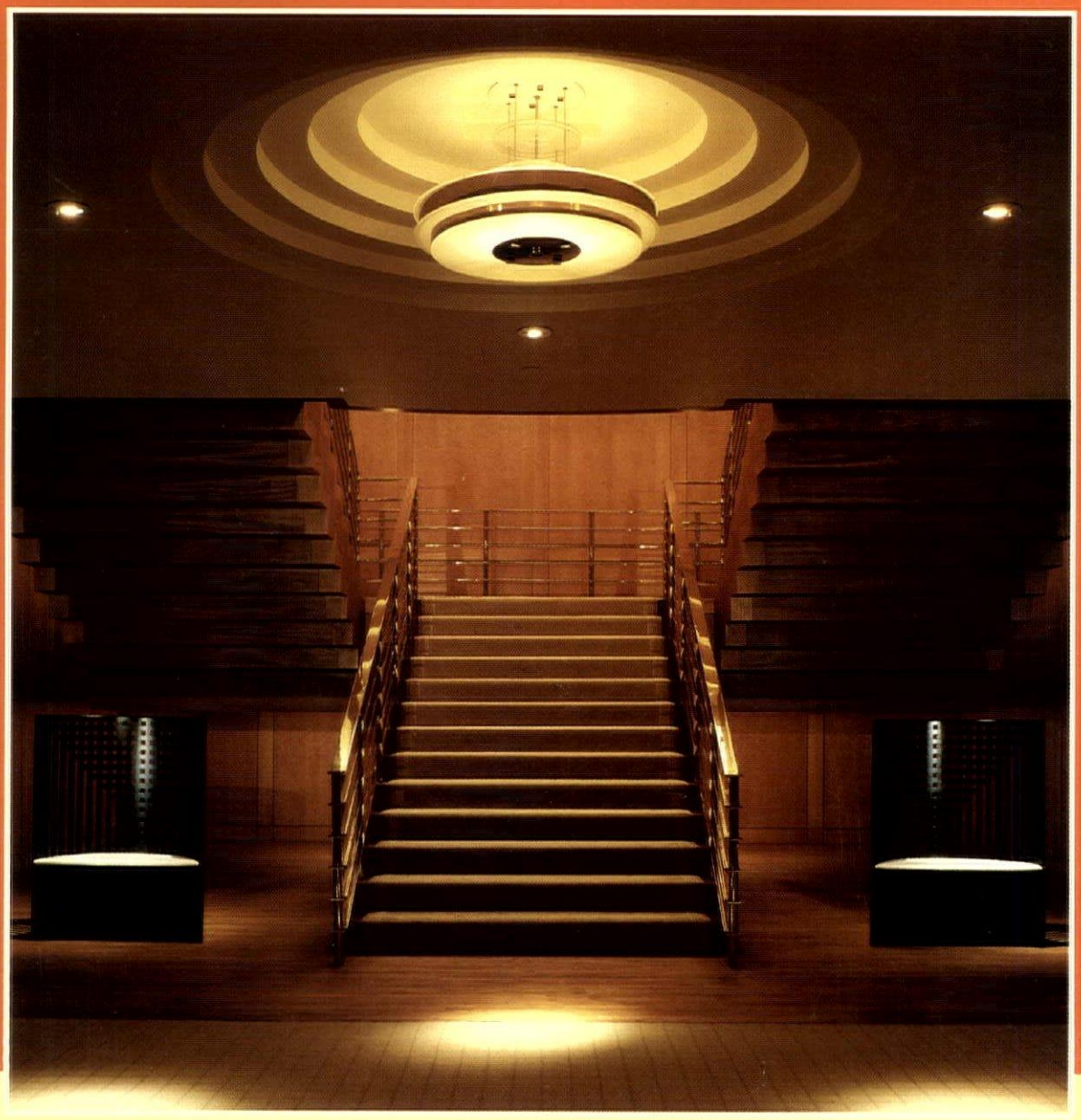
ARCHITECTURAL LIGHTING



March 1989
Eight Dollars

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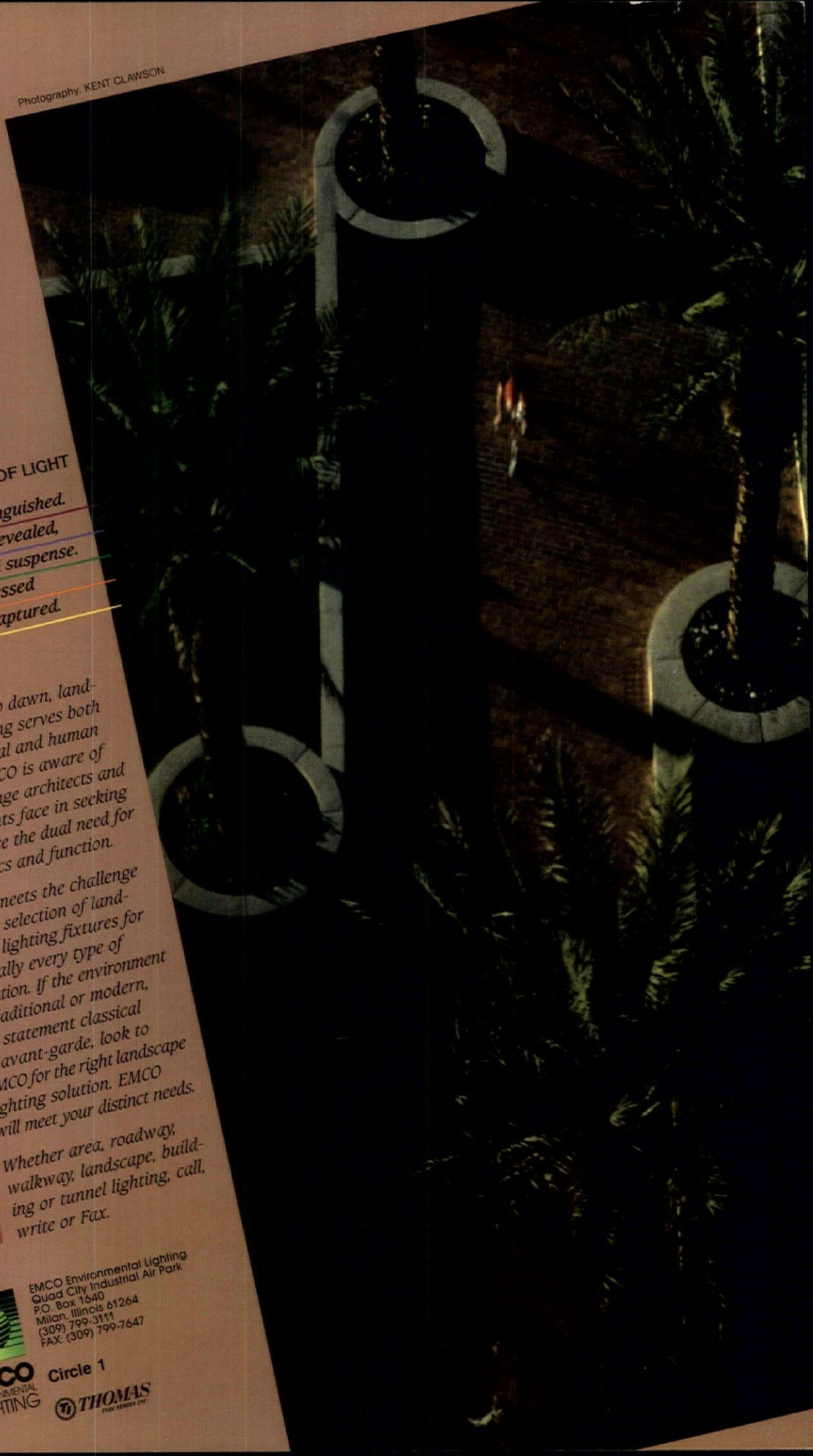

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Circle 1

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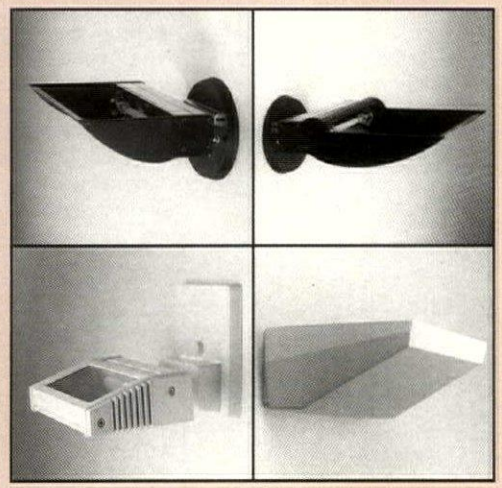

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Associate Editor M. Jane Ganter
Senior Assistant Editor Gareth Fenley
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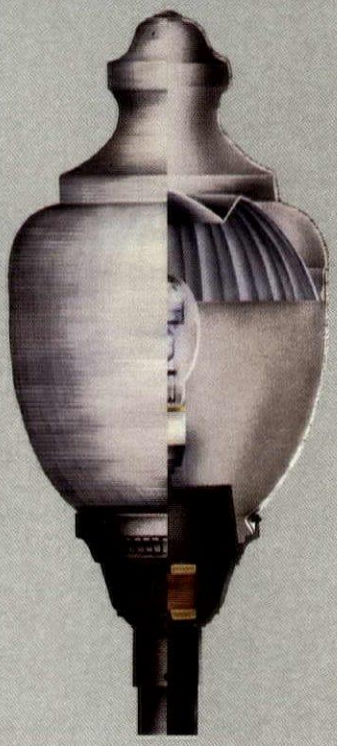

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Circle 4

ARCHITECTURAL LIGHTING

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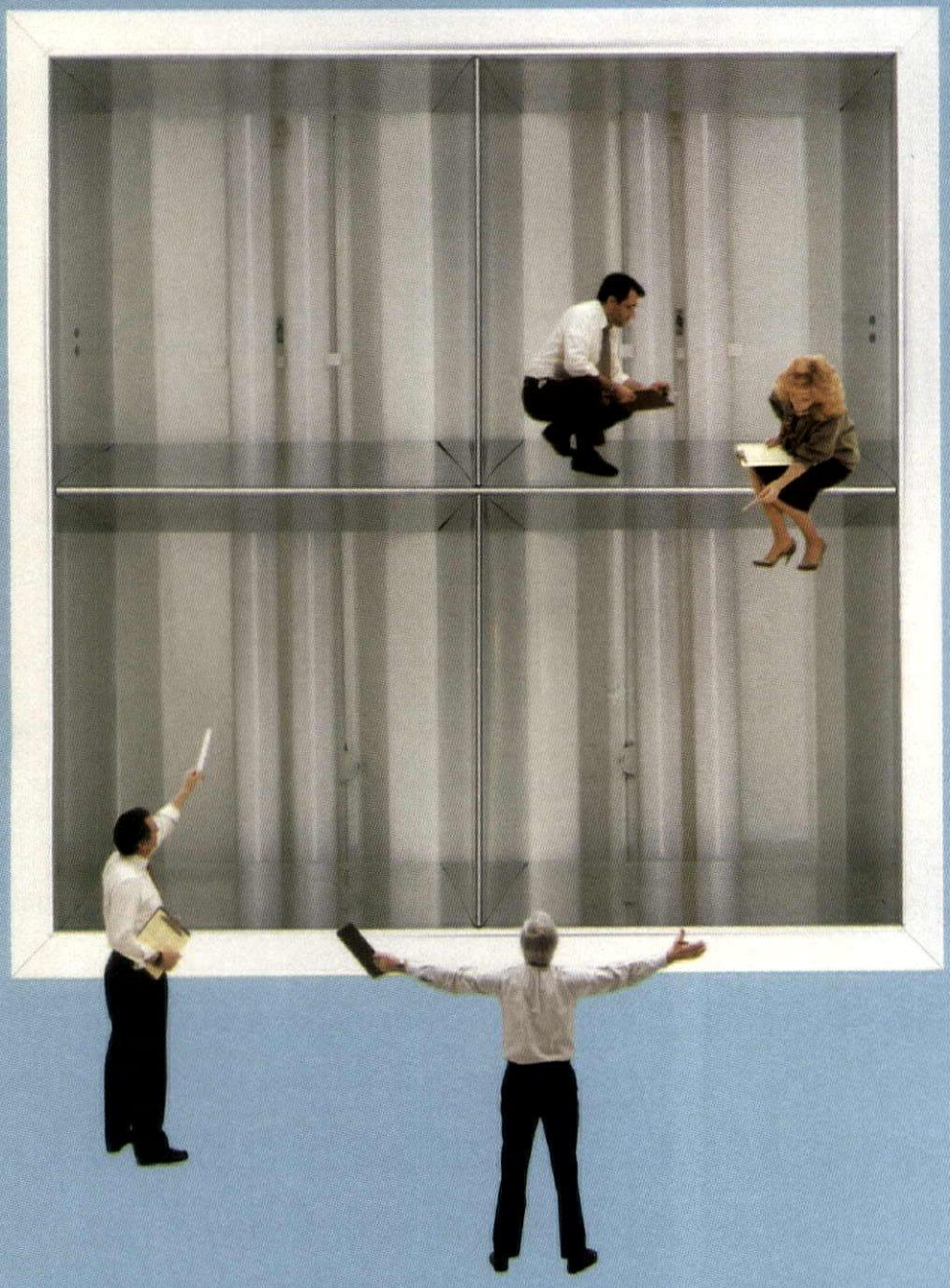
Quadrant: New Impact in Fluorescent Downlighting



Introducing Quadrant: The new high impact downlight for today's compact fluorescent sources.

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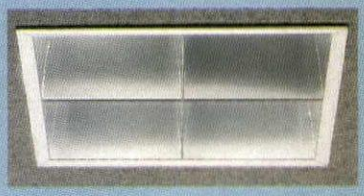

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Circle 6

From the Editor

As I announced in this column in the January issue of *Architectural Lighting,* our readers are finally going to get what they've been asking for since this magazine was introduced in late 1986: residential lighting. This month, we are introducing a new section, the Residential Lighting Forum. It starts on page 40.

The omission of residential subject matter from our editorial coverage has been pretty obvious; it has seemed like we should do something about that ever since our first issue. It isn't that we don't like homes. In fact, I believe that people are universally interested in them. Homes happen to be my favorite building type.

But the reality is that for the first two years we had our hands full, trying to do justice to every other conceivable kind of lighting. Now, don't think for a minute we're introducing residential lighting because we've begun to run out of things to write about other kinds of lighting projects. It's just that now we feel we've *scratched the surface,* so it's time for something new. We'll publish two more issues with Residential Lighting Forum sections this year, and we will include a residential section in our December *Showcase* issue.

But these special sections on residential will not completely replace the kinds of projects readers are used to seeing in the magazine. In fact, you'll notice our cover story this month — "Coca-Cola's USA tower: Elegant, whimsical, dignified, fun" — is not exactly a residential project. So, you'll continue to be able to read about the best in commercial, industrial, and institutional lighting as well.

And finally, I hope readers will notice that, along with the advent of our new residential section, we've also included a number of related new products that merit their attention.

Charles Linn, AIA

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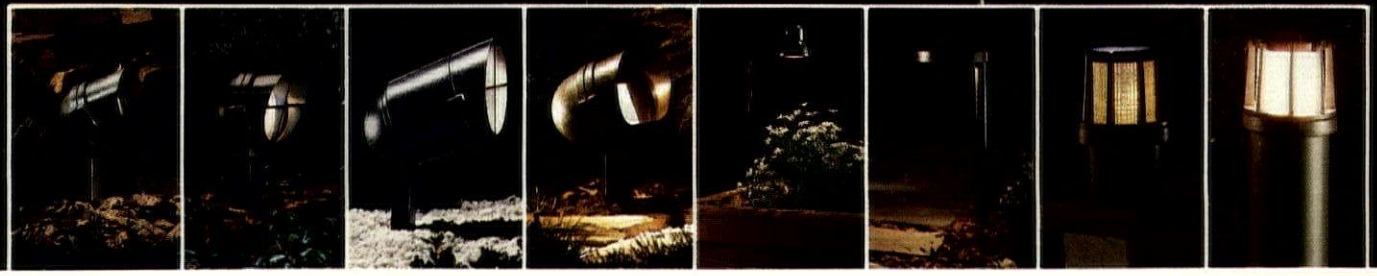
The magic of landscape lighting.

Lightolier has created the first landscape lighting system that offers total freedom of choice. You can have an easy-to-install low voltage system, a standard line voltage system, or a *combination* low voltage and line voltage system with all fixtures in the same integrated style.



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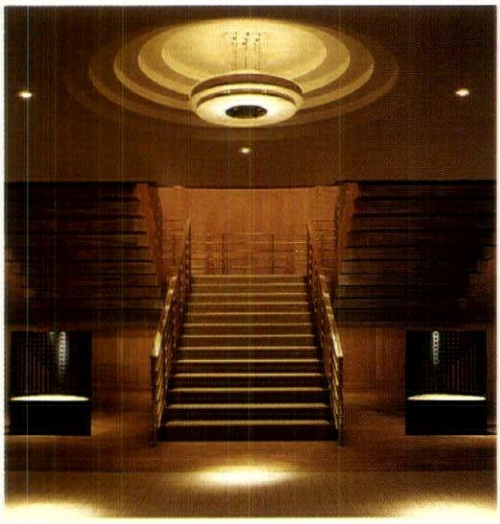
Circle 9

LIGHTING

March 1989
Volume 3, Number 3



Cover Story

Residential Lighting Forum

Statements

Columns

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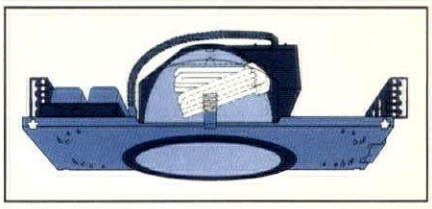

An illustrated view of the new PolyQuad compact fluorescent downlight

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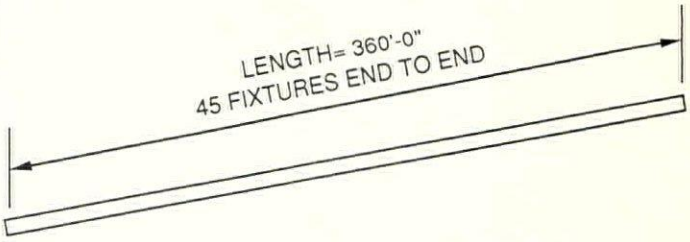
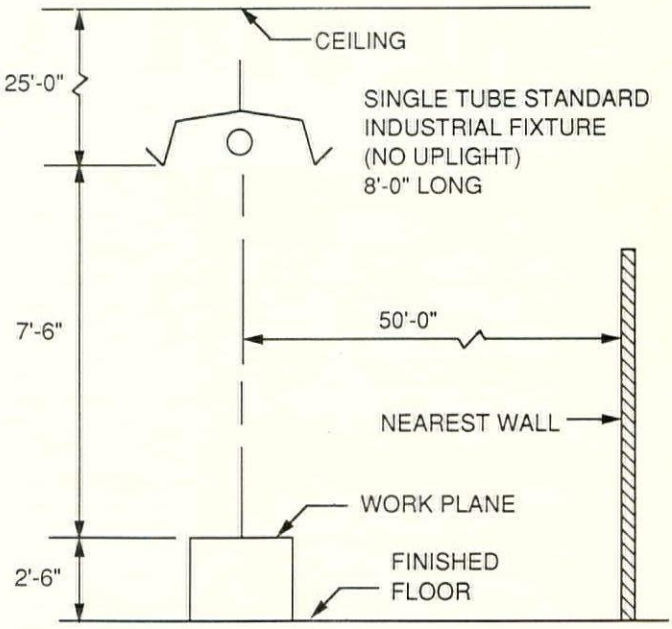
Lighting Clinic

Task lighting for an assembly line

Recently we were faced with applying point-to-point calculations to an area using a linear source (fluorescent lamps). The area is a light manufacturing facility, approximately 160,000 feet square with a 35-foot-high ceiling, lit with HID lighting to a level of approximately 30 footcandles.

The problem was how to put task lighting on an assembly line. The desired light level at the work plane was 100 footcandles. Because of physical constraints and other related problems, it was determined that the best solution was a continuous row of fluorescent fixtures. The question then was the type and number of tubes required. The sketch shows the physical conditions and dimensions of the problem area.





