business machines now offer a matte finish for keys. Progress seems to have stalled in the area of proper finishes for business machines; hopefully it will soon revive.

How far can we go with downlighting in such places as offices? It is hard to say until methods for evaluating shadows and reflections from lighting systems have been established. In the meantime, experience such as from the Ohio Power Company's installation indicates that high intensity discharge lamps in direct lighting equipment may work better than many lighting engineers have thought.



BOGOTA, COLOMBIA, SOUTH AMERICA

A Photographer's Report
by J. D. Ulrich, Photographic Section, Nela Park.

On many of the principal limited access highways outside the United States there is high incidence of casual use by pedestrians, slow moving vehicles, and sometimes animals. Such factors make very apparent the lighting designer's responsibility to make the total highway environment clearly visible at night.

Bogota, capitol of Colombia, South America, is a city of two million people. It is probably the first city of its size in the world that has planned and executed so complete a lighting system for major arterial roadways, as mapped above with color keys to footcandle levels. No city of comparable size in the United States has had a similar opportunity for achievement in roadway lighting. In fact, in most United States cities, street lighting in current use is a hodgepodge in which the evolution of light sources can be traced step-by-step from lamps of the incandescent series type to Lucalox.

Capitalizing on an opportunity, Bogota has lighted 82 miles of central city roadways with the latest in light sources, using the latest in roadway lighting techniques.

New in concept in the Bogota lighting project is the use of inherent light-source color to differentiate between types of traffic flow. The "golden" color of Lucalox lamps defines the high-speed limited-access roadway through the center of Bogota, while the crisp whiteness of the Deluxe White mercury lighting provides a contrast in color identification for lower-speed downtown and residential thoroughfares.

Above introductory note and technical editing by R. L. Paugh, Street and Highway Lighting Specialist, Nela Park. — Editor.

The progressive direction of Bogota's Mayor Virgilio Barco, in two years has brought the city great progress in modernization—new utilities, many new wide roads and boulevards, and many new commercial buildings.

Mr. Ramiro Bonilla, International General Electric's Sales Manager for lighting products, has pointed out that even though a complex and costly system of generators, transformers and related equipment was put in place to supply this modern city's

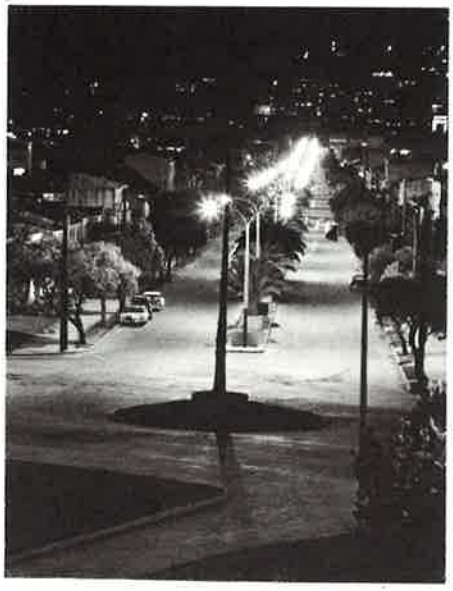
LEGEND

	fc	lux
Major roadways, downtown	3.7	40
Major roadways, intermediate	2.8	30
Urban commercial streets and expressways	2.3	25
Expressway feeder roads	1.9	20
Secondary roads	1.5	16

The "golden" white light of over 1,000 Lucalox lamps defines Bogota's 12 miles of high-speed bypass highway 100. In addition to the lighting level, 2.5 fc (.27 hlx) maintained, the warm contrasting color of Lucalox lamps on this multi-lane highway gives the driver instant recognition that this is the bypass highway.

Avenue Jimenez, the center of downtown Bogota, is lighted with 1,000-watt Deluxe White mercury lamps, averaging 4 fc (.43 hlx). The Deluxe White mercury color-rendition characteristics benefit the heavy pedestrian traffic. The high lighting level is conducive to an even flow of traffic through this congested area, but more important, provides the downtown shopper with an atmosphere of confident security.

On thoroughfares and residential boulevards not lighted with Lucalox lamps, Deluxe White mercury lamps are used. Effective color and visibility are illustrated on these two pages. Heavily traveled residential boulevards make lighting levels like the 1.6 fc (.17 hlx) shown below economically feasible. A comparison of the daytime versus nighttime photographs emphasizes that the roadway's visible surroundings at night do not differ greatly from the daytime. The light on the fronts of homes can conceivably be disturbing to the residents, but the light on sidewalks and yards gives advantages of protection and safety both to residents and pedestrians.



growing electrical demand, the new street and highway lighting is the most obvious municipal improvement to the average citizen. Two factors in the central city areas apparently influenced in part the decision to undertake an extensive street lighting installation: there is no outdoor floodlighting in Bogota; building interior lights are always turned off at night. Obviously, the city at night was dark and the striking contrast of the present lighted city as compared with the previously darkened city accounts for the public impression that lighting is the most important single factor demonstrating progress.

