

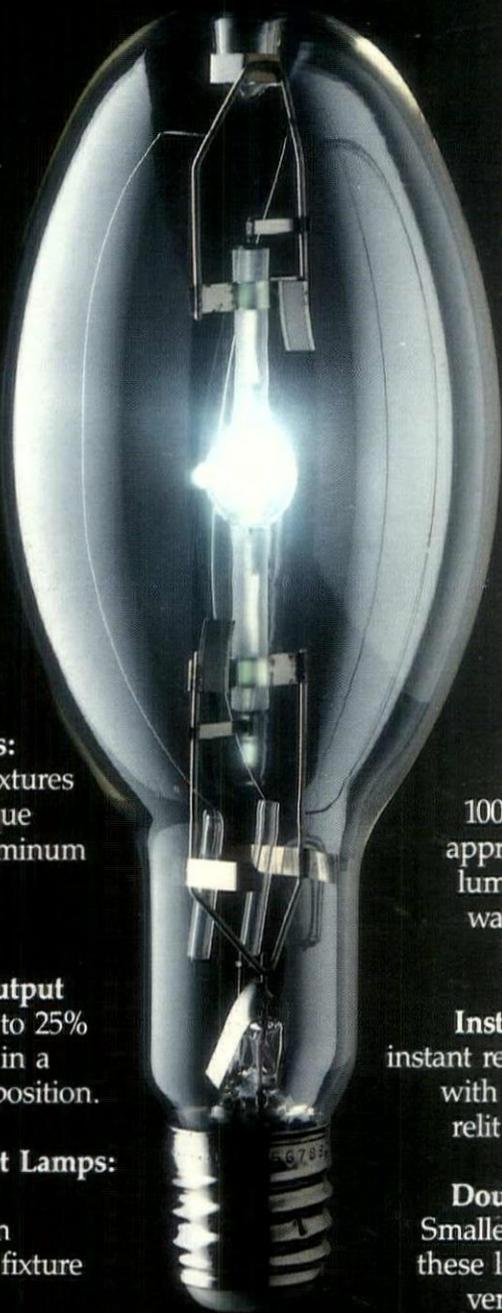
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December 1987
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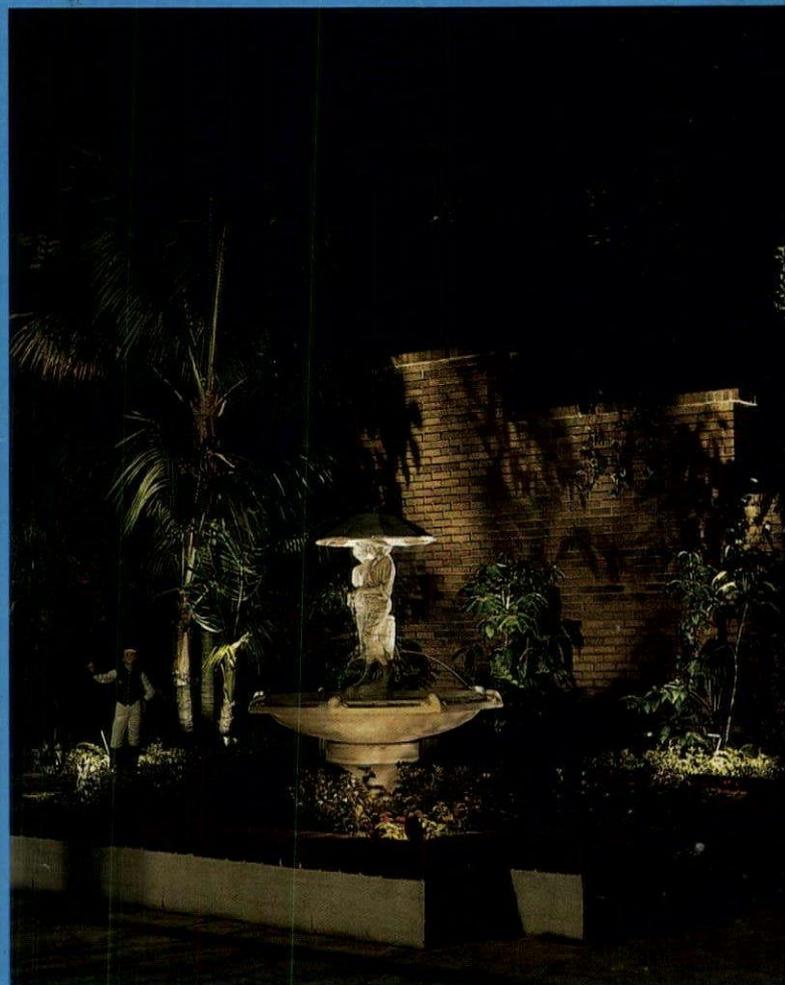
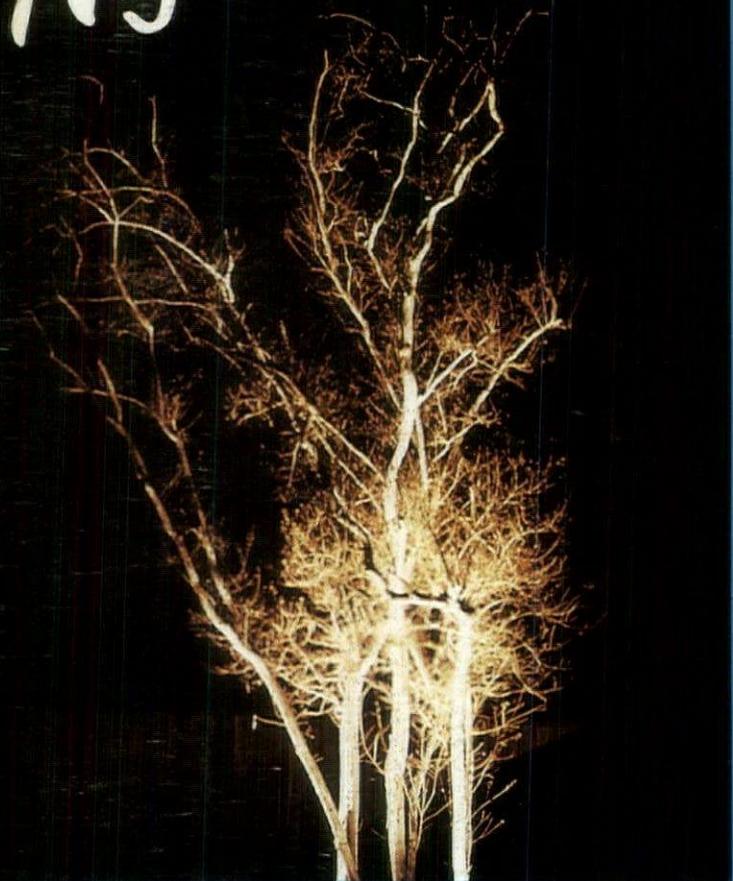
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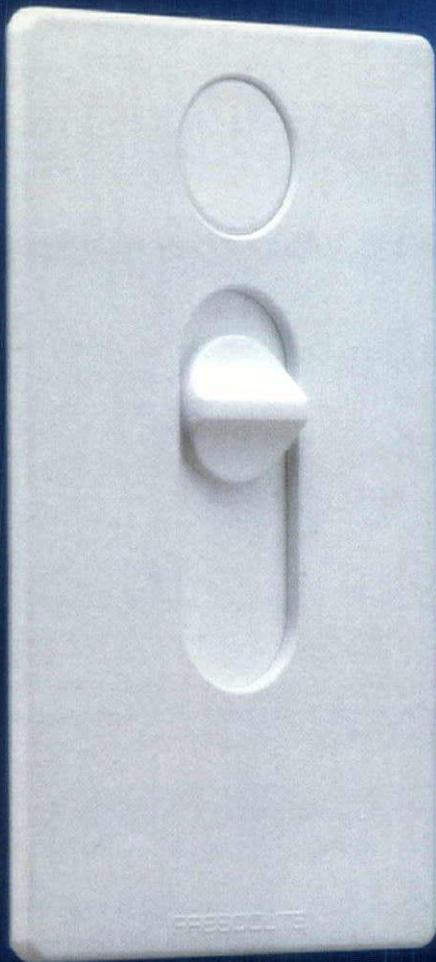
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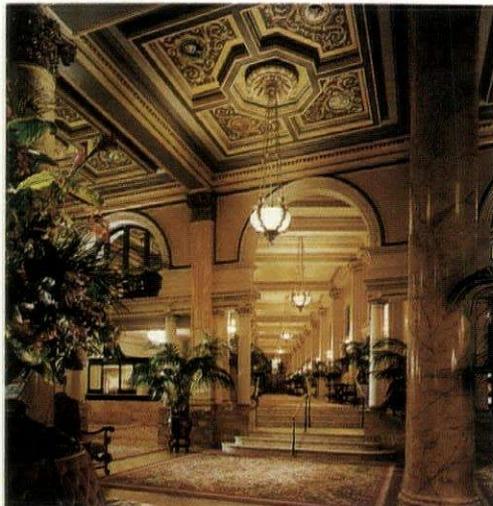
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ARCHITECTURAL
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From the Editor

Often, when writing or editing the articles that appear in *Architectural Lighting*, I come across conflicting opinions about the performance or application of products. Usually those statements have to do with whether or not a product works the way its manufacturers claim it does. Or in use, what a product's limitations might be.

The purpose of publishing such opinions is twofold. The first is most obvious: readers look to us for advice and ideas on how to use lighting and daylighting products. If we give our readers bad advice, that damages our credibility. The second reason is less obvious: if we recommend that a product be used in a way in which it will not perform satisfactorily, that will eventually damage the manufacturer's credibility as well.

Since I became the editor of *Architectural Lighting*, I've found that the majority of manufacturers are honest about what their products can and cannot do. There are, however, just enough who make claims so totally absurd that it tends to make all manufacturers' claims and data suspect. And many of the readers and even some of the manufacturers I talk to also view all claims and data with a wary eye.

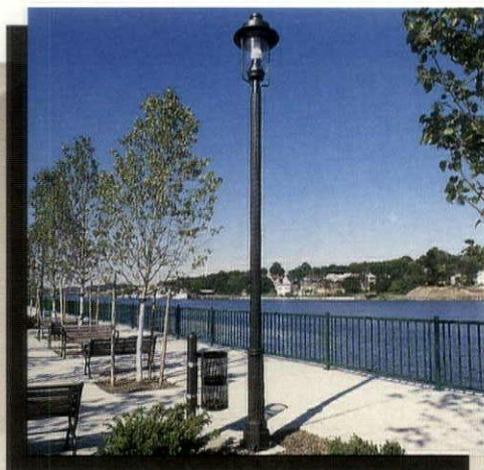
When you have questions about a product, who can you trust? I attempt to trust experts who have had experience with the product in question and who have nothing to gain by being less than totally objective. Occasionally, I get burned. When I wrote in last month's cover story that a particular glass product could not be used in a near-horizontal position without being subject to damage, I was relying on a report written by an expert. And I am convinced he would never intentionally discredit this manufacturer or their product. I verified his statement with a second source. Turns out both sources were wrong. And so was the statement in my story. But I found out only because the manufacturer came forward to set the record straight (see Letters) — and I'm grateful that he did.

A similar situation occurred earlier this year when we ran a story stating that designers should be aware of certain limitations of a popular fluorescent lamp. One manufacturer of the product phoned and vehemently discredited the story. But no one ever protested in writing, or supplied any data to discredit it. For the sake of the credibility of both us and them, I wish they had. But now, who do you believe?

We pursue a strict policy of fairness, accuracy, and objectivity. And we encourage both our readers and manufacturers to support that policy by setting the record straight when necessary.

Charles Linn, AIA

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Letters

Low-e glass can be used horizontally

Your November cover story on the Museum of Flight in Seattle described how new technology in glazing materials can allow a building to be constructed almost entirely of relatively high-transmittance glazing without compromising energy efficiency.

Southwall is proud that Heat Mirror insulating glass was specified for all of the vertical glazing in the impressive structure because of its unique ability to reject near-infrared and ultraviolet energy while transmitting high levels of daylight. However, we were dismayed to read in your article that Heat Mirror was not used for the roof glazing because installation "in a nearly horizontal position . . . would have caused stresses in the metal oxide-coated membrane of the Heat Mirror, and its long-term performance could not be guaranteed."

This statement is entirely wrong. The *correct* reason that Heat Mirror was not used in the skylight was that the glazing had to be flush-glazed (no mullions) to allow for snow runoff, and the sealant used (polyurethane) with Heat Mirror cannot be used in flush-glazed applications.

In thousands of skylight applications throughout the world, including the Westin Hotel in Washington, D.C., and the new Jacksonville Convention Center in Florida, Heat Mirror has *never* had a failure related to the coating or the polyester substrate. In the seven-year history of the product, Southwall has never made any limitations on our warranty for sloped glazing applications, and Heat Mirror's durability record in skylights is impeccable.

*Bradley J. Davids, PE
Director of Marketing
Southwall Technologies
Palo Alto, California*

We strive for accuracy

Although our staff makes every effort to be accurate and fair, errors do occur from time to time. We encourage interested readers to set us straight when the occasion demands — uncomfortable as that sometimes is.

The Editors

Training, not licensing, hope for the future

The annual IES convention failed to inspire me. Why do we not hear more of Edwin Land and color, of Betty Edwards and design, and of the work being done in visual research? Architects seem more sensitive to the visual needs of their building's inhabitants than do illuminating engineers.

Certain questions about illumination arise with the regularity of the seasons. Most of the questions have been addressed over and over during the past century. How much light is enough? When is light glaring? Can we measure visibility?

Should lighting be designed or engineered? Who plans the lighting? Should states license or certify lighting professionals? Although experts have given serious thought to these questions, there are no definitive answers. One thing is certain, they will be asked again.

Since art defies definition or regulation, and since illuminating engineering is contingent upon design, it appears that there is no defensible basis for accreditation or licensing. Can engineers be sensitized? I hope so. Can designers acquire the necessary numerical application expertise? I hope so. The hope for the future lies in training, not licensing.

*Louis Erhardt
Camarillo, California*

Violation of 1987 National Electrical Code?

Your October 1987 issue has an article on outside lighting [Schlumberger Well Services complex in Austin, Texas]. Article 225-26 of the National Electrical Code states, "Live vegetation, such as trees, shall not be used for the support of overhead conductor spans, or other *electrical equipment*."

The reasons for this are quite obvious, that is, growth and movement.

Please explain or correct in a future issue before we lighting engineers are overrun with requests from clients to mount fixtures in trees.

*Henry A. Jager, Electrical Engineer
The Upjohn Company
Kalamazoo, Michigan*

Some changes in the code

According to Jim Janek of Showcase Lighting, the electrical contractor for the project, the work was done in accordance with the 1984 National Electrical Code even though the work was done outside Austin city limits and was not subject to the code, which was in force in Austin at the time. The 1984 code did not contain this article. In addition, the National Fire Protection Association has written a tentative interim amendment to Article 225-26 (Letters to the Editor, *Architectural Lighting*, May 1987) which states: "EXCEPTION #2: Outdoor lighting fixtures and associated equipment installed on trees where supplied by an underground wiring system with the branch-circuit conductors extended up the trees by an approved wiring method."

It appears that the Schlumberger installation would comply with the 1987 NEC under this exception. We would like to assure our readers that we would not knowingly endorse any method of work that violates any provision of the various life safety codes.

The Editor



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Introducing another innovative product from Capri... the R4X family of recessed downlights. Now available, these diecast miniature downlights deliver powerful accent lighting whenever extra drama is desired. Whether highlighting art objects, adding sparkle to fine crystal, or accenting textures and colors, striking effects are easy with the R4X. And it accepts a variety of light sources, from spot to flood lamps, including the brilliant new PAR 20 tungsten halogens.