The IES Lighting Handbook: 1987 Application Volume *addresses industrial lighting in chapter 9; however, the explanation is not completely clear. Applying its methods to the problem results in numbers that are intuitively incorrect. We also used an illumination engineering textbook; it gave us a completely different end result, but the same uncomfortable feeling. We finally put together a solution using both books and help from people at two luminaire manufacturing companies. However, even the experts at those companies admitted to being uncomfortable*

Continued on page 16

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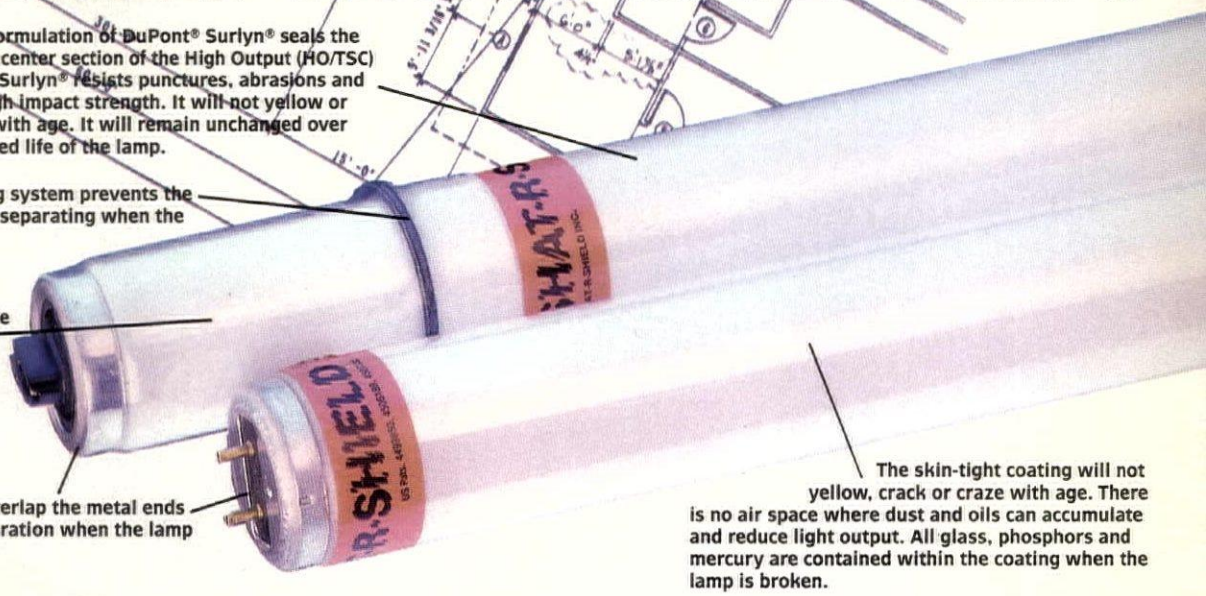

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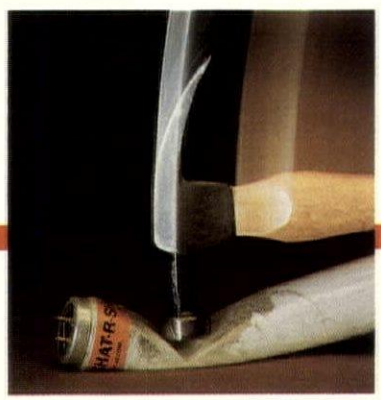

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Circle 14

Lighting Clinic *continued*

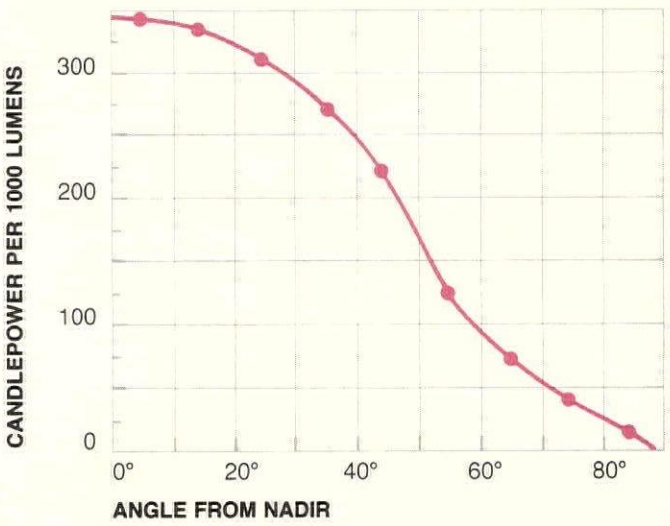
with the problem.

The question then is, knowing the type of fixture, the type of tube, and the physical constraints noted on the sketch, how should we have approached the problem of predicting footcandles directly beneath the fixture and at any given point on either side of the fixture?

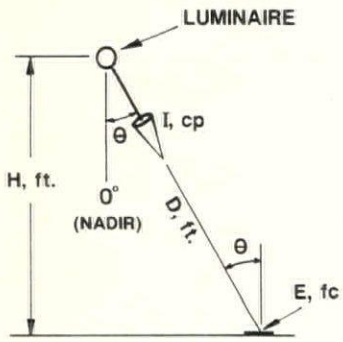
James Single
United Engineers & Constructors
Philadelphia, Pennsylvania

Only the component of light directly from the luminaire to the bench need be considered for the lighting system described; reflected light will be negligible. One possible solution is based on the inverse square law (ISL).

To apply the inverse square law, you need to know the luminaire intensity distribution. If you lack specific data, you can approximate it by using data from the *IES Lighting Handbook: 1984 Reference Volume* (Figure 9-62; in 1981 edition, Figure 9-12), which illustrates many generic luminaires. The closest type for the reader's application is number 25; it has an open bottom and a diffuse reflector that directs 65 percent of the lamp flux downward and 22.5 percent upward through slots. Since the reflector diffuses the light, redirecting the upward light downward (by closing the slots) would not appreciably change the *shape* of the intensity distribution. Assuming 15 percent of that light will be trapped, the downward intensity will be increased by: $(0.85 \times 0.225 + 0.65)/0.65 = 1.29$. The intensity distribution for the luminaire is given at the end of Figure 9-62 as candlepower per 1000 lamp lumens. Multiply each value by 1.29, and plot as shown here.



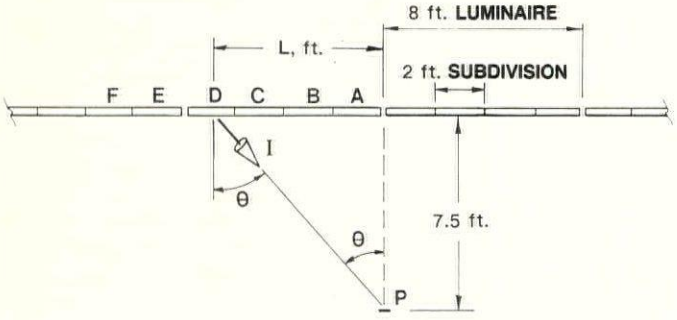
The following figure illustrates the ISL. Although the first equation is more familiar, the second is advantageous for repeated calculations because you don't need to find several values of the distance D. The source dimensions must be small compared to the distance D for the ISL to apply. For interior luminaires in directions where the intensity does not change rapidly with changes in angle, the ISL is a useful approximation when the distance D is two or three times the maximum luminaire



$$E = \frac{I \cos \theta}{D^2}$$

$$E = \frac{I \cos^3 \theta}{H^2}$$

dimension; it is reasonably accurate at five times. When the luminaire is large in relation to the distance, as it is here, the trick is to subdivide the luminaire(s) into smaller segments. Assume that the *shape* of the intensity distribution for each segment is the same as the shape for the entire luminaire, but divide the *magnitude* of the luminaire intensity by the number of subdivisions.



The reader, who is working with a luminaire 8 feet long, can divide it into four 2-foot lengths; the diagram shows the geometry when viewing perpendicular to the row of luminaires. For some point P under the row, half of the illuminance (footcandles) is produced by each side, due to symmetry. Consequently, it is necessary only to calculate the illuminance due to the luminaires on one side and then double the results. The equation for the illuminance due to one segment is

$$E = \frac{(0.25 I_\theta) \cos^3 \theta}{(7.5)^2}$$

The intensity in the candlepower graph is for the full 8-foot luminaire; it is multiplied by 0.25 when used in the preceding equation because each of the four segments produces one quarter of the total intensity.

Because the illuminance calculation for each segment will contain the 0.25 and the 7.5 terms, these can be factored out. Calculate and sum ($I_\theta \cos^3 \theta$) for the various segments; then apply the factored terms to the final sum. This factoring is not necessary, but it eliminates needless arithmetic. The table shows the calculations. By the time that segment F is reached, the contribution is about 2 percent of the sum; further segments contribute even less.

Continued on page 18

Lighting Clinic *continued*

Because lighting calculations are of limited accuracy, we cease summing. Thus, the illuminance at point P is

$$E = 2 \times \frac{0.25 \times 897}{(7.5)^2} = 8.0 \text{ fc per 1000 lamp lumens}$$

The factor of 2 is to account for luminaires in both directions from point P.

Assuming a two-lamp luminaire using 75-watt, slimline, cool white fluorescent lamps (6300 lumens), the "final" result for the illuminance at point P is 101 footcandles: (2 × 6300/1000) × 8.

Actual illuminance will be less than this calculated value due to *light loss factors*. The only anticipated nonrecoverable loss is the *ballast factor*, estimated at 0.93. Therefore, the initial illuminance is 95 footcandles (0.93 × 101). The two recoverable losses are the *lamp lumen depreciation factor* and the *luminaire dirt depreciation factor*. The former is 0.89 (Figure 8-120, 1984 handbook; Figure 8-117, 1981); the latter is found in two steps. First, determine the luminaire's *maintenance category* — in this case type IV — by looking at Figure 9-7 (1984 handbook; Figure 9-2, 1981). Then find the factor in Figure 9-10 (1984; Figure 9-5, 1981); assuming a clean environment and luminaire cleaning every 24 months, the factor is 0.80. Consequently, the maintained illuminance is 67 footcandles (0.89 × 0.80 × 94).

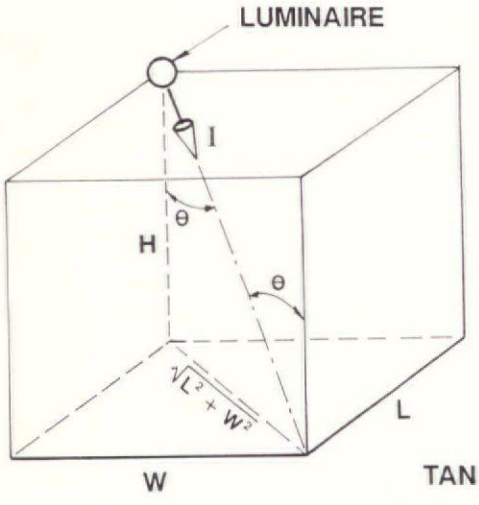
The 67 footcandles added to the 30 footcandles of HID lighting meets the 100-footcandle target value surprisingly well. Had the results been less satisfactory, they could have been adjusted by changing the number of lamps, the type of lamps, and/or the type of luminaire. Directly under the end of the row of luminaires, the illuminance is half that in the central region. This is observed from symmetry; if the row were continued, the illuminance would double and equal that of point P. Examine the table and note that the first 8-foot luminaire adjacent to a point on the bench is the principal contributor to the illuminance at that point. Consequently, the illuminance decreases only in the last few feet from the end of the bench. If this decrease is unacceptable, and if space permits, add one 8-foot luminaire past the end of the bench or add one alongside the end luminaire.

Illuminance calculations for lamp segments

Segment	L, feet	Angle θ	Candlepower at angle θ	$I_\theta \cos^3\theta$
A	1	7.6°	340	331
B	3	21.8°	315	252
C	5	33.7°	275	158
D	7	43.0°	230	90
E	9	50.2°	170	45
F	11	55.7°	115	21
Sum				897

This method of dividing large luminaires into smaller segments is the key to using the ISL for virtually any large luminaire. The luminaires need not be in a row, but can have any arrangement, and the illuminance can be calculated at any arbitrary point. The

Continued on page 21



$$\text{TAN } \theta = \frac{\sqrt{L^2 + W^2}}{H}$$

final diagram shows an easy way to visualize the geometry for illuminance at a point between luminaires in a typical rectangular layout. Imagine a rectangular block with the luminaire and the point at diagonally opposite corners. Generally, it is simpler to scale the distance from a plan drawing, as shown in the diagram, than it is to calculate it.

If there are many luminaires and many points at which illuminance is to be calculated, the arithmetic is tedious. For such situations, you might try the rapid and easy semigraphical method described in chapter 9 of the *IES Handbook,* headed Plan-Scale Method.

Do not forget that this procedure calculates only that component of illuminance due to light directly from the luminaire to the point. This is all that was necessary for the reader's problem. In general, there will be an additional component of illuminance due to reflected light within the space. This can be calculated by an advanced application of the zonal-cavity method commonly used to find average work plane illuminance. It, too, is described in chapter 9 of the handbook. Needless to say, many of the ubiquitous computer programs for lighting calculations can solve for illuminance at points, taking into account both the direct and reflected components.

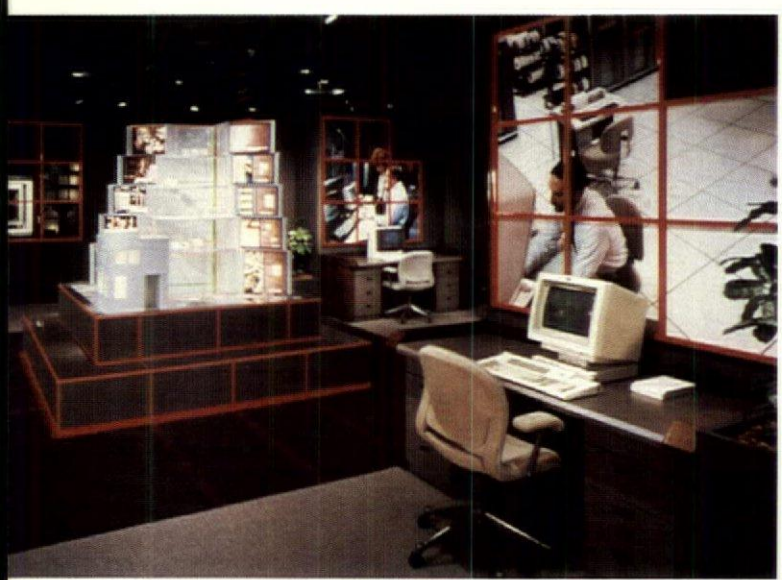
Robert E. Levin, PhD, Senior Scientist
GTE Products Corporation, Salem, Massachusetts

Correction

In the December issue, Mullican-Dunn Associates was incorrectly credited as the firm responsible for the lighting design of the Cathedral of the Incarnation ("Light accents space where action, events take place"). Although Ray Mullican, AIA, was responsible for the lighting design, he was at the time an employee of Gobbell Hays Partners, the architects for the project. We apologize for any confusion or inconvenience caused by this error.

Charles Linn, AIA, Editor

Dynamic lighting, dimming for high-tech products



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Client: AT&T
Location: Lisle, Illinois
Architect: George P. Johnson; Alex Klimov, project architect
Lighting Designer: Gregory Kay, Tech Lighting
Photos: Jess Smith

Displays of technical equipment like computers and switching gear can easily be made sterile and uninviting. But AT&T's Universal Information System Showcase avoids that trap. Dynamic lighting highlights the company's million-dollar displays of communications system components for its major corporate clients. Lighting designer Gregory Kay says, "Our aim was to make technical products more exciting without drawing attention to the lighting itself."

Low-voltage track fixtures over the showroom's doorway illuminate a polished black wall with blue-highlighted inscriptions that marks the entrance to the display areas. "The ambient light level is low, to set off the inscription and establish a sense of drama," says Kay.

After passing through the opening display, visitors find themselves in a black space. "To your left there's a dimly lit walkway. That's the only place you can go. It's sort of mysterious," says Kay. When visitors reach the first display, a salesperson pushes a switch, which activates a modular fluorescent system, track-mounted low-voltage spotlights, and other display lights. Synchronized on a four-second rise, the lights brighten to standard office levels as the presentation begins.

To focus attention on the products rather than on the lighting, Kay used black fixtures, which are barely visible against the showroom's low, black ceiling. Near video monitors, he added louvers to the fluorescent modules to control glare on screens. Track-mounted MR16 fixtures illuminate the paths between displays and accent display backdrops, models, and artificial plants; blue and green gels make the plants appear more natural.

Different fixture types are connected to separate banks of the control system, which dims or brightens all fixtures in a display area simultaneously. The salesperson can turn off the lights display by display, after each is viewed, or can turn off all the display lights at once at the end of a customer's visit. The system uses a special ballast to operate the fluorescent lighting at one-half volt without flicker, a ballast too big to fit the fluorescent modules. Kay solved that problem by mounting the transformer remotely. "It posed more technical problems, but installation went very smoothly," he says.

"Good lighting can add both warmth and vitality to a technical display. That helps achieve the client's goal for the Showcase — to instill user confidence and avoid creating an antiseptic feeling or a maze of technology," says Kay. At one point during the project's design phase, Kay considered an even more interactive control system that would raise light levels as a salesperson stepped on a special patch of carpet and began talking. "But I realized," says Kay, "that people would wonder how he did it, which would detract from the sales message. Theatrically it would have been really exciting, but that would be emphasizing the lighting instead of the products."

—Susan Degen

For product information, turn to page 70 and see Manufacturers.

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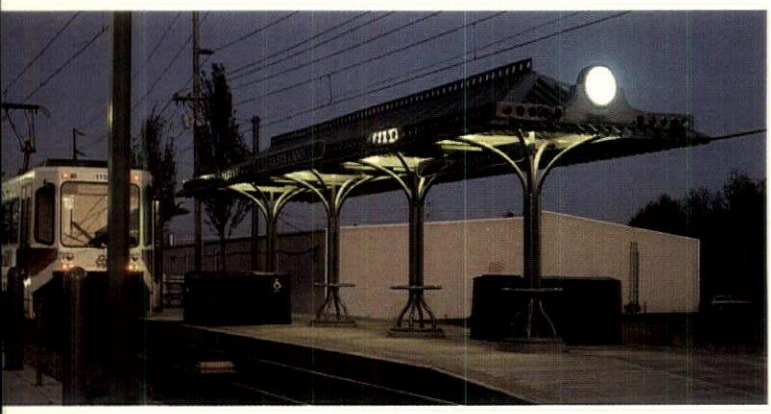


Project: Banfield Light Rail transit stations
Location: Portland, Oregon, and suburbs
Clients: Tri-County Metropolitan Transportation District of Oregon, Oregon Department of Transportation, City of Portland, City of Gresham, Multnomah County, Metropolitan Service District
Architect: Zimmer Gunsul Frasca Partnership; Gregory Baldwin, principal; Karl Sonnenberg, Ron Stewart, Tom Geiser, project team
Electrical Engineer: Dick Burgess, PAE Consulting Engineers, Inc.
Photos: William Hughes

No one likes to stand in the dark to wait for a bus or an electric tram. People who ride the new Banfield Light Rail system in Portland, Oregon, don't have to, thanks to practical, well-lit station shelters that encourage off-hours riders. The key is a versatile structural design that can be modified to suit various neighborhoods along the light rail route but that uses the same basic lighting system in every station.

The architects designed the shelters to be bright sanctuaries of light at night. "We tried to create surfaces around the shelters that would reflect the light," says project architect Gregory Baldwin. "They become a warm spot just like a showroom window. Rather than being attracted to a point source, like a street lamp, you are attracted to an illuminated shelter that provides a sense of sanctuary."

Baldwin kept down maintenance and replacement costs by using standard fixtures. Sets of four high pressure sodium emergency fixtures with prismatic diffusers brighten the inside of the shelters. Sets are ganged and attached to a structural steel ring. Shelters outside the downtown area have distinctive white half spheres lit by compact fluorescent sources that give them a glow like full moons.

Area lighting around the shelters changes with location. The architects chose standard city light fixtures for the downtown shelters and metal halide fixtures with spherical prismatic lenses for others. "In fact, we redesigned a traditional concrete park standard so that it was easier to maintain and put a spherical lens on the top of it for our sodium vapor source," says Baldwin. To minimize lighting fixture costs further, the architects chose standard cobra head fixtures for park-and-ride lots along the light rail route.

