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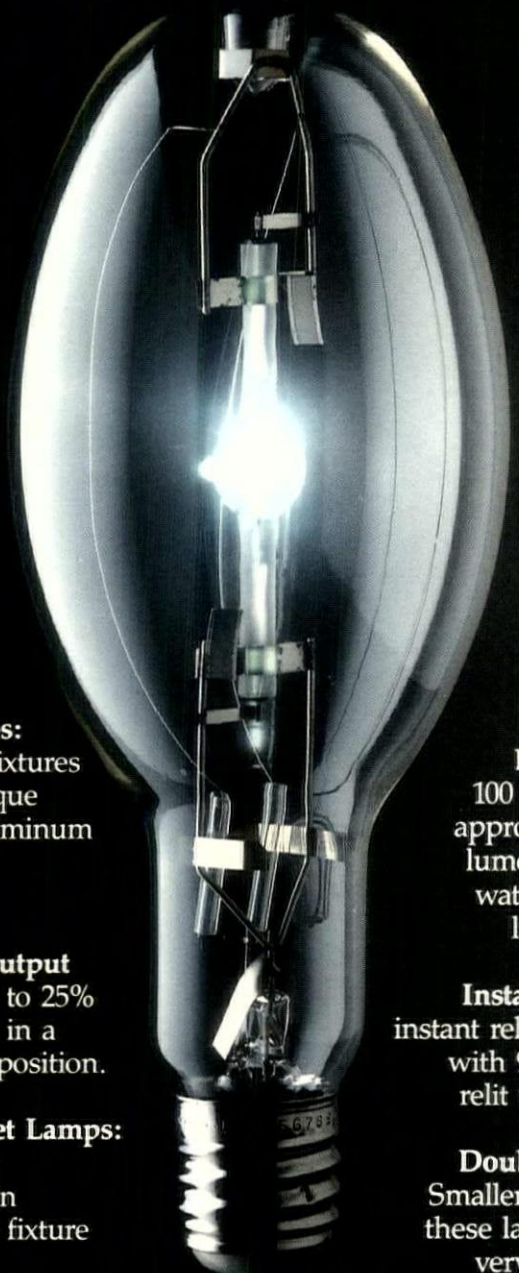

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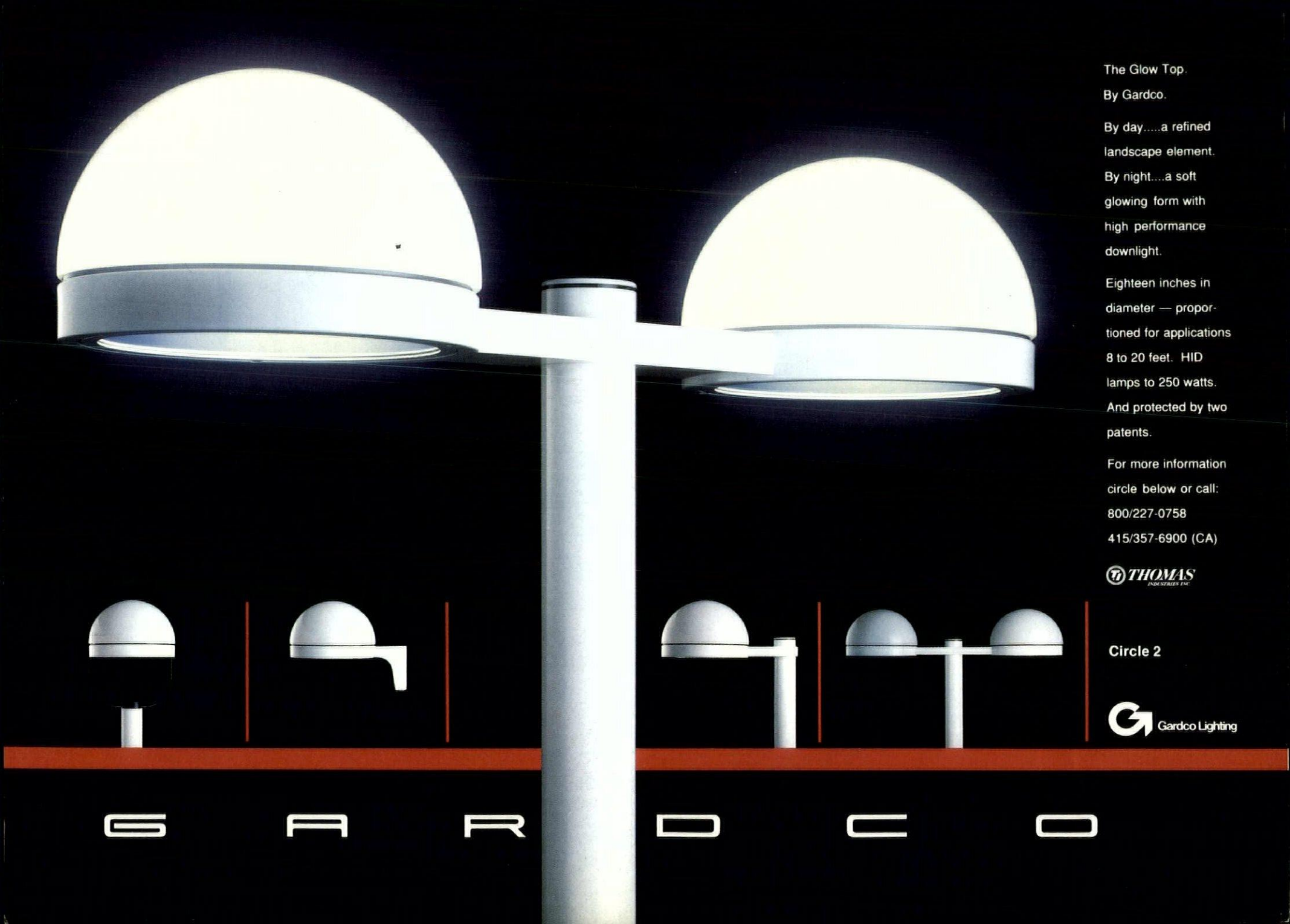
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ARCHITECTURAL LIGHTING

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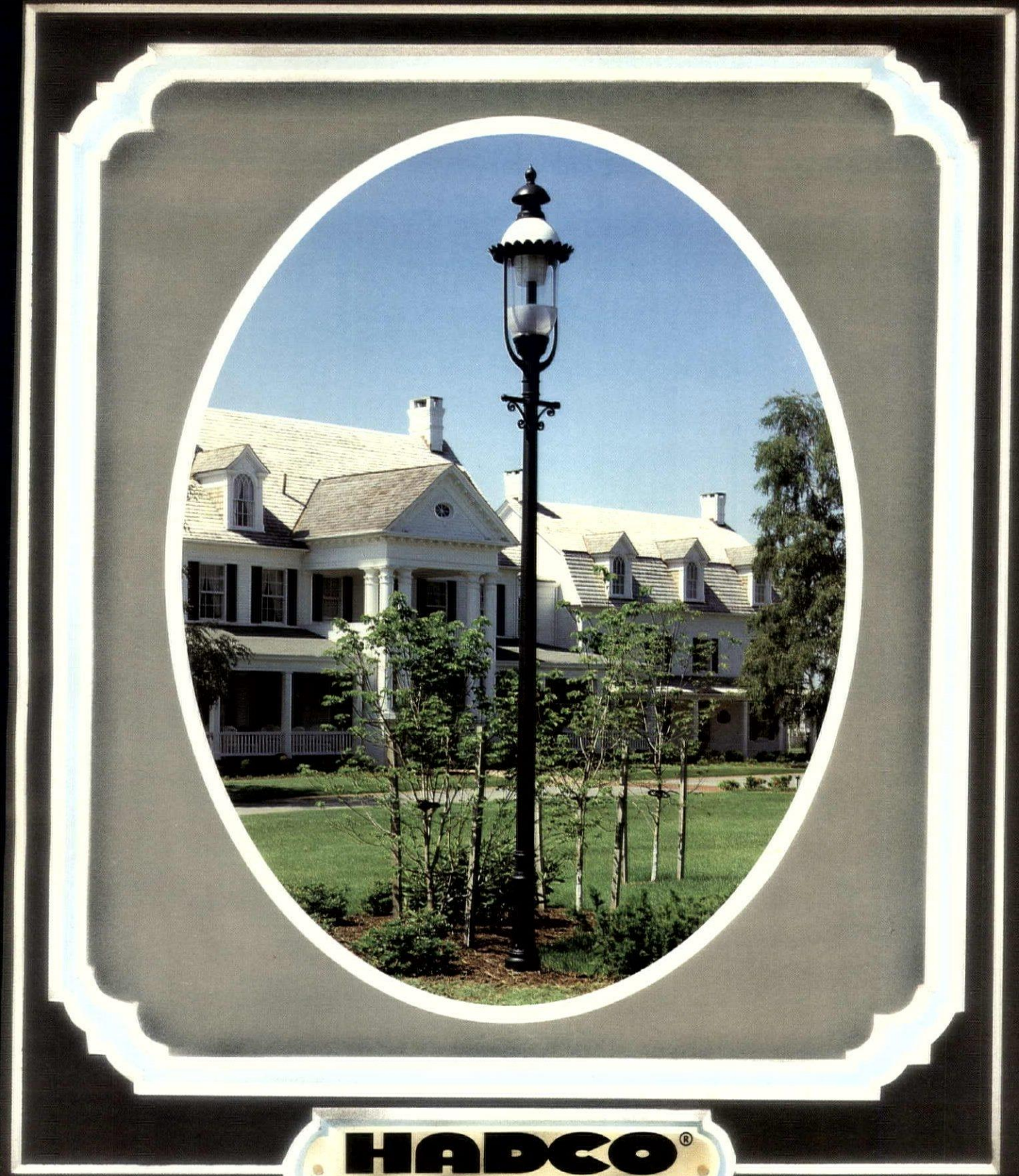

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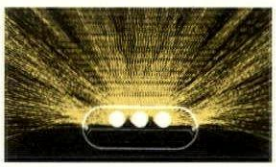

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ARCHITECTURAL LIGHTING

February 1988
Volume 2, Number 2

Cover Story

Articles

Statements

Columns

Departments

From the Editor

Last month I got so excited explaining why we were putting a suspension bridge on our cover for the second time in six months that I forgot to write the *thanks for a great first year* editorial I had planned. Please forgive my neglect.

The first year *was*, thanks to all of you, a terrific one for *Architectural Lighting*. Starting a magazine from scratch was no cakewalk for our fanatically devoted editorial, production, circulation, and sales staffs. But the efforts of all of those people would mean little without the support of the rest of you. We are deeply indebted to those who have contributed their projects and ideas to us. Thanks for your trust and support. And we thank all of you readers, who have responded in an overwhelmingly positive manner to our magazine.

We are also deeply indebted to those companies who have chosen to advertise in *Architectural Lighting*. I am often asked how we are able to provide this magazine free of charge to design professionals. The answer is simple. The advertisers who appear within these pages consider you, and the information about lighting we deliver to you, to be so important that, in effect, they have paid for your subscriptions. Those companies are, in our opinion, the greatest lighting companies in the world. We urge you to support the companies who make possible your subscription to *Architectural Lighting*.

So we had a great year. Are we ready to rest on our laurels? No way. I am extremely proud to announce two new regular columns, The Lighting Design Professional, by Jim Benya, and Daylighting Techniques, by Mojtaba Navvab. These knowledgeable authors will continue to provide you with the kind of practical advice on daylighting and electrical lighting that you've come to expect from *Architectural Lighting*. We also have begun to feature in color some items in our Product Showcase and Literature sections. In March, we'll begin expanding our Letters section to include challenging lighting problems posed by our readers, to be answered by some of America's top lighting consultants.

In July and December, watch for *Architectural Lighting Showcase*, our guides to the new lighting products and services available. And of course, we'll see you at Lighting World International, the American Institute of Architects convention, NEOCON, the IES convention, and the American Society of Landscape Architects annual meeting.

Once again, thanks, everybody. And get set: the best is yet to come.

Charles Linn, AIA

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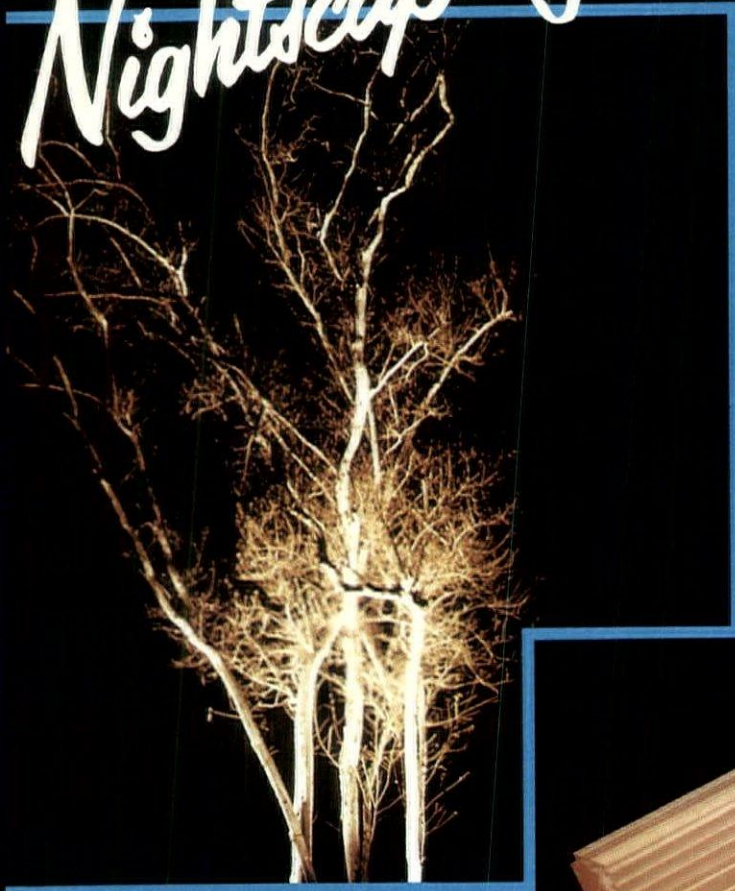

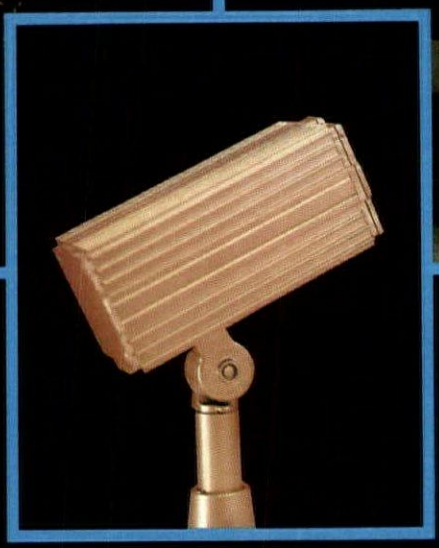

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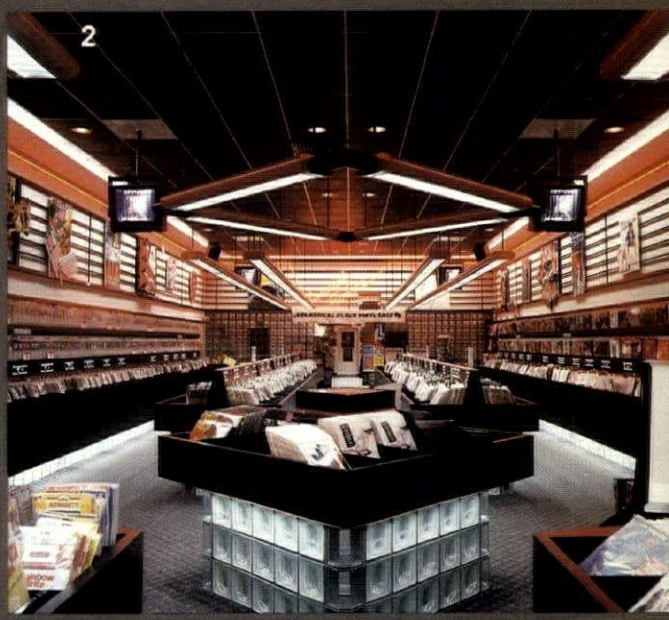

1. Project: Wall mounted vertical facia and pendant mounted fluorescent tube units
Kings Borough Community College, Brooklyn, N.Y.

Architect: Mark Cooperman, AIA.

Specifications: VCL # RD3x-1L40-P-L
VCL # 3.5x10-1L40-W-L

2. Project: Low profile pendant mounted and parabolic staggered wall system fluorescent units
Record World, Garden City, N.Y.

Architect: Stephen Sanders & Assoc.

Specifications: VCL # SYM-2L40-PB-P
VCL # WWP-2L40-ST-PB

3.&4. Project: Rotatable remote ballasted pendant mounted fluorescent tube units and recessed low voltage wet location fresnel lensed units
Excellsior Club, New York, N.Y.

Architect: Lea Hubert, AIA.

Specifications: VCL # RD3x-1L40-R-RB-P-L
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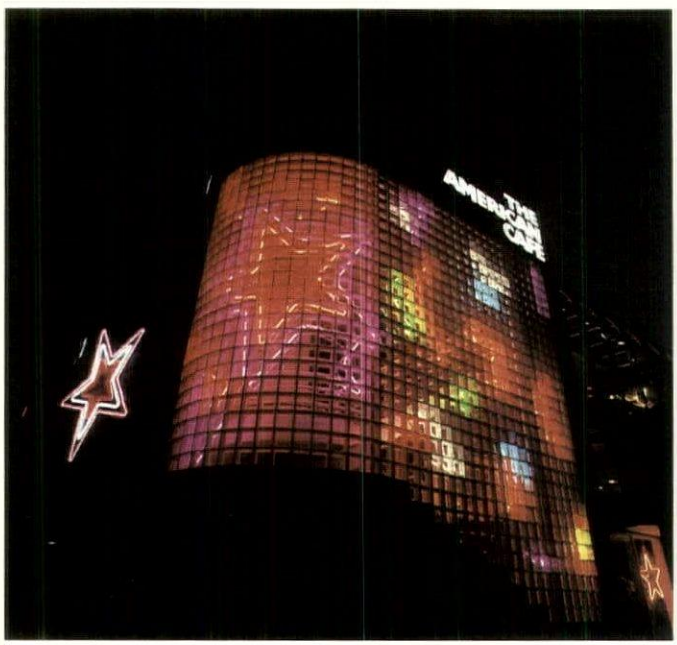
When a sign is not a sign — it's a neon mural



Project: The American Cafe
Location: Tyson's Corner, Virginia
Client: Monolith Enterprises
Architect: Ward Hall
Lighting Designer: Charles Morris Mount, Inc.
Photos: Kenneth M. Wyner

It's not easy to grab the attention of speeding commuters, but when your business depends upon it, you've got to find a way. The American Cafe at Tyson's Corner is just one of many restaurants located on a six-lane highway near Washington, D.C. "We needed a symbol or some sort of attraction to make the place different and noticeable," recalls designer Charles Morris Mount. He came up with a lighting design that gives motorists a landmark to remember: a 1000-square-foot glass block wall lined with exploded neon stars.

The installation turns the building into a glowing advertisement for its principal tenant, while complying with a severely restrictive zoning code for on-site signage. The full amount of allowable signage was used for the building's exterior three-star neon logo and for the illuminated letters spelling the restaurant name. Because it is inside the walls, the neon mural was not considered signage — yet from the restaurant's point of view, it serves the same purpose.

Mount had worked on other restaurants in the chain for the same client. At one, he concealed the rest room and kitchen entrances with a serpentine glass block wall, then decorated it with multicolored neon stars. The success of this installation inspired the Tyson's Corner mural, where the glass block encloses a stairwell to the bar.

Using Plexiglas to simulate the wall and phosphorescent-painted wire forms to simulate neon, Mount constructed a presentation scale model at 1 inch to 1 foot. The client was already fully behind the concept, he says; "the model was for the developer who built the building, to show him that it was going to be a piece of art." The construction team also was treated to a luncheon at the American Cafe with the serpentine wall. Mount believes that the extra involvement, especially the model, communicated the design purpose and contributed to the quality of the result.

Mount made drawings of the stars, and from these the neon fabricator came up with the final patterns. The wall's curved surface made fabrication difficult; "some were done a couple of times."

The neon lamps are mounted with customary glass tube supports anchored to the mortar joints. High-voltage cable used in the sign industry was rejected because of its obtrusive black color. In its place the fabricator used a specialty high-voltage cable with clear insulation, a product principally used in high-performance automobile ignition systems.

The neon transformers that power the star mural are controlled as one zone of a 12-zone scene controller operated from the headwaiter's station. The mural's brightness can therefore be adjusted along with the rest of the interior lighting, including low- and line-voltage track and high-hat low-voltage fixtures.

"I'd like to see more creative uses of neon," says Mount. "It's not just for signage. It's a wonderful element to play with."

—Gareth Fenley

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

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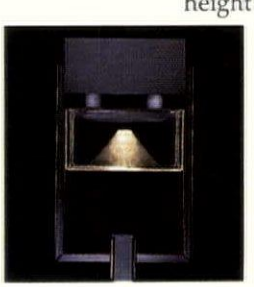

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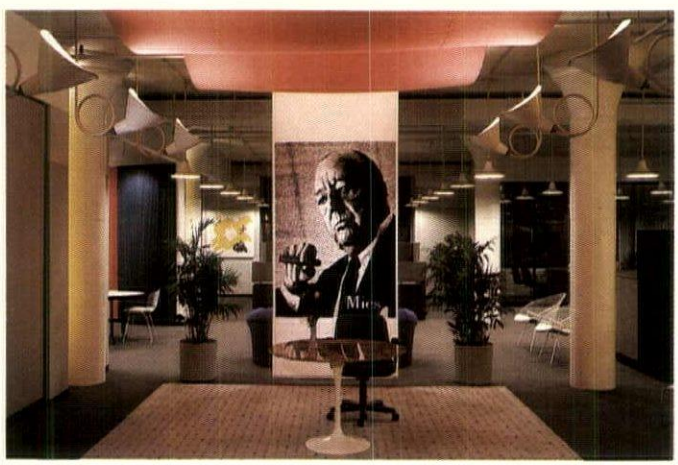


Project: Knoll Furniture Showroom
Location: International Market Square, Minneapolis
Client: Corporate Environments, Inc.
Interior Designer: Dan R. Fox, ASID, of BRW, Inc.
Photos: George Heinrich

Even in this era of sophisticated new lighting equipment, some of the most effective designs are achieved with old-fashioned, low-tech components. One example is a Knoll contract furniture showroom where simple embellishment transforms industrial fixtures into French horns to celebrate visitors' arrival.

The showroom is one of many in Minneapolis's International Market Square. The renovated turn-of-the-century manufacturing plant has some of the first concrete poured-in-place mushroom columns made with the reusable mold technique. Because this feature gained the building a historic designation, most new interior spaces must not alter or conceal the columns. The ceiling of a typical showroom is therefore a mass of air ducts, electrical conduit, plumbing, and other mechanical devices.

"Frankly, I was bored with the track lights and dark ceilings that predominate in the building," says designer Dan Fox of BRW, Inc. "Most showrooms deal with the overhead clutter by painting all of it a flat black with tracks hung below. I wanted to create a more luminous, brighter feeling to contrast the Knoll showroom with the others."

To achieve this effect, the ceiling clutter and concrete columns were painted flat white. A regular grid of standard off-the-shelf industrial downlights create a blanket of incandescent light in the show space. The evenly spaced downlights allow for greater flexibility of placement of the display pieces and give the sense of a ceiling height. "As a further note of reference, the form of the downlights repeats the form of the column capitals," Fox says. Finally, the lights are priced at only $10 each — essential to meet the owner's small budget.

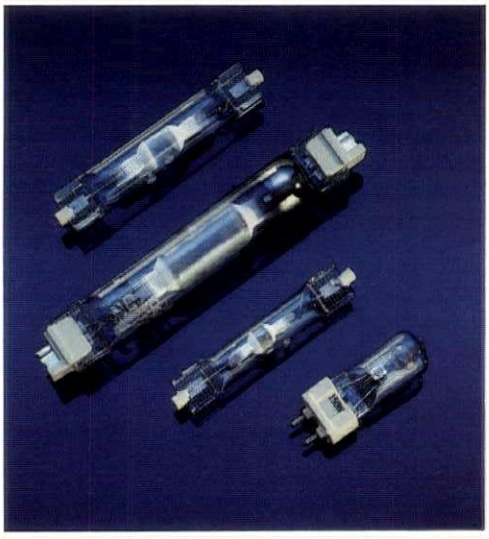
A double row of uplights gives a more dramatic flavor to the entrance area. The fixtures are standard industrial lights, priced at $14 each, mounted on double looped electrical conduit. The fabric suspended overhead was hung by the owner's son, a draper, to create the impression of a floating canopy, "like Aladdin's magic carpet," says Fox.

At the showroom's periphery, the unusual concrete columns are highlighted by cylindrical shells of gypsum board. A single uplight inside each shell draws attention to the form. The inside of the cylinder is painted with a bright accent color, recalling the classic Florence Knoll design statement of the early 1960s.