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Store skylight works day and night



The psychic and energy-saving benefits of natural light are the usual reasons for adding daylighting to a design project. A prototype California store demonstrates a new role for daylighting — as a marketing tool.

With a 40-foot-long skylight on the peak of its roof, the Food & Liquor Store in Santa Rosa, California, radiates the ambience of sunny California during the day and encourages customers into its transparent, brightly lit space at night.

Saving energy was the original purpose for daylighting the prototype store. The building's central feature is an 8-foot-wide barrel vault skylight of 2 3/4-inch-thick insulated translucent plastic in a 180-degree arc. During the day it acts as a source of interior illumination. At night, it signals a place open for business, as the glow from two parallel rows of linear fluorescent uprights inside the vault illuminate the skylight and 8-foot-diameter windows with the company logo at either end.

Other illumination comes from four banks of continuous fluorescent fixtures suspended by airplane cables from the

ceiling trusses. Each supports three rows of exposed lamps mounted on the sides and bottom. One, two, or all three rows on each bank can be switched on or off, depending on the light needed to supplement available daylight. A bank of fixtures just under the skylight also supports a top-mounted track system for accent spotlights.

The store's front is a clear single-glazed entrance window wall. Windows just below the ceiling in the side walls admit additional light from skylights over the entrance doors and openings in the roof's 10-foot-wide overhang. Solar sensors control automatic shades that shield these lower perimeter windows from direct sun whenever the store is being cooled. At other times, the shades are retracted to admit more light around the perimeter of the store and to give the front a more transparent, open-for-business look. To further enhance the feeling of space and light, mirrors below the windows on the side and back walls reflect light from both the overhead fluorescent fixtures and the windows.

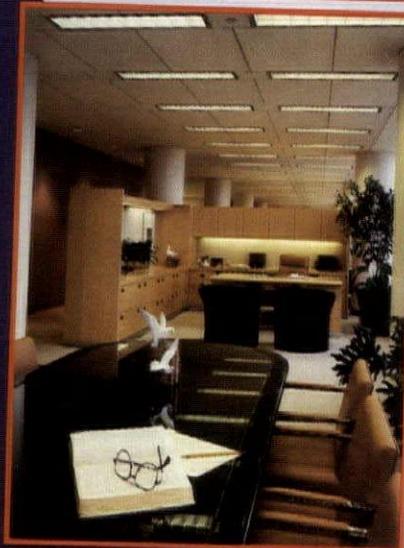
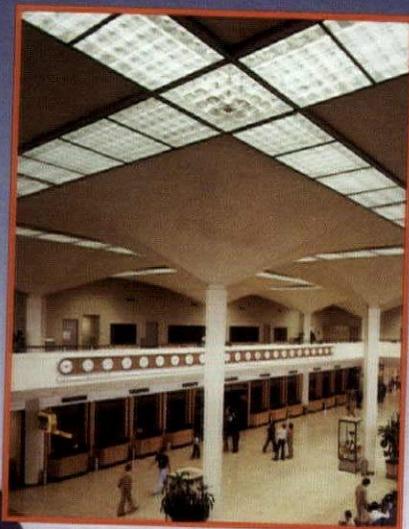
The owners of the store wanted a spacious-looking, energy-efficient structure that would fit any type of community and any building orientation with only minor modifications. They got far more than that, however, with a skylight that works both day and night to set their store apart from ordinary neighborhood market clones. ■

Project: Food & Liquor Store
Location: Santa Rosa, California
Client: Customer Company
Architect: William Simpson, AIA
Daylighting and Model Studies: William Simpson and Van der Ryn Calthorpe & Matthews
Electrical Engineers: BRW Associates
Lighting Designers: Bruce Wishard, BRW Associates, and William Simpson
Photos: Douglas Symes



For product information, see the Manufacturer Credits section on page 70.

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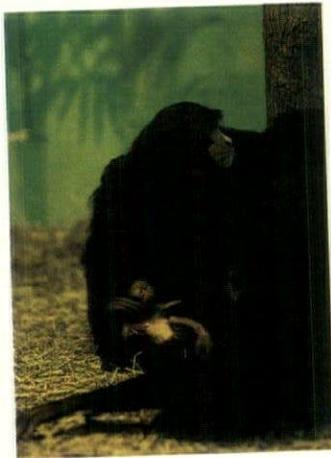
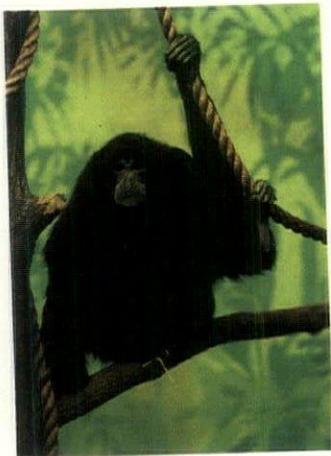
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Lighting a zoo to please animals and people



Human visitors to a zoo building need lighting that allows safe passage through the exhibit corridors and a good look at the creatures on display. The animals that live there need the levels of full-spectrum light essential to their life and growth. Even when the building structure made it difficult, Sargent-Webster-Crenshaw & Folley's electrical engineering division found ways to satisfy both needs in a county zoo's expanded main building.

The exhibits in the building are divided into three sections. "Animals and Antiquity" is a cave-like area designed to create a sense of the natural habitat of fish, shellfish, and reptiles. Nocturnal animals inhabit the second area, and the third is for "social beings" — monkeys, lemurs, and meerkats. All exhibits need 150 footcandles of light during the daytime cycle to sustain plant and animal life.

In the nocturnal area, lighting is used to manipulate the animals' schedules so they are most active during daytime visiting hours. Automatic timers activate the daytime cycle at night. During the day, the timers turn on stage lights with each color dimmed separately and adjusted to simulate moonlight.

Full-spectrum daylight fluorescent lamps were used to achieve 150-footcandle levels in the cave and nocturnal areas. But there just wasn't room to install fluorescents in the social beings area, a remodeled part of the original 1930s-era zoo building. "That was the trickiest part of the job," says SWC&F chief electrical engineer Bill Chase.

Each large exhibit room is unique. Some have windows; others do not. The architects wanted to keep the ceilings free of fixtures, but few alternative mounting locations were available. Positioning the fixtures where the animals could not reach them would also make them relatively inaccessible to people, so the engineers looked for fixtures that require only infrequent maintenance.

Chase's team settled on high intensity discharge indirect lighting. Metal halide and high pressure sodium luminaires were mounted on the pipe railings of the overhead maintenance catwalk and aimed at the exhibit ceilings, which were repainted to improve reflectivity. The balanced mix of light sources — 400-watt metal halide and 250-watt sodium — provides a spectral distribution that closely resembles that of daylight.

To minimize veiling reflections on glass, exhibit lighting is kept brighter than lighting in the public viewing areas. Corridors are adequately illuminated where light streams from the social beings exhibits. In the cave area's darker corridors, recessed MR16 fixtures provide light for circulation.

The zoo's remodeling and expansion project has been a great success. "The community has really latched onto the zoo as a gathering place," says Chase. "Attendance has been way over what the client expected. When it's open, the place is mobbed." ■

For product information, see the Manufacturer Credits section on page 70.

Project: Burnet Park Zoo main building

Location: Syracuse, New York

Client: Onondaga County Department of Parks & Recreation, under the direction of County Executive John Mulroy

Architect: Sargent-Webster-Crenshaw & Folley

Lighting Designers: Patricia M. Lamphere and William M. Chase, Jr.

Electrical Engineer: William M. Chase, Jr.

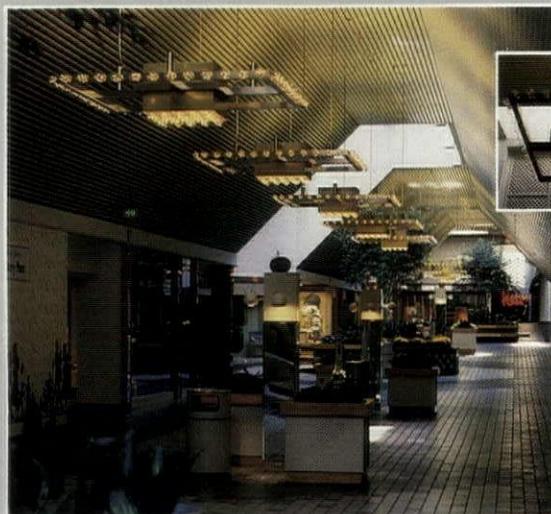
Landscape Architect: Hueber Hares Glavin

Photos: John Dowling

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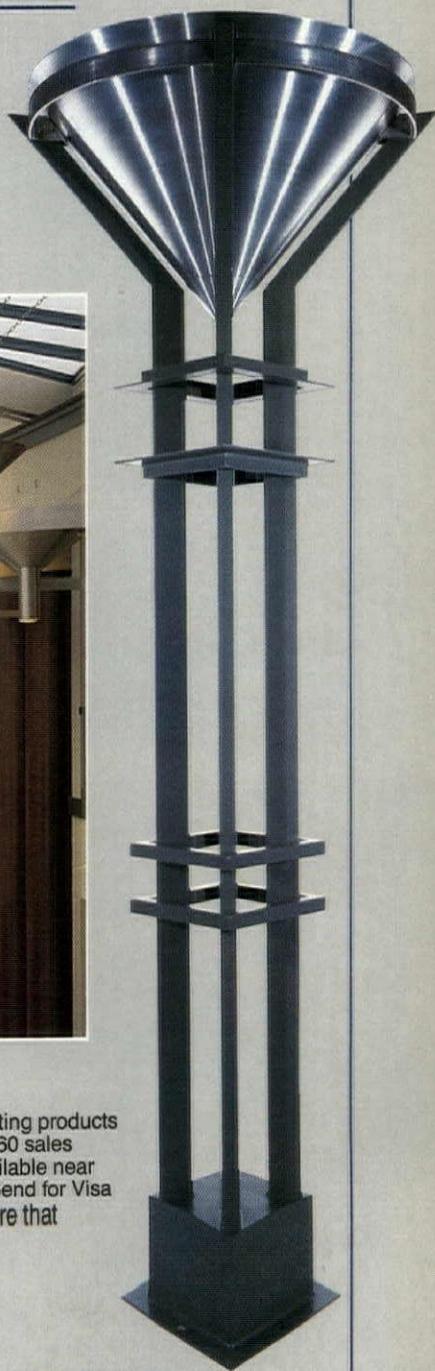
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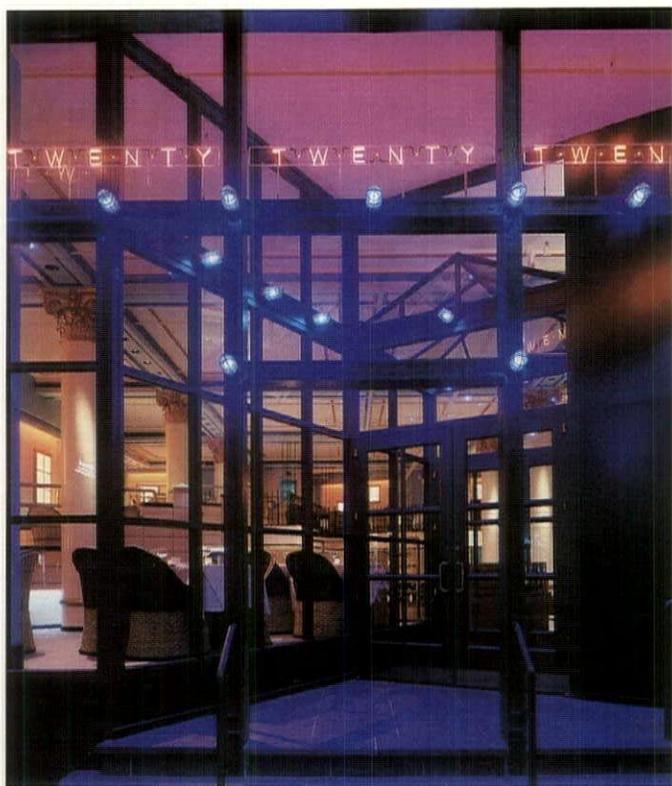
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Light puts 240 restaurant customers on stage



Customers come to New York's Twenty:Twenty restaurant not only to dine, but also to see and be seen. In this case, "dinner theater" involves all who enter the space. Architects David Rockwell and Jay Haverson stated that their primary design goal was to create an environment "in which the people and their movement through the space would be considered primary design features." They layered the space into six levels so that 240 people could each feel they were in a special area of the room.

Lighting plays a major, yet supporting, role. The architects avoided intrusive sources such as track or pendant fixtures in the interior. They designed a coffered ceiling to house a meticulously orchestrated pattern of recessed PAR fixtures, all customized to accept a glass color filter and 30-degree cut-off louver. Ambient lighting comes from line-voltage, 150-watt spots with a light pink filter; accent lights are low-voltage, 50-watt very narrow spots with clear and pale blue filters.

The perimeter of the room features stylized street-front vignettes, recessed 6 inches into the walls and dramatized by light. Concealed red-orange

neon washes down color from above; 300-watt PAR floods recessed in the floor add upward beams of accent light colored by amber glass color filters. Custom-made decorative windows, only 2½ inches deep, glow warmly with backlighting of continuous 4-watt, 5½-volt lamps under a double layer of fluted glass.

Around the inner perimeters of the irregular dining tiers, a continuous white neon outline "floats" the ascending levels. The back bar features a mirrored-panel mural lit by MR16 fixtures, again supplemented with amber glass filters. Distinctive exterior lighting creates a signature with neon signage and vaporproof blue incandescent fixtures.

A four-scene dimming panel controls the entire system. The bright daytime setting plays up the vivid interior color scheme. At night, ambient light goes down and the colored light from the decorative niches comes up to suffuse the room. The 12 channels allow lighting on each tier to be adjusted independently to create the comfortable, yet dramatic environment that Twenty:Twenty's customers seek. ■

For product information, see the Manufacturer Credits section on page 70.



Project: Twenty:Twenty
Location: New York City
Client: Bobby and Carolyn Ochs, Nick Ashford, and Valerie Simpson, CAO Restaurant Corp.
Architects: David Rockwell and Jay Haverson, Haverson/Rockwell Architects

Photos: Timothy Hursley, The Arkansas Office

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Creating new lighting for the historic Willard Hotel

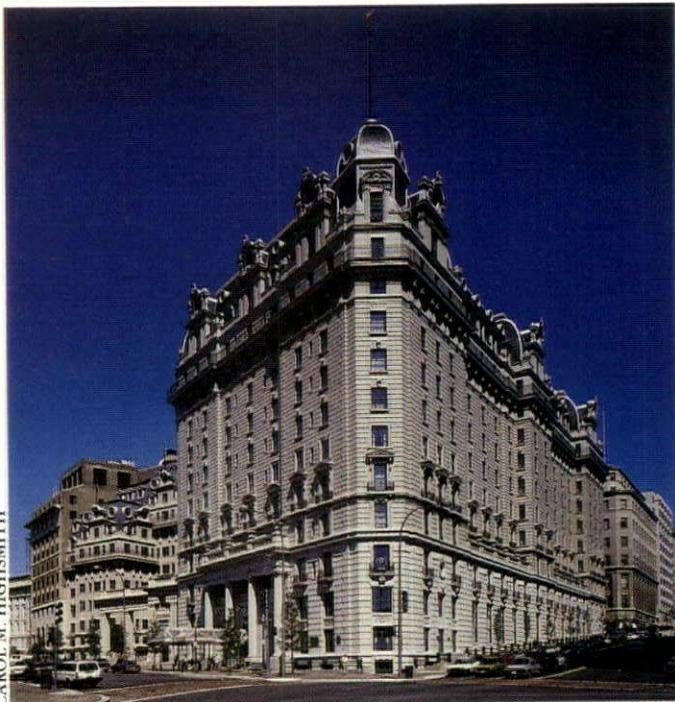
STORY BY
CHARLES LINN, AIA

INTERIOR PHOTOGRAPHY BY
PETER AARON, ESTO

The Willard Hotel is not historic merely because it has been around for a long time — history has been made there. When such notables as Mark Twain, Sarah Bernhardt, John Philip Sousa, and Victor Herbert visited Washington, D.C., they preferred to stay at the Willard. The Second Empire Beaux-Arts edifice was that city's first high-rise hotel; it was built between 1901 and 1904 on the site of an earlier Willard Hotel, which had been host to kings, queens, princes, ambassadors, and presidents.

