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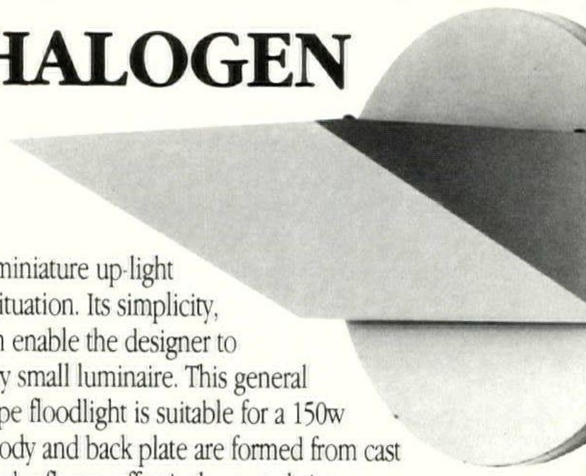

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From the Editor

One of the most intriguing sessions at last month's Illuminating Engineering Society Conference in Phoenix was a panel discussion concerning the issue of whether to establish a certification process for architectural lighting designers.

As discussed by the panel, options for a method of qualifying for the profession run the gamut — from voluntary participation in educational programs and testing, leading to a certificate, to licensing of lighting designers by individual states.

Although the panel did not officially represent any of the groups that certification might affect most significantly, an IES committee is studying the issue. That scares a lot of people.

There are lots of ways to design lighting. Many sorts of folks design it: from illuminating engineers, who are alleged to base their lighting designs on number crunching and photometric charts, to the architectural lighting designers whose work is allegedly based on things like emotional and experiential phenomena — and visualization. And of course, there are the rest: architects, engineers, landscape architects, and interior designers.

The fears are, on the one hand, that the licensing of lighting designers could be used as a means of excluding qualified people from practicing the profession. On the other hand, a few unqualified hacks can give everyone a bad name. And it has happened that some unlicensed professions not recognized by state laws have been legislated out of existence. Licensing could therefore protect lighting designers by restricting practice.

Both sides have some valid points. But, from my perspective, the most disturbing aspect of the discussion was neither certification nor the lack of it. It was watching the number crunchers and the experiential visualizers draw battle lines over who should qualify.

The idea of establishing a voluntary education and testing program leading to a certificate is a first step toward establishing standards that could be defensible, should lighting design as a profession ever be threatened by legislation. But the worst possible outcome would be a poorly thought out certificate program that caused the two groups to become even more polarized than they are now, and even more vulnerable to extinction. No program of any kind is likely to get off the ground unless both groups are willing to learn from each other and to work together to establish it.

Charles Linn, AIA

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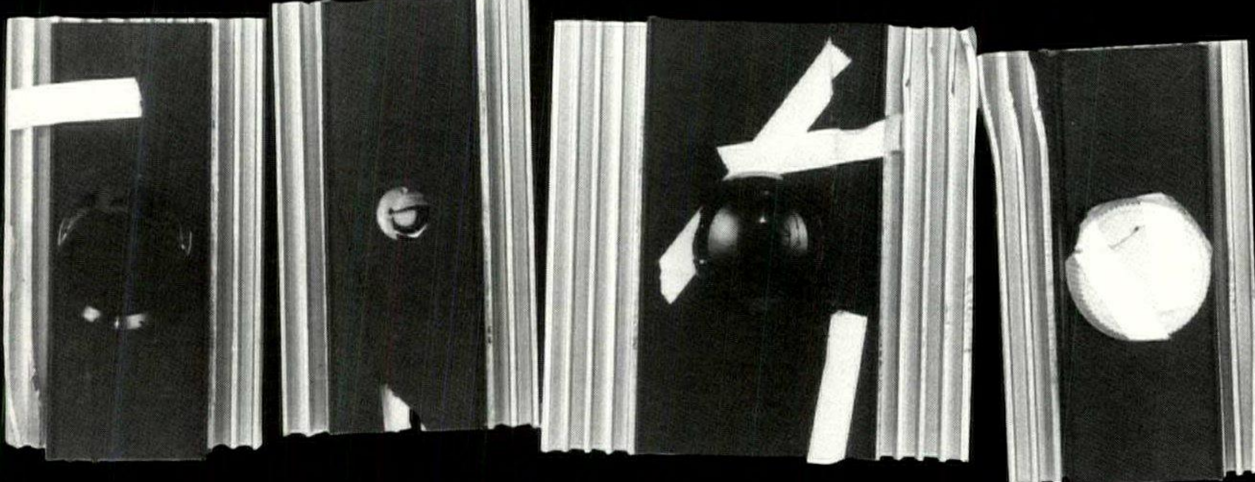

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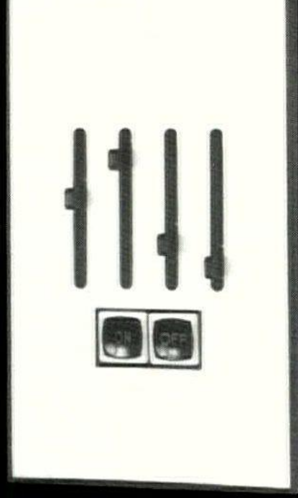

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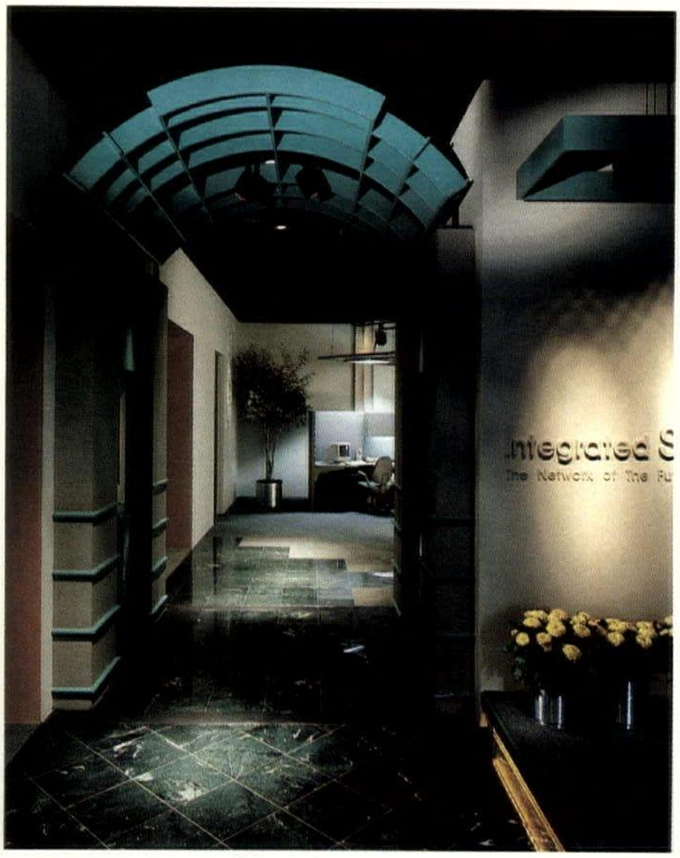
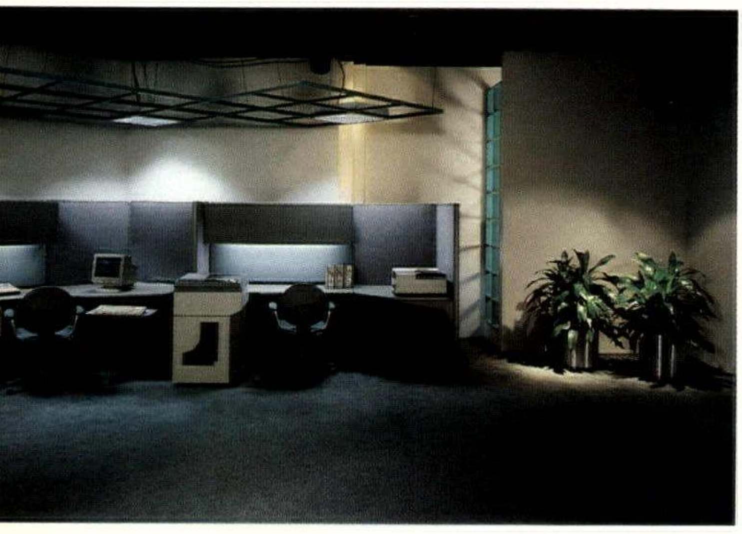
Eye-catching showroom piques customer curiosity





Southwestern Bell's small area at the Innova merchandising center competes for attention with showrooms located closer to the beaten path of customer traffic. People don't naturally circulate past the space — something has to grab them. That's why the client wanted a strong, dramatic visual impact along with low initial cost, low operating costs, and complete installation within two months.

Irvine Associates realized that light could help meet these challenging design requirements. "We had no artwork budget at all," says Dennis Irvine. "We had to make the space the art." As part of the architectural and interior design work, Irvine called in lighting consultant Cheryl Sevin for assistance.

The time constraint ruled out custom lighting and special-order items. Every component in Sevin's fixture schedule had to be available in town. Track lighting was clearly the best solution because of availability and economics. Sevin chose tungsten halogen PAR 36 narrow spot 12-volt lamps for their color rendition and narrow beam. Cube cell louvers on the track fixtures provide glare control and add a cross-hatched pattern to the light beam.

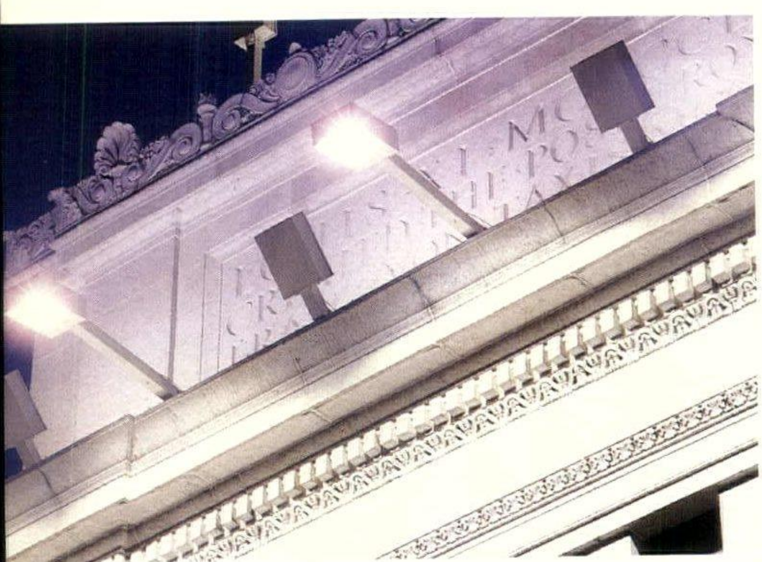
A key to the success of the showroom is its invitation to come inside. An archway reveals a glimpse of the space within, and pools of light on the floor beckon the visitor to walk through to see what's inside. Computer equipment includes four VDTs and is set up in a display area used to demonstrate the Southwestern Bell technology. The architect had expected to use track lighting here, but Sevin recommended louvered fluorescents to prevent glare on the screens.

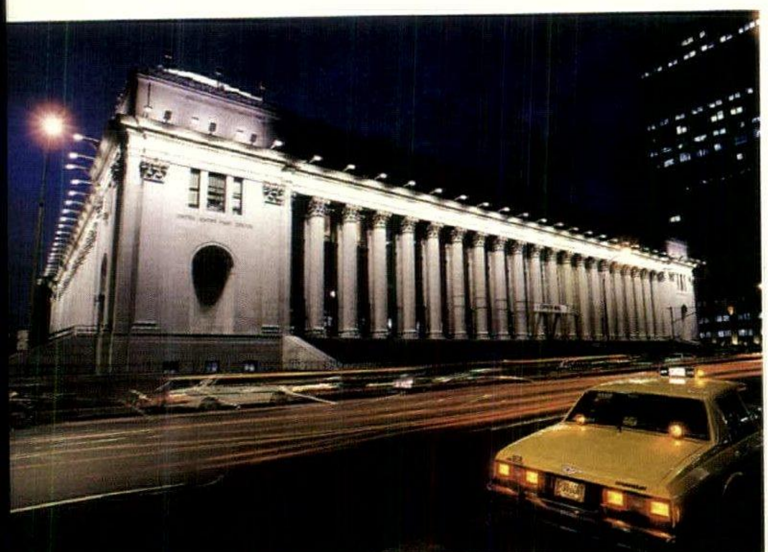
"They didn't want to use the standard lay-in grid," Sevin says. "They wanted the space to be different, and just to use the grid system was too typical." She suggested an exposed grid, suspended without tiles and painted "an outlandish color." Irvine chose a bright blue-green for the grid and other ceiling structures — another element in the strategy for making the showroom stand out in a crowd. ■

For product information, see the Manufacturer Credits section on page 74.

Project: Southwestern Bell Integrated Systems Digital Network Showroom
Location: Houston, Texas
Architect: Irvine Associates
Lighting Consultant: Cheryl Sevin
Photos: George Gomes

Pulleys, double lamps customize fixtures for post office





Project: James A. Farley Building
Location: New York City
Client: United States Postal Service
Electrical Engineer: Supriya K. Ghosh, Mariano D. Molina, P.C.
Photos: Bart Barlow

New York City's main post office was ready for energy-efficient new exterior lighting. Supriya Ghosh, an electrical engineer at the firm of Mariano D. Molina, observed that half its incandescent floodlights weren't even working. Saving money was the client's top priority; installation, maintenance, and energy costs all had to be taken into account.

Ghosh had to mount luminaires on the building itself. The steps leading up to the building's 20-column colonnade left nowhere to base a floodlight. Besides, floodlights from the ground would glare at people looking out the windows at night, and might wash out the carved details of the stone facade.

Ghosh determined that high intensity discharge floodlights mounted on arms extending from the cornice's wide ledge would best illuminate the building. His layout places luminaires shining downward between columns, putting the most light where people walk. Other luminaires uplight areas above the cornice. The layout's regular pattern minimizes disruption of the rhythm of the Corinthian colonnade.

"When we put luminaires on the ledge, we had to think about maintenance," says Ghosh. The expense of a hydraulic ladder for changing a lamp or ballast would negate the energy cost savings. He discussed the situation with building maintenance personnel, who said they were willing to go out on the ledge if they could avoid leaning out over the drop-off.

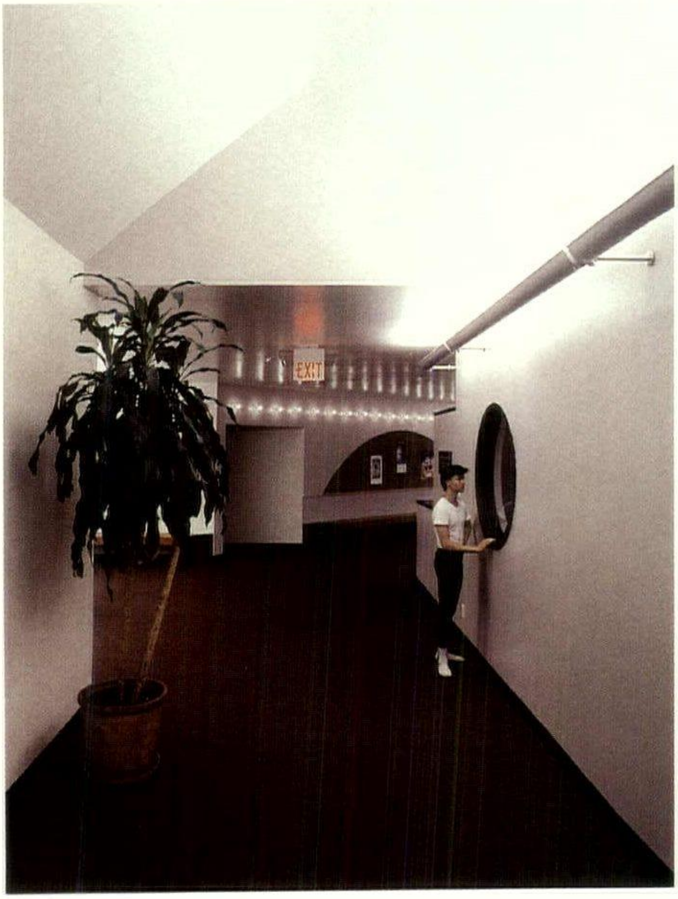
"We couldn't find the right type of standard fixture available," Ghosh recalls. A custom manufacturer solved the problem by designing a floodlight with a hinged arm and pulley system. To service the luminaire, a repair person pulls it up to the ledge.

Ghosh specified an unusual lamp combination for color rendering properties. To whiten the yellowish-pink cast of high pressure sodium (HPS), each floodlight houses a metal halide lamp alongside a higher-wattage HPS lamp.

The reflector and housing for the project are entirely custom made, tailored to data about the mounting locations of the fixtures on the building and the area to be lit. A prototype pleased the client, and the completed system now stands on duty through snow, rain, and heat to banish the gloom of night. ■

For product information, see the Manufacturer Credits section on page 74.

Billboard fixture lights academy halls



Project: Houston Ballet Academy
Location: Houston, Texas
Architect: Ray Bailey Architects, Inc.
Electrical Engineer: MAS & Associates, Inc.
Photos: Paul Hester/Houston

When a bell signals the end of classes, hundreds of children fill the corridors of the Houston Ballet Academy, and the athletic young dancers are likely to leap up and grab anything. For corridor lighting, the academy management specifically requested energy-efficient, indirect light fixtures with a protective device to shield lamps from damage. The fixtures also had to be adjustable to effectively illuminate spaces intermittently enlivened by curved walls, stepping walls, and vaulted ceilings.

"We wanted to make the corridors fun," says project designer Matt Starr of Ray Bailey Architects. The firm renovated a 52,000-square-foot dress factory to create the facility. Starr notes that the studio and office spaces are purely utilitarian, "so the corridors had to have some life to them."

For the light source, the architects leaned toward fluorescent because of its energy efficiency and ease of relamping. Starr unexpectedly spotted a rugged fixture. "I was driving to a meeting regarding the project, oddly enough," he recalls, "and I saw a billboard light. It occurred to me that it had an adjustable shield and it could pretty much take any abuse that a child could throw at it."

Fixtures were mounted to the wall using 3/4-inch conduit attached to solid blocking in the walls. Where they appear to pass through cutouts in rated separation walls, the fixtures float slightly off the face of wire glass. Ballasts were remotely located with access panels in the ceiling adjacent to the fixtures. Theatrical rows of clear A19 lamps outline bulletin board display areas located opposite reception areas in full view of the staff, where vandalism is not a problem.

The same light fixtures, floor treatment, and wall color identify corridors throughout the academy. "That provides an important kind of clear orientation for users of the building," says Starr. "Because of budget considerations and the quality of the existing architecture, the building aesthetics remain industrial. Therefore, the billboard fixture fits right in with the design mode we were trying to choose." ■

For product information, see the Manufacturer Credits section on page 74.

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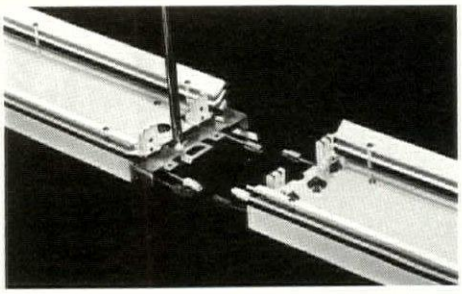
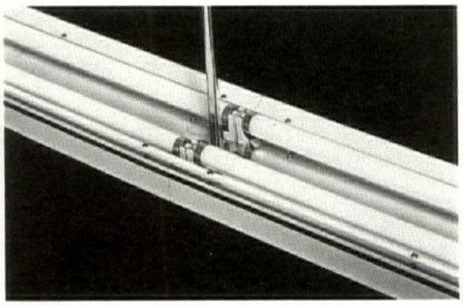
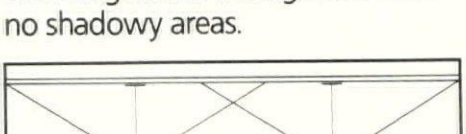


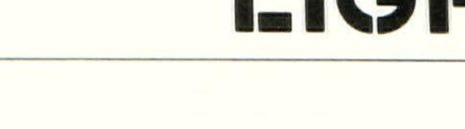


HOW IS IT DIFFERENT?

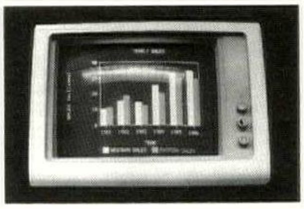
Conventional indirect systems do not distribute light evenly enough to avoid hot spots. Uneven ceiling brightness leads to uneven surface brightness.



