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UME 3 NUMBER 1

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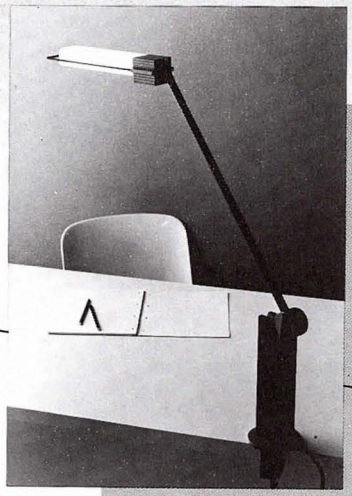

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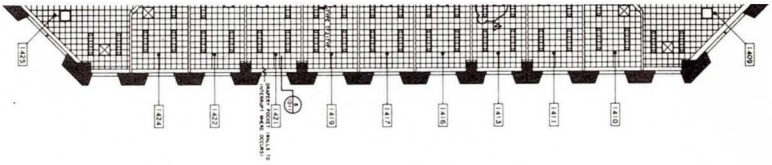


arts+architecture

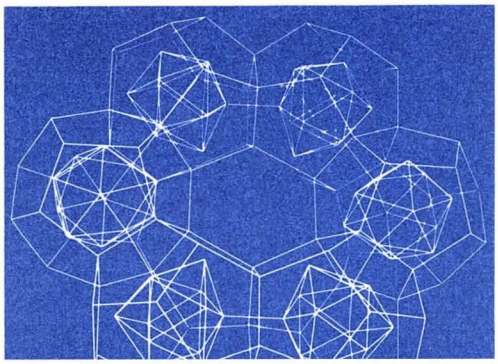
VOLUME 3 NUMBER 1

essim is a visual artist who has lived
d in New York City for more than
Her work has appeared on the
IME, and is widely exhibited and

ver: Laura Parker

atement was missing from Jan
interview with George Segal in
issue. Segal stated that he had
ıe name of his piece from *The*
The Holocaust.

Contents



Notes In Passing

In the last issue of *Arts and Architecture,* we looked at utopian attempts to create new models for human society. In this issue, we explore some of the technological developments which may make our lives more ideal. ¶ Since the beginning of the industrial revolution, the growth of technology has vastly expanded human capabilities. We can move faster, see farther, and build larger structures than ever before. Machines have assumed jobs which are dangerous or tedious for people; and now, with the rapid development of the computer, we can extend our intellectual capacity to solve problems more rapidly and systematically. ¶ In itself, the growth of a new technology is not enough to improve the quality of life. In this issue, therefore, we look at the work of several individuals who have brought their artistic concerns to confront technology. Physicist/sculptor Robert Wilson, director of Fermilab, has applied his esthetic ideas to the design of the lab and its environs. Artist Don Potts has designed exquisitely-detailed racing cars which bring visual poetry to automotive speed. Other designers, using lightweight materials and human engineering, have expanded our capacity to move elegantly and quickly through space in man-powered vehicles. ¶ In architecture, author Andrew Rabeneck points out that the use of technology has long been a confused issue. While the *image* of the machine has been used romantically to symbolize the power or wealth of the client, the creative use in inexpensive, industrialized building materials has been taking place with a minimum of fanfare. We examine variations of these attitudes in the flamboyant industrial imagery of the Dallas Infomart, and the more recessive, loft-like spaces of the Menil Collection in Houston. ¶ The use of the computer by artists, musicians and designers is only in its infancy, and much of its potential remains undiscovered. Most of the work illustrated in this issue uses computers to perform the traditional role of rendering an artist's existing preoccupations. However, as a new generation embraces the computer as an interactive tool, its ability to inspire an entirely different array of artistic concerns will emerge and enhance our universe.

BY BARBARA GOLDSTEIN

'rong Czech 'adition

ıoslovakian ›graphy

7–July 1

ıncisco Museum of Modern Art
ss at McAllister Street
ıncisco, CA 94102-4582
63-8800

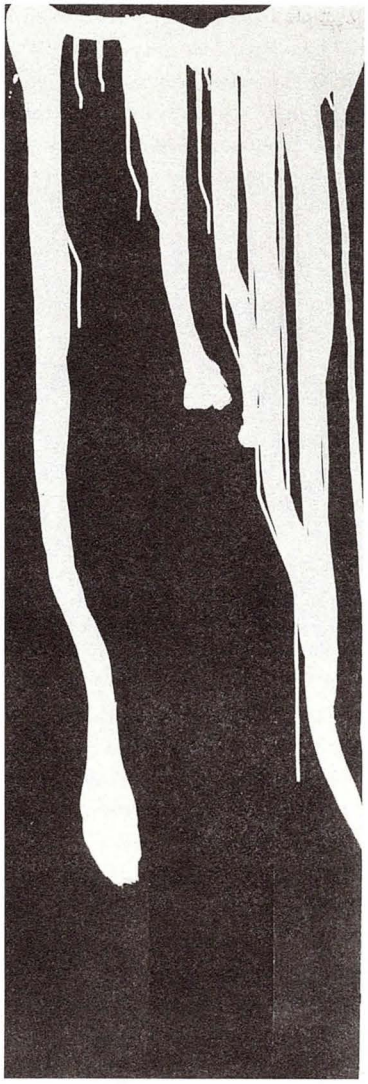
/ Martinson traveled to Czech-
ia in 1983 and selected art
o give a historical overview of
slovakian photography. Mar-
s assistant curator in the San
:o Museum of Modern Art De-
ıt of Photography. "Czechoslo-
s achievements in the
aphy medium have been com-
to those of its world-recog-
m industry," says Martinson.
; Czechoslovakian tradition of
and surreal imagery is evident
photographers' work, which
›m the twenties to the present.
e from various avant-garde art
nts, such as constructivism,
ıphic manipulation and land-
otography, can also be seen in
ts' images.

) Motherwell

-June 3

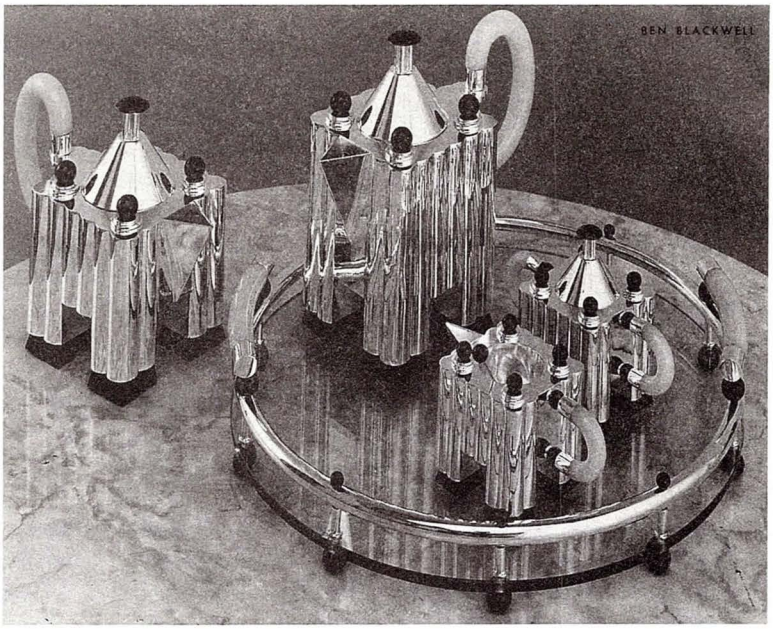
cisco Museum of Modern Art
; at McAllister Street
cisco, CA 94102-4582
3-8800

expressionism was termed the New York School by its youngest member, Robert Motherwell. Shortly after World War II, Motherwell and fellow artists Franz Kline, Jackson Pollock, Mark Rothko and Clyfford Styll made famous this uniquely American, bold style of painting. Immense scale appears to be a standard requirement of abstract expressionism. Motherwell's paintings, however, often



Robert Motherwell, *River Liffey*, 1975

possess an intimacy achieved through abundant literary allusions. The *Elegy to the Spanish Republic* series is a strong example. The Spanish Civil War begins a 30-year history of Spain; frieze-like arrangements of vertical planes loom large on white grounds, successful with power and tragedy. This retrospective of Motherwell's work also includes the geometric, stark landscapes from the *Open* series. Organized by the Albright-Knox Art Gallery.



Michael Graves' coffee and tea service

Architecture in Silver

April 28–June 3

La Jolla Museum of Contemporary Art
700 Prospect Street
La Jolla, CA 92037
(619) 454-3541

Italian houseware manufacturer Fratelli Alessi s.p.a. commissioned 11 internationally prominent architects to produce functional sterling silver coffee and tea sets. Each service is handmade of 925/1000 silver, and consists of a coffee and tea pot, creamer, sugar bowl and tray. The 11 services are somewhat surreal reactions to the postmodernist style most of the commissioned architects are working in, and designs vary considerably. Aldo Rossi created a Greek-cum-courthouse structure with a small clock in its pediment, to announce teatime no doubt. Michael Grave's set reflects his monumental office building in Portland, Oregon. Alessandro Mendini's service is completely elegant in its sleek globular curves, while Stanley Tigerman depicted various human body parts in his service, complete with braided hair serving as handles. Also included in the exhibition are Hans Hollein, Charles Jencks, Richard Meier, Paolo Portoghesi, Oscar Tusquets, Robert Venturi and Kazumasa Yamashita. Organized by the Max Protetch Gallery, New York.

Second Western States Exhibition/38th Annual Corcoran Biennial

June 3–August 12

Laguna Beach Museum of Art
307 Cliff Drive
Laguna Beach, CA 92651
(714) 494-6531
and
Long Beach Museum of Art
2300 East Ocean Boulevard
Long Beach, CA
(213) 439-2119

The Western phenomenon is explored by 30 artists from California, Colorado, Hawaii, Montana, New Mexico, Oregon, Texas, Utah and Washington. Landscape is a recurrent theme in the 106 paintings. The severity of nature in the Western states, from earthquakes to scorching sun, is an understandable preoccupation in the art works. Western subjects such as cowboys and the desert, are perpetuated by traditional depictions, as well as deified by pop images. Universal idioms are seen through a Western point of view. Aside from theme, an obvious human execution unifies all paintings. An unabashed attention to technique is a force of the exhibition, along with a clear sense of freedom and experimentation.

Grant Wood: The Regionalist Vision

May 12–August 12

M. H. de Young Memorial Museum
Golden Gate Park
San Francisco, CA 94118
(415) 750-3614

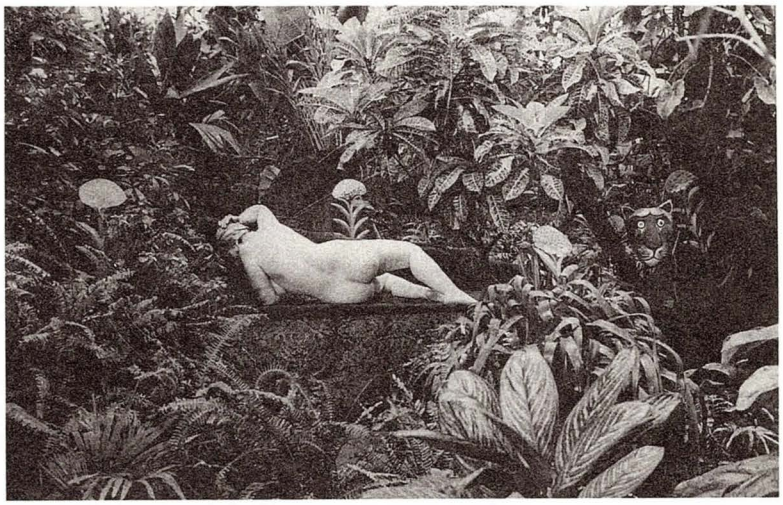
Wit, pride and irony in middle America appropriately describe the subject matter of Grant Wood's paintings. Wood's reverence for 19th century midwestern culture dates back to his childhood on an Iowa farm. His drawings, lithographs and paintings all glorify the surroundings and pioneers of this culture, presenting the midwest as an idyllic, if not restrained, vision of beauty. "Vision" traces Wood's work from 1917 to the early 1940's, with a concentration on his American scene paintings. Two documentary sections in the exhibit are examples of the many ways in which *American Gothic* has been caricatured, and assorted memorabilia providing a perspective on the origin and ideas of the artist.

Hindsights

April 14–June 14

Center for Creative Photography
University of Arizona
843 East University Boulevard
Tucson, AZ 85719

Eouard Boubat's distinctively humanistic photographs capture the essence of everyday life. Specifically, Boubat's interests lie in the backside of life. In other words, the artist has reacted to the preoccupation people have with presenting themselves for a portrait, by typically photographing from the rear. Thus, all facades are eliminated, and reality shines through. Boubat traveled around the world as a staff photographer for *Realites* Magazine from 1952 to 1965; works from France, India, Portugal, Mexico, Japan and China are exhibited. Boubat is now a free-lance photographer and has published several books.



Edouard Boubat, *Homage au Douanier Rousseau*, Paris, 1980

Denny Moers Exhibition

April 22–June 14

Denny Moers describes the prints he works on each separately by hand: "My goal with the process is to achieve an image that can only be seen as a 'picture,' not as a manipulated black-and-white print." Moers typically photographs walls and interiors of old buildings. He then interrupts the developing process of his photographs, and selectively paints fixer on each print. The results are a subtle range of colors and various deceptive compositions.