The showroom's evenly distributed illumination lacks the visual punch of high-contrast track and accent lighting. Fox points out, though, that the scheme is inexpensive and practical for a showroom with a changing display of all types of products — from art pieces to chairs to fabrics to massive workstations. "Rather than highlight certain things," he says, "I wanted to create the sense that you've entered the Knoll world."

—G.F.

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



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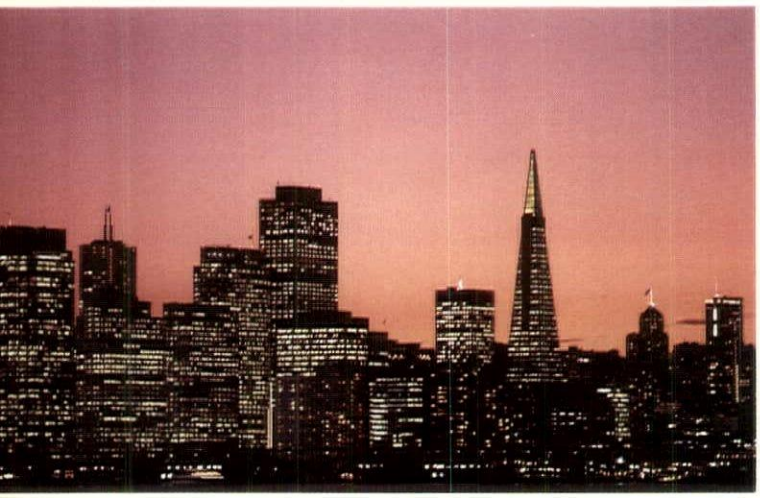
Retrofit cuts energy costs, preserves appearance



Project: Transamerica Pyramid Building
Location: San Francisco
Client: Transamerica Real Estate Management Co.
Owner: Transamerica Insurance Corp. of California
Architect: William L. Pereira Associates
Consulting Electrical Engineers: G.M. Simonson and T.R. Simonson
Photos: Mark Snyder

The Transamerica Pyramid has one of the best-known profiles in the United States. A recent advertising campaign for Transamerica Insurance shows the building in different locations throughout the country — popping up on the horizon of a Midwestern landscape, for instance — to symbolize the company's presence.

The building's dramatic architecture is so integrated with the company's image that its owners are very sensitive to any change in its appearance. So, when building manager Jeffrey W. Land studied the cost-effectiveness of a fluorescent lighting retrofit, preserving the integrity of its appearance was a high-priority design objective.

Specular silver reflectors solved the problem. Because of the highly reflective surface and custom configuration, the reflectors efficiently direct light out of a luminaire and into the work space. The optical imaging quality of the reflectors also preserves the appearance of luminaires, creating the illusion that they are still fully lamped.

Transamerica implemented the retrofit to achieve substantial energy savings by removing lamps and ballasts. The company also expects to reduce fixture maintenance and cleaning costs, and to save on HVAC energy costs by decreasing heat loads throughout the building.

Retrofitting took about two months; during that time, 5896 fluorescent lay-in fixtures in the building were retrofitted with specular silver reflectors. Most were three-lamp fixtures converted to operate with only one lamp. "Most of the office areas had been overlighted," says Land. The modestly reduced light output of the three-to-one retrofitted fixtures actually improved visual comfort in these areas, he says.

The project also included 562 three-to-two retrofits (in areas that required higher light levels) and 185 two-to-one retrofits. The project resulted in removing 11,045 lamps and 5711 ballasts; because of the imaging qualities of the reflector, the appearance of the building has been maintained. Few tenants have complained about reduced lighting.

After the retrofit, an independent engineer determined that the anticipated savings of 113,000 kilowatt-hours per month is being realized. At the current energy cost of 8 cents per kilowatt-hour, Transamerica expects return on investment in just over two years.

—G.F.

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

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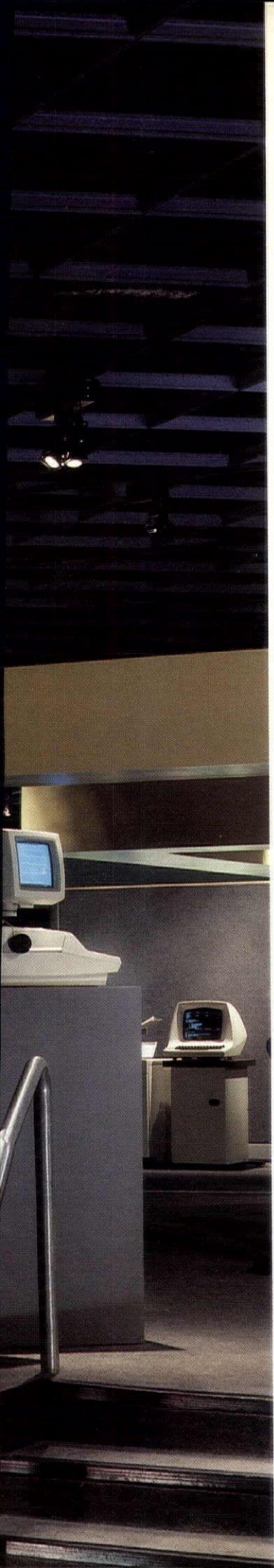


Lighting sets the scene for a high-tech showroom

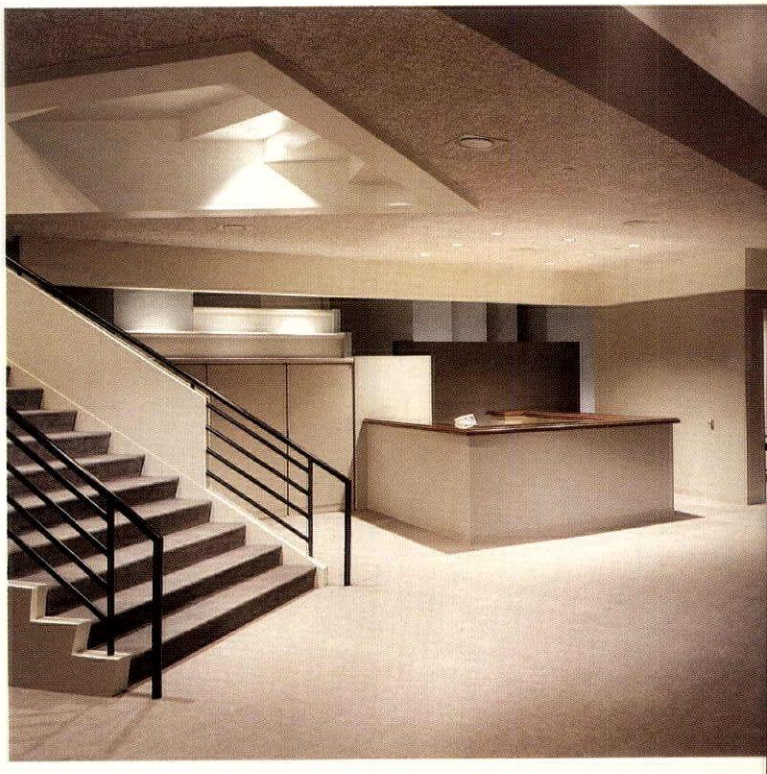
STORY BY
CHARLES LINN, AIA

PHOTOGRAPHY BY
JAMES D'ADDIO

There was no precedent for the new Xerox showroom at Infomart. That meant that architect Richard Zampi and the client team from Xerox had to determine at the outset what kind of experience customers would have at the facility, and how products could best be arranged and lit to make the most of that experience.

"Infomart, the first high-tech market center in the world, houses the showrooms of competitive companies," says showroom manager Dick Terrell. "It provides customers with an opportunity to compare the products and solutions that different vendors offer to solve problems for customers' organizations. It simplifies the decision-making process for customers because they can see many different systems at once. The advantage for Xerox is that we can reach more customers quicker and at lower cost.

"Our showroom also presents products from all Xerox divisions, and supports Xerox worldwide; customers come from as far away as Europe, South America, and the Far East. A problem we have is that everybody knows that we're a successful copier company, because we created that marketplace," continues Terrell, "yet many customers are not aware of our extensive offerings in the electronic office



Project: Xerox at Infomart
Location: Dallas, Texas
Architectural, Interior, and Lighting Design: TEC 3; Richard Zampi, AIA, partner-in-charge; Thomas Bartushintz, project manager; Jac Cooper, Nancy Kahn, design team
Audiovisual Consultants: Jim Sant'Andrea Inc.
Electrical Engineers: Cosentini Associates

Project: Xerox Executive Communications Center at Infomart
Architecture and Interior Design: TEC 3, Richard Zampi, AIA, partner-in-charge; Thomas Bartushintz, project manager; John Katimaris, Barbara Piazza, design team
Lighting Design: Light and Space Associates Ltd., Renée Cooley, senior project designer; and TEC 3

Low-voltage track (left) gives equipment museum-like lighting. Interactive videodisk kiosks (above) are detailed with blue acrylic plastic, backlit with fluorescent. The video wall (overleaf) greets visitors to Xerox's showroom at Infomart.

systems market. If a customer visits our facility and gives us a couple of hours, we can provide a basic understanding of our capabilities. This enables customers to determine if our solutions meet their requirements. That's really what any company would like to accomplish. That's what it's all about."

"The first part of our task," says Zampi, "was to make the Xerox showroom something that was highly competitive visually, to bring the people in at first sight." The focal point of the reception area, where salespeople meet customers and ascertain their needs, is an "electronic wall." This consists of 21 video monitors and 34 light boxes, all computer synchronized, that give the potential customer an instant multimedia look at all of the capabilities of Xerox and its products.

The "wall" is, to a certain extent, its own source of ambient lighting. In order to heighten the visual impact of the display, very little additional lighting was provided in this area. "The 'wall' is covered with a perforated scrim painted gray to match the surrounding walls," says Zampi. "This allows the monitors and light boxes to go unnoticed until they are illuminated." The Xerox logo is painted on the scrim in a phosphorescent paint that is nearly invisible unless illuminated by the 18 black light fluorescent lamps hung above the ceiling grid. These lamps are also synchronized by the electronic wall's computer.

After being greeted in the reception area, customers are treated to a 9-minute audiovisual presentation in one of the showroom's three theaters. The entries to these theaters are indicated in the ceiling plane by four converging blue beams, each backlit by a continuous length of single fluorescent lamp wrapped in blue gel. This gives the entry to each theater a "cool, spacelike image," according to Zampi. Inside the theater, audience seating and lecturer support lighting are provided by a grid of incandescent downlights and track mounted low-voltage framing projectors recessed into the ceiling. These lighting systems are synchronized with the audiovisual equipment using electronic dimming controls.

"After customers have seen our audiovisual presentation," says Terrell, "we try to determine how much time they have, and exactly what they would like to see." The area behind the reception desk provides a place for customers to enjoy coffee, soft drinks, and appetizers while waiting for an event to begin. While here, they can get more information by using one of several interactive videodisk display kiosks. The semicircular glass block wall around this area is given sparkle by canopy-mounted, theatrically styled, low-voltage lights. As in the electronic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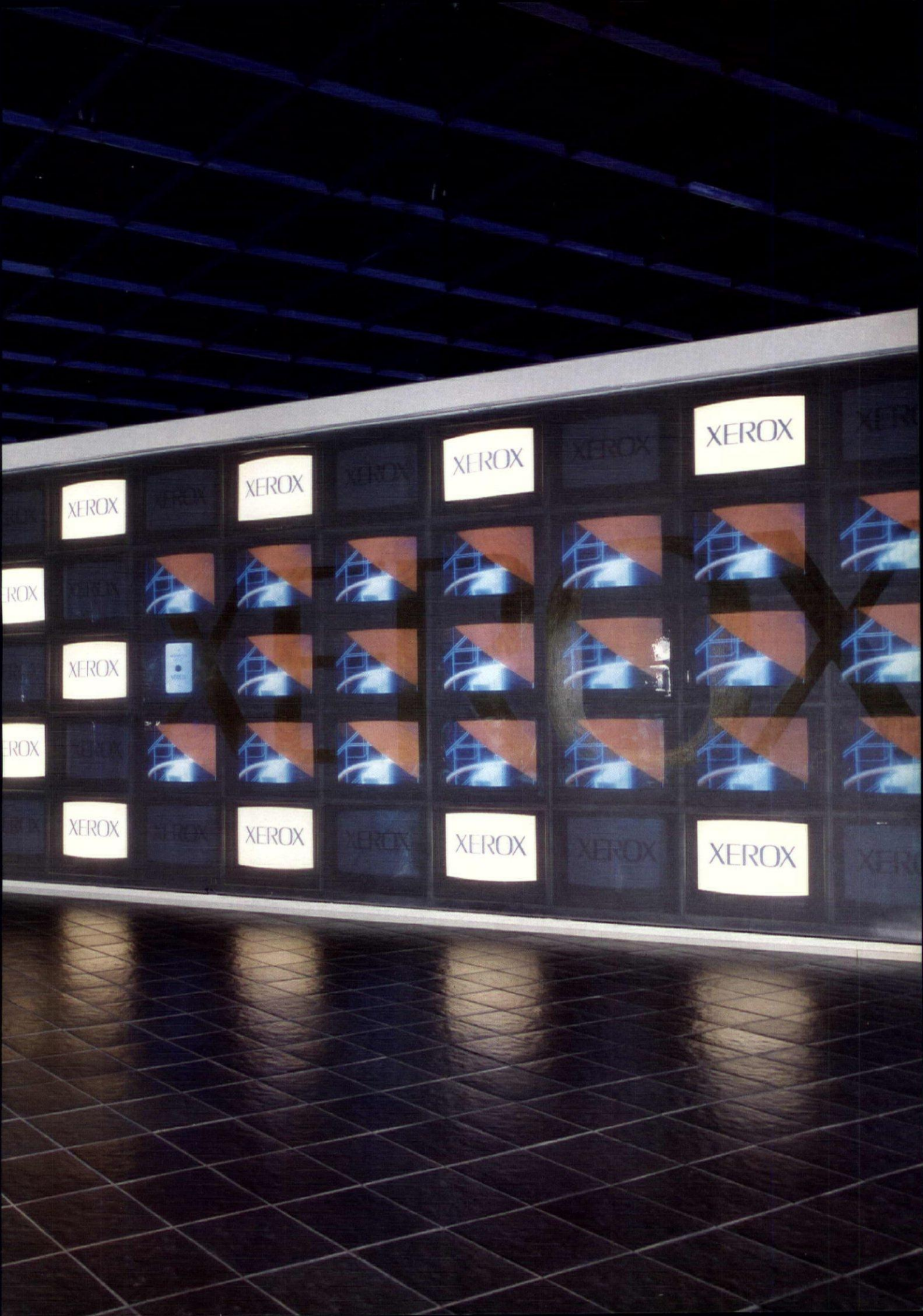
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Lighting in the Executive Communications Center (top left) is softer but brighter than the lighting in the showroom. ECC dining room (top right) and conference room (above).

wall in the reception area, much of the light in the applications area is provided by the video displays themselves, but each kiosk is further defined by blue acrylic plastic strips backlit with fluorescent lamps.

A customer who has a need that relates to a specific system would then be taken to one of six applications environments designed by Zampi. Each applications environment has several workstations with fully operational equipment, linked together by a local area network. Here, the customer can see how documents are created, assembled, and published — actually moving from one workstation to the next.

Each applications environment is designed to replicate the sort of office in which this kind of equipment might actually be found. There are areas for engineering, publishing,

management, reprographics, and the like. "In these areas, it is critical that customers feel as comfortable as they would in their own offices," says Zampi. "It also was necessary to use lighting that in no way distracts the customer from the demonstration; so indirect, pendant-mounted fluorescent uplighting was chosen to provide glare-free lighting."

A customer who has already seen the various pieces of equipment work together in an applications environment or a customer who has very specific equipment needs might be taken to the hands-on demonstration area. Here, in-depth product demonstrations can be conducted and customers can be given an opportunity to actually use the equipment themselves. In this area, Zampi shifted the focus of the lighting from the illumination of an entire space, as in the applications environments, to the illumination of individual pieces of equipment as entities unto themselves. Easily adjustable low-voltage track lighting lights the individual pieces of equipment as if they were on display in a museum. The demonstration area itself is separated from surrounding circulation areas by a low wall. On the circulation side, this wall is illuminated by a stem-mounted fluorescent tube, parallel to a stainless steel handrail.

"Downstairs from the showroom, we have our Dallas Executive Communications Center, which is for major account customers, usually senior level executives. Executive Center visits are highly structured, customized discussions designed to meet a customer's requirements and interests. We want our customer's executives who visit to feel that they are in a comfortable learning environment that will maximize the effectiveness of their time with us," says Terrell.

"As you wind down the stairs," says Zampi, "the lighting becomes brighter, but softer. You get the sense that you're leaving a very public area for one that is much more private and highly tuned to the upper management level. We used a lot of polished woods and lighter, warmer-colored fabrics here, in contrast to the plastic laminate and cooler painted surfaces upstairs. Recessed 120-volt and low-voltage downlights and wall washers were used here, rather than the low-voltage track that was appropriate upstairs." Activities in this area can include customer training sessions and dining as well as sales presentations.

Terrell concludes, "If you look at our overall facility, it provides us with great flexibility. The theater is an excellent staging area for presenting our overall capabilities. There is a tour of office environments, where visitors see products working together, and a hands-on product demonstration area, where they can work on a specific piece of equipment. Downstairs is the Executive Communications Center, a quality environment for a meaningful exchange between customers and Xerox executives. Lighting sets up the ambience for each area. It sets the mood for the kind of experience we want our customers to have." ■

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

New Olympic Oval champions daylighting

Charles Linn, AIA

Charles Linn, AIA, is editor of Architectural Lighting.

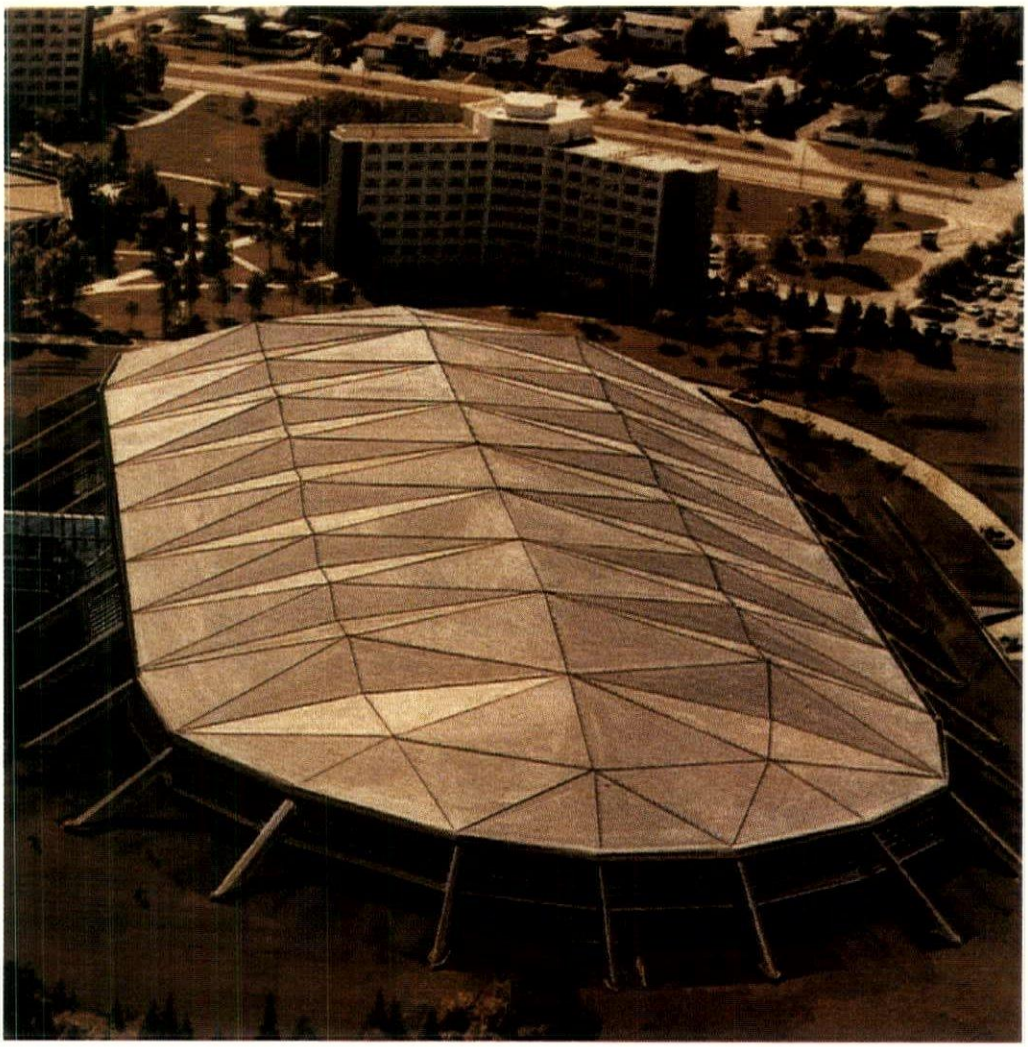
The new Olympic Oval in Calgary takes an outdoor sport, speed skating, indoors for the first time. Architect David Edmunds and lighting designer Henry Zywotkiewicz worked together to be sure that one of the most important qualities of the outdoor event — daylighting — would be efficient but glare-free in the new facility.

Calgary's climate was one of the most important factors in the decision to build a facility that takes the sport indoors. Winter temperatures there sink as low as minus 30 degrees Fahrenheit, making outdoor competition and training difficult. At other times, chinook winds may drive temperatures as high as 70 degrees Fahrenheit, obviously far too warm for an ice track. The wind also deposits skater-slowing dust and debris on the track.

The form of the building was also influenced by the forward thinking of the Calgary Olympic Development Committee and the University of Calgary, which eventually will own the building. "When Calgary pursued the games," says Edmunds, "one of the things the committee tried to do was ensure that whatever was built there would provide a legacy for sports in Canada. They didn't want to end up with facilities that were incredibly overbuilt, but neither did they want to end up with a series of temporary facilities that would be dismantled after the games were over. The idea for the Oval was to build a facility that would regularize the climate around the speed skating track, and provide a superb training and competition facility after the games were over." One of the University of Calgary's stated goals for the oval was "to create an open, warm, receptive environment that is enhanced by the introduction of natural light."

"We felt that if the facility was to be successful after the games, it had to be an incredibly high quality environment," says Edmunds, "and it was felt that, because we were translating what was basically an outdoor sport into an indoor sport, we should try to get as much daylight inside as possible.

"We looked at a number of possible solutions, such as building a translucent fabric roof over the entire structure or using skylights. But we felt that neither of those solutions would have been technically or economically feasible in this situation.



Project: Olympic Oval
Location: Calgary, Alberta, Canada
Owner: University of Calgary
Project Architect: David Edmunds of Graham•McCourt
Lighting Designer: Henry Zywotkiewicz of Stebnicki Cassie and Associates
Daylighting Consultant: Mojtaba Navvab, University of Michigan
Photos: Mojtaba Navvab

"So the obvious solution was to put windows around the perimeter of the building. Well, the first thing that comes to the mind of nearly anyone who has ever worked with daylighting is that windows can create very high glare conditions that usually interfere with most of the activities that are going on inside. I think nearly everybody has seen a gymnasium with a bunch of nice windows in it that have been painted out by the sports director three or four years after the the building was built, because nobody dealt with the glare.

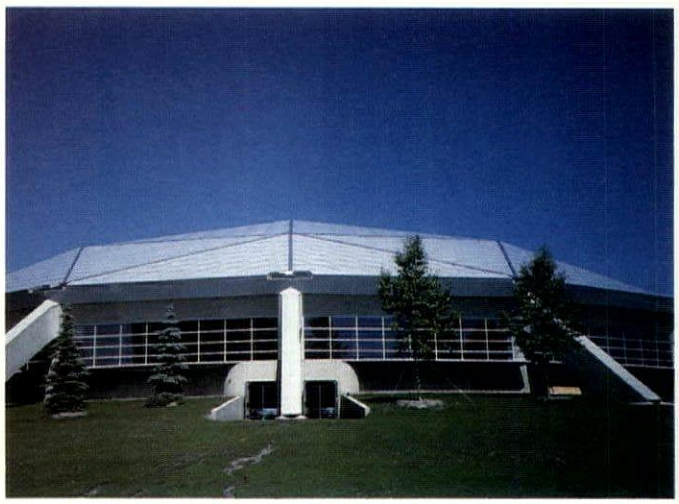
"We started looking at some of the research that had been done in California on daylighting deep-core office buildings and realized that some of these buildings had pretty decent daylight levels 60 or 70 feet into the core, and without creating these debilitating glare conditions. The core of our building is about 100 feet in, but we have a much higher building section. We thought we could probably take what is essentially a light shelf system for a deep-core office building and scale it up," says Edmunds.