The landmark hotel at 14th and Pennsylvania Avenue fell into complete disrepair after it was closed in 1968. Then, after 15 years of doubts and rumors, in 1983 the Oliver T. Carr Company took on the task of completely restoring the hotel under the watchful eye of the Pennsylvania Avenue Development Commission (PADC). The PADC required that a number of public spaces be restored to their original colors and architectural backgrounds. That mandate included re-creating the look of the original architectural lighting.

"At the turn of the century," says Lesley Wheel, "they didn't have the wide range of lamps or lamp housings available to us today. Everything would have been illuminated by pendants and sconces. Those fix-



CAROL M. HIGSMITH

tures would have distributed the light equally in all directions and the rooms would have been very evenly illuminated. Today's lighting designs have trained our eyes to look for contrast. Then, there wouldn't have been any contrast.

"We set out to create that contrast in such a way that the viewer can enjoy it, without realizing that it's there. We've found that when you can't do downlighting — and we could not in most of these rooms —

Project: The Willard Inter-Continental Hotel

Location: Washington, D.C.

Lighting Designer: Wheel, Gertzstoff, Friedman Associates; partner-in-charge, Lesley Wheel, IALD; project designer, Babu Shankar, IALD

Interior Designer: Tom Lee Ltd.; president, Sarah Lee;

project manager—design, Roger Danforth; project manager—interior architecture, Edward Jenkins

Architect: Vlastimil Koubek, AIA



CONCIERGE



you can compensate for the loss of it by using dramatic accent lighting. And it breaks through that bland, even illumination."

New Based on the Old
The lighting and interior designers faced the problem of creating lighting and fixtures that would fulfill the needs and expectations of today, yet retain the look of the old, especially in the main lobby and in a promenade known as the Peacock Alley.

"When this building was built in 1905, people relied on pendant fixtures and wall sconces for most of the lighting," says lighting designer Babu Shankar, "so the pendant fixture was kind of a given for us. We took that idiom and added something else to it.

"When we're involved with a room like the main lobby, we try to look at what's really interesting about it in terms of sculpture, artifacts, artwork, and vertical architectural elements, such as columns and

arches. In this room, we started by looking at what's interesting about the ceiling. Each column bay is coffered and heavily embellished with plaster architectural detailing. Each coffer was separated into four parts, each part featuring a different state's seal. These were re-created from the originals and each is hand-painted.

"And on the floor, each bay is filled with a beautiful English carpet. What was needed for that space was a pendant that would provide multidirec-

tional light — both uplighting and downlighting."

Fortunately, interior designer Sarah Lee was able to unearth both drawings and period photographs of the original fixtures. With these available, the lighting designers were able to design new fixtures that would, at first glance, appear to duplicate the originals. But it was not practical to duplicate them exactly. In order to have the capacity to uplight the ceiling, for example, the designers eliminated a large ostrich egg-shaped globe that once sat atop the assembly.

The new fixtures contain three different kinds of light sources. Five 75-watt R30 reflector lamps uplight the ceiling. These are located between the five chains from which the pendants are suspended, so that shadows of the mounting chains are not cast upon the ceiling.

In the center section of the pendants, five 60-watt A lamps illuminate five translucent molded-glass lenses. A 50-watt medium-flood MR16 lamp concealed inside the finial at the bottom of the luminaire lights the carpet below. Its low-voltage transformer is concealed inside the fixture.

Each of the three lamp groups is on a separate dimming circuit, so the intensity of each group can be adjusted individually and the amount





of light each element contributes to the room can be balanced. The preset dimming system has four settings, for day, evening, late night, and cleaning.

"The other interesting architectural elements in the main lobby are the arches that drape the perimeter of the room," says Shankar, "along with a decorative iron railing that runs in front of each one. We wanted a linear light source, so that we could highlight the iron railing, and also uplight the arch itself. In order to accomplish this, we used five 20-watt MR16s, located about 12 inches apart. These lamps are covered with a thin-spread lens to create an even wash of light, and the enclosure is vented to prevent overheating. To increase lamp life, we used a step-down transformer that supplies the lamps with 10.8 volts and wired it back to the hotel's emergency generator. If there should be a power failure, the arches in the lobby remain illuminated to serve as emergency lighting. This technique was also used in some of the torches located in the Willard Room.

"The main lobby features a number of large palm trees in vases. We uplit each of these with a small fixture fitted with an MR12 lamp, which provides each palm with interesting



The Willard Room.

light and projects some shadow patterns on the ceiling. The low voltage is supplied by a small transformer that fits inside an electrical box recessed into the floor beneath the vase. The wire is very small and has clear insulation so that it is virtually unnoticeable."

The pigeonholes located behind the concierge desk, which originally was the hotel check-in desk, are downlit with a concealed row of 50-watt R20 lamps located 6 inches on center. A low-voltage light strip hidden behind the cornice molding atop the pigeon-

holes uplights the station's antique clock. The desk top is illuminated by desk lamps reproduced from the period.

Willard and Crystal Rooms Interior designer Roger Danforth designed the ornate custom-fabricated chandeliers and



The Crystal Room.

matching torcheres in the Willard and Crystal Rooms. They are based upon Danforth's research into fixtures of the period, rather than on the photographic records of the originals, whose appearance was not deemed suitable.

Each Crystal Room chande-

lier contains over 5000 prisms, each of which was strung, or "pinned," by hand. Danforth chose a manufacturer who had been building such fixtures since the late 1800s, and he worked with the company to refine the designs. The chandeliers are made of solid brass

castings, tubing, and wrought bronze. Some of the castings utilized patterns that dated back to the early 1900s. The metal was hand-patinaed to the designer's specifications and protected with lacquer. The manufacturer imported blown glass globes and crystal

prisms from Europe. Chandeliers like these may weigh between 300 and 400 pounds each, and though they can be assembled on site, a safe, proper installation requires a great deal of care, as well as coordination between designer, manufacturer, and contractor.

In other areas, low-voltage accent lighting has been discreetly hidden inside existing rosettes around the perimeter of the rooms to light sculpture and other artwork. A buffet in the Willard Room was also illuminated with concealed low-voltage lighting.

The new lighting at the Willard Hotel is an admirable representation of the original lighting of 1904. Yet it has unobtrusively incorporated improvements in lamp technology and what has been learned about lighting design in the ensuing years. ■

For product information, see the Manufacturer Credits section on page 70.

Dramatic lighting kindles excitement at museum in a mall

Mass transit, automobiles, and additional leisure time have transformed the shopping experience from a functional visit into a form of entertainment. In response, merchandising has evolved in recent decades. Shops and stores have been centralized for convenience. In many areas, malls have appeared only to be replaced by larger malls.

To compete with other retail centers, the Foothills Mall in Tucson, Arizona, took a unique approach. Instead of adding exotic food courts, larger anchor tenants, or new retail wings, the Foothills Mall management decided to incorporate a cultural center into one of its main open areas.

Museum in a Mall

The existing food court, centered in the mall's traditional axial layout, was a logical location for the newly created Old Pueblo Museum. The prominent architecture of the museum provides a needed focal point for the mall and a dominant, exciting backdrop for the food court.

Project: Old Pueblo Museum
Location: Tucson, Arizona
Client: The Foothills Mall
Architect: Paul Edwards, Design & Building Consultants, Inc.
Designer: Rory McCarty, Rory McCarty Design
Lighting Designer: Chip Israel, Grenald Associates Ltd.
Electrical Engineer: Jack Echols, Echols Engineering
Photos: Mark Citret

Chip Israel

Chip Israel is a designer at Grenald Associates Ltd., a firm of architectural lighting consultants with offices in Los Angeles, Philadelphia, and New York. He works in the Los Angeles office.

Project designer Rory McCarty of Rory McCarty Design used natural regional elements to create an area completely different from the remaining Spanish colonial-style mall. A spectacular 120-foot wall of patinated copper stretches from one corner of the food court to the museum gallery area. The wall's size and diagonal position exaggerate the museum's disjuncture from the mall, creating a "contemporary artifact" that appears to predate the surrounding architecture.

The museum has four unique display areas. The main gallery provides a versatile space for touring exhibits, an automated audiovisual theater presents continuous audiovisual shows, and the basement level houses a mineral display case that

showcases local and exotic gems. A simulated archaeological dig, visible from both levels, highlights the lower level with a sensory display and prehistoric artifacts.

The copper wall unites the individual display areas into a functional and aesthetic museum. The lighting was designed to dramatically highlight the elements of each area.

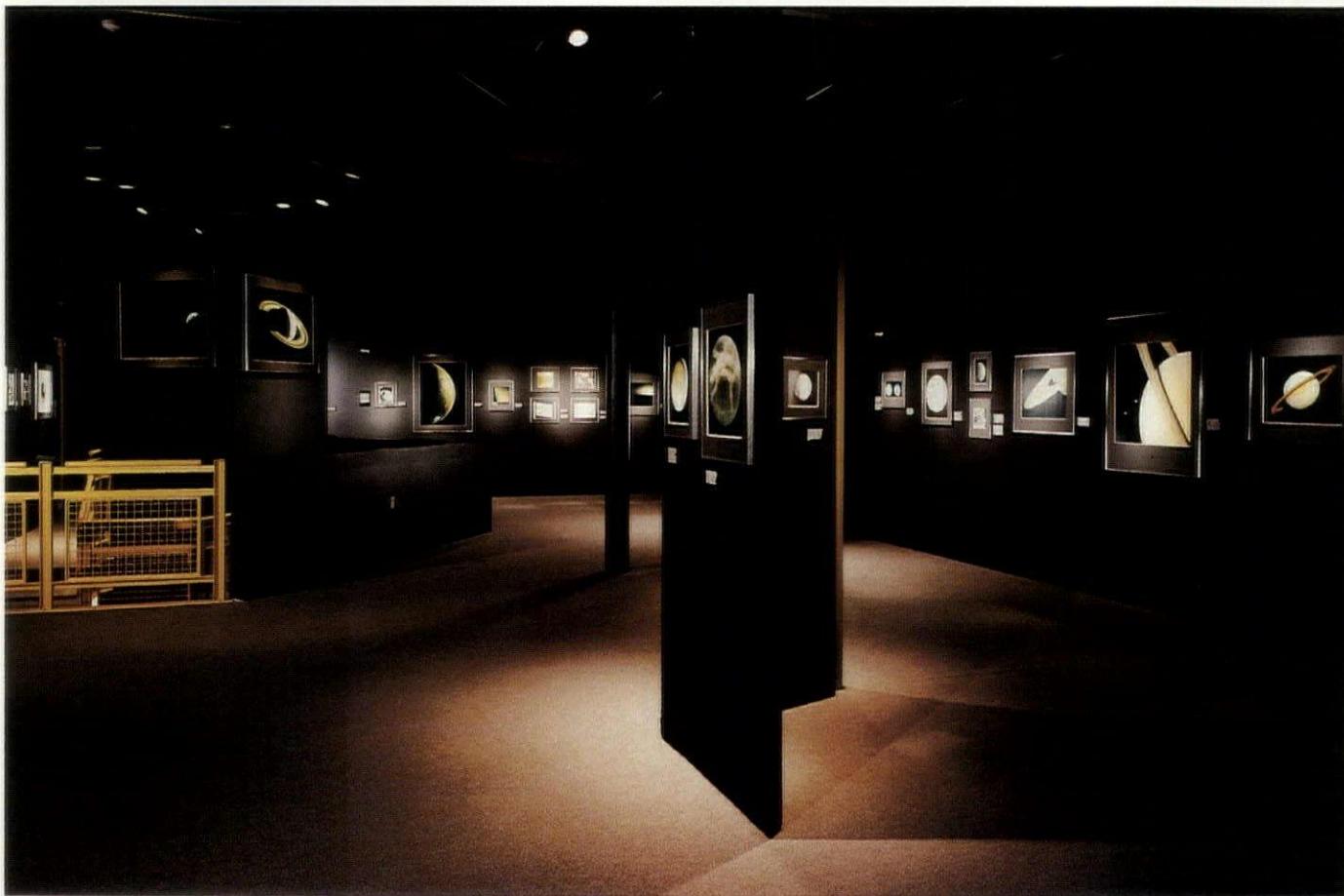
Food Court and Museum Entry

Outstanding attention to detail and architectural sensitivity are evident throughout the project. In the center food court, a trompe l'oeil ceiling, the copper wall, and a spectacular water feature command attention and create



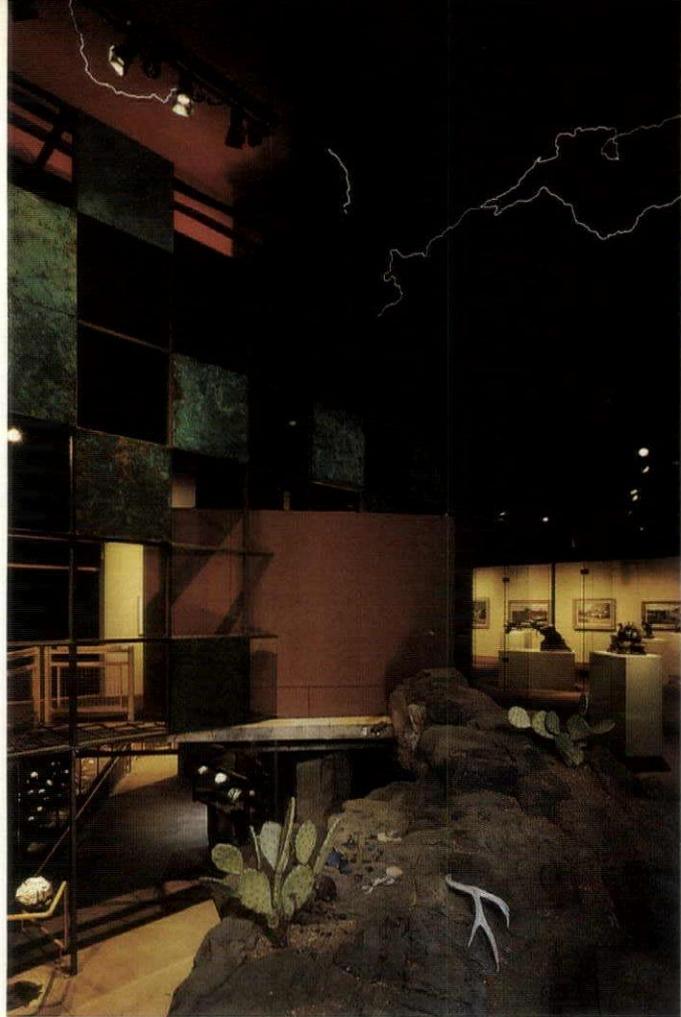
Attention to detail is a hallmark of the Foothills Mall. Skylights and a range of electrical light sources create a spectacular focal point in the mall's food court.