Clayton Bailey: Robots and Sculpture

June 30–August 5

The Boise Gallery of Art
670 South Julia Davis Drive
Boise, ID 83702
(208) 345-8330

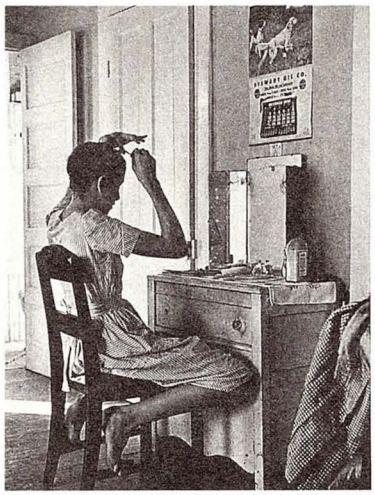
Artist-scientist Clayton Bailey built his first robot, on/off, in 1976. On/off lures tourists into Bailey's Wonders of the World Museum in Port Costa, California. Flea markets and junkyards serve as shopping ground for Bailey's fabricated robots, many of which contain radios and movable parts. The exhibited robots also emit sonic waves and photon beams. Organized by the American Craft Museum.

Three Documentary Photographers

May 19–July 29

Amon Carter Museum
3501 Camp Bowie Boulevard
Fort Worth, TX 76113
(817) 738-1933

The three featured photographic essayists are Morris Engel, Robert Frank and Marion Post Wolcott. Engel's photographs are taken from a 1949 *Ladies Home Journal* article in which the artist photographed daily happenings of a family in a small Texas town. Similarly, Robert Frank has photographed the commonplace in American life, including nineteen exhibited photographs of cowboys attending the annual Madison Square Garden rodeo. Wolcott's nineteen prints were commissioned by the Farm Security Administration during the 1930's. Her photographs juxtapose tranquility and problems in rural America.



A Morris Engel gelatin silver print, 1949

Artist's Books

June 9–August 18

San Antonio Art Institute
6000 North New Braunfels
San Antonio, TX 78209
(512) 824-0531

Ship-with-mermaid bookends e
from Nancy Chamber's book, '
Dick." A buoy and string of fish
from its wooden pages. Char

Future Atkins, *The Cowgirl Lessons*

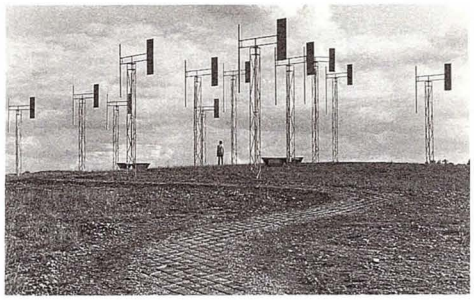
sculptural book is one of 3
works by Texas artists. Unexpe
lios of visual ideas range fro
standing journals to reworke
books. Also included are Celia
"El Espiritu Malo," a mixed m
cordian-book measuring 42" l
and Toby Topec's "Private P
three-part book sporting a pa
cover. Inside Topec's piece
lages of found materials, poe
photographs.

Kienholz in Context

May 3–June 3

Eastern State Washington H
Society
Cheney Cowles Memorial Mu
West 2316 First Avenue
Spokane, WA 99204
(509) 456-3031

Old downtown Spokane is rec
Edward and Nancy Reddin l
nine life-size environment
tures. The exhibited art wor
sharp view of reality with s
struction materials as tatter
ture, old wooden doors, smuc
and doors; most items were
from historic Spokane ho
Kienholzes are highly conce
their audience; as they exp
try to create something that
viewer to participate in the



Doug Hollis, *A Sound Garden*, NOAA, 1983

OAA uilt a Park

NOAA Public Artworks Project

It has sometimes been the case in public "percent for art" projects for the recipient agency to balk at their commitment to accept or fund artworks. (This is not necessarily such a bad thing — communication and cooperation are vital to these kinds of projects, and a healthy questioning of purpose can be beneficial to the ongoing process.) So when an agency does enthusiastically accept legislated artwork into its domain, it is received as especially good news.

The National Oceanic and Atmospheric Administration, an agency of the U.S. Department of Commerce, endorsed the commissioning of artworks for its new Western Regional Center in Seattle under the auspices of the goverment's Art-in-Architecture program. A jury convened by the Seattle Arts Commission (contracted by NOAA for administrative assistance) selected the five sculptors — Siah Armajani, Scott Burton, Doug Hollis, Martin Puryear and George Trakas — whose projects are now integrated into the landscape plan for the 114-acre site along the shores of Lake Washington.

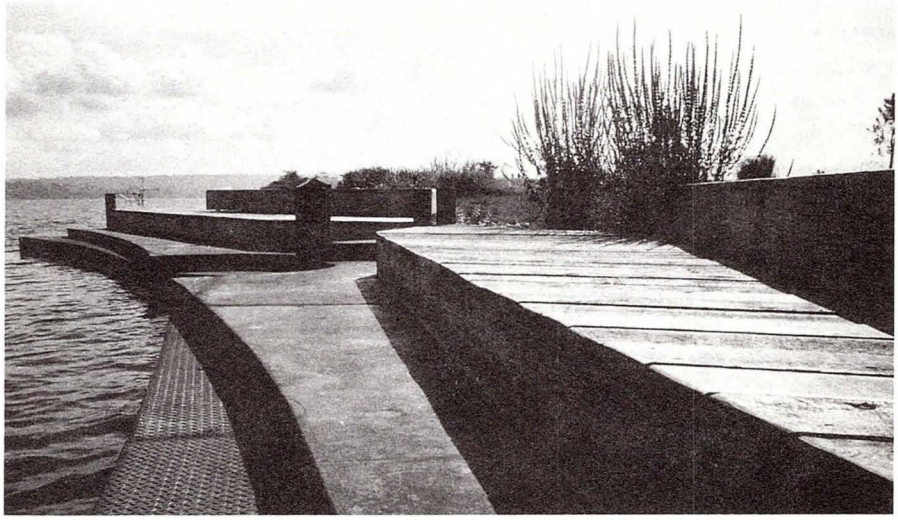
NOAA's mission is scientific and environmental. The recently completed artworks in Seattle involve the situational aesthetics of environmental art. Seldom has there been such congruity between the mandate of a government agency and the mode of contemporary artwork selected for its facilities. (Unless perhaps the Treasury Department is promoting serial imagery.) This undoubtedly accounts for much of the spirit of cooperation and trust between the artists and their sponsor. In addition, the project is community-minded — the peninsula formerly occupied by a U.S. Navy air base is now shared by NOAA, a city park and Navy administration facilities, and the shoreline is open to the public for the first time since World War II. A footpath from the park extends into the NOAA campus, and all but one of the sculptural projects are located on or adjacent to the pathway.

The NOAA sculpture projects have been inaccurately described as a "collaboration." The individual works are interrelated only within the context of the site, not as examples of shared concept and execution. Each work is distinct and different in its conception, structural form and placement. A "cooperation" is more descriptive of the process which witnessed the coming together rather than the dichotomizing of creative egos and administrative turf.

Siah Armajani's two rudimentary, identical footbridges in place along the footpath are functional (spanning runoff swales), consisting of slab sidewalls and ramps angled over a cylindrical culvert. Once on the bridge, strips of bronze letters inlaid into the terracotta-colored aggregate concrete deck and rail are revealed to the walking viewer. The text is excerpted from Melville's *Moby Dick*. Near one of the bridges is a grassy knoll bristling with free-standing windvane towers, seemingly some sort of experimental or scientific apparatus. A serpentine path laid with triangular ceramic pavers winds through Doug Hollis' *A Sound Garden*, an array of 12 tubular steel towers with counterbalanced vanes and vertical aluminum pipes. The pipes incorporate slots "tuned" to emit harmonic vibrations during windy conditions (hence the rudder-like vanes). The resonant, atonal timbre and pitch rises and recedes according to wind velocity and direction, and can be experienced while seated on any one of several tetrahedral benches made of perforated sheet metal.

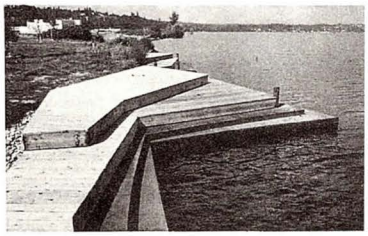
Hidden along the shoreline, across the path from some old wartime concrete foundations situated in a serial array that would do Donald Judd justice, is George Trakas' *Berth Haven*. Stepped layers of asymmetrical platforms in yellow and red cedar rest atop two narrower curved Corten steel decks that drop to lake level. The structure is anchored to concrete riprap dumped at the water's edge years ago, thus not only covering the unsightly mess but making functional use of it. Bulkheads extending along the shoreline at both ends were backfilled to contain and protect the natural shoreline grasses. The second Armajani footbridge lies on the connecting path between Trakas' deck and Scott Burton's terrace extending over the lake from the crest of another knoll. Sections sliced from schist, basalt and granite boulders dredged from the lakebottom convert the raw stone into chairs, settees and planter boxes which are arranged on a rectangular grid. The proportions of the grid, the aluminum channeling and the blue-grey coloration of the aggregate surface were derived from the glass spandrel walls of the NOAA research buildings. Again, the natural shore grasses and native vegetation was saved and replanted on and around the terrace; a grove of slender flowering trees was planted on the back of the terrace.

The extensive dredging of the lake that provided Burton with raw materials was necessary to accommodate the NOAA ships



Berth Haven is not only sculpture, but a creative and aesthetic approach to land re-use as well.

docking at a large service pier. The rest of the 490,000 cubic yards of fill was used for berms and fill behind the low-slung buildings. This elevated topography hides the structures from view on the landside approach and provides surface for parking lots and access roads. On top of a promontory berm near the service pier is Martin Puryear's *Knoll for NOAA*, a large concrete dome ringed by curved stone benches. Sections of hand-laid concrete and aggregate are configured into two interlocking spirals that meet at the top.



Decks of wood and steel lead to the water

What should be apparent from these descriptions is the accommodating nature of the artworks; a place to sit, a place to walk on or through, a place from which to look. One can listen to aeolian music or the rhythm of splashing waves, read, eat a brown bag lunch, go fishing or swimming, relax or fly a kite. One can watch the hundreds of mallard ducks and Canadian geese that flock to the lakeshore and grounds. The most compelling formal aspect of the works is the degree to which each derives information from the site in terms of form, function, material and metaphor. Significantly, the projects were not conceived nor installed as adornments to the architectural or landscaping scheme of the facility, existing instead in relationship to the environment of the site. The integrity of the work has not been sacrificed to accommodate function.

The experience is truly uplifting, perhaps even spiritual at times. Yet examples of "public art" like these are indicative of a shift from isolated statement, singular vision or dialectical tension to a kind of holistic, therapeutic denomination. The challenge seems to be in the coping with an unstated public demand for amenities or gratifying experiences. All this suggests is another questioning of purpose, of what these projects were designed to accomplish and on what level its goals were achieved. The NOAA sculpture projects are vehicles of convergence between the agency and the public, between scientist and artist, between artist and public, between nature, site and human artifact. Judged by these criteria, the NOAA sculpture projects are highly successful examples of public art.

Ron Glowen is a contributing editor for *Artweek* and writes for *Vanguard* and *Art in America*. He is based in Seattle.

Image – Bearing Light

It was after one came away from "Ābhāsa: Image-Bearing Light"—the multimedia installation/event by the artist Lita Albuquerque, composer Harold Budd and architect Robert Kramer—that its soft, interpenetrating images sharpened, the reverberating harmonics became hauntingly melodic and layered implications of thin, open constructions developed meaning. Ābhāsa was a pooling of creativity, wisdom, and, above all, vision, that made it transcendental. Even before entering, a white wall marked the building as a sanctum. And it was one; a place in which human scale and temporality were subsumed to metaphorize the universe; a here that was all place, all space, and a now that was both the single moment and the eternal.

In the central space of USC's Hunter Gallery, two identical chairs of ceiling height stood like totems, framing the area. In their assertion of balance and equality, they forecast ideas that would unfold as slides dissolved in concert with the majesty of Budd's resonant chords. In the two flanking galleries, other constructions were visible: a high-legged bed in one; a coiling, open stairway in the other. In both spaces, the slides and music for Part One, "Abandoned City," occupied the first half hour. Viewers changed places after Part Two, "Dark Star," which continued with slides in only one area.

Music penetrated the space as systematically as did the constructions—black and white images that seemed suspended in dream space. Scaled to spill over both ceiling and floor, figures and objects formed a landscape with some extraordinary abstractions occurring between phases. Improbable juxtapositions—the ancient with the modern, the familiar with the exotic—flooded the eye.

Images of southern California were interposed with NASA satellite photos. One saw birth, death, love, nurturing and a great deal of joy. Most of all, there was light, in all its senses and in all its generative powers—natural, technological and metaphysical. Light was structure and content.

Surreal juxtapositions characterized *Abhasa: Image-Bearing Light* at Fisher Gallery, USC.

These qualities were encapsulated in the gauzy beam which transmitted the slide images. As the actual "image-bearing light," it illuminated on many levels. In its lateral stretch, it was an orbit surrounding the Earth, recalling one of the NASA slides; it also was suggestive of a jet stream.

For several years, Albuquerque, whose childhood was spent primarily in Tunisia, and Kramer, born and raised in west Los Angeles, have shared an intense engagement with mythology and cosmology and have continued their efforts to make these elements more viable in contemporary life. With that as the genesis of the exhibition, their concerns were reinforced by events they viewed as climactic, to become underlying concepts of the show.

One is the achievement of the feminist movement as being a step towards the creation of a new male/female archetype. Another is the exploration of space, marking planetary h giving way to an interplaneta cept, one that is infinitely exp They see new technology—elec for example, was obviously an e ingredient to the work—lea global communication and a consciousness, providing a bal the dire prospects of nuclear tion.