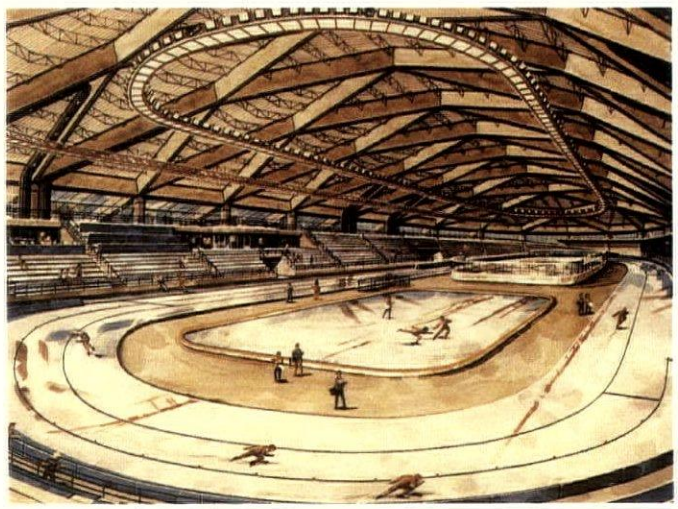
"We had no idea whether it would work or not, but we made some rough-cut assumptions and said, 'Let's put 10-foot-high glazing around the entire perimeter of the building, and build a light shelf that is structurally as big as we can get it, both on the inside and outside of the glazing.' In fact, we found that the location of the concourse used to get spectators into the building was just about the right height for the light shelf, so we used it.

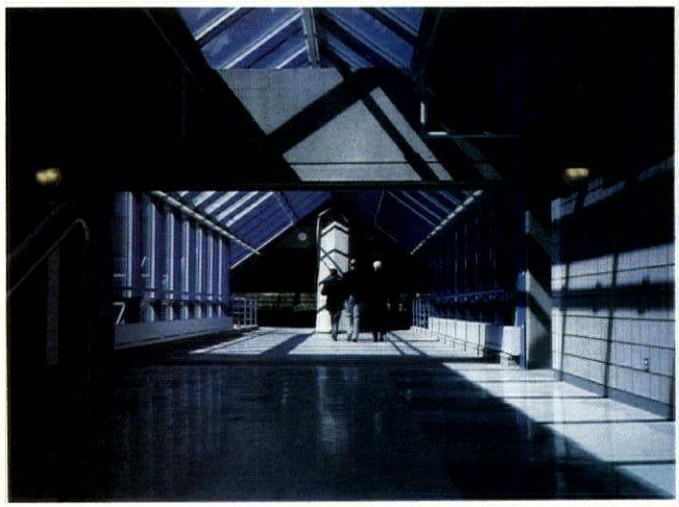
"At the time we were doing the preliminary design, no software was available that was really appropriate for modeling the space by computer, so we developed a physical model — built as big as we could make it and still get it on an airplane. It's a very repetitive building, so it really lent itself to being analyzed. We had to build only one bay, because we were confident that if one bay was functioning one way, then all of the bays would function that way.

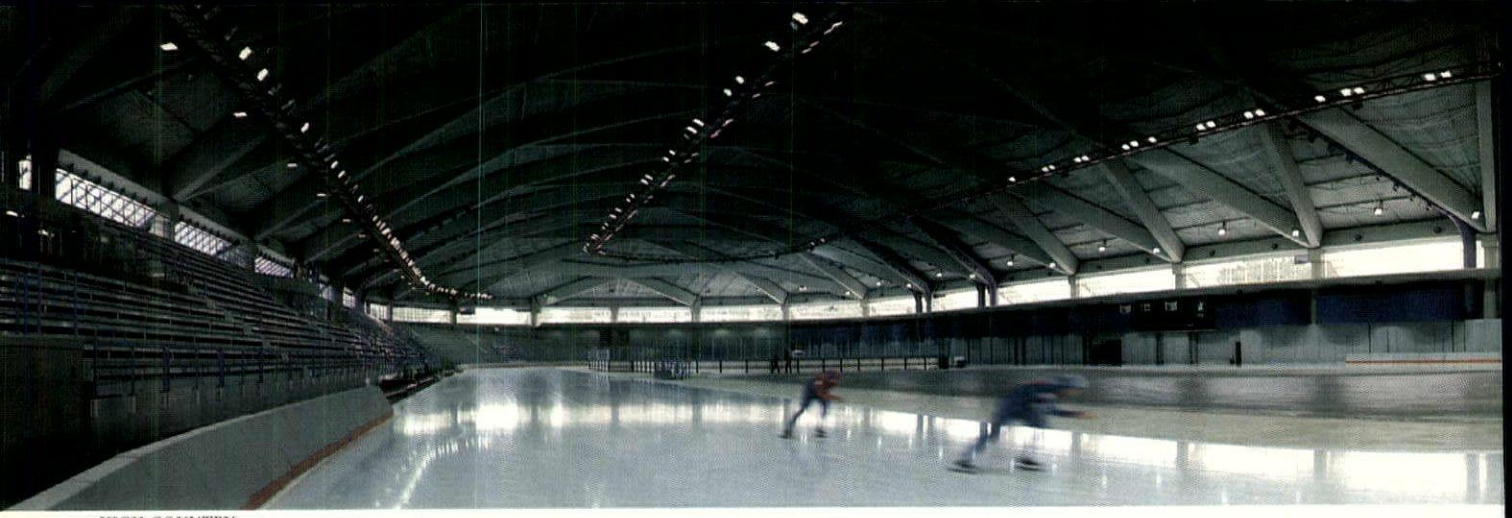
"Then, over the course of a month, we made preliminary illuminance measurements under actual sky conditions here in Calgary, using photometers located inside the model. We used these measurements to establish the basic lengths and elevations of the light shelves. At that point, we felt we had basically taken the thing as far as we could without a controlled laboratory environment," says Edmunds.

The next tests were con-

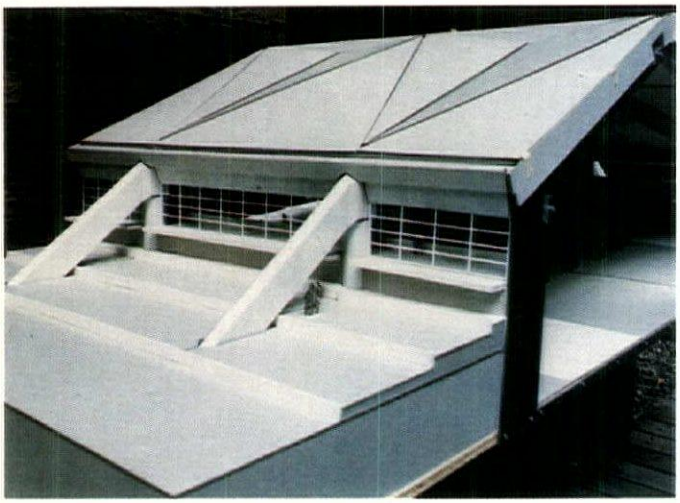


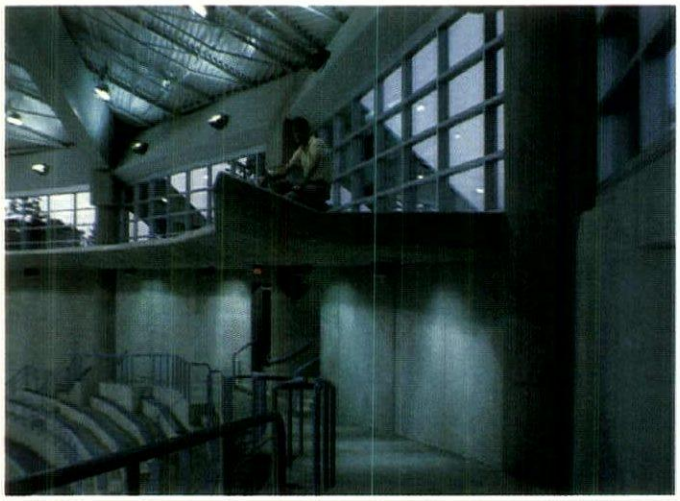


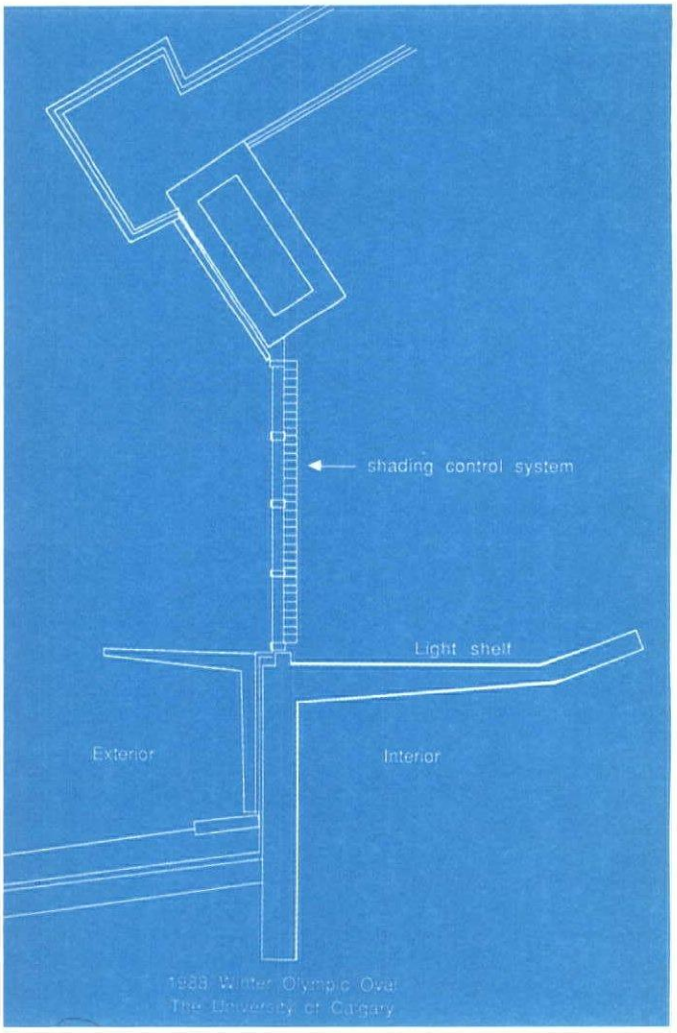




HIGH COUNTRY







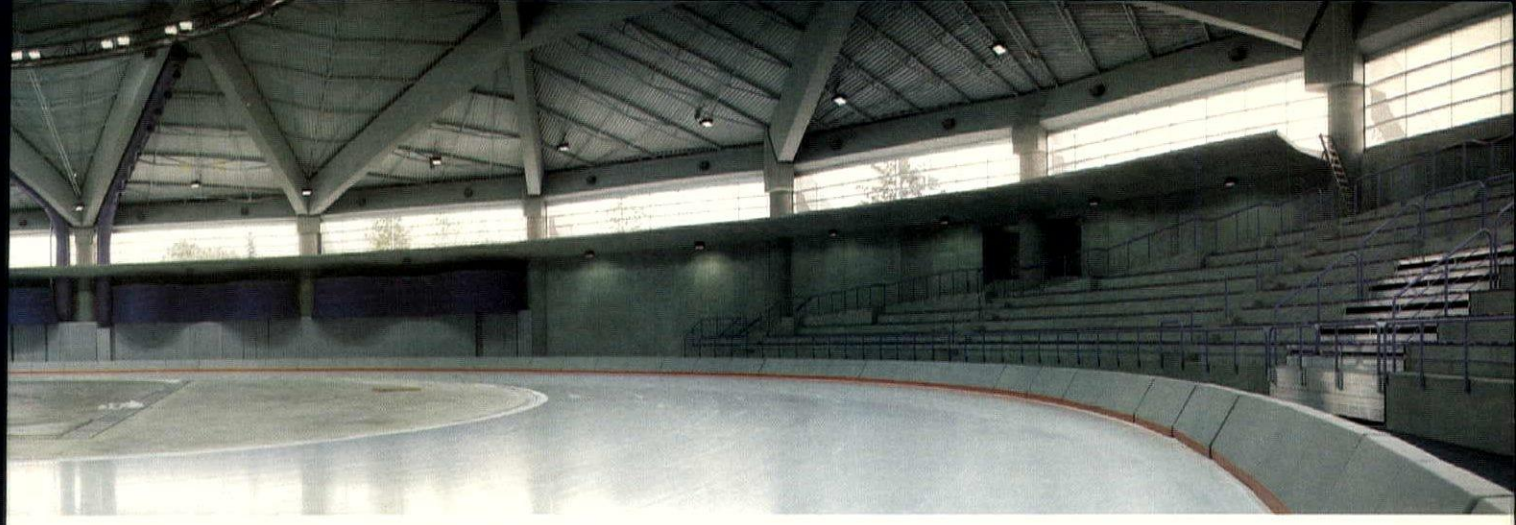
ducted in the sky simulator at Lawrence Berkeley Laboratory. These tests measured the performance of the light shelf system under various sky conditions and were used to optimize the characteristics of the system: the glazing, light shelf and shading system geometries, the reflectivity of the light shelf itself, and the building orientation.

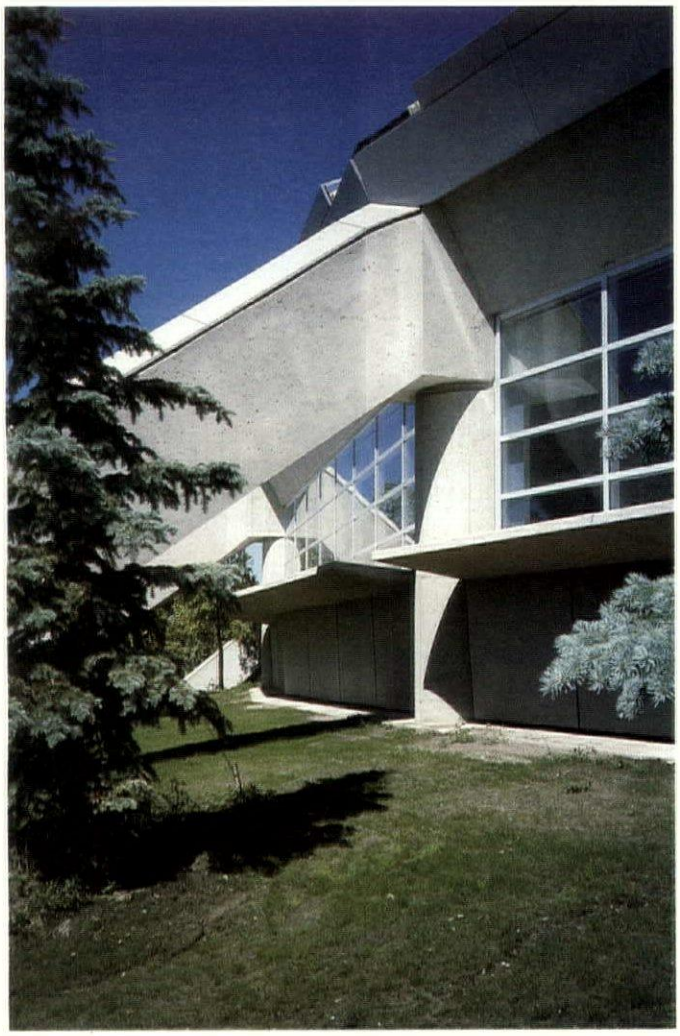
Television Lighting, Too

Lighting designer Henry Zywotkiewicz conducted preliminary design studies on the oval's complex electric lighting system and was also involved with the daylighting studies. He says, "One of the things the tests in the simulator did, besides proving the building could be entirely illuminated by daylight, was to show us where the building would have very dark areas versus very light areas. If you get an area that has an illuminance ratio of greater than 20 to 1, the eye or the television camera can't adjust to it, and you have veiling glare.

"So in essence, we also used the sky simulator studies to point out areas that would not get enough daylight, so those could be reinforced with the level of electric light that would be required for television, and also to soften the differences between the shaded areas and the lit areas." A motorized shade system can be used to screen the daylight when illuminance ratios are excessive.

The metal halide illumination system itself was a design challenge. High levels of electric lighting are essential for television cameras. At the same time, glare from 400- and 2000-watt metal halide sources must be kept off the ice, out of the eyes of spectators, and away from the cameras. "The incredible thing about determining the camera angles," says Zywotkiewicz, "was that no one really knew where the cameras would be. We decided to put a catwalk on the inside of the speed skating oval, and hang fixtures from it. To make the skaters more visible on the spectator's side, we put another catwalk along the complete length of the spectator's seat-





ing and hung fixtures from it.

"We calculated the visual comfort probabilities at hundreds of different points. Every fixture ended up being simulated with respect to the competitors, the spectators, and seven possible camera locations. In essence, our specifications stated that each one of the fixtures had to be aligned in the least disruptive direction to all nine positions."

Zywotkiewicz's lighting design and performance specifications were developed into a final lighting solution by Philips Lighting of Canada. All of the fixtures were attached to the catwalks on the floor and preaimed before being hoisted into place. Only minimal reaiming was required once the catwalks were in place.

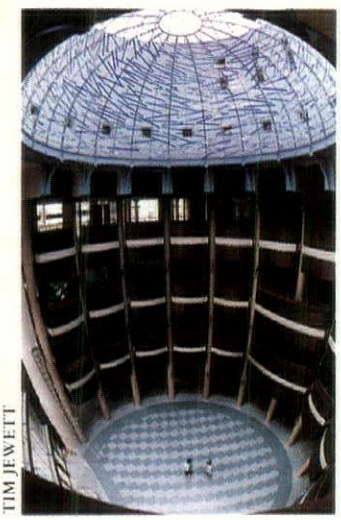
The lighting system has several preset illumination levels, which are controlled by a computerized system. It turns on only enough lights to maintain the specified level of illumination for a given function — televised or untelevised competition, practice, and maintenance.

One feature incorporated into the control system is an automatic time log for each lamp. The system documents the number of hours each lamp burns during the course of a year so that lamps approaching the end of their mortality curves can be replaced. This is necessary because with so many different preset levels, some lamps will be used many more hours than others. "This way," says Zywotkiewicz, "you don't get into the embarrassing situation of having a bank of lamps burn out during a televised meet."

Architect David Edmunds notes that the daylighting works best under overcast conditions, but the real test has been the reaction of the skaters themselves. In December, Edmonds reported, "The athletes just love the facility. They just had their first international competition there, broke five world records, and every Canadian record there was. This building signals the beginning of a new era in speed skating." And daylighting. ■

Multihued sculpture glows in ever-changing play of light and color

Suspended 70 feet in the air beneath a transparent skylight, bands of glass swirl in a spectral whirlpool of blue, turquoise, violet, and gold. As the sun moves across the sky, colored shadows dapple the walls and slide slowly down them to the checkerboard floor of a huge rotunda. When night falls, starry reflections of spotlights twinkle in the glass. Invariably, glances wander upward and heads tilt back as theatergoers in Portland's new Center for the Performing Arts gaze up at the Spectral Light Dome swirling high above their heads.



TIM JEWETT

Project: Spectral Light Dome
Designer: James Carpenter
Location: Portland Center for the Performing Arts, Portland, Oregon
Client: City of Portland
Architects: Barton Myers Associates; Broome, Oringdulph, O'Toole, Rudolf, Boles & Associates; ELS Design Group
Electrical Engineers: Interface Engineering Incorporated
Glass Sculpture Installation: O'Neill Studios
New York Studio Design Team: Vera Marjanovic, I-ni Chen, Neil Logan, and Larry Jasse
Photos: Dick Busher

Susan R. Degen

Susan Degen is assistant editor of Architectural Lighting.

The building's main entrance is located in a 46½-foot-high wall of glass. Theater patrons passing through it gain a new perspective on theater — from the stage performer's point of view. For a moment they seem to be on stage in a 16th-century Italian theater as they face the lobby's four balconied tiers, rising one directly above another, which open onto the building's rotunda. Box seats rim the balconies to provide alcoves where lounging theatergoers can perch and people-watch. "The whole idea here is that the attendees are performers on a stage," says James Carpenter, the sculptor and structural glass specialist who created the Spectral Light Dome.

Carpenter's sculpture also recalls ancient Greek theater, which was staged under the natural dome of the sky and the celestial bodies in it. The sky, visible through the clear glass skylight above the sculpture, forms a natural backdrop. "We generated what appears to be a time-lapse photograph of stars in the sky, as they spiral around. There's some feeling of that and a feeling of rotation, spinning," says Carpenter. The skylight was the obvious location for an artwork, according to Carpenter, because it can bring a natural conclusion to the space and provide a visual reference point.

Selective Transmission

Colors in the Spectral Light Dome change with the time of day and one's viewing angle. Carpenter achieved this effect with specially treated dichroic glass that transmits transparent shades of blue and violet and reflects gilt shades of yellow and green. The colors complement the lobby's decor in tones such as the reflective gold that echoes its brass accents. "Making it dynamic and exciting but not garish was probably the most difficult thing," says Carpenter. "I'm hoping this doesn't cross that boundary. With this glass it could be visually overwhelming, but using it sparingly and not too densely, I think it has enough visual, aesthetic sparseness that it works. If you used too much, it'd be dreadful."

The glass appears to change colors because of *selective transmission*, which is caused by a series of special coatings on the glass that interfere with the light so that it transmits and reflects only specific wavelengths in the color spectrum. Walking around and underneath the sculpture alters one's viewing angles, so the glass seems to change colors. The viewer's position in relation to the light causes the color changes; the glass itself does not change.

Illumination Sources

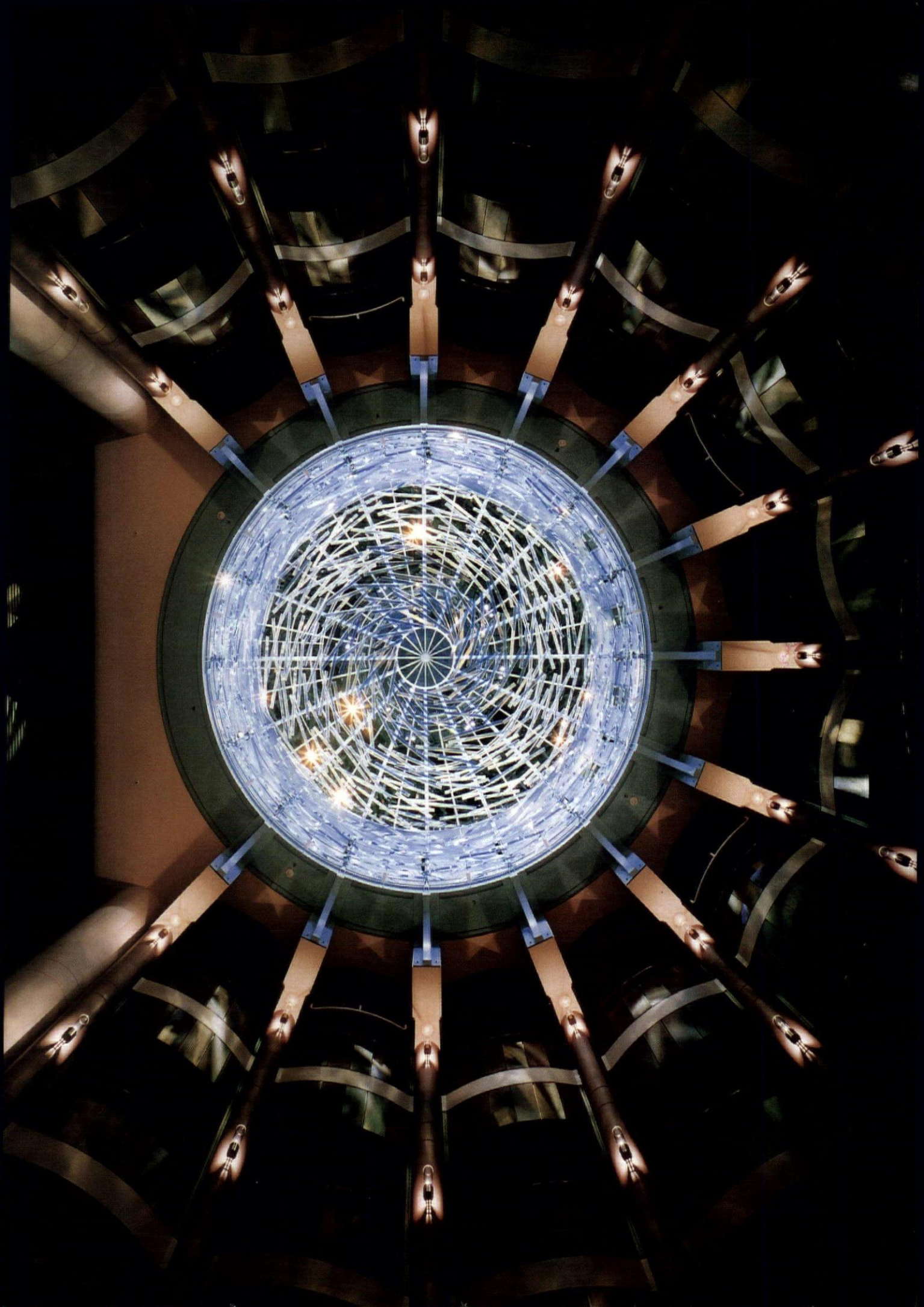
Daylight and electrical light sources combine to create the ever-changing effects of light and color in the Spectral Light Dome throughout the day and into the night. During the day, the primary light source is natural daylight from a 35-foot-diameter clear skylight over the vault above the sculpture. It has double-glazed panels framed by aluminum mullions. A 5-foot oculus in the center of the sculpture allows some direct light to enter the rotunda. Daylight is augmented by 16 uplights around the bottom rim of the dome and theatrical PAR 38 cans on the white walls of the dome's vault. Light reflected by the sculpture provides a substantial amount of ambient light in the rotunda, particularly during the day.