Color rendition was carefully considered by the lighting consultants in their choice of lamps. The color rendition of Deluxe White mercury lighting, and particularly its pleasing effects on complexions, made it the choice for all commercial areas of the city. There are a few minor exceptions where clear or color-improved mercury lighting has been installed, but those installations suffer in comparison with the predominating Deluxe White mercury. Lucalox lamps, on the other hand, were selected for the by-pass highway where color rendition was a consideration secondary to efficiency.

The eighty-two miles of new lighted roads in and around the city have been lighted with 1000-watt and 400-watt Deluxe White mercury lamps and 400-watt Lucalox lamps in GE outdoor lighting luminaires. All 400-watt luminaires have Lexan plastic covers; 1000-watt luminaires have hard glass covers. Both types are breakage-resistant. The Lucalox lamps are used in a type of luminaire also named "Lucalox." Numbers of poles, spacings, and lamp choices have been related to road widths and numbers of traffic lanes. Some of the roads are impressively wide with twelve lanes separated into high-speed and low-speed sections. Mercury lamps are mounted at a height of 35 feet. Lucalox lamps are at 40 feet. The power supply is three-phase, 260 volts. Each luminaire has its own photo cell, a feature that conserves copper wire—an expensive commodity in Columbia. On completion of the Bogota lighting project, approximately 8000 lighting fixtures will be in place. It is more than half completed now.

The design criteria for the Bogota street lighting were CIE and IES standards for public thoroughfares. An early policy decision for the project was to apply the highest recommended lighting standards, or higher—none lower. Design footcandle levels are 1.6, 2, 2.5, 3 and 4 footcandles (.17, .22, .27, .32 and .43 hlx) on the roadway depending on traffic density. The system of lighting for any road is so constructed as to permit illumination levels to be raised if future needs develop.

Intersecting roads always call for a driver's decision: turn? stay left or right? proper lane? Research has found that poor design and integration of intersections and lighting confuse drivers and congest traffic; good design and integration eliminates confusion, traffic flow is smoother, regulated, controlled. Drivers use many visual cues received from their total visual scene in daylight. Night lighting for paronamic scene, not confined only to the driving path, adds to drivers' visual comfort and effectiveness. Day/night photographs below show night visual scene at intersection not greatly different, except in lighting level, from that of daytime.

As viewed from Monserrat Mountain, the falling dusk on Bogota throws a sparkling golden necklace around the city from the 1000 Lucalox lamps, 400-watt, on highway 100, a twelve-mile-long, eight-lane by-pass road. This is surely one of the most exciting illuminated cityscapes. On highway 100, average lighting level is 2 fc (.22 hlx). It is so well lighted that at night it is commonly used as an exercise track by runners, who apparently feel quite safe from injury. The modes of use of public roadways are curiously different in comparison with the pedestrian restrictions on U. S. highways. The fact remains, however, that adequate lighting levels for highways everywhere are geared to the possible presence of people or animals on highways, and in Bogota that important principle has been reaffirmed.

Although the impression of progress conferred on Bogota by new lighting is welcome, it is a by-product secondary to less obvious but more important objectives. The country is a living museum of outdated automobiles by U. S. standards because of a high import duty on cars. Hence, many cars are of pre-World War II vintage. Operating lights are poorly maintained. Mechanical failures cause unpredictable stops on roadways. Pedestrians and sometimes animals compound roadway safety problems. Theft and robbery, typical of all cities in their central areas, have similarly been of concern in Bogota. Both accidents and vandalism are said to be greatly reduced, and people now walk the streets and use the highways in and around Bogota more safely at night. The police don't keep statistics on accidents or crime, but everyone expresses the feeling that reductions have been substantial due to the increased lighting.

The street and highway lighting is not the last of the Bogota lighting projects. The Bull Ring, not finished now, will have Lucalox floodlighting outside, accented with mercury lighted arches for color. Multi-Vapor lamps around the top of the Bull Ring will provide illumination in the center of the arena. The new lighting will bring more fun to Bogota citizens; and under the new Bull Ring lighting, many evening public events will be added to the afternoon schedule of bullfighting.

A world-of-tomorrow science-fiction scene in the new GE Power Transformer Department plant at Pittsfield, Massachusetts, where 400-watt Lucalox lamps today are setting tomorrow's performance standards for real-life manufacturing operations. Illumination averages 125 fc (13 hlx) from 105-ft-high mountings. Loading is only 3.03 watts per square foot.

Lucalox Lamps discount a myth

"Him that makes shoes go barefoot himself."—Robert Burton (1577-1640)

by Gordon D. Rowe, Lighting Development Coordinator for GE Properties, Nela Park.

Plant and facilities operations and construction methods that will produce dollar savings are basic concerns of modern progressive industrial enterprises. The General Electric Company has identical concerns. GE plant managers are individually charged with responsibility to apply methods that provide economy, to use improved quality products, and to improve working environments.