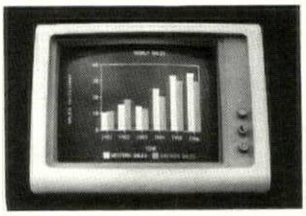
Lytespread, on the other hand, gives off a wide spread of overlapping light that creates a soft, even brightness throughout. With no shadowy areas.



WHAT ABOUT COMPUTER SCREEN GLARE?



Lytespread prevents it by indirectly diffusing the light evenly over the ceiling. As a result, brightness contrast between the light and the surface is reduced—eliminating veiling reflections from both printed material and computer screens.



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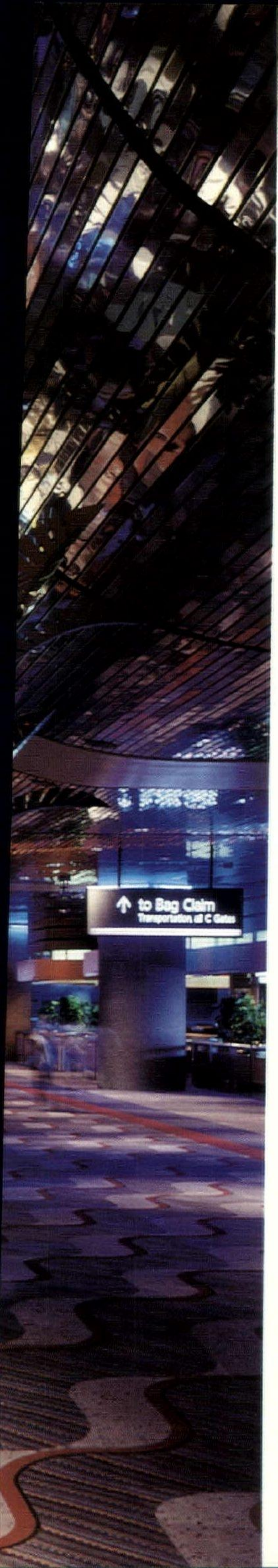
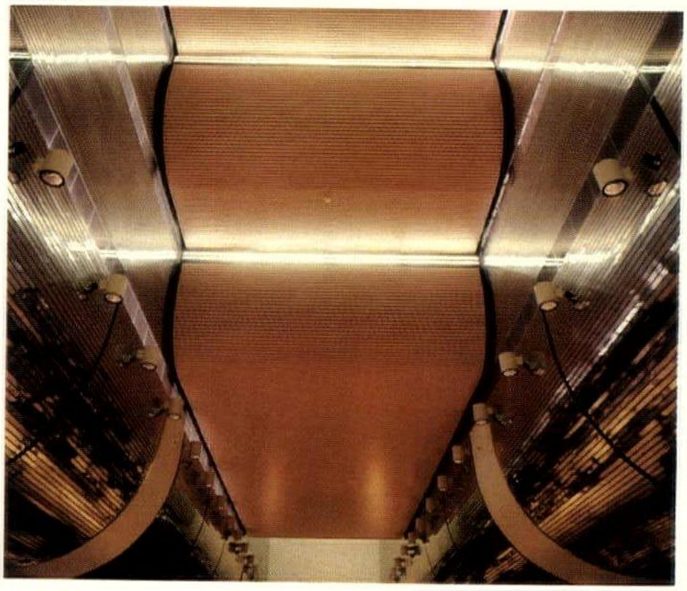


Airport lighting strategy emphasizes circulation, image, and efficiency

ARTICLE BY
CHARLES LINN, AIA

PHOTOGRAPHY BY
TIMOTHY HURSLEY, THE ARKANSAS OFFICE



It would be difficult to differentiate the character of most cities if they were judged only by the look-alike quality of their airports. Airport architecture as a type doesn't vary much. But in Las Vegas — a city built on fantasy, a city where most visitors arrive by air — people get a sense of the city's flavor immediately upon deplaning at McCarran International Airport. Although the new additions to the complex acknowledge the architectural vocabulary of The Strip, they do so with calculated restraint.

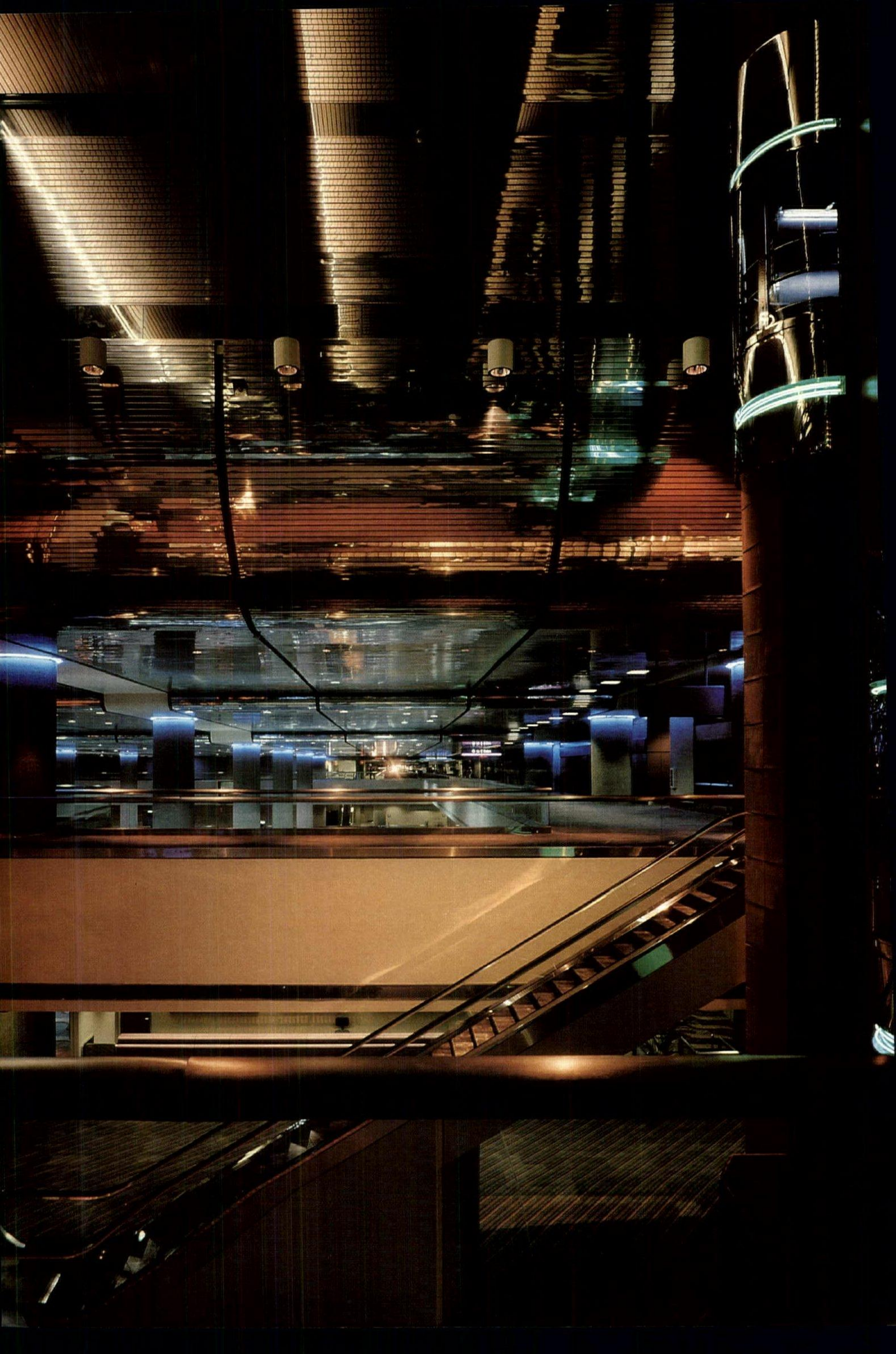
Clad in mauve painted steel panels and bands of concrete with exposed aggregate in colors reminiscent of the desert landscape, the recently completed facilities include new roadways, parking, and a fire, crash, and rescue building. A new central terminal is linked to a new concourse, called Satellite One, by a light rail system.

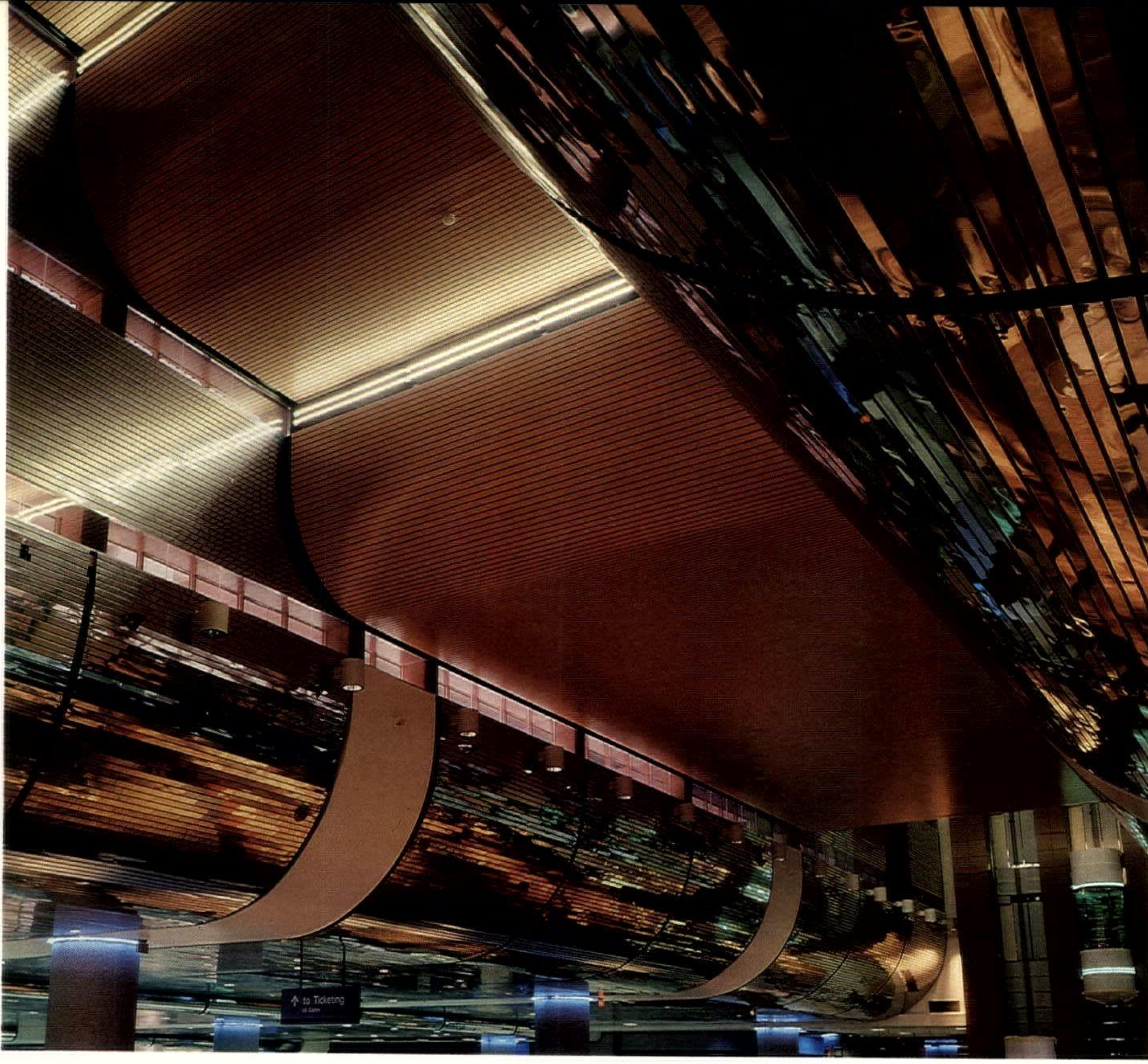
These facilities are the completed first phase of a three-phase master plan by TRA of Seattle, which the Clark County Commissioners accepted in 1980. TRA was selected as airport consultant and prime architect and engineer for the project and subsequently selected Horton•Lees Lighting Design to develop the lighting and write lighting design directives, documents establishing the lighting design to be used throughout the airport.

"From my point of view, airports have to do two things to be successful architecturally," says Stephen Lees. "First, they have to be very functional as circulation devices. Second, the structures themselves have to convey an image. It's got to be the right one.

"Functionally, the airport is a set of circulation systems — for planes, people, automobiles, and baggage. At certain points these systems intertwine — at the boarding areas, for example, where a circulation system for people interfaces with a circulation system for planes. All of

Project: McCarran International Airport
Location: Las Vegas, Nevada
Prime Architect and Engineer: TRA Consultants, Inc.
Architectural Design: TRA Architecture Engineering Planning Interiors
Lighting Designer: Stephen Lees, IALD, Horton•Lees Lighting Design Inc.
Associate Architects and Engineers: Central Terminal and Parking Structure, Edward P. Lorenzo, Architect Ltd. and The Benham Group; Satellite One and ATS Guideway, Cambeiro & Cambeiro, Ltd., Architects, Planners, AIA





the systems must move whatever they are intended to move from one place to the next quickly and easily. These functions are obviously defined by the logic of the circulation pathways and by signage, but they can be significantly reinforced by the lighting.

"As far as image is concerned, the lighting at McCarran is part of an architecture that must satisfy two groups: the tourists, with their image of a vacation in Las Vegas, and the citizens of Las Vegas who are not part of the gaming scene and may not necessarily associate themselves with it."

Lighting for Function

"We used a fairly limited lighting palette, and very consciously chose certain types of lamps for certain purposes: fluorescent for circulation, incandescent for retail areas, and metal halide for baggage claim areas," says Lees. The circulation was planned to help direct arriving passengers. Persons deplaning at the gates of the new concourse, Satellite One, enter waiting areas adjacent to the gates, which are lighted by daylight and low brightness fluorescent fixtures at a comfortable 30 to 60 footcandles in the daytime, 25 to 30 footcandles at night. The rows of fixtures nearest each glazed exterior wall are switched off by photocontrols whenever the daylight level exceeds 60 footcandles.

Passengers are drawn to the light rail transit station by the highest light levels in the Satellite — 80 to 400 footcandles during the day, provided by north-facing skylight vaults. Linear fluorescent fixtures are switched on by photocontrols whenever footcandle levels in the transit station fall below 50. Photocontrols also switch on fixtures that wash the curved surfaces of the skylight monitors.

At night, the light rail guideway is illuminated by wraparound fluorescent fixtures that run the entire length of the track. The fixtures serve a dual purpose: they illuminate an emergency exit step down to the platform from the light rail cars, and they provide a continuous band of light along the track, visually connecting Satellite One to the central terminal building.

At the opposite end of the light rail transit station at the central terminal building, Lees took care to see that skylight light levels would be similar to those at Satellite One. He wanted to see to it that "it wouldn't seem like you were leaving one city and arriving in another."

Passengers arriving in the central terminal building from Satellite One enter the esplanade, a major circulation space that links the rest of the airport together, including concourses, restaurants, retail shopping, parking, and baggage claim. The polished metal linear ceiling steps up several stories to form "clouds," daylighted by clerestories and accented by bands of cold cathode.

"We felt very strongly about the decision to keep the esplanade mostly incandescent," says Lees. "The lighting in this area defines a spine of warm, inviting light, signals a higher energy level, and keeps people moving. There's always something ahead of you to keep you going.

"In this area," says Lees, "we used mostly the tungsten halogen versions of the PAR 38 and PAR 56 in downlights; these lamps have a long life to begin with. In addition, we specified that all the incandescent fix-

tures be supplied with voltage reduced 10 percent by 'bucking' transformers. Theoretically, that increases lamp life fourfold. The initial expenditure for the transformers is not large. When you consider the fact that not all of these fixtures are easily accessible and that lamps will need to be replaced once every four years rather than once a year, the transformers can pay for themselves before the first lamp is ever changed,'' Lees says.

''Past the esplanade, the arriving passengers come upon the baggage claim room. The approach used here was unusual; at most airports, when you get to baggage claim it seems as though there are hundreds of signs, and that the baggage carrousels go on forever. You have no idea which way to go. At McCarran, passengers arrive on an upper level, where they can view almost the entire baggage claim room at once. We made a very conscious decision to change the color of the lighting in this room to cooler, calmer, metal halide lamps, which are also more efficient than the incandescent ones of the esplanade,'' says Lees.

''Thus each sequence of a passenger's journey from the plane to the front door has its own kind of lighting. The purpose of these very conscious transitions is to distinctively define the different areas and

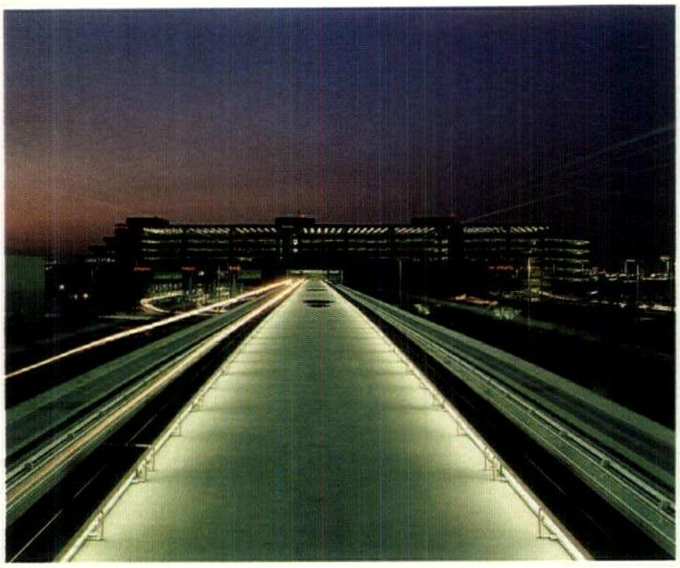
their different activities, to keep passengers directed, and to make them aware that there's always something ahead," says Lees.

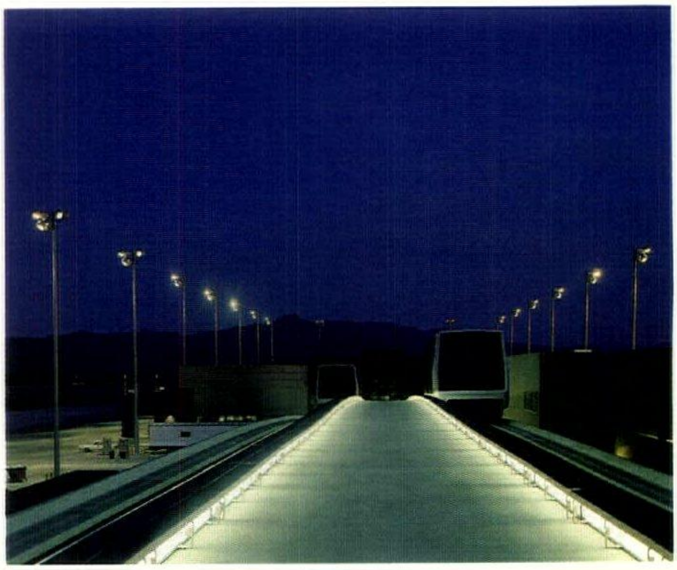
"From the point at which passengers deplane, the lighting reinforces the signage and overall layout of the airport, so they can move themselves through the airport quickly and easily with a minimum of difficulty. That's especially important at McCarran, which has a tremendous swing in the number of passengers it accommodates between the peak and off-peak periods."

Roadway and Garage Lighting

For persons coming to the airport at night in automobiles, Lees took care to design the roadway lighting so as to orient the drivers. "We used single luminaires with high pressure sodium lamps on 40-foot poles," says Lees, "which is not all that unusual. But instead of just poking them down wherever necessary to get proper roadway lighting, we were careful to locate poles only on one side of each roadway, always the side away from the view of the terminal. Placing the luminaires 40 feet off the ground allows more flexibility in spacing the fixtures, and it gets the luminaires out of the way as well."