In accepting their proposal, director Selma Holo's foresi only rewarded the artists' ho furthered the project to a dipitous culmination. Her in tion of Budd, a Los Angeles whose work is chiefly recogn New York and Europe, found i ate concordance. To Albuquer Kramer, his previously-compo sic corresponded in auditory t their vision. To Budd, their w ideally suited to his music in w for him a first experience in collaboration. In addition, the tunity to develop and prepare hibition on site—Holo turned gallery to the artists six mont to the show—allowed the int necessary for integration into ness, and the experiencing of find the measure that would cu in the monumentality whic loped, indeed, embraced, the

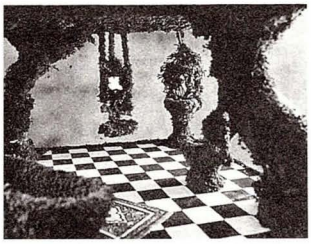
The viewer did not—and wi a deserved reprise of Ābhāsa about—need to bring knowle belief to the work for a revelat work requires only a willingne as another collaborator to com

Merle Schipper is an art h and critic living in the Los area.

Low Tech

There are the stories of pl Architectural Tales. "The pl grew. That's how it happ planted the first room there, a well, then one addition grew a another and another. I tell you dare throw out peach or cherr more. I admit I really do like now. It's cool in the summer insulated nice and warm come From time to time I redecor I'm planning on growing anot over there in the living room, kitchen shelves are comin nicely. I'm cutting back on t vines some . . . and if the weat

e ceiling over the bedroom will ered just thick enough for fall. I in this house, in nurturing it ıtering and watching it grow and rtile. I believe in keeping a home



ırchitecture, designed by Marc Balet

y, trimmed and weeded. It's ard work but now and again I back in a freshly trimmed chair joy the fruits of my labor."

Balet architect: Rhode Island of Design; Prix de Rome of the can Academy 1973–75; since ırt director of Interview Maga- xhibitions: London, Rome, New Most of his works evolve as of series, "Topiary Home" be- to the longest, "Architectural ' begun in 1972.

---

ie Anderson

ı dream. Pick a song. "Laurie son: Mid-Career" is traveling hout the United States, and of- wide variety of amusements which to choose. A text-inscribed provides a good laugh about glossy New York art magazine," may opt for a technically so- ated analysis of contemporary can society — and you don't o look far for that.

gallery exhibition beckons: take ide and educated look at Amer- th Laurie Anderson. However, ıing in Anderson's telling, scien- yes remains yet unattainable. all in on the clever joke, but at ne time, we are the joke. After nderson is communicating h, and to, people just like our-

attempt to define a large body lerson's work is as difficult as ng the artist herself. Maybe they ıe and the same, as Anderson like us to think. Cool and non- describe Anderson and her art well. This hermaphroditic fig- ısually clad in mens' black ng, creates, designs, sculpts, rt works void of self-incrimina- ınderson is consistently in control of the situation, however varied it might be.

Practically, this retrospective is impossible to digest in one visit. Any attempt to do so eventually makes it impossible to differentiate between the mailman's and the mechanic's dreams, the lithographs and the etchings, the early 70's books and the late 70's books. Do we use all eyeglasses and the headphones hanging from the oversized television screen at once, or each tool separately? One wonders what marathon viewing an "end-career" survey would entail.

Anderson's use of language serves her work well. Her incessant, probing thoughts never lose their punch. When we are finally engulfed by our mothers' electronic arms in the song "O Superman," it serves as a reminder that the artist knows her subject matter. Whether she tape-records, writes

Anderson's retrospective is now touring

or speaks, Anderson's words all have precise timing as well as meaning. Anderson's pre-recorded voice in *Numbers Runners*, and the viewer's tape-delayed voice in the telephone booth, provide enough time span, with exactly the right words, to infer that the participant is in control of the situation. And of course it is Anderson's actions alone which mediate the environment.

Paradoxically, as audience we are made aware of the subconscious through sometimes vaporous methods. Exactly how do we decipher the tonal vibrations floating up to our heads, while our elbows are firmly in position on the wooden *Headphone Table*?

"Laurie Anderson: Works From 1969 to 1983" was organized by the Institute of Contemporary Art, University of Pennsylvania, where it opened October 15, 1983. The retrospective has since traveled to the University of California, Los Angeles, and the Contemporary Arts Museum, Houston, where it remains until June 3. The Queens Museum in Flushing, New York, will be the tour's final exhibition, July 1 through September 9.

Bruce Bibby is an editorial assistant at *Arts and Architecture*.

Museum Architecture in a Post-Modernist Age

A recently-opened addition to the Santa Barbara Museum of Art, the Alice Keck Park Wing, was an occasion in January to visit the new wing and attend a somewhat ambitious, weekly series of lectures put together by Penny Knowles, curator of education, and her assistant, Karen Moss. This series, "Museum Architecture in a Post-Modernist Age" included an excellent, recent film, "Beyond Utopia: Changing Attitudes in American Architecture." The film portrays, among other fascinating items, Eisenman having much of his interview during a shampoo and Gehry wondering whether Graves was the "new Fascist architect."

For the second program, Reyner Banham spoke on "Masterworks and Tired Feet—An Overview of Museum Architecture," in which he outlined major issues and the development of museum design. He formulated the "50-Year Rule," whereby one should withhold final judgment on a building's success for that time. The next week, Robert Hale from Frank Gehry's office presented some of Gehry's recent work, emphasizing the Temporary Contemporary.

The fourth presentation was by Steven Izenour of Venturi, Rauch and Scott Brown, who spoke on "The Architecture of Exhibits and Mixed Media in a Post-Modernist Age," emphasizing their own museum exhibit on "Learning from Levittown" and their children's museum in progress. The last speaker was Charles Moore, who showed his museum at Dartmouth College, the Beverly Hills Civic Center complex in progress and a lot of slides of the local County Court House, which seems very close to his art.

Finally, recent museum architecture was discussed by a panel made up of Paul Mills, former director of the Santa Barbara Museum of Art; Paul Gray of Warner and Gray, architects for the museum addition; Dr. David Gebhard, professor of architectural history at UC Santa Barbara; Dr. David Farmer, director of the Art Museum at UC Santa Barbara; Allan Temko, art critic for the *San Francisco Chronicle*; and Penny Knowles, education curator at the museum. Temko kept everyone wide-awake with a Howard-Cosell-like approach and some high griping about what seems to him to be low architecture. If anyone expected this last meeting to be less than lively, they were surprised, for Temko milked not a few sacred cows, including Post-Modernism.

On the whole, the series was well-attended, informative, fun and interesting. The museum addition itself was little discussed, except briefly by the architect, Paul Gray.

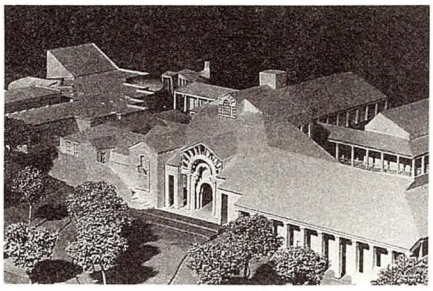
The new exhibition area of the Keck Park Wing is small and complements what is now being renovated in the old part of the museum. It is more than the clean, well-lighted space it immediately appears.

Emphasis and drama occur both in the sense of entry and the sense of place. The rather triumphal arch through which one cannot enter without a feeling of ceremony, recalls the past in a distinctly un-post-modern way. Also contributing to the ceremony are the double stairs leading to the galleries, which are as precipitous as James Stirling's at Leicester (faint-of-heart will use the near-by elevator).

The galleries have a jewel-box quality—small, pristine, reverent, beautifully appointed spaces to hold precious things. (You can even put your own precious things in one of some 400 wood lockers and take the key along as you browse). This is the museum as the more traditional series of small rooms, in contrast to the large, relatively undifferentiated space pioneered in Kahn's first gallery at Yale. It is also interesting to compare Thomas Vreeland's proposal for the same addition in *A View of California Architecture 1960–76*, by David Gebhard and Susan King.

Being able to see art in a place which enhances it, however the architect chooses to achieve this, finally emerged in this lecture series as one of the main goals of a good museum. In the Keck Park Wing, Paul Gray showed us a very successful way to do just that.

Ms. Clayton is an architect in Santa Barbara.



Model, San Antonio Art Institute

We Love Short Short Lists

Getty Announces Short List

The Getty Trust has announced a reduced short list of architects being considered to design the J. Paul Getty Fine Arts Center in Los Angeles. The list names Fumihiko Maki, Tokyo; Richard Meier, New York; James Stirling, London. The selection committee which made this reduction assembled the original short list including Batey and Mack, San Francisco; Henry Cobb for I. M. Pei and Partners, New York; Robert Venturi, Philadelphia; Romaldo Guirgola, New York.

These architects were chosen from an original group of 33 by a selection committee composed of seven authorities in architecture and fine art. They include Bill Lacy, president of Cooper Union; Reyner Banham, dean of art history at UC Santa Cruz; Richard Bender, dean of environmental design at UC Berkeley; Kenneth Dayton, executive committee chairman of Dayton-Hudson; Anne d'Harnoncourt, director of the Philadelphia Museum of Art; Ada Louise Huxtable, formerly the architectural critic for the *New York Times;* and Craig Smyth, director of the Harvard Center for Renaissance Studies, Florence.

The proposed fine arts center has a budget of over $100 million and will occupy 24 acres of a 742-acre site in West Los Angeles. Following further investigation of the architects and interviews, the selection committee will choose three unranked names for final consideration by the Getty Trust. Construction should begin in early 1986.

The hilly site is located north of Sunset Boulevard and west of the San Diego Freeway, at a geographic gateway where the freeway spills out of the Sepulveda Pass into Westwood and the LA basin. In contrast to this heroic situation, the program calls for a design which is less monumental and more expressive of the client's commitment to human scale. With a strong emphasis on site planning and landscape design, the program notes that, in this project, the "particular opportunity exists to re-establish the importance of integrating man-made structures and the natural surroundings;" that "in a city of automotive transport this ample site can accommodate the contrasting experience of a pedestrian oriented solution. . . ."

The program calls for three interrelated facilities. A center for the history of art and humanities will be dedicated to broad research in art history; spaces will include a major library and photographic archive as well as housing for a small community of scholars. A conservation institute will accommodate teaching and research activities, and a new Getty museum will display the collections of painting, drawing and decorative art which are now uncomfortably housed in the existing, revival-style Getty Museum in Malibu.

Moore Designs Art School Venturi Selected for Museum

The Los Angeles firm of Moore Ruble Yudell is designing a 55,000 square foot addition to the San Antonio Art Institute of San Antonio, Texas. The building is scheduled to break ground this fall; when finished, it will be Charles Moore's second building in the state, after the Sugarland country club.

The addition will join two constructed buildings on the 25-acre site; the existing school is a one-story contemporary building. It is affiliated with the McNay Art Museum, a former residence designed by Atlee Ayres with additions by Ford Powell and Carson. Charles Moore describes these two buildings and his intentions for the addition.

"I think the McNay is one of the most delightful places I've ever seen, and the existing Art Institute is a careful and interesting building. They don't have much with each other, though. The new bu should be a good neighbor to both, so one gets invited to the same party."

The addition has been conceived campus, in which linear building linked by breezeways and open court architecture will be styled in a cont manner which loosely combines eleme the McNay residence, a stucco buildin Spanish-revival style, and the McNay tions, which employ a Texas vernacu shed roofs and verandahs, favore O'Neil Ford.

The courts will be connected ir strings. What the architect describes "clean" street will connect the McN the existing school by way of more areas: auditorium, cafe, library and store. The clean street will be termina each end by major circulation rooms: the McNay, a three-story-high, enclose vilion; merging at the school, a co porch with an open-air fireplace. A "c street will branch out from this porc lead to less public areas such as cri class rooms, studios, and an install space for site specific work.

In other news from Texas, the La Gloria Art Museum announced the tion of Venturi Rauch and Scott Bro architect of the museum's new dowr facility. The selection culminated a s month search in which 60 firms from a the country received requests for prop

Associated on the project will be tv cal firms, Renfro, Steinbomer and I and Holt + Fatter + Scott. The new seum will be part of a mixed-use, r block complex under development by son-Casey Companies. In January, Wa Casey announced the donation of both and money toward the construction c museum. Construction is scheduled t gin in 1986.

MOCA Acquires Collection

The Board of the Museum of Cont rary Art, Los Angeles, announced in F ary that it agreed to acquire 80 works the internationally known collector Giuseppe Panza di Biumo of Italy. T quisition, which is valued in excess c million, represents one of the larges most significant single acquisitions.

Director Richard Koshalek anno that MOCA will acquire several excep works by nine of the modern era's highly regarded artists: Mark Ro Robert Rauschenberg, Franz Kline

Continued on page 72

Kroin

Sanitary Fittings
Design: Arne Jacobsen, 1967.
Selected for The Design Collection, MoMA.

Uncompromising design and quality are reflected in this all brass modular plumbing system for the kitchen, lavatory and bath. Represented here by a variety of wall-mounted fixtures and accessories finished in 10 epoxy colors, polished brass or chrome. Part of a series available exclusively from Kroin.