Track lighting and movable walls provide ultimate flexibility in the gallery area, allowing museum staff to create dif-

ferent atmospheres for exhibits such as these focusing on the Old West and outer space.



Custom metal halide fixtures dramatically render colors of patinaed copper wall in the Old Pueblo Museum.

excitement. A massive monolith stands guard over the museum entry, while a symbolic water stair connects the storm clouds above to the slabs of granite at its base.

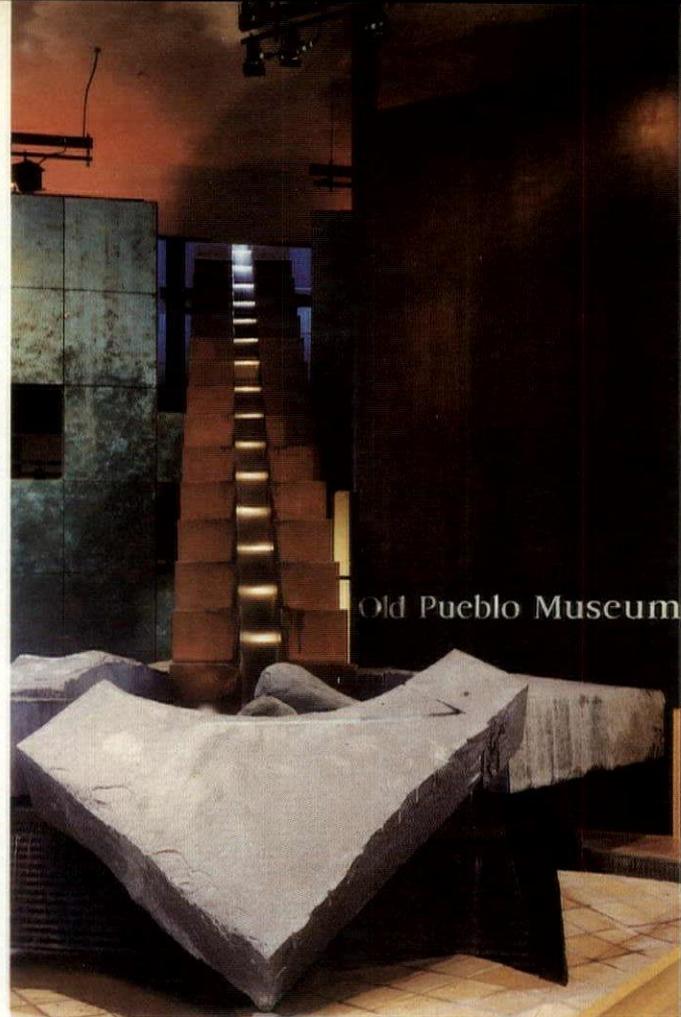
In the courtyard, skylights were retained over planting areas and along the walls. Highlighting the copper wall and water details required extremely high levels of illumination to compete with the daylight, creating bold accents on the wall that are noticed from the mall's corridors and major entrances.

Custom fixtures suspended from a theatrical connector strip dramatically illuminate the wall. For optimum maintenance, color rendition, energy efficiency, and aimability, we selected 70-watt double-ended metal halide lamps. Barn doors, swivel mountings, and asymmetric reflectors provide flexibility and control. Glass color filters are used to warm the color slightly, to enhance the color of the wall and diffuse the asymmetric beam of light, minimizing hot

spots. Neon in two colors — violet and burnt orange — is concealed in the soffit above the copper wall to create sunset images on the ceilings.

The sculptural fountain features misters and falling water among granite slabs. Two 250-watt metal halide narrow spot fixtures highlight the center. Warmer-colored 6000-hour, 250-watt PAR lamps accent the perimeter zone and stones and the food court trees. The PAR lamps offer long life, high intensity, precise beam control, and incandescent color rendering — all of which we considered beneficial in the food court area.

The Cor-Ten steel water stairway is illuminated by individual submerged low-voltage PAR lamps at each riser and suspended PAR lamps with unidirectional spread lenses. The monolith is highlighted by theatrical fixtures mounted on a second connector strip. Shielded incandescent PAR lamps wash down the wall and provide



The variety of surfaces — fountain, water stair, and entry monolith, for example — requires a variety of light sources.

additional accent.

Additional features of the food court space include a flashing lightning bolt art piece on the wall and miniature low-voltage uplights and downlights mounted on existing columns. Dynamic controls and dimmers modulate the moods throughout the central court area.

Display Areas

The gallery area required ultimate flexibility. Black track, placed parallel to probable display planes, and black fixtures blend in with the black ceiling. Line-voltage and low-voltage incandescent lamps illuminate the displayed articles. White or black perimeter walls can be incorporated into displays, or they can be removed to expose glass-enclosed display cases with their own internal lighting and temperature control systems.

MR16 lamps in the gem display cases are recessed above a miniature louvered screen.

Highly absorptive black solar paint tends to soak up any stray light. The dramatic gems are brilliantly displayed while the case vanishes. Objects in the three-dimensional archaeological dig area are highlighted by line-voltage and low-voltage incandescent spots.

Public response to the revitalization has been outstanding. Based upon current interest and projections, the Old Pueblo Museum will host about 250,000 visitors this year, making it the 14th most visited museum in the nation. In January 1987, at a time when national indicators were slightly down, mall sales were up dramatically. The museum in the mall is definitely a success. ■

For product information, see the Manufacturer Credits section on page 70.



Lighting measurement and calculation: A view of future practice

Measurement and calculation are the twin columns that support lighting as a technical activity. Most of what we measure and calculate is related, directly or indirectly, to the effects of light on human beings. More specifically, we are primarily concerned with measurement of the brightnesses of objects in visual scenes and with the visual and non-visual consequences of these luminous objects on people.

Despite this fundamental necessity for acquiring and then evaluating luminous information, our ability to do so is limited. In most instances, we are restricted to making a few illuminance or luminance measurements, writing the values on paper, entering them into a computer file back in the office or laboratory, and then performing simple calculations. The procedure has a number of drawbacks.

Some Shortcomings

The customary procedure is susceptible to recording errors. It can be difficult, even impossible, to trace the source of any discrepancy that develops in the data. Discrepancies may arise from, for example, improper tabulation, a measurement artifact, or a calibration error.

The procedure is imprecise. Assessments of illuminance are but crude indicators of truly important aspects of the visual scene, such as overall brightness, object contrast, and luminous uniformity. When luminance data are obtained, it is possible to acquire only a small number of coarse — usually 1-degree — samples. Too often it is impossible to obtain luminance measurements of very small targets like printed letters or numbers on a page. The procedure is time-consuming, and turnaround from data acquisition to final results can

Mark S. Rea

Mark Rea is head of lighting group, Institute for Research in Construction, National Research Council Canada, Ottawa, Ontario.

take days, if not weeks. More rapid feedback can take many hours of staff time; consequently, it is quite expensive.

The calculations performed on the data are often simple, many times restricted to simple averages. Sophisticated calculations relating lighting to human behavior are almost never performed.

Such time-consuming and inherently limited measurement and calculation procedures restrict the rate at which we can develop our understanding of the relationship between lighting and human behavior. What we need is the ability to acquire accurate luminous data that can be analyzed more rapidly and more completely. Without a more sophisticated procedure, we are condemned to insignificant advances in our understanding, and lighting will remain a static industry.

New Developments

At the National Research Council Canada, Dave Kambich, Ian Jeffrey, and I are developing a system that avoids these problems. It opens new doors to understanding the relations between lighting and human behavior. This system and

future systems like it could revolutionize lighting research and application.

The measurement and calculation system we are developing involves the use of a solid-state video camera with a CIE photopic spectral sensitivity and an IBM PC/AT computer and image processing board. Almost 250,000 luminance measurements are captured, and their visual effects are calculated almost immediately. The system we are working with records a visual scene, stores the luminous information, and then computes the expected level of visual performance for a designated luminous object in that scene. For example, we can acquire complete luminous information about a visual task at a given point of regard and then determine the expected level of visual performance for that viewing distance, target contrast, and background luminance.

The system is not, however, limited to determining the visual performance of targets in a visual scene. It can also calculate discomfort glare, and it is flexible enough to go beyond the actual scene captured; it can calculate the impact of changes — in viewing distance or worker age, for example — on visual performance or glare. In principle, it could also assess comfort or psychological preference of various objects in a visual scene. In effect, the system offers to research and application professionals the ability to capture and then calculate the impact of lighting on human behavior at a very low cost in time and expense.

Importantly, algorithms must be developed to describe many of these relationships and software written to analyze them. This has been a particularly interesting aspect of the project. We are finding that the system offers new oppor-

tunities for translating complicated research findings into practice. We are also discovering large areas of uncertainty in our understanding of the relations between lighting and human behavior. This was less obvious in the past because of the lack of a practical way to obtain such complete data.

Several new lines of research will be incorporated into the system's software. Thus, already the system provides an opportunity to rapidly accelerate our understanding of these relationships and to translate them into practice.

It's too soon to answer many of the questions that arise about the system. We don't know yet when it will be commercially available or what it will cost. More detailed technical information will be published soon. We hope to find a manufacturer in the near future to market the system and set prices.

In the meantime, the National Research Council Canada will continue to develop the system and perform custom measurements for clients. During the next few months, for example, Public Works Canada will begin to make field measurements in many of its office buildings. We have started down an exciting path of research and development that could change technical lighting. Soon, this technology will be available to everyone concerned with lighting and its effects on human behavior.



Printed material with veiling reflections and a detail enlarged for closer inspection.

Printed material without veiling reflections and a detail enlarged by a factor of three.

The camera is sensitive enough to record light levels of interest to roadway lighting engineers.

Interior Application

Using the system devised by the author and his colleagues, it is possible to obtain the luminances and contrasts of different portions of printed materials — with and without veiling reflections. As the accompanying photographs show, the operator can enlarge areas of special interest for closer visual inspection to more accurately locate a desired pixel or group of pixels.

Two photos of a magazine cover show small areas of the original images enlarged by a factor of three. Other magnification factors are also possible. The

luminances of specific points in the captured image may be located with the keyboard by placing the cross hairs over the desired pixel. The cross hairs are visible in two of the magazine cover photos.

Visual performance algorithms are incorporated into the software currently in use; they take into account observer age as well as effective background luminance, target contrast, and target size.

Roadway Application

As is the case for interior application, the system permits evaluation of luminances and contrasts of different

aspects of outdoor scenes. The camera is sufficiently sensitive to make recordings at light levels of interest to roadway illuminating engineers.

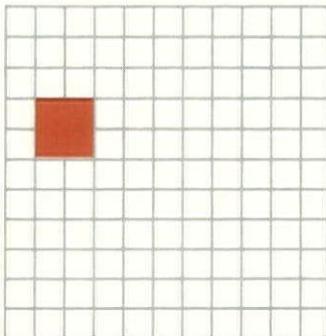
The same software allows the user to locate and enlarge object images, like the bricks in the roadway photos, for accurate assessment of their luminances and contrasts. Visual performance algorithms very similar to those used in interior applications are incorporated into the software; they can handle many situations of interest to roadway illuminating engineers. ■

The Computer Department

This month's column, in addition to reporting on new lighting software, looks at three energy calculation programs that are useful to lighting designers.

The Contour Module

Several recent additions and upgrades make the family of software offered by Lighting Technologies more useful and dramatically increase the visual output quality. The graphic clarity of Lumen-Point and Lumen-Micro results now makes any lighting study more easily understood by both clients and professionals. Lighting Technologies has long been a leader in easy-to-use, reliable software. A year ago, Lumen-Micro was one of the first lighting programs to feature a perspective graphics module that made use of the AT&T Targa-16 video capture board. That combination made it possible to simulate the lighting in a room (or a scale model of a room) that had been captured as a video image.



David Lord

David Lord is a professor of architecture at California Polytechnic State University, San Luis Obispo.

The latest enhancement for the Lumen series is the contour module, which permits an interactive visual display of the values calculated by Lumen-Micro and Lumen-Point. Previously, it was possible to obtain contour plots, but only after waiting for a dot matrix printer

to generate the results. Any design changes then required a long wait between runs and many sheets of paper. Now the contours can be seen in color on screen instantaneously. Examination of the contours permits a quick visual check on the lighting design, and all changes can be made before generating the hard-copy print-out. Details of furniture or partitions can be integrated into the screen picture of illuminance. Zooming and panning are possible using either cursor controls or a mouse. This is the sort of friendliness all IBM PC software should emulate. Designers can only benefit from the accurate and increasingly visual portrayal of lighting designs.

Lighting Technologies also publishes an entertaining and educational software newsletter, *Lumenews*. A recent series of articles suggests ways of using Lumen-Micro for daylighting analysis, one of which is simulating skylights and light shelves. For those who want hands-on experience

with the Lumen series software and wish to evaluate the IBM PC/XT/AT operating environment, Lighting Technologies offers periodic seminars. The company will send on request a Lighting Software Shopper's Guide and a performance comparison of lighting analysis software.

Lumenews is an entertaining and educational software newsletter.

Building Energy Analysis
In addition to aesthetics and cost-per-square-foot, architects and engineers are increasingly required to design for building efficiency measured in watts and BTUs. California requires that every new building meet its Title 24 energy efficiency standards. Lighting energy budgets are a part of these regulations; both glazing and lighting power density are



Lumen-Micro Targa-16 results produce screen displays of simulated room lighting — in this example, two images



of the same corridor. It is shown lit by a traditional down-lighting system (on the left) and by wall sconces (on the right).

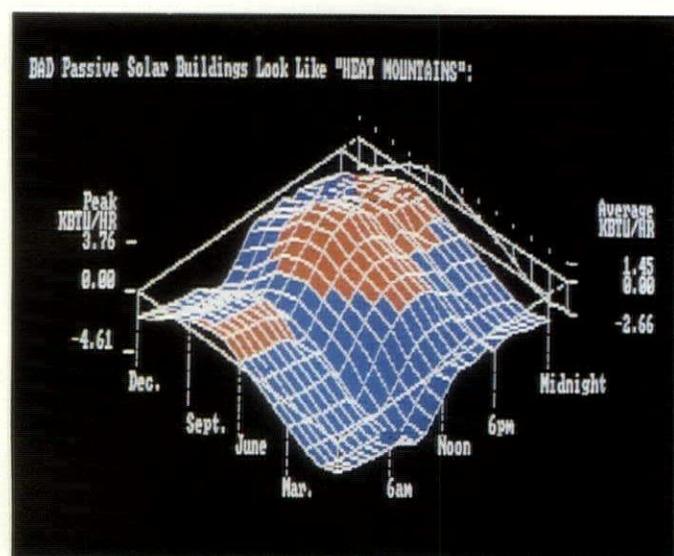
strictly controlled. There are two ways to meet the standards: the prescriptive approach and the performance approach. Many designers find the prescriptive approach, which dictates a limited number of component packages for each building type, too

constraining. A designer who can prove that another design will perform as well or better than the one prescribed is permitted to use the performance approach.