In the parking garage, Lees used wraparound fluorescent fixtures. "Here," he says, "we





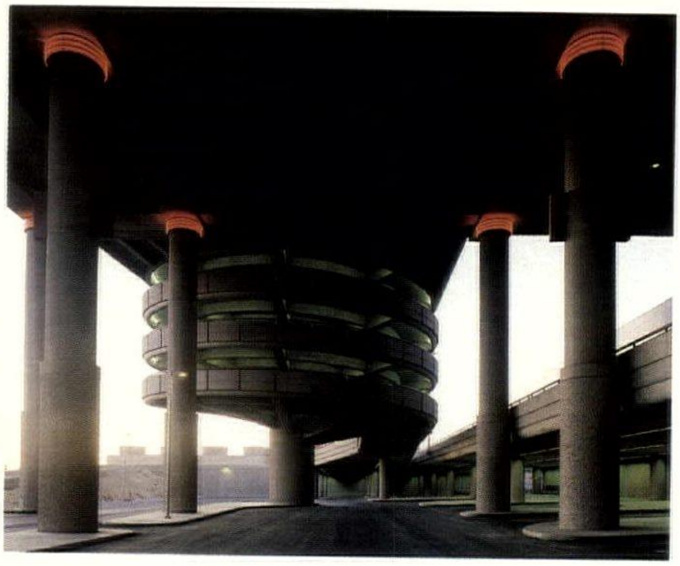
had long, narrow ceiling coffers running parallel to the direction of the driving lanes and parking spaces perpendicular to them on both sides. We put the wrap-arounds in the coffers that occur over the tail ends of the parked cars. Located there, the fixtures light the cars and cross-light the driving lanes, filling the coffers on each side of the lanes with light.

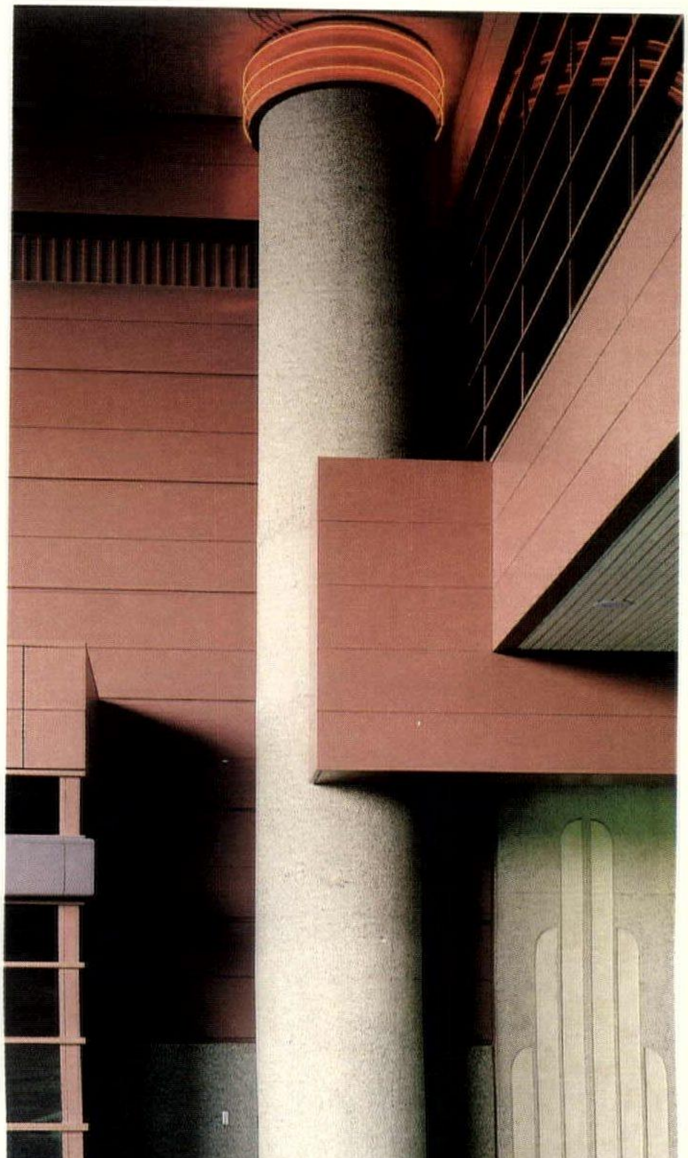
"This solution gives good vertical illuminance without the disorienting glare and hot spots that regularly occur in garages illuminated by high intensity discharge fixtures. You may get some energy savings with HID, but it depends on the structure of the garage. In this particular one, we worked with the consulting electrical engineer to research the use of T-8 fluorescent lamps and electronic ballasts. We found a manufacturer willing to subject its ballasts to our tests and to guarantee to replace them with conventional ballasts if they failed. As far as I know, there haven't been any problems with the ballasts to date. This strategy resulted in about 30 percent energy savings over a conventional fluorescent system, which is considerable in a garage of this size," says Lees. "The HID, in this case, would not have been much more efficient."

Apron Lighting

"The purpose of lighting the exterior areas around the jetways — the aprons — is to provide illumination for docking and parked aircraft and for service functions like refueling, loading and unloading baggage, and conducting visual inspections of the aircraft," says Lees. "The problem is that lighting has to provide minimum illumination levels — say, an average of 2 footcandles horizontal — for the rear of the aircraft, which may be 200 to 250 feet from the poles on which the luminaires are mounted. When the light has to be projected such a distance horizontally, some designers are tempted to throw that light out there from a fixture aimed at a very low angle on a 40-foot pole. The low-pole strategy is a bad one because the angle of the luminaire is such that it's going to be shining into the eyes of pilots trying to park planes," says Lees.

"We used 1000-watt high pressure sodium lamps in fixtures that have extremely good cutoff characteristics mounted on 80-foot poles. These were mounted in gimbal-type spherical housings; so, although the fixtures have been aimed in a





number of different directions, they still have a unified appearance. We located the poles halfway between the center lines of the aircraft parking spots, so that the planes are cross-lighted from each side. When a pilot turns from the taxiway toward the gate, the plane is in the dark beyond the luminaire's beam cutoff. In the illuminated area, the beams of light are directed downward, and cross in front of the plane, so the light never really shines in the pilot's eyes."

There is another advantage of the higher poles, according to Lees. "They do a good job of clearly defining the air side of the airport. Approaching the airport from town and seeing the tall poles and visually dominant apron lighting immediately establishes a sense of destination. That's where you're going. It functions as a visual signal that ties together all of the other goals we've tried to achieve with the lighting as it relates to orientation and circulation throughout the rest of the airport." ■

For product information, see the Manufacturer Credits section on page 74.

Lighting redesigned just in time for opening night

Tom Ruzika

Tom Ruzika is principal designer at The Ruzika Company, a lighting design and consulting firm based in Irvine, California.

Lobby lighting for the Orange County Performing Arts Center was designed, partially built, redesigned, and rebuilt in time for opening night. A major architectural sculpture commission brought three lighting design firms together on the project just 12 months before completion.

The 120-foot-wide Fire Bird sculpture and its special lighting were commissioned in September 1985. When the Segerstrom family asked The Ruzika Company to create and coordinate a sculpture lighting design plan, building construction was more than 60 percent complete.

During construction, we became involved with the project by lighting the building site for fund-raising events and for photographers. Two other lighting design firms had been involved with the design of the center since 1981. Jules Fisher & Paul Marantz, Inc., the project's architectural lighting consultants, had completed the lobby lighting plan, and most of the lobby fixtures were already installed. All remaining equipment to be installed had been ordered and much of it manufactured.

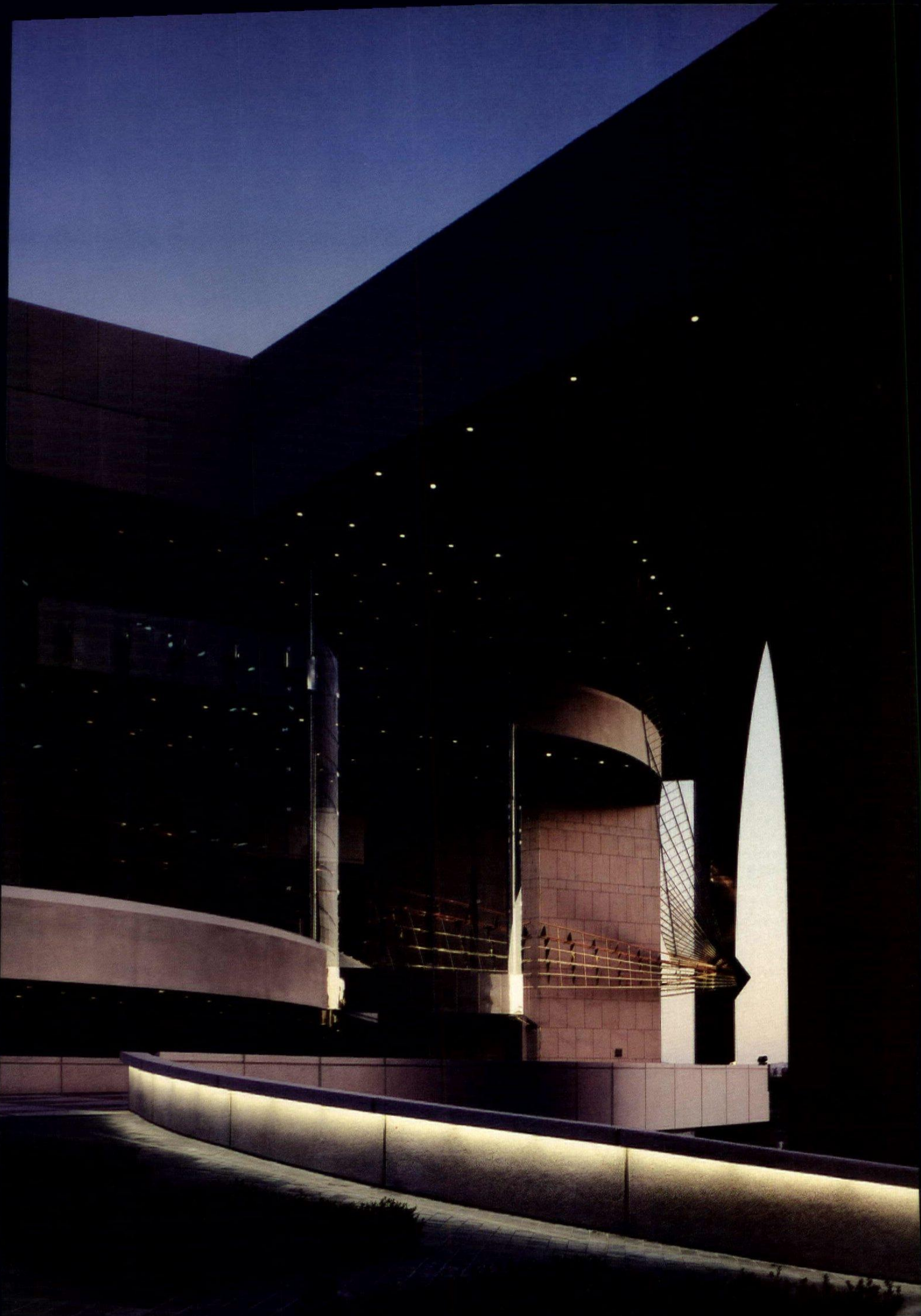
Project: The Fire Bird
Location: Orange County Performing Arts Center, Costa Mesa, California
Client: The Segerstrom family
Architects: CRS/Sirrine and The Blurock Partnership
Sculpture Lighting Designers: Tom Ruzika and Nancy Hood, The Ruzika Company
Architectural Lighting Consultants: Paul Marantz and Charles Stone, Jules Fisher & Paul Marantz, Inc.
Theater Lighting and Lighting Control Systems Consultant: Tom Garrett, Jules Fisher Associates
Electrical Engineer: Frederick Brown and Associates
Sculptor: Richard Lippold
Photos: Mike Sasso

In addition to the theater lighting, Jules Fisher Associates, a theatrical consulting firm affiliated with Fisher/Marantz, had designed the lighting control systems for the entire building. Although the firm had designed the lobby lighting control system and ordered it, it had not yet been manufactured.

With construction continuing at a rapid pace, redesign of the lobby lighting could not be allowed to slow its progress. Structural engineering of the sculpture would take several months, and the sculpture's installation was to begin about two months before the center's scheduled opening.

A Suspended Centerpiece

Stainless steel cable suspends the sculpture from multiple hanging points — eyebolts mounted on steel plates welded into ceiling support beams. It is 60 feet high, 120 feet wide, and 100 feet long, constructed of



polished red-, gold-, and silver-colored stainless steel and aluminum tubes and triangular sheets.

Fire Bird inhabits both indoor and outdoor areas of an asymmetrical lobby space dominated by a 120-foot-high arched entrance called the Grand Portal. A glass curtain wall divides an exterior plaza from a series of interior spaces.

Curved balconies extend from a central V-shaped granite structure, called the prow, that encloses a five-story grand staircase and interrupts the glass curtain wall. Fire Bird was designed to allow people exploring the many levels of the lobby area to glimpse parts of the sculpture by looking up, down, or across.

When we began the lighting design process, only a scale model of the sculpture existed. We held design discussions with the sculptor, Richard Lippold, to learn how he visualized the finished presentation.

The sculpture was to become the accented centerpiece of the architecture, framed by the Grand Portal. The lighting needed to dimensionalize the dynamics of the piece, bringing it a sense of life and movement and allowing it to become a unifying element of the lobby spaces. Lighting was to create a vibrant environment for the sculpture, architecture, and viewing public, both up close and at a distance. On nonperformance nights, the sculpture would become a hanging gallery piece, brightly illuminated against a darkened background.

Initial Design Ideas

After the initial discussions, Lippold left the design in our hands. Meanwhile, the contractor needed to know our plans as soon as possible. We at first hoped to supplement the existing lobby lighting with a totally separate system of fixtures and controls. As we studied the design, however, we realized that the solution would not be so simple.

Two strong line elements were in opposition between the existing layout of lobby downlights and the proposed sculpture hanging points, which coincided with some fixture locations and blocked relamping access to many others. Also, the specified line-voltage PAR 64, PAR 56, and PAR 38 lamps would glare in the eyes of people looking up at the sculpture.

The design of the control system did not offer the control possibilities necessary to highlight the sculpture as a gallery piece. All the lobby downlights were on one channel; the sculpture could not be set apart by darkening areas around it. The original 400-ampere power service would be inadequate for the additional sculpture lighting. Clearly, we needed to work with the other lighting design firms to make physical changes to the overall design plan.

A Collaborative Effort

In January 1986, we traveled to New York and spent an entire day at the Fisher/Marantz offices discussing the project with Paul Marantz, Charles Stone, and Thomas Garrett. Using overlays, we reviewed the position of the sculpture and its hanging points in relationship to the existing lighting plan. Everyone agreed that we had to rework the design. We decided to combine the interior and exterior lobby and sculpture lighting, redesigning all the lobby lighting that related to the sculpture.

The firms established an attitude that we defined as artistic cooperative collaboration. Charles Stone explains, "As the lighting designers for the entire project, our job was not to collaborate on the design concepts for the sculpture, but rather to help integrate design and equipment requirements into the already-under-construction lobby lighting system. We made suggestions and helped with layout studies in an attempt to locate the many fixtures required to light the sculpture in such a way that they made sense with the architecture and the sculpture." Throughout the project, all design details were carefully coordinated between the firms' offices.

Starting Over

The revised lobby fixture layout reflected the pattern created by the hanging points of the sculpture while retaining the lobby lighting's original appearance by using the same pattern relationships. Fixtures were placed outside the lines of hanging points rather than directly above the sculpture to allow physical access for relamping. To help create glare-free light, 12-volt PAR lamps were substituted for the line-voltage lamps originally specified. Equivalent low-voltage fixtures from the same manufacturer were used to maintain a unified look.

Beams of light were aimed parallel to the stainless steel support cables, revealing rather than concealing the slender cables in accordance with the sculptor's intent. Lippold told us that he wouldn't have made them silver if he didn't want people to see them. The sparkling lines shooting out from parts of the sculpture give it an extra burst of light and a sense of floating movement.

New uplights were needed to highlight the colors of the metal on the underside of the sculpture's exterior nose and silver wings. Lippold's original drawings called for support cables anchoring the bottom of the exterior part of the sculpture to the granite prow. One of our first design presentations showed a row of uplights mounted in the prow between the cable anchor points.

When the sculpture and its lighting were commissioned, however, the prow walls had already been finished. Both the contractor and the architect were apprehensive about cutting through the granite. When the sculpture design engineer decided that the lower support cables were structurally unnecessary and deleted them from the plan, we deleted the wall-mounted uplights.

We then tried to design granite "planter" boxes that could conceal lights at the base of the prow. In this low-set location, however, the public could have walked up against the lights, creating shadows on the sculpture and glare in people's eyes. Granite to build the planters would have had to be shipped from Italy. The final sculpture lighting design omitted the prow uplights.

We uplighted the sculpture from the front edge of the plaza level with eight spherical fixtures later dubbed "bird eggs" or "bowling balls." Narrow spot lamps in those fixtures focus light on the nose. Six exterior fixtures mounted directly above the nose in the fifth-level ceiling, a last-minute addition to the design, also house narrow spot lamps that light the nose, approximately 80 feet away. All other fixtures use medium flood lamps.

We often took design ideas to a contractor to find out how much time and expense would be involved.

To confirm design choices, we experimented with fixtures and lamps at the site one night. We set up low-voltage and line-voltage fixtures on the partially contructed building and scaffolding, then stood in each beam to conduct an informal glare test. It took 4 steps to get out of the glare range of a low-voltage fixture; for a line-voltage fixture, it took 10 to 12 steps.

As a general rule, we found that the more light we put on the Fire Bird, the better it looked. We had to be concerned, however, with where the light would fall. Aiming angles had to be very tight so that we didn't overlight the building, creating hot spots on walls or ceilings.

The control system was completely redesigned to facilitate greater control of the lobby spaces; 57 control channels and dimmers allowed for balancing lighting levels for both the sculpture and the lobby spaces. Of particular importance was the ability to showcase the sculpture as a gallery piece on nonperformance evenings when the lobby spaces are not occupied.

While developing the design, we worked closely with the general and electrical contractors, C.L. Peck and Sasco Electric, who helped make the redesign cost-effective. We often took design ideas to a contractor to find out how much time and expense would be involved in the necessary electrical and structural work, given the construction already completed and the equipment on the job at that stage.

Obviously, the redesign was expensive, but it was unavoidable. The unusual lobby architecture set the design parameters. Because the sculpture lighting also lit public spaces, code requirements protected it from being cut. Even given more time, we probably would have reached the same design solution and incorporated it into the original plans.