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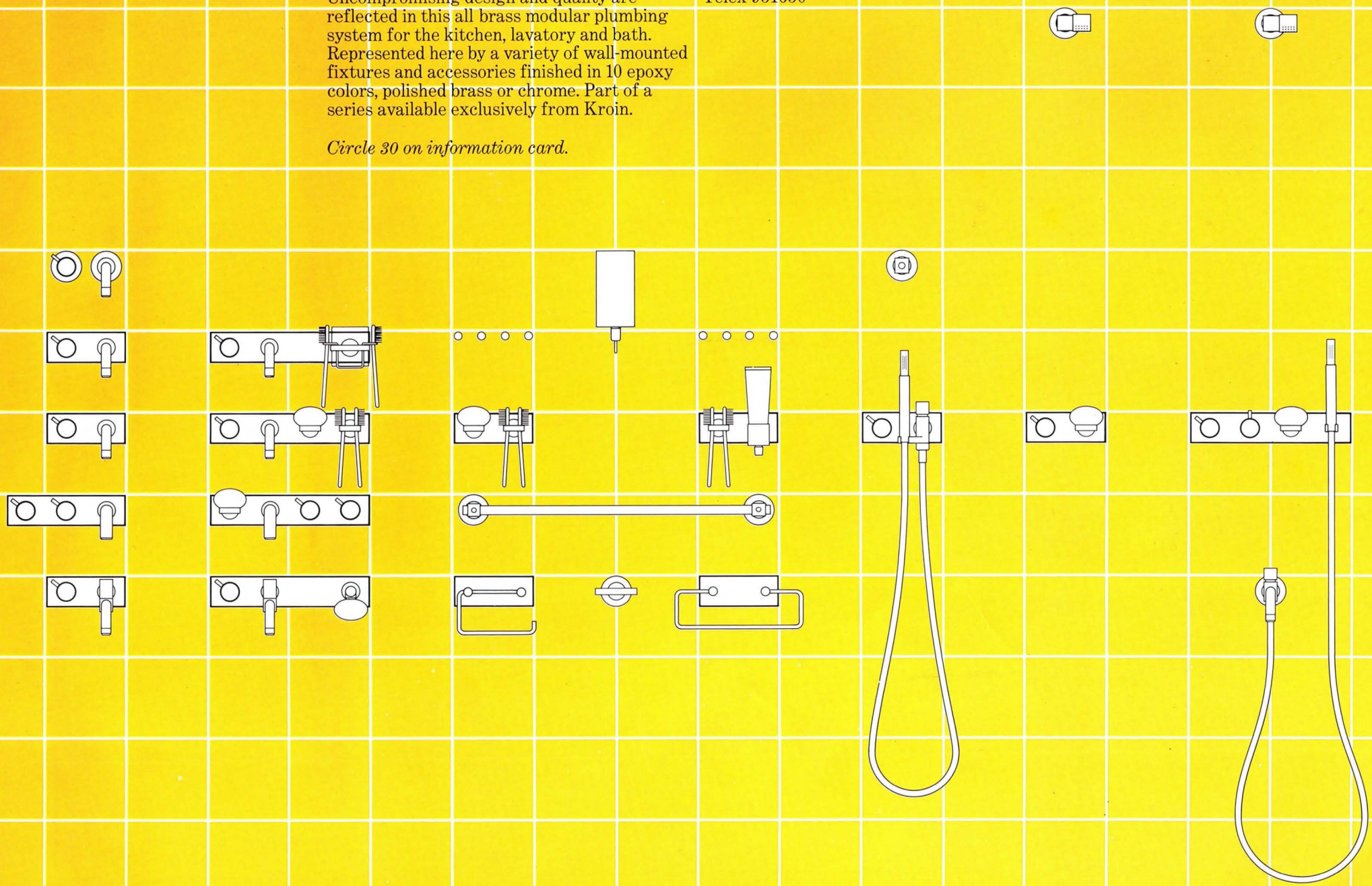

BY JACQUELINE ROSALAGON

In the post-industrial age, stamped by post-industrial technology and craftsmanship, man himself is creating some very beautiful and useful new materials. For the most part these products are designed to withstand the harsh post industrial environment in which they have to perform, and natural materials are put through their paces to measure up to the task.

Wood, for example, has long been treated for fire and water resistance in structural applications and impregnated with acrylics for flooring. Today the material itself is being redesigned.

At Knoll International, "Techgrain" has been developed as a fascinating veneer option. Starting from original woods, with all of their inherent disparities, Knoll's patented process eliminates variations in pattern, color and texture. The resulting Techgrain material is light, soft and fine-grained; it is available in "effects" of natural white oak, and english brown oak. In addition to uniformity, an important quality when additional workstations are required or offices are re-arranged, Techgrain resists stains. The polymer material with which the veneers are coated is impervious to normal water and alcohol.

STICKS + STONES

TECHNOLOGICAL IMPROVEMENTS IN CONVENTIONAL BUILDING MATERIALS INCREASE DURABILITY AND STRENGTH

Neoparium is a unique building material developed by Nippon Electric Glass, Ltd., distributed by Forms and Surfaces. It is produced by a process of crystallization that fuses granular glass particles into a material harder and stronger than granite. It has a marble-like appearance but, unlike marble, its color is uniform.

Neoparium resists acid and alkali, so the highly polished surface is undaunted by permanent exposure to wind, rain and smog. It is impervious to water or strong chemicals and resistant to scratching and abrasion. Unlike natural stone, it is available in curved panels, and, having three times the bending strength of marble or granite, can be used in thinner sections.

Marble itself is being used to make new, marble-like finishes in tile and slab form. "Quarella," made of 96% marble, is an agglomerate made by a process called "vacuum vibromixing." In this process, pieces of marble are bonded with cement and polyester resin, cast into enormous blocks, then placed in vacuum chambers in which they are cooled and vibrated. On removal, the blocks are sliced and given polished or honed surfaces. Quarella's finished appearance is like marble with the exception

that the slabs are more uniform in color. The manufacturer, F. Ili Quarella of Italy, claims that the material is superior to marble in integral strength, compactness and durability, less likely to crack or chip, and more difficult to stain.

Also of recent vintage is Zeta marble, quarried from blocks of marble and onyx (also a marble) and fabricated by a process involving the resin bonding of different marbles. The stylish results are striped and geometrically designed marble tiles that can be assembled in many possible patterns, colors and textures.

Granite, a classical material very much in vogue, is being imitated quite well in resilient flooring by Fritztile, carpeting by Stratton and Edward Fields, plastic laminates by Nevamar, and boundlessly in ceramic tile. But the material that comes closest to looking like the real thing most often has the real thing in it.

Granite-porcelain tile combinations are the result of a firing process, the same which creates granite in nature. Nitto Granite tiles and pavers and a Japanese product distributed by Gail are examples, but many other manufacturers are about to offer them.

Gail's product is a combination of pulverized natural granite and 12% ceramic porcelain, which is compressed in a 40-ton hydraulic press with moisture as the bonding. When fired at temperatures above 2000° F, the porcelain and granite fuse together to form a new, granite-like body.

The most elegant version of the porcelain-granite tile has been developed by Castellarano-Fiandre Ceramiche of Italy and is distributed by Park Tile. Called "Fiandre Ceramic Granite" in this country, the tile is a refined porcelain stoneware incorporating 90% natural granite.

Man-altered but enduring—in fact, more enduring than ever—wood and stone materials will be more uniform as a result of this applied technology. The possibility of rich and exciting accidents or planned effects is traded for the assurance of a generally high level of quality and the ability to withstand a phenomenal array of corrosive elements, but in most applications this is considered to be a fair exchange.

Jacqueline Rosalagon organizes and maintains resource materials for architects and interior designers.

Flo Fox is a professional photographer. She is legally blind.

Her book, Asphalt Gardens, is available through the National Access Center in Washington D.C.
The proceeds are used to help other handicapped people.

The talent is there. Use it.

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arts+architecture

Announcing a Limited Edition Portfolio Of Outstanding Artists and Architects

Arts and Architecture magazine, in association with Freidenrich Contemporary Art, is pleased to announce the creation of a special Portfolio to be released in late 1984. A partial list of distinguished artists and architects participating in this project includes:

Ronald Davis

Michael Graves

Tom Holland

Michael C. McMillen

Frank O. Gehry

Charles Moore

Barbara Kasten

Peter Shire

Arata Isozaki

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A R T S
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T U R E

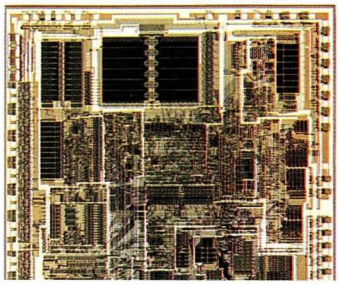
BY ANDREW RABENECK

TECHNOLOGY ARCHITECTURAL IDEOLOGY

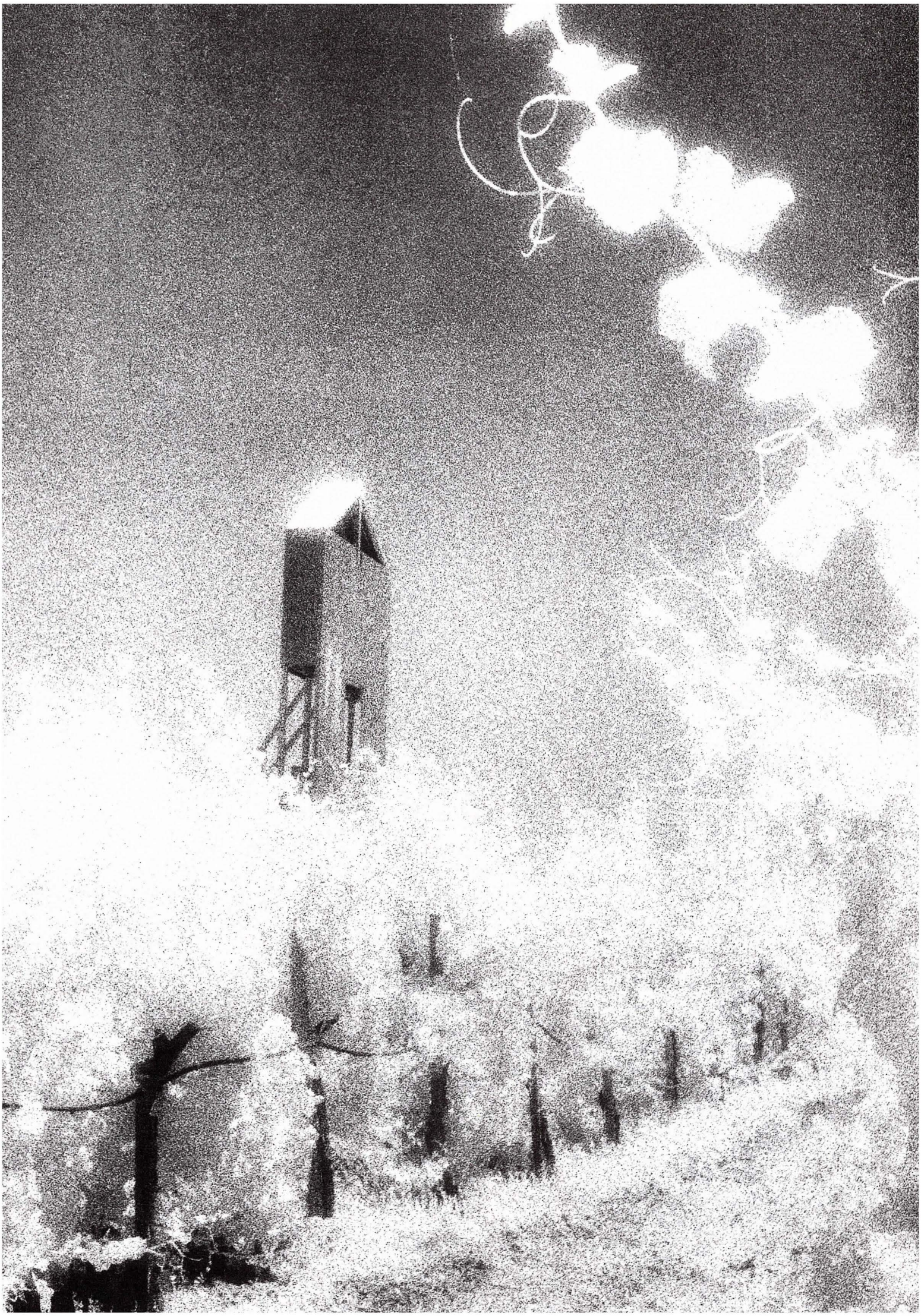
In this waning century's continual architectural battle between the machine and the hut, the hut currently seems to hold the high ground, bolstered by a blizzard of publishing and a fashionable interest in architecture. The hut and the machine are the two key icons around which see-sawing architectural ideologies have coalesced for the last 200 years or so, and which have served, as do icons in a church, to distract and distance architectural theoreticians and practitioners alike from the fascinating actuality of their surroundings. ¶ The reality of architecture, indeed its enduring challenge, is its inextricable closeness to prevailing uses of capital and means of production. Ideologies are the instruments of reconciliation between the hermetic purposes of architecture and the objective reality of its context. These ideologies are seldom more than reflections of the dominant material relationships in a society, but cast in such a way as to make architects feel comfortable while reassuring patrons that the status quo is being maintained. Ideas in good currency are emphasized at the expense of negative political realities such as domination or unjust distribution of wealth. Ideologies which offend this premise, such as "community architecture" or "energy conserving design" are short-lived unless they accompany a radical shift in the objective reality of the context, whether the formation and use of capital or the means of production. The hut and the machine ideologies have endured because they emerged at the end of the 18th century in revolutionary Europe, just as the conditions of today's true context were being forged. ¶ It is notable too, that mere political change (e.g., an increase in oil prices) is insufficient premise for the emergence of sustainable new ideologies. Indeed architectural ideology is generally careful to remain ignorant of political reality, cleaving only to social harmony and obedience; it is put up for adoption as it were. Thus communist and fascist regimes have appropriated the hut with impartiality. At some points, particularly in the 1930s, their products were indistinguishable. Both Bauhausler and constructivists, adherents of machine ideology, were synchronously unacceptable to Hitler and Stalin, leaving the way clear for hut ideology based on tradition, vernacular, normality. ¶ If ideology is one of the ways in which professional groups socially distance themselves legitimize their activities and protect themselves from the harsh realities of their true predicament then nostalgia must play a strong part in the framing of ideology. It may be nostalgia for the past in the case of the hut—"Let us never lose sight of our