At night, backlighting and uplighting can be used separately or together to create different effects. Lit only from below at night, for example, the glass becomes completely reflective. Hot spots in the glass from the electrical lights below glimmer like stars against the darkened backdrop of the night sky. "You realize that everything in the space is going to be reflected in the glass; it's reflecting the activity of the space itself," says Carpenter. He hopes too that this dynamic use of color and lighting will draw people in. "I tried to keep the sculpture from being just decorative or ornamental. The tension between clarity and the dynamics of light refraction gives it enough continual activity to hold a viewer's interest."

For flexibility, the two sets of lighting fixtures are on separate control systems. The uplights are connected to a relay system; the downlights are controlled by a dimmer. Dimmer controls are located in a space next to the dome's vault. A catwalk and a curved ladder that revolves around the sculpture's steel frame provide access to the sculpture and the light fixtures for maintenance and relamping.

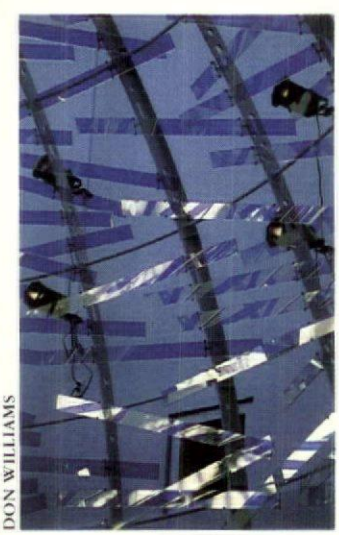
Coating the Glass

The glass has 15 clear coatings, with a second layer of glass laminated over them for protection. "The coloring comes from what are called interference coatings," says Carpenter, "meaning that each layer is interfering with the transmission of light and the reflected part of the spectrum. So depending upon how you



sequence your layering at different levels, you can create different colors, densities, and other effects."

The coating process takes place in large vacuum chambers, into which 6-foot by 3-foot sheets of glass are placed.



DON WILLIAMS

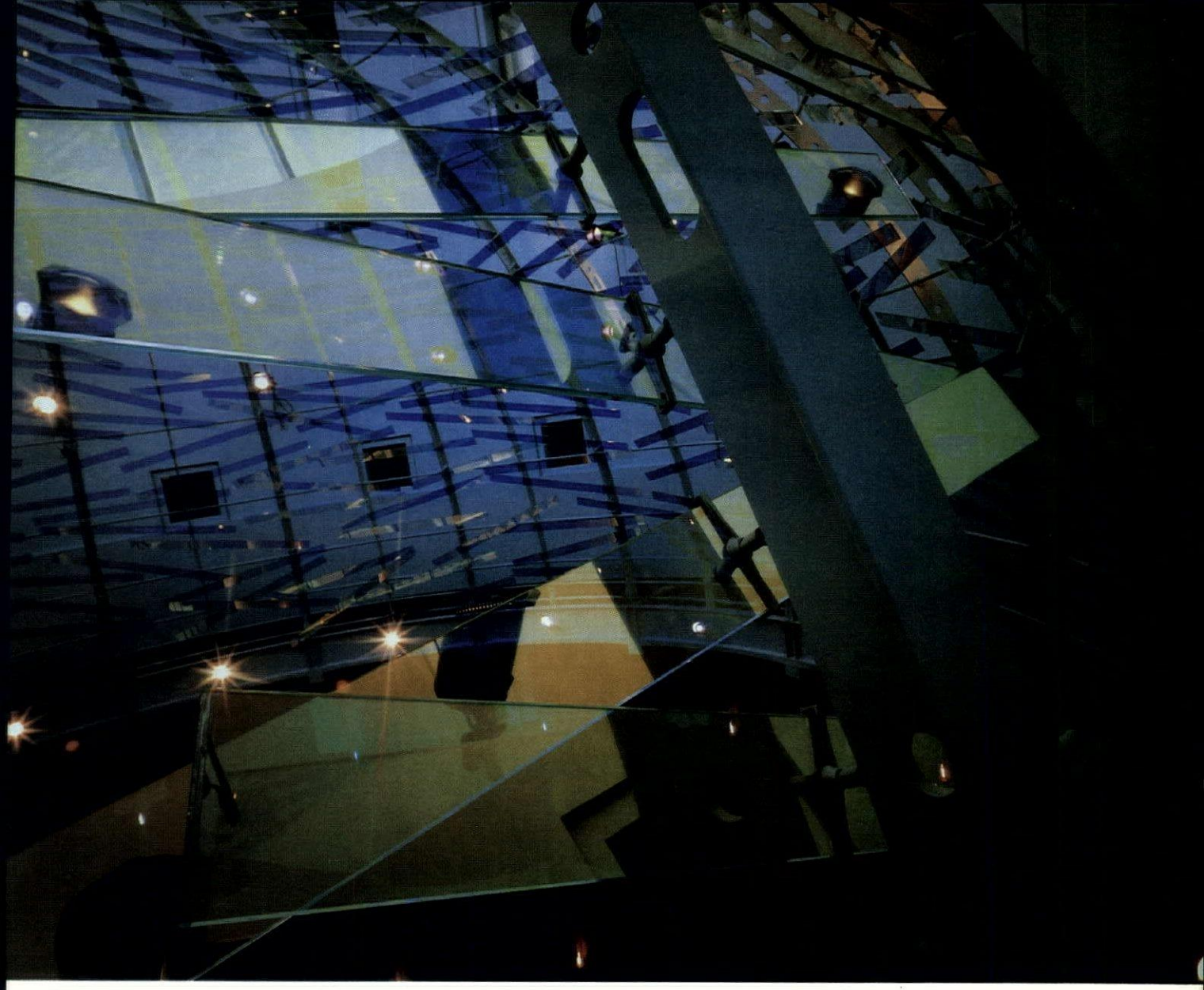
Carpenter explains: "They place the glass sheets symmetrically around the perimeter of a drum. In the middle is a very small container in which they place the metals they want to vaporize — in this case, germanium and indium. They deposit them in very small amounts and bombard them with electron beams to vaporize the metals instantaneously. The glass is given a negative charge, and the metals a positive charge. Floating in the chamber after the bombardment, the positively charged metal atoms deposit themselves on the negatively charged glass surfaces." After the coatings are applied, the glass is laminated, cut to desired dimensions, ground, and polished.

Carpenter applied the two metals in varying combinations. One layer, for example, might have two parts indium and one part germanium, and the next layer might have one part indium and three parts germanium. Color effects vary with the combination and the sequence of layers. Interestingly, the company that Carpenter worked with to produce the coatings specializes in glass used in laser beam splitters for the optical industry and sighting systems for the military.

Controlled Randomness

More than 500 individual pieces of glass make up the sculpture; each is ¼-inch thick, 3 inches wide, 4 or 5 feet long, and weighs 6 or 7 pounds. Carpenter determined a specific numbered location for each piece to ensure even weight distribution on the steel frame and to ease concerns of the city's building department. At the same time, however, he wanted the layout to appear random even though it is not. "It's an interesting thing working with randomness that at the same time has to be controlled," says Carpenter. "The arrangement still reads random and looks random. It's supposed to be almost like a tornado, a vortex, like the pieces were picked up off the floor by a whirlwind."

Two small stainless steel castings with bolted-in setscrews hold each piece of glass in position. They are connected to welded steel threaded studs shot into the huge hemispherical structural steel framework. The studs are spaced 6 inches apart all along the frame's steel members. Sleeves of three different lengths hold the glass strips away from the studs so that they can overlap. Suspended below the frame, the cantilevered strips appear to hover beneath the support



system and float over each other as the curves become tighter towards the top.

Although unnoticed from a distance, the long edges of the glass are slightly mitered, and the ends are cut off sharply. "Closer up," says Carpenter, "I thought what you might read is that they look like bands that have been broken so that they indicate fragments of longer pieces. They're all straight too. You can see that from the back. The pieces of glass actually go behind the structure. The dome is indicating a perfect hemisphere, and the pieces of glass are breaking through the hemisphere."

Public Art

Creating dynamic, performance-quality public art is important for Carpenter. "One of the things about public art is that you can do something that has a specific image or effect," he says, "but over a period of time a lot of that work becomes dated because people see it every day. This sculpture is to change day to day, like a set changes after each act, so it has an ongoing interest."

Carpenter actually created two original designs. "One was a fairly formal all-glass construction. The dome structure was glass as well, using glass mullions but as curved arches, so the whole structure would have been all glass. And then this one, which is somewhat more formal in its structure but random in its image. It's a contrast of light, formal structure, and random design."

Although the sculpture involved months of work in his New York studio, Carpenter sees the project as a group effort; he worked closely with the building's architects throughout the design phase. "I tend to like to work collaboratively," says Carpenter. "The space contributes as much to the work's success as the dome contributes to the space's success — something that really meshes and works."

Trained in sculpture and structural glass engineering, Carpenter has been experimenting with glass and special coatings for more than 18 years. Yet, although he has exhibited smaller sculptures at several New York galleries, he hopes for more opportunities to do independent structures such as the Spectral Light Dome. "I have a greater sense of accomplishment working with things like this, as opposed to a piece that goes into a private collection. I'm getting back more to my original interest in engineering and architecture rather than producing museum art."

The familiar gray clouds of the Pacific Northwest covered the sky for several days during the final week of fine-tuning before the Center's dedication on August 28th last year. Yet Carpenter was pleased with the effect on the glass; the gray background made the colors subtler and richer.

"What happens when it's overcast, when it's gray up there, is that the glass becomes a little stronger and a little more reflective, so there's a little more sparkle, a little more contour." That unexpected bonus shows just how well the Spectral Light Dome suits its surroundings. This new multi-hued jewel of glass and steel delights the public as it sparkles high above their heads, constantly changing like the crowd and the movements reflected in its bands of glass. ■

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

IALD presents 1987 design awards at annual meeting

The International Association of Lighting Designers (IALD) announced two awards of excellence and five citations for significant design achievement at its annual meeting and awards dinner in San Francisco in November. Awards were based upon aesthetic achievement, technical merit, and sensitivity to the architectural concept.

Members of the 1987 IALD awards jury were Peter Barna, IALD, Light & Space Associates Ltd. (New York); Margaret F. Gaskie, Architectural Record *(New York); Frances Halsband, FAIA, R.M. Kliment & Frances Halsband, Architects (New York); William Lam, IALD, William Lam Associates, Inc. (Cambridge, Massachusetts); Arthur Cotton Moore, FAIA, Arthur Cotton Moore/Associates, PC (Washington, D.C.); Sandra Stashik, IALD, Grenald Associates Ltd. (Philadelphia); and Kevin Walz, Walz Design (New York).*

Function and Image

An Award of Excellence — the highest award — went to Stephen W. Lees, IALD (Horton•Lees Lighting Design Inc., New York and San Francisco), for the McCarran International Airport in Las Vegas, Nevada. The project, the first phase of a three-phase master plan, consists of the Central Terminal and parking structure, a remote loading gate structure, and an automated transit system that links the two.

Deliberately working with a limited lighting palette, Lees gave each area its own kind of lighting — fluorescent for circulation pathways, incandescent for retail areas, metal halide for baggage claim areas, and neon for decorative accent.

The jury praised the designer's use of lighting to create a likable, welcoming airport that conveys the flavor of Las Vegas without overdoing it.

Wit and Proportion

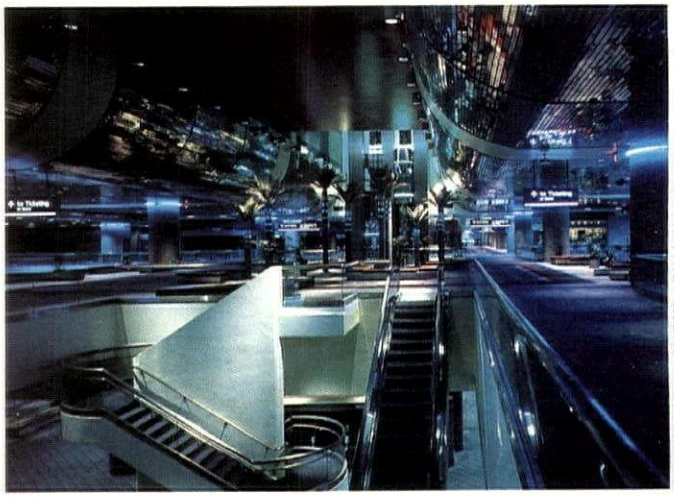
Chris Ripman, IALD, and Nancy Tekirian Polcari (Ripman Lighting Consultants, Belmont, Massachusetts) received their Award of Excellence for the Advantage Showroom in Waltham, Massachusetts, which displays modern appliances against the backdrop of a plaster relief sculpture of a 1930s kitchen.

One of the showroom's two primary light sources is exposed, tying together the sculpture, architecture, and product displays. A curved, warm white neon tube more than 20 feet long forms part of the steel trellis over the reception desk; behind the receptionist, a line of neon "smoke" rises from a plaster frying pan and drifts into the showcase corridor. Inside the showroom, lines of neon connect the different display areas.

The second source is unobtrusive display lighting that floats overhead on a track. MR16 and PAR 36 low-voltage lamps in black holders on black track disappear into the unlit ceiling grid above the colonnade that frames the displays. An occupant sensor dimming system brings up the display lighting when someone approaches, causing the appliances to stand out from the overall design. When the person walks away, the lights fade.

The dimming function grew out of the owner's plan for using the showroom: access is controlled; architects and interior designers move through the galleries one at a time, accompanied by a company representative.

The jurors called the lighting design "playful and witty," saying it plays a major role in the design theme of old versus new, is used with discretion, and is in proper proportion in relation to other design elements.



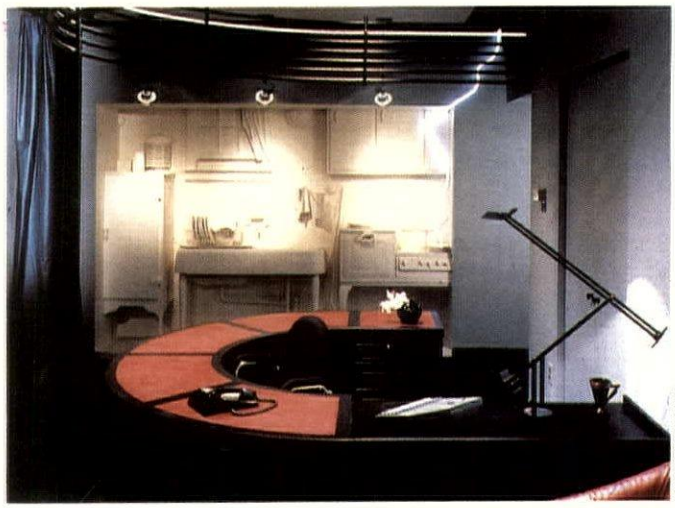
TIMOTHY HURSLEY/THE ARKANSAS OFFICE

An Award of Excellence went to Stephen W. Lees, IALD, for McCarran International Airport in Las Vegas, Nevada.

Citations for Significant Design

Tyler H. Donaldson (James Stewart Polshek & Partners, New York) and Charles Stone (Jules Fisher & Paul Marantz, Inc., New York) received a citation for the renovation of Carnegie Hall in New York.

One of the primary goals of the project was to faithfully preserve the hall's original appearance. A custom-designed "tiara" fixture updates the stage lighting. The main lobby was totally redesigned with concealed light sources to highlight the volume and detail of the lobby; custom-designed fixtures at the box office windows and flanking the ornamental stairs serve as markers and human-scale elements in the monumental space.

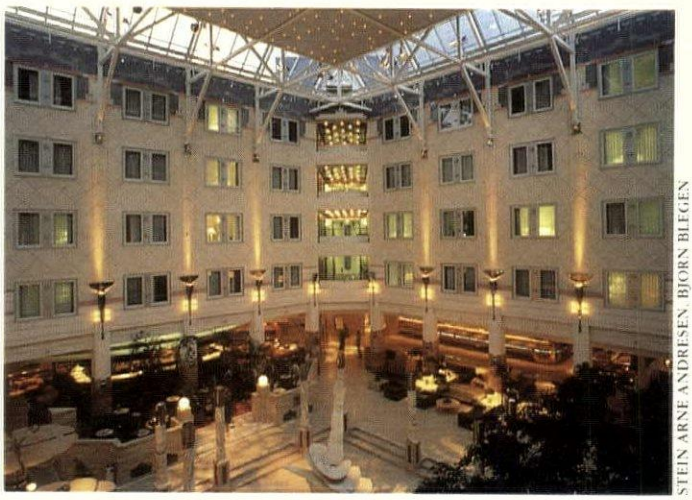


PETER LEVITT

An Award of Excellence was given to Chris Ripman, IALD, and Nancy Tekirian Polcari for the Advantage Showroom in Waltham, Massachusetts.

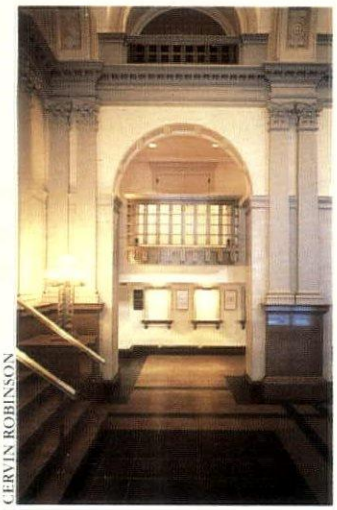
PETER AARON/ESTO

Babu Shankar, IALD, was awarded a citation for the renovation of the Willard Hotel in Washington, D.C.



STEIN ARNE ANDRESEN BJORN BLEGEN

Jonathan Speirs, IALD, was cited for the lighting design at the Sheraton Hotel Oslofjord, Oslo, Norway.



CERVIN ROBINSON

Lighting designer Tyler H. Donaldson received a citation for the renovation of Carnegie Hall in New York.

Babu Shankar, IALD (Wheel Gersztoff Friedman Associates, Inc., New York and Los Angeles), was cited for the Willard Hotel in Washington, D.C. — a project that modernizes the lighting while retaining its original character. The 1904 lighting scheme used chandeliers and wall sconces. The renovation uses accent lighting — pendants have an element to light the glass of the chandelier itself, an uplight to accent the ceiling art, and a low-voltage downlight to accent the colors of the carpet. Period fixtures were reproduced from photographs, and small accent lights were recessed into rosettes in the ceiling patterns to highlight sculpture and artwork.

Jonathan Speirs, IALD (Lighting Design Partnership, London and Edinburgh), was cited for the Dress Circle Restaurant in Harrods in London. The jury cited the elegance of the design solution.

Speirs received a second citation for his design of the atrium at the Sheraton Hotel Oslofjord in Oslo, Norway. This project called for the interior atrium to appear as an exterior atrium, with light emulating dawn-to-dusk changes in daylight. A microprocessor-based dimming system controls 50 circuits in the atrium, providing a progression of lighting scenes from predawn to dawn, midmorning, midafternoon, dusk, and night.

Derek Phillips, IALD (Derek Phillips Associates, Bovington, United Kingdom), was cited for the lighting design at Durbar Court, Foreign and Commonwealth Office, Whitehall, London. The design scheme created an atrium at Durbar Court, which is surrounded by offices of the Foreign and Commonwealth Office. The Court will be used — and lit — only for official functions and state occasions, perhaps as infrequently as twice a year. Metal halide sources at handrail height near the overhead catwalks provide general wall lighting; sources mounted lower are directed to the rear walls and tiled ceilings of courtside loggias. Circular medallions on the catwalk are lit with tungsten halogen spots to provide decorative light around the upper story. Low-level light from small tungsten torcheres is added for state occasions to enhance the appearance of silverware. ■

TONY HARRIS

Jonathan Speirs, IALD, received a citation for his work relighting the Dress Circle Restaurant in Harrods, London.

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Durbar Court, Foreign and Commonwealth Office, Whitehall, London; lighting solution by Derek Phillips, IALD.

Daylighting Techniques

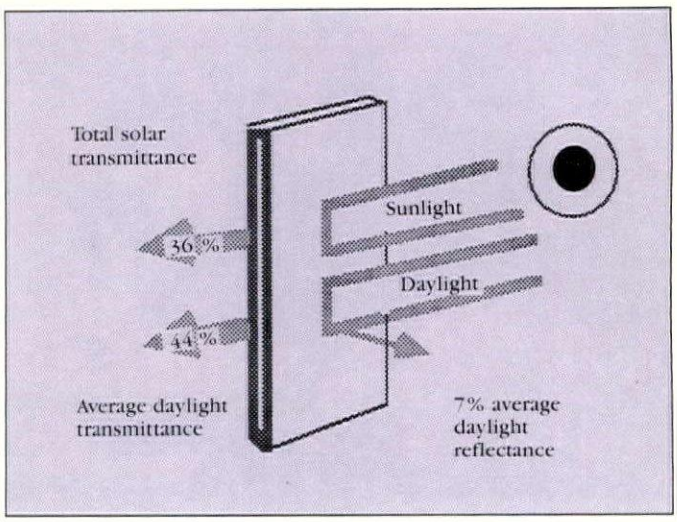
The design of new buildings that use daylight has been greatly influenced by new daylighting systems. Today, designers have available a great deal of technical information that describes what works and how it works in various daylight application strategies. It is important for designers to identify the components of each system and learn how to match a system's function with a user's actual requirements.

Unlike other building systems, a daylighting system is in full view for everyone to see. In this situation, a designer cannot ignore user demands for visual comfort without glare and for architectural or artistic expression. The successes and failures of daylighting systems are measured on the spot by occupant response throughout the day.

Light transmission and reflection

Mojtaba Navvab

Mojtaba Navvab is an assistant professor of architecture in the College of Architecture and Urban Planning at the University of Michigan, Ann Arbor.



The transmission and reflection of light is illustrated in the accompanying computer-generated graphs.

Unlike other building systems, a daylighting system is in full view for everyone to see.

The potential benefit of daylight is easily identified. It influences the quality of the indoor luminous environment; with an appropriate daylighting control system that responds to daylight's dynamic changes, it can increase visual performance. Most people prefer daylight at their place of work. It is free, with proper planning, so it can reduce electric lighting energy consumption, and thereby decrease heating and cooling loads and therefore reduce the size of the HVAC system needed.

Daylight provides a great range of luminance and a spectral composition that physically differs from electric light. These variations can be seen during the course of the day. The impact of dynamic changes on the quality and quantity of indoor light is greatly dependent on the design of the daylighting system. In the design of any daylighting system, it is important to avoid excessive luminance at any fenestration or skylights; it causes glare. The daylighting system should use the light from the sky and, as a rule, should eliminate the direct beam from the field of view.

The performance of each system's components has a major effect on illuminance levels and luminance distributions within the space. The reflectance of surfaces, the amount of glazing, and any obstructions caused by structural members has to be integrated in the design of a daylighting system. The amount of light reaching the deep part of the space depends on wall or ceiling reflectances, which act as a light guiding system. A basic understanding of the analysis of physical properties of materials, coupled with today's technology, provides daylighting designers with various choices for controlling the distribution of light.

Transmission and Reflection of Light

Materials used in lighting applications generally fall into three categories: opaque, transparent, and translucent. Opaque materials transmit no light; instead, they reflect or absorb part of the light. Transparent materials allow the transmittance of light and a view of objects on the opposite side. Translucent materials transmit light, but the light is scattered or diffused, and objects cannot be seen through these materials.

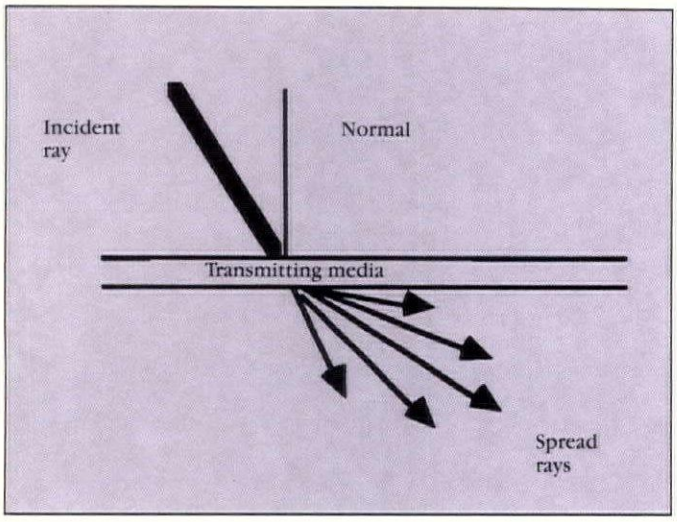
When light strikes a surface, it is reflected, transmitted and absorbed, or polarized. Incident and reflection angles are equal for regular specular reflection.

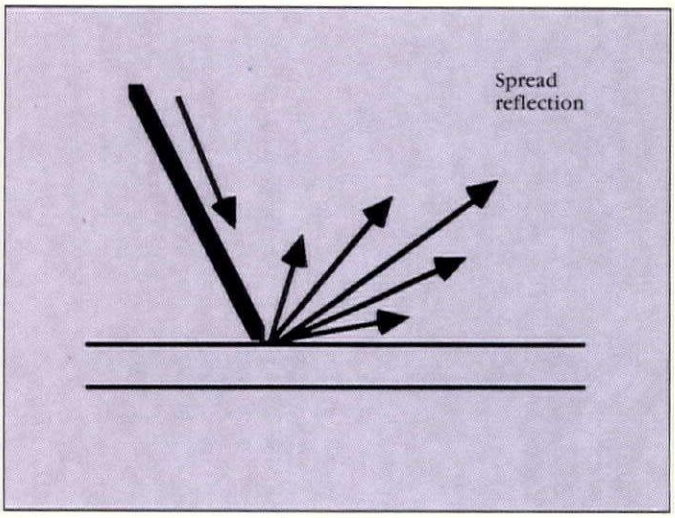
The reflection of light is characterized as *spread reflection* when the reflected light is dispersed in a general direction. Complete *diffuse reflection* occurs when the reflected light bounces off a surface equally in all directions regardless of the source direction. *Mixed reflection* has both specular and diffuse reflection properties.