Construction Strategies

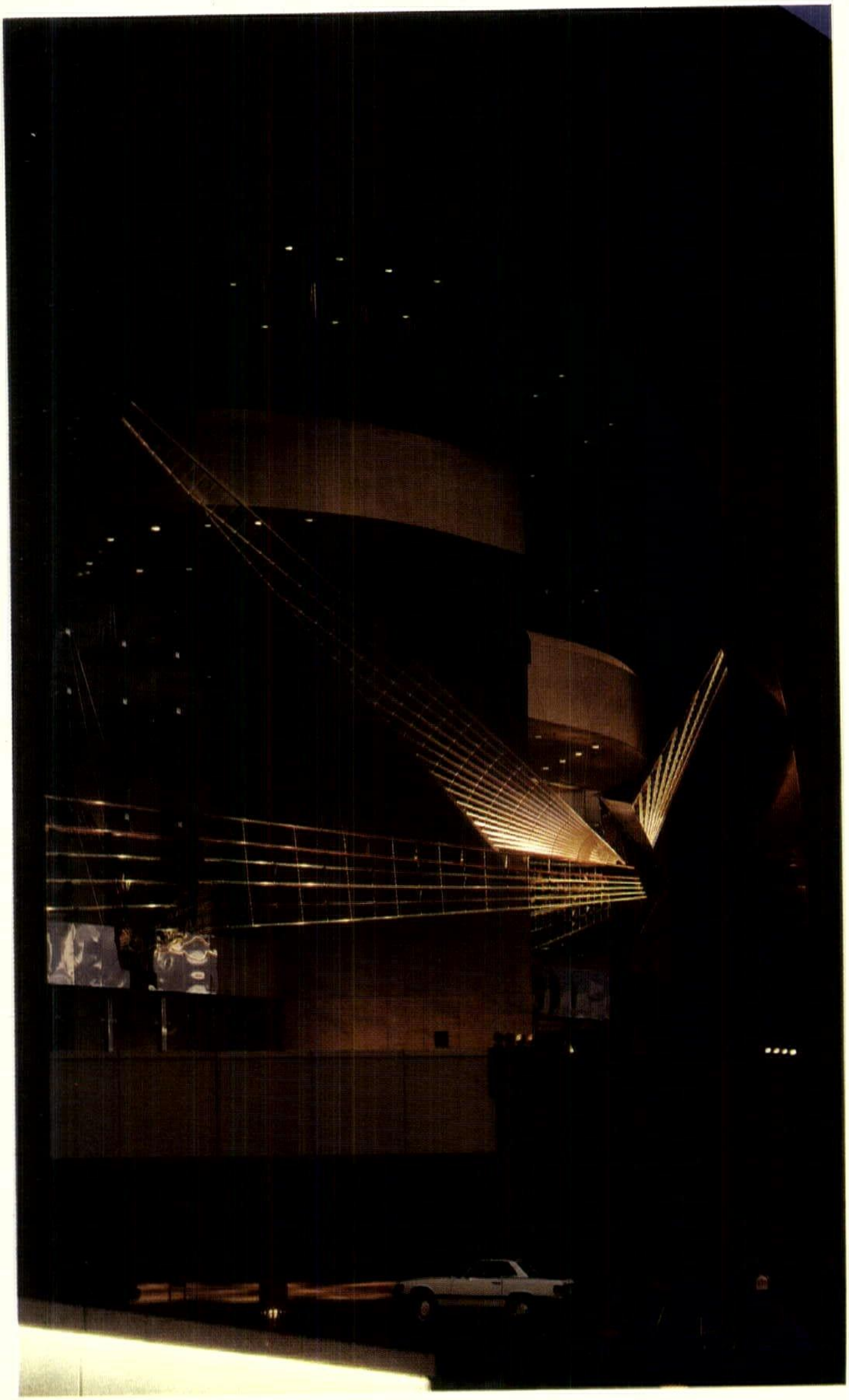
Construction continued during the two months spent redesigning the lobby lighting and control systems. Fortunately, many of the interior fixtures were not yet in place and some ceilings had not been plastered, and we helped the contractors to develop strategies to work around the revised lighting plan. All of the existing lobby fixtures had to be removed, requiring extensive structural and mechanical work. Work projects and crews had to be carefully scheduled to allow time for suppliers to manufacture and ship new equipment.

Throughout the final six months of construction, we worked closely with the contractors and Warner Nebling, Lippold's design engineer, to coordinate the installation of all fixtures and equipment with structural revisions of the sculpture. Fire Bird had come to the project too late to be included on electrical or structural drawings. Nebling worked from the architectural drawings, and we worked from his drawings. Our measurements were based on the steel plates that supported the sculpture.

We set the final fixture layout on the day that Jeff Morlok, supervisor at C.L. Peck, called to tell us that the steel plates had been installed in the ceiling. He needed to relocate sprinkler lines, HVAC ducts, and the lights — all of which had to be up within two weeks. The fastest, simplest way to get all the systems to fit together would be to have designers and engineers on site, and he asked us to come show him where we wanted the fixtures.

So, we went to the site and started measuring. Instead of trying to make every measurement from every plate, we stretched a long string one foot out from the plates. John Shields, foreman at Sasco Electric, put a piece of red tape on the string wherever we wanted a lighting fixture.

We snapped chalk lines on plaster to show workers how much to demolish. In other areas, our marks showed how much of the ceiling they could complete before stopping work and waiting for lighting equip-



ment to arrive. It was an unusual way to finish a lighting layout, but a safe way. Everyone involved was on the spot making final decisions as quickly as possible.

It was sad to see a fully plastered ceiling ripped up to tear out fixtures. The contractor knocked a hole in one curved balcony wall so a worker could crawl inside to unwire fixtures that had no top access. Some fixtures were simply pushed up into the ceiling and plastered over; this was the cheapest way to do the work considering the labor required to tear them out and save them.

It was sad to see a fully plastered ceiling ripped up to tear out fixtures.

During the final weeks before opening, Charles Stone of Fisher/Marantz focused all lobby lighting and set preliminary levels. Programmed scenes include day and evening settings for performance and nonperformance modes. The sculpture was completed just a few days before opening, and we focused the sculpture lighting, much of it outside during an unseasonal rainstorm. Final lighting levels were balanced, and the sculpture and the center premiered on September 29, 1986. ■

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Circle 15

More viewpoints on office lighting: Louvered and indirect ceiling light

The first part of this two-part article outlined the history of task-ambient lighting systems. It discussed the development of those new lighting systems — development that failed to meet high expectations raised during the early part of the last decade. One author examined what he called the "revolution" in task lighting.

The conclusion of this article looks at two methods of ceiling lighting: louvered and indirect. The authors were participants in a seminar on task-ambient lighting that was held in Philadelphia.

■Ceiling lighting systems

Robert O. Oblak

Bob Oblak is executive vice president with American Louver Company, Skokie, Illinois.

This section explores some of the basics of ceiling lighting systems and examines some of the reasons behind the fact that 90 percent of U.S. offices have chosen ceiling lighting systems instead of task-ambient systems.

From the late 1930s until the early 1970s, equal light levels over an entire office were the goal of every lighting layout. The IES recommended 100 footcandles in office areas. It was basically an era of "quantity of light" rather than "quality of light." Delivering that amount of light was typically accomplished by using a fluorescent troffer with a prismatic lens diffuser. The purposes of the lens-type diffuser are to provide some light control and to hide the fluorescent lamps from view.

The prismatic lens has been engineered for high light efficiency. In order for it to be satisfactory in a workplace environment, however, it must be made somewhat inefficient. This is often accomplished through tinting. If it is necessary to make the lens somewhat inefficient to make it acceptable, a logical question arises: "Why bother with this approach?"

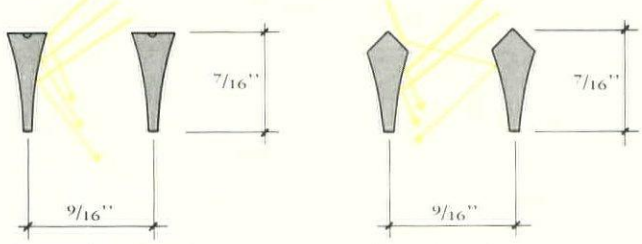
With the advent of the VDT, it became readily apparent that although fluorescent troffers with prismatic lenses provide high illumination levels, they needed major modifications to meet emerging quality needs. Thus, it became apparent that prismatic lenses had no role as integral components of office lighting systems of the future.

Here, the parabolic louver entered the picture. General Electric originally designed, and still holds the patent for, parabolic louvers. GE made the patents available to any manufacturer that wanted to invest time and money into making the product. In the mid-1960s, plastic parabolic louvers first appeared on the scene. The grid configuration was 1/2 inch × 1/2 inch × 1/2 inch, which remained the only size until the early 1970s.

During this same period, some fixture manufacturers opted to use the basic parabolic louver design and build it of aluminum. Because they could fabricate different sizes, they were able to please designers. With a parabolic louver overhead, glare or reflectance from the overhead troffer is removed from the VDT screen, and it is possible to read what is on the screen.

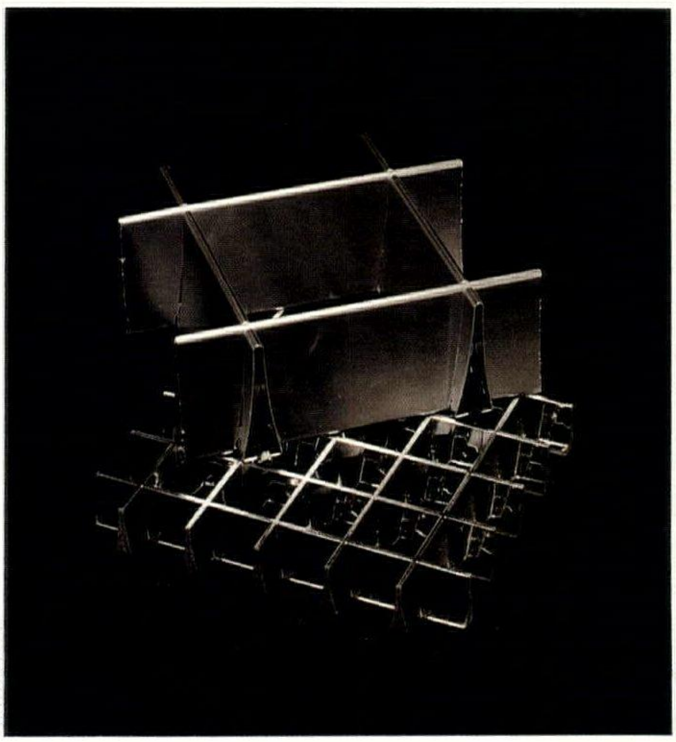
This is a dramatic example of the effectiveness of parabolic louvers and demonstrates one way that lighting in VDT areas can be handled. The light from the troffer is redirected downward away from the high angles. In fact, the light is directed in such a way that it may never cause glare on the screen or directly in a worker's eye.

The accompanying drawing demonstrates the principles at work with light devices of parabolic louvers. Three elements are involved: the curve of the louver wall, the height of the louver, and the specularity. The diagram on the left shows how the light rays bounce off the surface of the parabolic curve of the louver wall or blade. This is a mathematically precise curve that predetermines the angle of reflected



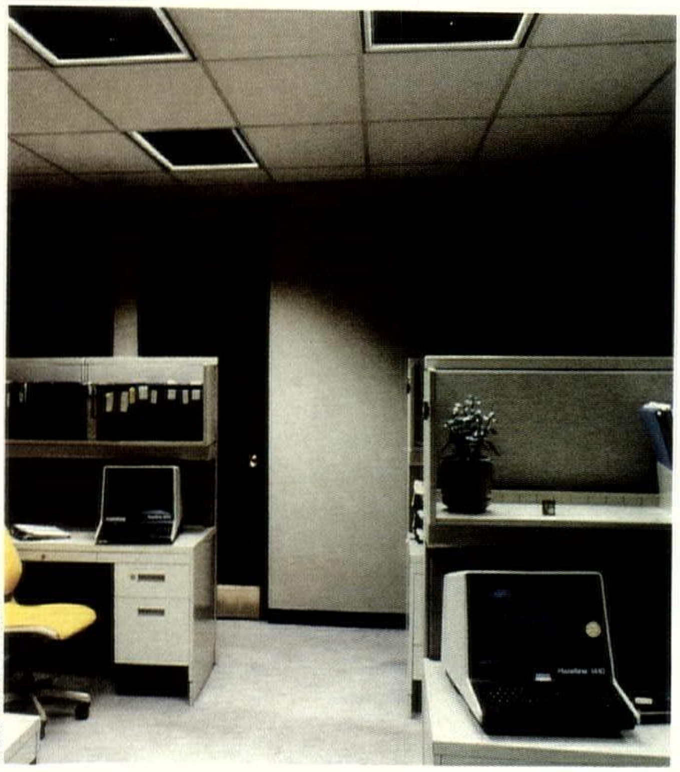
Standard configuration — Tipped configuration

The diagram on the left shows how light rays bounce off the surface of the parabolic curve. The height of the louver determines the cutoff angle. Specularity affects the direction in which the rays bounce. Adding a dome at the top, as shown on the right, can force more light downward.



PHOTOSPHERE

Half-inch by 1/2-inch by 1/2-inch plastic parabolic louvers (below) were the only choice until the 1970s, when aluminum parabolic louvers (above) were offered in various other sizes.



DAN WARKENTHIEN

Before and after photos show the effect of retrofitting parabolic louvers into an existing ceiling lighting system in order to eliminate glare on VDT screens.

light off the blade. In this example, the design reflects light at a 45-degree angle.

Depending upon the height of the louver, different cutoff angles are possible — ranging from a 45-degree cutoff to a 30-degree cutoff.

Specularity is the mirror-like finish on the parabolic louvers, which has a very shiny appearance and enhances the reflectivity. With a diffused finish, the rays bounce off in a nonformulated pattern. With a mirror-type finish, it is possible to project the direction in which the rays bounce. With a more diffused or satin type of finish, the light rays will rebound in ways other than 45 degrees, which produces a softer light but is less efficient.

The diagram on the right illustrates the fact that adding a dome to the top of the louver blade can force more light to rebound downward, thus creating a more efficient diffuser.

Because an aluminum parabolic louver with a semispecular finish is not fully specular, it sends out light rays at higher angles than is the case for a similar louver with increased specularity. This semispecular finish may provide for higher overall light levels, however, and could be acceptable where glare elimination is not an overriding concern.

VDT applications are not the only place that parabolic louvers are desirable. Wherever a quality vision system, as opposed to merely adequate lighting, is required, parabolic louvers may be the single most important component in the illumination environment — at least in terms of the quality of the lighting system.

Plastic parabolic louvers can be easily adapted for retrofitting into existing fluorescent fixtures. The before and after photographs illustrate the changes to an office environment that this characteristic makes possible. In the first photo, in which prismatic lenses are in use, glare is visible on the VDT screens. In the second photo, in which the lenses have been replaced with parabolic louvers, glare has been eliminated from the VDT screens.

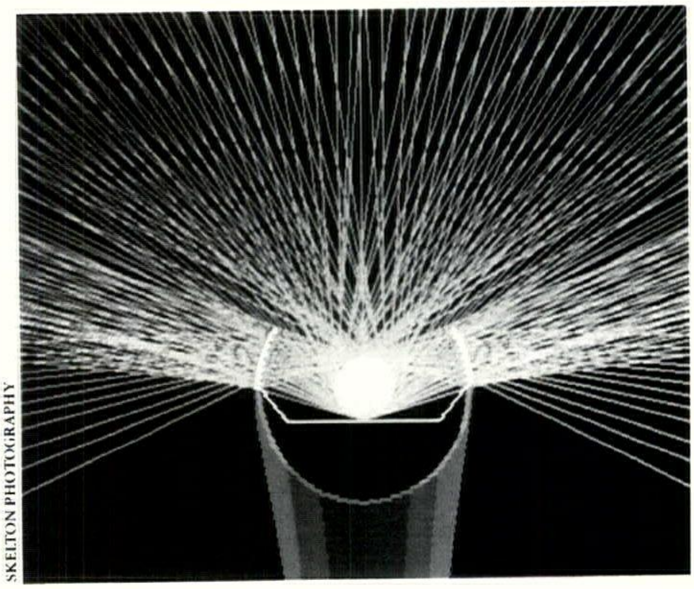
Of the total cost of office space, the cost of mediocre lighting accounts for about 0.5 percent; good lighting adds about 0.25 percent to the cost. In fact, properly designed lighting, using new energy-saving products and techniques, probably costs no more than mediocre lighting, and it offers the added benefit of increased worker productivity. Some case studies indicate that a 1 percent increase in office productivity more than covered the cost of good lighting.

It's fair to ask, then, why indirect task-ambient systems have captured only 10 percent of the market. It seems likely that ceiling lighting systems that use parabolic louvers have dominated for several reasons.

It is possible to retrofit existing ceiling diffuser systems with plastic parabolic louvers without purchasing new pieces of furniture. A retrofit is accomplished economically by simply using the fixture already in place. It can be done very quickly. When a plastic parabolic louver is inserted into an inexpensive troffer, it is nearly impossible to discern a visible difference in light output from that of an expensive troffer and parabolic louver combination.

Indirect lighting is dependent on several factors. One important one is ceiling maintenance. At best, a new, clean ceiling has 80 percent reflectance. After three years, it loses about 30 percent of that reflectance. Task-ambient lights placed close to the ceiling create hot spots on the ceiling, which gives the ceiling a nonuniform appearance with light and dark spots. With a high ceiling, normally located task ambient lights produce a "cloudy day" environment. If some task-ambient lighting systems are placed low enough to reduce the hot spot effect on a normal-height ceiling, it is necessary to shield the worker's eyes from the direct glare of the lamps with a panel or some type of diffuser.

Also working against greater acceptance of task-ambient lighting systems is the fact that people expect higher overall light levels than task-ambient systems can provide effectively and efficiently. For most general areas, the parabolic louver system works better. There is a place for indirect task-ambient lighting. It is to complement, not substitute for, current ceiling lighting systems. ■


SKELTON PHOTOGRAPHY

Computer-generated drawing illustrates the light distribution of a lensed, 6-inch, round indirect fixture.

■ Indirect lighting

Douglas Herst

Doug Herst is president of Peerless Lighting Corporation, Berkeley, California.

If an entire room is a luminous environment and light emanates from walls and ceiling as it does from luminaires, the soft light makes it easier to perform a multiplicity of task types. People in the space perceive it as being more brightly lit than is actually the case, and the visual comfort probability is improved.

Indirect lighting can make a luminous environment a reality. Yet, as has been pointed out, indirect lighting constitutes only about 10 percent of the office lighting market.

Just 10 years ago, however, indirect lighting accounted for a mere 3 percent of the lighting market, and manufacturers of indirect systems said they appealed to only about 1.5 percent of designers. Now they say they appeal to 20 percent of designers — designers who often say they have to educate the clients who still fear problems associated with the indirect lighting of 20 years ago.

An Evolving System

During the 1960s, it was necessary to have a very high ceiling to create successful indirect lighting. Even a fixture 24 inches to 36 inches from the ceiling could create a hot spot across the ceiling that was tantamount to placing a downlight there and that skewed the footlambert maximum to minimum ratios. The indirect fixture also became a part of the space. From a volumetric point of view, indirect fixtures created a false ceiling.

In an effort to correct some of indirect lighting's problems, luminaire designers began working on specially designed lensed systems during the 1970s, spreading the light with prismatic lenses. It became possible to put fixtures closer to ceilings. The goal was to put the top of the luminaire 12 inches from the ceiling and, with a 6-inch-diameter linear tube, to have the bottom of the fixture 18 inches from the ceiling and at least 7 feet, 6 inches above the floor. Lensed fixtures that met these goals would permit the installation of indirect lighting in modern low-ceilinged (8 feet, 6 inches to 9 feet, 6 inches) spaces.

The path to the goal was not completely smooth, of course. Early efforts to develop reflectors were hampered by the narrow aperture — 90 degrees to 120 degrees at the top. No matter what the designers did with the reflector, the housing effectively blocked a good deal of the lateral spill of light. When the aperture was widened to 150 degrees or more, the bare lamp was exposed.

The task, then, was to develop a precise lens with a wide aperture combined with an efficient reflector. Then the lens could direct the light out, yet the luminaire could cut down on source brightness. New indirect luminaire designs combine lamp placement and reflectors in ways that allow light to spread out laterally.

An accompanying computer drawing illustrates the light distribution around a 6-inch round indirect fixture. The lens arrangement provides for lateral light distribution while also concealing the source.

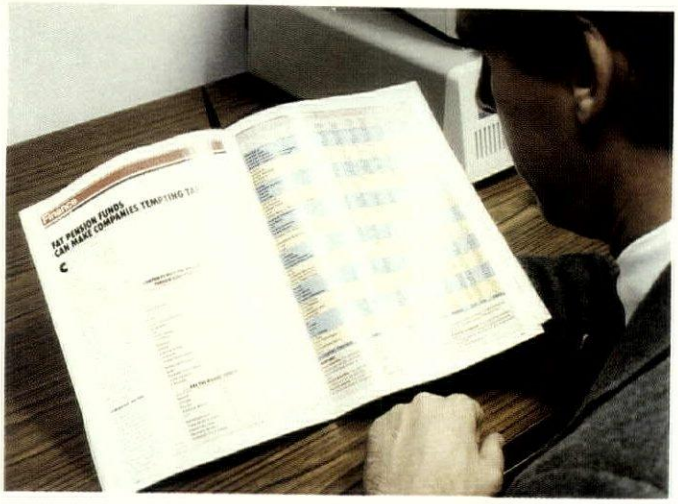
Gaining Acceptance

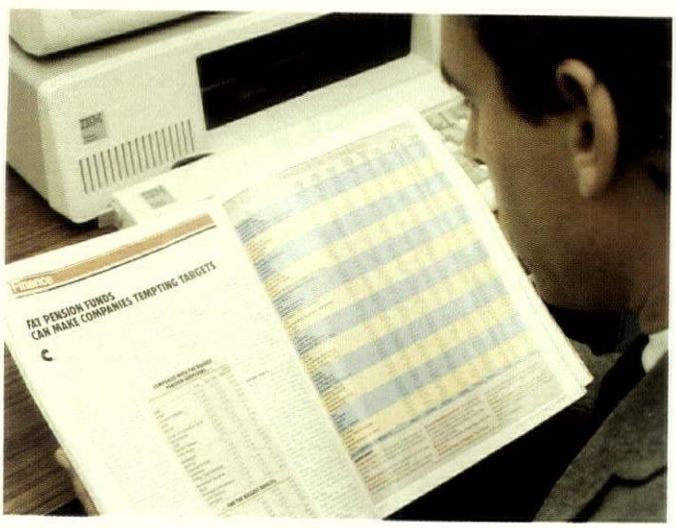
To understand why it has taken 10 years for indirect to capture another 7 percent market share, it is useful to examine some designer objections that have to be overcome. Many people believe that indirect is more expensive to purchase and install, that it won't produce the light levels needed, and that it intrudes into a space in a way that dictates to the designer how that space will look.