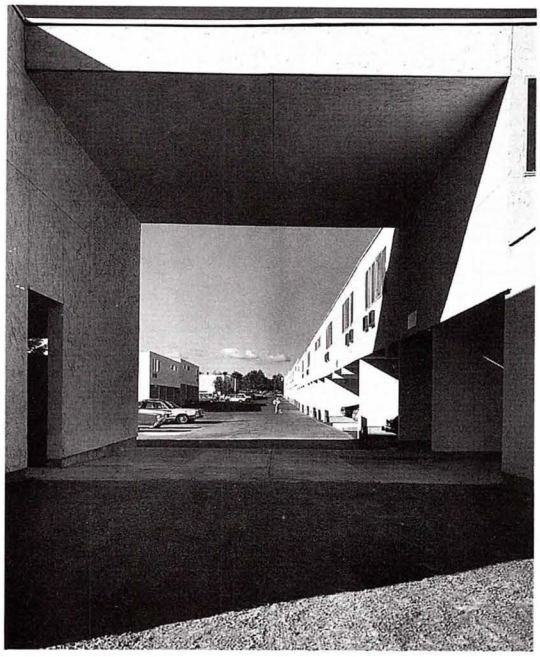
18th Century nostalgia, Laugier's hut

Computer chip, dominant icon

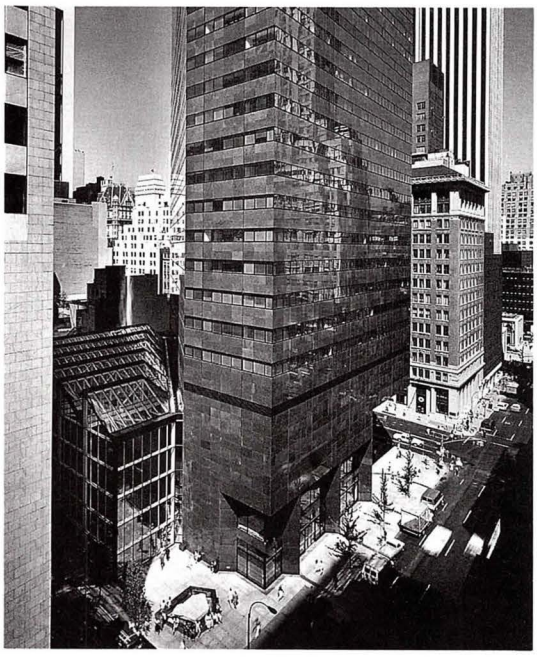


The hut and the machine are the two key icons around which see-sawing architectural ideologie have coalesced for the last 200 years





Gwathmey Siegel's Perinton housing – liberating simplicity or degradation of the human habitat?



Barnes' IBM building, cheap use of precious materials

The Eames house, precious use of cheap materials

little hut" said Abbé Laugier in 1753—or it may be nostalgia for the future, as in the case of the machine which recalls in this century the futurists, the Bauhaus, and the system builders, to name a few.

The present, however, is to be avoided in ideology because it entails inescapable discussion of actual political and economic power, actual conditions of production and labor. The present is too close for comfort. We are more readily able to inspire by allusion to a golden age or an arcadia, to the "good old days" or to the "bright future before us." The risks of dealing in the present are, as any politician knows, simply not worth taking on.

Thus we can understand the current ascendence of the hut ideology, recast in the terminology of the Neo-Rationalists and Post-Modernists. These sensibilities pander to the patrons' and the users' long-incubated antagonism towards the poverty of mass-modernism. But they are also a reaction to the practitioner's wounded self-esteem, brought on by debased modernist aesthetics (is this all there is?), the affronts of socio-economic reversal (the average electrician earns more than the average architect), and the increasingly ephemeral nature of the product, built for leverage rather than for the ages.

It is small wonder that the progeny of early 20th century machine ideology have been taking a beating of late. And yet, perhaps ironically, "high-tech" is an adjective used to describe an increasingly broad spectrum of products, activities and businesses, and to signify a transformation of technological promise from smokestack to silicon. How then do the new technical myths relate to the venerable machine ideology of architecture?

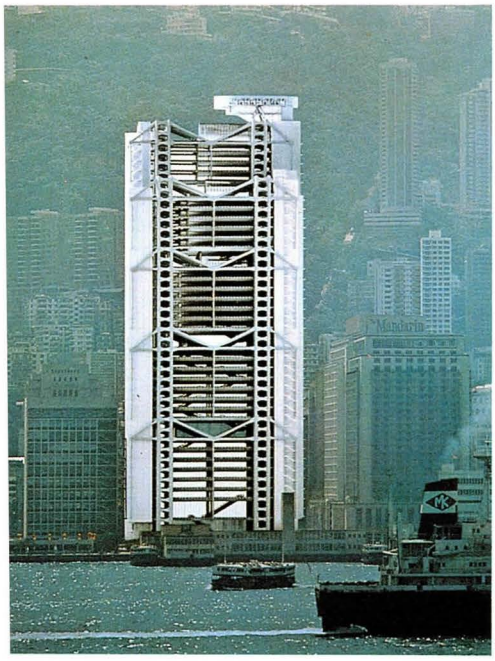
At its origin the building *was* the machine, the embodiment of the rational program whether clinic, prison, factory or workhouse. It was a distinct instrument of management and a clumsy armature to which conventional architectural vocabularies could be applied, often with little success because the basic forms had no traditional precedent.

Later, in the mid-19th century, emerged the concept of architectonic order as a resultant of processes of production, distribution and assembly, rather than as mere application, at least for some building types. The exhibition buildings of Paxton, the railway stations, glasshouses, and cast iron architecture generally exemplify the relationship. Towards the end of the century explosive growth of all kinds of industry led to the construction of the unadorned and unselfconscious machine-ings that were to thrill Moisie Ginzburg a Corbusier, inspiring their mocking juxt tions of corrupt bourgeois art with grain tors, cooling towers, biplanes and stean

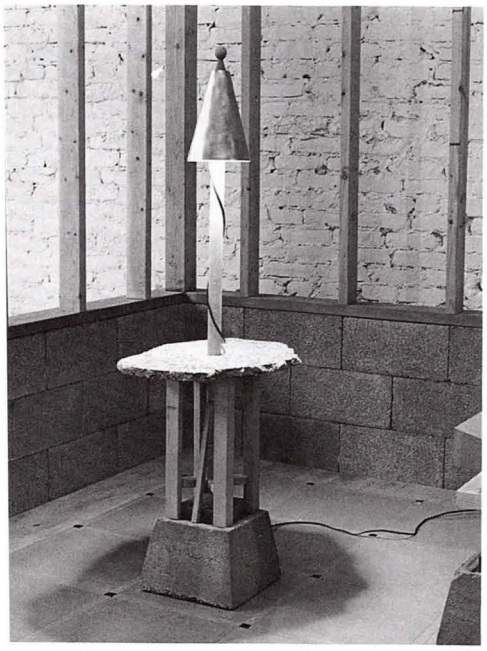
In this view the intrinsic logic of engin form was venerated; it either possesse quate poetic power of its own (Ginzburg least required little poetic interventic Corbusier) to serve as a liberating instr of the benign social purposes of archite Later it was only necessary for the buil look like a machine, but that's another Who was using whom? Engineering an duction capability, the fruits of shrewd capital, *can* liberate as modernists hope they can also enslave.

Architects were generally blind to this potential. Sheltered from objective rea the warm blanket of ideology, art rushe the arms of commerce, a marriage that have unwanted and unanticipated out This was particularly true for housing, and factory buildings. The architect's qu liberating simplicity and rationalit quickly subverted into "a giant enterpr the degradation of the human habitat," Claude Schnaidt's phrase. And yet, thro this time the power of the original ideol been sustained by the work of some arc the couturiers of high-tech modernism group includes exemplary prophets s Jean Prouvé, but also the yeomen po sians and post-Saarinens in the USA, a post-Fullerians in England. These shar lief that they are putting advanced tech in the service of the building user, th pushing the limits to prove the liberati tential of the machine ideology.

Happily, their impulses are generally nant with those of their patrons—g cheap, thin walls mean more space, etc.. couturiers have often spearheaded te development in the product industry, a case of mirror glass and the evolution chanical services. Their buildings are felt and often finely executed works of they are not well executed it is genera cause the technical imagination of thei tors outstrips the ability of ordinary i to respond. The Pompidou Centre in probably the greatest machine-building cent years, suffers rapid deterioration l many of its systems are virtual prototy cannot withstand the constant onsla



Architecture as symbol, Foster's Hong Kong bank



y & Mack, furniture as a critique of the ordinary

30,000 visitors a day. But those visitors are a testament to Pompidou's vision in choosing the Rogers design to exemplify France's recovery from the events of May 1968, and the reassertion of Paris as a great center of art. Who is using whom?

Yes, machine buildings serve well to symbolize capital accumulation (whether of culture or money) and confidence in the future. Norman Foster's spectacular Hong Kong Bank, being built in the twilight of the Crown lease on Hong Kong, sends a strong message to the People's Republic about its future access to hard currency. Richard Rogers' new Lloyds building in London expresses similar confidence in the city as the insurance capital of the world, despite the decline of Britain in global affairs. These buildings are optimistic emblems of technocracy, promising responsiveness to an indeterminate future.

As in fashion, it takes time for the work of the couturiers of machine ideology to reach Main Street. As in fashion, along the way the model is cheapened and simplified to suit the purse of the ordinary patron and the limitations of his ordinary architects. The results have been gruesome enough and so pervasive as to drive patrons, users and architects into the arms of the hut-ideologies. Ironically, though, the objective reality of, say, commercial development will not permit true huts—huts that Laugier or Morris could applaud. The 40-year domination of machine ideology has fuelled the evolution of an everyday construction technology finely tuned to simplicity and rationality, be they manifest as cheapness and meanness.

It is a normalized technology that reflects the hegemony of the vast corporations which produce, distribute and market the ever-narrowing range of products, tools and processes used to build buildings. Its highly refined microeconomic precision is geared to the pragmatic problems of building development. This system of production is one focus of true power in construction, the other being capital.

The architect as unwitting agent of the productive force is flattered and cajoled into believing that he retains the power to choose and, thus what he really craves, the power to create meaning. Thus we witness, in our fresh pursuit of the hut, a somewhat pathetically cheap use of precious materials in a vain attempt to recapture for architecture the cultural position architects fear they have lost. True, there are paths of flight from the unpalatable realities of the productive force. Appealing and even plausible though they may seem, such paths charted for us by a Christopher Alexander, a Culot or a Krier, remain blind to material reality. They are in the end sentimental rather than subversive.

A more promising line of thought is exemplified by Albert Kahn and Charles Eames, with their precious use of cheap materials, a persistent pitting of poetry against what they saw as the remorseless encroachment of a yet friendly productive force. It was a position Eames could sustain credibly because of his taste and his judgement, but also because of the admiration he excited among architects who knew him to be close to the production engineering of his furniture. Here was someone who just might be in control of production at last. At the time the Eames house was a simple if imaginative exercise in the appropriation and transformation of technology, the time honored strategy of machine ideologues, an emotion first crystalized in Marcel Duchamp's ready-mades of 1916, and later propagated in the polemics of all branches of modernist literature. It is the impulse that propels the couturiers of high technology architecture, borrowing a steamship air-scoop here, a gobbet of NASA breakthrough there. The design procedure is this: a problem is defined by the architect in such a way that it cannot be solved by ordinary construction technology. Borrowing forms or techniques from outside construction affirms the associative creativity of the designer. It even represents a critique of ordinary technology. This is also the procedure of hi-tech interior design.

But what might have been seen as a subversive and anarchic exploitation of the dumb forces of production has been dealt a death blow by the recent commercialization of hi-tech as a design fashion. Ironically this death was prefigured by Emilio Ambasz in his thoughtful introduction to the notorious book, *High Tech*. The selected industrial products have indeed been assigned "pseudo liberating powers" by the interior design subculture as Ambasz feared, thus fuelling the mania to consume that the idea was originally intending to escape.