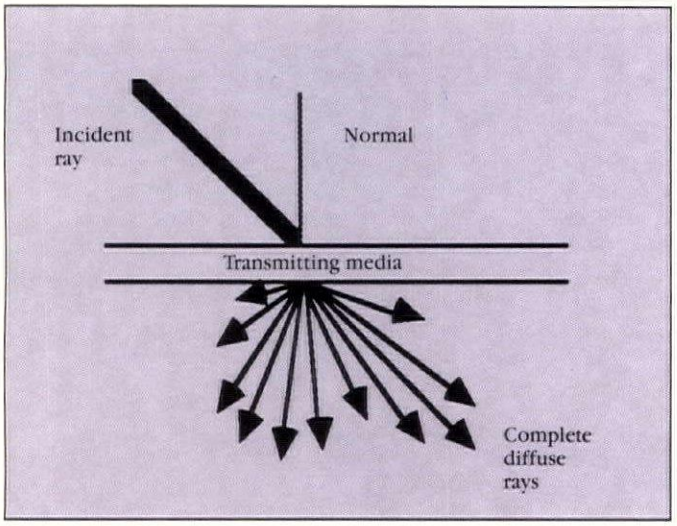
The spread reflection can be seen from materials such as mirrors or highly polished metals — Alzak, for example. Flat white paint and baked enamel produce diffuse reflection; high gloss paint and porcelain create mixed reflection. The same characteristics can be applied to describe *spread, diffuse,* and *mixed transmitting media.*

White glass, Plexiglas, and various plastic materials that have low transmittance levels produce diffuse transmittance. Light travels in uncontrolled waves radiating in all directions. When all waves vibrate on one plane, light is polarized. This light is used to reduce glare from veiling reflections, and its use results in greater visual contrast, texture, detail, and color.

Daylighting systems have been designed to make use of the properties of these materials. Designers use translucent materials and prismatic transparent materials, for example, to admit skylight while eliminating the direct sunbeam. The next Daylighting Techniques column will discuss and illustrate translucent and transparent daylighting systems. ■


Incident ray
Normal
Transmitting media
Spread rays


Spread reflection


Incident ray
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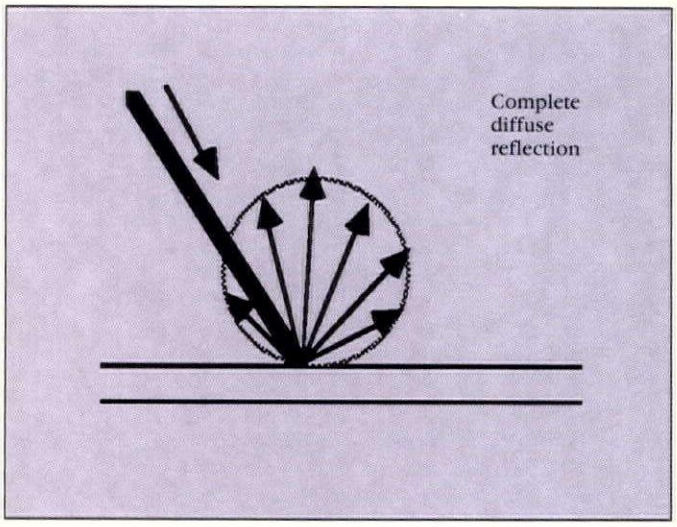
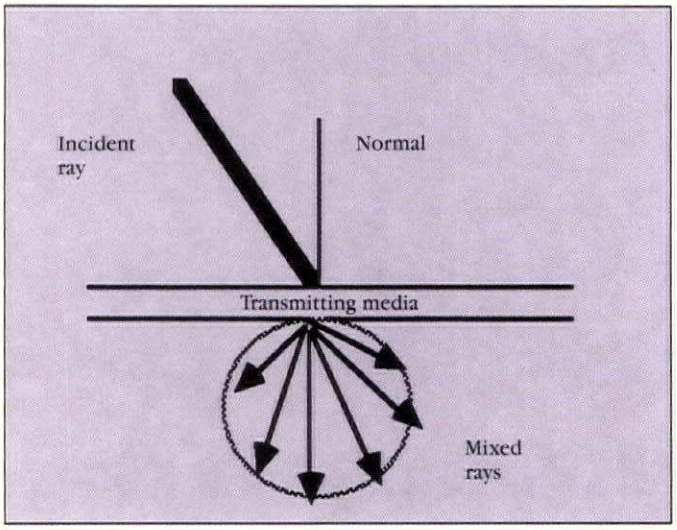
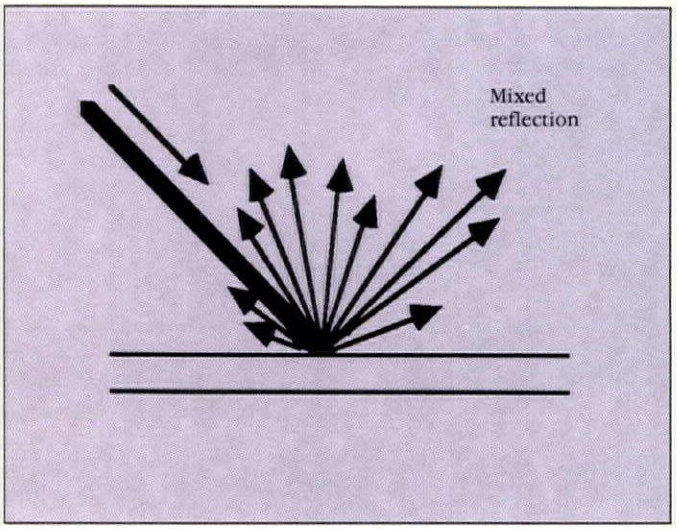
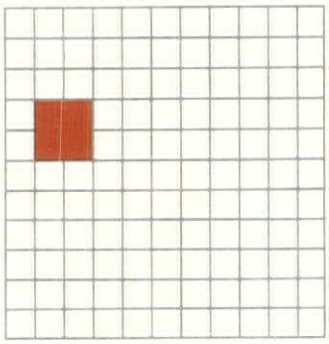
Transmitting media
Complete diffuse rays


Complete diffuse reflection


Incident ray
Normal
Transmitting media
Mixed rays


Mixed reflection

The Lighting Design Professional



High style, low-voltage design and application

James R. Benya, PE, MIES

James R. Benya is senior principal and CEO of Luminae, Inc., San Francisco. He is on the faculty of California College of Arts and Crafts, is active in IES and Designers Lighting Forum of Northern California, and teaches lighting design classes for the ASID, IBD, and AHLI.

In the 1980s, lighting finally became an accepted, major design specialty within architecture and interior design. Like architecture, it was freed from the shackles of modernism — which tended to treat lighting as a "building system." The lighting design profession benefited from the growing interest in ornamenting and decorating as part of architectural design. The achievement of effective and efficient lighting required uniquely trained individuals, specialized equipment, and new approaches.

Many of the new lighting designers saw low-voltage lighting as an important tool. It offers the precision of theatrical instruments at a fraction of their size and energy consumption. It allows the creation of many new effects, like a slash of light, that had not been seen before. But most of all, the close, intertwined harmony of high technology and supreme artistic creation appeals to these designers and their clients alike.

With the introduction of the MR16 lamp and many new high-quality products, low-voltage lighting became an important everyday tool for most lighting consultants and many architects, engineers, and other designers. Subsequently, a host of new and creative products have been introduced to solve lighting design problems in better ways than ever before.

Designing for Energy Efficiency

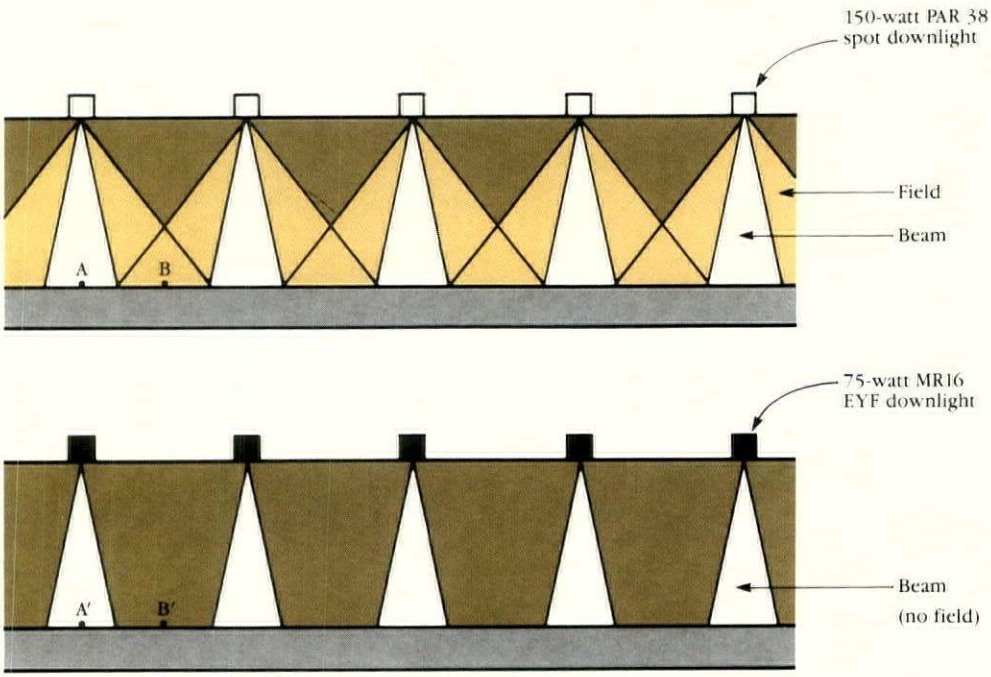
Low-voltage lamps are a type of incandescent or tungsten-halogen lamp. All low-voltage lamps produce less than 25 lumens of light per watt of electricity, giving them relatively low efficacy. In addition, the transformers needed to reduce ordinary 120- or 277-volt power to low voltage account for a 1 to 5 percent loss of input wattage. But some low-voltage lamps are much more *optically* efficient than standard-voltage R and PAR lamps. By focusing most of the lamp's lumens into the *beam,* there is less spill light into the *field,* or unfocused area of light. This optical advantage can save energy by concentrating light where it is needed, so fewer fixtures are required.

Both lamps in the accompanying figure provide the same illumination (measured in footcandles) for the task area directly below the fixture. Ambient illumination from the low-voltage lamp, however, is comparatively low. Energy conservation is achieved either by maintaining this very high contrast between task and ambient illumination, as for commercial display, or by adding ambient light with higher-efficiency general light sources, such as fluorescent. A typical retail store, traditionally lighted exclusively with PAR 38 incandescent lighting at 5.0 watts per square foot, can have the same illumination levels using MR16 task lighting and fluorescent ambient lighting at 2.5–3.0 watts per square foot.

The Advantage of Compact Fixture Size

Most low-voltage lamps have significantly lower wattages than common 120-volt lamps. This, combined with the diminutive size of lamps like the MR16 and MR11, allows the use of much smaller recessed housings, track fixtures, and strip lights. In addition, the smaller the aperture, the less likely that the ceiling will have a gopher-hole appearance.

Full-featured fixtures do, however, provide sufficient lamp recess to prevent glare and a cheap appearance. A typical full-featured, recessed, adjustable accent light for MR16 lamps has a 5½-inch-high housing and a 2⅞-inch-wide aperture. A similar PAR 36 accent light is 10⅛ inches



Comparison of illumination produced by line-voltage and low-voltage lamps. Task illumination level at A and A' is 115 footcandles. Ambient illumination level at B is 25 footcandles; at B', 5 footcandles. Source: GE photometrics.

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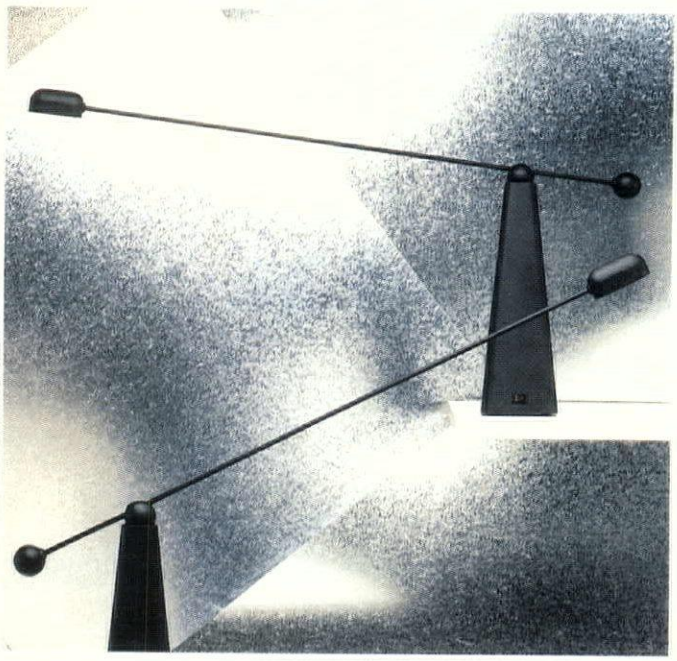
Circle 16



COURTESY OF RON REZEK/ARTEMIDE

Halogen task lamp.

high with a $5^{11}/_{16}$-inch aperture, and a similar light for line-voltage PAR 38 or R40 lamps is $13^{5}/_{8}$ inches high with a $5^{11}/_{16}$-inch aperture. The housing height restricts applications: of these three, only the MR16 fixture could be used in a residence with 2″ × 8″ ceiling joist construction.

Accompanying sections show under-shelf lighting and depict the possibilities of low-voltage lighting compared with lighting by traditional incandescent or fluorescent fixtures. Note the improvements in optical control and cutoff. The disadvantage of low-voltage lighting here is heat: higher lighting levels require much more wattage.

The small size of a halogen bud lamp allowed the task fixture shown in an accompanying photo to have a delicate lamp reflector and shell that complement the beauty of the rest of the fixture. (Try to imagine this design with an A19 lamp on the end!) The fixture is now in the Museum of Modern Art in New York.

Dimming

All low-voltage lighting systems are dimmable. Dimming is almost always done on the primary (120- or 277-volt) side of the transformer. When choosing a system, consider the following recommendations.

Autotransformer dimmers (variable transformers) work best; they do not cause noise, flicker, or other problems. Unfortunately, they usually are large and not easily controlled by modern dimming systems, such as four-scene presets.

Solid-state dimmers rated for low-voltage (inductive) loads work fairly well on low-voltage systems that use conventional magnetic transformers. Debuzzing coils are generally recommended, especially for PAR 36 incandescent lamps. Universal dimmers — capable of dimming standard incandescent or low-voltage lighting — are used in wall-box preset dimming systems.

The solid-state "transformers" supplied with many track fixtures are not really transformers, but solid-state switching power supplies. Because solid-state dimmers are also switching devices, interference and interaction between dimmer and transformer are likely if they are used together. That can result in strobing, buzzing, and possibly device failures. Most manufacturers of solid-state transformers or dimmers recommend against using them together, and will not warrant equipment that is so used.

Dimming increases lamp life for low-voltage lighting, as it does for regular incandescent lamp lighting. Remember that MR16s and other halogen lamps still require periodic near-full-light operation to activate the halogen cycle and thus achieve expected lamp life.

Good Color with Some Variety

Low-voltage lamps provide warm-toned white incandescent light with very good color rendering. Designers can choose from a surprising variety of options. Reflector lamps, for example, are offered in both regular incandescent (PAR 36–PAR 64, R12–R14) and halogen versions (MR11, MR16, certain PAR lamps, GB series).

Low-voltage systems concentrate light where needed.

Halogen lamps are noticeably whiter than regular incandescent lamps, and are great for commercial display. Many designers find the halogen lamps too white for residential lighting, however, especially fill light, and prefer to use color-correcting filters with them or to use incandescent lamps instead.

Most linear low-voltage systems operate lamps considerably under voltage to preserve lamp life. These systems appear yellow and dull, especially next to halogen lighting. In the Franco Ferrini shoe store, halogen display lighting seems crystal clear next to the warm, linear festoon lamp system used for the shelf lighting. This combination was very effective, however, at revealing a sophisticated, layered lighting appearance.

A Safer Source

Low-voltage lighting helps solve a number of difficult wiring problems. By operating under 30 volts, low-voltage lighting can fall under National Electric Code Article 725, Class 2. In addition, it is often considered "intrinsically safe" for operation in and around swimming pools, wading pools, and similar situations. Many exterior garden landscape lighting systems use low-voltage wiring with the secondary conductor lying unprotected in the topsoil or ground cover.

In interiors, however, low-voltage transformers are often best located at the fixture. This allows for the exact desired voltage to be supplied to the lamp. In addition, all wiring to the fixture is conventional electrical work that requires no special knowledge or experience on the part of the electrician.

Remote transformer systems are an alternative, but only experienced personnel should design and install them. The advantages of remote transformers include lower acoustical noise, intrinsic circuit safety, and, occasionally, a lower installed cost due to less expensive materials or simplified wiring methods.

Many remote transformer installations, however, when not properly designed or used, have suffered from poor voltage regulation, severe overloading, and higher installed costs. At least one major manufacturer has stopped marketing remote transformer–supplied track systems.

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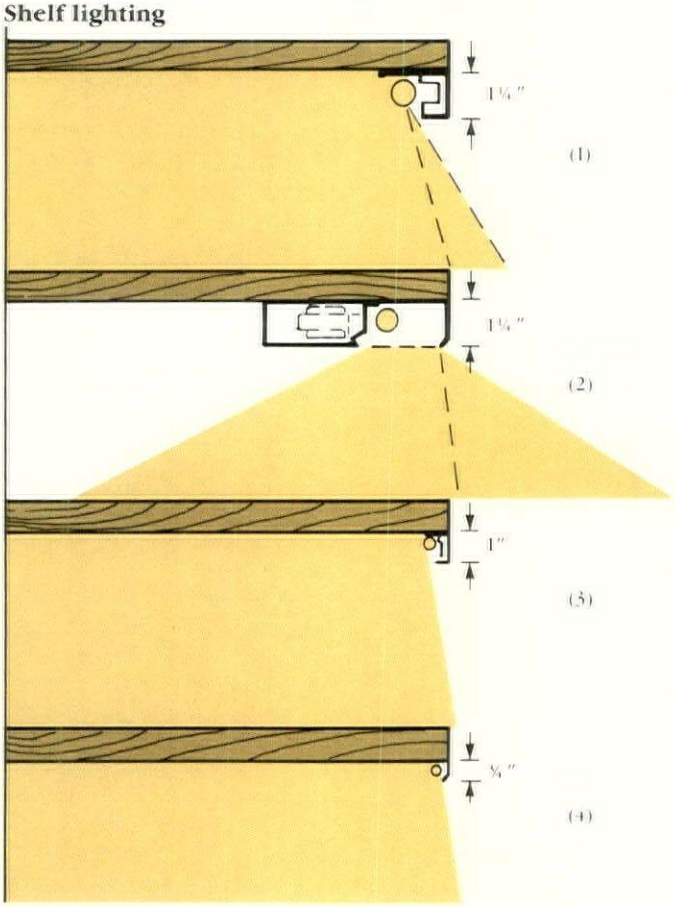
Franco Ferrini shoe store display lighted with linear shelf lighting and MR16 track.

Shelf lighting



Under-shelf lighting options: (1) standard 120-volt "Christmas tree" lamp strip (note limited cutoff), (2) fluorescent compact strip (note lack of control), (3) low-voltage festoon lamp strip with housing, (4) low-voltage flexible light tubing with housing.

Beware the "museum" look

The popularity of low-voltage lighting has encouraged its improper use by inexperienced designers. Try to avoid the following classic problems — which occur when low-voltage lighting is not used well.

The "museum" look. This occurs primarily in residential design when all the art objects in the room are highlighted by low-voltage lighting without fill light. To fix, add wall sconces, torcheres, table lamps, or additional track or recessed fixtures and flood lamping.

Garden uplighting. A good-sized tree or hedge, especially in a commercial application, often needs more raw light than low-voltage landscape lighting equipment can generate. Better solutions usually include PAR 38 incandescent, quartz, and/or HID sources.

Wall washing. True wall washing, as opposed to grazing or accent lighting, is a job for bulk raw light sources. It is simply a waste of money to use low voltage here. The same advice applies to any kind of floodlighting.

Downlighting. Unless a true "pinspot" downlight is needed, think twice about using these lamps. Remember, they are normal-lived incandescent lamps that, generally, cannot be changed easily (most use lamp holding clips or screw terminals).

Finally, remember that low-voltage lamps are not available at the corner hardware store. They tend to be hard-to-find, expensive lamps with a critical need for a trained individual when it's time to change them. It's one thing for the ultimate owner to be someone who loves and appreciates the finesse and achievement of the design; it's another to stick an unwary maintenance person or householder with an overly sophisticated lighting system. ■

Because a remote transformer installation must be designed for a specific voltage drop, wire size and distribution pattern are the keys to proper operation. In low-voltage systems, even a small voltage drop across the wiring is a significant percentage of initial voltage. A ½-volt drop that would scarcely affect a 120-volt lamp noticeably reduces the brightness and color temperature of a 12-volt lamp.

To prevent significant voltage differences from fixture to fixture, the distribution pattern of the transformer should be radial or star-shaped rather than a long string. Because voltage drop accumulates along a string, improper wiring can produce extremely bright and short-lived lights near the start of the string and dull, yellowish lights at the far end.

Exceptional Applications

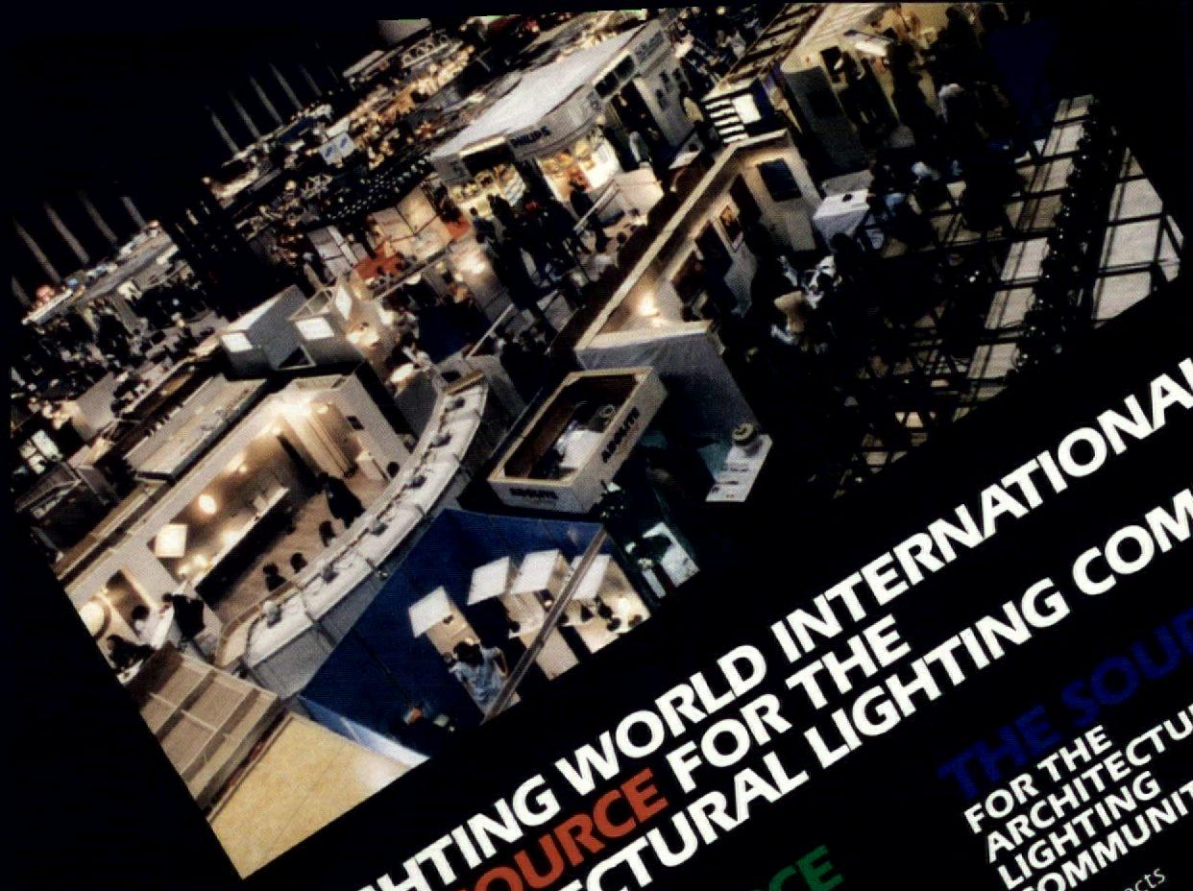
In a few situations, the low-voltage solution is clearly the best — substantially better than any other.