The awareness of plant managers that good lighting is a function closely related to those benefits has established a lighting philosophy embracing the use of higher levels of illumination, control of visual and thermal environment and the use of excellent equipment—on a basis of minimum lighting levels approximately fifty per cent greater than the minimums suggested by the IES.

A set of luminaire specifications has been issued by GE setting forth minimum photometrical, electrical and mechanical standards. A Lighting Manual published for GE plant engineers, emphasizes the importance of proper selection of finishes for room surfaces and machinery.

For any practical and progressive industry it can be assumed reasonably that a 150 fc (16 hlx) installation will require a proportionally greater investment than a 100 fc (11 hlx) installation when comparable equipment is used. And it logically follows that the greater expenditure amplifies the need to find the most economical light source available to serve the purpose.

In the design of industrial lighting GE has discovered by use of detailed cost analyses that the Lucalox lamp (46,000 lumens in a 400-watt package) is very often the most practical choice. Hence, thousands of Lucalox lamps are now in use in General Electric plants—in both new and renovated properties. A review of a few of these installations may serve to exemplify the practicality of the choices.

In the new assembly and laboratory facilities of the Missile and Space Division at King of Prussia, Pennsylvania, (Fig. 1) 192 Lucalox lamps, 400-watt, in GE Filterglow® fixtures provide an average of 160 fc (17 hlx) for an area approximately 300 feet by 100 feet. The luminaires are suspended 55 feet above the floor. Color of walls and ceiling are light beige, contributing to an unusually pleasant environment. Against that background is a bright yellow bridge crane which, in addition to its normal function, is used to service the lighting equipment.

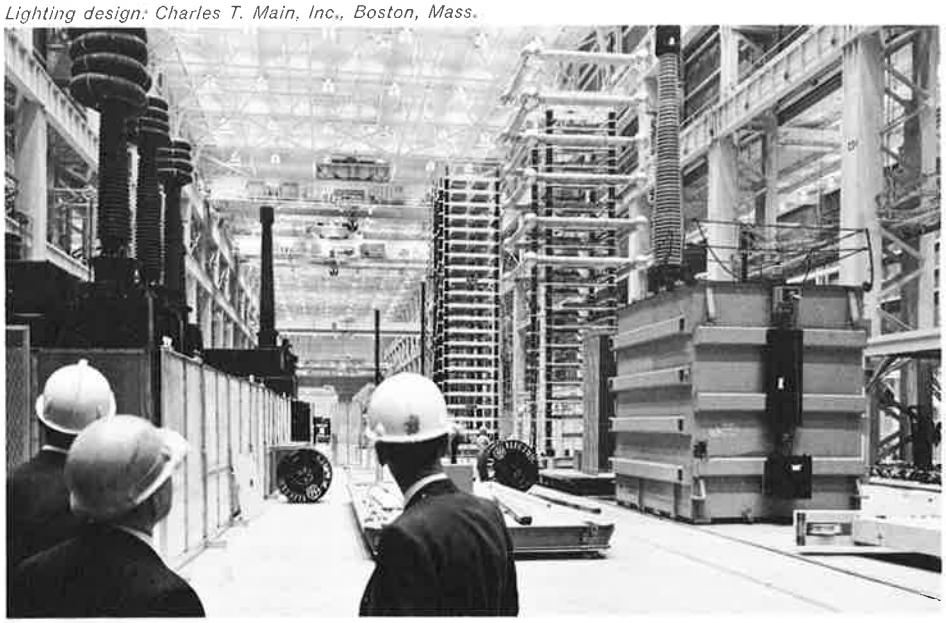
In Pittsfield, Massachusetts (Fig. 2), the company has several Lucalox installations. That in the Commercial Distribution Transformer Department's "Building 19" —an assembly area—is an example of Lucalox employed in lighting renovation.

Eighty-eight 400-watt Lucalox lamps mounted 32 feet above the floor raised an old 35 fc level to 110 (4-12 hlx) and reduced by 15,400 watts the energy required by the old system of 44 mercury lamps, 400-watt, plus 44 incandescent

1.

2.

Lighting design: Charles T. Main, Inc., Boston, Mass.



3.

lamps, 750-watt. The annual energy-and-demand savings amount to about twenty-seven dollars per fixture.

What is probably the most exciting Lucalox installation to date is located at Pittsfield's Power Transformer Department's new assembly plant (Fig. 3). One hundred and five feet above the floor of the high bay (which measures 1100 feet by 110 feet), 768 Lucalox lamps, 400-watt, are mounted in 192 clusters of four. An additional 160 lamps are installed in a lower bay at a 50-foot mounting height. Most of the lamps have been operating twenty-four hours per day, seven days per week. Of the first 192 lamps installed (48 4-lamp clusters), only 15 failed after approximately 10,000 hours of operation—a testimony to the outstanding performance of Lucalox lamps.