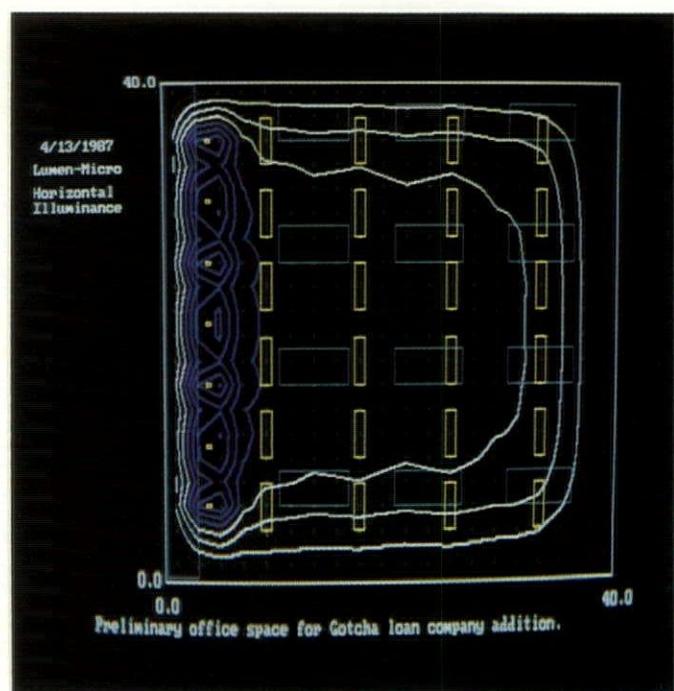
The microcomputer makes life easier for designers who want to optimize energy and

also enjoy the design freedom of the performance approach. Quick methods of calculation indicate whether certain design options fall within regulations. For final compliance with Title 24 in California, only an approved energy analysis program may

be used. A designer who works in a climate that is similar to any of California's 16 climate zones might want to write to the California Energy Commission for a list of publications on building energy efficiency. The CEC also publishes a list of ap-



Solar 5 graphic output showing peaks and valleys of energy use throughout the year.



This photo of a computer screen shows Lumen-Micro output displayed with the contour module.

Featured programs

Lumen-Micro, \$2660

Perspective graphics module (works with Lumen-Micro), \$750

Contour module (works with Lumen-Micro and Lumen-Point), \$395

Lumen-Point, \$995

All require an IBM PC/XT/AT; contact vendor for other hardware requirements.

Lighting Technologies
3060 Walnut Street
Boulder, CO 80301

Solar 5

Requires an IBM PC/XT or fully compatible microcomputer with two diskette drives or one diskette drive and a hard disk.

Designers Software Exchange
Department of Architecture
Massachusetts Institute of Technology
Cambridge, Massachusetts 02139

Simplified Calculation Method, \$19.98

IBM PC/XT version with manual (Publication Number P-400-84-009):

California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Macintosh version:

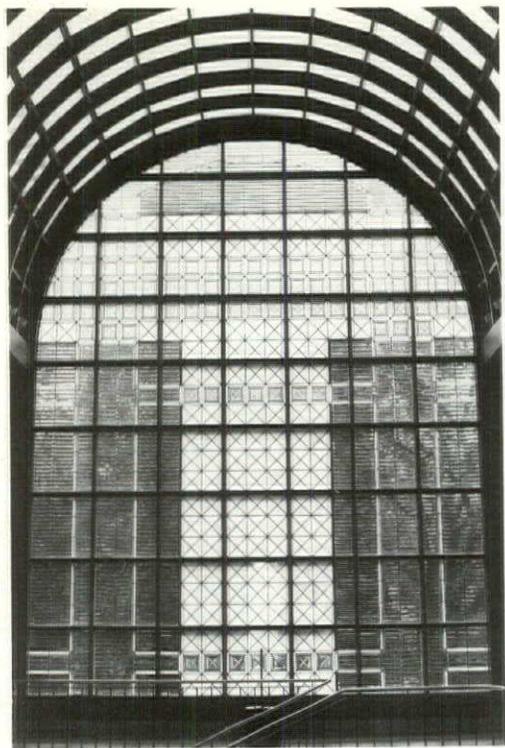
Richard Searle
Argosy Services
150 Color Cove Road
Sedona, AZ 86336

Microcomputer Assisted Heat Transfer Analysis, \$95

Requires IBM PC/XT/AT or compatible with 256K memory, color graphics adapter, and graphics monitor, or Apple II+, IIe, IIc, or compatible with 48K RAM and a monochrome monitor.

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proved energy analysis computer programs. Two inexpensive programs will interest both novices and experts: Solar 5 and the Simplified Calculation Method.

Solar 5

Solar 5 is an ingenious, user-friendly program for the IBM PC that gives a coarse-grained visual display of building energy flows, useful during the conceptual design phase. Murray Milne spent several years developing the program at the UCLA School of Architecture.

Two inexpensive programs will interest both novices and experts.

On startup, Solar 5 defaults to typical design values for the building type you choose. As you gain experience with Solar 5, you can enter values specific to your design and location. It is possible to compare alternate design schemes to a base case by systematically altering building components; this gives you a graphic yardstick of each design's energy performance in both summer and winter.

Cycling through several alternate designs — for instance, by changing orientation or window size — takes an experienced user only a few minutes. All results are displayed graphically, not just numerically, which is where the program shines. By looking for peaks and valleys in the energy use patterns, users can quickly evaluate daily and seasonal performance.

A similar program, called Daylit, calculates the energy performance of systems that combine daylighting and elec-

tric lighting. It is under development and should be announced soon by Southern California Edison. These two programs are promising conceptual design tools.

Simplified Calculation Method

Enticing not only because of what its name promises, but also because its \$19.98 price makes it a bargain, the SCM is on the list of approved programs for California's office energy standards. It also comes in a version marketed privately for the Macintosh computer; both versions come complete with climate data. The simple screen interface prompts the user for a series of design data inputs.

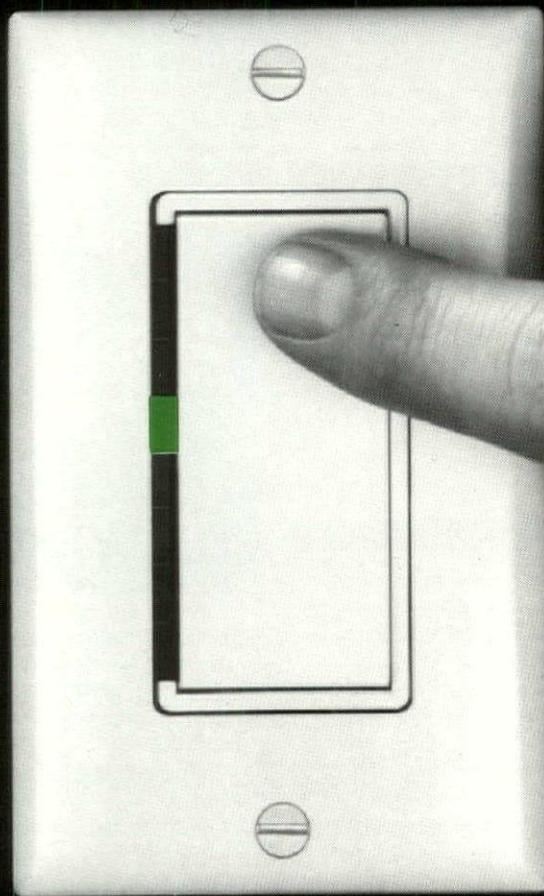
Computing building energy use with the SCM requires about one hour once all the design data is at hand. Interestingly, the SCM package includes a manual calculation technique that requires only a pencil and a pocket calculator. The manual calculation routine takes about three hours to complete.

Engineers who want a basic heat transfer program will enjoy the Microcomputer Assisted Heat Transfer Analysis program. The long name belies its easy operation for solving basic problems in conduction, convection, and radiation heat transfer. Both IBM and Apple II+ versions are available.

The Computer Department has received for future review Cerenet energy simulation software from Ball State University in Muncie, Indiana. ■

The Computer Department welcomes reader comments. Write to David Lord, Architecture Department, Cal Poly, San Luis Obispo, CA 93407.

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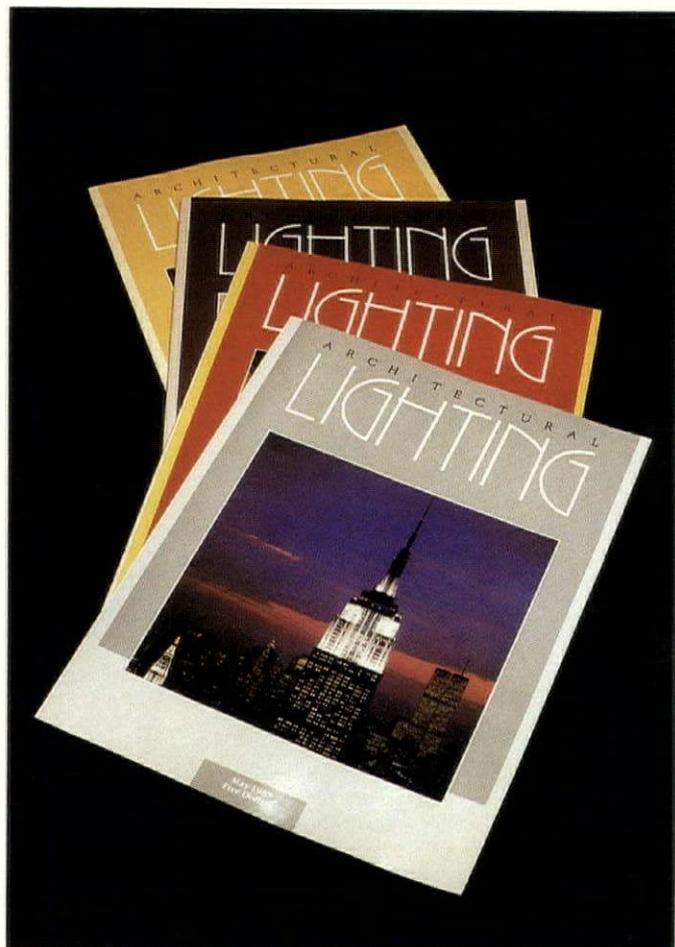
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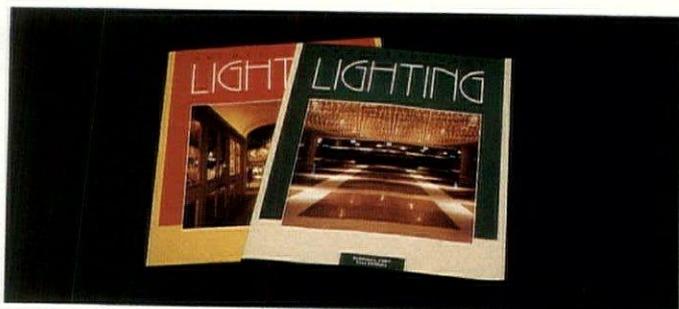
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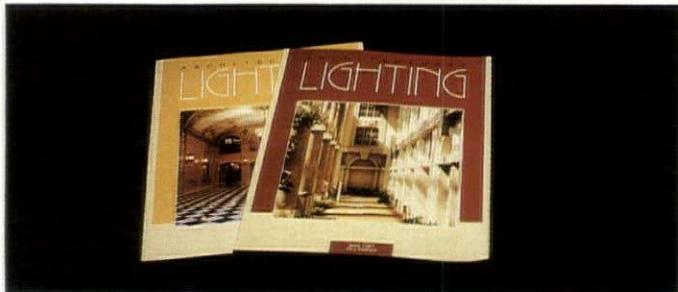
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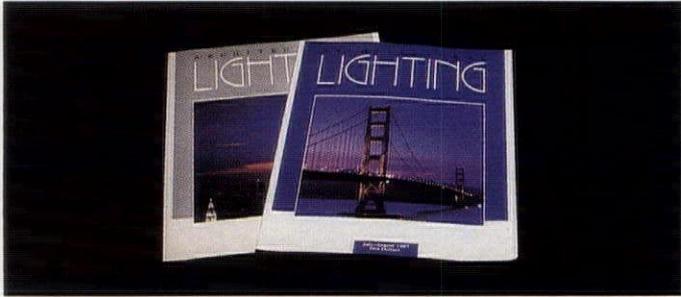
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ALINEA

BEAUTIFUL LIGHT



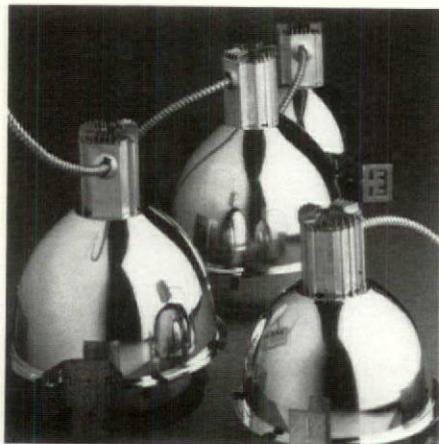
The Alinea Light is an Art Deco concept brought to beautiful perfection by Aamsco Manufacturing. A tubular incandescent bulb and fixture, the Alinea radiates a soft, warm light that is especially flattering to flesh tones. Controlled by a standard incandescent dimmer, Alinea makes everything in a room more radiant and beautiful. At 2800K, Alinea bulbs come in three lengths. Fixtures are available in 10 decorator colors. For more information call Aamsco at (201) 434-0722, or write Aamsco, P.O. Box 15119, Jersey City, NJ 07305.



Circle 12



Product Showcase

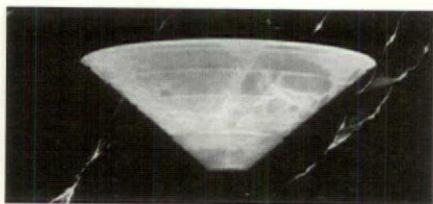


■ Downlights

Perfeclite's incandescent downlights provide high-efficiency illumination with low surface brightness. The downlights feature a spun aluminum aperture collar that is attached to a specular Alzak reflector. A one-piece trim snaps into the aperture collar; a specular reflector cone trim for NQMEA units and a matte black multi-groove baffle trim for NQMRB units. A die-cast plaster frame assembly supports the reflector and collar assembly.

The units are designed for easy installation in acoustical, plaster, and other dry construction ceilings. They accommodate 100- to 300-watt incandescent lamps; HID models are also available. The manufacturer recommends the downlights for general applications that require accent light, such as stores, lobbies, banks, restaurants, auditoriums, schools, and churches. Perfeclite, Cleveland, OH.

Circle 60

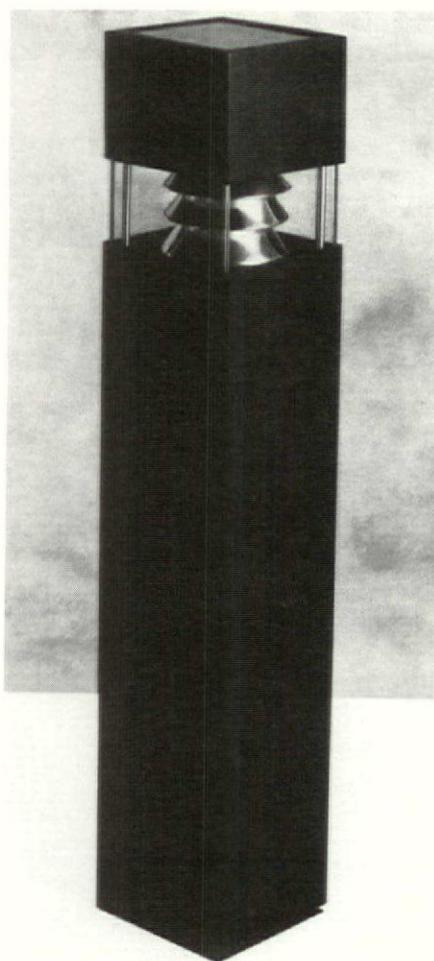


■ Alabaster wall sconce

Boyd Lighting's Cirrus wall sconce, designed by Gary Cross, has a cone-shaped lens individually quarried from solid white alabaster. The waxed translucent alabaster sconce measures 6 1/4 inches high and 17 inches in diameter, and projects 8 3/8 inches from the wall. Its steel

backplate is finished in white baked enamel. The UL-listed wall sconce can be mounted on a standard outlet box. It accommodates a 100-watt maximum A19 incandescent lamp or a 13-watt compact twin tube fluorescent lamp. Boyd Lighting Company, San Francisco, CA.