Cost. Although prices have been substantially reduced over the years, indirect fixtures remain somewhat more costly than other ceiling fixtures. Primarily, this is because they are visible and therefore have greater material and finish costs than luminaires that are primarily hidden in the plenum.

Light levels. Standards have changed since the days when teachers and parents kept telling us "more light is better light." Now, quality of light is considered along with quantity, and footcandles are only one lighting criterion. Previous guidelines for many applications called for 100 or even 150 footcandles, although few office tasks require such high light levels; at the high end, 70 is probably an optimum level. For most office tasks, many lighting designers, electrical engineers, and architects are now designing for 30 to 50 footcandles. For very critical, exclusively VDT tasks, both guidelines and empirical evidence suggest that 15 or 20 footcandles may be ideal.

If an application called for the very high light levels of days gone by, it would indeed take a great many indirect fixtures to reach those levels. But office applications of the 1980s and 1990s can achieve





DALE WILSON SMITH

Most of the hard copy tasks in office environments involve reflective surfaces. At top, a magazine under a paracube fixture; at bottom, the same magazine under indirect lighting.

Although the office lit by a louvered (paracube) fixture (top) has ample task light on work surfaces, the top third of the room is in shadow. The same office (bottom) lit indirectly is a luminous environment, with softer shadows.

high levels of visual comfort and office layout flexibility with indirect ceiling lighting.

False ceilings. Two recent developments have minimized the problem of indirect luminaires intruding into the space. Lensed systems can be installed as close as 12 inches from the ceiling; original systems often intruded as much as 36 to 48 inches. Many choices of sizes, shapes, finishes, and types of systems are now available. Those who want to use indirect lighting are no longer limited to running a piece of industrial channel below the ceiling. In spaces with ceilings lower than 8 feet, 6 inches, designers can choose from an array of precision-lensed furniture-mounted indirect lighting.

The Changing Office Environment

Two changes in office environments during the past 20 years have made indirect lighting a particularly useful choice: the switch from large open offices to partitioned spaces, and the increasing use of video display terminals (VDTs). Each of these changes has introduced new challenges into lighting design.

Partitioned work stations. With conventional troffered ceiling light, partitions can create dark shadowed areas in work spaces; cutoff can be even sharper with louvered ceiling troffers. Careful design can, of course, brighten those dark corners. The most carefully conceived and executed design, however, can be negated by changes in work station configurations.

A major advantage of the versatile new partition systems is the flexibility they give companies to reorganize space in response to changing needs. If the lighting system fails to provide similar flexibility, the advantage is at least neutralized, if not completely lost.

An office lighting system should be as versatile and flexible as the space it illuminates. Modern indirect lighting systems can provide overall ambient light levels in a space that adapts to changing needs with different work station configurations.

The ubiquitous VDT. It has been estimated that a VDT is installed in a U.S. workplace every three minutes of every work day. Whether that figure is precise is less important than the fact that it reflects a current preoccupation among office space designers. Workers report eye strain and other complaints related to VDT usage, the National Institute for Occupational Safety and Health studies productivity at VDT work stations, and the lighting industry commissions research.

A 1984 study at the University of Colorado compared three commercially available fluorescent lighting systems: a three-lamp, deep-cell parabolic louvered recessed system, a two-lamp linear indirect system, and a one-lamp indirect system. Subjects worked for nearly an hour in a test room set up like a standard office space, with a VDT at approximately eye level. Each subject performed the same task — comparing printouts of random numbers against a similar readout on the VDT — under the three different lighting conditions. The room layout and equipment remained unchanged throughout the tests; only the lighting was changed.

At the end of each test period, subjects completed a questionnaire about the environment in which they'd worked. They gave the highest ratings to indirect lighting, citing relative freedom from glare on the computer screen, from lights, and from surfaces. They also reported feeling more productive and preferred the overall light distribution and general impression of the overall visual environment when the test room was illuminated with the indirect systems.

A 1985 study at The Pennsylvania State University showed that subjects perceived greater overall room brightness when indirect luminaires had a visible, low-level light source. This has important implications for those who complain that the perceived level of light is diminished with indirect lighting. The American Optometric Association recommends indirect lighting for VDT users.

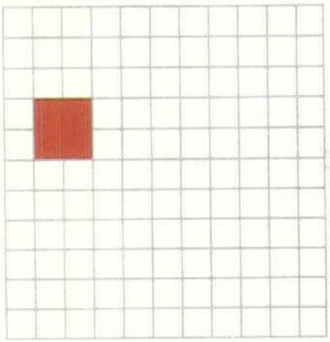
Photographs that accompany this article illustrate some of the differences between lighting systems. Indirect lighting can be seen to produce far less glare on many surfaces.

Indirect lighting systems are more than methods of illumination. The philosophy behind using such a system is to create an environment that goes a step beyond simply directing footcandles onto a work surface. It is an attempt to create an environment in which all the surfaces reflect light — an environment that incorporates subtle, rather than glaring, variations in luminous intensity. ■

The Computer Department

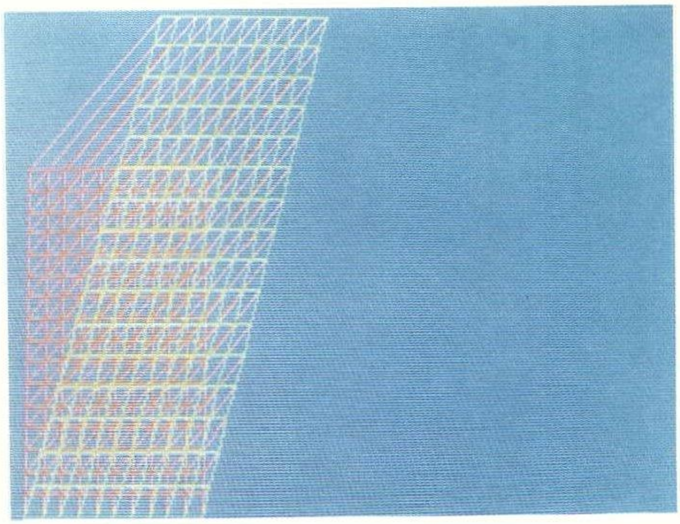
Designing for daylighting and sunlighting is primarily the domain of architects. Decisions about the shape of the building and the orientation and location of windows and skylights can significantly reduce energy consumption for electric lighting. While our British counterparts consider electric lighting to be supplemental to daylighting, it seems we hold the opposite view.

One misgiving about daylight has been that it is not as predictable as electric light. Microcomputers and electronics, however, are rapidly changing our ability to use daylight when it is available. This review looks at two programs for daylighting and sunlighting and a program for integrated daylighting and electric lighting.



David Lord

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



Aesop* Shades *option screen display. Nine color choices are available. The axonometric envelope, shown projected toward the viewer, shades the south-facing window, 10 units wide by 16 units high, from July to September.

One program helps architects design solar shading solutions, another lets them accurately examine sunlighting patterns.

From Cardboard to Computers

The traditional method for precise simulation of sunlight entering windows at any moment throughout the year has been a cardboard model with an attached sunpeg for proper orientation to the sun's path. Most practicing architects have an intuitive feel for the relationship of the sun's path to a building site. Now, architects and engineers have a valuable tool to use when designing integrated daylighting and electric lighting systems: the microcomputer.

Although the microcomputer cannot yet replace an architect's model, it can answer many questions about daylighting and sunlighting. Two utility programs, Aesop and Sunpatch, furnish designers with precise information on solar location and movement. One program helps architects design solar shading solutions, the other lets them accurately examine sunlighting patterns. The operation of each program takes only a few minutes, assuming previous knowledge of principles. If not much is known about the subject, these programs are an enjoyable way to learn more.

Aesop

Aesop is a lighting and solar energy utility program that, like the legendary Greek author of fables, is a classic. It is recommended for anyone interested in solar geometry and architecture. The name is an acronym derived from "An External Shading Optimization Program." The program was written by Richard Sater at the Florida Solar Energy Center.

Aesop gives designers basic values for solar altitude and azimuth, sunrise and sunset, in either local time or solar time, for any latitude and longitude. The solar data is calculated for the exact location of the building and is therefore more precise than tabular data from a reference such as the *IES Lighting Handbook*.

Aesop has a *Shades* option that asks the user to key in the building location, dates and times of interest, and window size and orientation. Aesop then displays a suggested architectural shape for solar shading that excludes 100 percent of the sun for the times specified. An axonometric view of the shading envelope may be printed out for further study.

Although overall operation of the program is easy to understand, suggested shading envelopes must be used with caution. Judgment is necessary in selecting the hours when total shading is desired. If too broad a range of times is selected, the suggested shading device will be impractically large.

Sunpatch

Sunpatch is a utility program written by James Taylor that allows designers to visualize sunlighting effects on any day of the year through windows oriented in any direction. The patches of sunlight coming through as many as 32 windows are accurately outlined on the walls and floor of the room for sequential times on any desired day of the year.

If the programmed time interval is set short enough, the simulated view of sunlight coming through the window moves in real time, sliding slowly across the floor. In addition to simulating sunlight, Sunpatch gives tabular information on the sun's altitude and azimuth and the time of day the sun begins and stops shining in the window.

The program can be interrupted and new parameters entered quickly and conveniently. It is easy to change the size, location, or orientation of the windows with a series of mnemonic, one-keystroke commands. At any time, an *H* may be typed to display help screens. This is one of those programs I enjoy because it is possible to explore and exploit it without once reading the documentation!

Both Aesop and Sunpatch offer limited graphic options

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The compatibility of fluorescent lighting, small cube parabolic louvers and CRT screens is generally acknowledged. American Louver Company now introduces new features that put the PARACUBE I H.E.F. (High Efficiency Flange) ½"×½"×½" louver* ahead of the rest—"light years" ahead.

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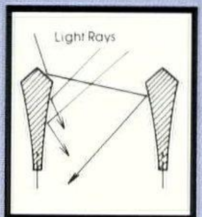

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*Patent Pending

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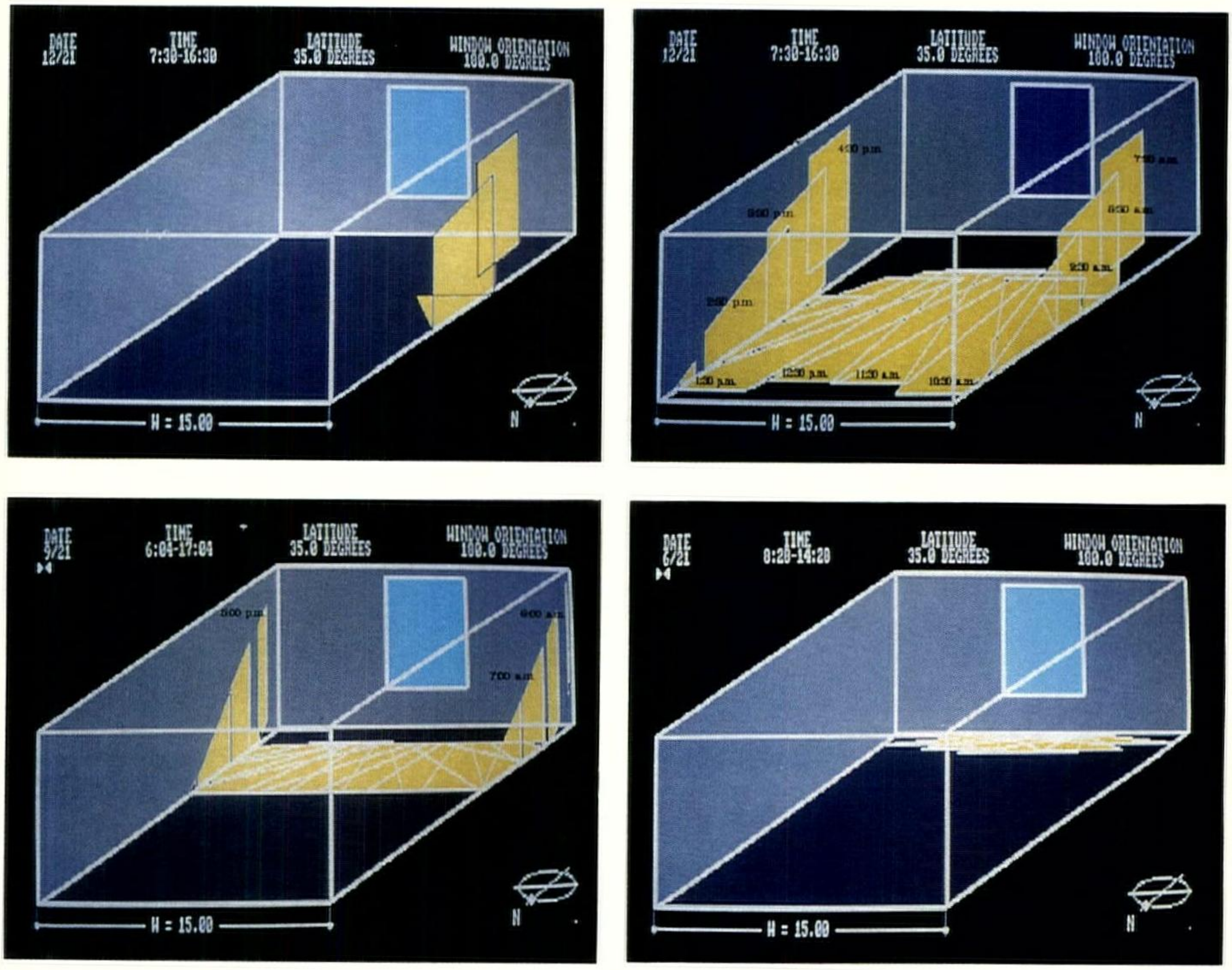
Circle 18



Sunpatch screen display of sunlight penetration into a room through a south-facing window at three different times of year: December 21 at 7:30 a.m. and 8:30 a.m.; December 21, entire day at hourly intervals; September 21, entire day at hourly intervals; June 21, entire day at hourly intervals. Images enhanced with Microsoft Paintbrush.

for presentation of results. If you have an enhanced graphics adapter and monitor for an IBM PC and would like to embellish monochromatic screen solutions with additional colors and visual texture, you might be interested in using a paint program.

Microsoft Paintbrush and Showpartner are graphics and presentation programs that come bundled with the Microsoft Mouse. Using Showpartner, I was able to capture a two-color image from Sunpatch that originally had a resolution of 320 by 200 pixels (the individual points of light that make up the screen image). I converted the image to 640 by 350 pixels for higher resolution display on an EGA monitor and manipulated the high resolution image with the Paintbrush program, filling the sunlit areas with canary yellow color selected from the program's 16-color palette. Showpartner lets users create a presentation sequence from the screens that have been captured.

Controlite

Two major lighting analysis programs have been developed at Lawrence Berkeley Laboratory. Superlite, from the windows and daylighting group, is a sophisticated daylighting analysis program for predicting illuminance on the workplane and on room surfaces. Comparatively few designers, however, have direct access to the large mainframe computer needed to run it.

The lighting systems research group developed a program for the IBM PC: Controlite. Controlite is really two programs in one. Within Controlite is a subprogram called Quicklite.

Controlite helps lighting designers and engineers to model the performance of lighting control systems that continuously monitor available daylight and provide just enough electrical power to maintain a constant level of illumination. The computer is ideal for analyzing the constantly varying power consumption possible with new equi-illumination dimming systems. In addition to continuous control systems, Controlite also models stepped control systems.

The Quicklite segment of the program calculates daylighting values by the daylight factor method, either independently or as a part of the Controlite calculation. If invoked separately, Quicklite models up to 10 windows in a room, using overcast, clear, or uniform sky conditions. The Quicklite subprogram reports daylight illuminance values on a grid of analysis points.

Featured programs

Aesop

Requires an IBM PC/XT with one disk drive; color graphics adapter preferred.

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

Sunpatch

Requires an IBM PC/XT with one disk drive. Graphics may be sent to a dot matrix printer. To order the program on one diskette with notes on its operation, send $25 to:

Architectural Science Unit
School of Architecture and Environmental Design
California Polytechnic State University
San Luis Obispo, CA 93407
(805) 546-2471

Controlite

Requires an IBM PC/XT or fully compatible microcomputer with two diskette drives or one diskette drive and a hard disk, internal memory of at least 256K with PC DOS 2.0 or later. An 8087 coprocessor is optional but strongly recommended. User's manual and diskettes are available from two sources. NESC reference number 9693.

National Energy Software Center
Argonne National Laboratory
9700 South Cass Ave.
Argonne, IL 60439
(312) 972-7250

Francis Rubinstein
Lighting Systems Research Group
Building 90-3111
Lawrence Berkeley Laboratory
Berkeley, CA 94720
(415) 486-4096

Microsoft Mouse

Four versions (depending on computer configuration) available, priced from $125 to $195. Comes with Paintbrush and Showpartner software.

Microsoft Corporation
16011 N.E. 36th Way
Box 97017
Redmond, WA 98073-9717
(206) 882-8088

For some users, Controlite is like meeting an old friend in new clothes.

Anyone who has previously used a program from Lighting Technologies, such as Lumen-Micro, will immediately recognize the style and front-end logic of Controlite. It is like meeting an old friend in new clothes. The menu system, data input, and error checking routines are related to their other work. The user completes several screens of a self-prompting worksheet, then the program checks the worksheet for errors.

The 130-page manual that accompanies the program is a model of completeness and accuracy, with few exceptions. In working through one of the examples given in the manual, the error checking routine announced one printed error with a loud beep; the error was easily corrected before continuing.

The Controlite analysis is based on economic factors alone, considering only the energy consumed directly by the lighting system. Within these limits it is very useful. Ignored, however, are the additional HVAC system savings realized when lighting systems are controlled. Neither user acceptance nor aesthetic qualities of lighting control schemes are part of the analysis. A designer's balanced analysis will include other criteria in the lighting system design.

Each of the programs mentioned deserves a niche on the lighting designer's software shelf. All three are useful in projects where daylighting and sunlighting are of concern.

Programs received by The Computer Department for review include CALA from Manville Sales Corporation, Point and Isopoint from Lighting Analysts, Inc. of Littleton, Colorado, and Candle, Influx, and Autolux from ITL/Computer Services in Boulder, Colorado. Argosy Services in Sedona, Arizona, has sent an energy analysis program — SCM version 2.0 — for the Macintosh. We hope it signals that more programs will become available for the Mac. ■

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

Lighting Graphics

Sam Mills, AIA, IES

Sam Mills is an architect and lighting consultant with his own firm in Oklahoma City. In this new column, he draws on 25 years of experience in lighting and architecture to offer useful design ideas, technical data, and graphic details for coordinated lighting and architecture.

Many of today's buildings have an open style of interior space planning that uses a variety of circulation elements, such as bridges, walkways, atria, and balconies. Lighting for these circulation areas is typically located in the ceilings and walls, but it doesn't always need to be.

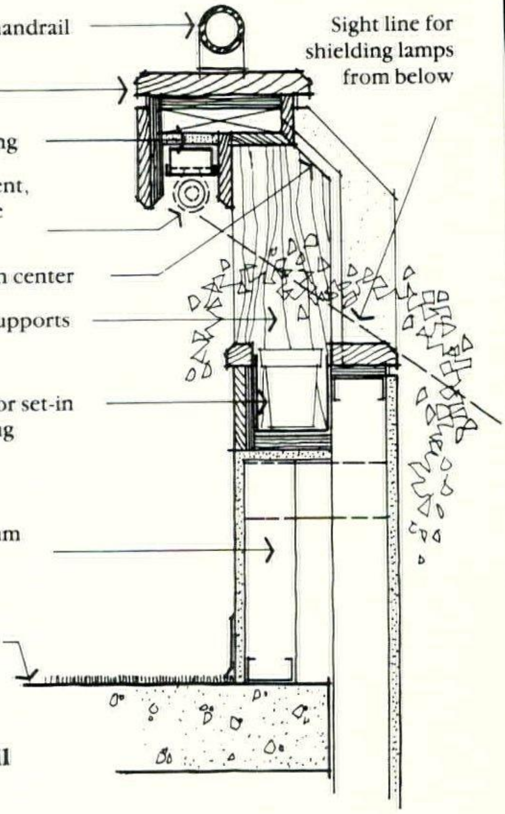
In some instances, lighting in the ceilings or walls produces visually dominant light patterns that can be distracting to the general view of the space. This may be true, for example, from the lower levels of an open atrium with circulation areas at the perimeter of the upper levels.