Lighting maintenance is served from two 350-ton cranes at the 100-foot level (Fig. 4). The six Lucalox luminaires under each crane are mounted on trap doors which are lifted when these fixtures require service. Here, too, the yellow finish of all cranes, including the four 25-ton units at 50-ft. height, imparts favorable color contrast against the beige walls and white ceiling.

Pittsfield has other installations and new firm plans for installing 700 more Lucalox lamps in other buildings. Other GE Lucalox installations are at Anaheim, Fort Wayne, Hendersonville, Louisville, Philadelphia, and Schenectady. Plans are on the

4.

drawing board for installation of approximately 1500 lamps in a new plant at Shreveport, Louisiana.

In March of this year, the GE Atomic Power Equipment Department dedicated new facilities at Wilmington, North Carolina, where over 1850 Lucalox lamps have been installed in two of three major buildings. One of the buildings, called Equipment Manufacturing Operation (Fig. 5), has the world's largest industrial Lucalox installation to date with 1450 lamps mounted at a 36-ft. height; the remaining 400 lamps are in the Fuel Component Operation building (Fig. 6), mounted at a 42-ft. height. Illumination levels range, according to functional requirements, between 100 and 150 fc (11-16 hlx), with superior uniformity in all areas. In the shipping and storage areas (Fig. 7) lighting at the lower practical level of 80 fc (9 hlx) is also with Lucalox lamps, with single-unit mountings on 18-ft. centers.

The 100-150 fc levels in manufacturing areas, where lamps are on 12-ft. centers, give a distinct practical advantage to the process engineers. TV study tapes of operational procedures are made without the need for auxiliary lighting equipment (Fig. 8). The camera operation is fast, easily mobile and the video images are realistic. The black-and-white picture quality is good.

The third building at Wilmington, the Fuel Manufacturing Operation, uses High Output fluorescent lamps adapted to the needs of a complex and highly specialized

5.

Lighting design: J. S. Sirrene & Co., Greenville, S. C.

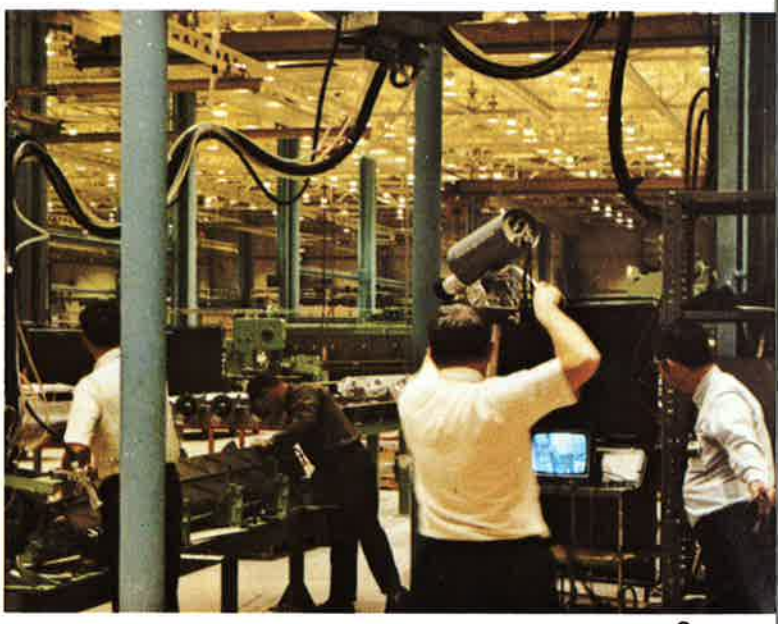
arrangement of equipment and structural facilities.

At night, during off-shift periods, the lighting equipment is thermostatically controlled, so that in the cooler months, when thermostats demand additional heat, lighting fixtures are automatically turned on. During "on hours", of course, the thermostats are bypassed and excess heat is dissipated through roof vents.

Contributing to the excellent visual environment is the unusual attention given to the color treatment of horizontal, vertical, and equipment surfaces. Colors vary

6.

7.



8.

among several areas within the plants. In one area, for example, walls are yellow-tinted, columns are green, machinery is green; in another area, walls are beige, columns grey, machinery green. Piping is color coded. The total result is attractively varied, enjoyable work spaces.

Applications of Lucalox lamps are also in outdoor areas at Wilmington illuminating the roadways, yards, parking lots and building facades.

Lucalox applications in GE properties have proved to be both practical and economical. Enthusiasm among plant-design, operations and production-management staffs of the diverse manufacturing functions within the General Electric Company has inspired great confidence to continue plans for many more Lucalox lamp installations for GE facilities.

Changing themes is the excitement of Christmas decorating. These religious and ethnic themes are both set by expendable elements; the camel cut-outs, windows, and creche structures. Reusable on a long term basis are all the wiring, string lights, flood and spot lamps and holders, and the star framework—in the interest of economy, the second-most-important factor in an effective Christmas display. This display's location: San Juan, Puerto Rico.

Midsummer—Halfway to Christmas

by Frank LaGiusa and John Suter, Lighting Development, Nela Park.