Home and residential settings with very high ceilings. High cathedral ceilings are difficult lighting situations. Many designers want the drama and impact of the "low-voltage look," and many others just want some focal lighting without glare or the extreme cost of framing projector installations. PAR 36 lamps are especially good in these situations (be careful to use louvers).

Low-profile track lighting. Track can be objectionable because the fixtures create a ceiling full of clutter. The MR16 fixtures are especially small, making track useful in many sensitive applications.

Inside cabinets. The delicacy and comparatively low wattage of flexible strip lighting can provide soft lighting inside cabinets and furniture. Tiny wiring and a minimum of mounting hardware allow for virtually no damage to the cabinet.

Galleries, museums, aquaria, and similar attractions. In these ultrahigh contrast situations, low-voltage lighting is unparalleled as a design tool. ■



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Sam Mills, AIA, IES

Sam Mills is an architect and lighting consultant with his own firm in Oklahoma City.

Lighting systems characterized as having *indirect* distribution are distinguished by a quality of light best described as being nondirectional. As the name implies, light rays are bounced off a secondary surface, which diffuses and redirects the light. These surfaces are most often architectural ceilings and walls.

Some indirect lighting systems are classified as built-in and offer the opportunity for detailed integration with the architecture of the space. The names given to these built-in lighting elements reflect their architectural heritage: lighted *cornices, soffits,* and *coves.*

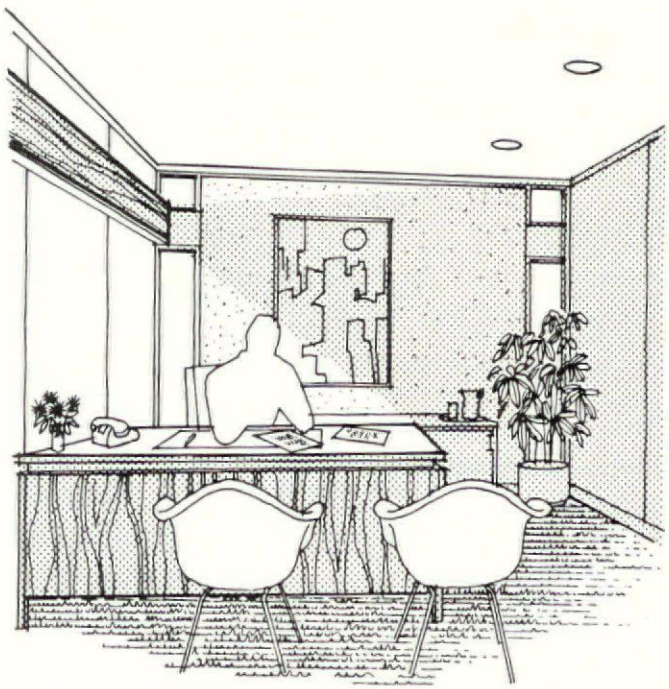
The accompanying drawings show one of the most versatile indirect lighting elements, a lighted *wall bracket* or *valance.* The term valance usually applies to applications above windows that include provisions for draperies. Many possible variations of the lighted bracket design include locating it high or low on the wall, using it as an individual element, running it wall to wall, and incorporating various architectural details.

The bracket shown in the drawings has a relatively small projection out from the wall, which is accomplished by the use of a side-mounted two-lamp fluorescent light strip. As for other built-in fluorescent installations, the best lamps to choose are 3-foot and 4-foot rapid start types; this is because they offer a wide selection of energy and color characteristics that permit overall lengths in 1-foot multiples (see Lighting Graphics, September 1987).

A unique characteristic of the wall bracket is its ability to furnish both indirect general lighting and direct task lighting. The direct task lighting, however, is limited to a relatively short distance out from the wall, as a result of shielding the lamps by the face board. The problem is alleviated by some additional task light furnished by the light reflecting off the ceiling and wall. If a different face board position is considered, care must be taken to shield the lamps from direct view by both seated and standing occupants of the room.

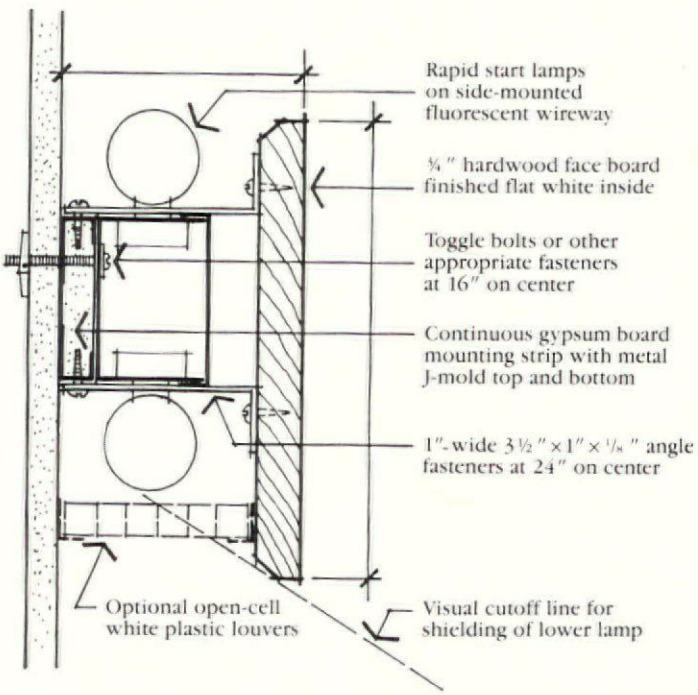
After the architectural details are worked out, the following rule of thumb helps in estimating the lighting levels to be expected. Current average light output for 3-foot and 4-foot rapid start fluorescent lamps is approximately 750 lumens per foot of lamp length; so, a density of 150 to 200 lamp lumens per square foot of the total room floor area provides lighting levels within the range of current recommendations for typical office tasks — 50 to 70 footcandles.

The custom-designed bracket may not be suitable for all applications. In that case, consider the many excellent off-the-shelf products that function quite well as lighted wall brackets. ■



Lighted wall bracket

Lighted wall brackets furnish an architecturally coordinated interior appearance while also providing both indirect general lighting and direct task lighting through the use of the architectural surfaces for distribution of the light.



Wall bracket cross section

The Kim Architectural Floodlight

You don't have to hide it behind shrubbery.

There is no other way to say it: Kim has re-invented the floodlight. By combining performance, versatility and ruggedness with a new standard in aesthetic refinement, Kim has created a superb lighting instrument for exterior and interior use. Available in three beam patterns, six H.I.D. lamp modes and nine mounting options, the AFL is another example of Kim's commitment to affordable quality.

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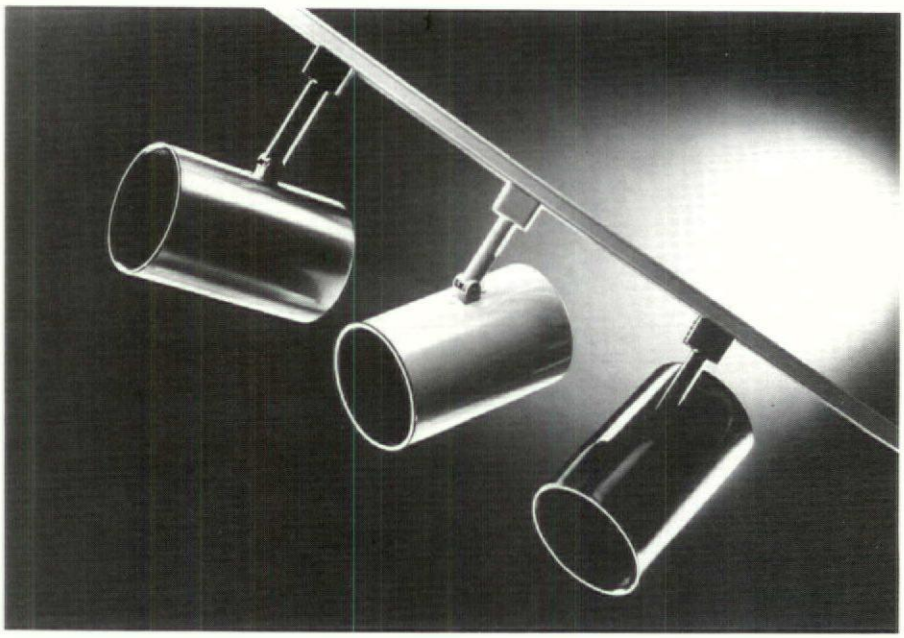
Product Showcase



■ Track lighting system

Con-Tech's 2400-watt Lighting Zone system features an easy-to-install track and a variety of connectors and fixtures. Fixtures have a deep, black phenolic baffle, a specular white reflective surface, and a switch. They may be moved anywhere along the track. Stem mounting is standard; a flexible yoke mounting is optional for some models.

Fixtures are available in three sizes and four designs. The largest models accommodate an R40 or a PAR 38 lamp up to 150 watts; others accommodate smaller R or A lamps. Fixtures come in white, black, polished brass, and antique brass finishes; tracks and accessories come in white and black. The system is suitable for general, task, and accent lighting. Conservation Technology, Ltd., Northbrook, IL.

Circle 60

■ Tilting pendant lamp

Boyd Lighting's Tilt 36 pendant lamp, designed by Doyle Crosby, features a double-disc assembly suspended by four slender steel cables. The lamp can be tilted at angles from the horizontal plane for multidirectional, targeted control of the light beam. Its counterbalanced construction keeps the angle stationary; a small canopy switch locks the angle into permanent position in vulnerable locations.

The 11⅝-inch-diameter pendant lamp of brass and aluminum suspends from an 8¼-inch-diameter canopy, which houses a miniature solid-state transformer. It comes in two finishes: satinized aluminum and brass or silver granite, a durable, textural application of silver and black veining. The pendant accommodates one 50-watt, 12-volt PAR 36 lamp. Four overall height options are available: 24, 30, 36, and 42 inches. Boyd Lighting Company, San Francisco, CA.

Circle 61

■ Direct, indirect lighting

Columbia Lighting's Pendacurve fixtures are trim-profile extruded aluminum units with softly rounded sides. They provide a soft, glare-free wash of approximately 40 percent direct and 60 percent indirect light, according to the manufacturer. The fixtures can be suspended individually or in rows and can be bracket mounted on walls or pendant mounted from stems or aircraft cables. An optional injection-molded end cap follows the fixtures' rounded lines.

Detailed connectors and end pieces are available as accessories and are painted to match fixture bodies. Fixtures, louvers, and other components come in a variety of standard and custom colors. The fixtures are available in models for one or two T8 or T12 fluorescent lamps. Columbia Lighting, Spokane, WA.

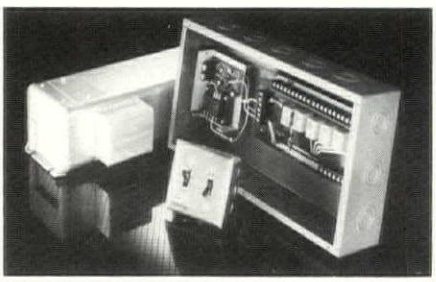
Circle 62

■ Bollards

U.S. Pole has a new collection of steel and aluminum bollards in four styles. Besides standard round and square models, the company also offers new dome-topped and octagonal models. The bollards feature opal diffusers, cast louvers, a twin reflector system, and a choice of prismatic glass or an internal louver system.

All bollards have a corrosion-resistant baked enamel finish in standard black or dark bronze, with optional finishes available. Lamp choices include mercury vapor, metal halide, high pressure sodium, and incandescent. U.S. Pole Company Inc., Sun Valley, CA.

Circle 63



■ Lighting control system

Wide-Lite offers UL-listed ZoneMate lighting control systems for dimming or bi-level switching of high intensity discharge lighting in commercial and industrial settings. The dimming system provides appropriate lighting levels at different times of the day and night, while the bi-level switching system provides high-low switching of HID lamps.

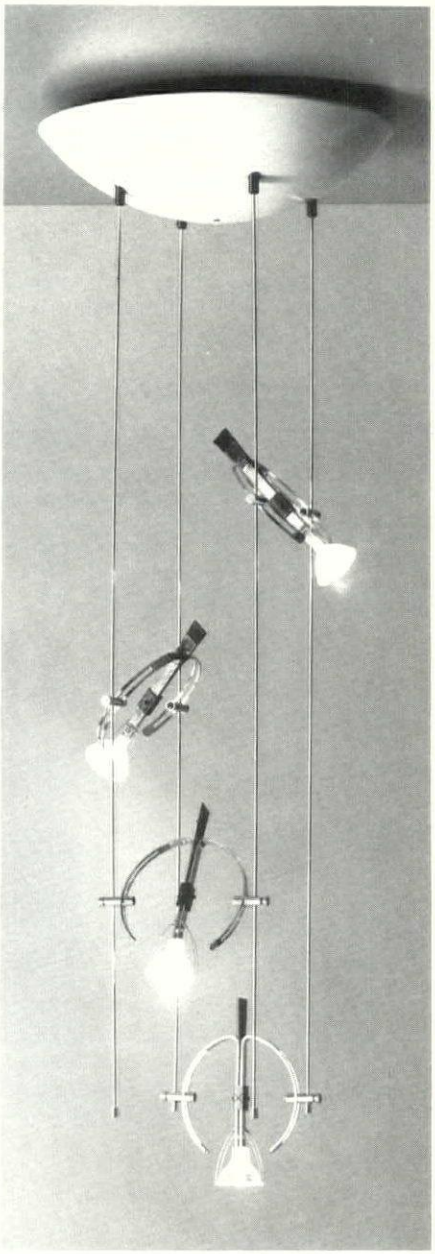
The dimming model is suitable for gymnasiums, offices, churches, factories, transportation centers, and multipurpose arenas. It has an optional photosensor that automatically increases or decreases fixture output to compensate for levels of sunlight. The bi-level switching system is suitable for warehouses, security areas, storage facilities, parking garages, and other applications where low-level lighting is normally adequate but high levels are needed periodically. Wide-Lite, San Marcos, TX.

Circle 64

■ Table lamp

The Coppa table lamp from VeArt was designed by Jeannot Cerutti. It features a white opaline Murano glass shade, a transparent blue crystal base, and silver-plated metal. The lamp is approximately 30 inches high with a shade just under 14 inches in diameter. It accommodates one 150-watt E27 halogen lamp. VeArt International Inc., Montreal, Quebec, Canada.

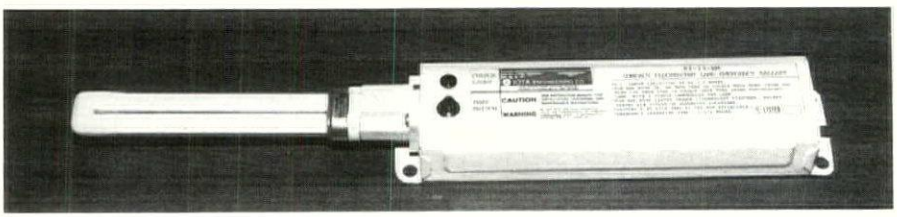
Circle 65



■ Ceiling lamp

Lightscape offers Valenti's Alfa ceiling lamp, which was designed by Giuseppe Raimondi. The metal lamp has four stems that extend down from a white canopy to support four aimable lamps. The fixture accommodates four 12-volt, 50-watt halogen lamps with dichroic reflectors. Lightscape Inc., New York, NY.

Circle 66



■ Emergency pack

Iota Engineering's EZ-13-EM replaces a standard 40-watt fluorescent emergency battery pack and saves labor by reducing wiring connections to as few as two. Other emergency packs may have 8 to 10 connections, according to the manufacturer. The unit can be installed in a recessed troffer on the outside of the ballast channel cover above the fixture lens. A 13-watt compact fluorescent emergency lamp, a test switch, and a charge light are included and require no additional wiring or installation.

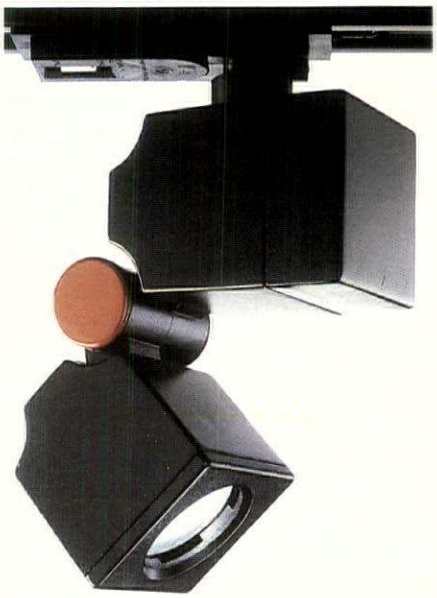
The emergency lamp can also function as a night light when used with an optional ballast and sensing module. It automatically switches on for nighttime illumination after the normal fixture lamps are switched off. The unit is UL listed for 90-minute operation and complies with all NEC and Life Safety Code 101 emergency lighting requirements. Iota Engineering Co., Tucson, AZ.

Circle 67

■ Outdoor lighting

The series 86 architectural cube fixture from Guardian Light incorporates a specular, anodized spun reflector and an HID lamp in a vertical burn position. The fixture provides uniform Type V light distribution, which allows wider pole spacing, according to the manufacturer. The series is available for single post-top mounting or side-mounting assemblies of one to four fixtures. Units have a heavy-gauge aluminum housing and a die-formed steel inner bracket with an internal slip-fitter. Guardian Light Company, Chicago, IL.

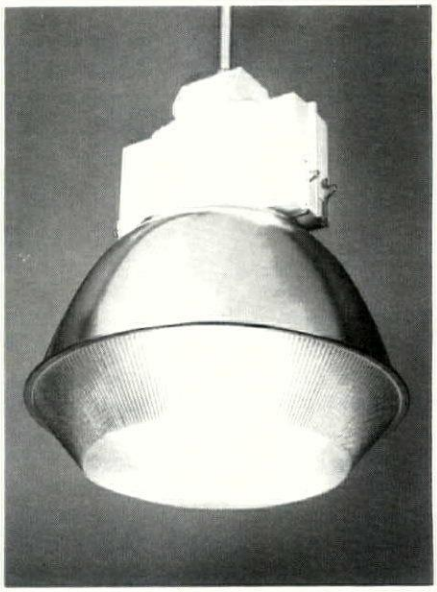
Circle 68



■ Low-voltage MR16 fixtures

Lighting Services offers its MR Series low-voltage fixtures for MR16 lamps. The die-cast fixtures come in both track-mounted and freestanding configurations. The track-mounted version is available in models with and without an integral transformer for normal 120-volt usage. The freestanding version for shelf or desk-top illumination has an adjustable, self-locking swivel, integral on-off switching, and a coiled cord. All units are available in black, white, and silver aluminum finishes. Optional features include a selection of glass color filters, contrast-color swivel caps, a beam softener, and museum-quality UV-blocking safety glass. Lighting Services, Inc., Stony Point, NY.

Circle 69



■ Low bay fixture

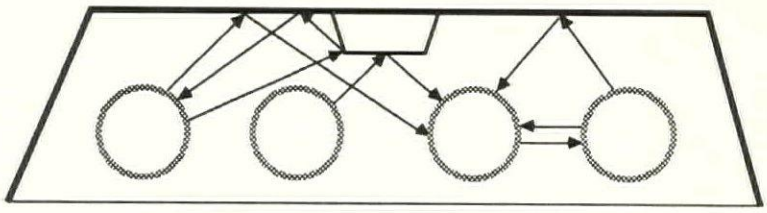
Appleton Electric's Lumenmaster 250 series low bay fixtures use a computer-designed reflector-refractor system to provide uniform, energy-efficient, low-glare lighting for indoor industrial work areas. The refractor is permanently spun onto the Alzak-finished aluminum reflector. The hinged optical assembly is gasketed for use in damp locations. The ruggedly built fixture has a copper-free aluminum ballast housing finished in a corrosion-resistant white polyester powder coat.

All models come with multitap ballasts or ballasts for 480-watt operation. The fixtures accommodate 175- or 250-watt metal halide or mercury lamps or 150- or 250-watt high pressure sodium lamps. Models for metal halide lamps are available with an instant hot-restart feature that eliminates the blackout period after power decrease or loss. Options include a prewired quartz emergency lamp system. Appleton Electric Company, Lighting Division, Chicago, IL.

Circle 70

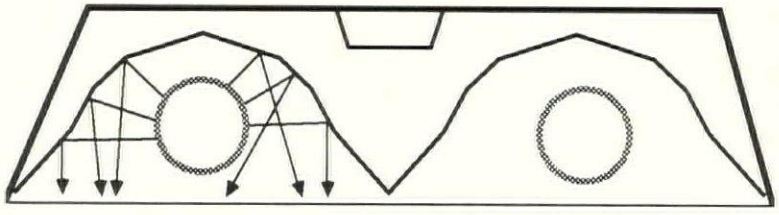
The Problem

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



The Solution

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



The Benefits

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

The Company

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

MAXIMUM TECHNOLOGY

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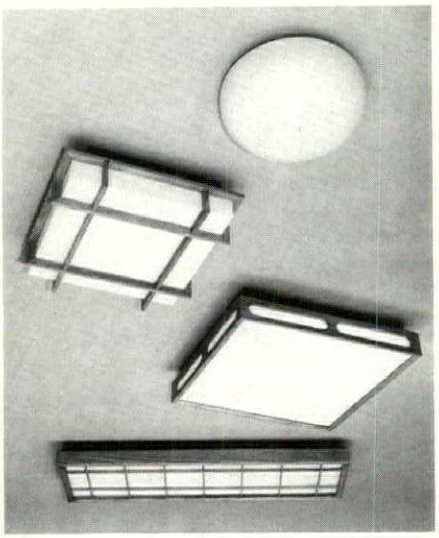
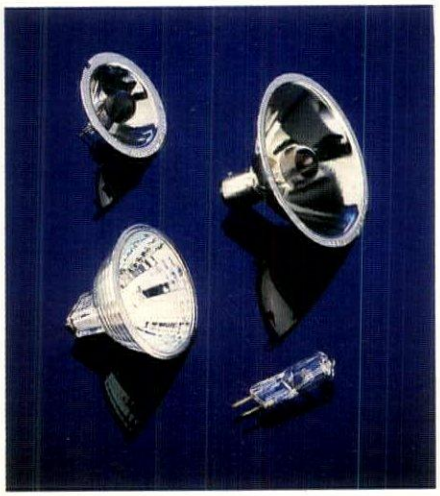
Circle 21



■ Fluorescent luminaires

Brodwax Lighting offers a contemporary series of luminaires for linear, circular, and U-shaped fluorescent lamps. The luminaires feature acrylic diffusers, many with solid oak or walnut frames. They come in a variety of sizes, including those shown here. Brodwax Lighting, Island Park, NY.

Circle 71

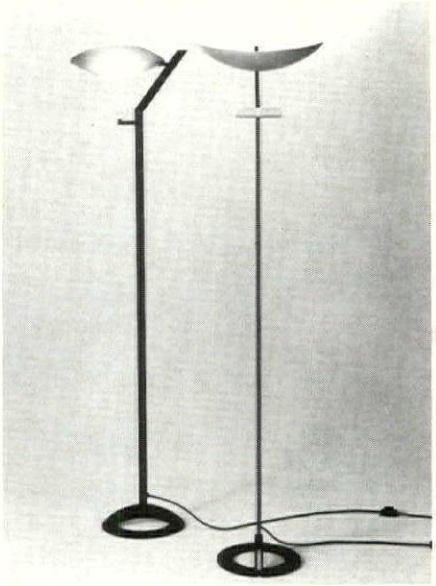


■ Low-voltage halogen lamps

Several types of low-voltage halogen lamps, some with and some without reflectors, are available from Osram. The compact lamps without reflectors (lower right) offer efficacies up to 25 lumens per watt, in wattages from 5 to 100. They are suitable for use in small fixtures and in fixtures with built-in reflectors, or as free-burning decorative light sources. They are recommended for applications in display windows, small showcases, museums, and galleries.

The lamps with metal reflectors shown here produce color like that of incandescent lamps and provide even light distribution without hot spots, according to the manufacturer. The type with a glare shield comes in two sizes (upper left and right), two beam spreads, silver- or gold-colored reflectors, and wattages from 10 to 75. Also pictured is the KLR (MR16) lamp with a dichroic reflector (lower left), available in 20, 50, and 75 watts. These lamps are suitable for track lighting, downlighting, and display lighting. Osram Corporation, Newburgh, NY.

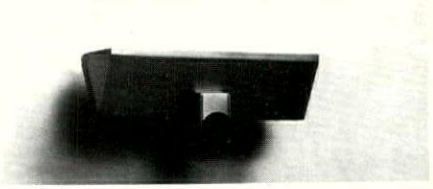
Circle 72



■ Floor lamp

Artemide's Zen floor lamp with two anodized diffusers was designed by Ernesto Gismondi. The 20-inch-long upper diffuser adjusts for general lighting; the lower diffuser provides indirect light. The 78-inch-high lamp stands on a 14-inch-diameter base; both the stem and the base are of metal finished in black. The lamp accommodates two R7s/15 halogen lamps: one up to 200 watts, the other up to 300 watts. Artemide, New York, NY.