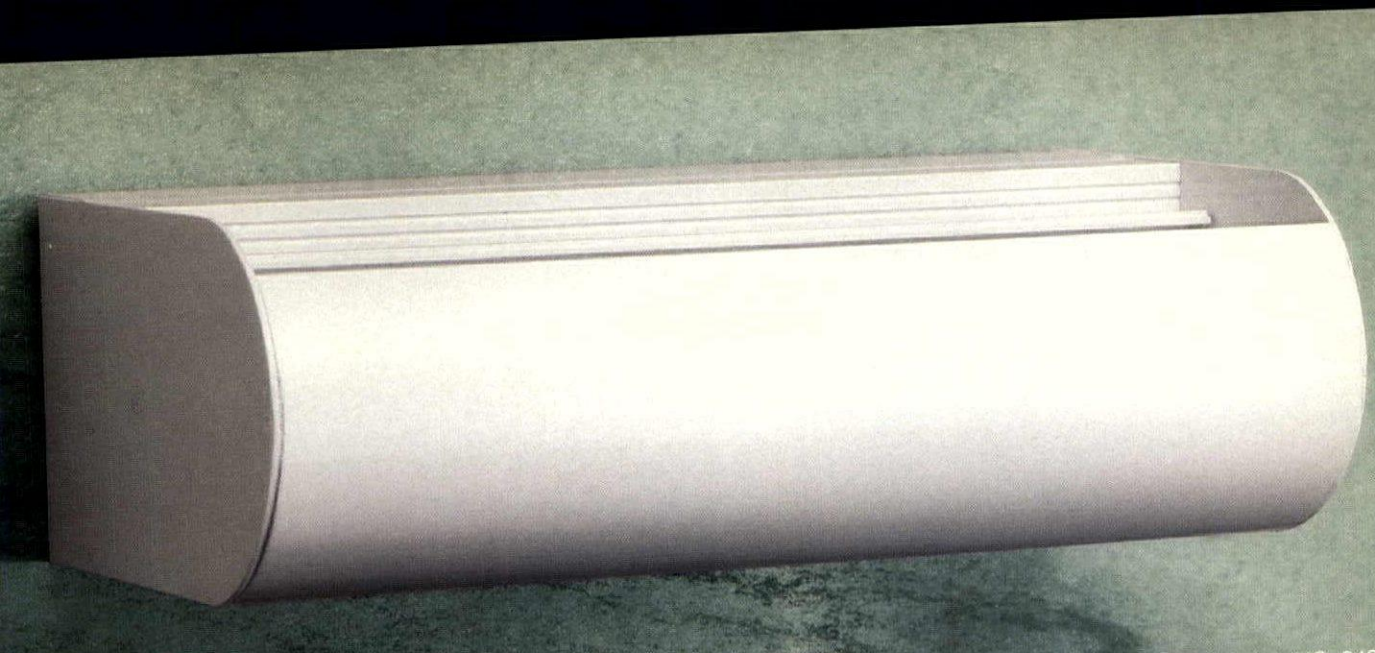
Part of the light rail system lies parallel to a freeway that cuts diagonally across the city. The architects used the modified city park standards here but spaced them closer than usual so that the lighting would make people feel secure as they walk through the stations. Stairways and elevators for disabled riders connect stations with bus stops on surface streets bridging the freeway. These transfer hubs continue the design of the light rail shelters, providing a visual link with the system.

Some shelters near downtown are located in median strips, where drivers don't expect to find pedestrians. To alert auto drivers, the architects stretched cable between lighted bollards. The series of low-intensity light sources where they aren't expected helps to catch drivers' attention.

The success of the shelter design rests on its simplicity — a practical, versatile design and standard lighting fixtures. "We tried to provide an environment that seems secure and inviting. We didn't push conventional wisdom," says Baldwin, "we used it."

—Susan Degen

For product information, turn to page 70 and see Manufacturers.



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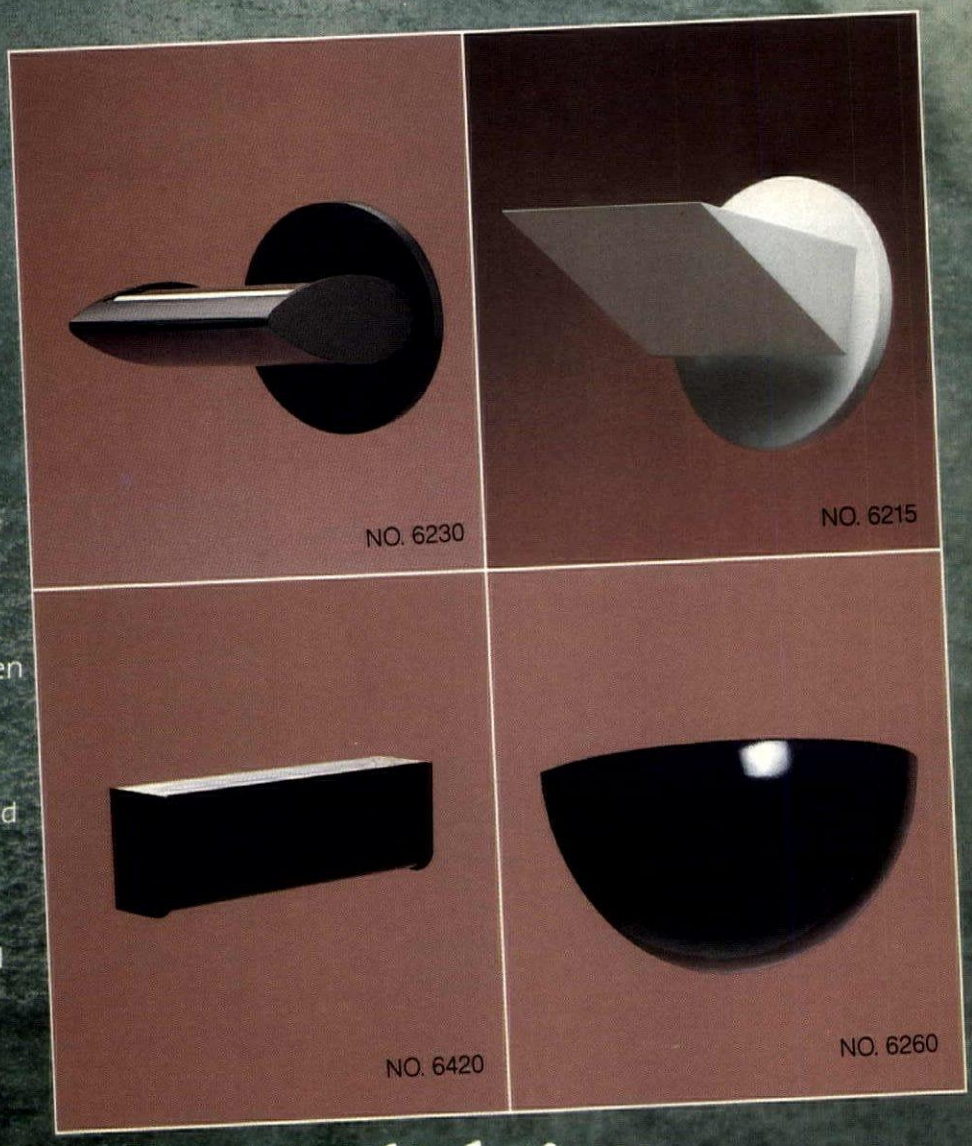

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ence center, and the offices on the third through twentieth floors. "We didn't want what you find in so many speculative office buildings — the same thing everywhere, with half a dozen fixtures used throughout the whole building," says Beldecos. "We want people to feel that they are in different spaces as they go through different areas."

Custom Fixtures

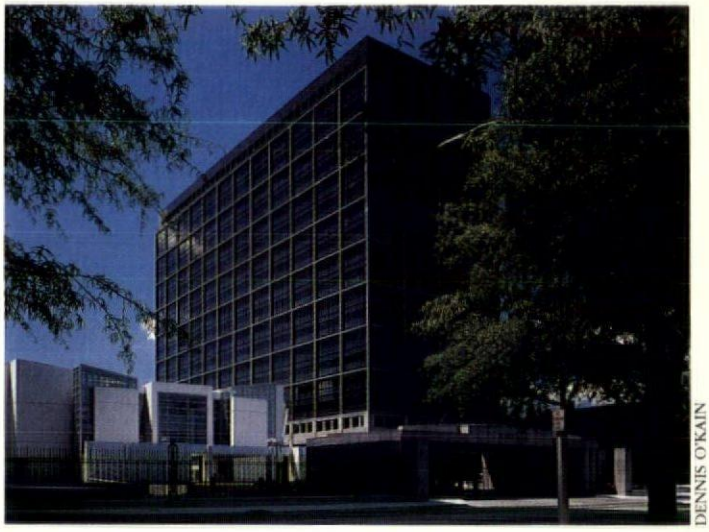
A wealth of custom fixtures — about 25 completely original designs — contribute to the unique moods established in many public and private areas of the building. "I'd have to say that if the project were begun today, we would not use as many custom fixtures," Belde-

Five-foot-diameter pendants and floor lamps were custom designed for the entry lobby of Coca-Cola's USA tower (left). Cross corridors from the elevators feature fluorescent cove lighting and adjustable recessed lighting for original art.

Coca-Cola's USA tower: Elegant, whimsical, dignified, fun

STORY BY
GARETH FENLEY

PHOTOS BY
BOB HARR, HEDRICH-BLESSING



DENNIS O'KAIN

A short tour through the halls of the Coca-Cola Company's USA headquarters tower gives a visitor the impression of several entirely different buildings. The ingenious variety of the interior design relies partly on lighting. Floor lamps and 5-foot-diameter pendants, all custom designed and cleverly lit by concealed fluorescent lamps, impress visitors in the spacious entry lobby. Sparkling low-voltage beams and frolicking neon in the employee center create a sense of escapist whimsy. On the executive office floors, soft lighting from polished bronze pendants indicates the utmost in quality.

Three main firms were involved with the design of the tower. Each contracted directly with the Coca-Cola Company; there was no prime professional. "This arrangement meant that we each were not only responsible to our client, the owner, but also were responsible to the other design firms for coordinating the work," says Stephen Sessler, partner-in-charge for Newcomb & Boyd. "After we had been selected as mechanical and electrical engineers for the complex, we asked for and were given the opportunity to make a presentation of our credentials for the lighting consultant role. We were selected, and found ourselves in a challenging position."

"In some parts of the lighting design, the interior designers at Stevens and Wilkinson had a pretty strong feel for what they wanted to accomplish," says lighting designer Andy Beldecos. "In those cases, it became our task just to see that the lighting was executed properly — that it worked, and that the ideas were practical, workable solutions."

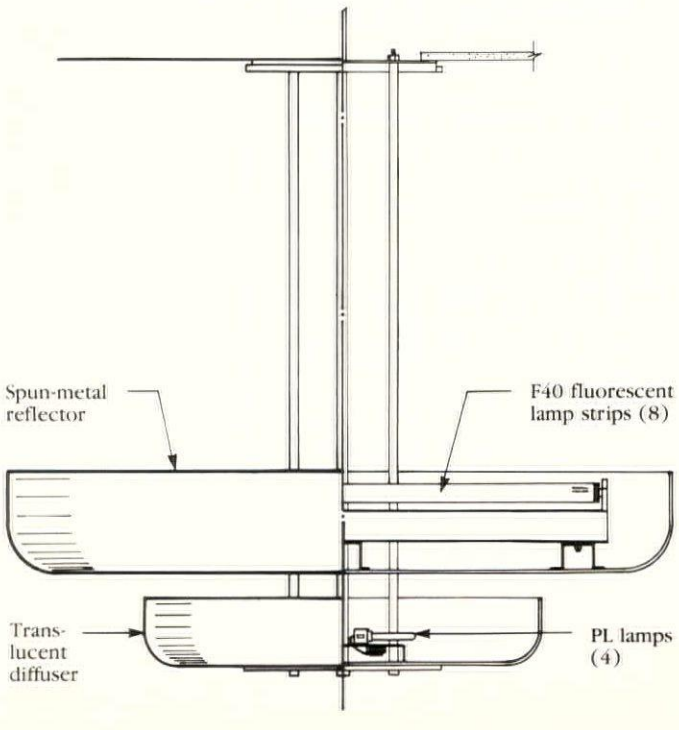
One of the interior design goals, strongly supported by lighting design, was to give distinct personalities to the three major areas of the building: the employee center, the conference

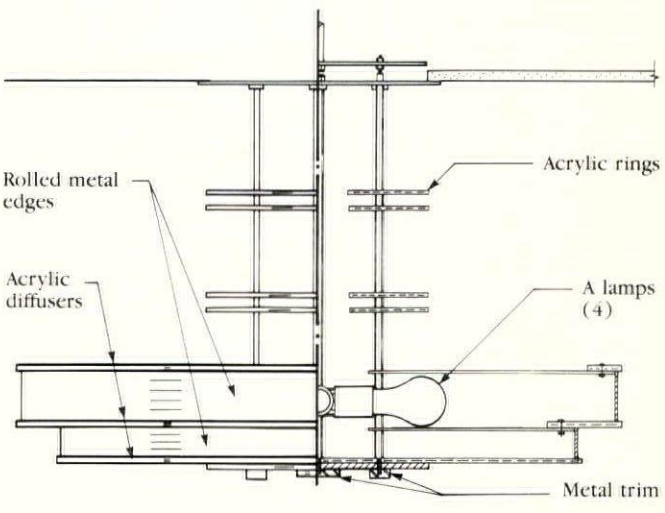
Project: The Coca-Cola Company headquarters addition: USA office tower, employee and conference center
Location: Atlanta, Georgia
Client: The Coca-Cola Company
Architect: Heery Architects Inc.
Landscape Architect: Heery Engineering & Land Planning
Lighting, Mechanical, Electrical, Fire Protection, and Acoustical Design and Contract Administration: Newcomb & Boyd; Jim Costley, electrical engineer; Andrew Beldecos, lighting designer (currently principal of Andrew Beldecos Lighting Design)
Interior Designer: Stevens and Wilkinson Interiors, Inc.

cos says. "That's simply because the industry has detected a need for elegant, high-quality fixtures in the past few years. When we were designing this building, though, nothing available off the shelf was visually compatible with the architecture and interior design."

The extra expense for custom design and manufacturing was judged appropriate for a building that was to be a cut above the norm. "Once you get up into the economics of quantity, the cost per fixture was not that great," Beldecos points out. "All the elevator lobbies use custom fixtures, for example, but the unit cost for 65 fixtures was not so bad. For some of the special fixtures, where we only used a total of one, two, or three, the cost per fixture was high, but not much more than you would pay for similar fixtures ordered out of a catalog today." The short-run custom fixtures were used primarily on the 19th and 20th floors — the executive office levels.

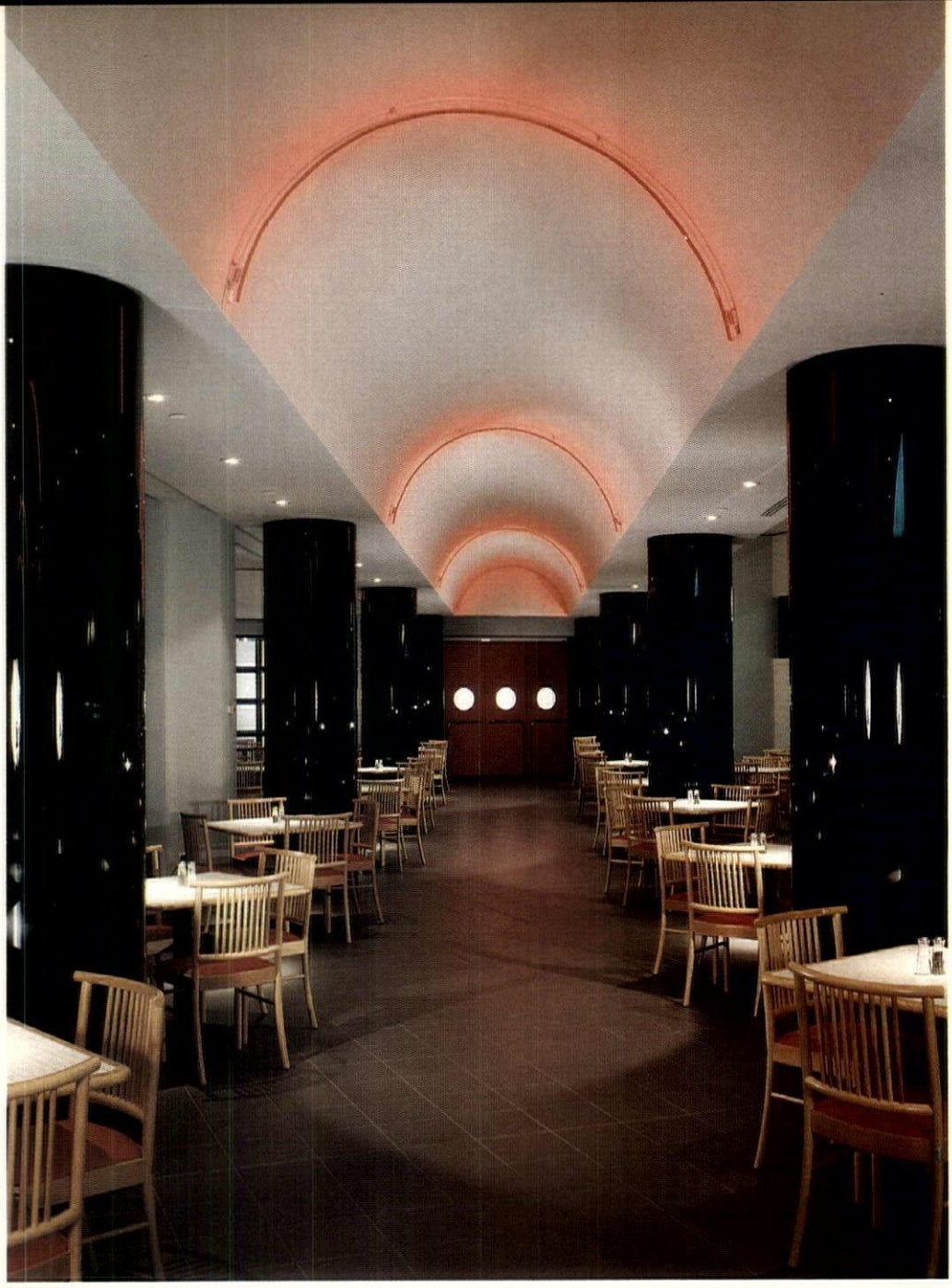
"You don't often run across projects that give you the opportunity to do so much custom design, so this was a lot of fun," Beldecos says. "Considering how much crossover design work had to be done on this project, we began to appreciate the problems faced by manufacturers that do this for a living, working out the details of each and every custom fixture. Getting it right takes constant dialogue. 'This isn't going to work; there's not enough room for the lamps. We have to increase this dimension, and then we'll have to increase this other dimension proportionately, and then this material won't work.' It's easy to make something look good, and it's sometimes easy to make it work right, but to put the two together in a





Eight standard and four compact fluorescent lamps are the light sources for the 5-foot-diameter custom-made pendants (left) in the main lobby.

Sixty-five incandescent pendants of the design above, some finished in enamel and some in bronze, were custom made for elevator lobbies throughout the building.



package can sometimes get to be quite a headache."

Office Tower

Typical floors in the office tower have private offices around the perimeters and secretarial support stations in the open-office cores. The interior design and lighting are elegant and subdued. "We made a deliberate effort to make the lighting in the office areas low glare and high quality," says Beldecos. "We used parabolic fluorescents in the private offices and indirect fluorescents in the support cores.

"In the elevator lobbies, a low-voltage fixture in front of each elevator door puts a pool of light right at the base of the door. We used recessed fixtures with good glare control because we didn't want distracting sparkle; the design is reserved and businesslike. Custom incandescent pendants add dignity to the elevator lobbies. We used essentially the same fixture on all floors, except that we used a painted finish on the typical floors and a polished bronze finish on the first, second, nineteenth, and twentieth floors.

"The cross corridors from the elevator lobbies are lit from fluorescent coves. We wanted to accent vertical surfaces by reflecting light off them. Original artwork is on brightly colored walls at the end of the cross corridors. During the design phase, we knew the art was going to be there, but we didn't know whether it was going to be two-dimensional or three-dimensional, its length and width, colors, or materials. We just had to provide flexible lighting, so we used adjustable recessed incandescent fixtures. Track lighting would have been much more flexible, but we didn't really want to have track hanging in corridors.

"In some cases, the art lighting didn't work because of the constraints we had. In some areas, we had to put the fixtures a little too close to the wall, so the light hits the art at too much of a grazing angle; a piece with some depth to it casts distracting shadows. In cases where the piece warranted special attention, the owner usually was willing to go back and change the lighting after the fact. That's typically how you end up handling artwork in a new construction project, because art is one of the last things purchased and installed."

Employee Center

The employee center in the second floor of the tower serves more than 3000 employees who work in the Coca-Cola Company's entire headquarters complex. It provides a place to escape from the corporate world, yet paradoxically remain inside it. The Town Square, somewhat like a miniature shopping mall, has a credit union office, cashier, travel agency, ticket outlet, and company store. Employees eat lunch in the adjoining cafeteria.

Lighting in the Town Square, says Beldecos, "tends to provide enough of a sensory stimulus that it takes you to another place, so to speak. We used neon, low-voltage downlights, decorative sconces, and indirect lighting. The lighting equipment and techniques are intended to create a whimsical, fun space, very different from the office environment above.