This episode has been an important revelation of the power of commerce, striking down or at least smothering a key weapon in the dwindling arsenal of the architectural ideologue. It has left architectural critics Charles Jencks and Kenneth Frampton unhappy and

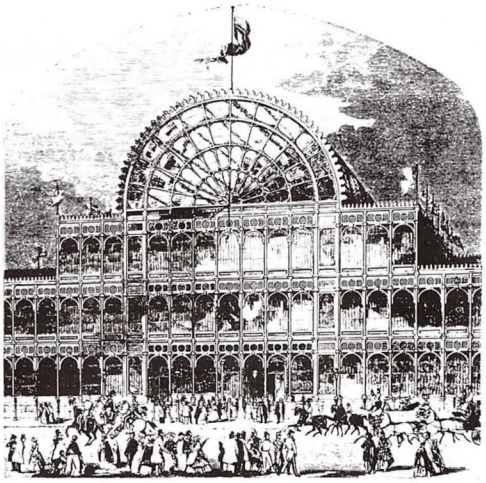
Continued on page 77

BY JOHN PASTIER

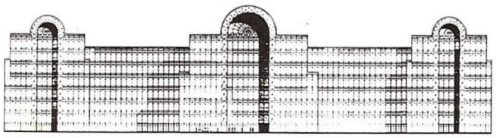
COMPUTER MARTS

NEW FUNCTIONS IN OLD FORMS

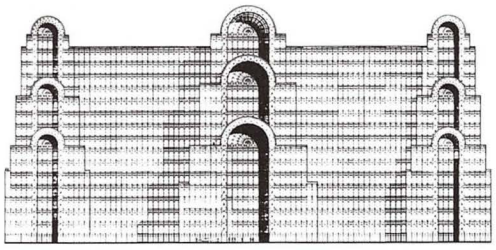
Conventional wisdom has it that electronic wizardry will dramatically reduce the need for centralized workspaces and physical travel to them. People will stay home to work on their computer terminals, and meetings will be held through electronic devices linking locations miles or even continents apart. We will all be able to bank, shop, and attend school electronically. The notion of place will become largely obsolete as technology evolves. ◐ The human animal, however, stubbornly chooses to resist certain notions of progress. Perhaps computers will liberate us from the shackles of space and materiality, but their industry has not yet weaned itself from centralization in conducting its own business. Manufacturers and suppliers flock together in Silicon Valley or along Boston's Route 128. Large trade shows, including a colossal annual extravaganza in Las Vegas, are prime means of communicating with distributors and the press. And now, the computer industry is centralizing in yet another way, by developing permanent trade marts in the style of such conventional businesses as apparel and home furnishings. It seems that buyers, even those of such cutting edge products as computers and software, are still old fashioned enough to want to touch the goods, talk to live people about them, and physically compare one product with another. As of now, there are plans for such centers in New York, Toronto, Atlanta, San Francisco, Montreal, Chicago, Boston, and Dallas. ◐ The last two, the first to be under construction, are of special interest because of their architecture and their symbolism. Boscom, the eastern installation, will be housed in the refurbished Commonwealth Pier just south of downtown Boston. Built in 1914 as a steamship passenger terminal, it is listed on the National Register of Historic Places. Its arched stone headhouse is in the Beaux-Arts mode that has once again become fashionable, and the long structure behind it is a utilitarian industrial shed whose esthetics have never quite gone out of style. Together, these disparate elements link the structure physically and symbolically to its setting. An old city that attracts young people, Boston is both adventurous and conservative. Boscom's 70-year old classic-revival front epitomizes the city's tradition of solid masonry architecture, while the pier structure itself represents an equally strong local tradition of pragmatic engineering. When built, this 1.3 million square foot enclosure was the largest of its kind on earth, and it reminds us that the maritime industry that made Boston a major city has represented a cutting edge technology over most of its history. ◐ By putting a sophisticated new use in an old building that itself combines classicism and vintage high-tech in its design, Boscom becomes an appropriately complex metaphor of mediation between an innovative occupancy and a tradition-laden local context. And with its working parts screened from the street by a more conventional and recognizable structure, it also embodies the computer industry's prime marketing concept—user-friendliness. ◐ This same strategy is being applied more audaciously in the Texas project. Called Infomart, it will be part of the already large and financially successful Dallas Market Center along the Stemmons Freeway. Its architect is Martin Growald, who also designed the Fort Worth headquarters of the Tandy Corporation, the nation's largest computer merchandiser. Infomart will be large; its first phase will include 1.8 million square feet, and it is designed to be expanded in two steps to an ultimate size nearly twice that.



Infomart was inspired by Paxton's Crystal Palace

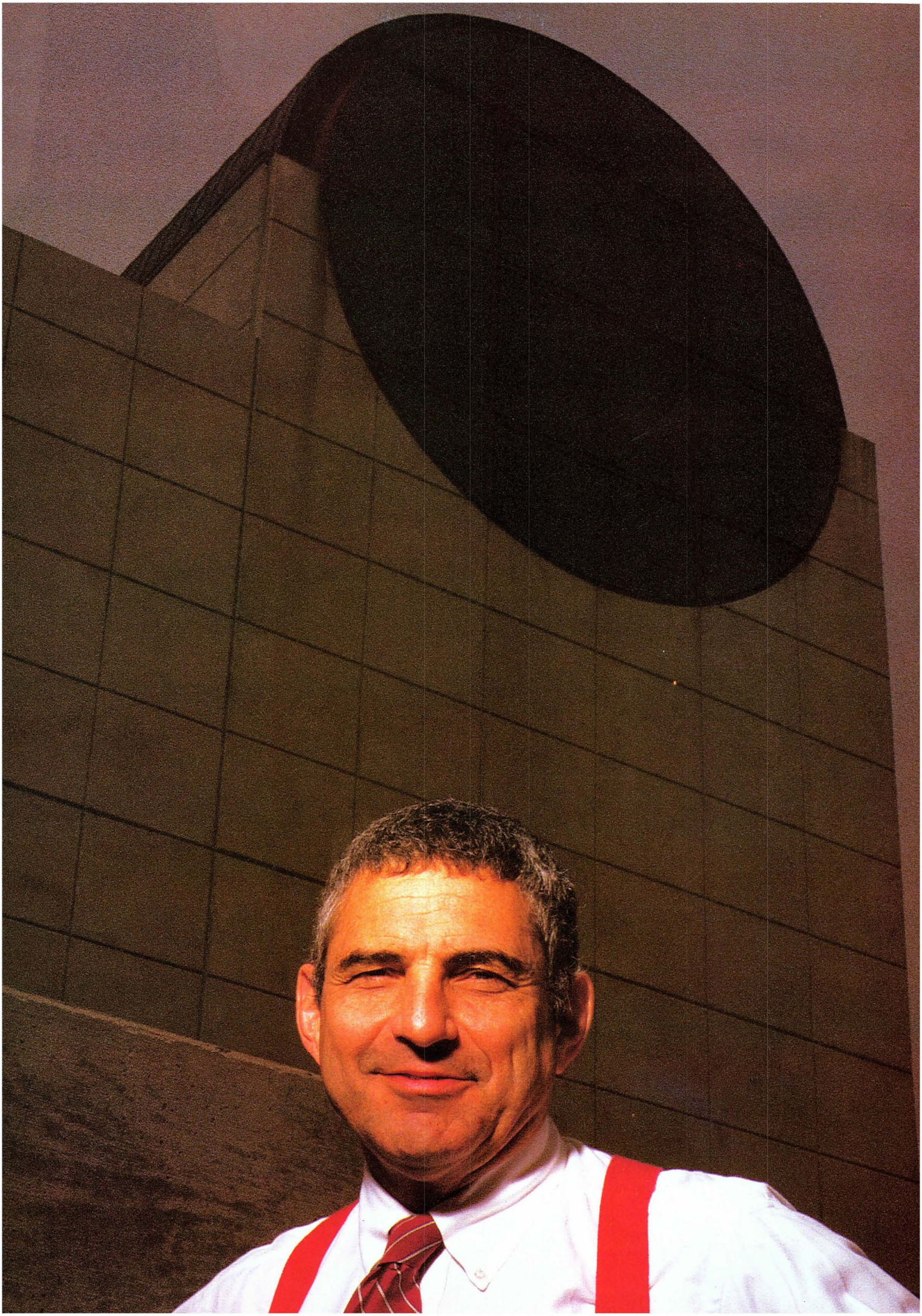


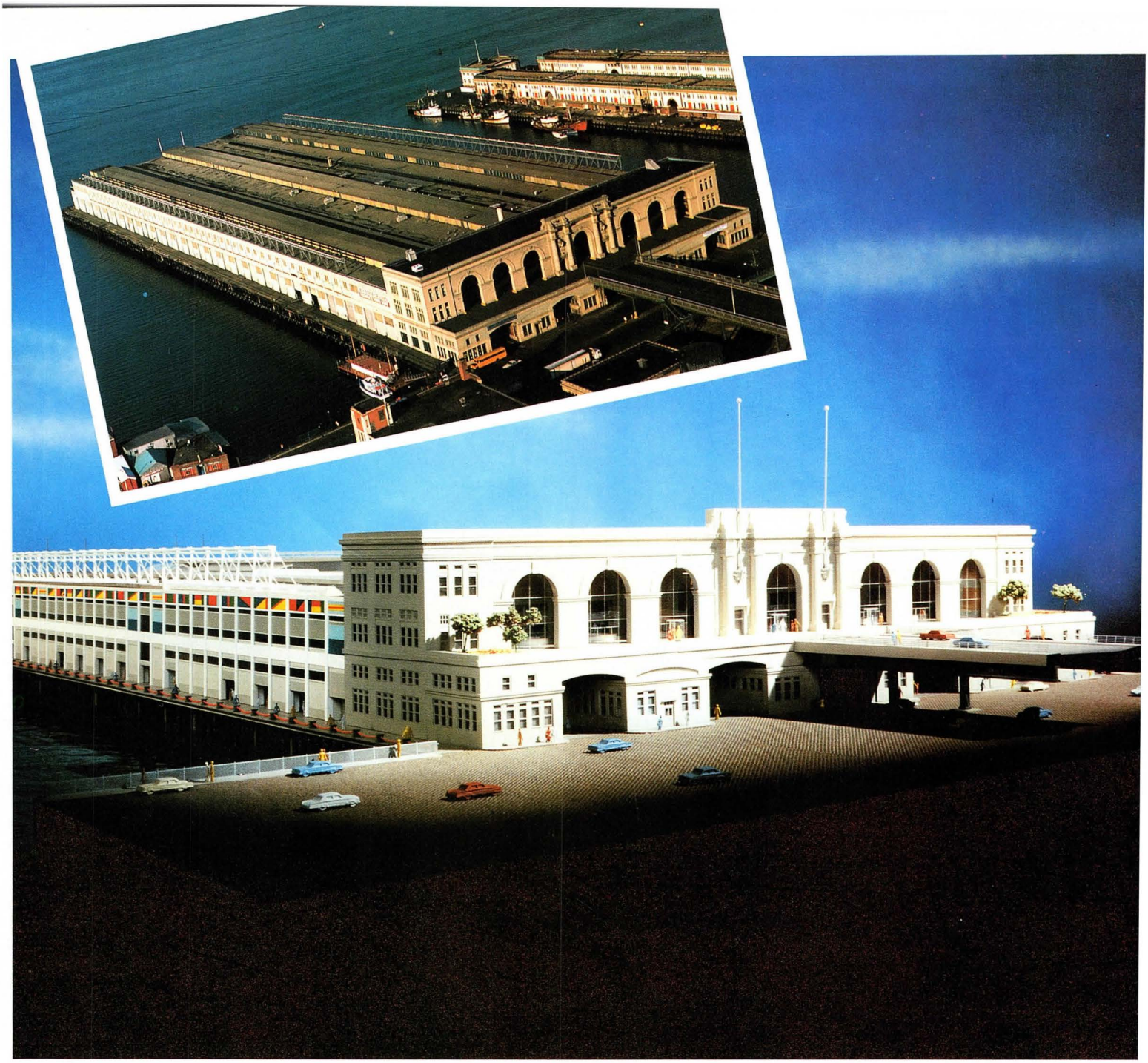
Preliminary elevation, phase one, Dallas Infomart



Phase two shows proposed vertical growth

Right Architect Martin Growald, designer of Infomart, Dallas





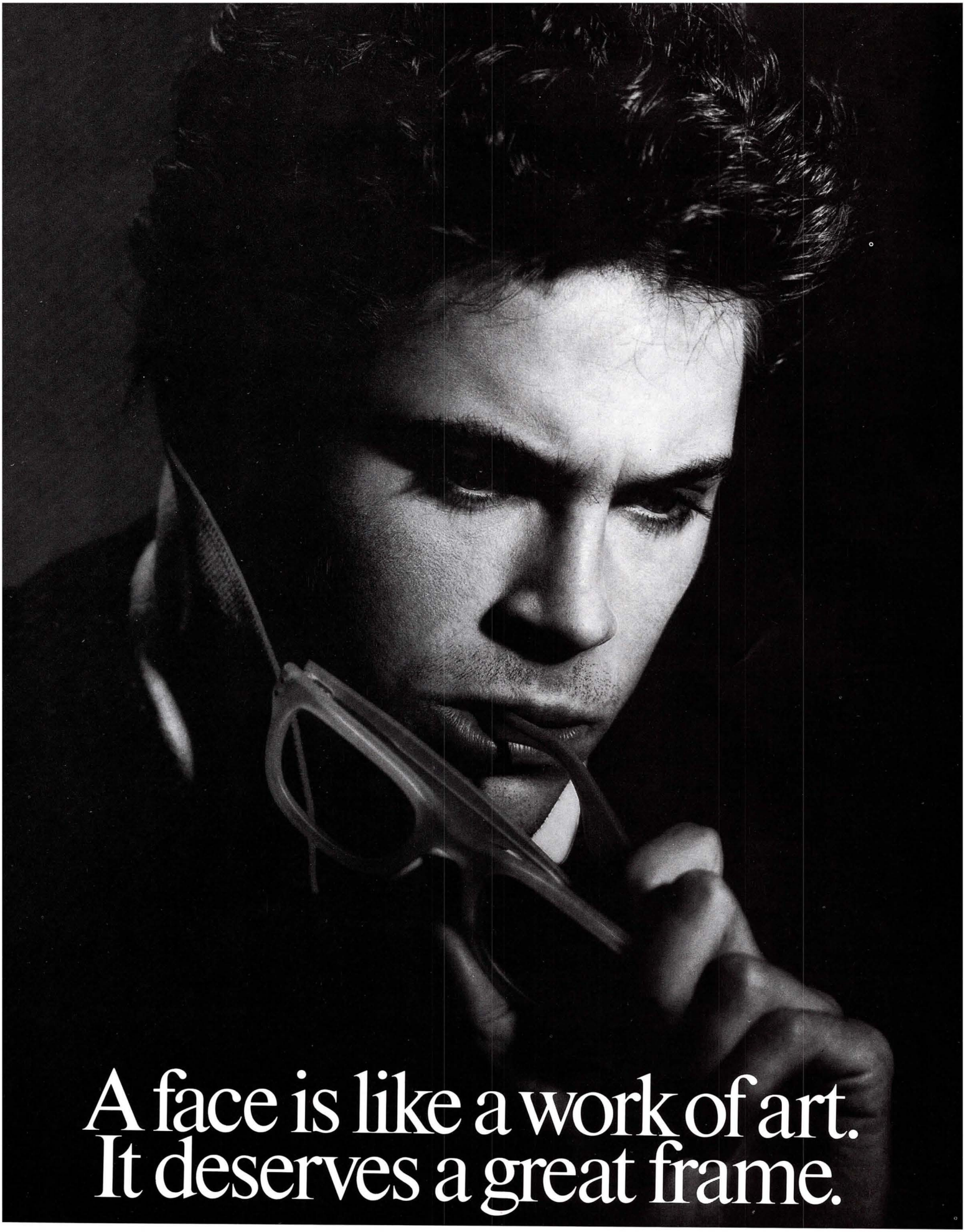
Boscom, a new computer trademart, will be housed in the refurbished Commonwealth Pier, a utilitarian industrial shed fronted by an arched, Beaux-Arts headhouse

Design, however, and not size is what makes Infomart audacious. It is modelled after the great architectural watershed of the industrial age, Joseph Paxton's Crystal Palace of 1851. To call it a replica would be overstating the case, but its exterior will be based on the original working drawings for Paxton's revolutionary greenhouse curtain wall. The original panel size of 8′ x 18′ + will be reduced to 6′ x 12′ +, and the size of the framing members will be reduced accordingly. Mirror glass will be used in place of clear, and cast aluminum will supplant wrought iron, but otherwise the form and details of Paxton's original skin will be reproduced with reasonable accuracy.