All the world is audience to the Christmas drama—everyone is also a player. Lighting is the visible drama of the staging; it is the visual dimension, the sparkle, the glitter, and the color fulfilling the tradition of the season. Decorative opportunities abound. Lighting unmistakably sets the festive mood, highlights the attractive, conceals the unattractive. And there is hardly an observer who is disinterested or inattentive.

The message and the spirit are goodwill, played to a receptive audience. Sales increase, morale is boosted, public images are enhanced — the statistics are always impressive—but these are only indicators of the overwhelming influence of the many faces of Christmas symbolism: the traditional, the stylized, the modern, the religious.

Enormous creative possibilities for staging and dramatizing the visual Christmas scene are inherent in presentation situations and techniques — panoramas, dioramas, distant scenes and close-ups, environmental schemes, scenes to be viewed, scenes to be occupied, vast and complex scenes, miniscule and simple scenes. Then, too, there is the mobility of the audience making them viewers of one scene, participants in another, or both simultaneously; and their transitions are sometimes at high speeds, sometimes at a snail's pace.

Perhaps only one ground rule for success should be emphasized: evaluate the audience's viewing or participation pace and situation; relate that evaluation to the staging space and location available to you, and stage your expression of goodwill to play to your specific audience as you have determined it by evaluation.

Inasmuch as new ideas sprout from ideas that have proved workable, we present at right an array of expressive Christmas decorative ideas from past years.

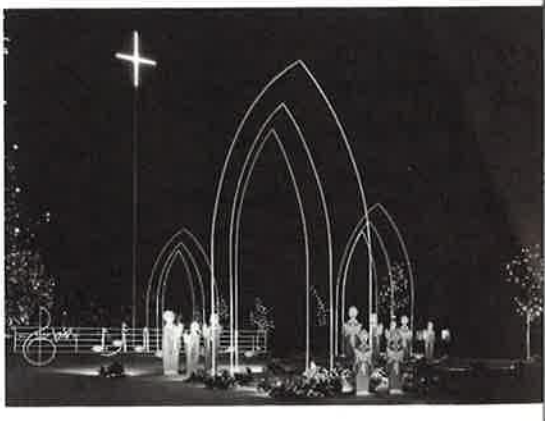
Annually, the coming of Christmas brings a flush of enthusiasm for decorating with lights. Then the tactical problems emerge. Decorating ideas make sense ONLY IF creative talents, productive skills, and time and ability for planning are available. For many private and public organizations and institutions, they are not available; do-it-yourself ideas are out of the question. Yet, the will to display the spirit of Christmas visually somehow gets expressed.

Much seasonal decorating is done by amateur and semi-professional decorators. For


00 PIPERS


THE CASTLE


MERRY
CHRISTMAS



them, the season is short-lived, posing a dilemma involving quick designing, quick choices of decorations, and quicker installations.

Out of the dilemma a growing, vigorous and productive new industry works the year-round to meet the short-term seasonal demand—designing and improving product lines, manufacturing and stockpiling products, developing and planning installation ideas, and educating responsible installers. And, engineering the techniques of construction, erection, suspension and mounting in keeping with public safety and code requirements is no small part of the contribution made by the seasonal decorating industry.

The manufacturers concentrate on creative planning of displays and lines of decorative elements that might be described as "mechanical set" pieces that can be linked together to fulfill a plan. Knowing that seasonal demands for creativity far outstrip their creative planning services, this highly capable industry carefully designs decorative elements so that amateur and semi-professional decorators can find unique ways to incorporate the stock elements into creative decorative plans. And the cost of the manufactured elements is a fraction of the cost for custom-made elements. Designed for compact and convenient storage, the manufactured elements can be reused repeatedly which, of course, is also economical.

If talent seems unavailable locally for designing and building Christmas displays, professional suppliers, such as one of the following, may be able to suggest competent local assistance, decorating ideas, and economical component elements.

Bronner's of Frankenmuth
121 East Tuscola Street
Frankenmuth, Michigan 48734

General Plastics Corporation
1400 North Washington Street
Marion, Indiana 46952

Valley Decorating Company
P. O. Box 251
Pinedale, California 93650

L. C. Williams Company
5100 South Willow Drive
Houston, Texas 77035

An illustrated case history

For those who feel capable to design, construct, and erect Christmas displays for themselves, the following case history shows in general terms how displays have been planned and built.

The first year, the theme was "101 Christmas Trees"; the second year, some of the elements were incorporated in a display on the same site titled "Nela Park's Greeting to the Community." The two displays show how equipment was classified "expendable" for one year and "durable" for reuse the following year.

Step-by-step procedure for planning

STEP 1

DETERMINE OBJECTIVE in terms of nature of message to be expressed, viewing angles, sight lines of viewers, natural features, architectural features and structures. Analyze site, utilize the natural attributes, consider best locations for placement of decorative devices, single out feature for highlighting, consider locations for equipment placement and concealment, determine power distribution routing.