"In an office environment, glare is not good, but in a space like this, we call it *sparkle*. It's desirable because you can create drama by creating a lot of

And now for something completely different: Neon arches, brilliant downlights, and bright sconces contribute to an upbeat mood in the cafeteria. Like a miniature shopping mall, the "Town Square" in the employee services center provides escape from the corporate world above. Retail lighting techniques are brought to bear in the Town Square's food court.

contrast. In the cafeteria, for example, we put rows of adjustable downlights along a barrel vault. Those particular downlights have the lamp right at the plane of the finish plate, and you can see a good deal of sparkle from them. That effect was intentional. In an office environment, the lamp would have been recessed, and a cone would cut down the glare, so you'd see only the effect of that fixture. In this case not only do you see the effect of the fixture on the floor and tables, but you also get a starlight effect."

Control System

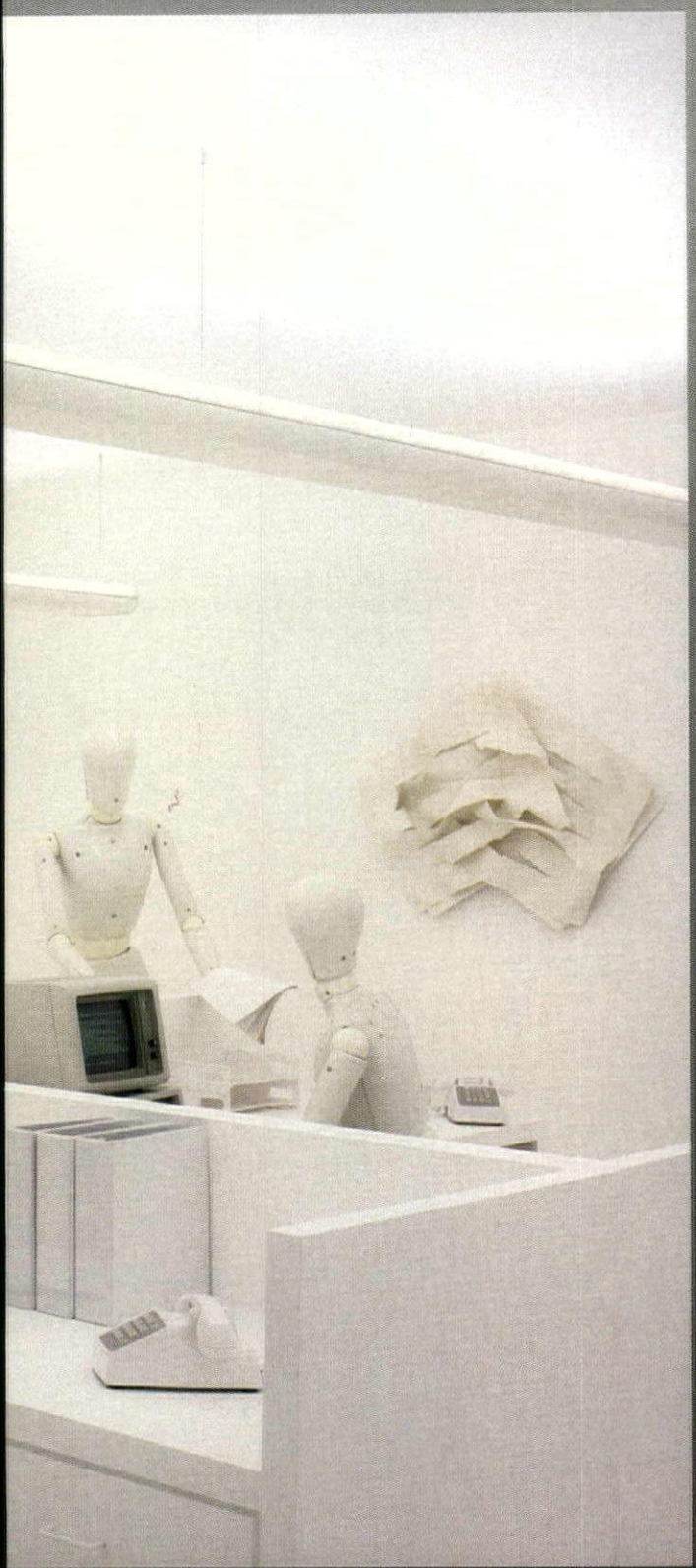
The owner decided to control all the new lighting with the same type of building automation system used in the existing headquarters tower. Each office floor is switched in quadrants. "The system allows very little flexibility, but the owner felt that little was needed," says Beldecos. "We don't really need to dim the fluorescents that make up most of the lighting on the typical office floors. The building is used from nine to five, with just a small percentage of the personnel working later hours." To keep lights on after hours, there are local switches in each office and zone override switches for each quadrant.

"Where we needed dimming, we used dedicated dimming systems," says Beldecos. "There was actually quite a bit of incandescent dimming in large conference rooms and on the executive floors, where flexibility and changing programs required it.

"The cafeteria has an extensive dimming system. All the neon, low-voltage lighting, indirect lighting, and sconces — everything in that area — is wired into an eight-scene preset system with 22 channels. Each setting can be activated by the building automation system. The dimming in most public spaces throughout the building, in fact, is tied into that master system. The conference center on the first floor is the biggest exception; the auditorium and all the conference rooms there stand alone, with their own independently adjustable systems."

The building with its diverse lighting techniques and aesthetic impressions makes a perfect home for Coca-Cola USA. Employees and visitors alike can feel comfortable there. Never taking itself too seriously, the lighting projects the impression that the USA building and the employee services center are refreshing and fun — just like Coca-Cola. ■

For product information, turn to page 70 and see Manufacturers.



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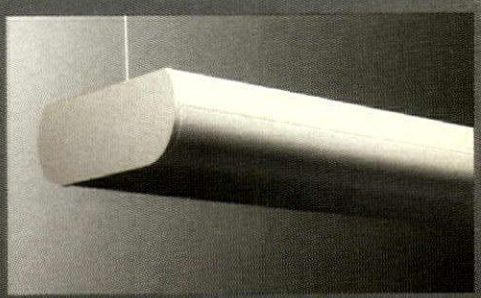

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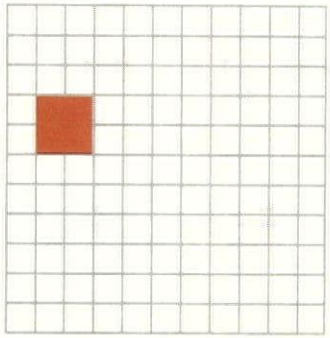


Uplighting specimen trees

Janet Lennox Moyer

Janet Moyer is a landscape architect and principal with Jan Moyer Design, Oakland, California

Both a plant's form and its rate of growth help to direct your approach to uplighting specimen trees, as discussed in two previous columns. This month, we'll look at four examples of lighting trees in the Japanese maple (*Acer palmatum*) family. Trees in this group come in diverse forms with radically different growth rates. Whatever their size or shape, their natural beauty encourages lighting designers to show them off.

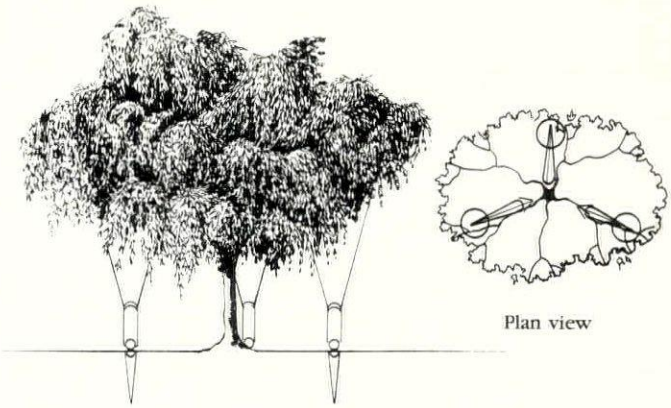
Acer palmatum "Omuryana" grows into a rounded, willowy form, 10 to 15 feet tall and 15 to 20 feet wide. With its open, cascading foliage pattern and its translucent, brilliant green leaves, this type of tree glows when lit from inside the canopy area. At least three fixtures should be used, as shown in the accompanying drawing, to show the full shape of the tree.

Acer palmatum "Butterfly" has an upright, twiggy growth to 10 feet tall and 3 to 4 feet wide, an open foliage pattern, and cream to pale green foliage. It's another perfect candidate for uplighting from inside the canopy. When it's situated close to a wall, as shown in the drawing, two uplights may be sufficient. The wall encourages the tree to restrict its growth on that side, so the canopy is smaller there. The wall also often acts as a reflector and provides enough light to the back of the tree so no additional lights are needed to show its full shape.

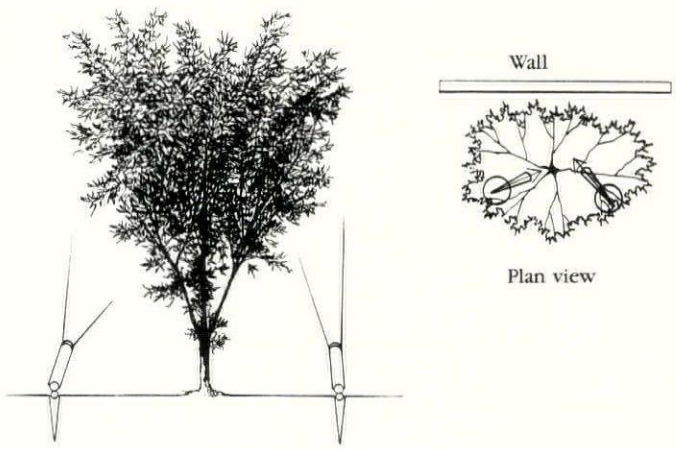
Some Japanese maples — *Acer palmatum dissectum atropurpuren* "Crimson Queen," for example — can be trained to have a braided trunk that creates an upright, cascading form. With its dark red leaves, compact foliage pattern, and distinctive trunk and branching pattern, it benefits from fixtures located outside the canopy. To show fullness, you can locate two fixtures 45 degrees off the front center line. For drama, light it from one side, as illustrated. When this type of tree is close to a wall, side lighting provides pleasing shadows on the wall, both when the tree has leaves and when it is dormant.

The low-growing *Acer palmatum dissectum atropurpuren* "Ever Red" may reach a height of 6 feet after 20 or 30 years. Its branches grow down to and along the ground, so below-grade uplights (as illustrated) are most successful for this tree.

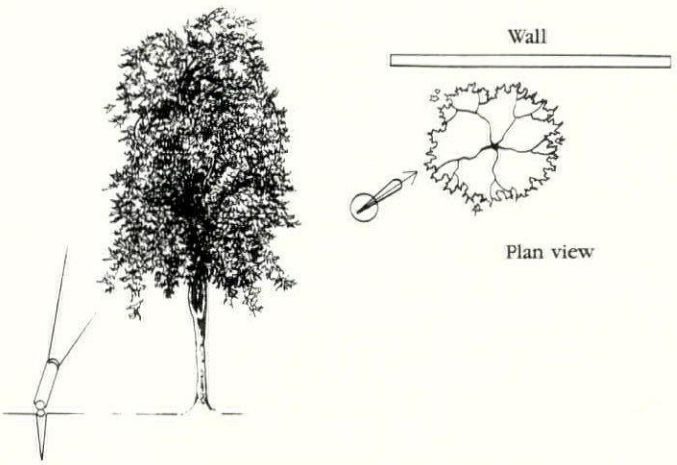
Trees with translucent leaves, like the Japanese maples, glow when lit from beneath and can create a sensational focal point in a garden. If several trees are lit in this way, however, there's a risk of too much drama and of spotty brightness imbalance. Then it becomes critical to tie the scene together with fill light on plantings or grass between the specimen trees to provide a comfortable visual composition.



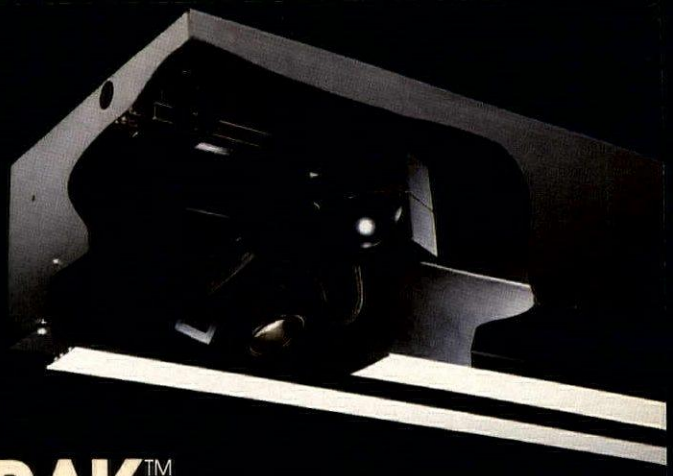
Acer palmatum *"Omuryana," with its translucent, brilliant green leaves, glows when lit from inside the canopy area. Three fixtures show off its rounded form.*



The wall behind this Acer palmatum *"Butterfly" may reflect enough light on the back of the tree so that just two lights are needed to show its full shape.*



Dramatic side lighting of this Acer palmatum dissectum atropurpuren *"Crimson Queen" against a wall provides pleasing shadows when the tree has leaves and when it is dormant.*



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Another important factor, mentioned in a previous column, is the size of each plant. The planting plan provides information about the probable approximate size of a plant when it arrives at the site. Understanding how quickly it will grow and its size at maturity helps to formulate your decisions about the lighting equipment to use and where to place the fixtures. Depending upon a specific plant's importance to the overall garden plan, you may need additional information about such factors as the pruning and maintenance approach planned for the garden. Without such information, it's easy to make critical mistakes in fixture and lamp selection and placement — mistakes that could ruin the visual composition of the garden at night.

Choosing Fixtures

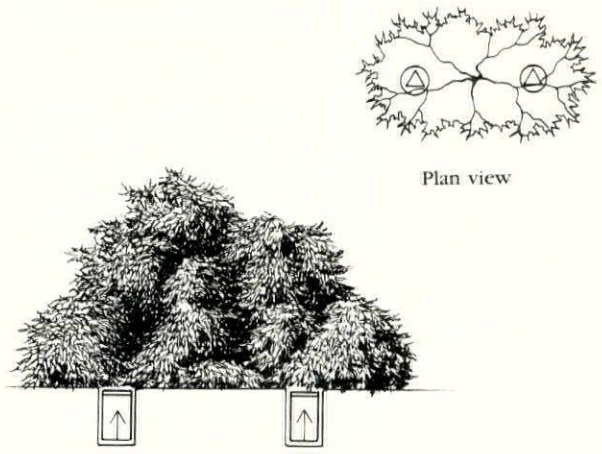
For a mature tree, direct burial type fixtures may be a wise choice. For a young tree, however, stake-mounted fixtures with an extra length of cord may be more appropriate. Then it is possible to move the fixture out as the tree grows.

Direct burial fixtures provide a clean look and, when trees are located in a lawn, permit lawn maintenance without interference from the fixture. They work equally well for mature dwarf trees that are not in a lawn, but which have little ground cover planting around them. The absence of visible fixtures enhances the garden's appearance and, because the lamp is farther from the plant, reduces the potential for burning foliage.

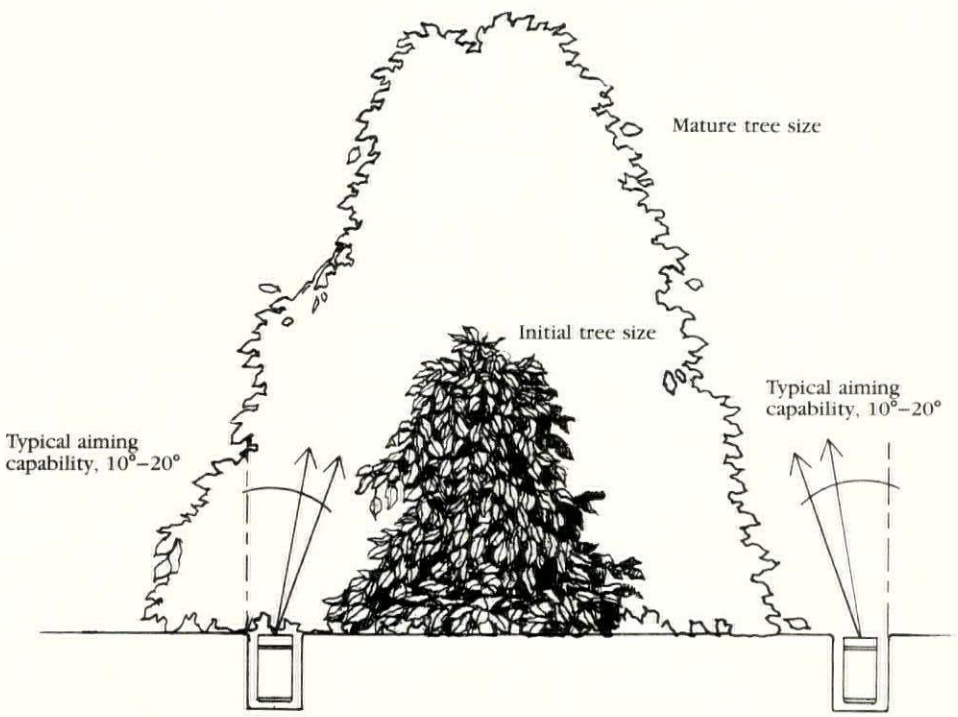
Some plants are unavailable in mature sizes, so specimen trees and other unusual plants are often planted while immature. When immature trees are planted in lawns, a lighting problem arises. Where do you place the fixtures?

Ground-recessed fixtures typically offer a vertical aiming angle adjustment of from 10 to 20 degrees. If fixtures are located for the initial tree size, the lights may quickly become nonfunctional; as the tree rapidly grows well beyond the reach of the fixture, light from the fixture is smothered in foliage. If fixtures are placed in a position appropriate to the mature size of the tree, the horizontal aiming capability may be insufficient to light the tree for the first few years.

One solution is to locate the fixtures properly for the mature tree size and simply not activate the fixtures until the tree has matured. Another solution is to select a fixture that can be raised and lowered within the burial can. This fixture must have nearly full-range aiming capability. Lift it even with, or slightly above, the soil line;



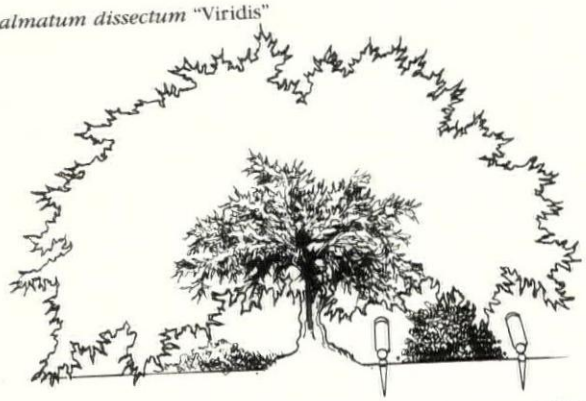
Below-grade uplights are most successful for the low-growing Acer palmatum dissectum atropurpuren *"Ever Red," with branches down to and along the ground.*



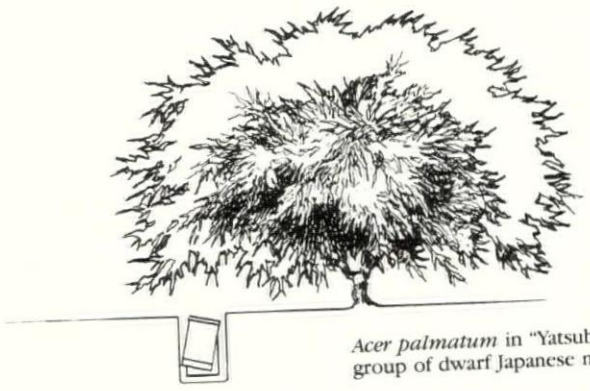
ILLUSTRATIONS: CRAIG LATKER, MAGRANE LATKER LANDSCAPE DESIGN

Dense immature trees, such as Fagus sylvatica, *may significantly increase in size. When trees like this are planted in grass, plan carefully for a lighting installation that works for both the young and the mature tree. A fixture placed close to the immature tree will soon be buried and its light lost in the dense leaf coverage; a fixture properly placed for the mature tree may not be able to light the young tree.*

Acer palmatum dissectum "Viridis"



Flexibility in lighting is important for some trees — such as Acer palmatum dissectum *"Viridis," which may quadruple in size from planting to maturity. Then stake-mounted fixtures are appropriate. The dwarf Japanese maple may increase in size by only a foot or less over many years. In this case, a ground-recessed fixture is logical, especially for trees with branches low to the ground that may be burned by the lamp heat of higher fixtures.*



Acer palmatum in "Yatsubusa" group of dwarf Japanese maples

then aim it at the required angle to hit the tree. This approach is not problem-free. Two potential problems must be considered — a negative impact on lawn maintenance and the possibility of glare created by a low aiming angle. For the period of time that the fixture is above ground, ground cover surrounding it will have to be hand clipped. To avoid glare from these fixtures, the lighting designer must carefully consider the garden layout and coordinate both fixture and planting locations with the landscape architect.