The nearly square floor plan of Infomart will depart considerably from the elongated one of the Crystal Palace, since it was set by the developer, Trammel Crow, before Growald was brought into the picture. A tight site and early leasing froze the shape, but the original design's exterior of brown masonry and strip windows has been dramatically transformed. In its initial phase of seven stories, Infomart will be a distant but still recognizable relative of the three story original, and its proportions will be plausible if judged on their own terms. But as it expands to 12 and then 16 stories, it will become progressively less convincing as a building, and seem increasingly like an illustration for a visionary novel of 1890, with each new layer repeating the one below as though more could only be better.

One may ask whether a well-bred early Victorian greenhouse designed for London's overcast skies can find true happiness under the broiling Texas sun, especially if its originally long, low proportions are compressed into those of a 16-story cube, but that is not the only way to see the situation. Dallas is notoriously a city of banal ultraconservative architecture, and Infomart is a refreshing antidote to that status quo. If it runs the risk of vulgarity — only the finished building can settle that doubt — it shows welcome courage in doing so.

Just as IBM has set out to demystify personal computers by using a Charlie Chaplin look-alike in its advertisin fomart is also hoping to humanize an anonymous ent linking it with another familiar image born in England. B this almost innocent implication of user-friendlines fomart is also following some well-known patterns of and technology. Marshall McLuhan posited that the cont any medium is an earlier medium, and by using a Vic exhibit hall to sell computers, Infomart merely gives ne to that adage. An even older principle, dating back at le far as early Egypt, is that new technology at first imitat form of its predecessor, such as stone temples being car resemble ones built of wood. Some of this may be lin superstition and magic, and some of it reflects desi understandable difficulties in dealing with unprecedent uations. A postmodern structure for postindustrial te Infomart revives the palpable high tech of the 19th cen serve and to symbolize an abstract technology that w will lead us into the 21st.



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Glasses shown: The Beat in matte crystal. Designed by L.A. Eyeworks. Face: Rob Lowe. Photographer: Greg Gorman. © 1984, L.A. Eyeworks, Los Angeles, CA 90046.
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RENZO PIANO'S MENIL COLLECTION BUILDING

A HIGH-TECH LIVING ROOM FOR VIEWING ART

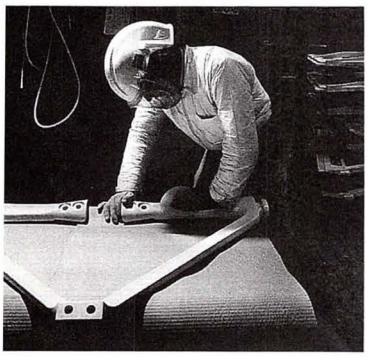
THE MENIL COLLECTIO

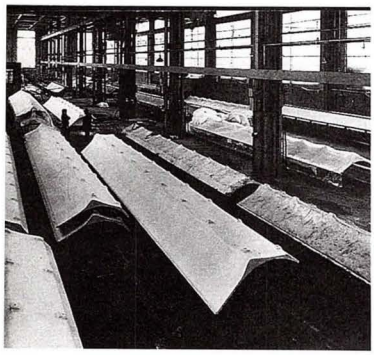
THE MENIL COLLECTIC

BY JEAN TURNER

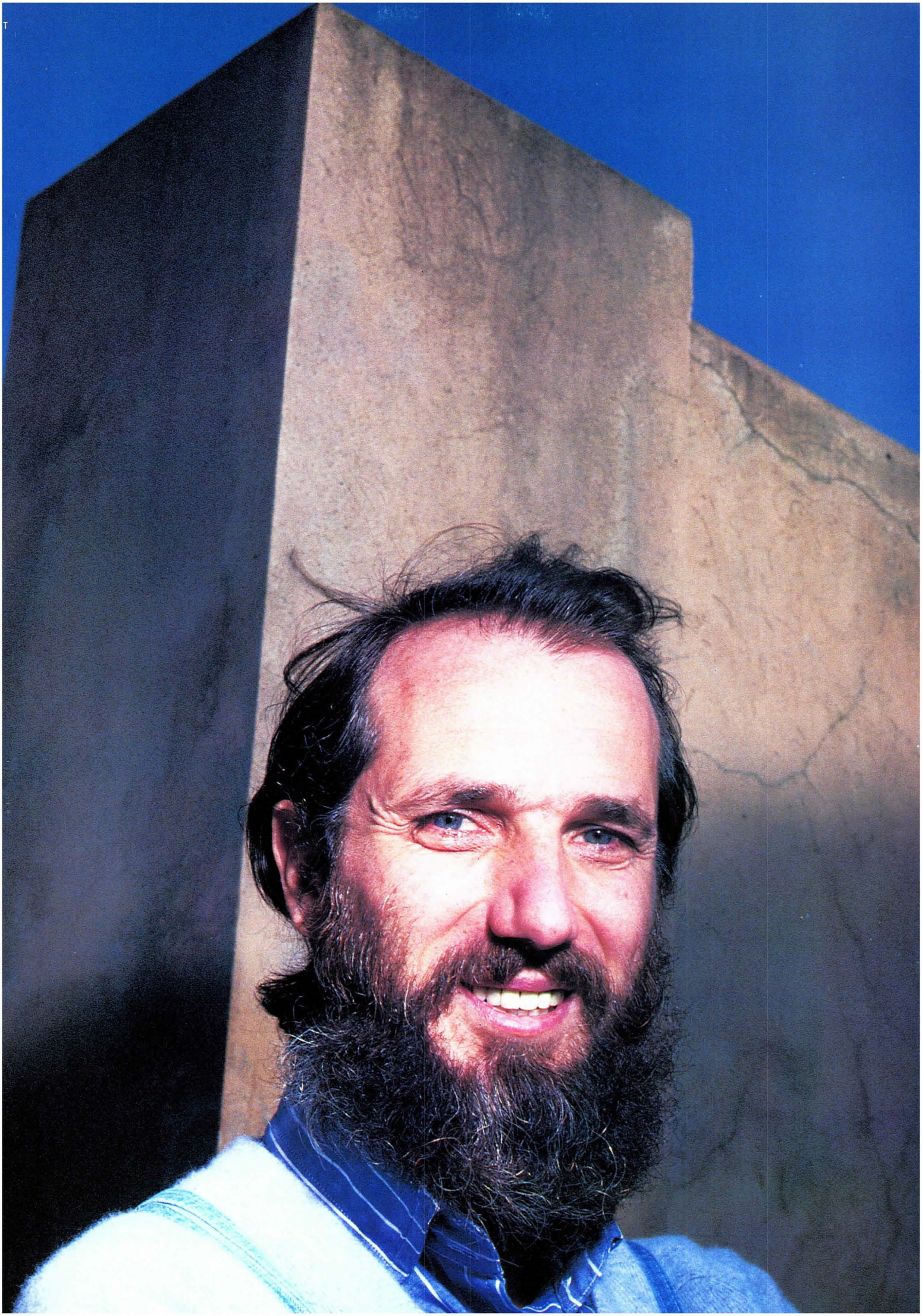
If attendance figures may be taken as even a partial index to a museum's success, the Centre Pompidou, France's center for art and culture, is a triumph of architectural design. One of the architects responsible for that design, Renzo Piano, now thinks it may have succeeded too well. He has some new thoughts on museum design, not all of which arise from distinctions of site, patron and location. He will soon realize these ideas in the new Menil Collection, a project now underway in Houston. ◖ One block west of the Rothko Chapel, the new design is taking shape. The Menil will be built in a well-developed and successful arts district. A 13-acre tract near the University of St. Thomas has been acquired by the Menil Foundation for the Rothko Chapel, the Foundation offices, the Southwest Alternate Media Project, and for park areas with sculptures by Tony Smith and Barnett Newman. Still, the residential character of the neighborhood has been sustained alongside the arts activities. ◖ Despite its historically important location, the Pompidou Center had to engender a new arts district. The site was part of a Thirties' slum clearance project on the Plateau Beaubourg, which for decades had served as a parking area for trucks working *Les Halles*, the wholesale food market. Although Piano might disagree, critic Phillipe Bourdon raises the amusing possibility that the Beaubourg's colorful linearity recalls bottle racks and stacks of produce crates. Ties with the 19th century metal and glass market pavilions, as innovative as the Beaubourg in their own time, would seem more plausible. ◖ It was just as *Les Halles* was being demolished in 1971 that Georges Pompidou, then France's president, announced an international competition to design a center for French art and culture. From 1660 entrants representing 46 countries, a team of judges including Philip Johnson and Oscar Niemeyer selected the design by the team Piano + Rogers. In retrospect, Pompidou said that he felt that the jury was influenced by the public protest over the destruction of *Les Halles;* that they were disposed to reject anything with pretentions to the monumental in favor of a design that would facilitate the interplay of public and environment. Piano + Rogers' design has done just that. By virtue of the building's vitality, the plaza space is energized so that almost as much spontaneous arts activity occurs outside the building as does planned exhibits within. ◖ At the time of the Beaubourg competition, Piano's experience had been primarily in the field of industrial architecture. Having grown up in a family of building contractors, he tended to approach design through materials, tools and procedures instead of theoretically. His work had been essentially experimental: temporary architecture, pre-fabs and plastic roofing systems. At the Polytechnic in Milan

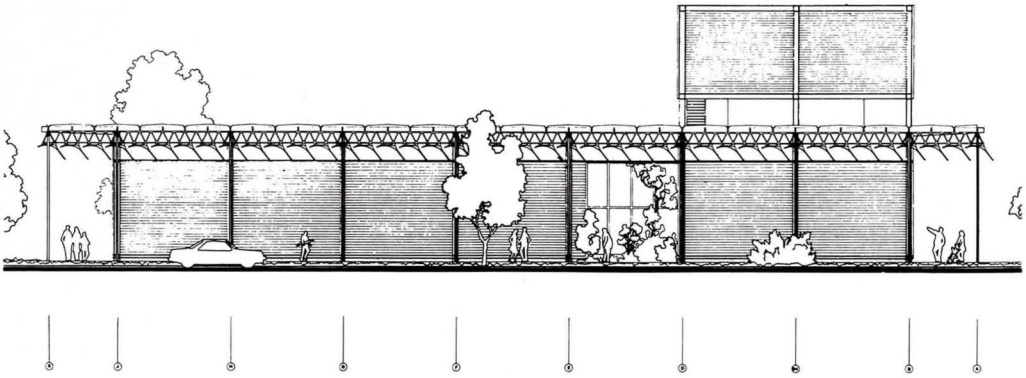
Ferro cement elements under production

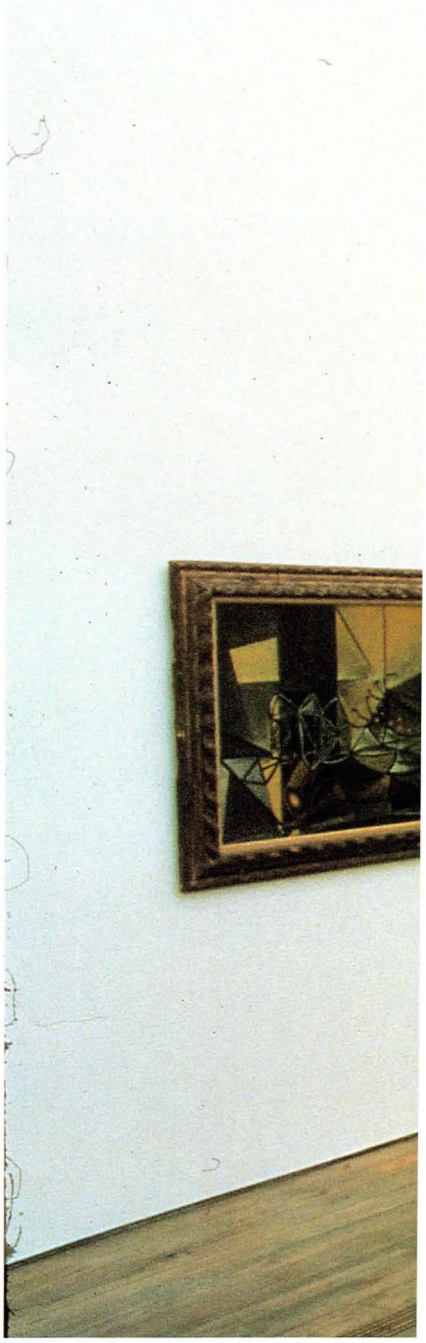




Crown Foundary; Northhampton, England







Above West elevation of the Menil Collection, showing light-filtering ceiling leaves and exterior clapboard panels. *Opposite* A full-scale mock-up of a gallery space at the Menil; note the sculptural quality of the lighting leaves.

one of his professors was Franco Albini, known for three important museum designs executed in Genoa in collaboration with Professor Caterina Marcenara, Director of Fine Arts for Genoa. These museums, which adapted existing historic structures, made use of accessible storage for the display of artifacts. Piano plans to use a similar solution for the 10,000-object Menil Collection.