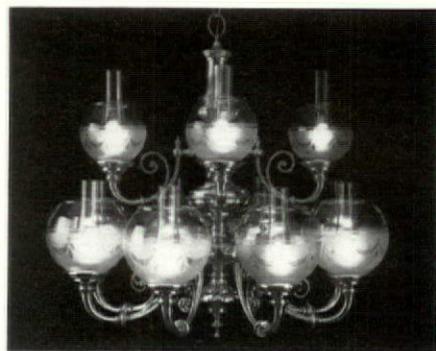
Circle 61



■ HPS bollard

TrimbleHouse offers walkway and garden bollards that provide soft uplift for accent lighting on trees and shrubs. The bollard is available in square and round shapes and accommodates a maximum 150-watt high pressure sodium lamp. Options include a directional cast louver, fusing, photocells, gold-colored reflectors, house side shields, and a red cedar covering. TrimbleHouse Corp., Norcross, GA.

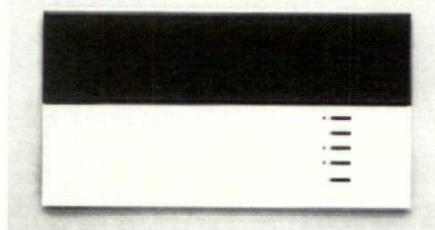
Circle 62



■ Brass chandelier

Quoizel offers a polished solid brass 12-lamp chandelier that is part of the Royal Kensington collection. The 35-inch-high, 40-inch-diameter chandelier features crystal chimneys that have been acid etched in a floral design. It accommodates 12 60-watt incandescent lamps. Quoizel Lighting, Hauppauge, NY.

Circle 63

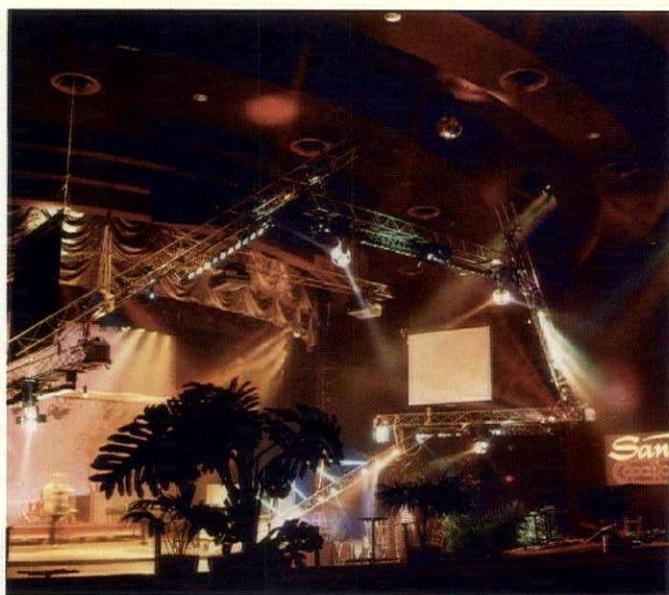


■ Dimming control

Lutron's Grafik Eye preset dimming control fits into a standard four-gang switch box and requires no remote panel. Users can manually adjust four lighting zone sliders to create preset scenes; pressing the touch button recalls any of four preset scenes. The unit also features an adjustable fade-rate setting for a transition of 0 to 15 seconds between scenes or between on and off. A locator light makes the control easy to find in the dark.

The thin-profile unit controls up to 2000 watts of regular incandescent, low-voltage incandescent, or fluorescent lighting. Auxiliary scene activators are available to control one or two remote wall locations. The UL-listed units are available with a smoked translucent or a white opaque cover. Lutron Electronics Co., Inc., Coopersburg, PA.

Circle 64



Mark Darley, Photographer

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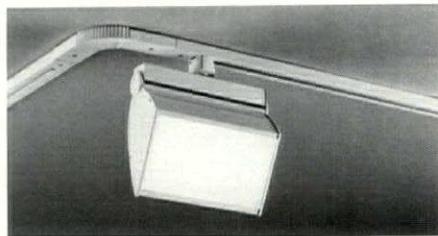


■ MR16 picture light

Lighting Services offers the compact MRXG, a low-voltage unit that mounts on a shelf or desk top to light objects on vertical surfaces such as pictures, photographs, and wall hangings. A state-of-the-art self-locking cylindrical swivel makes the energy-efficient die-cast luminaire completely adjustable. It comes with an integral on-off switch and a coiled cord.

The UL-listed unit is available in black, white, and silver aluminum finishes; color accent swivel caps are optional. It accommodates MR16 lamps from 20 to 75 watts in all beam spreads. Accessories include glass color filters, beam conditioner lens, louver, spread lens, light blocking screens, and glass ultraviolet filters. Lighting Services Inc., New York, NY.

Circle 65



■ Track lighting

Guth Lighting's Q-Trak system allows designers to place illumination precisely where desired. Fixtures can be moved laterally to any location along the track, swiveled within a range of 60 degrees, and then locked into position. An extruded Alzak reflector inside the fixtures has computer-positioned prisms for uniform light distribution. Computer-designed optics provide illumination free of scallops,

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The connector's orientation allows users to control two circuits separately. The fixtures accommodate 150-watt halogen or 70-watt Osram HQI compact metal halide lamps. A variety of connectors, end caps, and other accessories are available for expanding the system's versatility. Guth Lighting, St. Louis, MO.

Circle 66



■ **Explosion-proof luminaire**

Holophane's Petrolume meets NEC requirements for explosion-proof fixtures and is UL-listed for use in Class I, Division 1, Groups C and D hazardous locations. Two different refractors are available: one for long, rectangular light distribution, and another for symmetrical light distribution. Other standard features include a heavy-duty, copper-free cast aluminum ballast housing; a potted ballast; and a standard heavy-gauge epoxy painted wire guard.

The fixture is available for pendant, stanchion, or ceiling mounting arrangements. Dome and angle reflectors and a swivel adapter for wall or ceiling mounts are also available. The explosion-proof fixture accommodates a variety of lamps: high pressure sodium in 70, 100, 150, and 250 watts; mercury in 100, 175, and 250 watts; and metal halide in 175 and 250 watts. Holophane, Newark, OH.

Circle 67



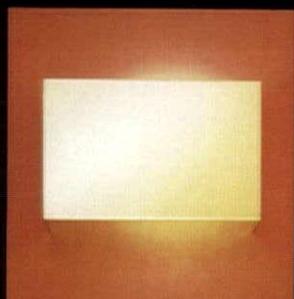
'Prisma' prismatic glass/brass



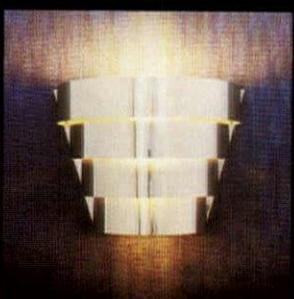
'Deco' art deco glass/brass



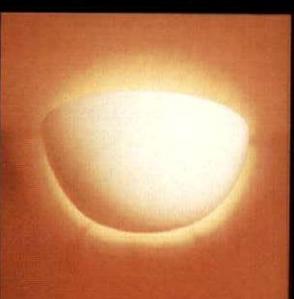
'Tier Drop' white acrylic/brass



'Contempo' rectangular brass



'Brass Tier' louvered brass



'Floating Halo' painted metal

Finally, you no longer need to spec obtrusive, industrial-looking "2-headed boxes" for your esthetic interiors.

Now you can meet emergency lighting codes without sacrificing the visual continuity of your luminaire design, because new Siltron "Designer

Line" sconces come in both emergency and conventional versions.

State-of-the-art electronics is hidden within these remarkable fixtures, which switch to emergency mode without visible blinking. And you have a choice of lamps, wattages and options.

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Circle 15

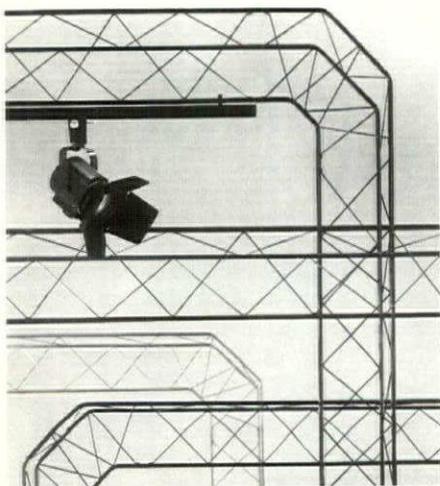


■ **Wall sconce**

The Brass Light Gallery features the Sherman Park double-lamp wall sconce from

the Goldenrod Collection of 10 solid brass reproductions of original Arts & Crafts and Mission-Prairie fixtures from the early 20th century. The 11½-inch-wide, 6-inch-deep sconce accommodates two 150-watt incandescent lamps and can be mounted facing up or down. It is available in polished brass, antique brass, and nickel chrome finishes. A single-lamp version is also available. Brass Light Gallery, Milwaukee, WI.

Circle 68



■ Display system

Lightolier's Structura system is a series of modular triangular frames in curves, corners, and four span lengths that fit together to follow architectural shapes or to define interior spaces. The system can support merchandise, graphics, or artwork as well as the company's track lighting system. A detailed catalog and a template assist designers with layout. The components are finished in standard black or white; custom colors also are available. Accessories include fluorescent, track lighting, and dimming systems. Lightolier, Secaucus, NJ.

Circle 69



■ Compact arc lamps

Venture Lighting International's single-ended compact arc lamps have extremely short arc gaps, according to the manufacturer. A 1200-watt compact arc lamp has an arc gap of only 10 millimeters, for example; but a standard 1000-watt metal halide lamp has a 94-millimeter arc gap. The lamps feature a rapid initial warmup

time of less than 2 minutes to full light output.

Their design makes these lamps suitable for narrow beam projection applications in portable video lighting, searchlights, and ultraviolet and infrared lamps for special processing. A color rendition index of 90+ and a high color temperature of 5600K also make the lamps suitable for stage, studio, and film applications.

The lamps are available in 575- and 1200-watt restart and instant restart versions, both for universal burning positions. They are available in custom designs to meet many lighting applications. Venture Lighting International, Cleveland, OH.

Circle 70

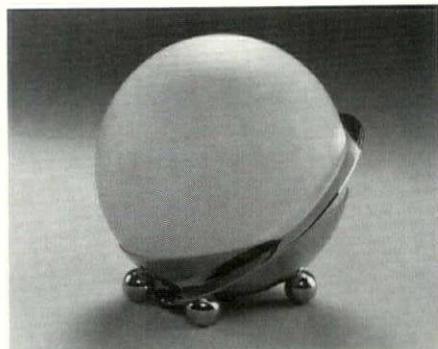


■ Commercial chandelier

The MA series of commercial chandeliers from RWL is part of the Odyssey Illumination line of contemporary interior luminaires. The fixtures are manufactured of brass, aluminum, or steel shells with reinforcing bands as required. Their one-piece lenses are molded of white DR acrylic.

The chandeliers are available in diameters from 20 to 45 inches with rod supports or chain mountings. They accommodate three metal halide lamps of up to 250 watts each or incandescent lamps totaling 600 watts, depending on the application. Brushed brass or aluminum finishes are standard; eight painted metallic finishes are also available. Options include emergency lighting circuits and tinted lenses. RWL Corporation, New Haven, CT.

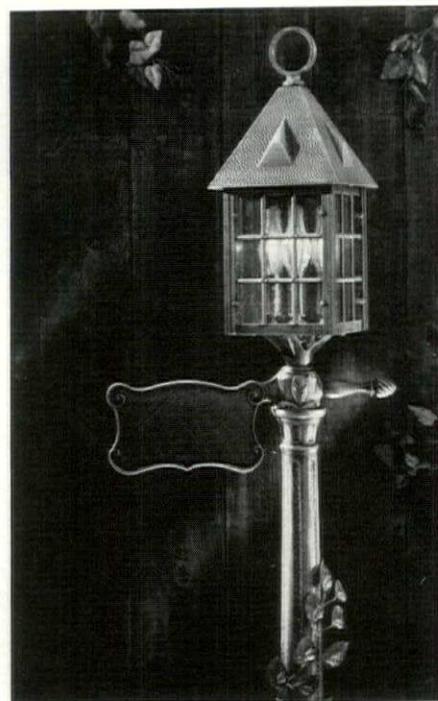
Circle 71



■ Illuminated sphere

Patrick Monoury designed Koch + Lowy's 7-inch-high spherical Espace lamp. Its base of flat or nickel-plated brass supports the 6-inch-diameter white frosted glass shade. The unit accommodates a 60-watt T lamp and has an on-off line switch. Koch + Lowy, Long Island City, NY.

Circle 72



■ Lanterns

Dinico's Revere series 260-2600 lanterns for outdoor lighting applications are made of cast aluminum and come in three sizes for a variety of mounting configurations: 30 by 11 inches, 26 by 8 1/2

Move up to Hubbell, and see the forest and the trees.

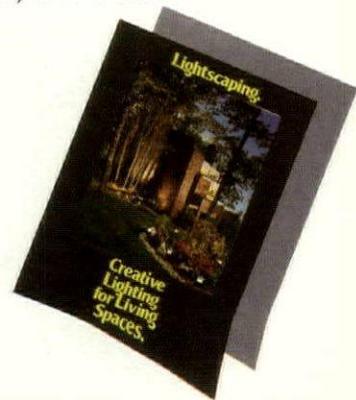
Discover the enchanted world of Hubbell landscape lighting, because we live in a world shaped by light. More than any other stimulus, we respond to light . . . to evoke a mood, an atmosphere, an emotion. Soft light, muted light, starlight, candlelight. Yet, what light does to us in only part of the story. The real



excitement lies in what *we* can do with light.

With Hubbell Lightscaping™ you'll discover how contemporary lighting fixtures and techniques improve safety and security; enhance the aesthetic quality of a commercial building, home, garden or pool; and how a minimal investment in lighting can yield maximum enjoyment of outdoor living spaces and leisure time facilities.

Let Hubbell enlighten you to the possibilities of landscape lighting. Send for our Lightscaping brochure. Write Hubbell Lighting Division, Hubbell, Inc., 2000 Electric Way, Christiansburg, VA 24073. Or call (703) 382-6111. In Canada, 870 Brock Road South, Pickering, Ontario L1W1Z8. Or call, (416) 839-1138.



Lighting Division

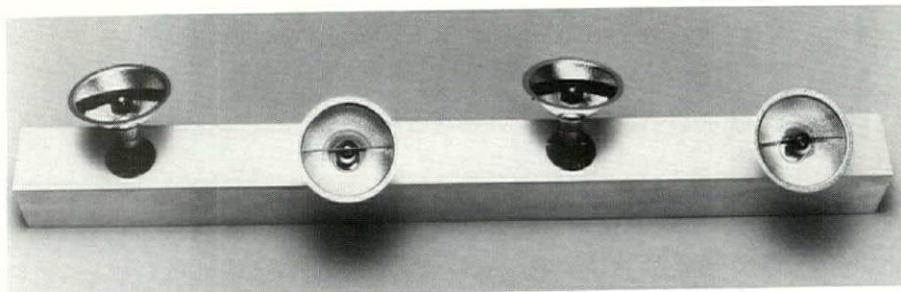
Providing tomorrow's lighting today.