The solution with the least impact on the planting is to use vertically adjustable stakes. They permit raising the fixtures as the plant material grows, thus keeping fixtures from becoming buried. Do not raise the fixtures completely above the planting so that they become obvious. Keep them tucked into the top of the plant material, still relatively hidden, but not covered by the plant.

Now that we've run through the basics of uplighting, the next column will focus on a simpler technique, downlighting — my first choice technique in many situations. Its difficulty lies in choosing mounting locations. Do we use sky hooks? ■

ILLUMINATING READING.

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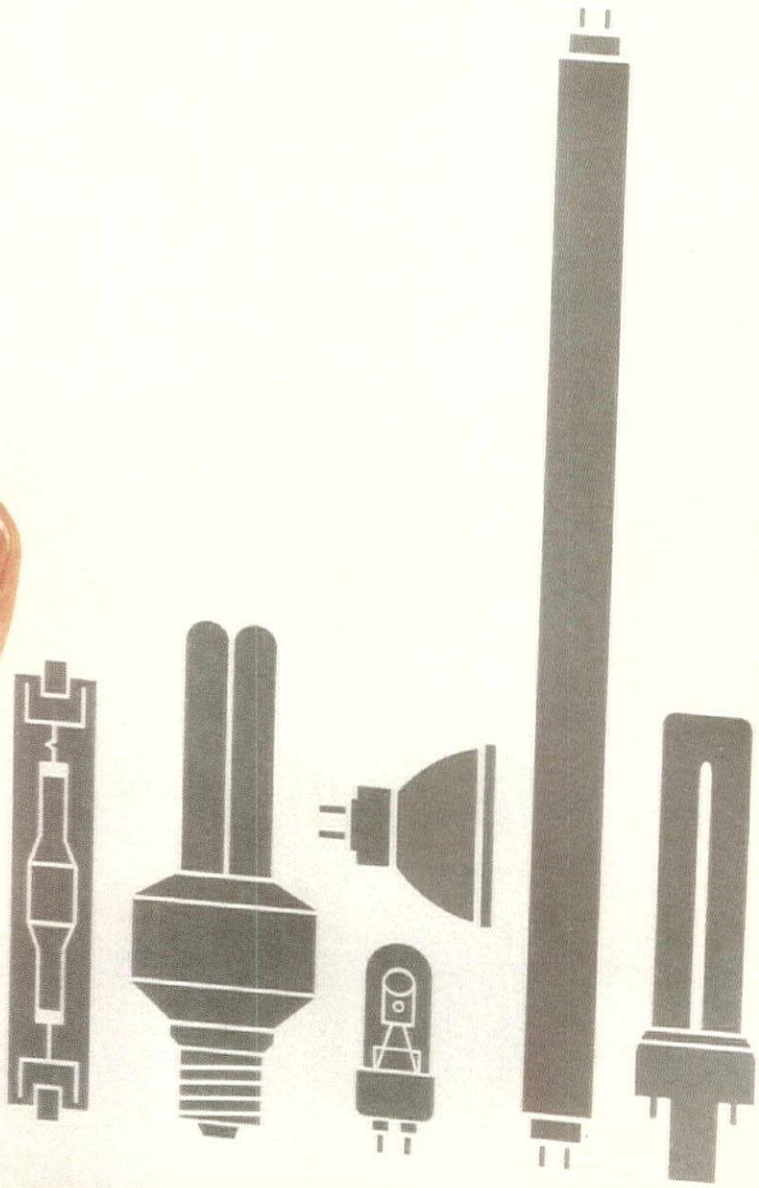

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TECHNOLOGY BROUGHT TO LIGHT

Circle 26

OSRAM

RESIDENTIAL LIGHTING FORUM

Planning, on-site supervision make success of penthouse lighting

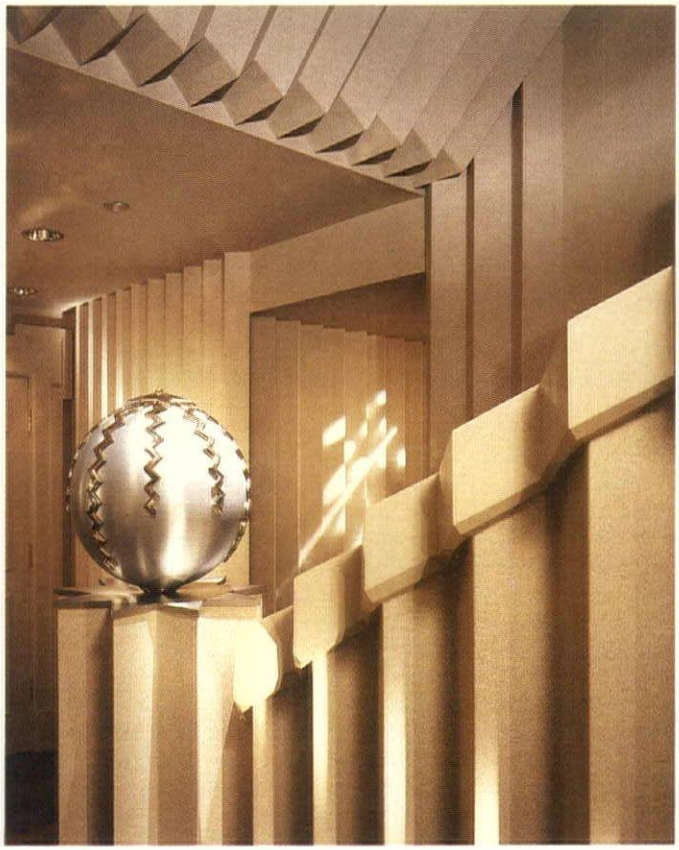
ARTICLE BY
CHARLES LINN, AIA

PHOTOGRAPHS BY
ROBT. AMES COOK

Lighting designer Craig Roeder says the comprehensive design work of interior designers Loyd Ray Taylor and Charles Paxton Gremillion was critical to the successful lighting of this penthouse apartment. Roeder knew exactly what had to be lit and where it would be located.

"Loyd and Paxton know what they're going to use on a project before they ever start it. Other designers will say, 'We're going to have a painting on the wall and a chest down below it.' Loyd and Paxton show you the painting. They show you the detailing of the hand carving in the frame and the gilding in the actual armoire or piece of furniture or whatever is to go below the painting; so you really have the opportunity to light an exact piece. It's an unbelievable advantage from a lighting standpoint to actually see what you're going to light."

Roeder says that kind of working relationship was doubly important for the penthouse recently redone for Dallas real



In the salon (left), "stalactites" hang from the irregularly angled existing ceiling above, leaving a level plane for recessed adjustable fixtures. The streak of light across the pleats comes from a framing projector recessed into the ceiling.

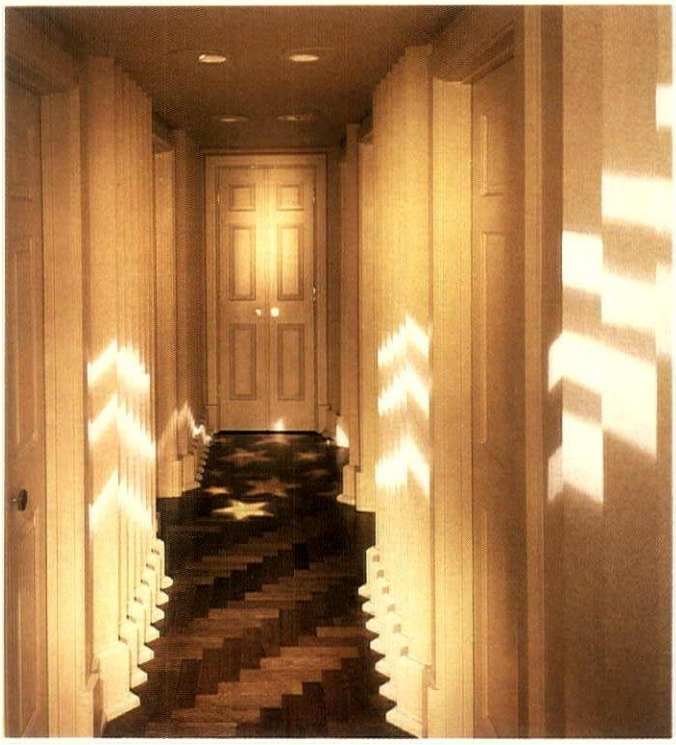
Project: Henry S. Miller Residence
Clients: Juanita and Henry S. Miller
Location: Dallas, Texas
Lighting Designer: Craig A. Roeder and Associates; Craig A. Roeder, principal; Robert Oakes, project manager
Interior Designers: Loyd-Paxton; Loyd Ray Taylor, Charles Paxton Gremillion, principals
Electrical Contractor: Owens Electric; Jim Owens, project manager
General Contractor: AABCO; H.D. Williams, project manager

Each pleat in the dining room wall is lit by its own low-voltage 25-watt PAR 36 display spot. Of the photo at bottom (near right), designer Craig Roeder says, "This fun little corridor is too small for furniture, but one has to pass by it to get to the living room. We decided to throw lightning bolts down its walls and a little pile of stars at the end." In the sitting room (top, far right), the pattern established by the pleated walls is carried into a large ceiling coffer illuminated by strips of low-voltage lamps.

estate executive and arts patron Henry Miller and his wife, Juanita. "The pieces of 'furniture' there are all really special works of fine art."

That might make it sound like lighting the two-story apartment was a snap, but Roeder quickly adds that it wasn't all that easy: the irregular, multi-angled ceiling in the existing space left some "real obtrusive, frightening conditions. There was no sense of rhyme or reason or proportion to it. Strange obtuse angles intersected with other ones. In some areas, we were faced with trying to light from a sloping ceiling two stories high. I felt it was *not* appropriate to use track lighting in this particular residence."

To solve those problems, Roeder went a bit beyond what most lighting designers do. "Paxton had already come up with this concept of pleating



the walls, so I had my model department make a model of the ceilings. Then, we began exploring ways to deal with the ceiling conditions that would reflect the concept of the pleated walls, and finally came up with the pleated 'stalactites' that hang from the higher ceiling." These bring down the scale of the rooms, as well as give Roeder a level ceiling to mount the light fixtures above.

Creating Drama, Flexibility

"We set out to create drama in the space by making the contrast ratio between what's being lit and the wall beside it very high. This entire project is lit with low-voltage PAR 36 lamps," says Roeder. "I like to use them because they're available in many wattages and beam spreads, and they're accurate. If the lamp says it's got a 3.5-degree beam spread, then it does. Once you can control the light and put it exactly where you want it, you can create that drama.

"We also do many concise drawings when determining exactly what fixture and lamp to use at a given location — floor and reflected ceiling plans, elevations, sections, whatever it takes. It doesn't always take all of that, but it can get that extensive. For flexibility in the future, we've used a variety of adjustable recessed fixtures from several manufacturers; they'll take a great variety of lamps." Roeder also used champagne gold reflectors throughout the project to complement the neutral color of the walls. A six-scene preset dimming system permits the owners to adjust the lighting to suit the occasion, and it lengthens lamp life.

"These fixtures will adjust up to 40 degrees from nadir in any direction. So, if the furniture layout is changed in four or five years, the ceiling won't have to be ripped out to make it possible to readjust the lighting. I like to be able to tell my clients that, barring the most unusual circumstances, it will be possible for them to redecorate their homes, and the lighting will still work. We may have to be called in to change some lamps and re-aim them, but that's all. A lighting job like this is a sizable expense, and we feel that paying for it once is enough."

On-Site Coordination

Despite all of the advance planning, including scale models, and some full-sized mock-ups of rooms and their lighting, this remodeling job required that Roeder's project manager Robert Oakes be on the site full-time. "I lived on the job," he says. "Everything was just a matter of problem-solving: drawing full-sized details on the wall and just working them out with the contractor.

"One thing that's really important is the precise location of all of the fixtures. We generally did our fixture layouts on the floor, and then used a laser level to project them onto the ceiling structure. That's a good way to do it, since it's pretty hard to measure in mid-air."

Roeder adds, "It was good that the job was in Dallas, where my firm is located, so it was easy to watch. We also had a contractor who was very easy to work with. This is especially important in remodeling work, where every time you tear out a wall you can be faced with an entirely new set of criteria." ■

For product information, turn to page 70 and see Manufacturers.

RESIDENTIAL LIGHTING FORUM

'Home movie' is animated neon facade of home, studio

Any night of the week, right in front of my house, I can watch a steady flow of spectators instantly become children. Their faces fill with amazement as they watch Neon Mural #1's story unfold with electric sentiment.

A computer activates relays and transformers that control the action of this animated neon movie. The flower appears first, then the house and heavens. A rocket ship flies over, drops a bomb, and destroys the little world. After 10 seconds of darkness, the sequence starts over again.

Ben Livingston

Ben Livingston owns the Beneon Company of Austin, Texas.

The 14-by-40-foot computer-animated neon cartoon is a childlike interpretation of the beginning and ending of our world. It starts with a big flower next to a house and lawn with a kitty cat. Suddenly a large rocket ship appears, thrusting its way through a universe of planets, stars, and galaxies. It drops a bomb that falls on the flower and explodes upward into a pulsating mushroom cloud. The scene is plunged into total darkness for 10 long, apprehensive seconds. The flower finally reappears, and the cycle starts all over again.

The original concept for the mural started in 1986, when my parents and I kicked around the idea of outlining their house in neon. But instead of clean, straight lines, we'd make it look like a kid had drawn it.

Now, this is not an unusual conversation for us. We lean a little toward the eccentric side, and we are usually not afraid to express or initiate our ideas. In my parents' backyard, for example, a herd of painted wooden cattle "graze" alongside the garage, where a life-size pink neon lady swims naked in a sea of argon-blue waves. Legend has it that an old man who lived across the street started mowing his lawn at night the summer we put up the Pink Lady.

As time went by, the idea of a childlike drawing in neon became very exciting to me. The color and whimsy of a youngster's drawings seemed perfect for a medium as vivid as neon.

Several months later, I had just finished the neon sets for a Tri-Star picture called *Nadine*. I was feeling the show biz bug, big time! I had stowed away a few extra bucks from the movie job, so I decided to take a little time to do something really interesting to my own place, a 2200-square-foot studio and apartment converted from a cinder block machine shop. The front was boring and unsightly.

I must have had a hundred ideas, but naturally I could use only one, and it had to be just right. A neon project on this scale is quite a commitment.

Innumerable restaurant napkins, cups of coffee, and ball point pens later, it came to me: the kid theme! A two-dimensional house — life-size! Its door would be my apart-

Project: Neon Mural #1
Location: Austin, Texas
Lighting Designer: Ben Livingston
Electronics Designer: Frank Roberts
Photos: Smiley Poole

ment's door! A big yellow window, a red chimney with smoke, and a portrait of my cat Spuz in the front yard. A front yard. How about a white pebble sidewalk with scalloped curbs winding through an Astroturf lawn? Then the idea of animation popped into the picture.

Wouldn't it be fantastic to make this thing move? Especially with this theme! A rocket could appear, drop a bomb, and blow up the house. A movie in neon, a spectacular notion.

As kids, my cousins and I were always filming movies and short comedy skits; later, we produced a 50-minute video movie that cost us an entire summer and more than $2000. San Antonio and Austin public television stations showed it several times, and it became something of a cult hit.

I was comfortable with the notion of a neon "movie" until I started researching it. Standard commercial sequential animators proved to be relatively archaic in both form and function. They consist of a simple synchronous motor that turns a series of selected cams against point relays to activate the primary side of appropriate transformers. The problem with a mechanical movement is that it's not accurate enough for this project. To get a series of sequences with the varied rates needed to make my program visually smooth would call for an 8-foot axle full of cams made by Rolex. I was getting discouraged.

The only reasonable alternative was to go electronic, which revealed another problem: my electronic prowess stops short of 2000 volts wired in series. But I did have one trump card, a small electronic sequential animator that I had acquired in New Zealand while teaching and setting up a neon shop there. This little animator's sequencer could be changed randomly by arranging diodes to set pole configurations. Unfortunately, it had only four outputs. Stalemate.

Meanwhile, 300 feet up on a radio tower somewhere south of Austin, dangling by his safety harness, was engineer Frank Roberts. He had been shaken from his perch by an amorous Brahma bull who stopped to scratch his rump on one of the tower's low guy wires. Roberts regained his composure, lowered himself back to earth, and wished for a new career in electronics.

Frank has been fascinated with neon since he was a little boy. It was a godsend that he showed up at my shop. We got to talking, and then I showed him the Kiwi animator. Before long, he knew exactly what to do.

He asked me to sketch each sequence and estimate its time and rate. He took my notes and entered them into his Macintosh. Lo and behold, Frank had an animation program!

He drew each figure with the mouse, creating a cartoon, frame by frame, 512 times. We adjusted and fine-tuned the rates of action until the cartoon was perfect. Then he converted it into 512 separate binary codes, programmed them, and burned them into two EPROM memory chips.

With a MacCAD program, Frank designed a specialized circuit as a variable clock generator. It sends a series of pulses to an address generator (required to request the proper information from the memory chips), which in turn activates the 10 appropriate relays and transformers. In other words, it works something like an electronic player piano.

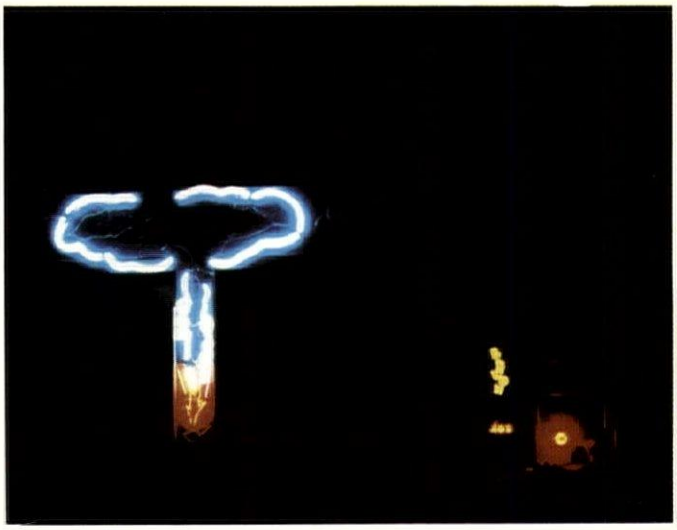
All neon designs and figures were drawn at their actual locations with colored chalk. When the designs were approved, patterns were made in place. The heavy glasswork load was faithfully crafted by neon glass bender John Hayward, who also assisted in color selection.

Installation was relatively simple. Using hammer drills, we made holes where high-voltage wire would penetrate the cinder block wall. We installed more than 250 3/16-inch anchors for neon tube supports. A small ladder truck helped us hang the glass in high, tight spots.

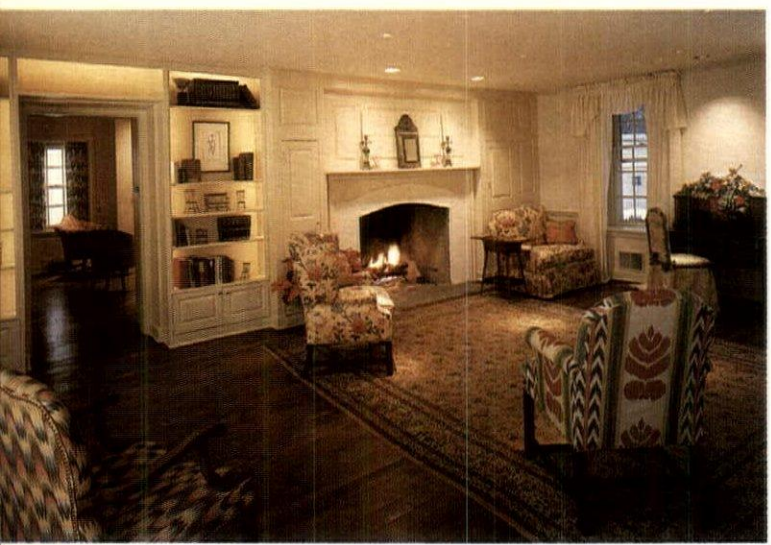
The entire computer, including relays, measures only 8 by 20 inches, and easily fits into a refurbished old steel fire-hose cabinet along with eight of the smaller neon transformers we used. The cabinet is hung on display inside my studio's gallery. LED indicators are attached to each relay to show viewers when different sequences are activated.