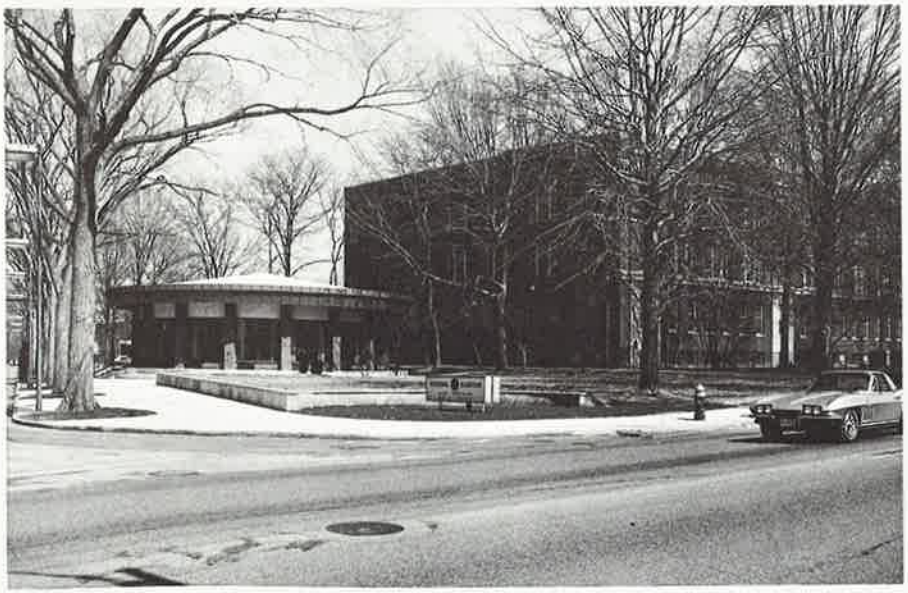
Implementing the plan—FIRST YEAR

CHOICE OF LOCATION AND DISPLAY OBJECTIVES

The plan was for a drive-by display along the seven-block landscaped street frontage of the General Electric Lamp Division, Cleveland, Ohio. The usable space varied between 50 and 150 feet in depth, between and in front of the scattered buildings. The main gate area near the center of the frontage was selected for the focal point. Viewers could pass as close as 20 feet from the display area; the average viewing distance was between 75 and 150 feet from the motor traffic lanes.

Implementing the plan—SECOND YEAR

The same location conditions exist, but notice the difference between the photograph (above) taken in the fall and this one taken in the winter. Planning concepts that begin when leaves are full on the trees and the grass is still green, tend to undergo dramatic changes when limbs turn barren allowing more viewing area in a central location.



Step-by-step procedure for planning

STEP

2

SELECT A THEME appropriate to the desired image— expressed in the traditional, the modern, or the religious idiom. Consider local customs, traditions, characteristic decor, ethnic traits, and religious customs.

Implementing the plan—FIRST YEAR

The theme selected was one of the most universal of visual Christmas symbols—the lighted Christmas tree. The title "101 Christmas Trees" was chosen; indeed, 101 trees could literally be arrayed along the seven-block frontage—a great many were in place as part of the existing landscaping. In addition, multiple varieties of trees and lighting techniques were planned and constructed.

Implementing the plan—SECOND YEAR

The theme reflected a more religious tone for this Christmas season, using Gothic arches and lighted and unlighted candle "tapers." As a backdrop internally lighted and floodlighted trees provided a continuous foil along the entire viewing area.

Step-by-step procedure for

STEP

3

TRANSLATE THE THEME TO A UNIFIED COMPOSITION: Establish a focal point. Establish a unifying

Implementing the plan—

CHOICE OF VISUAL COMPOSITION AND ORGANIZATION

To create impact and give meaning to the light-and-color display, the colors were organized to gradually lead up from both ends of the display to the focal point. Color transition was from red at each end to orange, to

Implementing the plan—

Throughout the current display blue was the unifying color and many contrasts of color were played against this—some subtle, some bold. The entrance again became the main focal point with a thirty-foot silver arch soar-

planning

format. Establish a color scheme organized to maximize dramatic effect. Establish variety. Hold a constant (the unifier) and then play variations against the theme. Vary color, or proportions, or sizes, or treatments; but DO NOT vary everything.

FIRST YEAR

yellow, to green, and finally to blue which created a complementary-color foil for a huge golden-white tree at the focal point. To avoid color dilution, colors were kept separate—most trees were lamped with a single color, or combinations of closely-related colors.

SECOND YEAR

ing above a setting of blue evergreens. The previous display gradually changed color starting from either end with red and becoming a subtle blue at the focal point with a brightly lighted gold tree for contrast.

Step-by-step procedure for planning

STEP

4

ESTABLISH TYPE OF CONSTRUCTION based on: Where devices will be mounted; how they can be mounted; how they can be reached with electrical power supply; consider weight and size limitations; consider visual conflict with lighted windows, street lights, and particularly the brightness of identification signs. Consider availability of manpower —utilize skills within the organization, e.g. carpenters, electricians, metalsmiths, etc., and use construction techniques and materials they are familiar with.