Circle 16

inches, and 20½ by 6½ inches. The largest lanterns can accommodate a maximum 13-watt compact fluorescent, 150-watt high pressure sodium, 250-watt mercury, or 200-watt incandescent lamp. The smaller sizes use lower wattage lamps. Multiple lamp configurations are also available for some models.

A variety of matching accessories are available for all three sizes: five post tops, 18 wall brackets, three chain lengths, and one adapter for flush ceiling mounting. Both the lanterns and accessories come in eight standard and four pastel finishes. Panels come in standard clear or amber seeded acrylic with many optional colors and textures. Dinico Products Inc., Hackensack, NJ.

Circle 73



■ Display lighting

Norbert Belfer's Halogen Star directional light strip allows lighting designers to use Osram's low-voltage maxispot halogen lamps with metal reflectors in a continuous raceway housing. Lamps are spaced 6 inches on center in the 2-inch-square raceway and can be adjusted for precise

aim. The raceway has a satin aluminum finish and accommodates 20-, 50-, and 75-watt halogen lamps in both spot and flood beam patterns. Norbert Belfer Lighting, Ocean, NJ.

Circle 74

E X I T A R C H I T E C T U R E



Betalux-E Sleek. Cordless. Self-illuminating. 8¼" x 12¾" x 1".

The next time you specify exit signs, specify Betalux-E. For safety. For styling. For simplicity of design.

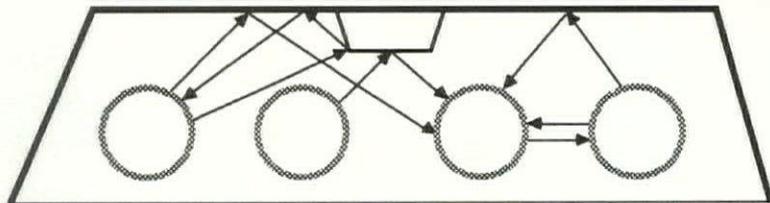
Call (602) 323-4344, or write:



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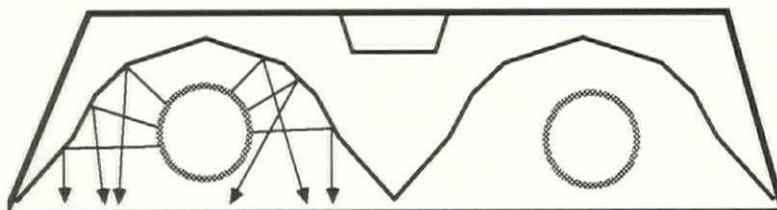
The Problem

Conventional lighting systems are inefficient and costly—40 to 60 percent of the light from fluorescent lamps can be trapped inside your fixture.



The Solution

An Optical Reflector System from Maximum Technology—to effectively reflect trapped light and redirect it to the work surface, eliminating costly excess lamps and ballasts.



The Benefits

- 40 to 50 percent lower lighting energy costs
- Fewer lamps and ballasts to replace
- Optimum light levels
- Illumination uniformity
- Glare control
- Cooling system load reduction

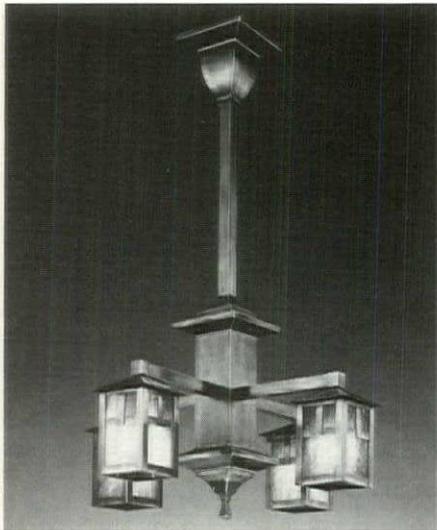
The Company

The oldest, largest, most experienced reflector manufacturer in the industry.



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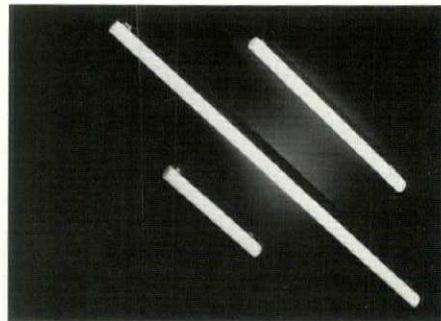
60 Industrial Way Brisbane, CA 94005 (415) 468-2560



■ Brass chandelier

The Alameda is part of Rejuvenation Lamp & Fixture's Craftsman Collection of solid brass fixtures, which are retooled, exact reproductions of original Arts & Crafts Movement fixtures from the early 1900s. The four-arm chandelier is available in seven metal finishes: antique brass, polished unlacquered or lacquered brass, brushed brass, polished copper, japanned copper, and polished nickel. The shades are available in standard caramel art glass, as well as green, blue, pink, and cream. Rejuvenation Lamp & Fixture Company, Portland, OR.

Circle 75



■ Linear incandescent lamps

Osram's Linestra linear incandescent lamps are line-voltage T10 lamps that require no ballast or transformer. They can be mounted under cabinets and around mirrors for glare-free illumination without shadows and can be placed end-to-end

Form illuminates form.



Columbia's Pendacurve features contoured lines that link luminaire with interior architectural detail. The soft wash of reflected indirect light is accompanied by the downlighting of Columbia's glare-free parabolic louvers.

Pendacurve's optional injection-molded end may be ordered to gracefully terminate a single fixture or end of row.



Ask your Columbia Representative for more details. And see Columbia's complete line of designer luminaires in the new "Lighting Imprints" catalog.

Columbia
Lighting

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LIGHTING

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for continuous lines of light. The lamps are offered in a choice of a clear or a low-glare opal finish, in wattages of 35, 60, and 120, and in lengths of 12, 20, and 40 inches. Osram Corporation, Newburgh, NY.

Circle 76



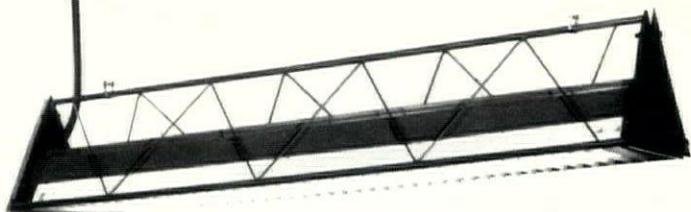
■ Lamp pole

Ryther-Purdy's Type W lamp pole is a square shaft with chamfered corners that give a tapered appearance without sacrificing structural strength. The pole is available in both solid and laminated western red cedar in sizes from 4 to 12 inches square and in heights up to 40 feet.

Each pole is fashioned to individual requirements and customized to receive a particular top- or side-mounted fixture or other manufacturers' arm mounts. The lamp poles may also be combined with the company's fences and other matching accessories for a unified architectural appearance. Ryther-Purdy Lumber Company, Old Saybrook, CT.

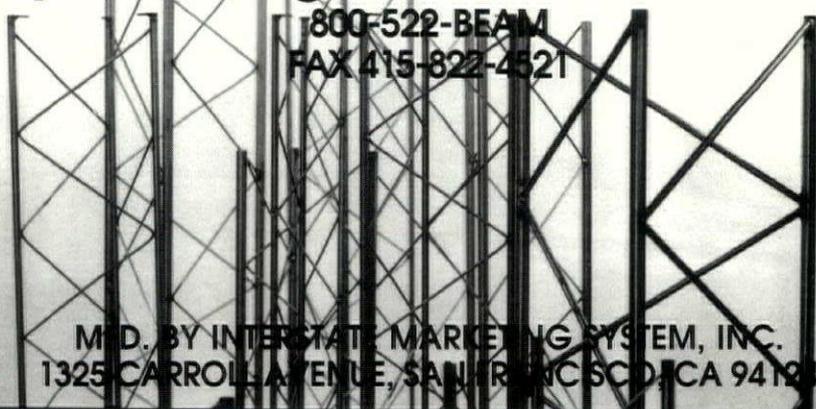
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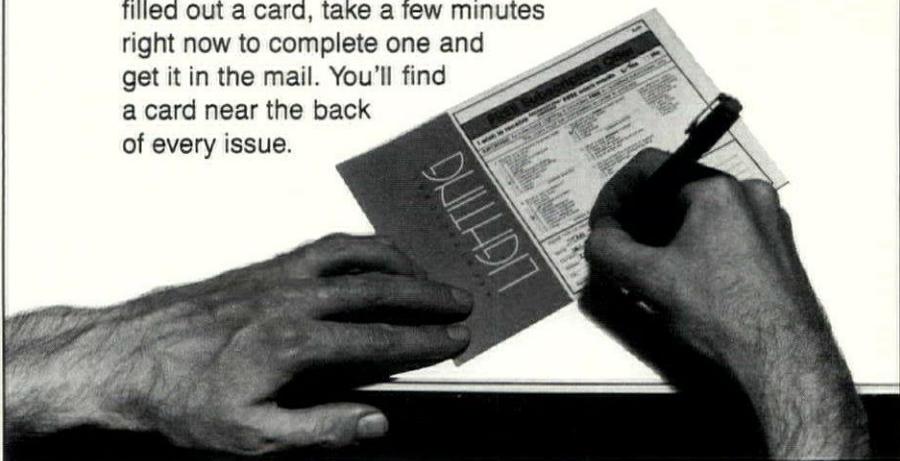
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Circle 20

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If you're not sure how long it's been since you filled out a card, take a few minutes right now to complete one and get it in the mail. You'll find a card near the back of every issue.



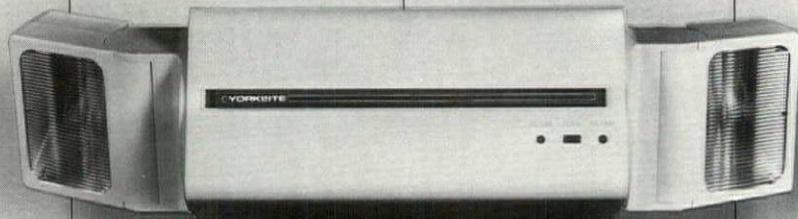
It doesn't have to be ugly to be functional.

Yorklite's Designer Series Emergency Lighting has the good looks and features worth looking at.

Yorklite is trying to eliminate functional as well as cosmetic problems faced by today's emergency lighting designers and engineers. The sleek lines of the injection

The battery and charger are easily inspected with Yorklite's easy-access forward opening enclosure.

Long-lasting LED indicators include AC "on", high charge and a utility power operation test switch. Power outages are responded to instantly via a transistorized relay, and a low battery voltage shutdown feature is present to prevent battery damage. Dual operating



molded Designer Series Emergency Fixture hide the most complete technical features available in emergency lighting today.

This compact unit includes an automatic charger with precision float voltage regulator and industrial-class transformer. Long-life calcium-lead batteries are recharged in less than 12 hours after discharge and then maintained at full charge.

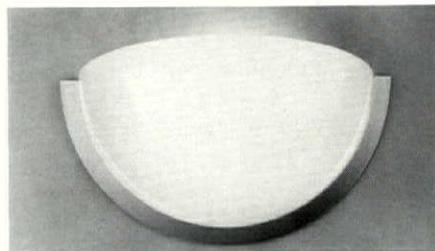
voltage works on either 120v or 277v power. Universal mounting plate attaches to 3½", 4" or single gang box for easy installation.

Simplify your emergency lighting problem by specifying Yorklite's Designer Series. The Emergency Light that looks great and works better. For more information concerning exit signs and power systems, call us at (512) 385-1773.

YORKLITE

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Circle 21



■ Wall sconce

The CB1210 wall sconce is among 16 standard fixtures that are part of Visa Lighting's Quick Ship program, which guarantees shipping to qualified buyers within three working days of receiving an order. The 7¼-inch-high sconce has a 14-inch-wide opal glass quarter sphere that extends 7 inches from the wall and has a polished solid brass band. The sconce accommodates two 60-watt A19 incandescent lamps. Visa Lighting Corporation, Milwaukee, WI.

Circle 79



■ Outdoor lantern

ELA's Pageant lantern is made of cast aluminum and has a hinged hood for easy relamping. Atop the hood is a one-piece dome of opal or clear glass. The lantern is available in three sizes and can be mounted on post tops or walls. It comes equipped with a cluster of three or five 60-watt incandescent candle lamps; the two larger lanterns may also be adapted for HID lamps. Standard finishes are painted weathered brass, black, verde, or rust; options include custom finishes and a metal dome. ELA Company, CAL Division, City of Industry, CA. ■

Circle 80



■ Halogen spotlight

Roxter's Mity Lite features a compact 2-inch by 2½-inch by 4-inch housing in a unit that weighs only 28 ounces. The spotlight has an adjustable light beam and an on-off switch in the cord. It comes complete with a 12-volt MR11 halogen lamp and is available in a white or black semigloss finish. The manufacturer recommends the fixture for illuminating sculptures, paintings, or similar accent lighting applications. Roxter Mfg. Corp., Long Island City, NY.

Circle 78

Product Literature



Control system

A technical data sheet details Hubbell's H-Moss 200 control system for fluorescent or incandescent lighting, including components, sensor locations, installation, and wiring. Hubbell Incorporated, Wiring Device Division, Bridgeport, CT.

Circle 120



Low-level outdoor fixtures

Data sheets illustrate four low-level fixtures with color photos of typical applications. Included are a semirecessed unit with matching bollard, an outdoor wall- or ground-mounted washer, a floodlight, and garden lights. Hadco, Littlestown, PA.

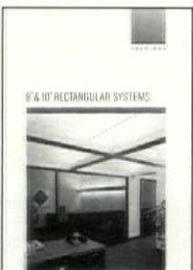
Circle 121



Mirror reflector

The Omega Mirror reflector for new and retrofit fluorescent fixtures is a true mirror surface that is vacuum-deposited on a high-grade anodized aluminum substrate. A data sheet describes benefits. Omega Energy, Hayward, CA.

Circle 122



Linear lighting

Eight- and 10-inch rectangular fixtures for work space lighting have high-efficiency optics. A brochure illustrates a selection of five lens options and mounting configurations for downlighting, uplighting, and both. Peerless Lighting Corporation, Berkeley, CA.

Circle 123



Outdoor luminaire

The Small Seattle luminaire for outdoor applications is available in models for mounting on pole tops and walls. A data sheet contains cutaway drawings and details construction, electrical components, photometrics, and lamping requirements. Hanover Lantern, Hanover, PA.

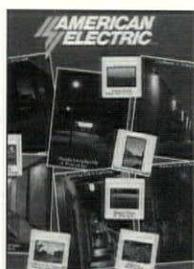
Circle 124



Parabolic louver

The Paracube I high-efficiency flange louver is available in a full-grid model and two flange widths for ceiling or fixture installations. A data sheet contains dimensional drawings and information on finishes and sizes. American Louver Company, Skokie, IL.

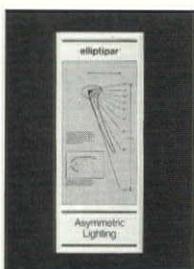
Circle 125



Outdoor lighting

American Electric features its complete line of products for area, site, roadway, and security lighting in a 145-page catalog that includes a discussion of applications and design considerations. American Electric, Southaven, MS.

Circle 126



Asymmetric illumination

A brochure profiles four luminaires with asymmetric distribution patterns for wall washing, indirect lighting, and floor lighting. Descriptions of each luminaire accompany color photos. Elliptipar Inc., West Haven, CT.

Circle 127



Electronic ballasts

The Ballastar line of high-frequency electronic ballasts helps reduce power consumption and increase the efficiency of fluorescent lighting. A brochure discusses benefits and lists specifications. Triad-Utrad, division of MagnTek, Inc., Huntington, IN.