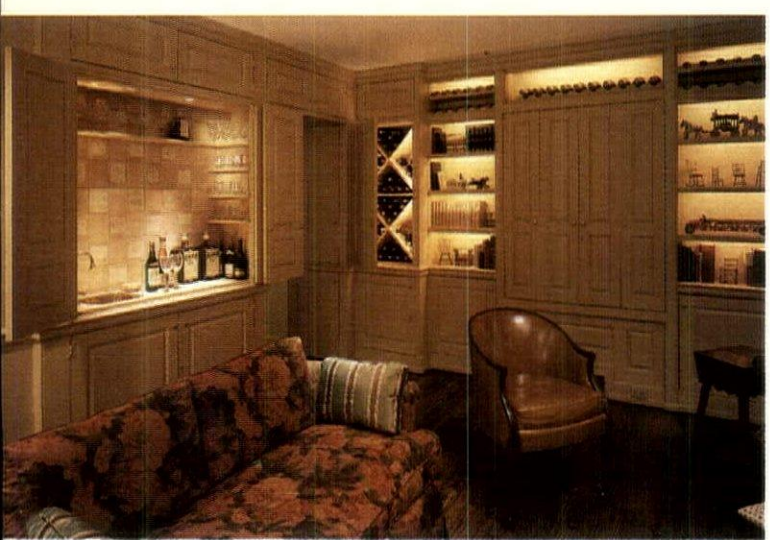
The mural has been a hit since we first plugged it in. It's been featured in television spots and in numerous magazine and newspaper articles, not to mention winning the IES Paul Waterbury Design Award of Excellence.

We've had a ball with this project and never dreamed it would have this kind of impact. Some folks say it's negative, some think it's wonderful. I guess that means it's doing what it's supposed to. And like ol' Frank says, "Hell, we've won an Oscar for a home movie. They ain't seen nothin' yet." ■



Rehab lighting recalls period sources





The rehabilitation of a 50-year-old colonial-style house presented a dilemma for its two owners, and a challenge for me, the lighting designer. One of the owners, a lighting equipment manufacturer and supplier, wanted the finished project to showcase the latest fixture and control technology. The other owner, an artist, was very sensitive to the period quality of the original interior. She did not want modern lighting equipment to intrude on the traditional style she was trying to reestablish, preferring instead the look of candlelight.

My inspiration for happily resolving their conflicting desires came as I paged through some architectural preservation books. Photographs in these books showed spaces apparently lit by historically appropriate period sources — candles and oil lamps — but hidden modern sources were used to augment them. I would light each room with concealed fixtures, but soften and balance the illumination level with dimmers. The illusion of light from antique sources could be supported by modern technology.

A cluster of downlights adds the luster of a chandelier to the dining room (top). Lighting focused on the fireplace augments the warmth of firelight in the living room (middle). Low-voltage lamps on brass strips glow on shelves that display some of the owners' collectibles (bottom).

Project: Residence
Location: Gladwynne, Pennsylvania
Interior Designers: Norma Hall, Ambience Interiors; Max Bari
Lighting Designer: Alfred R. Borden IV, IALD
Photos: Jack Neith, JDN Photography

The structural system and generous casework in the house, along with dedicated clients and a supportive electrician, smoothed and simplified the construction process. The ceiling joists were deep enough to allow the installation of adjustable, low-voltage, recessed downlights. These fixtures have small apertures and minimal trim rings, making them much less obtrusive than other fixture types. We tested MR16 lamps in a number of wattages and beam spreads until each room had a "feel" that was pleasing to the owners.

In the dining room, a cluster of downlights installed over the dining table, in lieu of a chandelier, adds luster to the place settings. Wall washers create the feeling of an intimate surround. The built-in bookshelves in the library and living room were perfect places to display the owners' mementos, collectibles, and part of their impressive wine collection. Strings of low-voltage lamps mounted on brass strips give the shelves an unusually warm glow.

The historic detailing of this house made it a real find, and the solution pleased both owners. The illumination levels in rooms with multiple sources — downlights, wall washers, and shelf lighting — can be easily adjusted with wallbox-type preset dimming switches. The green, glowing LEDs that mark the dimming switches are tucked away in a corner, where they don't intrude on the artist-owner's period look, but where the manufacturer-owner can guide the gaze of a fellow technocrat.

—Alfred R. Borden IV, IALD

For product information, turn to page 70 and see Manufacturers.

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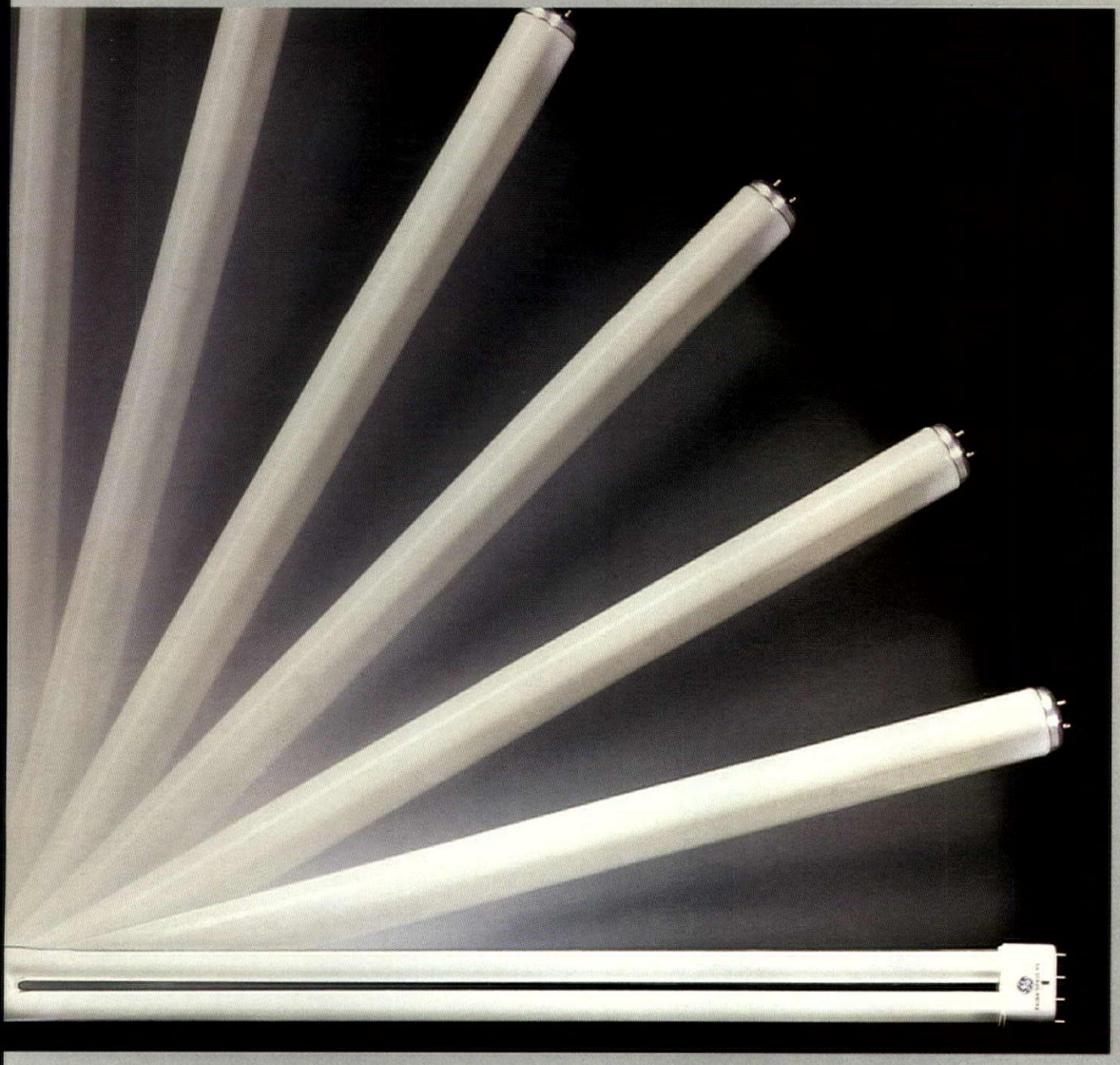

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Circle 28

Lighting a production in great music room

MRSA's client is a music aficionado who does a lot of entertaining. He wanted a room in his new home that could be used for formal music recitals, musicales, and general entertaining, as well as a showcase for his 1897 classical pipe organ, complete with 703 pipes. For these purposes, the architects designed a vaulted great room that became the focus of the residence.

The lighting is designed to provide general purpose lighting and also to be flexible and adjustable. Adjustable eyeball fixtures are recessed into the collar beams 16 feet above the floor, and the ceiling of the room is illuminated by uplights concealed in the top of the collar beam. The eyeball-type downlights are a good source of ambient light and can also be repositioned to emphasize different features in the room: the organ, the organ pipes, or some seasonal feature, such as a Christmas tree.

Downlights recessed into the soffit wash the front elevation of the three-story great room (above). Adjustable eyeball fixtures and uplights are mounted in the collar beams (below). Sconces mounted over pilasters integrate the lighting with the architectural structure.

A pilaster beneath the end of each collar beam is capped by a sconce in the shape of a quarter-sphere, positioned to look almost like a column capital. A space between the top of the sconce and the bottom of the collar beam allows light to spill onto the adjacent wall, ceiling, and underside of the beams, almost giving the illusion that the roof structure and ceiling are supported by rays of light. The column capital motif helps integrate the lighting into the architecture of the space.

Lighting circuits in the great room are controlled by dimmers that can be manipulated to create various moods appropriate to the music and activities under way in that space: brighter settings for cheerful music and general entertaining, darker settings for somber or mellow music.

When lighting exteriors, MRSA tries to conceal the lighting fixtures, except where they are decorative. In this case, where fixtures are meant to be visible, surface-mounted fixtures are used; they provide warm illumination outside the front entrance, garage, and dining room. Soffit-mounted exterior recessed floodlights bathe the front elevation of the three-story great room, as well as providing light for an exterior patio area. In the winter, the owner can open the windows of the great room, and accompany carolers with his organ music.

The combination of interior lighting, large glass elevations, and exterior lighting blend to enhance the architecture and, at the same time, to give visitors a warm invitation.

—Charles Linn, AIA

Project: Johnson Residence
Location: Naperville, Illinois
Architects: MRSA Architects and Planners; Mark Schaefer, AIA, principal; Gary Neyer, project architect
Photos: Bruce Van Inwegen

For product information, turn to page 70 and see Manufacturers.

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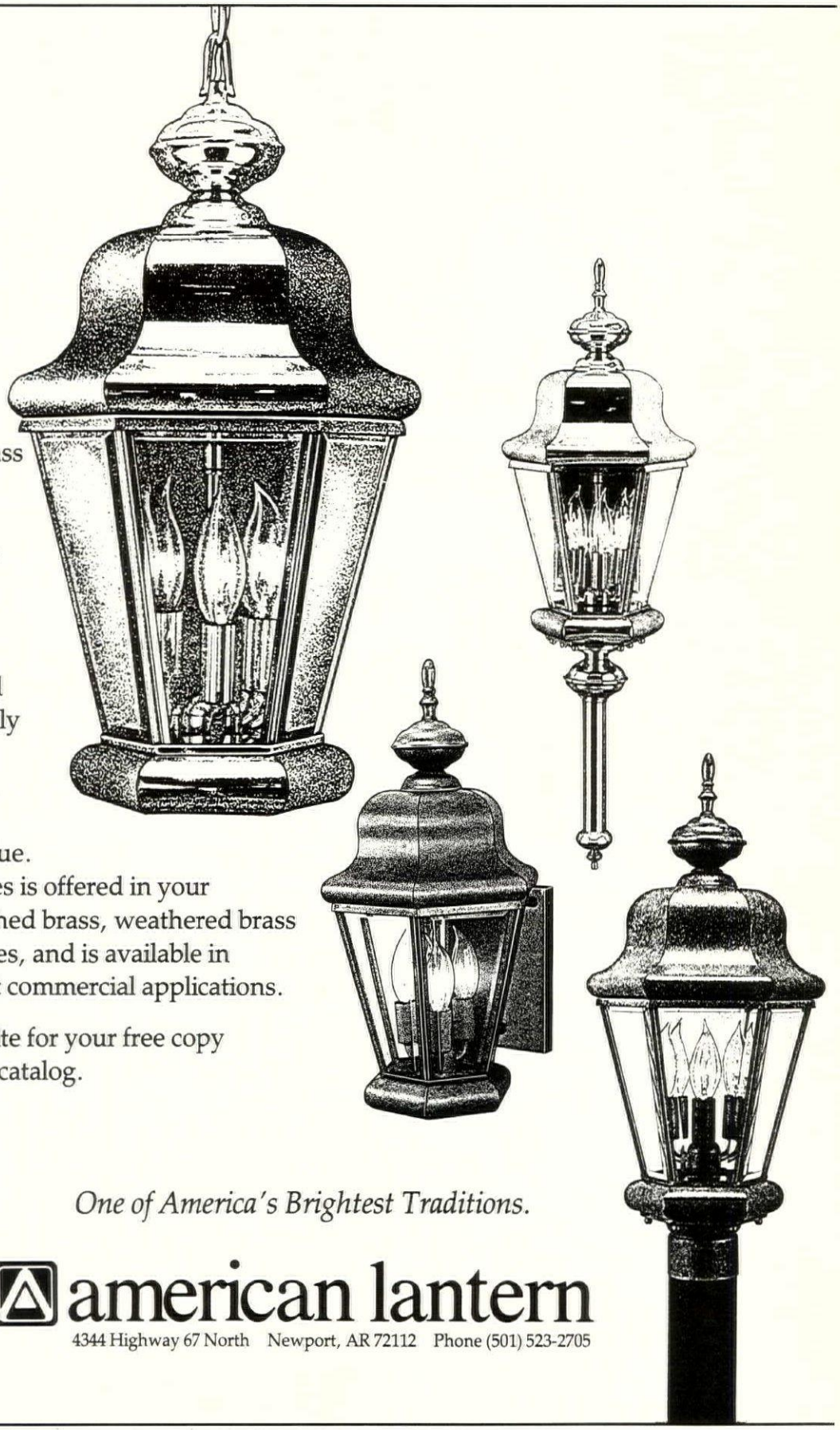

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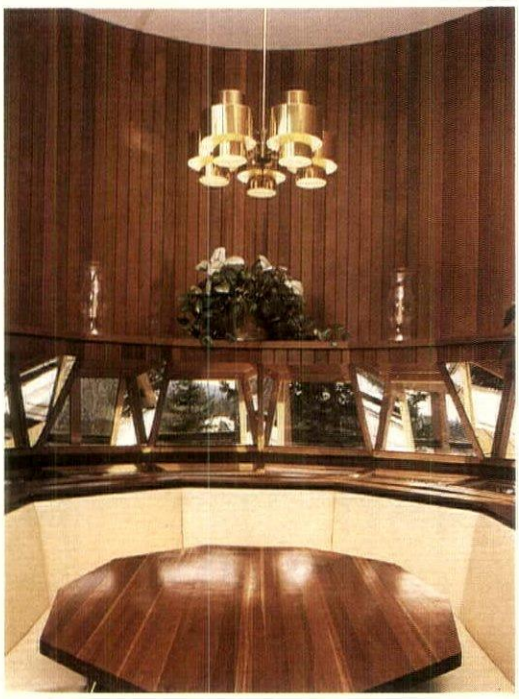
Circle 29

Glass admits daylight, view to cold-climate house



Keeping out winter's chill limits the use of glass in cold climates, but this New England home combines seasonal temperature control with a spectacular view. The cylindrical section houses the dining room. Placing windows near the deck (middle photo) increases winter daylight in the dining room. The view of the mountains (bottom photo) is done with mirrors.

The home of John and Cindy Edmondson is a study in daylighting for a cold climate. The design, by architect Eliot Warren Goldstein, includes more glass than is used in most cold-climate houses. The extra glass helps make the most of both solar gain and the spectacular view.

"If low-emissivity glass had been on the market, we probably would have used it," says Goldstein. Instead, he chose clear, sealed triple glazing, a solution that is energy efficient without sacrificing the clarity of the view, as film or tinted glass would. The floor-to-ceiling windows on the south are deeply recessed beneath overhangs that block the summer sun. They afford much more view than most cold-weather houses, and the overhangs provide better seasonal temperature control. In the greenhouse, a low-iron glass is used because it has higher light transmittance than regular glass.

Goldstein wanted to enclose the cylindrical dining room with glass to capture the view, but he was concerned that anyone seated at the table would feel the chill from these windows on a cold night. He also wanted the cylinder to look solid in contrast to the windows on each side of it. The cylinder's lower inner portion is supported from below. Its upper outer portion is hung from the roof. The gap between has fixed horizontal glazing. Positioning its windows adjacent to the roof deck admits reflections from snow on the deck that increase the dining room's winter daylight.

The solution was inspired by two projects by other architects: Eero Saarinen's cylindrical chapel for the Massachusetts Institute of Technology, in which a horizontal ring of glass allows only reflected sunlight from a surrounding moat to enter the chapel, and Gunnar Birkert's design for the Museum of Glass in Corning, New York, which has a continuous strip of angled pairs of parallel mirrors around the building's perimeter.

Goldstein combined the two concepts by sloping parallel sets of mirrors to create an architectural periscope that reflects the outside view. The result is a clear, bright, but reflected view of the mountains. Insulated, horizontal glass panels between the sloping mirrors keep out drafts and the cold. Because there are no columns between the lower and upper portions of the drum, the panoramic view is unobstructed.

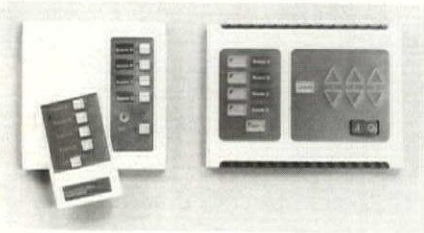
"It's just the greatest thing to feel like you're outdoors when you're in the house, and not be cold," says Cindy Edmondson.

—Mike Heffley

For product information, turn to page 70 and see Manufacturers.

Project: Edmondson residence
Location: Waterbury Center, Vermont
Clients: John and Cindy Edmondson
Architect: James Goldstein & Partners; Eliot Goldstein, principal in charge

Product Showcase



■ Controller, wireless remote

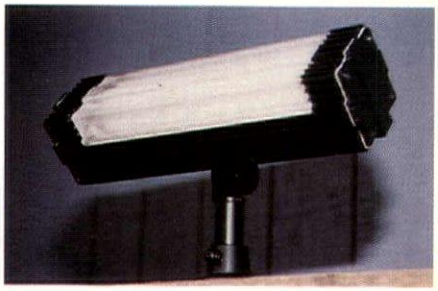
Lightolier's IR Remote, a wireless infrared remote control, lets users select lighting scenes from virtually any location in a room without direct access to the master control. Designed for use with Scenist and Lytemode control systems, the device consists of a receiver and a hand-held transmitter that can access the master control's preset lighting scenes and off function. The receivers come in wall- and ceiling-mounted models; the wall-mounted model also houses the transmitter. Lightolier, Secaucus, NJ.

Circle 60

■ Pendant luminaire

Poulsen Lighting offers the Visir Pendant designed by Jens Jensen. The luminaire's aluminum housing is scaled for commercial and residential applications. Its lamp compartment is a vertical cylinder that reflects light to the inner surface of the main reflecting shade, which makes the two apertures appear to float. The pendant comes in the two colors shown and accommodates a 100-watt incandescent lamp. Poulsen Lighting Inc., Miami, FL.

Circle 61



■ Backlighting fixture

The improved AL-0311 Fluoraliter from Nightscaping has a commercial-grade extruded aluminum housing and an 8-inch-long high-impact polycarbonate diffuser. The watertight, spike-mounted fixture has a 2-inch stem with a fully adjustable, locking toothed knuckle. It throws a 170-degree light pattern, making it suitable for backlighting signs, decks, walls, and walkways. A patented 12-volt AC circuit drives the standard-voltage fixture, which accommodates a cool white F6T5 miniature

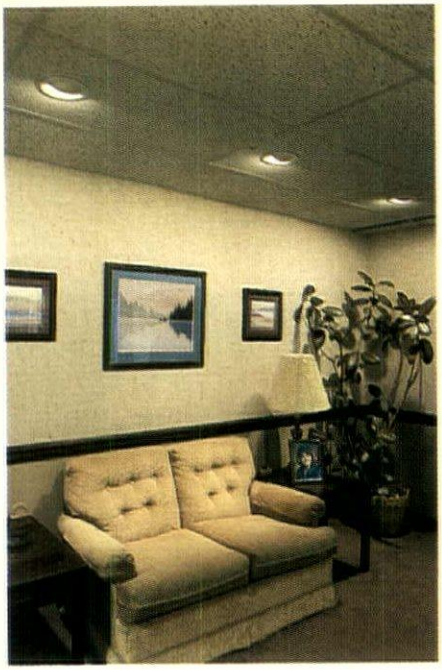
bipin fluorescent lamp. Nightscaping, division of Loran Inc., Redlands, CA.

Circle 62

■ Miniature downlight

Norbert Belfer offers the low-voltage Miniature Halogen Star Downlight, a 3-inch-diameter unit designed to accommodate halogen reflector lamps from Osram and Philips. The lamps have a color temperature of 3000K and a reflector designed to eliminate hot spots. One remote 12-volt transformer can operate several fixtures. A variety of lamp wattages and beam spreads are available. Norbert Belfer Lighting, Ocean, NJ.