Circle 73



■ Wall lamp

Gullans International offers the Bieffeplast Plato 2 wall lamp designed by Douglas Varey. The lamp's epoxy-painted metal housing measures approximately 10 inches wide, 5½ inches high, and 5 inches deep. It comes in black or light metal gray with a red light adjustment button. The lamp accommodates one linear halogen lamp of up to 300 watts. A matching floor lamp is also available. Gullans International, Long Island City, NY.

Circle 74

■ MR16 outdoor fixture

Nightscaping's Spaceliter-AL outdoor fixture for 12-volt MR16 lamps features a watertight, extruded aluminum housing mounted on a swivel joint. The mounting provides complete 180-degree rotation for system mobility, ease of positioning, and beam adjustment. The finish is guaranteed for 10 years and comes in standard black, green, or copper. Lamps come in several wattage and beam spread combinations. Nightscaping, division of Loran, Inc., Redlands, CA.

Circle 75

TEMPO II

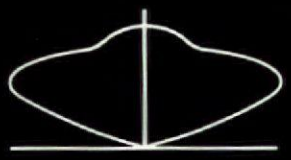
Unequaled Efficiencies
TEMPO II offers a wide assortment of lighting distributions and efficiencies that range from 72% to an unequaled 94%.

Certified test reports are available upon request.

Balanced Color Mix
TEMPO II vertically mounted lamps combined with the TEMPO II patented optical system produces a symmetrical color mix and a color temperature range from 2450 K. to 2950 K.

Unequaled Distribution
TEMPO II offers a wide angle distribution - with maximum candlepower between the 105° and 120° zones.

TEMPO II can be mounted as close as 18 inches from the ceiling.



Wide Range of Lamp/Wattage Combinations and Shapes
Recommended combinations:
100W H.P.S./175W M.H.
150W H.P.S./250W M.H.
250W H.P.S./400W M.H.

Available in:
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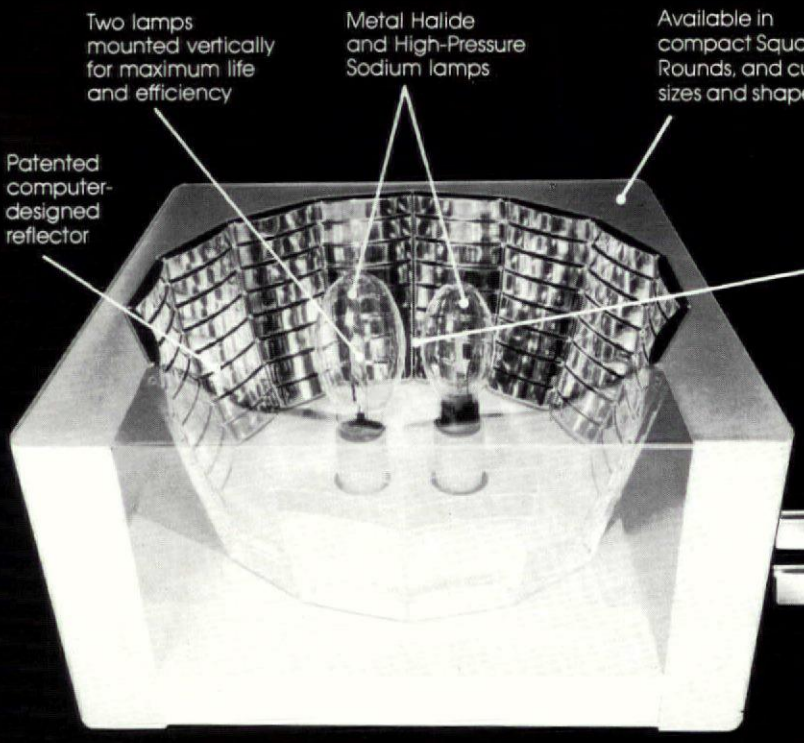
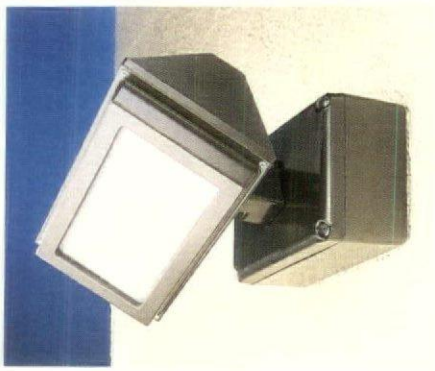


=94% efficiency

Patent NO. 4,293,900

Circle 22

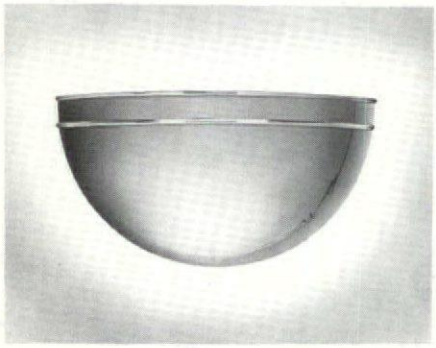


■ Floodlight

Gim Metal's model 3502 specification-grade floodlight features rugged, die-cast construction, superior thermal performance, and outstanding photometrics, according to the manufacturer. It can accommodate a variety of light sources — including high pressure sodium, mercury, and both regular and Osram HQI metal halide lamps — up to 150 watts.

The fixture can be mounted on walls, floors, or ceilings and is UL listed for wet locations. It comes unassembled with all necessary hardware, tempered glass, screws, and gaskets for OEM use. Ballasts, lamps, and sockets must be purchased separately. Gim Metal Products, Inc., Carle Place, NY.

Circle 76

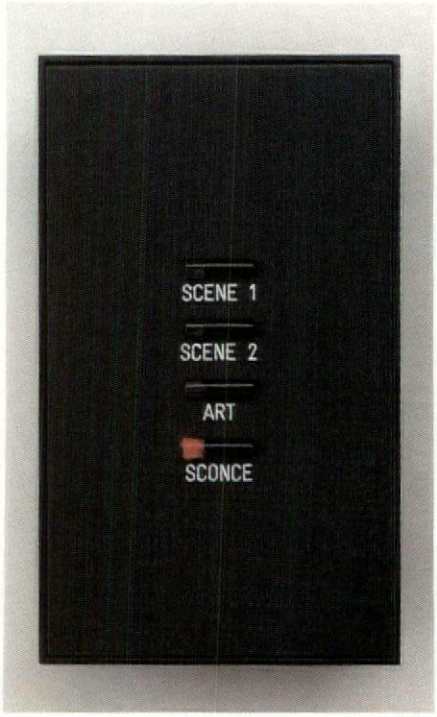


■ Wall bracket

The Alpha wall bracket from Lehr is an award-winning fixture for general lighting. It is mounted on a ball bearing bracket that allows the shade to tilt at 0, 45, and 90 degrees for easy installation, relamping, and light beam control. The fixture comes in two sizes — 8 by 16 inches and 6 by 12 inches — and accommodates two A19 lamps up to 100 watts.

Optional models are available for two compact twin-tube fluorescent lamps or two 100- or 150-watt halogen lamps. Available finishes include five natural metal and four special proprietary colors and a variety of standard and custom finishes. Optional trim bands in polished brass or nickel silver are also available. Lehr Company, Inc., New Rochelle, NY.

Circle 77

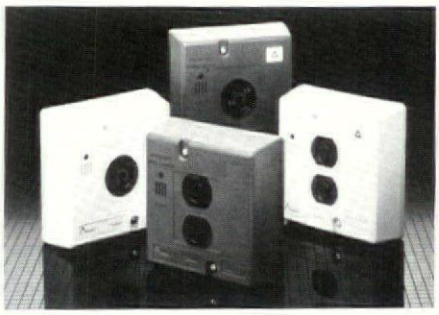


■ Lighting control station

The low-profile Vista lighting control station from Vantage Controls accommodates from one to eight switches in a single-gang space. Its LED indicator communicates function and load status. Switching functions include momentary and latched switching, dimming, raising and lowering light levels, group mastering, and multiple-scene presetting and recalling.

The contemporary-styled unit has matching trim and buttons. It is available in a variety of faceplate finishes: white, ivory, black anodized aluminum, gray anodized aluminum, satin brass, satin chrome, and prime coat. The unit is recommended for light commercial and custom residential projects. Vantage Controls, Inc., Salt Lake City, UT.

Circle 78

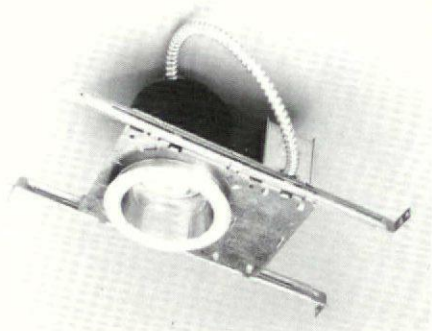


■ Surge protection

Hubbell's surge suppression modules protect locking or standard receptacles against transient voltage surges up to 3000 amperes and provide isolated ground protection. One module will protect other receptacles downstream from the surge source. Features include an LED indicator and an audible alarm that beeps when surge protection no longer exists.

Models are available for applications requiring electrical ratings of 15, 20, or 30 amperes at 125, 250, or 125/250 volts AC. Abuse-resistant, high-impact thermoplastic covers come in blue or ivory. The modules can be flush- or surface-mounted on 4- or $4^{11}/_{16}$-inch-square single- or double-gang boxes. The UL-listed, CSA-certified units are suitable for new or retrofit installations in office and industrial applications. Hubbell Incorporated, Wiring Device Division, Bridgeport, CT.

Circle 79



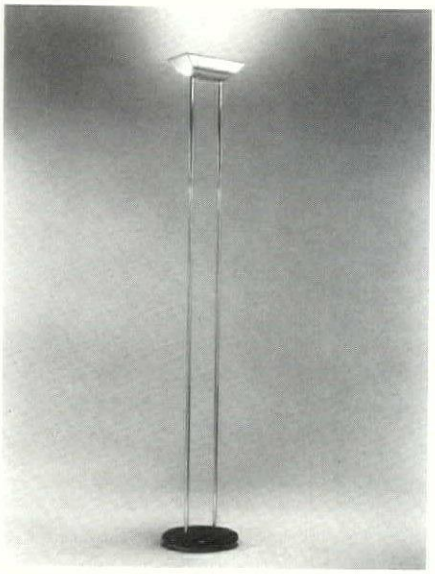
■ Recessed miniature downlights

Capri Lighting offers the R4 series of miniature downlights, which accent any part of a room or emphasize individual objects with pinpoint illumination. The fixtures' small housing size allows easy

placement in 2-inch by 6-inch joist construction. The manufacturer notes that they can be placed as close together as 8 inches on center.

The fixtures accommodate R20 reflector spot or flood lamps or Sylvania's PAR 20 quartz capsule. Compatible accessories include precision die-cast trims and baffles, open reflectors, eyeballs, and wall washers. A miniature remodel housing for installation in existing ceilings is also included. The fixtures are suitable for commercial and residential applications, including accent lighting for art objects, fine crystal displays, paintings, and similar objects. Capri Lighting, Los Angeles, CA.

Circle 80

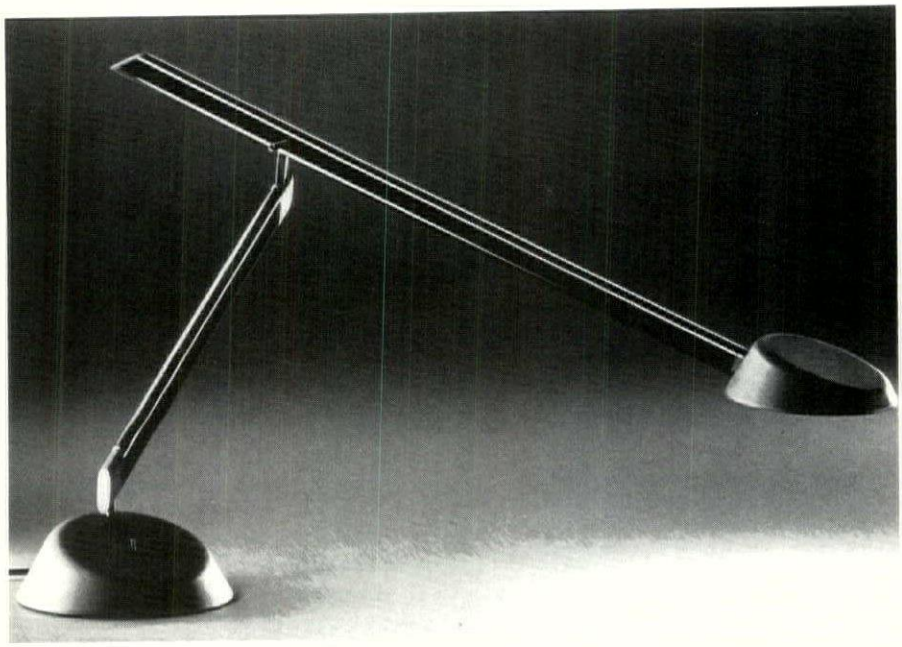


■ Floor lamp

Brueton Industries offers the 72-inch-high Theta torchere floor lamp by industrial designer Alex Forsyth. The lamp housing is a troughlike, half-cylindrical shell measuring 12 inches wide, 12 inches deep, and 5 inches high. Two $^{5}/_{8}$-inch round stainless steel uprights connect the housing and the 12-inch-diameter, bullnose-edged stone base.

The housing and upright supports come in polished or satin-finished stainless steel; the marble or granite base comes in 18 colors. The torchere accommodates one 500-watt halogen lamp that can be controlled by a dimmer. A matching wall sconce is also available. Brueton Industries, Inc., Springfield Gardens, NY.

Circle 81



■ Adjustable desk lamp

The Lester desk lamp from Tech Lighting is designed with an internal pulley that allows the lamp to rotate a full 360 degrees at the base while its reflector remains horizontal. The lamp's balanced arm extends and pivots, and the head automatically adjusts to prevent glare and focus the beam. The lamp accommodates a 50-watt halogen lamp and comes equipped with a two-position dimmer. Three finishes are available: metallized black, metallized gray, and British racing green. Tech Lighting, Chicago, IL.

Circle 82

■ Motion-controlled light

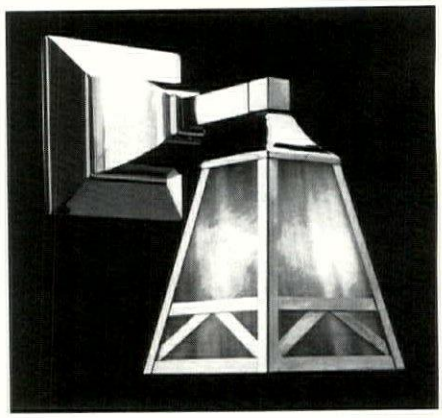
Rab Electric's SmartLantern outdoor security light has a built-in sensor that turns on outdoor lights when it detects the presence of people or cars up to 50 feet away. An adjustable timer can be set to turn lights off from 3 seconds to 20 minutes later. The unit has a quick test mode and a built-in manual override to allow operation of the unit from a light switch. The lantern is made of solid brass with beveled glass panels. It takes a 100-watt incandescent lamp, but has an additional switching capacity of 500 watts. Rab Electric Manufacturing Company, Incorporated, Bronx, NY.

Circle 83

■ Metal halide lamp

Venture Lighting's 70-watt metal halide lamp extends the range of metal halide applications. The single-ended lamp provides mean lumens comparable to the output of a 250-watt halogen lamp, according to the manufacturer, which makes the lamp suitable for commercial downlighting from 8-foot ceiling heights and for use in fixtures designed for compact metal halide lamps. The lamp is available in a universal burning position model and has a clear glass outer bulb. Venture Lighting International, Cleveland, OH.

Circle 84

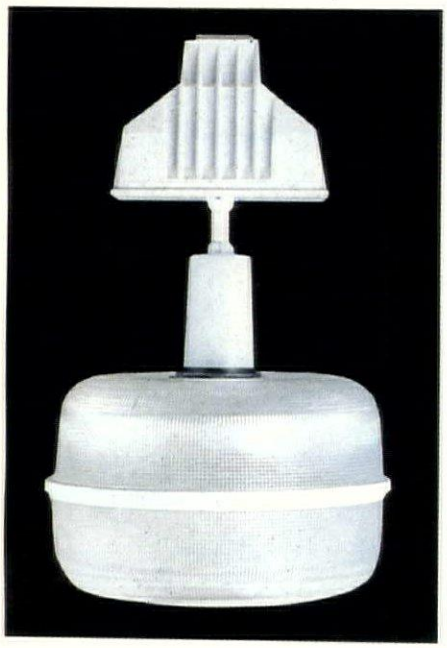


■ Wall sconce

The Aurora wall sconce from Rejuvenation Lamp & Fixture is part of the Craftsman Collection of late 19th- and early 20th-century designs. This wall sconce, an authentic Mission-style design in solid brass, is available in seven metal finishes: antique brass, polished unlacquered or lacquered brass, brushed brass, polished copper, japanned copper, and polished nickel. The fixture accommodates a 60-watt incandescent lamp. Its art glass

panels come in standard caramel and optional green, blue, pink, and cream. Rejuvenation Lamp & Fixture Company, Portland, OR.

Circle 85

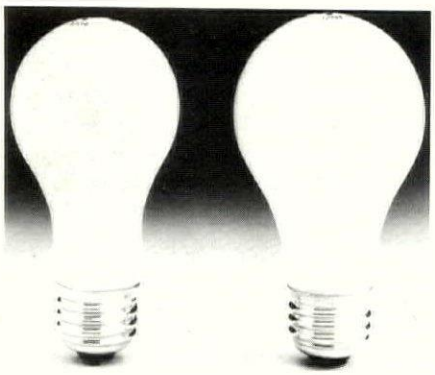


■ HID area lighting

Holophane's PrismGlo luminaires use HID lamps to illuminate areas where high-output fluorescent sources are commonly used. Two beam spread patterns are available: 60 percent uplight with 40 percent downlight and 40 percent uplight with 60 percent downlight. The luminaire features an 18-inch-diameter prismatic optical assembly molded of borosilicate glass. A door in the bottom of the optical assembly allows relamping without tools. The heavy duty die-cast aluminum ballast assembly has a white polyester powder paint finish.

The fixture accommodates 200-, 250-, and 400-watt high pressure sodium and 175-, 250-, and 400-watt metal halide lamps. The fixture is UL listed for damp locations and can be ceiling, surface, or pendant mounted. Recommended applications include retail areas, lobbies, institutions, exhibit halls, classrooms, offices, manufacturing and electronic production areas, grading and inspection areas, and assembly areas. Holophane, Newark, OH.

Circle 86



■ Compact A lamps

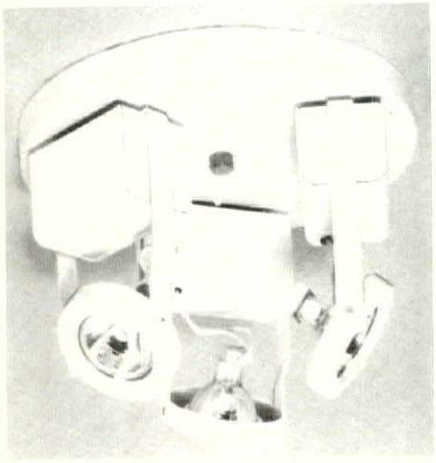
GTE/Sylvania's Slimlite compact A-line incandescent lamps for industrial and commercial use have a 10 percent longer life with no loss of light output and are 10 percent smaller than similar lamps on the market, according to the manufacturer. Longer lamp life is possible because of an improved filament design, more precise manufacturing techniques, and the construction of mount wires to which the filament is attached. The 2⅛-inch-diameter compact lamps come in wattages of 40, 60, 75, and 100. GTE/Sylvania, Danvers, MA.

Circle 87

■ Custom chandelier

TrimbleHouse offers custom fixture manufacturing. The chandelier shown was custom designed by Betty Smulian for the main lobby of the Southern Bell training center in Atlanta, Georgia. It has 15 sets of five extruded aluminum tubes ranging in heights from 3 to 8 feet. A center downlight accents the seating area below. Incandescent flood lamps were used in each light section. TrimbleHouse, Norcross, GA.

Circle 88

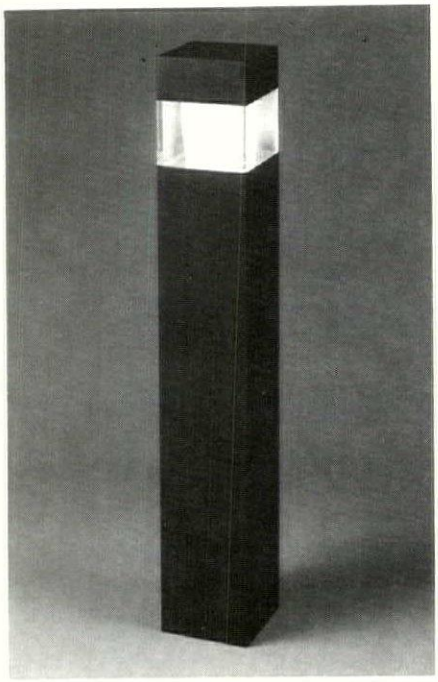


■ Halogen lighting

Roxter's compact low-voltage sealed-beam fixtures swivel a full 360 degrees for an unlimited number of light positions. A 50-watt transformer is housed above each fixture's 3-inch-diameter lamp holder. Nine models are available for single, double, and triple lamp configurations.

Canopy diameters are 5 inches for the single unit, 8 inches for the double, and 10 inches for the triple. The overall height of each unit is 8½ inches. A 50-watt halogen spot lamp is standard; 50-watt lamps in narrow flood and wide flood beam spreads and 25-watt models for pin-spots and floods are also available. The units come with a white or black finish. Roxter Mfg. Corp., Long Island City, NY.

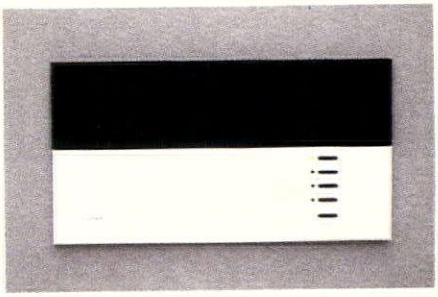
Circle 89



■ Bollard

Guth Lighting's Castellan series of outdoor lighting fixtures includes 6- and 8-inch square bollards in a slim, linear design. They have a heavy-gauge aluminum housing with a weather-resistant double-baked acrylic enamel finish. The units accommodate mercury, metal halide, and high pressure sodium lamps in wattages from 35 to 100. They come in heights from 30 to 42 inches. Guth Lighting, St. Louis, MO.

Circle 90



■ Dimming control

Lutron offers the Grafik Eye preset dimming control with a four-zone, four-scene capability. The unit fits into a standard four-gang switch box and controls combinations of incandescent, low-voltage incandescent, and fluorescent lighting up to a total load of 2000 watts. Users can manually adjust four zone sliders to create preset scenes and can recall a preset scene by pressing a button. They also can adjust the fade rate setting for variable transitions from 0 to 15 seconds between scenes and when turning the device on and off.

Auxiliary scene activators are available to control lighting from one or two remote wall locations. Units are UL listed and come with a smoked translucent or white opaque cover. Lutron Electronics Co., Inc., Coopersburg, PA.

Circle 91

■ Parking structure light

The CP Series parking structure light from Ruud Lighting has a computer-designed optical system that allows maximum fixture spacings and light levels. The 16-inch-square, 6½-inch-deep fixture has a die-cast aluminum housing with a bronze acrylic powder finish. A

clear tempered glass lens is standard. Its recessed die-cast aluminum door frame is nestled within the fixture housing for improved sealing, vandal resistance, and appearance.

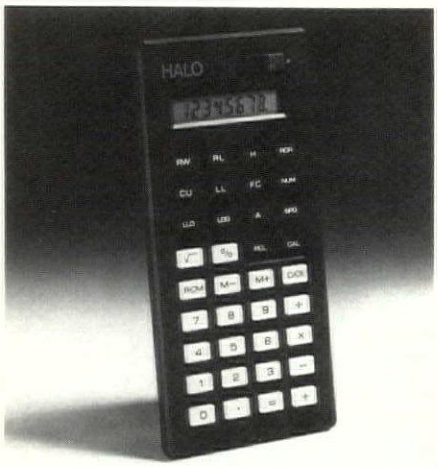
The ballast, capacitor, and ignitor are preinstalled to reduce installation time and provide cooler operation. A multitap high power factor ballast is standard; other ballasts are also available. The fixture is suitable for low ceiling heights and is available for 100- to 400-watt high pressure sodium and 100- to 400-watt metal halide lamps. It is UL listed for wet locations and is electronically tested prior to shipment. Ruud Lighting, Inc., Racine, WI.

Circle 92

■ High-frequency ballasts

Fyrnetics has a line of solid-state high-frequency electronic ballasts that draw as little as 70 percent of the current used by standard ballasts, according to the manufacturer. The thermally protected Class P ballasts guard against power surges and are designed for full light output and inaudible operation (sound-rated A). They have a low crest factor (1.6 or less) for maximum lamp life and a high ballast factor, 0.095 for standard lamps and greater than 0.90 for energy saver lamps. All ballasts are subjected to a burn-in at elevated temperatures and maximum line voltage to ensure reliability. The ballasts carry a three-year warranty, which provides for a replacement allowance. Fyrnetics, Inc., Elgin, IL.