Implementing the plan—FIRST YEAR

CHOICE OF VARIATIONS ON THE THEME
Within the unifying format of the Christmas tree symbol, display variety was expressed in variations of types, sizes, colors, etc., of trees.

Living-and-growing trees, cut trees set in place, man-made trees — modern, stylized, traditional—all variations on the one theme: the Christmas tree.

Implementing the plan—SECOND YEAR

Variations included arches with lamps of various wattages and colors, different lamp spacings and heights, as well as different treatments for the trees. In one area stylized trees were the focus while floodlighted trees served as the backdrop.

Normally counting on snow for a Christmas display and not receiving much, a different viewing situation reflected itself in the wet pavement on a rainy night.

Step-by-step procedure for planning

STEP 5

CHOOSE LIGHTING EQUIPMENT. Select fixtures and lamps of appropriate wattage, size, type, color, finish, etc.

Pro-rate "durables," write off "expendables." Plan source density; that is, the quantity of lamps necessary to provide the planned pattern and brightness of illumination for the area. Plan ahead, DO NOT overload the available power supply.

Implementing the plan FIRST YEAR

CHOICE OF EQUIPMENT AND VISUAL TREATMENTS

The newest and most powerful GE light source, the Lucalox lamp, was used in each of six 400-watt floodlights behind a hedge of concealing greens constructed to permit lighting from three sides. The focal tree was lighted with more than 250,000 lumens. Topping it was a golden tiara enclosing a smaller-wattage Lucalox lamp. One thousand Lexan-coated transparent sign lamps and 200 clear twinkle lamps added glitter and sparkle to the tree. Decorated with huge gold ornaments and swirls of silver garnish, the tree was attractive day or night. Forming a backdrop for the golden-white tree was a massed array of smaller trees. These were lighted with string sets equipped with more than 5,000 transparent blue lamps. The smooth color transition to the focal point built up to a climax with the centerpiece in its setting of complementary color.

Implementing the plan SECOND YEAR

To further explore the use of exposed lamps in displays, low wattage incandescent sources formed the bulk of the lighting. Single ended Quartzline lamps, shielded by perforated cylinders and unshielded in various groupings, gave shimmering sparkle throughout the display for the drive-by viewers.

For lighting in the trees, the previous year's string sets were reused with new lamps. Assorted floodlighting equipment, including that used for the Lucalox tree the previous year, found reuse in every part of the display; the Lucalox units were relamped with clear mercury and the ballasts changed, to floodlight the main arch with a crisp, cool color.

One greeting, many locations

by Gordon Rowe, Lighting Development Coordinator for GE properties, Nela Park

Each Christmas many General Electric properties are the sites of attractive lighted outdoor displays. They vary in size, elaborateness and cost as well as in adaptation to plant geometry and landscaping. Traditionally they are focal points of employee and community interest.

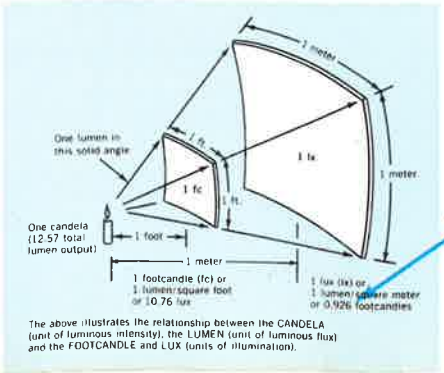
At some GE plants new themes were generated annually, and the materials were discarded at the end of the holiday season. Conservation of some of the investment seemed prudent; a plan to get greater mileage out of displays was initiated in the form of a voluntary rotation scheme based on trades of materials between any two plants.

Questionnaires to plant engineering personnel indicated their level of interest and provided complete descriptions of their available display materials. The returned questionnaires were duplicated and a complete set was sent to each participating plant engineer. The descriptions of available materials inspired trade offers; obviously, for the reason that the time and cost of transporting displays offers advantages over the time and cost to create and construct new ones.

This system was in contrast with an earlier and less successful attempt to collect and redistribute materials on a "broker" basis.

Favorable response to the program is growing; exchanged displays will be used on their third sites during the 1969 season. The plan is described here with the thought that other companies with multiple properties may find useful economies in the idea. The effectiveness of the plan is demonstrated in the photographs on this page. At top, a photograph of GE's Ravenna, Ohio, property; at right a photograph of the Schenectady, New York, works. In both pictures, materials are from displays of earlier years which are illustrated in use at Nela Park, Cleveland, Ohio, on pages 43 to 46 of this issue of LIGHT.

Thus, "newness" and added interest in the outdoor artistry inspired by the Christmas season is annually brought to a greater number of people; and often, happily, with significant economic advantage.