Circle 63



■ Wall-washing downlight

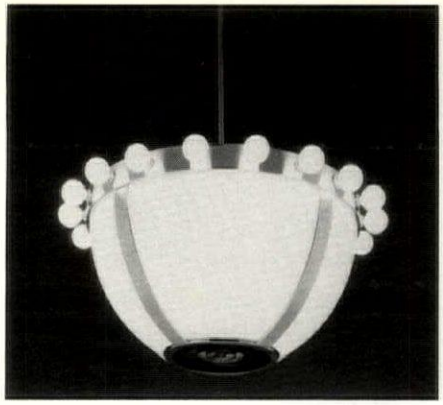
Lithonia Downlighting's Gotham R series specification-grade downlight has a kicker reflector for controlled lighting on vertical surfaces. The unit has a 6-inch aperture with a white aluminum trim and a black microgroove baffle. Its semispecular Alzak reflector attaches to a rotatable die-cast eyelid that extends below the ceiling plane and snaps out for easy relamping. The downlight accepts a 150-watt R40 floodlamp. Accessories include adaptors for sloped ceilings. Lithonia Lighting, Conyers, GA.

Circle 64

■ Track-mounted spotlights

Cirque track lights from Lightolier are designed for use with a wide range of line- and low-voltage lamps. Line-voltage models are available for PAR 38 and R30 lamps, low-voltage for MR16 and T4 halogen lamps. One or two reflectors can be used with the T4 lamp to produce a 6- or 14-degree beam pattern, respectively. The track lights come in two colors. Accessories include color filters, louvers, and barn doors. Lightolier, Secaucus, NJ.

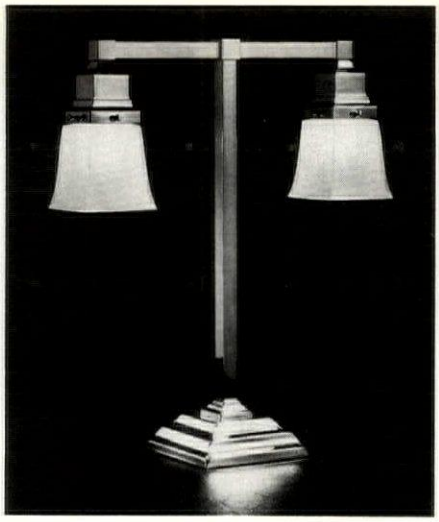
Circle 65



■ Custom pendant luminaire

Appleton Lamplighter, a manufacturer of custom luminaires, fabricates luminaires to individual specifications. Shown is a custom pendant manufactured for the auditorium of Libbey High School in Toledo, Ohio. The 2-foot-diameter pendant has an opal acrylic dome trimmed in polished brass. White G16½ lamps ring the rim, and four incandescent lamps light the dome. A black concentric ring louver at the dome's bottom diffuses downlight from a 300-watt R40 lamp. Other sizes and versions are available for a variety of light sources. Appleton Lamplighter, Appleton, WI.

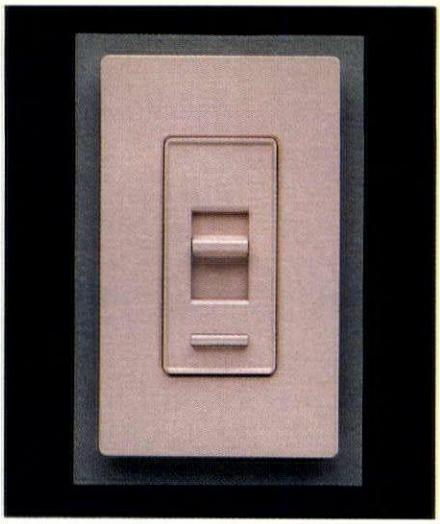
Circle 66



■ Desk lamp

The Hyde Park desk lamp from Brass Light Gallery's Goldenrod Collection of decorative luminaires has styling inspired by the Mission, Prairie, and Arts and Crafts movements. The 18-inch-high, 16-inch-wide luminaire is made of solid brass and accepts incandescent light sources. Brass Light Gallery, Milwaukee, WI.

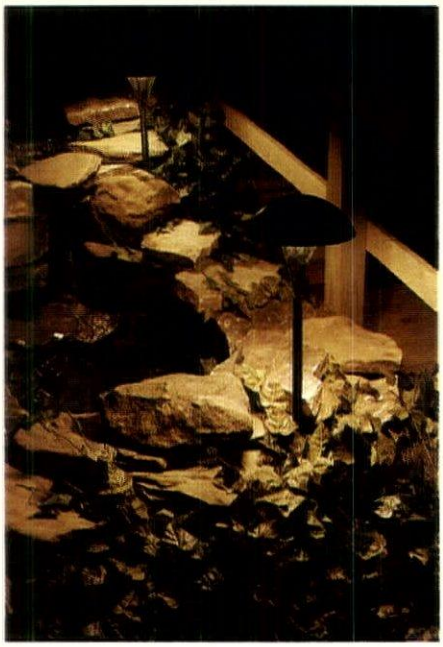
Circle 67



■ Controls, accessories

The Luméa family of matching lighting controls and accessories from Lutron come in seven pastel and seven primary colors. The line includes linear slide preset dimmers, switches, receptacles, telephone jacks, and cable television jacks. The dimmers are engineered with advanced electronic circuitry, which offers superior performance for controlling standard incandescent and electronic and magnetic low-voltage lighting systems. Lutron Electronics Co., Inc., Coopersburg, PA.

Circle 68



Spread light

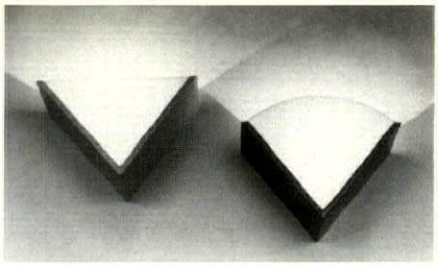
The Mushroom is part of Hadco's Night-Life collection of cast aluminum landscape lighting fixtures. The spread light produces a smooth, uniform light pattern with no distracting glare. It comes in three sizes and two colors. Models are available for mercury vapor and low- and line-voltage incandescent sources. Hadco, Littlestown, PA.

Circle 69

Craftsman-style lantern

The Hawthorne from Rejuvenation Lamp & Fixture is a solid brass lantern inspired by art glass fixtures found on porches of many early 20th-century homes. It is suitable for outdoor porch lighting and for lighting entries, halls, and similar spaces indoors. The lantern comes in a variety of metal finishes and is available in ceiling-mounted and wall bracket models. Its panels are available in plain frosted glass and four art glass colors. Rejuvenation Lamp & Fixture Company, Portland, OR.

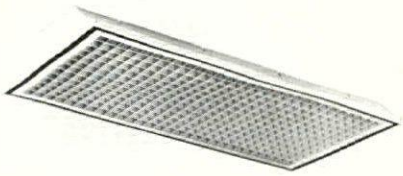
Circle 70



Lighted sconce

Aamsco's Tribble sconce combines the look of stone with the durability and easy maintenance of modern synthetics. The sconce is made of stonelike Sierra Corian and is available in two colors. Its translucent white diffuser panel comes in two styles; the fixture accommodates an incandescent or compact fluorescent lamp. Aamsco Manufacturing, Inc., Jersey City, NY.

Circle 71



VDT luminaire

Day-Brite's Designer VDT-CF-15 is part of

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Circle 37

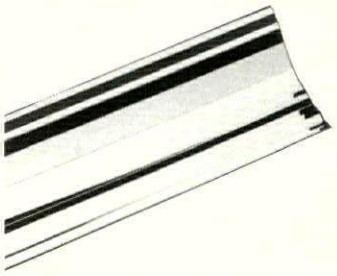
a family of louvered fluorescent fixtures designed to eliminate glare in VDT areas. At viewing angles from 60 to 90 degrees, it has little brightness, but it delivers 66 footcandles to the work surface at 1.4 watts per square foot, according to the manufacturer. The luminaire has a concealed frame, an anodized specular aluminum louver, a black reveal, and an electronic ballast. It fits three standard types of ceiling grids and comes in four sizes. Day-Brite Lighting Co., Tupelo, MS.

Circle 72

■ Grade-mounted uplight

Imperial Bronzelite's compact GM-2000 grade-mounted uplight is designed for optimum performance from miniature, low-wattage light sources such as the Osram HQI metal halide lamp and low-voltage MR16, halogen metal reflector, and PAR 36 lamps. The uplight's fiber glass–reinforced polyester housing withstands harsh soil conditions and resists impact and moisture. A textured top plate, which comes in three colors, frames the square lens. Imperial Bronzelite, San Marcos, TX.

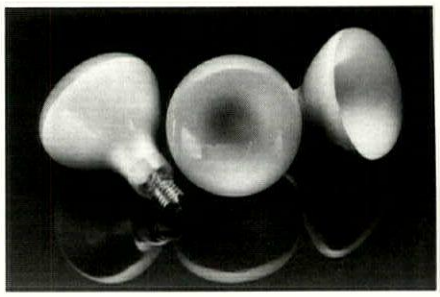
Circle 73



■ Specular reflector

Badger USA's Magnalux light reflector features do-it-yourself installation. Three reflector materials are available: a cost-effective aluminum film, an anodized aluminum film, and a silver film that provides maximum performance and color rendition. All three varieties are available in 2-, 3-, 4-, and 8-foot sections to fit most standard troffers. Badger USA, Baraboo, WI.

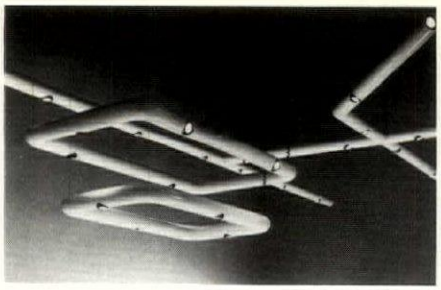
Circle 74



■ Metal halide R lamps

Venture Lighting offers a family of metal halide R lamps that have considerably higher lumen output and lamp life than do incandescent lamps of similar wattages. The 70-watt R38 lamp, for example, produces light output approximately the same as that of two 150-watt R40 incandescent lamps, according to the manufacturer. The lamps come in several sizes and wattages, have a color temperature of 4300K, and operate in any burning position. They are suitable for indoor and outdoor applications. Venture Lighting International, Cleveland, OH.

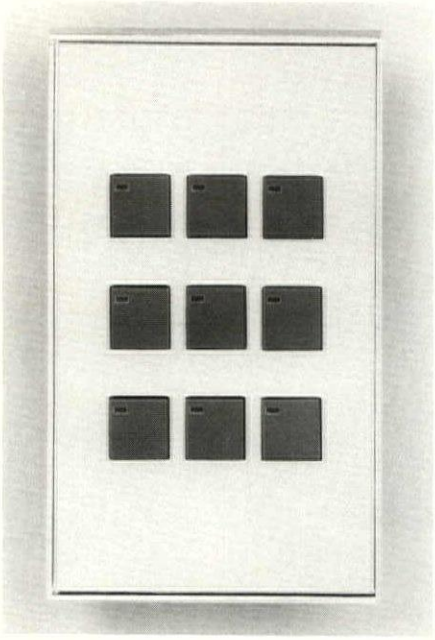
Circle 75



■ Linear fluorescent system

U.S. Powerbeam's Inner Spaces linear low-voltage lighting system houses aimable, glare-shielded MR16 lamp holders enclosed inside rotatable 3-inch-diameter tubing of aluminum, brass, or chrome. The lamp holders adjust 45 degrees within the tubes. Low-voltage transformers can be mounted inside the tube modules or as remote units. The system can extend to any length, and the tubes can be used independently or in combinations that form geometric shapes or multiple tiers. Tube sections support one to four lamp heads and are offered in several lamp spacings, fixture lengths, and colors. U.S. Powerbeam Inc., Little Ferry, NJ.

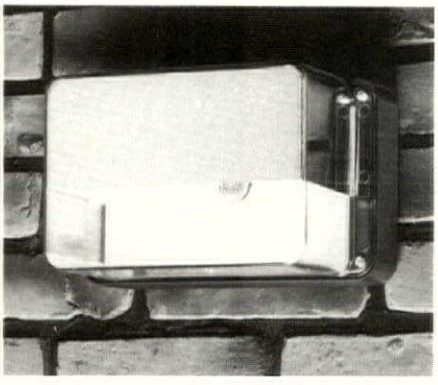
Circle 76



■ Lighting control station

The LiteStyle control station from Vantage Controls has plug-in dimmer modules with diagnostic indicators; preset functions can be defined by the user and driven by software. Features include momentary switching, latched switching, full-range dimming, group mastering, fading to preset levels, and multiple scene preset. Optional legends indicate functions. Vantage Controls, Inc., Salt Lake City, UT.

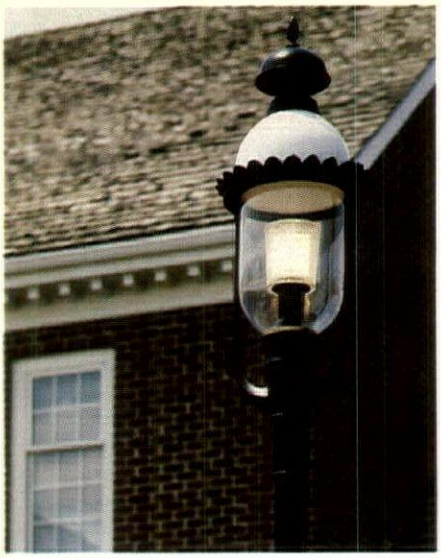
Circle 77



■ Security light

A 100-watt metal halide security light from Ruud Lighting can be used indoors or outdoors where accurate color rendering is important. It has a polycarbonate lens and a compact housing of die-cast aluminum. A thermal air isolation chamber between the ballast and electronic components keeps operating temperatures down. A variety of reflectors, shrouds, and other accessories are available. Ruud Lighting, Inc., Racine, WI.

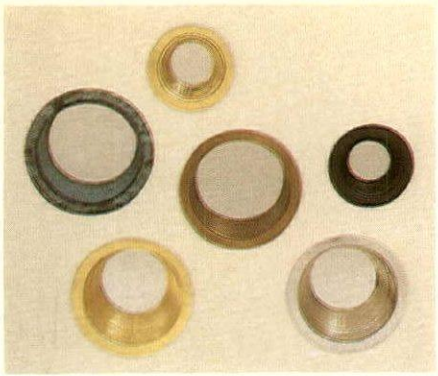
Circle 78



■ Area lighting

The cast aluminum Providence luminaire from Hanover Lantern has styling reminiscent of gaslights. It has a heavy-gauge, spun aluminum dome that is hinged for easy maintenance and relamping. Other features include an impact-resistant clear acrylic body, a two-piece vent top assembly, and a weatherproof ballast housing. The luminaire comes in models for HID and incandescent light sources. Refractor and reflector light distribution systems are available. Hanover Lantern, Hanover, PA.

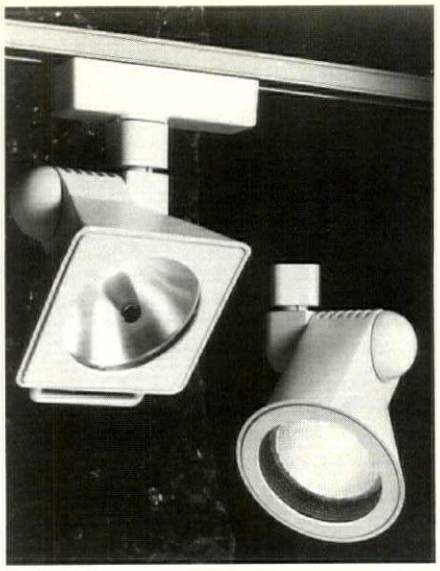
Circle 79



■ Recessed downlight trims

DeBaun Lighting offers recessed downlight trims in six finishes and a variety of designs. Shown are solid brass trims that fit most standard R20, R30, and R40 recessed housings. All trims come in one-piece units; trims for R30 and R40 units also come in two-piece mix-and-match versions. DeBaun Lighting Company, San Marino, CA.

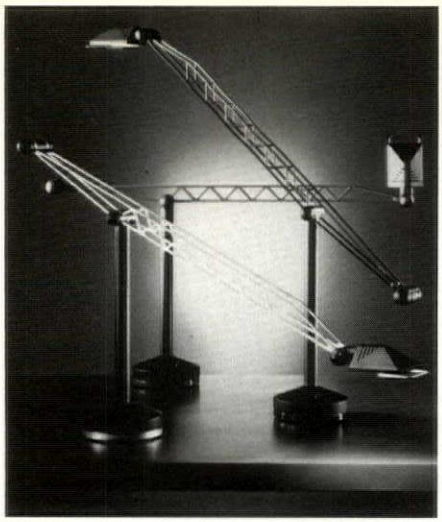
Circle 80



■ Track lighting fixtures

Capri Lighting offers Pyramid and Cone fixtures for track lighting systems. They can be ordered with Adjustabeam, a mechanism that allows beam spread adjustments from 6 to 22 degrees, and come in models for a low-voltage T4 halogen lamp and a PAR 30 lamp. Capri Lighting, Los Angeles, CA.

Circle 81



■ Halogen task luminaire

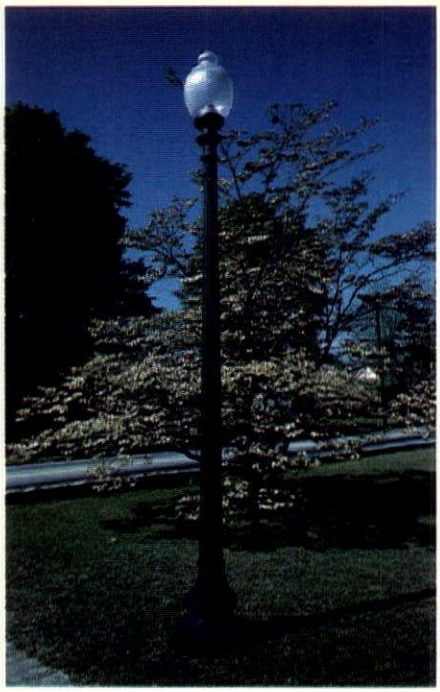
The Tronconi collection from Lee's Studio includes the Leader halogen task luminaire designed by Raul Barbieri and Giorgio Marianelli. The adjustable dual-intensity luminaire has a thermally protected transformer in its base. Lee's Studio, New York, NY.

Circle 82

■ MR11 lamps

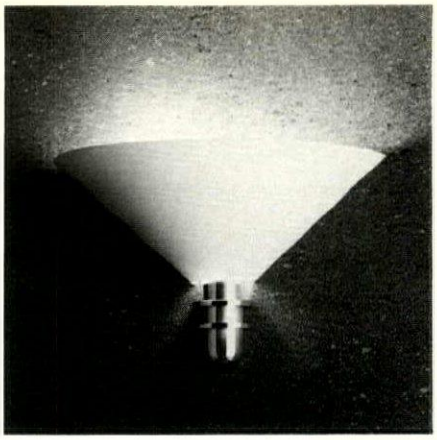
GE's MR11 lamps are part of the Precise line of low-voltage lamps for display lighting. The miniature bipin lamps measure less than $1\frac{1}{2}$ inches across and have the same faceted mirror reflectors as the company's MR16 lamps. They come in two wattages and three beam patterns, have a color temperature of 2950K, and last an average of 2000 hours in any burning position, according to the manufacturer. GE Lighting, Cleveland, OH.

Circle 83



■ Decorative pole

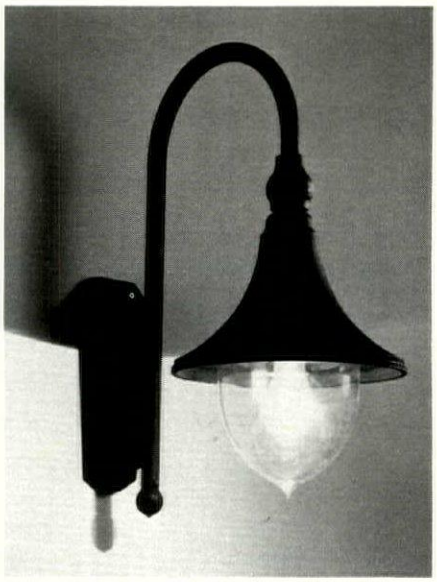
The Presidential Series fiber glass light poles from Shakespeare resist rust and corrosion and require little maintenance. Color permeates the pole walls, and a polyurethane finish improves durability. The poles are light enough to install manually, and come with a traditional anchor base



■ Sconce

Visa Lighting's CB2542 sconce for incandescent and fluorescent sources is a half-cone of spun aluminum that provides mostly uplight and some accent downlight. It comes in brushed aluminum and painted finishes with a vertical accent bar in polished solid brass, chrome, or a painted finish. Visa Lighting Corporation, Milwaukee, WI.