Circle 93

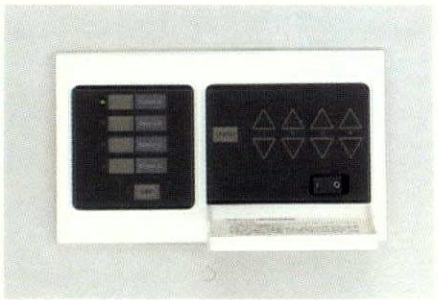


■ Lighting calculator

Halo Lighting's HLC-1 multifunctional hand-held lighting calculator determines fixture quality and spacing at any desired illumination level. It is especially useful for comparing layouts that use different fixtures, lamps, and trims.

The calculator accepts variables of room size, luminaire performance, illumination levels, and lamp and luminaire depreciation. Its programmed functions include computation of maintained footcandles based on lumen depreciation and lamp dirt depreciation values. The calculator can also be used with lighting products from other Cooper Industries subsidiaries. Halo Lighting, Elk Grove Village, IL.

Circle 94

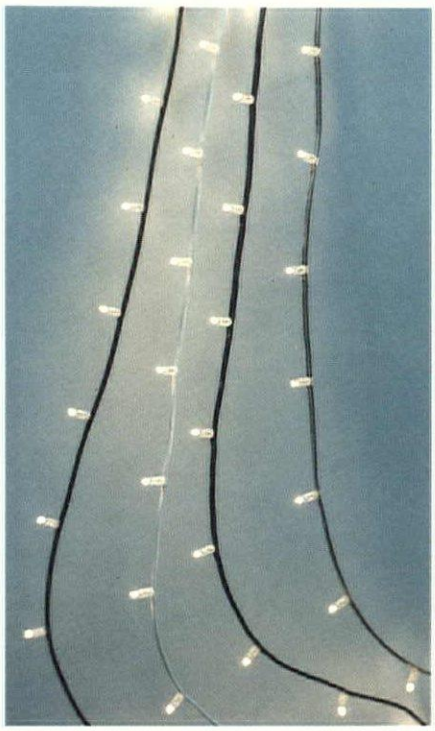


■ Dimming control

Lightolier's Scenist architectural preset dimming control dims four groups of lights into four independent lighting scenes. The digital control unit fits into a standard four-gang wall box and employs no remote dimmers. It is easy to operate, and a microprocessor-based memory makes it simple to program. Pressing the scene-select button activates a 5-second fade between scene transitions; pressing it twice causes an instantaneous change.

The unit is available in 1600- and 2400-watt sizes. Remote units are also available for scene selection from auxiliary locations. The controller is suitable for both residential and small commercial installations. Lightolier, Secaucus, NJ.

Circle 95

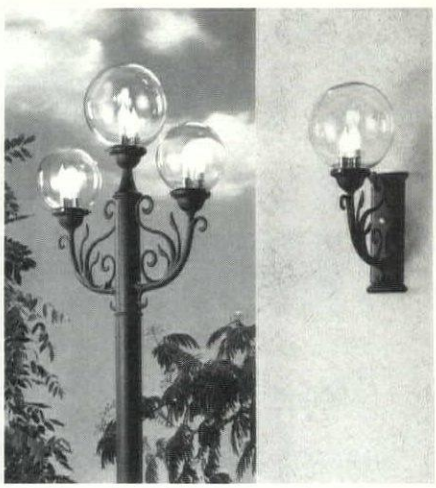


■ Low-voltage cord lights

Light Vines from Sylvan Designs are flexible, formable low-voltage cord lights with clear miniature 0.84-watt lamps spaced from 2 to 24 inches on center along a polyvinyl insulated cord. Sockets installed in the cord allow for easy relamping. The cords come in a weather-sealed, raintight exterior version and an interior version without the weather seal. They can be draped, twined, or contoured around structures or arranged in configurations.

Units are available for either 12- or 24-volt operation. Lamps come on black, brown, clear, or white cords in lengths up to 92 feet for 12-volt models and up to 130 feet for 24-volt models, depending on the number of lamps installed, lamp spacing, and voltage. An optional low-voltage transformer is also available. The cord lights are suitable for outdoor tree and landscape lighting and indoor lighting effects. Sylvan Designs, Inc., Northridge, CA.

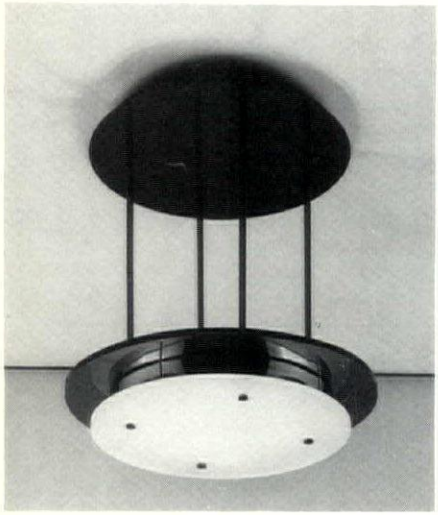
Circle 96



■ Decorative outdoor lighting

The Gardens outdoor fixture from ELA features cast aluminum arms that support blown glass globes. The fixture may be wall- or tenon-mounted in four different configurations. Arms come in a small size, which supports an 8- or 10-inch globe, and a large size, which supports a 12- or 14-inch globe. The globes are available in standard clear glass as well as clear acrylic, opal glass, or opal acrylic. Each standard globe is provided with a three-candle cluster of lamps; HID conversions are optional. The fixture comes in four painted finishes: black, verde, rust, and antique brass. Environmental Lighting for Architecture, CAL Division, City of Industry, CA.

Circle 97

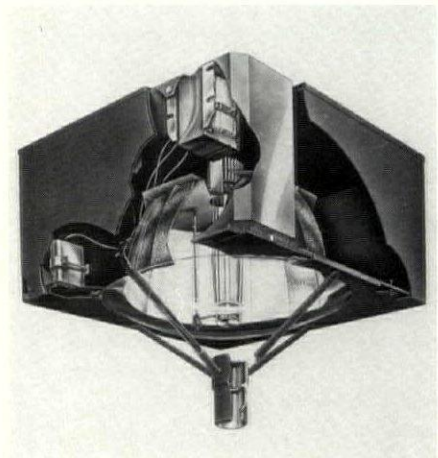


■ Custom ceiling fixtures

Appleton Lamplighter manufactures custom fixtures, such as this ceiling fixture designed by Christina Birkentall for the McCord Group of Chicago. Each fixture hangs above a 4-foot-high planter in a 12-foot-square alcove. The fixture design complements that of the planters.

Each fixture has a highly polished black acrylic disk 24 inches in diameter and ½ inch thick. A frosted acrylic lens 20 inches in diameter and ⅜ inch thick is held in place by four black fasteners, and a polished chrome center band separates the two disks. The entire lamp assembly hangs from a canopy on four gloss black stems. Appleton Lamplighter, Appleton, WI.

Circle 98



■ Exterior area lighting

Low-profile 1000-watt outdoor area luminaires from Quality Lighting produce a high-performance, sharp cutoff photometric distribution, according to the manufacturer. The fixtures contain a vertically mounted lamp in a reflector system that produces a rectangular, square, symmetrical, or forward-throw distribution pattern.

Features include a dual position cam latch for easy servicing, an impact- and heat-resistant convex clear glass lens, and a silicon-impregnated gasketing system that allows cool, filtered air to circulate within the unit. The 27-inch-square housing is constructed of formed, welded aluminum with a dark bronze finish. Optional colors are also available. The luminaires come in arm and post-top mounting models. Quality Lighting, Inc., Northbrook, IL. ■

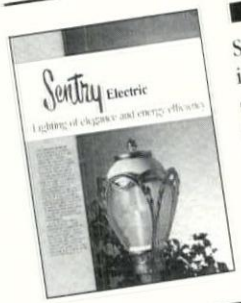
Circle 99

Product Literature

Wall-mounted cans

Hadco's wall-mounted cans combine various lamp arrangements and shapes. A color brochure illustrates three models and lists specifications, finishes, and lamp requirements. Hadco, Littlestown, PA.

Circle 120



Outdoor luminaires

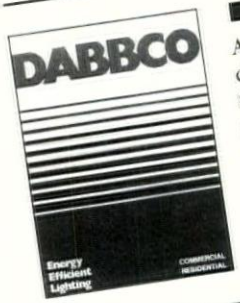
Sentry Electric offers a brochure illustrating a selection of standard and custom-designed outdoor luminaires for new installations, renovations, and period retrofits. Sentry Electric Corporation, Freeport, NY

Circle 125

Landscape lighting

The Terralight collection of landscape lighting fixtures is illustrated in an eight-page color brochure from Hanover Lantern. Included are application photos, sketches of fixtures and mounting options, and lamp requirements. Hanover Lantern, Hanover, PA.

Circle 121



Decorative fixtures

A 48-page catalog highlights Dabbco's decorative indoor and outdoor fixtures for compact fluorescent lamps. The fixtures are available in a variety of finishes and have plastic and glass diffusers in a choice of colors. Dabbco, Inc., Alhambra, CA.

Circle 126

Lighting collection

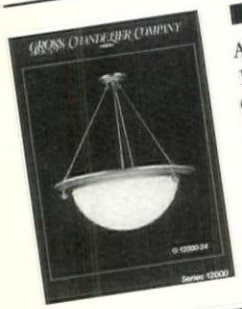
Alkco offers seven lighting product categories in a color brochure that highlights the Recessed Trak concealed track system, Lumenizers aimable accent fixtures, and tubular Lincandescents fixtures. Alkco, Franklin Park, IL.

Circle 122

UL compliance

Innovative Industries specializes in helping manufacturers design products to meet UL requirements and obtain UL listings for new products. Innovative Industries Incorporated, Tampa, FL.

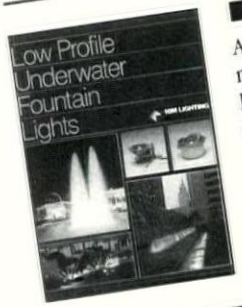
Circle 127



Chandeliers

A color brochure illustrates the Series 12000 line of chandeliers from Gross Chandelier in eight styles with acrylic bowls. They accommodate 100-watt incandescent or 13-watt compact fluorescent lamps. Gross Chandelier Company, St. Louis, MO.

Circle 123



Underwater fountain lights

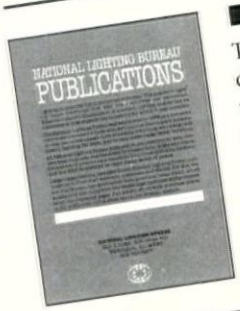
A brochure on freestanding and niche-mounted low-profile underwater fountain lights includes photos, specifications, photometrics, installation, and safety features. Kim Lighting, City of Industry, CA.

Circle 128

Sun-rooms

The Kleertek glazing system for sunrooms eliminates horizontal exterior caps to prevent water and dirt accumulation overhead. A brochure contains features, photos of applications, and dimensional drawings. Sunbilt Solar Products, Sussman Inc., Jamaica, NY.

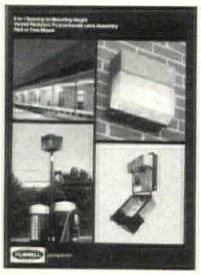
Circle 124



Lighting publications

The National Lighting Bureau offers a directory describing 10 NLB publications written for lay readers. Topics include performing a lighting system audit and solving video display terminal viewing problems. National Lighting Bureau, Washington, DC.

Circle 129



■ Area lighting

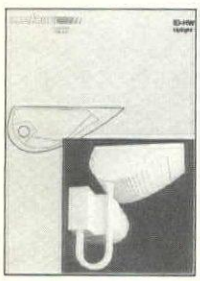
The energy-efficient, vandal-resistant Perimaliter is suitable for commercial and industrial wall and area lighting applications. A brochure contains detailed specifications, illustrations, and photometrics. Hubbell Incorporated, Lighting Division, Christiansburg, VA.

Circle 130

■ Luminous film

Scotchlamp film from 3M is a flexible film that transmits light from a source and distributes it uniformly throughout a fixture. A brochure suggests applications for a variety of locations. Traffic and Personal Safety Products Group/3M, St. Paul, MN.

Circle 132



■ Uplight

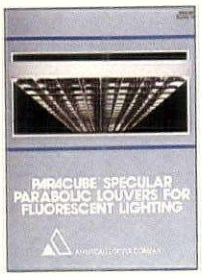
A brochure featuring the ID-HW uplight includes color illustrations of the fixture in use and information on construction, installation, and dimensions. Zumtobel Lighting Inc., Fairfield, NJ.

Circle 131

■ Hazardous location lighting

Rig-A-Lite's XP series fluorescent light for hazardous locations has factory-installed lamps in several wattages and lamp configurations. A brochure includes features, standard UL listings, photometric data, and components. Rig-A-Lite, Houston, TX.

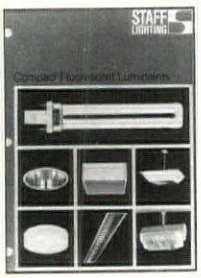
Circle 133



■ Parabolic louvers

A four-page color brochure shows the Paracube line of parabolic louvers for new or retrofit fluorescent lighting applications. The injection-molded polystyrene and acrylic louvers are finished in specular silver and gold. American Louver Company, Skokie, IL.

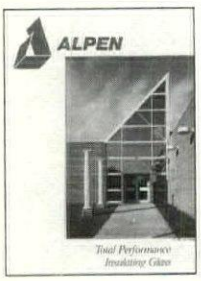
Circle 134



■ Compact fluorescent units

A specification catalog details Staff Lighting's group of compact fluorescent luminaires. Included are application photos, product descriptions, accessories, and photometric data. Staff Lighting, Highland, NY.

Circle 135



■ Low-emissivity glazing

A brochure profiles the features of Alpenglass glazing products with Heat Mirror low-emissivity glass. Included are application photos, performance data, and product descriptions. Alpen, Inc., Boulder, CO.

Circle 136

■ Ceiling components

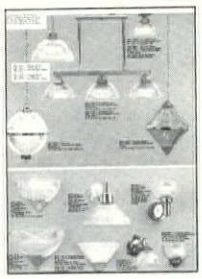
A 12-page color catalog illustrates components for lighted and nonlighted ceiling applications from A.L.P. Included are parabolic louvers, lenses and diffusers, and decorative ceiling tiles. A.L.P. Lighting & Ceiling Products, Inc., Chicago, IL.

Circle 137

■ Architectural lighting

A brochure illustrates the Tube, Mod, and Wall/Slot systems, specialties, and custom direct-indirect lighting fixtures. It includes color photos of sample applications and examples of available colors. Litecontrol Corporation, Hanson, MA.

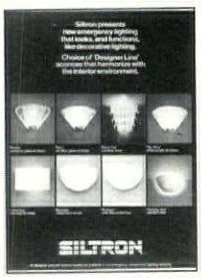
Circle 138



■ Prismatic glass fixtures

A data sheet from Primelite illustrates a line of 17 old-style prismatic fixtures available in polished brass, chrome, and custom colors. Included are wall sconces, brackets, and single- and multilamp chandeliers. Primelite Mfg. Corp., Freeport, NY.

Circle 139



■ Wall sconces

A color brochure illustrates the Designer Line of decorative wall sconces for compact fluorescent lamps. The sconces can also function as emergency lights with emergency battery packs. Siltron Illumination Inc., Cucamonga, CA.

Circle 140

■ Garage lighting

A technical paper from Devine Design discusses design considerations for covered garages, including the effects of glare on motorists and IES lighting design recommendations for covered garages. Devine Design, Kansas City, MO.

Circle 141

■ Sports lighting standard

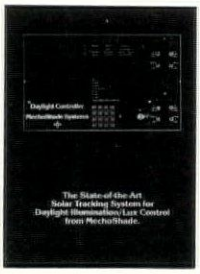
Centrecon's Sportsliner II-50 standard features an octagonal galvanized steel slip-fit arm assembly mounted on a round prestressed concrete pole. A brochure lists specifications for the virtually maintenance-free standard. Centrecon, Everett, WA.

Circle 142

■ Chandeliers

A collection of F. Fabbian's chandeliers, matching wall brackets, and selected table lamps is featured in a catalog from Casablanca Lighting. The catalog includes color photos and lamping requirements for each fixture. Casablanca Lighting, West Norton Township, PA.

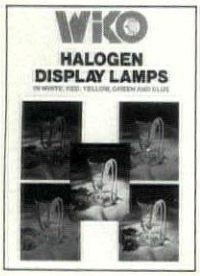
Circle 143



■ Solar-tracking system

A data sheet from MechoShade Systems describes a solar-tracking system that automatically controls the operation of sun shades to maintain a constant level of daylight. MechoShade Systems, Long Island City, NY.

Circle 144



■ Display lamps

A brochure featuring WIKO white and colored halogen display lamps includes information on wattages, color temperatures, average lamp life, and degrees of beam spread for a variety of MR11 and MR16 lamps. Lany Fax of America, Orland Park, IL.

Circle 145

■ Low-voltage picture light

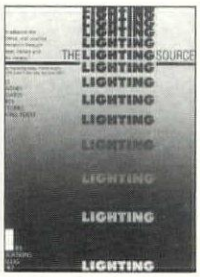
Harry Gitlin Lighting features the model 353 picture light with a tungsten halogen lamp mounted in a 1⅝-inch-diameter polished brass tube. A data sheet includes a description of the fixture and its lamp specifications. Harry Gitlin Lighting, New York, NY.

Circle 146

■ Accent cylinders

Miroflector's fully adjustable accent-style cylinder is designed to accommodate Osram's 70- and 150-watt HQI compact metal halide lamps. A data sheet gives complete design and photometric information. Miroflector Company, Inc., Inwood, NY.

Circle 147



■ Lighting publications

The IESNA Fall 1987 catalog lists books, magazines, standards, reports, directories, and other reference publications on lighting design and applications. Illuminating Engineering Society of North America, New York, NY. ■

Circle 148

Calendar

February 16, 1988 — **Lighting for WJR Radio,** DLF event, WJR Radio, Fisher Building, Detroit. Geri Larson of Interiors Group is the speaker. Contact: Lynda Hardy Scarfe, Chair, Detroit Designers Lighting Forum, 2153 Somerset Road, Bloomfield Hills, MI 48013, (313) 398-3933 or (313) 335-1303.

February 18, 1988 — **Design Awards,** IES Golden Gate Section event, Engineers Club, San Francisco. Study club on residential lighting by Joanne Lim Stinson precedes program. Contact: Mike Mazzi, Program Chairman, California Architectural Lighting, 310 Townsend, Suite 200, San Francisco, CA 94107, (415) 777-5111.

February 19, 1988 — **Application and portfolio deadline** for IALD Intern Program, which places students in temporary summer positions with lighting design firms and lighting equipment manufacturers. Applicants must demonstrate strong drafting, drawing, and design techniques. Get information and applications at many design schools and student chapters of professional societies, or contact the International Association of Lighting Designers, 18 East 16th Street, Suite 208, New York, NY 10003, (212) 206-1281.

February 24, 1988 — **New light sources,** DLF event. Contact: Sy Bollinger, President, The Designers Lighting Forum of New York, 58 Stratford Ave., Greenlawn, NY 11740, (516) 368-5470.

March 2, 1988 — **Neon!** From concept through fabrication to installation, DLF event. David Robinson of David Robinson Design is the speaker. Contact: Claudia Holmes, Chair, San Diego Designers Lighting Forum, 724 W. Arbor Dr., San Diego, CA 92103, (619) 294-4154.

March 3, 1988 — **Museum lighting,** DLF event. Nina Hubbs of the UC-Berkeley museum is the speaker. Contact: Paula Goodell, President, Designers Lighting Forum, Northern California Chapter, P.O. Box 1429, San Francisco, CA 94104, (415) 550-0333.

March 4–5, 1988 — **IES seminars,** San Diego, CA. Includes a display lighting seminar with James Benya of Luminae Inc. and an office lighting seminar with Gary Steffy. CEUs available. Repeats March 18–19 in Boston, April 22–23 in Chicago, and May 20–21 in Atlanta. Contact: Diane Darrow, Illuminating Engineering Society, 345 East 47th Street, New York, NY 10017, (212) 705-7269.

March 12–15, 1988 — **Worldstore '88,** international retailing exhibition and conference, Georgia World Congress Center, Atlanta, includes a presentation on visual merchandising and store lighting by Franz Wohlwend, Emil Senn, and Motoko Ishii. Contact: Worldstore '88, National Expositions Co., Inc., 15 West 39th Street, New York, NY 10018, (212) 391-9111.

March 14–16, 1988 — **Reflector design — Theory and practice,** seminar, Stapleton Plaza Hotel, Denver. For engineers, designers, and others who design or use reflectors. Includes problem-solving workshops, field trip to Independent Testing Laboratories in Boulder. Contact: TLA – Lighting Consultants, Inc., 72 Loring Avenue, Salem, MA 01970, (617) 745-6870.

March 17, 1988 — **Outdoor lighting,** IES Golden Gate Section event, Francesco's Restaurant, Oakland, CA. Burton Benjamin is the speaker. A study club on outdoor lighting design presented by Ken Fairbanks precedes the program. Contact: Mike Mazzi, Program Chairman, California Architectural Lighting, 310 Townsend, Suite 200, San Francisco, CA 94107, (415) 777-5111.

March 23, 1988	**Luminaire materials and processes,** DLF event, New York. Henry Muller of Lightolier is the speaker. Contact: The Designers Lighting Forum of New York, Sy Bollinger, President, 58 Stratford Ave., Greenlawn, NY 11740, (516) 368-5470.
March 25–28, 1988	**LABASH '88,** convention of the Student Chapter of the American Society of Landscape Architecture, OSU, Columbus, OH. Contact: Robert A. Jurs, Jr., or Joseph A. Fry, LABASH '88, The Ohio State University, Department of Landscape Architecture, Brown Hall, 190 West 17th Avenue, Columbus, OH 43210, (614) 292-8263.
April 13–15, 1988	**Lighting World International,** Los Angeles Convention Center, Los Angeles. Sponsored by IESNA, IALD, and the Southern California Section of the IES. Program includes opening day keynote address by Arthur Erickson, 14 educational sessions, and a product exhibition with almost 500 companies represented. Contact: Shahira Holliday, National Expositions Co., Inc., 15 West 39th Street, New York, NY 10018, (212) 391-9111.
May 1, 1988	**Entry deadline** for the Howard Brandston Student Lighting Design Education Grant. Applicants must be full-time students with substantial coursework in illumination studies from accredited programs and must solve a lighting design problem supplied by IES. Contact: The Howard Brandston Student Lighting Design Education Grant Competition, Illuminating Engineering Society, 345 East 47th Street, New York, NY 10017, (212) 705-7923.
May 1, 1988	**Entry deadline** for the 1988 International Illumination Design Awards. Eligible installations must be completed during the 24 months preceding March 31, 1988. Entry rules and applications are available from local IESNA Sections. Contact: Illuminating Engineering Society, 345 East 47th Street, New York, NY 10017, (212) 705-7923. ■

Manufacturer Credits

Page 12. *When a sign is not a sign — it's a neon mural* (The American Cafe, Tyson's Corner, Virginia).
Neon Projects: Neon.
PPG: Glass block.

Page 14. *Fanciful enrichment of practical lights* (Knoll Furniture Showroom, International Market Square, Minneapolis).
Benjamin Lighting, division of Thomas Industries: Industrial fixtures.

Page 16. *Retrofit cuts energy costs, preserves appearance* (Transamerica Pyramid Building, San Francisco).
Maximum Technology: Specular silver reflectors.
North American Philips: F40 T12 WW fluorescent lamps.
Advance Mark III: Ballasts.

Page 18. *Lighting sets the scene for a high-tech showroom* (Xerox showroom and Executive Communications Center at Infomart, Dallas, Texas).
Edison Price: Line-voltage and low-voltage incandescent downlights, wall washers.
Staff: 3-circuit track lighting with framing projector.
Lightolier: Track lighting.
Capri: Low-voltage lighting, including directional downlights, pendant downlights, and 2-circuit track lighting.
Visual Comfort Lighting, Inc.: Pendant indirect fluorescents (with and without dimming ballasts), indirect wall-hung fluorescents, wall-hung fluorescent handrails, wall-hung fluorescent side lights.
Alkco: Linear incandescent cove lighting.
Lutron: Dimmers.

Page 26. *New Olympic Oval champions daylighting* (Olympic Oval, Calgary, Alberta, Canada).
Philips Lighting: Lamps and fixtures.
PMD: Computerized control system.

Page 30. *Multihued sculpture glows in ever-changing play of light and color* (Spectral Light Dome, Portland, Oregon).
McFarland: Skylight.
Dundy Glass Company: Glass.
Ocli: Custom coatings.
Thompson Metal Fab, Inc.: Steel frame fabrication.
Investment Castings Corporation: Cast steel clips.
Die-Verse Tools: Machined fittings and sleeves.
Halo Lighting: Uplights.
Best Devices: Theatrical PAR 38 can downlights.
GTE/Sylvania: PAR 38 lamps.
Lutron Electronics Co., Inc.: Dimming system for downlights.

Manufacturer credits reflect the products specified for the projects; it is possible that other products were installed during construction or maintenance.

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