Lighting built into low partitions and guardrails at the edge of these open areas can efficiently light the circulation area and eliminate the problem. They can also create a more pleasant luminous environment in the atrium as well as in the circulation areas. This is particularly useful with walkways and bridges without a ceiling directly above.

Lighted railings efficiently light circulation areas and create a pleasant luminous environment.

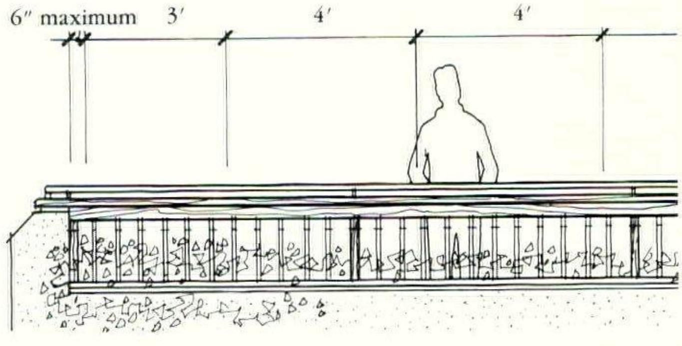
Care must also be used in locating light sources used in lighting railings and guardrails so that they are not seen from below. An exception may be the use of low-wattage incandescent lamps exposed in a theatrical way. Cold cathode sources (neon) can be used in a similar manner.

Handrails are generally located next to stairways and ramps and function both as safety barriers and handholds. Their height above the stair nosing can range from 30 to 34 inches. Guardrails, on the other hand, are usually used as safety barriers at edges of horizontal walkways, bridges, and balconies. They usually are 36 to 42 inches above the floor and normally require no separate railing or handhold.



Lighted guardrail planter section

Open circulation areas can be illuminated with lighted railings, as shown in this section of a lighted guardrail planter.



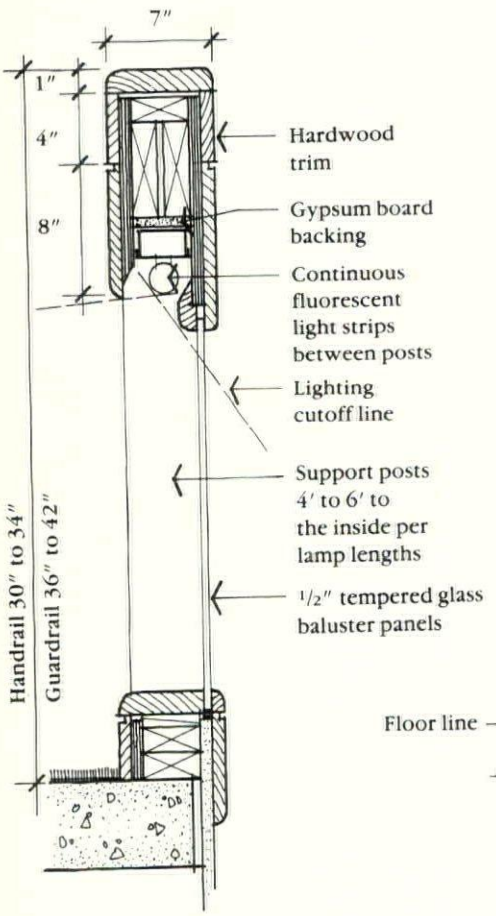
Elevation of lighted guardrail planter demonstrates the use of combined 3-foot and 4-foot fluorescent light strips to achieve overall lengths in 1-foot multiples. To minimize dark areas between lamps, use strips without end caps and install lamps back to back.

Light Source Selection

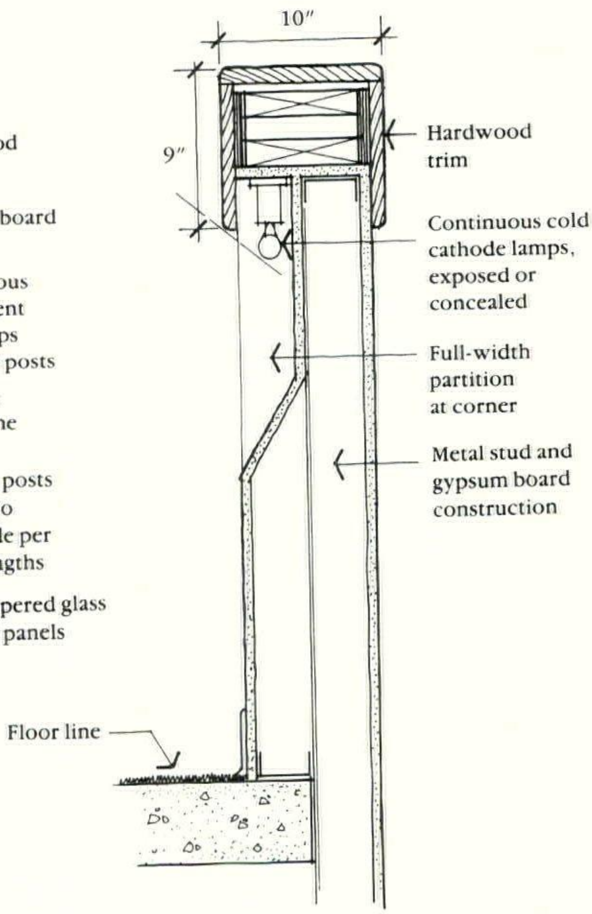
Proper lamp selection is important to the successful performance and appearance of a lighted railing. Four-foot and 3-foot rapid start fluorescent lamps are one of the best choices because their lengths can be combined to furnish any total length except 5 feet in multiples of one foot, leaving a maximum unlighted area of 6 inches at either end. Light output per foot of length of the two lamp sizes is also closely matched.

Typical rapid start lamps are 1 1/2 inches in diameter; new high-efficiency lamps are available in a 1-inch diameter. Either lamp with its corresponding ballast can be mounted in a relatively small area. A wireway of only 2 inches by 3 inches allows for easy concealment within the railing; the overall space requirement is approximately 3 inches wide by 4 inches high.

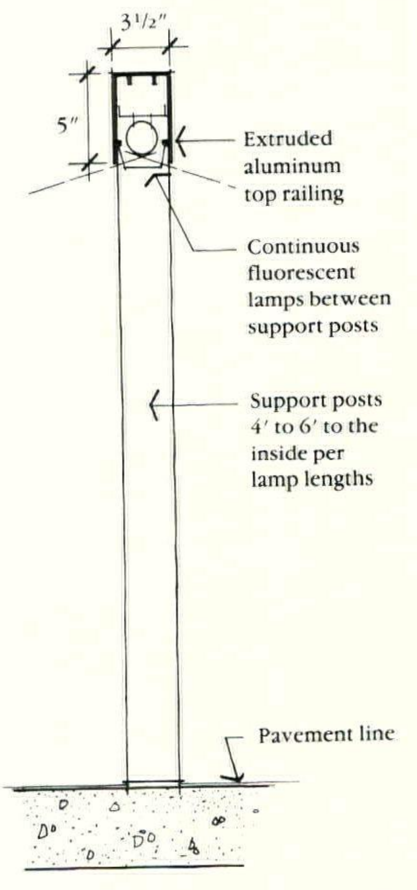
The color rendering index (CRI) of the lamps is also important when proper representation of interior finishes, materials, and colors is an issue. Newer lamps with a CRI of 80



Lighted wood and glass guardrail



Lighted low-partition guardrail



Extruded aluminum light rail

(80/100) are recommended. These lamps come in three color temperatures, ranging from warm to cool — 3000K (warm), 3500K, and 4100K (cool). The excellent color rendering capabilities of these lamps result from the wide spectrum phosphors used. In the example of the guardrail planter, the wide spectrum light is also essential for good plant growth.

Proper lamp selection is important to the successful performance of lighted railings.

Cold cathode lamps offer another lamp choice with the advantage of dimensional flexibility — the lamps are made to fit the architectural space. They are available in many of the same colors as fluorescent sources and in a wide variety of other colors.

Space requirements are about the same for both sources, with the exception of cold cathode's requirement for remotely located transformers — one is required for every 50 to 100 feet of lamp length. Transformers vary in size, but are typically 8 inches by 10 inches by 12 inches.

Illumination Levels

The lighting intensity furnished by this type of installation, whether fluorescent or cold cathode, should be more than adequate within a horizontal distance of 8 to 10 feet from the railing — based on current illumination recommendations for circulation areas. The light output of cold cathode lamps is a little less than half that of fluorescent lamps. Lighting distribution is a function of the exact lamp placement within the architecture of the railing and should be carefully worked out as design requirements dictate.

Light distribution is a function of lamp placement within a railing.

The use of glass baluster panels allows light to be transmitted through the railing while maintaining its performance as a safety barrier. When specifying glass panels, check the appropriate building codes for thickness and type requirements. Generally 1/2-inch tempered glass or 5/8-inch laminated tempered glass is required. Other glass types and horizontal loading requirements are called for under special conditions. ■

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It is officially called the Specular Silver Optical Reflector (SSOR). By installing the high performance retrofit reflectors in your buildings fluorescent light fixtures, the fixtures can be de-lamped by 50% without significant reduction in light levels. As a result, **The Bright Idea** *provides important* **benefits** *for your buildings needs.*

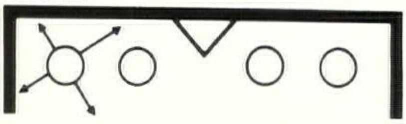
- *40 to 50 percent reduction in lighting energy bills*
- *Lighting maintenance cost reduction (50 percent fewer lamps and ballast to replace)*
- *No significant reduction of light levels*
- *Fixture illumination uniformity*
- *Glare control and reduction*
- *Improve color rendition*
- *Building cooling system load reduction*
- *Longer light fixture component life (lower fixture operating temperatures)*
- *Assured reflector reliability and longevity*

THE BRIGHT IDEA IS SIMPLE

Maximum Technology has engineered the highest performance reflector. The specular silver optical reflector consists of a space age silver film that is bonded to .025" aluminum material creating a highly reflective mirror. Unlike polished metals; the silver film demonstrates superiority in reflectivity because it reflects 96% of incident light.

When The Bright Idea is installed in a fluorescent light fixture, the light is precisely reflected back into the work area rather than being scattered by the aluminum or white metal surfaces found inside most fixtures.

BEFORE



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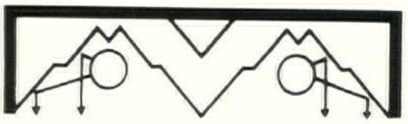


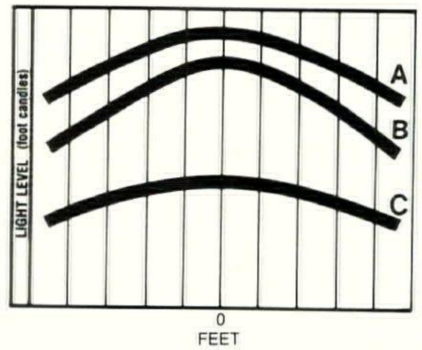
THE BRIGHT IDEA IMPROVES LIGHTING EFFICIENCY

Maximum Technology manufactures **The Bright Idea** *for almost all types of fluorescent luminaires, new fixtures as well as existing fixtures. Over 3,000 custom designs have been produced for a wide range of customer applications. However, the most common fixture is the standard 2×4 foot luminaire. Let's examine how* **The Bright Idea** *improves efficiency, through wattage reduction.*

2×4 Fixture Components	Before Retrofit	After Retrofit
#lamps/watts	(4) F40W/160W	(2) F40W/80W
#ballast/watts	(2) Ballast/30W	(1) Ballast/15W
Total watts	190W	95W
Total watts saved	95W	

By installing **The Bright Idea** *50% of the lamps and ballasts are removed from the 2×4 luminaire, thus improving efficiency of the fixture. Available photometric testing demonstrates the improved efficiency as well as the impressive light level performance.*

FIXTURE



A *Standard 2×4 foot fixture with 4 lamps*

B *Standard 2×4 foot fixture with 2 lamps removed and* **The Bright Idea**

C *Standard 2×4 foot fixture with 2 lamps removed*

THE DESIGN IDEA IS A QUALITY DESIGN

Maximum Technology utilizes computer aided design (CAD) techniques to engineer the highest performance reflective design for your fixtures. Once the design is determined, the reflectors are manufactured in Maximum Technology's 25,000 square foot modern production facility.

Sophisticated computer controlled fabrication equipment insures the accuracy and quality of the reflectors. The quality control department demands ±½° angular accuracy and ±.005" dimensional accuracy, because the slightest variations in angle or dimensions can change reflector performance.

Maximum Technology maintains a large inventory of raw materials as well as 15 computer controlled machines to produce up to 100,000 reflectors a week.

THE BRIGHT IDEA IS GUARANTEED

Your building, like your business, is different from any other. To accommodate these differences, a comprehensive **Lighting Application Analysis** *is recommended to determine the value you will receive from installing* **The Bright Idea.**

A no-charge walk-through evaluation of your facility is the first step. You will receive a written quotation, financial proposal and energy audit. Upon your acceptance, an evaluation test area within your building is designated. This will allow your personnel to experience the benefits of the system to be expected throughout your facility.

A design team determines the exact specifications required for each fixture to produce the best results. Once installed, either by Maximum Technology or by your crew, the system requires no special maintenance or cleaning. Maximum Technology **unconditionally guarantees** *the product and installation* **in writing.**

Most installations are completed during off-hours, so there is no intrusion during normal business hours.

THE BRIGHT IDEA PAYS FOR ITSELF

The installation of **The Bright Idea** *provides dramatic energy savings such that the investment ususally pays for itself in less than 2 years. In addition, energy credits, tax incentives, local utility rebate programs and other incentives may provide additional savings.*

Maximum Technology offers an exciting financing program. Based on documented energy savings, **The Bright Idea** *can be installed in your building* **without a down payment or cash outlay.** *The fixed monthly payments can be funded comfortably from energy savings.*

THE BRIGHT IDEA HAS BEEN APPROVED

This is a patented system that is **U.L. Listed** *(for safety).*

Over 100 major facilities have been successfully retrofitted with **The Bright Idea.** *Customers include: manufacturing facilities, offices, banks, institutions, stores, assembly plants—in large, medium and small buildings. Complete case histories and documented test results are available for your review. Call today and get* **The Bright Idea!**

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(415) 468-2560

U.S. Patent 4562517 Other patent pending products.

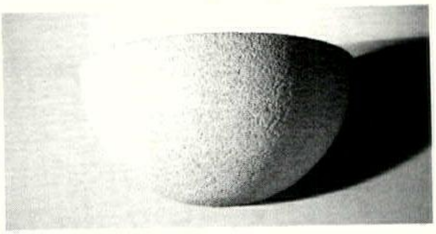
Product Showcase

High mast luminaire

The HMST high mast luminaire from Holophane features a prismatic glass reflector-refractor optical system designed to raise the angle of light distribution for better vertical lighting and high surface illumination. Available in symmetrical, asymmetrical, and long-narrow distribution patterns, the reflector-refractor spreads the lamp image to reduce glare.

The reflector-refractor's open-bottom, open-top chimney design requires minimal maintenance. Its smooth, electrostatically stable borosilicate glass surface attracts neither dust nor dirt, so particles fall through the luminaire. Mounting heights range from 50 to 150 feet. The fixtures accommodate 400-watt or 1000-watt high pressure sodium or 1000-watt metal halide lamps. Holophane, Newark, OH.

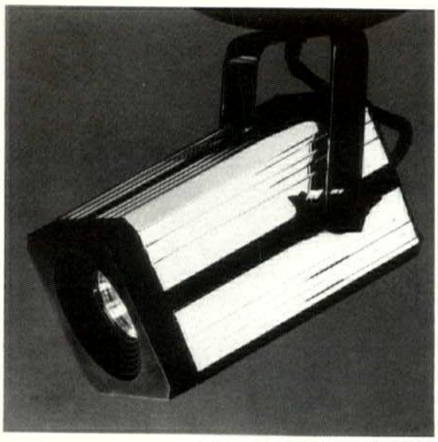
Circle 60



Wall sconce

Made of concrete in a quarter-sphere shape, the model 331-1 wall sconce is part of the D'Lights collection of wall sconces. Available in light rose, soft green, gray, and ivory, the sconce is also available in custom tints when 25 or more are ordered. The sconce accommodates a variety of lamps: 60-watt incandescent, 7- or 13-watt compact twin-tube fluorescent, and 300- or 500-watt quartz halogen for high intensity indirect lighting. D'Lights, Glendale, CA.

Circle 61



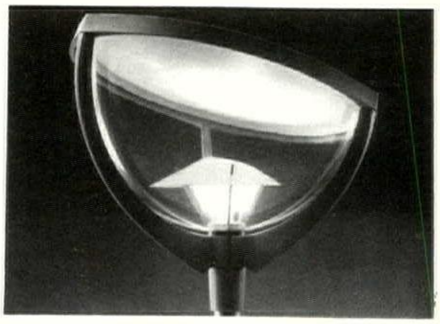
■ **MR16 fixtures**

The Soft Square, part of the Msetalight system from MSETA-USA, features specially designed fixtures for both low- and line-voltage MR16 lamps. The UL-listed fixtures combine optical performance and heat dissipation in a cool housing with an adjustable sliding yoke.

Low-voltage models have a built-in transformer and accommodate MR16 tungsten halogen lamps in 25-, 50-, and 75-watt sizes. The line voltage models accommodate 75- and 100-watt dichroic MR16 halogen lamps with intermediate bases. All models are available in canopy, track, base, and C-clamp mountings. Buyers can select from five finishes — white, black, polished chrome, polished brass, and polished copper.

The fixtures adjust easily to any angle including a downlight position. The manufacturer recommends them for residential and commercial applications such as museums, hotels, restaurants, jewelry stores, offices, theaters, stages, and medical examination rooms. MSETA-USA, Hollywood, CA.

Circle 62

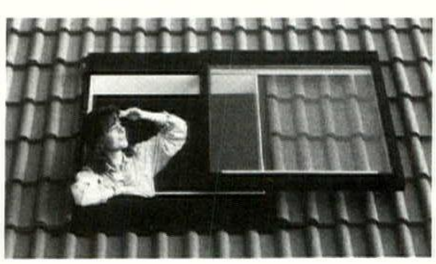


■ **Outdoor luminaire**

Poulsen's MH Wegner outdoor pole-top luminaire directs light up to the surface of its primary reflector and outward in a broad symmetrical pattern. The primary reflector is cast of aluminum and sand-blasted for a smooth finish. A vandal-resistant enclosure of clear polycarbonate surrounds a second, smaller luminaire that conceals the lamp. The luminaire's outer finish is sandblasted natural aluminum; all reflecting surfaces have a baked white enamel matte finish.

The luminaire accommodates 50- and 100-watt mercury, 100-watt metal halide, 35- to 100-watt high pressure sodium, and 200-watt incandescent lamps. A field-adjustable lampholder assembly allows proper positioning for all lamps. Accessories include ballasts for all HID models and components for mounting one to four luminaires on a single pole. Poulsen Lighting Inc., Miami, FL.

Circle 63

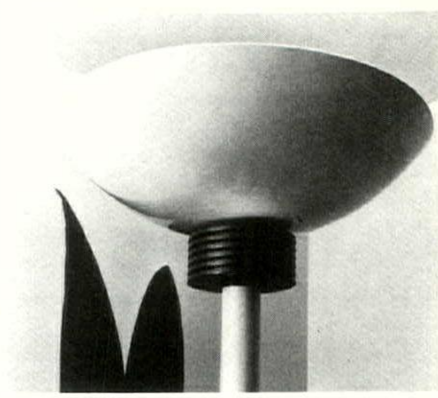


■ Sliding roof window

Barra Corporation's Studio Collection double-glazed lift-and-slide roof windows open 90 degrees vertically and slide left and right. The roof window's frame is made of double-walled white polyvinyl chloride, reinforced with aluminized steel to prevent expansion and contraction. Brown exterior surfaces are coextruded with an acrylic coating. A flashing of 6-inch-wide CPE membrane is solvent-welded to the frame to prevent water leakage and allow contractors to install the window and flashing as a single unit.