Circle 87



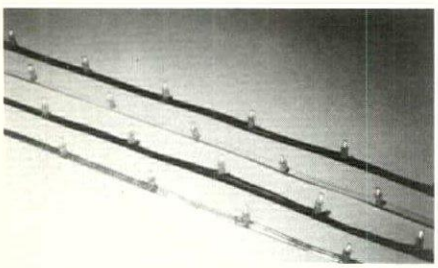
■ Outdoor residential lighting

Outdoor residential fixtures in Noral Lighting's Trumpet line are designed to resist corrosion. The lens is a single piece of clear impact-resistant plastic with a pointed hemispherical shape. Wall-mounted and two-lamp post-mounted models are available in black, white, and patina green finishes. Noral Lighting, Inc., Cleveland, OH. ■

Circle 88

or with a direct burial post that eliminates the need for anchor bolts and a concrete foundation. Shakespeare, Newberry, SC.

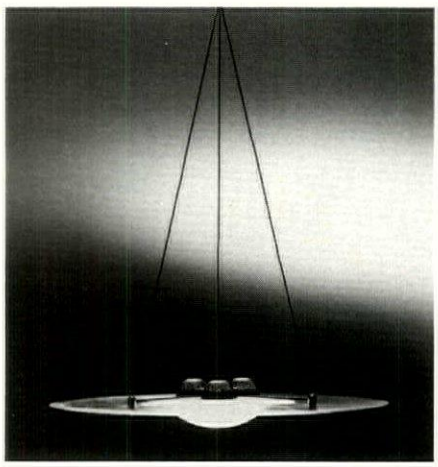
Circle 84



■ Low-voltage cord lights

Light Vines from Sylvan Design are flexible, formable 12- and 24-volt cord lights for creating unusual lighting configurations in trees and around architectural structures. The cord lights have miniature 0.840-watt lamps spaced 2 to 24 inches on center along polyvinyl-insulated cords. Lamp sockets in the twin-conductor cords make relamping easy. The cord lights are available in indoor and outdoor versions in four colors and a variety of lengths. Sylvan Designs, Inc., Northridge, CA.

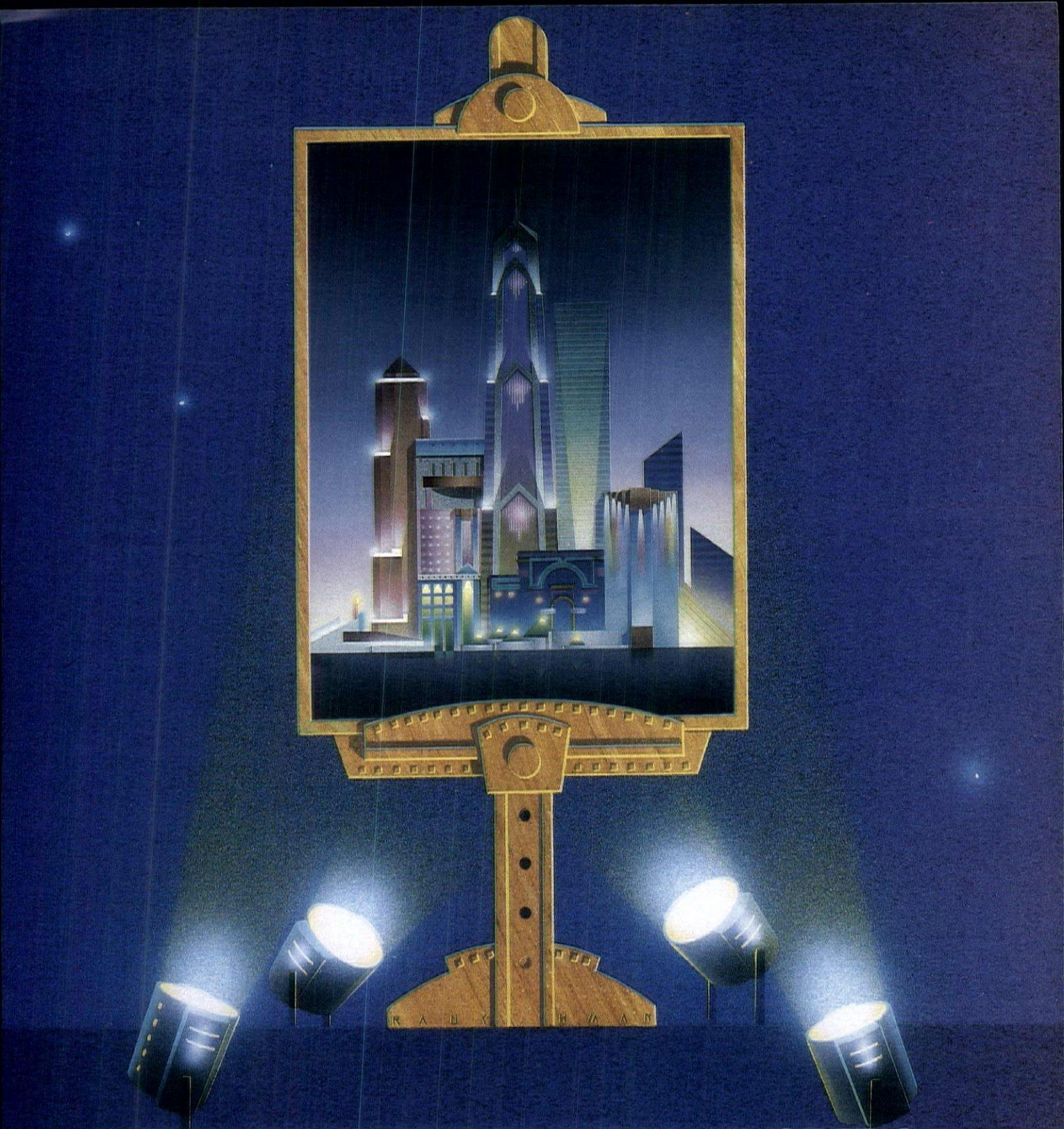
Circle 85



■ Hanging luminaire

The Sguish suspension fixture from Gullans International houses three 12-volt, 35-watt halogen lamps under steel covers. The covers are attached to three chromed arms that join above a 2 3/8-inch-diameter disk of clear, frosted glass with a beveled edge. Its maximum length is 60 inches. Gullans International, Long Island City, NY.

Circle 86



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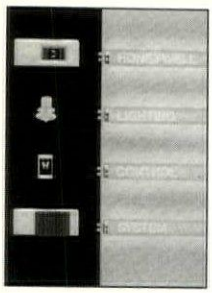
Circle 43

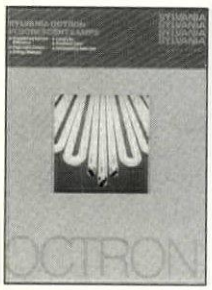
Product Literature



Lighting control

A color brochure describes the Honeywell Lighting Control System, which can dim both standard and energy-saving fluorescent lamps. Features include time-of-day scheduling, lumen depreciation compensation, and fixed power reduction. Honeywell Inc., Minneapolis, MN.

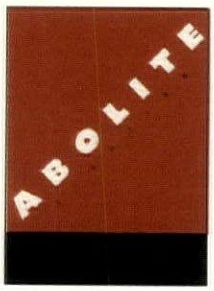
Circle 120



Fluorescent lamps

Energy-saving T8 and U-shaped Octron fluorescent lamps provide 78–90 lumens per watt and have an average rated life of 20,000 hours, according to the manufacturer. The lamps come in color temperatures of 3100K, 3500K, and 4100K. GTE/Sylvania, Danvers, MA.

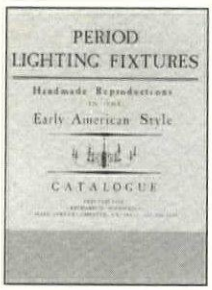
Circle 121



Indoor, outdoor lighting

A color catalog features Abolite Lighting's complete line of indoor and outdoor fixtures, including HID units, sports lighting fixtures, and industral low- and high-bay fixtures, reflectors, and accessories. Abolite Lighting, subsidiary of Lighting Systems Inc., West Lafayette, OH.

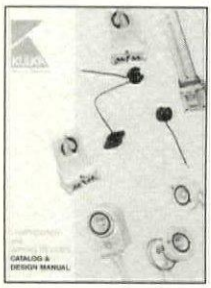
Circle 122



Early American fixtures

A 44-page catalog illustrates handmade reproductions of Early American chandeliers, sconces, desk lamps, and exterior lanterns and posts. It also contains discussions of lighting in early America and notes on locations of original fixtures. Period Lighting Fixtures, Chester, CT.

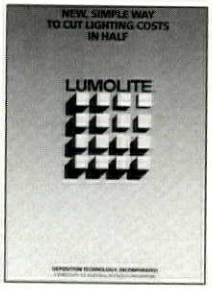
Circle 123



Lamp holders, wiring devices

A 40-page catalog with diagrams and reference charts features Kulka's recessed double-contact, slimline, and medium bipin lamp holders and accessories for fluorescent, compact fluorescent, cold cathode, and HID lamps. Kulka Wiring Devices, Mount Vernon, NY.

Circle 124



Reflector kit

The Lumolite retrofit reflector kit contains rolls of a highly reflective, adhesive-backed silver film for installation inside standard fluorescent troffers. A brochure illustrates installation procedures. Deposition Technology Incorporated, San Diego, CA.

Circle 125

Variable focus floodlight

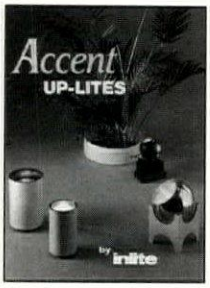
Toro's low-voltage Varifocus landscape floodlight has a rotatable focusing ring that adjusts beam size and a rotatable lens that controls beam shape. A brochure lists features, specifications, and accessories. The Toro Company, Mound, MN.

Circle 126

Metal halide fixtures

A compact metal halide fixture is designed to provide high lumen output, good color rendering, and low ceiling brightness. Versions for double- and single-ended bipin lamps are available. Kirlin Company, Detroit, MI.

Circle 127



Accent lights

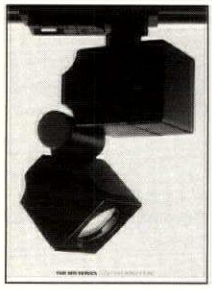
A data sheet from Inlite features four Accent Up-Lite models — two cylinders, a sphere seated in a four-legged support, and a low-voltage eyeball. Finishes and lamp options are listed. Inlite Corporation, Berkeley, CA.

Circle 128

Optical projectors

Wendelighting's model 1176 and 2346 recessed optical projectors use a special masking technique to produce controlled illumination of an exact area or object. A brochure contains cutaway sketches, photometrics, and suggested interior applications. Wendelighting, Burbank, CA.

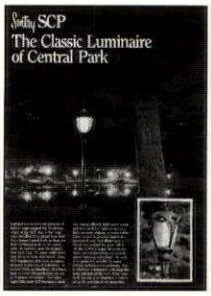
Circle 129



Low-voltage track fixtures

LSI's MR Series low-voltage track fixtures accept 20- to 75-watt MR16 lamps in a variety of beam spreads. Models for 120-volt tracks and stand-alone units come with integral transformers; models for 12-volt tracks come without transformers. Lighting Services Inc., Stony Point, NY.

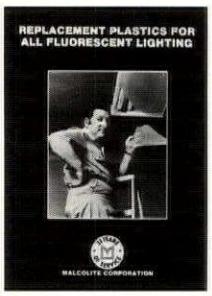
Circle 130



Outdoor area lighting

Sentry Lighting's SCP luminaire was designed for New York City's Central Park. A data sheet lists features and specifications for the luminaire, which is available in models for a variety of HID sources. Sentry Electric Corporation, Freeport, NY.

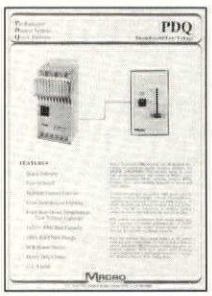
Circle 131



Replacement diffusers

A 16-page brochure features Malcolite's plastic replacement lenses and sheet stock. Replacement lenses are available for all standard and custom lay-in and wrap-around fluorescent fixtures, according to the manufacturer. Malcolite Corporation, Monterey Park, CA.

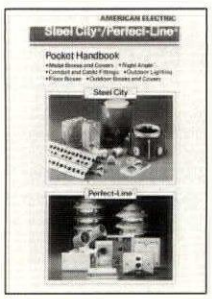
Circle 132



Prepackaged dimmers

PDQ prepackaged dimmers for standard and low-voltage incandescent lighting systems come in five models to handle load capacities from 1920 to 5000 watts. A brochure describes components and lists specifications. Macro Electronics Corporation, Austin, TX.

Circle 133



Electrical products

A pocket handbook describes Steel City and Perfect-Line electrical products, including conduit and cable fittings, outdoor boxes and covers, and outdoor lighting equipment. American Electric Construction Materials Group, Memphis, TN.

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Calendar

April 5–6, 1989 — **Lighting Efficiency Congress '89,** Santa Clara Convention Center, Santa Clara, CA. Presented by Association of Energy Engineers. Sponsors: Pacific Gas and Electric, Western Area Power Administration, and others. Contact: Lighting Efficiency Congress '89, 4025 Pleasantdale Rd., Suite 420, Atlanta, GA 30340, (404) 447-5083.

April 5–9, 1989 — **19th annual NEMRA conference,** Marriott Hotel & Marina, San Diego, CA. Contact: Henry Bergson, NEMRA, 222 Westchester Ave., Suite 330, White Plains, NY 10604, (914) 428-1307.

April 6–7, 1989 — **IES regional technical conference,** The Westin Hotel, Indianapolis, IN. Sponsor: IES North Central section. Contact: Bill Stella, c/o Circle Design Group Inc., 127 E. Michigan, Suite 200, Indianapolis, IN 46204, (317) 635-9838.

April 7, 1989 — **Entry deadline** for Table Lamp + Chair: Designers Take a Dare! Furniture and lighting design competition for professional and student designers in Oregon and Washington. Sponsors: Women's Architectural League, Oregon School of Design, AIA Portland Chapter. Contact: Women's Architectural League, c/o AIA, Portland Chapter, 215 SW First Ave., Portland, OR 97204.

April 11, 1989 — **Lighting yesterday's home today,** DLF event. Speaker: Randy Whitehead. Contact: Designers Lighting Forum of Northern California, P.O. Box 1429, San Francisco, CA 94101-1429, (415) 824-8310.

April 15, 1989 — **Lighting calculations I,** IES lighting seminar, Holiday Inn O'Hare, Rosemont, IL. Contact: Richard N. Miller, Teng and Associates, Inc., 220 S. State St., Chicago, IL 60604, (312) 341-0101.

April 17–20, 1989 — **Electrical systems design for the nonelectrical engineer,** course, University of Wisconsin, Madison. Contact: E.K. Greenwald, Engineering Professional Development, University of Wisconsin–Madison, 432 N. Lake St., Madison, WI 53706, (608) 262-0573.

Continued on page 69

Classified Directory

ACCENT AND DISPLAY LIGHTING (INTERIOR)

AMERLUX, 23 Daniel Rd., Fairfield, NJ 07006 ..... 201/882-5010
CUSTOM NEON Mfg., install interior neon portable & wall-mount art & signs. 213/937-6366
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MAXIMUM TECHNOLOGY, 60 Industrial Way, Brisbane, CA 94005 ..... 415/468-2560

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EMCO ENVIRONMENTAL LIGHTING, 7300 50th St., P.O. Box 1640, Milan, IL 61264 ..... 309/799-3111
HOLOPHANE, 214 Oakwood Ave., Newark, OH 43055 ..... 614/345-9631
J.H. BAXTER & COMPANY, P.O. Box 10797, Eugene, Oregon 97440 ..... 503/689-3020
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PEMCO CORP., Philadelphia, PA, Exterior HID & Custom Lighting & Poles 215/236-9020
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RWL CORP., 240 Sargent Dr., New Haven, CT 06511 ..... 203/789-1710
STONCO, 2345 Vauxhall Rd., Union, NJ 07083. Contact Phil Henry at 201/964-7000
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OSRAM CORP., P.O. Box 7062 Jeanne, Newburgh, NY 12550 ..... 914/564-6300
PHILIPS LIGHTING CO., 200 Franklin Square Dr., Somerset, NJ 08875 ..... 800/631-1259 800/752-2852
USHIO AMERICA, 20101 S. Vermont Ave., Torrance, CA 90502 ..... FAX 213/329-3641 or 213/329-1960
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Iowa Power, the electric utility serving central and southwest Iowa, is seeking an experienced Lighting Specialist to join its Marketing Services Staff. Responsibilities include providing interior and exterior lighting design and support service to large commercial customers. The successful candidate should possess a BSEE or BSIE degree with experience in commercial and fade lighting design. Additional experience in sales is desirable. Must possess outstanding customer relation skills. Iowa Power offers an excellent compensation package, including a comprehensive benefits program. Interested persons should submit resume and salary history to: Human Resources Administrator, P.O. Box 657, Des Moines, IA 50303. Equal opportunity employer.

LIGHTING APPLICATION SPECIALIST
Fluorescent lighting manufacturer seeks person with strong technical skills to design fixtures using computer drawing and modeling. Unique opportunity, excellent compensation and benefits package. Send resume to Neo-RAY LIGHTING, 537 Johnson Avenue, Brooklyn, NY 11237. ATT: MITCHELL CONN.

Continued from page 67

April 20, 1989 — **Entry deadline** for 1988 Southeastern Designer of the Year competition for designers residing in the Southeast and Puerto Rico. Contact: Kate Nerone, Atlanta Market Center, 240 Peachtree St., NW, Suite 2200, Atlanta, GA 30303, (404) 658-5674.

April 22, 1989 — **Lighting calculations II,** IES seminar, Holiday Inn O'Hare, Rosemont, IL. Contact: Richard N. Miller, Teng and Associates, Inc., 220 S. State St., Chicago, IL 60604, (312) 341-0101.

April 26, 1989 — **Restaurant lighting,** DLF event. Contact: Sy Bollinger, president, Designers Lighting Forum of New York, Inc., 58 Stratford Ave., Greenlawn, NY 11740, (212) 255-8555.

April 27, 1989 — **24th annual Lumen Awards dinner,** International Design Center, Long Island City, NY. Contact: Michael Cahana, Wheel Gersztoff Friedman Associates, 30 W. 22nd St., New York, NY 10010, (212) 807-7727.

April 28, 1989 — **Entry deadline,** 2nd annual PC GlassBlock design awards. Contact: Pittsburgh Corning Corporation, 800 Presque Isle Dr., Pittsburgh, PA 15239, (800) 992-5769.

May 5–8, 1989 — **AIA/Expo '89,** national convention and exposition, Cervantes Convention Center, St. Louis. Contact: AIA/Expo '89, The American Institute of Architects, 1735 New York Ave., NW, Washington, DC 20006, (202) 626-7396.

May 9, 1989 — **Here comes the sun,** DLF event. Contact: Designers Lighting Forum of Northern California, P.O. Box 1429, San Francisco, CA 94101-1429, (415) 824-8310.

May 10–12, 1989 — **Lighting World International,** conference and exposition, Javits Convention Center, New York City. Contact: Jacqueline Illonardo, Show Manager, National Expositions Company, Inc., 15 W. 39th St., New York, NY 10018, (212) 391-9111.

May 10–12, 1989 — **Design ADAC '89,** conference and exhibition, Atlanta Decorative Arts Center. Contact: Kate Nerone, Design ADAC '89, Atlanta Market Center, 240 Peachtree St, NW, Suite 2200, Atlanta, GA 30303, (404) 658-5674.

May 11, 1989 — **DLF annual workshop.** Contact: Sy Bollinger, president, Designers Lighting Forum of New York, Inc., 58 Stratford Ave., Greenlawn, NY 11740, (212) 255-8555. ■

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Kim: Exterior metal halide lighting.
Lithonia: Parabolic fluorescent fixtures.
Lutron: Conference room dimmers.
Marco: Downlights.
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York-Lite: Exit signs.

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Photographers

Robt. Ames Cook, 2200 N. Lamar Street, Suite 113, Dallas, TX 75202, (214) 871-2726

Bob Harr, Hedrich-Blessing, 11 West Illinois, Chicago, IL 60610, (312) 321-1151

Jess Smith, Photo Smith, 290 E. Deerpath Road, Lake Forest, IL 60045, (312) 295-7796

Bruce Van Inwegen Photography, 1422 West Belle Plaine, Chicago, IL 60613, (312) 447-8344

William A. Hughes, 2360 SW Lark Street, Milwaukie, OR 97222, (503) 659-3653

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