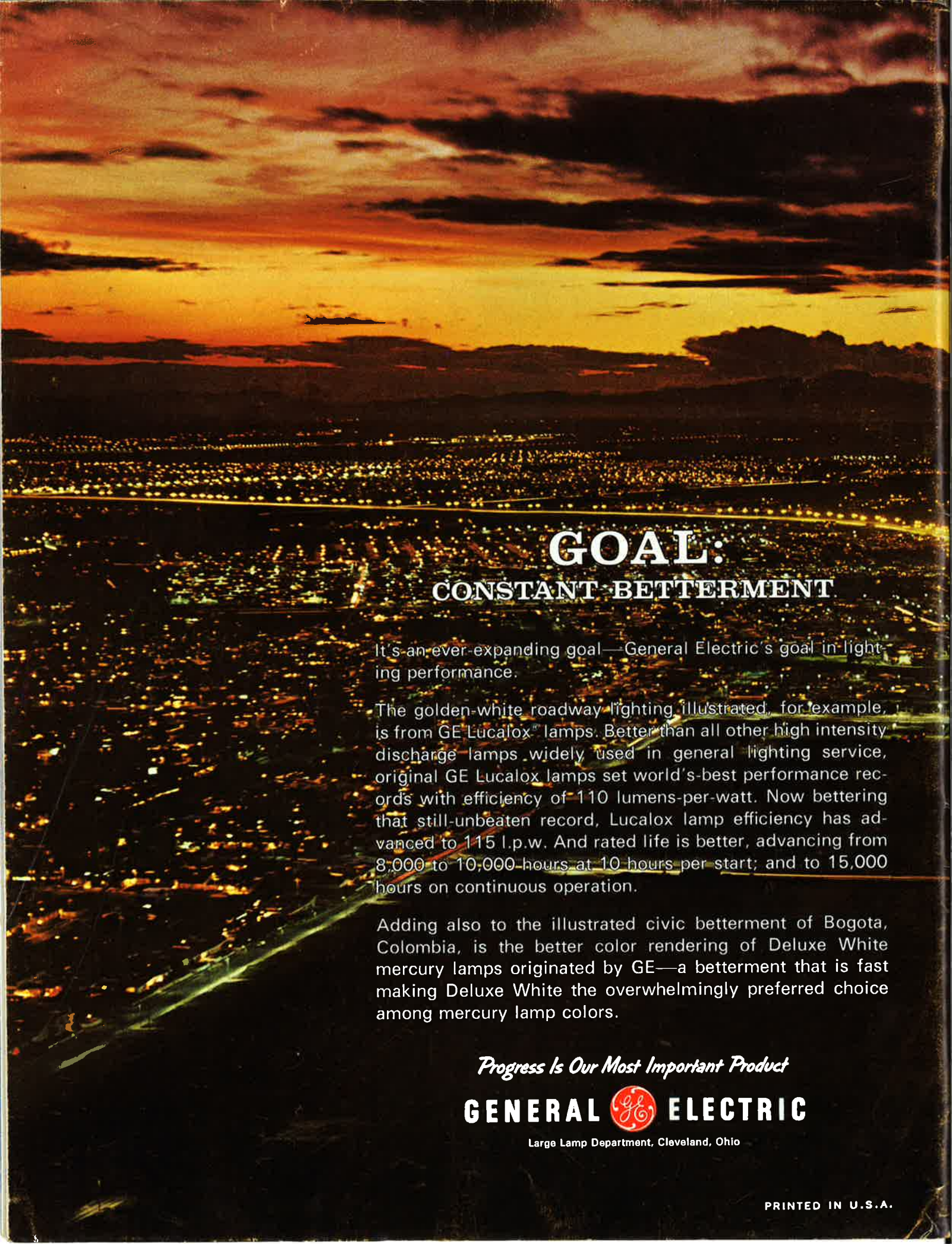
The above illustrates the relationship between the CANDELA (unit of luminous intensity), the LUMEN (unit of luminous flux) and the FOOTCANDLE and LUX (units of illumination).

Correction, Please

The illustration, reproduced at left, which originally appeared on page 22 of LIGHT Vol. 37, No. 3, should be corrected as indicated.

We are not happy about the error, but we are happy some of our readers called it to our attention. Editor.

0.0929



GOAL:
CONSTANT BETTERMENT

It's an ever-expanding goal—General Electric's goal in lighting performance.

The golden-white roadway lighting illustrated, for example, is from GE Lucalox® lamps. Better than all other high intensity discharge lamps widely used in general lighting service, original GE Lucalox lamps set world's-best performance records with efficiency of 110 lumens-per-watt. Now bettering that still-unbeaten record, Lucalox lamp efficiency has advanced to 115 l.p.w. And rated life is better, advancing from 8,000 to 10,000 hours at 10 hours per start; and to 15,000 hours on continuous operation.

Adding also to the illustrated civic betterment of Bogota, Colombia, is the better color rendering of Deluxe White mercury lamps originated by GE—a betterment that is fast making Deluxe White the overwhelmingly preferred choice among mercury lamp colors.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Large Lamp Department, Cleveland, Ohio

PRINTED IN U.S.A.