Circle 128



Recessed projector

Wendelighting's recessed optical projector for confined interior illumination accommodates a 400-watt halogen lamp. A brochure contains features, photometrics, and suggested applications. Wendelighting, division of Jackson International Ltd., Burbank, CA.

Circle 129



■ Skylights, skyroofs

Kalwall's skylights, skyroofs, and clear span structures are made of fiber glass-reinforced sheets permanently bonded to interlocked, extruded aluminum I beams. A brochure includes specifications, test data, and applications. Kalwall Corporation, Manchester, NH.

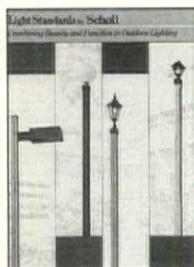
Circle 130



■ Fluorescent ballast

A data sheet profiles the Profit Line electronic tuning ballast for fluorescent lights and details performance characteristics, technical comparisons with standard ballasts, and physical specifications. XO Industries, Inc., Mountain View, CA.

Circle 132



■ Light standards

A brochure from Scholl Lumber features light standards of laminated, kiln-dried southern yellow pine that is pressure treated for applications above or below ground. The brochure lists finishes, surface textures, and load specifications. Scholl Lumber Company, Bethlehem, PA.

Circle 131

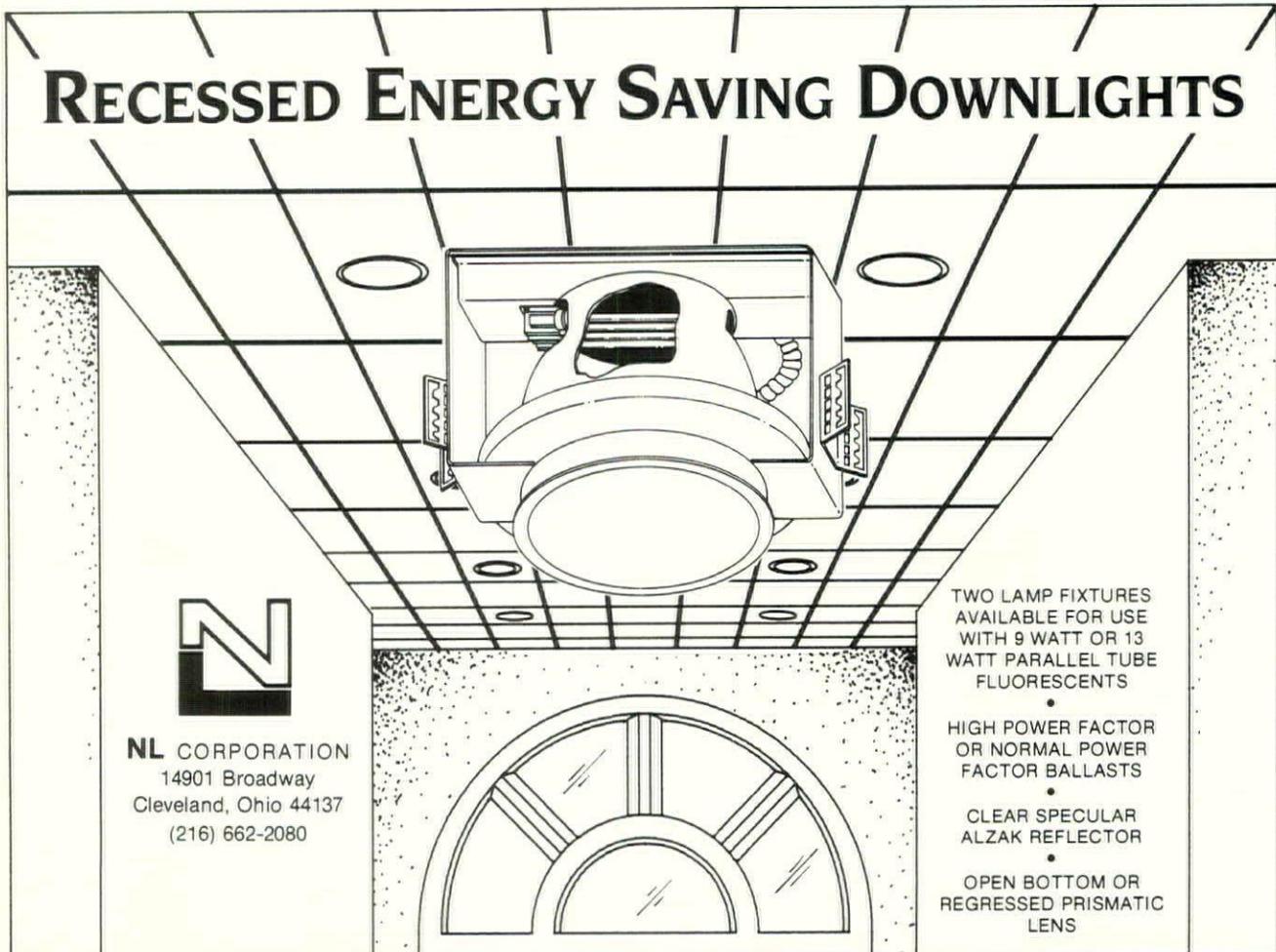


■ Lighting control system

The Galaxy automatic lighting control center uses a low-voltage external photo-cell sensor to control incandescent, fluorescent, or high intensity discharge lamps. A descriptive brochure provides technical data and specifications. Multi-point Control Systems, Inc., Mill Creek, WA.

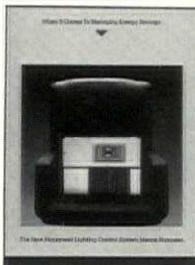
Circle 133

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- TWO LAMP FIXTURES AVAILABLE FOR USE WITH 9 WATT OR 13 WATT PARALLEL TUBE FLUORESCENTS
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- CLEAR SPECULAR ALZAK REFLECTOR
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- OPEN BOTTOM OR REGRESSED PRISMATIC LENS



■ Lighting controller

A brochure explains features of Honeywell's lighting control system for fluorescent lamps, which controls and maintains light levels according to the amount of natural daylight available. Honeywell Telemarketing Center, Minneapolis, MN.

Circle 134



■ Garage illumination

Gardco's garage luminaires eliminate glare at normal viewing angles and provide uniform illumination. A brochure describes and illustrates features of six optical systems and includes photometric data and specifications. Gardco Lighting, San Leandro, CA.

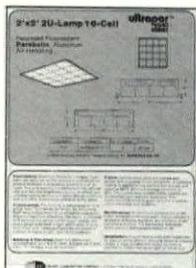
Circle 139



■ Neon dimmer

Lite-Set light level controls allow users safe dimming of neon signs and cold cathode lighting systems. A brochure describes available controllers and system components. Voltarc Tubes, Inc., Fairfield, CT.

Circle 135



■ U-lamp luminaire

The Ultrapar 9040 series of recessed parabolic aluminum fixtures includes a 2-foot-square, 16-cell model for two fluorescent U lamps. A data sheet provides information on construction, finishes, and installation. Globe Illumination Company, Gardena, CA.

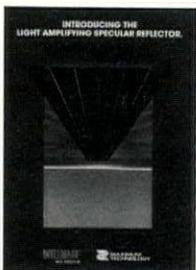
Circle 140



■ Sports lighting

A brochure discusses metal halide fixtures for baseball, softball, football, soccer, and tennis. Layouts for different types of fields and desired lighting levels are discussed and illustrated. Hubbell Incorporated, Lighting Division, Christiansburg, VA.

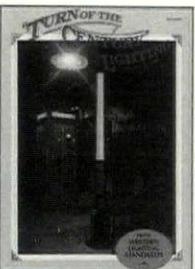
Circle 136



■ Specular reflector

The highly reflective surface of the LASR specular reflector helps two fluorescent lamps do the work of three or four. A brochure discusses benefits and provides a case study of energy savings. Maximum Technology, Brisbane, CA, and Wellmade Metal Products Co., Oakland, CA.

Circle 141



■ Lighting standards

A brochure illustrates a turn-of-the-century line of cast aluminum poles and brackets as well as luminaires in a wide variety of sizes, styles, and mounting configurations. Western Lighting Standards, Fountain Valley, CA.

Circle 137



■ Landscape lighting

A brochure describes features and components of Hydrel's landscape lighting system for low-voltage MR16 halogen sources. Photos of fixtures and accessories are included. Hydrel, Sylmar, CA.

Circle 142



■ Exit, emergency sign

The PFX series self-powered AC/DC exit sign uses two 5-watt compact twin-tube fluorescent lamps for low power consumption and maintenance costs. A data sheet includes dimensional and cutaway drawings, features, and options. York-Lite Electronics, Inc., Austin, TX.

Circle 138



■ Light level sensor

A pamphlet explains Conservolite's Daylight Savings system, which monitors available light around a fluorescent fixture and reduces or increases lamp output to maintain a constant light level. Conservolite, Inc., Oakdale, PA. ■

Circle 143

Calendar

December 15, 1987 **Entry deadline** for second annual NGA Awards for Excellence. Awards recognize projects using architectural glass and glazing design completed between January 1, 1982, and December 31, 1987. Entry fee. Contact: Awards for Excellence Competition, National Glass Association, 8200 Greensboro Drive #302, McLean, VA 22102.

December 15, 1987 **Entry deadline** for 23rd annual Lumen Awards. The Illuminating Engineering Society, New York Section, presents the awards for projects in the New York area completed in 1986 or 1987 and/or any project designed by a New York designer or consultant. Contact: Michael Cahana, Lumen Awards Program Chairman, Wheel Gersztzoff Friedman Associates, 30 West 22nd Street, 3rd Floor, New York, NY 10010, (212) 807-7727.

January 8, 1988

Abstracts deadline for IES conference papers. 1988 annual IES conference papers are invited on the art, science, and practice of illumination — particularly in design and application and in lighting education. Contact: Kevin Heslin, Illumination Engineering Society, 345 East 47th Street, New York, NY 10017.

January 10-13, 1988

17th Toronto Furniture Market, the International Centre and the Constellation Hotel, Toronto, Canada. Canadian and foreign manufacturers will display new furniture, lamps, and accessories. General public may attend the evenings of the 12th and 13th. Contact: Isabelle Bleau, Isabelle Bleau Communications, (514) 393-1076, or Renée Dufresne, Director of Exhibitions, Quebec Furniture Manufacturers Association, (514) 866-3631.

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DUAL LITE

Newtown, Connecticut

January 14, 1988

Entry deadline for the 1988 Presidential Design Awards. Awards in seven categories recognize works authorized, commissioned, produced, or supported by any department or agency of the U.S. government completed between January 1, 1977, and January 1, 1987. Contact: Design Arts Program, National Endowment for the Arts, 1100 Pennsylvania Avenue, NW, Washington, DC 20506.

February 9, 1988

Lighting through a designer's eye, DLF event, San Francisco. Alan Lucas is the speaker. Contact: Paula Goodell, Northern California Designers Lighting Forum, P.O. Box 1429, San Francisco, CA 94101, (415) 550-0333.

March 12-13, 1988

WorldStore '88, Georgia World Congress Center, Atlanta. The first international retail trade exhibition and conference serving the entire store environment. Contact: Bailey Beeken, Show Manager, National Expositions Company, 49 W. 38th, Suite 12A, New York, NY 10018, (212) 391-9111.

May 1, 1988

Entry deadline for the Howard Brandston Student Lighting Design Education Grant. Applicants must be full-time students with substantial course work in illumination studies from accredited programs in engineering, architecture, interior design, or theater. They must submit an original and ingenious solution to a lighting design problem supplied by IES. Contact: The Howard Brandston Student Lighting Design Education Grant Competition, Illuminating Engineering Society, 345 East 47th Street, New York, NY 10017.

May 27, 1988

Entry deadline for the 12th annual lighting design competition sponsored by the Cooper Lighting Group. The competition, held under the auspices of the American Society of Interior Designers, encourages the creative use of lighting. Contact: The Hanlen Organization, 401 N. Michigan Avenue, Chicago, IL 60611, (312) 222-1060. ■

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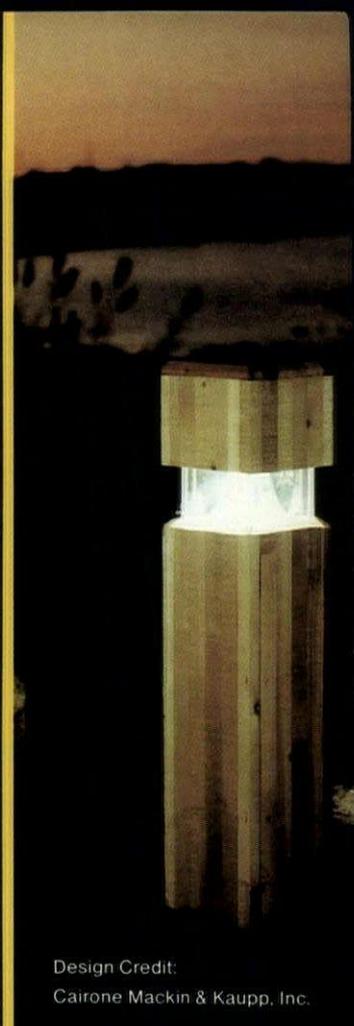
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PS Form 3526
July 1982

(See instructions on reverse)

Manufacturer Credits

Store skylight works day and night (Short-Stop prototype store, Santa Rosa, California). Main skylight: **Kalwall**. Motorized controllers for automatic shades: **Somfy**. Banners: **Wildside Graphics**. Exterior lighting control: **Tork**. Interior lighting control: **Lite Miser**. Exposed-tube continuous fluorescent fixtures: **Wellmade**. Fluorescent ballasts: **Advance**. Fluorescent lamps: **General Electric**. Single-circuit low-voltage track, fixture, and adaptor: **Halo**.

Lighting a zoo to please animals and people (Burnet Park Zoo main building, Syracuse, New York). Recessed, retractable MR16 fixtures: **Capri Lighting**. Industrial fluorescent fixtures with specular Alzak reflectors: **Guth**. Industrial fluorescent fixtures with baked white enamel reflectors: **Gibson**. Ultra high output fluorescent lamps: **Duro-Test**. 150-watt incandescent border light units with red, white, and blue filters: **Lehigh Electric Products Co.** Automatic timers: **Tork**. Remotely ballasted 400-watt metal halide and 250-watt high pressure sodium fixtures: **Infranor**.

Light puts 240 restaurant customers on stage (Twenty:Twenty, New York City). Downlights: **Edison Price**. Neon: **Alan Bank**. Decorative window lighting and incandescent cove lighting: **Norbert Belfer**. Exterior lighting: **Stonco**. Recessed floor lights: **Lite Lab**. Dimming: **Lutron**.

Creating new lighting for the historic Willard Hotel (The Willard Inter-Continental Hotel, Washington, D.C.). Lobby and Peacock Alley chandeliers: **Corlite Corp.** Low-voltage planter uplights: **Dichrolite**. Low-voltage light strip: **Lucifer Lighting Co.** Willard Room chandeliers and sconces: **Louis Baldinger & Sons**. Crystal Room chandeliers and sconces: **Louis Baldinger & Sons**. Concierge desk lamps: **Chapman Manufacturing**. Preset dimming systems: **Theatre Technics**.

Dramatic lighting kindles excitement at museum in a mall (Old Pueblo Museum, The Foothills Mall, Tucson, Arizona). Incandescent downlights: **Lightolier**. Incandescent track: **Edison Price**. 250-watt metal halide spots: **Arc Sales**. 70-watt metal halide spots, custom designed by Grenald Associates: **Eric Industries**. Controls: **EDI**.

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