A three-position locking device lets users lock windows slightly open for ventilation or seal them tight. The windows also have a built-in safety lock that prevents children from operating them. The roof windows are available in five standard sizes and are suitable for both new and retrofit applications. Options include flashing for concrete roof tiles, miniblinds, sun shades, outside awnings, and roller screens. Barra Corporation of America, West Caldwell, NJ.

Circle 64



■ Metal halide uplight

The UST 200 stand-mounted uplight from Amerlux uses a specially designed reflector system to produce a controlled wide beam. The lamp housing and matching base come in round and square styles with a black or white finish. The trim castings for the 73-inch-tall uplight come in standard finishes.

Suitable for offices, corridors, lobbies, and other large areas, the uplight eliminates the problem of glare in areas with computer terminals. It accommodates a 70- or 150-watt double-ended metal halide lamp. An asymmetrical wall-mounted version is also available. Amerlux, Inc., Fairfield, NJ.

Circle 65

■ Cast aluminum exit signs

Dual-Lite's Excalibur specification-grade emergency exit signs feature precision die-cast aluminum housing, frame, and canopy. They also have maintenance-free, pure lead batteries with a 15-year life expectancy. All models feature integrated circuitry that provides continuous self-diagnostic monitoring of emergency operation.

The UL-listed exit signs come with standard extended-life incandescent AC lamps or optional fluorescent AC lamps. The signs are available in black, brushed aluminum, white, putty, and bronze finishes. They are suitable for surface, end, or ceiling mounts. Dual-Lite, Inc., Newtown, CT.

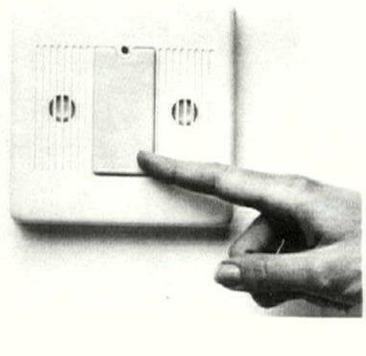
Circle 66

Circle 23

■ Extended-life lamps

Marvel Lighting offers a complete line of long life lamps, including incandescent, fluorescent, and high intensity discharge lamps. Because of their rare gas mixture, filament supports, and stronger filaments, long life A19 lamps last 2000 hours, more than twice as long as the 750-hour life of standard A19 lamps, according to the manufacturer. Marvel Lighting Corporation, Fort Lee, NJ.

Circle 67



■ Light control switch

The Light-O-Matic wall switch from Novitas replaces ordinary wall switches and controls lights automatically. Developed for one-person offices of up to 250 square feet, this switch turns lights on when someone enters a room and turns them off at a preset interval after it senses the last person has left. Available for 120- or 277-volt circuits, the switch works with either incandescent or fluorescent lamps. It carries a three-year warranty. Novitas, Inc., Santa Monica, CA.

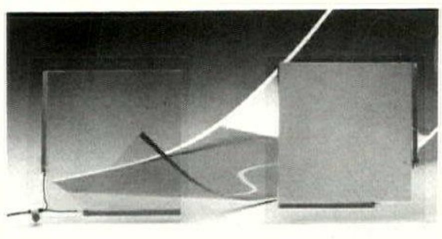
Circle 68

Indoor, outdoor luminaire

The waterproof Luna 2 from McPhilben can be mounted on walls, ceilings, or poles to provide indirect or direct light. The luminaire's fully enclosed and gasketed one-piece housing of precision die-cast aluminum supports a prismatic diffuser of impact-resistant polycarbonate. Reflectors for HID lamps are of semispecular aluminum; those for fluorescent lamps have a white enamel finish.

The luminaire is available in a white or black polyurethane finish. It accommodates a 50-watt mercury lamp; a 35-, 50-, or 75-watt high pressure sodium lamp; or two 13-watt compact twin-tube fluorescent lamps. Accessories include adapters for wall and ceiling installations and pole-mounting adapters for single or double fixtures. McPhilben Lighting Division, Emerson Electric Co., Melville, NY.

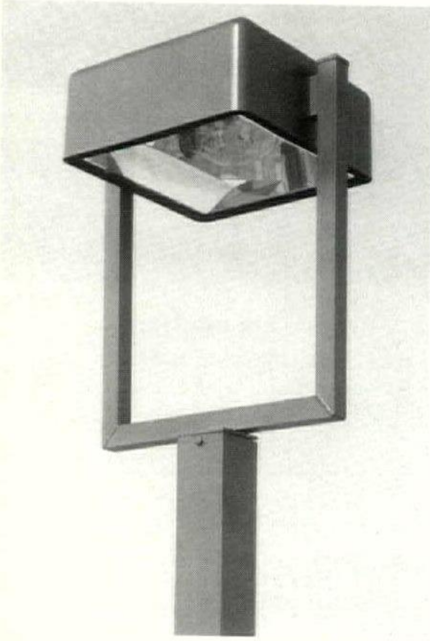
Circle 69



Liquid crystal film

The N-Cap diffuser from Artifex is a liquid crystal that can fade from transparent to translucent or pulse at frame rates of less than 30 milliseconds with an electronic interface. Part of a line of electronic variable diffusion accessories for architectural and theatrical lighting fixtures, the N-Cap diffuser comes in a variety of sizes. It can be ordered in flexible film sheets or laminated to specific materials. Custom applications are also available. Artifex Corporation, Newport Beach, CA.

Circle 70

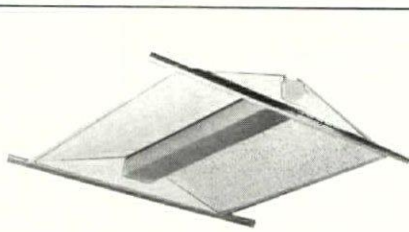


■ Post-top floodlight

Ruud Lighting's PR series outdoor post-top yoke-mounted floodlight provides symmetrical quadratic light distribution. Its die-cast aluminum housing supports a flat tempered glass lens and has a seamless, leak-resistant design. Gaskets and internal hinges improve sealing and vandal resistance. The housing's 30-inch yoke and mounting base is available to fit inside a 4-inch square pole or over a tenon or pole with a 2³/₈-inch outside diameter. A bronze powder paint finish provides maximum heat dissipation and reduces fading and corrosion.

The luminaire comes with preinstalled ballast components. A multitap high power factor ballast is standard; a 480-volt ballast is also available. The luminaire accommodates a variety of HID lamps: 100- or 400-watt metal halide or high pressure sodium and 175- to 400-watt mercury vapor. UL-listed for wet locations, the post-top luminaire is suitable for roadway or parking lot applications. Ruud Lighting, Racine, WI.

Circle 71



■ Coffer ceiling fixture

Metalux Lighting's Atrilite fluorescent fixture for coffered ceiling systems interfaces with standard 4-foot-square inverted T grid ceilings. The fixture's diffuser features a microprism bottom to hide the lamp and control brightness and optical side prisms to conceal fasteners and provide greater surface area for lower brightness.

The unit's fixture channel, channel cover, and fixture supports are made of die-formed cold-rolled steel with a baked white enamel finish. The fixture is available in a 4-foot model for one or two 40-watt lamps and an 8-foot model for two single 40-watt lamps or two pairs of 40-watt lamps mounted end-to-end. An injection-molded lens is also available. Metalux Lighting, division of Cooper Industries, Elk Grove Village, IL.

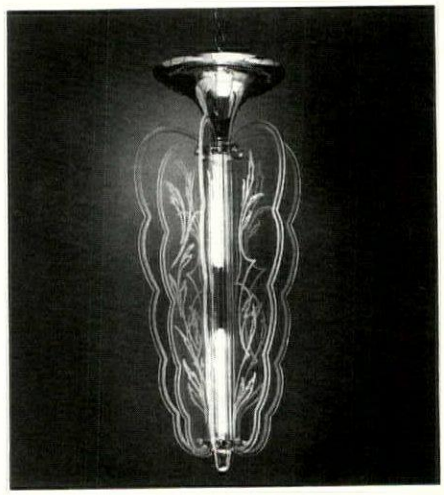
Circle 72

Bent laminated glass

Bentlite from Laminated Glass Corporation can be used for skylights, atria, glass canopies, and sunspaces. The bent laminated glass meets most building code requirements for overhead glazing and needs no protective screens, according to the manufacturer. It also resists scratching, reduces glare and fading, and controls ultraviolet light.

This glazing material is available in single-layer and insulated, double-glazed units with clear, bronze, or gray interlayers. Available in units up to 178 inches high, the glass comes in thicknesses from 1/4 inch to 1 inch. Laminated Glass Corporation, Telford, PA.

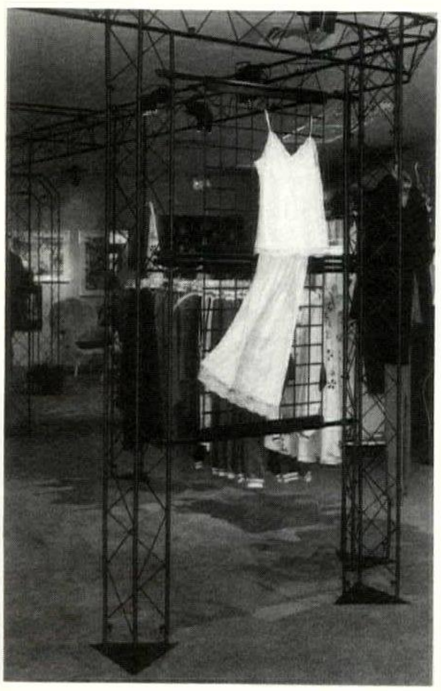
Circle 73



Art deco chandelier

Boyd Lighting has reintroduced the Chrysa Deco chandelier, a model first manufactured in the 1930s. The chandelier features six panels of $\frac{3}{16}$-inch clear glass with a sand-etched design. Available with a finish of polished brass or polished chrome, the chandelier accommodates two 75-watt incandescent lamps. Boyd Lighting Company, San Francisco, CA.

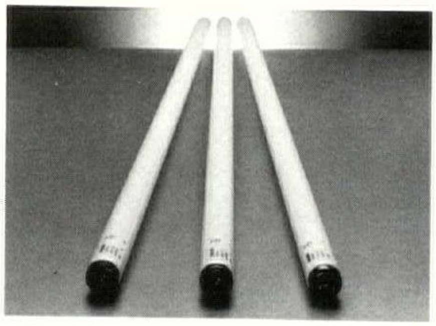
Circle 74



■ Truss support system

Components of the 10-inch Simplex truss system allow it to serve as a lighting display or support system for a variety of applications: retail merchandising, dormitory bunk beds with desks and lighting, or open offices with horizontal task surfaces or support shelves and drafting tables. The cold-rolled steel tubes and cold-drawn solid steel rods of the truss system are welded at all intersections for maximum strength and minimum weight. All components have a powder-coated, baked-on finish. The truss system is available in four standard colors — black, red, white, and yellow. Simplex Systems, a division of Rogers-Mistic P.A., Little Rock, AR.

Circle 75



■ Fluorescent lamps

The Advantage X from North American Philips is a new line of 40-watt, 48-inch fluorescent lamps. A blend of rare earth activated phosphors gives the new fluorescent lamps a color rendering index (CRI) of 80; standard cool white lamps have a CRI of 67. The new fluorescent lamps produce 3700 initial lumens and have a lamp life of 24,000 hours at 3 hours per start. Compared to a standard F40 cool white fluorescent lamp, the Advantage X produces 17 percent more light and lasts 20 percent longer, according to the manufacturer.

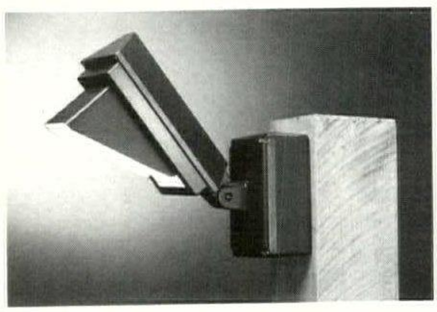
The Advantage X line is available in three color temperatures — 3000K (comparable to a warm white fluorescent), 3500K (comparable to a standard white lamp), and 4100K (comparable to a cool white fluorescent). North American Philips Lighting Corporation, Somerset, NJ.

Circle 76

■ HPS starting aid

The U.S. series high pressure sodium starting aid from Area Lighting Research can operate ballasts from 35 to 400 watts and arc tube lamps of 55 or 100 volts. Suitable for new and retrofit applications, the compact starting aid installs easily because its 9-inch wire leads are stripped and ready to connect. Wiring instructions for ballasts from most manufacturers are included with every unit. Area Lighting Research, Hackettstown, NJ.

Circle 77

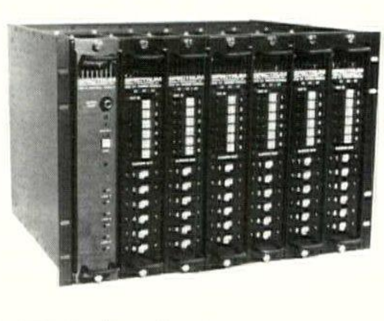


Post or wall light

Available from Gim Metal Products, the model 3515 post/wall light is suitable for mounting on walls, posts, ceilings, or the ground. It has separate die-cast housings for the lamp and ballast, connected by a swivel arm that rotates 360 degrees with positive lock stops. The lamp housing can be adjusted vertically 110 degrees. The fixture has a 6 by 6 NEMA distribution pattern and provides optical performance of up to 72.8 percent beam efficiency.

Available with a powder finish or unfinished, the post/wall light comes with all the necessary hardware, a tempered glass lens, a reflector, and gaskets. It accommodates a variety of high intensity discharge lamps: 35- to 150-watt high pressure sodium, 50- to 100-watt mercury, and 70- and 150-watt double-ended metal halide. Gim Metal Products Inc., Carle Place, NY.

Circle 78



High-density dimmer

The new HD Series high-density dimmer system from Spectrum Design & Development is designed to adapt to the power and size requirements of varied applications. The basic 36-channel dimming package includes six dimmer modules, each with six 2.4-kilowatt dimmers, and one control module that carries all its power supply and timing signal components.

The dimming package's heavy-duty card cage design permits easy access for maintenance of the dimmers, power supply, and timing components. All power and control connections are at the rear of each card; connections to the card cage housing are made automatically when a card is locked in place.

Users can specify a variety of options, including all inputs and outputs, input breakers, and a power patch. Spectrum Design & Development, Inc., Allentown, PA.

Circle 79

Electronic fluorescent ballast

The E-tronic ballast from Innovative Industries dims fluorescent lamps to 30 percent of their output, according to the manufacturer. The UL-listed, FCC-certified electronic ballast measures 2 1/2 inches long, 1 3/8 inches high, and 2 inches wide and weighs 5 ounces. The ballast uses a four-output-wire design to provide constant voltage to the lamp cathodes during dimming, which the manufacturer says increases lamp life.

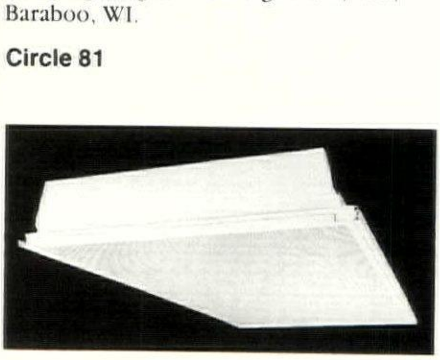
The ballast is in a weather-resistant industrial-grade package and is available with cold starting circuitry for use to 0 degrees Farenheit. The ballast is now available for Osram's 10- to 26-watt Dulux D/E lamps, and it will soon be available for lamps from other manufacturers. Innovative Industries, Inc., Tampa, FL.

Circle 80

■ Fluorescent reflector

The Megalux silver light reflector from Badger USA helps save energy and increase the lumen output per watt when installed inside a fluorescent luminaire. Made of a highly reflective foil laminate on an aluminum substrate, the reflector is custom cut and bent for retrofitting existing installations. The manufacturer says that after installing the reflector users can remove half the lamps in a fixture without reducing lighting levels. Light meter readings are taken before and after installation to verify lighting levels. Badger USA, Inc., Baraboo, WI.

Circle 81



■ Fluorescent troffer

Columbia Lighting offers the 4000 plus family of nonair lensed troffers for fluorescent lamps. The above-ceiling housing is made of die-formed, embossed steel with a hinge-and-latch door frame. The troffer is designed to be compatible with inverted T, overlap flange, and fit-in flange ceiling types. Its doors are available in three styles: flush steel, flush aluminum, and recessed aluminum.

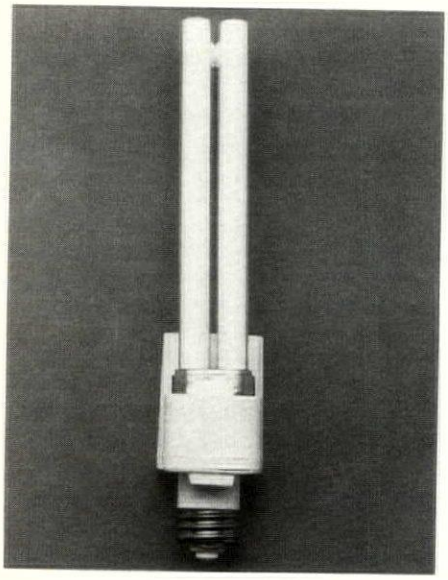
A lens of pattern 12 prismatic acrylic is standard; optional lenses and parabolic louvers can be special ordered. The troffers are available in three sizes: 2 by 4 feet, 1 by 4 feet, and 2 by 2 feet. The 2-foot-square size accommodates two U-shaped fluorescent lamps; the other two models take from one to four tubular fluorescent lamps. All three models are completely wired with 120-volt class P ballasts as standard. Options include 277-volt ballasts, dimming ballasts, and emergency lighting packs. Columbia Lighting, Inc., Spokane, WA.

Circle 82

■ Outdoor luminaire

The Todd/Magnum series is part of a new line of outdoor luminaires from Dinico Products. Made of clear or white polycarbonate, the globes have 3-inch collars and come in two sizes and two styles. Shown is the model TM-24, for which a finial and a reflector are also available. The globes mount on matching standards or wall brackets, each available in two different styles and 12 colors. The luminaires accommodate a 1000-watt (maximum) incandescent lamp, a 250-watt mercury lamp, or a 150-watt high pressure sodium lamp. Dinico Products, Inc., Hackensack, NJ.

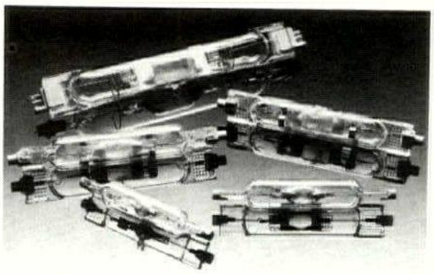
Circle 83



■ Fluorescent retrofit

Electro Elf offers a twin-tube fluorescent retrofit unit that directly replaces incandescent lamps. Available in sizes for lamps of 5, 7, 9, and 13 watts, the unit has a built-in ballast and screw-in adapter. It comes with or without the compact fluorescent lamps. Electro Elf, Temple City, CA.

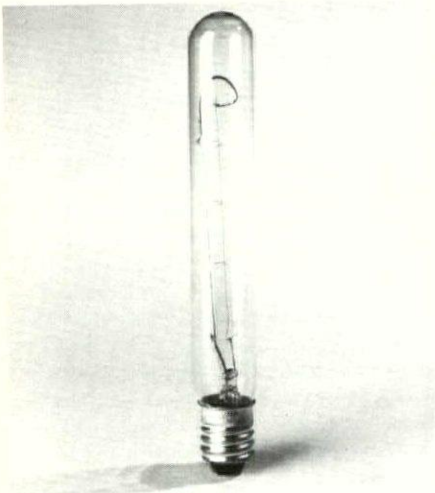
Circle 84



■ Double-ended metal halides

Venture Lighting International's Pro-Arc double-ended metal halide lamps have the same color and color rendition as regular single-ended lamps, according to the manufacturer. This color compatibility allows both double- and single-ended lamps to be used in the same installation with no appreciable difference between lamps of the same wattage. The compact size of the double-ended lamps expands the color and performance of metal halides to applications with small fixtures. The lamps are available in wattages from 70 to 1500. Also available are 70- and 150-watt lamps with high color rendering (a CRI of 82). Venture Lighting International, Cleveland, OH.

Circle 85



■ Exit sign lamp

DioLight Technology offers an exit sign lamp that has an average life of 80,000 hours, according to the manufacturer. The lamp has a built-in diode that changes alternating current to direct current, thereby reducing the amount of heat and energy channeled to the filament. Special gasses inside the lamp increase lumen output. The company backs the product with a four-year replacement warranty. DioLight Technology Inc., Pontiac, MI.

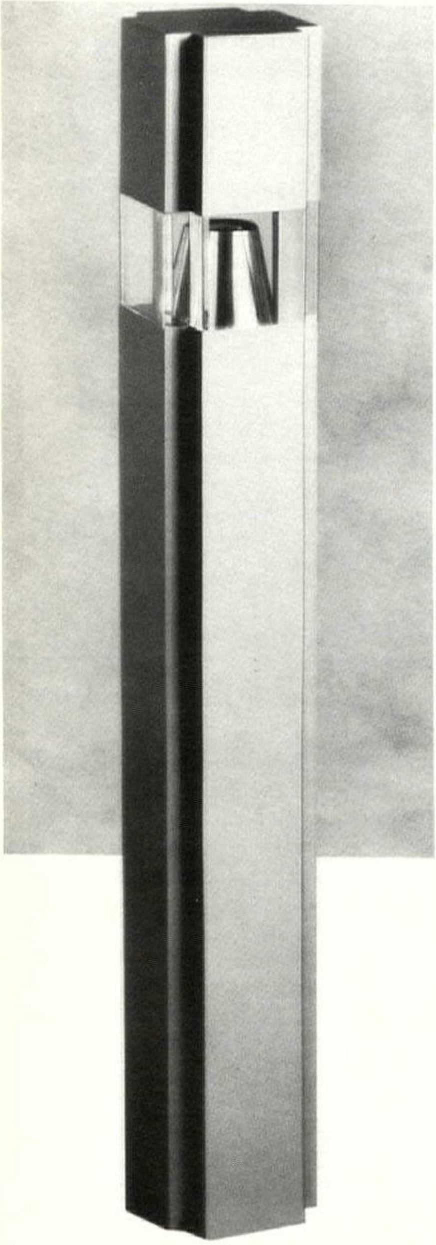
Circle 86

■ Lighting design software

The Isopoint program from Lighting Analysts is designed to operate with IES format photometric reports. The program produces scaled lighting distribution templates for most luminaire and pole configurations, including multiple luminaires or different types of luminaires on a single pole. Not only can the program generate simple point-by-point calculations, it also can produce an entire catalog of templates unattended overnight with its built-in batch-processing capabilities. Isopoint is available for IBM PC, PC/XT, and PC/AT and compatible machines with 256K RAM, a math coprocessor, and a dot-matrix graphics printer. Lighting Analysts, Inc., Littleton, CO.

Circle 87

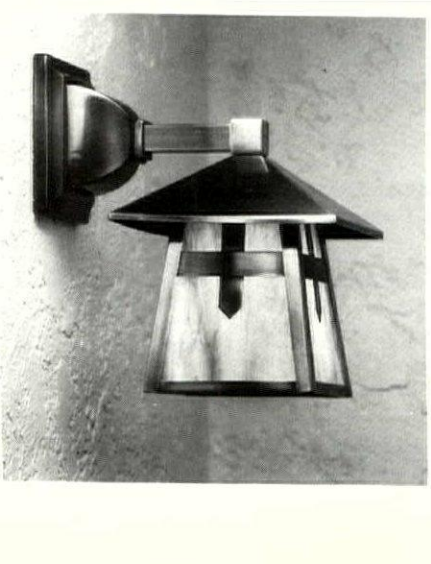
Circle 34



■ HPS bollard

TrimbleHouse offers cross-shaped bollards for high pressure sodium lamps of up to 150 watts. Available in 4-, 5-, and 6-inch-square sizes, the bollards come in heights from 12 to 60 inches. They have a unitized body that is easily removed from the lamp and ballast chamber with four stainless steel screws. The bollards have a clear heat-welded acrylic lens and are available in a variety of colors and finishes. TrimbleHouse, Norcross, GA.

Circle 88



■ Wall bracket

The Stamford wall bracket is part of the Brass Light Gallery's Goldenrod Collection of solid brass fixtures reminiscent of early 20th century American designs from the Mission, Arts and Crafts, and Prairie schools. Suitable for contemporary and period applications, the Stamford has art glass panels in a choice of four colors — clear, white opal, caramel, and green-violet. The fixture is available with a brushed antique or a verdegris copper finish and accommodates a single incandescent lamp of up to 150 watts. Brass Light Gallery, Milwaukee, WI. ■

Circle 89

Product Literature

Aluminum sheets

Alcoa's EverBrite is a chemically brightened, anodized aluminum sheet for retrofitting fluorescent fixtures. A data sheet lists specifications, characteristics, and sample retrofit test data. Alcoa Sheet & Plate Division, Davenport, IA.

Circle 120

Task lighting

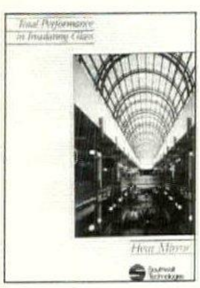
The Super Inch 105/115/215 series under-cabinet fixture from Alkco is 1 1/2 inches high and accommodates both 15- and 30-watt T8 and 13-watt twin-tube fluorescent lamps. A data sheet illustrates options and lists specifications. Alkco, Franklin Park, IL.

Circle 121

Skylighting

A color brochure illustrates Bristolite skylights for commercial, residential, and industrial applications. It includes skylight glazing options, drawings, and dimensions. Bristol Fiberlite Industries, Santa Ana, CA.

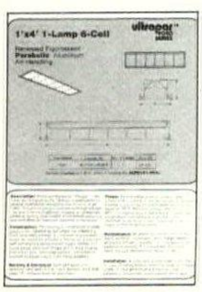
Circle 122



Heat-reflective glass

Heat Mirror, a clear low-emissivity glass from Southwall Technologies, allows light to pass through but reflects heat. A brochure outlines features and provides performance data. Southwall Technologies, Palo Alto, CA.

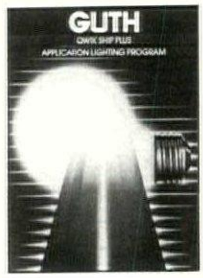
Circle 123



Fluorescent luminaire

A data sheet describes a six-cell single-lamp fluorescent luminaire included in the Ultrapar 9040 series of air-handling recessed aluminum parabolic luminaires. Globe Illumination Company, Gardena, CA.

Circle 124



Fixture collection

A brochure describes Guth Lighting's new QwikShip-Plus delivery program, which guarantees shipping of selected specification-grade lighting fixtures within 72 hours after receiving an order. Guth Lighting, St. Louis, MO.

Circle 125

Outdoor lighting

A color brochure from Hydrel illustrates architectural and landscape lighting products, including accent, border, decorative, well, and step and wall lights. Suggestions for applications are also pictured. Hydrel, Sylmar, CA.

Circle 126

Lighting controller

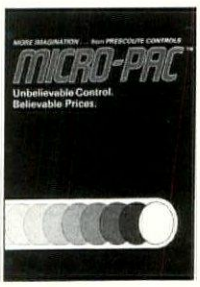
A color brochure describes Lutron's Aurora lighting scene control center for use in restaurants, hotels, houses of worship, and other applications. Schematic drawings are included. Lutron Electronics Co., Inc., Coopersburg, PA.

Circle 127

Low-voltage lighting

A brochure from Norbert Belfer Lighting offers a collection of low-voltage lights, including Hi-Beam fixtures, display lights, and other specialty lights. Norbert Belfer Lighting, Ocean, NJ.

Circle 128



Lighting controls

Micro-Pac controls and dimmer packs are designed for small to medium applications. A brochure illustrates basic components and includes specifications for manual and preset systems. Prescolite Controls, Carrollton, TX.

Circle 129

■ Illuminated bollard

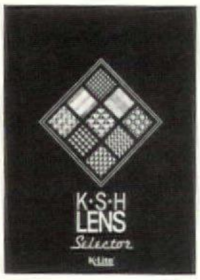
A data sheet illustrates the Lighthouse illuminated bollard from Ryther-Purdy Lumber. The sheet covers lamps, dimensions, and photometrics. Ryther-Purdy Lumber Company, Inc., Old Saybrook, CT.

Circle 130

■ Design software

The Cad-Lite program for luminaire design operates on microcomputers compatible with IBM-PC, PC/XT, and PC/AT machines. A brochure discusses the program's capabilities and hardware requirements. Lighting Sciences Inc., Scottsdale, AZ.

Circle 131



■ Acrylic panels

A K-S-H brochure illustrates 18 acrylic lens panels. It contains descriptions, cutaway profiles, and photometric data for all panels, including two designed for high intensity discharge lamps. K-S-H, Inc., St. Louis, MO.

Circle 132

■ Exit signs

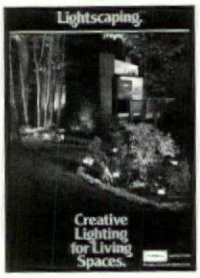
C.W. Cole offers two styles of ceiling- or wall-mounted edgelit exit signs for compact fluorescent lamps. A data sheet illustrates mounting configurations for both housing styles. C.W. Cole & Co., Inc., South El Monte, CA.

Circle 133

■ Task-ambient lighting

A brochure about the Lite-A-Part task-ambient lighting system contains photos and descriptions of three system options, including a free-standing portable system. Elliptipar Inc., West Haven, CT.

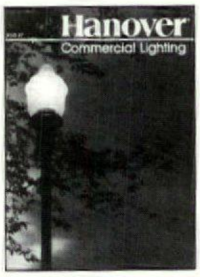
Circle 134



■ Landscape lighting

A 20-page color brochure from Hubbell explains fundamentals, techniques, and concepts for residential and commercial landscape lighting. Descriptions and illustrations of individual fixtures are included. Hubbell Incorporated, Lighting Division, Christiansburg, VA.

Circle 135



■ Outdoor HID fixtures

A 68-page color catalog illustrates Hanover Lantern's wall- and post-mounted outdoor HID lighting fixtures, wall brackets, and poles. Cut-away drawings of each fixture and sketches of poles and brackets are included. Hanover Lantern, Hanover, PA.

Circle 136

■ Outdoor lighting

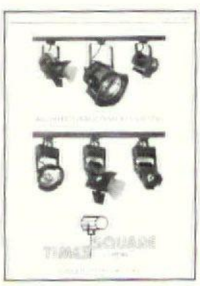
Hadco's 70-page catalog covers the company's entire line of high intensity lighting fixtures, bollards, low-level lighting, decorative posts, and accessories. The catalog includes photometric data, illustrations, and specifications. Hadco, Littlestown, PA.

Circle 137

■ Exit sign

The BetaLux-E exit sign from SRDI is illuminated by Betalight tubes coated internally with zinc sulfide phosphor and filled with tritium gas. A data sheet describes features, specifications, and options. Saunders-Roe Developments, Inc., Winston-Salem, NC.

Circle 138



■ Specialized lighting

A 20-page catalog from Times Square Lighting describes retail display and architectural lighting equipment, including dimmers, low-voltage fixtures, pin spots, PAR fixtures, tube lights, light bars, and accessories. Times Square Lighting, New York, NY.

Circle 139

■ Lamp and ballast

American Light offers a new double twin-tube compact fluorescent lamp and adapter ballast. A data sheet provides information on average cost savings, features, and available wattages. American Light, division of Edson Corporation, New Bedford, MA.

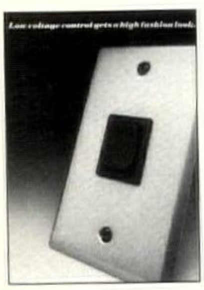
Circle 140

■ Ceiling panels

A brochure from A.L.P. illustrates a selection of decorative ceiling panels and louvers. The brochure includes pictures of available styles and finishes. A.L.P. Lighting & Ceiling Products, Inc., Chicago, IL.

Circle 141

■ Lighting control system



Enercon Data offers a remote control switch and signaling system for lighting control systems. A brochure describes components of the system and illustrates available colors for switch plates. Enercon Data Corporation, Minneapolis, MN.

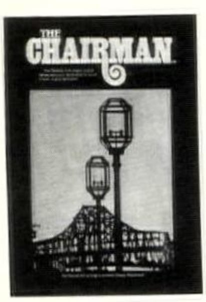
Circle 142

■ Retrofit reflectors

A brochure from R&R Plastics discusses the advantages of retrofitting fluorescent light strips or troffers with anodized aluminum R-Vue reflectors. The brochure includes specifications and ordering instructions. R&R Plastics, Inc., Clifton, NJ.

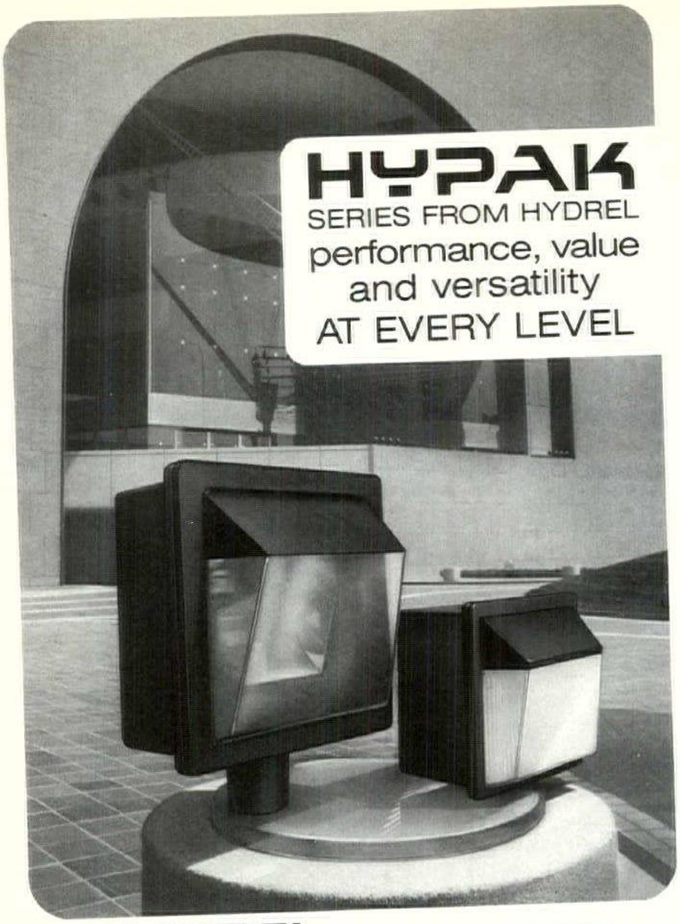
Circle 143

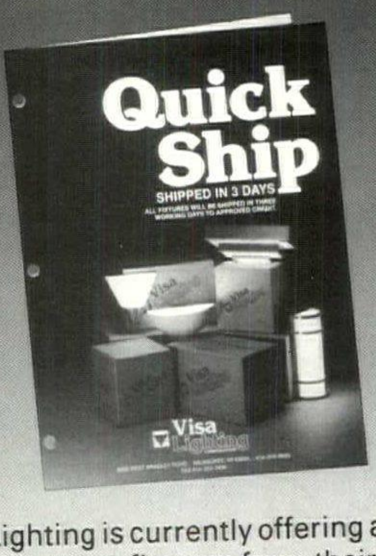
■ Outdoor luminaire

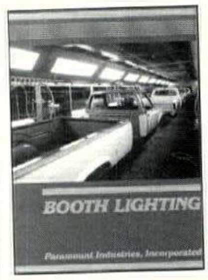


The Chairman outdoor luminaire is available in wall and post-top mounting configurations. A brochure contains sketches of available options, dimensions, and a list of features. Voight Lighting Industries, Inc., Leonia, NJ.

Circle 144







■ Industrial lighting

A brochure details Booth Lite, a heavy-duty enclosed and gasketed fluorescent fixture for Class I, Division 2 hazardous locations. Paramount Industries, Inc., Croswell, MI.

Circle 145

■ Skylight guide

Velux-America offers a 28-page guide to the selection, placement, and operation of roof windows and skylights. It includes descriptions, photometric data, and photographs of applications for four models. Velux-America Inc., Greenwood, SC.

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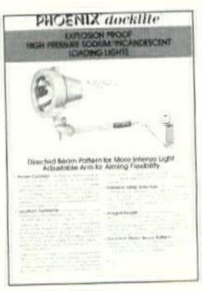

■ Explosion-proof fixtures

Docklite explosion-proof adjustable-arm loading lights are made for high pressure sodium and incandescent sources. A data sheet details features, construction, mounting, wiring, and photometrics. Phoenix Products Co., Inc., Milwaukee, WI.

Circle 147

■ Fluorescent fixtures

The Facet line of fixtures designed for the 2D fluorescent lamp manufactured by Thorn EMI is featured in a brochure that contains specifications and color photos of available finishes, louvers, and lenses. North Star Lighting Inc., Broadview, IL.

Circle 148

■ Low-voltage systems

A brochure from Decolite features low-voltage lighting products, including tube lights, rigid theatrical and display lights, architectural ceiling systems, and illuminated tube chandeliers and curtains. Decolite, Chatsworth, CA. ■

Circle 149

Calendar

September 15, 1987
Reshaping spaces with light. DLF seminar, San Francisco. Contact: Paula Goodell, Northern California Designers Lighting Forum, P.O. Box 1429, San Francisco, CA 94101-1429, (415) 550-0333.

September 20–22, 1987
Pan Pacific Lighting Exposition and Conference, The Concourse at Showplace Square, San Francisco. Contact: Robert Zinkhon, Director, Pan Pacific Lighting Exposition, 2 Henry Adams Street, San Francisco, CA 94103, (415) 621-7345.

September 30, 1987
Entry deadline for IALD's fifth annual lighting awards competition. Contact: Marion Greene, International Association of Lighting Designers, 18 East 16th Street, Suite 208, New York, NY 10003, (212) 206-1281.

October 14, 1987
Tour of the Sylvania Lighting Center, Danvers, MA, sponsored by the Boston DLF. Contact: Paul Chabot or Tracy MacEachen, Boston Designers Lighting Forum, P.O. Box 6406, Boston, MA 02102, (617) 367-0910.

October 15, 1987
Entry deadline for the NLB's eighth annual National Lighting Awards. Contact: National Lighting Awards Program, c/o National Lighting Bureau, 2101 L Street NW, Suite 300, Washington, DC 20037, (202) 457-8437.

October 29–30, 1987
Lighting for corporate and institutional facilities, seminar, New York City. Contact: Anne Ballantine, New York University, The Real Estate Institute, 11 West 42nd Street, New York, NY 10036, (212) 790-1345. ■

Manufacturer Credits

Eye-catching showroom piques customer curiosity (Southwestern Bell showroom, Innova, Houston). Surface-mounted low-voltage track fixtures, under-counter task lights, and recessed 2-foot by 2-foot fluorescent fixtures with 1 1/2-inch parabolic louvers: **Lightolier.** PAR lamps: **GTE/Sylvania.** Incandescent light strip: **Roberts Step-Lite.**

Pulleys, double lamps customize fixtures for post office (James A. Farley Building, New York City). Custom floodlights: **TrimbleHouse.** Metal halide lamps: **Osram.**

Billboard fixture lights academy halls (Houston Ballet Academy corridors). Fluorescent billboard lights: **Columbia.** Porcelain holders for clear 75-watt A19 lamps: **Keyless Porcelain.** Rocker switches: **Leviton.**

Airport lighting strategy emphasizes circulation, image, and efficiency (McCarran International Airport, Las Vegas). Incandescent and metal halide downlights: **Kurt Versen.** Fluorescent luminaires: **Columbia.** Roadway lighting: **Hadco.** Apron lighting: **Sterner.** Carpeting: **Rubenstein's.** Electronic ballasts: **Triad-Utrad.**

Lighting redesigned just in time for opening night (The Fire Bird, Orange County Performing Arts Center, Costa Mesa, California). Low-voltage recessed downlights: **Edison Price.** Low-voltage spherical uplights: **Hadco.** Medium flood and narrow spot 12-volt incandescent lamps: **General Electric.** Lighting control: **Strand.**

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