The team concept which produced the Beaubourg design is also being used in Houston under the designation Piano-Fitzgerald, a joint venture with the Houston firm Richard Fitzgerald and Partners. Several members of the new team worked together on the Paris project. For example, Peter Rice, principal structural engineer for the Beaubourg, is an important member of the Houston team. Piano believes multidisciplinary teamwork fosters creativity, but given the confusion that reigns in the early stages of planning, generosity, mutual respect and patience are also necessary. In such a process, the client is a close collaborator with the architect from the beginning.

For the project, Dominique de Menil has given her clear and personal vision directly to Piano. She envisioned a building "big inside but small outside," one that would permit works to be shown selectively in attractive surroundings. The rest of the collection would be compressed in a separate area, but not hidden from scholars or art students. However strong the ties between the Pompidou Center and the French-born Mrs. de Menil, who serves on its board of directors, she feels that a different sort of architectural catalyst is needed in Houston to bring about a genuine encounter between visitors and art works.

"Big inside but small outside" could describe another museum John and Dominique de Menil sponsored in Houston, the Rice Museum. A more unpretentious building could scarcely be found. Constructed in 1969 as a temporary structure, and first hosting the Museum of Modern Art's "Machine" show, the Rice Museum has proved to be a pleasant place for experiencing art.

Her architect agrees with this approach. Both here and in Paris he has avoided the conventional idea of "museum." If the Beaubourg has become a monument, it is a monument in spite of itself. The transparent, non-massive aspect of the Paris center and the sense that its structure is composed of small-scale elements give it an accessible quality. Futurists who disdained traditional museums as 'cemeteries' would see in the Paris center their manifesto come to life: buildings as enormous machines. Clearly Houston does not have the entrenched institutionalization of the arts that so angered the Futurists and Georges Pompidou. Something like a "space ship that had landed in the middle of Paris," was required to encourage Parisians to freely approach new work.

Ironically, Europeans like Peter Rice frequently associate Houston with "mission control." The Menil, however, is not destined to look like a colored space-craft; its technological sophistication will be reticently clad in weathered grey cypress siding with white trim similar to the neighboring balloon frame cottages. Certain of those Twenties' houses will become part of the museum complex, serving as restaurant, staff offices, grounds maintenance and energy buildings. A freestanding 120-seat lecture hall will also be built. The dispersal of satellite structures around the main building and the fact that the volume of that structure will be broken up with covered walkways and garden courts should provide an inviting environment for the prospective visitor. Automobiles will be consigned to separate parking gardens screened by plants. The museum will be reached by a path through plantings and small buildings in an ambiance much like that of a village street. If the Beaubourg is antithetical to its neighborhood, the Menil plan acknowledges a tenor of life in the area which it would like to preserve—a quality which will be conducive to a meditative atmosphere.

The arrangement of the Menil interior will invite selective, leisurely viewing. Exhibition rooms will be cut, as Piano describes them, "on a domestic scale" varying in size, ceiling height an level. Relatively few works will be displayed given time. Storage space will be along the side in a second level 'treasure house.' The tect hopes to avoid the atmosphere of con ism that sometimes comes with crowded ga

In plan, the Menil Collection will have ab same size footprint as the Beaubourg, but it will be a much smaller area. The groun repeats an idea used in the Beaubourg: a promenade, the "living room" of the museu serve for circulation and provide access to "pockets" designated as a reception area, video room, and exhibition galleries. A axis completes the communication core in aimed at simplicity, efficiency and reduced nance costs. The conservation floor will be into sectors tailored to the requirements various media. Curatorial staff and scholars

DAVID CROSSLEY

:o see with ease all of the collection not exhib-
on the ground floor. Paintings will be hung
-fashion in study rooms; three-dimensional
s will be stored in glass cases.

spect for and continuity with the past will not
the Menil from being a modern building.
gh unobtrusive in appearance, it will employ
ıewest technology in matters of structure,
:enance, security, conservation and lighting.
he lighting system that has received the Piano
s special attention. Its unique character is a
ımental component of the architectural con-
The aim has been to maintain a range of
al lighting, "to make it possible to feel the
ıanging," with fluctuations to be kept within
ards acceptable for conservation.

: process has been an evolution toward sim-
'. Piano's tools have been technological: his
has studied solar boxes simulating angles of
the sun in Houston's latitude and utilized computer analysis of external light reverberation and the internal refraction of light levels within the building. Added to these studies were experiments with structural materials that have produced an element called a "leaf," a device for modulating both artificial and natural light. These leaves are of varying thickness cast in one-inch ferroconcrete and suspended from a truss system of ductile iron. Four such elements will regulate light admitted through a glass platform into each exhibition bay. Not every bay skylight will be of equal translucency; some may be made opaque according to the requirements of certain exhibition spaces. Leaves will be continuous in color with the white dry walls so they will not act as a distraction. The sculptural character of these lighting devices reflects the architect's belief that industrial technology can reproduce such units.

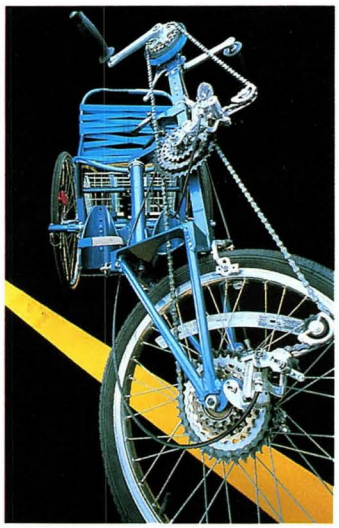
The Menil will be exceptional among new art museums not only because it will expose a private collection and, hence, the sensibility of one family, but also because central to its character is a singularly sympathetic collaboration between artist and patron. The museum will reflect their energy, their patient method and a concern for the human community conditioned by an international purview. Houston is not Paris. Georges Pompidou would find none of the disdain for the automobile here, none of the aversion to skyscrapers for which he reprimanded the Parisian establishment. The city of mission control is very much a 20th century city, vital and burgeoning. It will be an interesting paradox if a quiet, meditative place should prove to be one of Houston's most important buildings.

Jean Turner is an associate professor of art at Texas Wesleyan College in Fort Worth.

Paul MacCready's Bionic Bat in flight

PERSONAL MODES OF TRANSPORTATION

In transitory USA, a nation of wanderers, few values are as cherished as our mobility. As the technological revolution gathers momentum, our freedom to travel enters a new realm. New Personal Modes of Transportation (PMT) offer flight without airlines, travel without Detroit, options without oppression. ◖ Due to innovative technology, we are moving towards lightweight, ultra-efficient machines—mechanical extensions of ourselves. PMTs with designs and shapes that gently mold man's form to harmonize with nature ask little and return much. Whether powered by the sun, human energy or gasoline, PMTs exhibit appropriate alternatives to individual mobility. Growing interest in personal transportation, either self-propelled or using small amounts of fossil fuel, comes as we question our mass-produced lifestyle. Like growing our own food or working at home, PMTs symbolize a move towards a more rational, individual life. ◖ How these vehicles will affect the average American remains to be seen. Will future housing incorporate miniature runways or heliports? Will tiny, sanitary pedal cars be driven right into the home where they will generate pedal-powered electricity? Certainly, a drastic change is taking place, as evidenced by the PMTs which follow.



35-pound New England Handcycle

BY MAUREEN COSTELLO AND ROBERT COTTER

Left: The Titan wheelchair and Robert Cotter's PMT

Human Powered Vehicles
High Speed Bicycles

Aerodynamics unheard of when the modern bicycle appeared, are responsible for sending people pedaling off in new machines at 55 miles per hour! Reclining seats and an aerodynamic shell greatly expand our cycling abilities.

Utilizing techniques involving wind tunnels and computers, new materials such as kevlar (the same lightweight material used to make bulletproof vests) and graphites, inventors are expressing imagination through innovation. At the Laguna California Prix, these "rolling sculptures" inspired artist Dion Wright to remark, "This is the highest form of art—beautiful, functional and environmentally sound."

The Bionic Bat is pedalled like a bicycle

Exotic almost to the point of erotic, these shapes evoke giggles from children and inquisitive stares from General Motors engineers. The pleasing designs appear futuristic yet somehow familiar, with a timeless quality achieved in their attempt to imitate (rather than dominate) nature.

As physical limitations and barriers are stretched, practical applications for Human Powered Vehicles (HPV) expand. One wizard's self-expression could become humanity's magic carpet. Imagine highways accommodating five times as many HPVs as cars without damage to the earth or its inhabitants. In accidents, the plastic HPV bodies would bounce off one another like bumper cars. For the status-seeking individual, this new world sportscar conveys an image of environmental concern and a physically fit body. It's quite possible that in the future, the phrase "all things move in cycles" will have more than one meaning.

The California Commuter

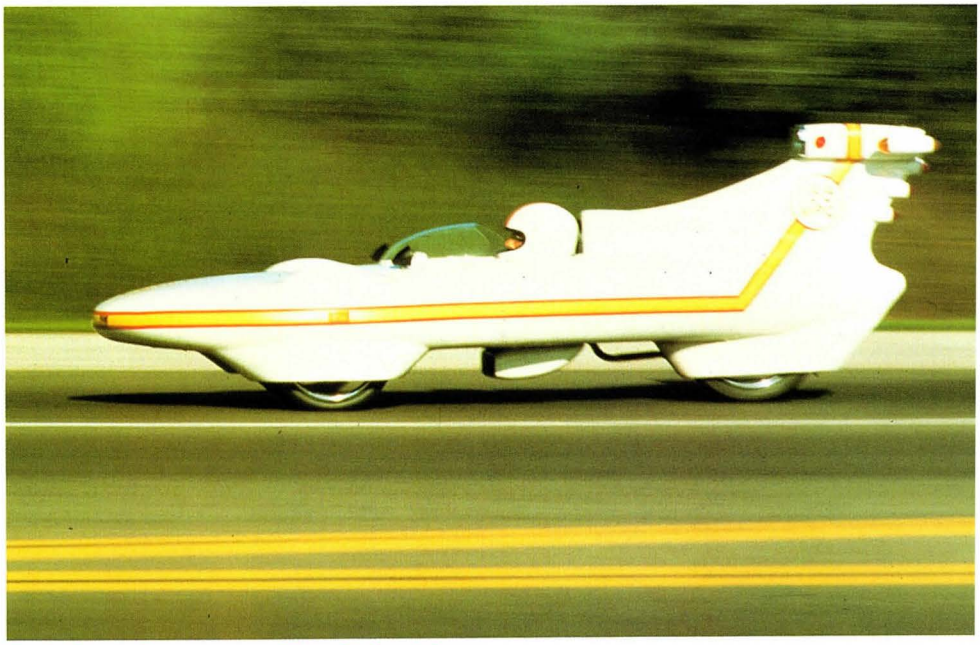
Doug Malewicki is a designer whose medium for expression is transportation. His "California Commuter," a tear drop-shaped car, resembles a symbol from an ethereal dimension—it's easy to imagine George Jetson piloting one from asteroid to asteroid.

However, this image-provoking form is all purpose. It transported Malewicki at 55 MPH from Los Angeles to San Francisco—450 miles—on less than three gallons of gas. According to those that have driven the California Commuter, it delivers a performance that would satisfy any Alfa Romeo aficionado. The 230-pound, 15 horsepower car accelerates from zero to 60 MPH in just 15 seconds. With its top speed of 82 MPH and its tight handling, this vehicle rides like a race car while setting records for economy.

Polyurethane foam and fiberglass cloth cover the three-wheeled auto, which is ridden in a position Malewicki compares to sitting in bed. With vehicles like this already on the road, one can't help but wonder if our energy crisis is a dream from which we've yet to awaken.

Ultralight Airplanes

In 1949, when François Rogallo ironed out the imperfections of the prototypical hang glider, the sport of soaring was still in its infancy. Even in the Sixties, as daring Californians jumped off mountains, hang gliders were still far from practical.



The California Commuter, an efficient lightweight car

Yet, they were joyous experiences indeed, leaving far below the trivial intricacies of daily life. But this new freedom had its drawbacks, as safety left much to be desired. As progress was made, lighter and larger wing surface areas and double surface sails produced greater aerodynamic advantages. Soon jet pilots were reporting sightings of these moth-like vehicles at altitudes of over 20,000 feet.

Simultaneously, the idea occurred to some backyard inventors that installing a small lightweight motor on a hang glider would allow f free from the whims of nature. These new u light planes opened flying to an even greater r ber of individuals.

Now, with some collapsible ultralights settin in five minutes and requiring only 60 feet of way, practical applications of the sport exp They are finding increasing usage by police partments as surveillance units and on farm crop dusting.

Special accessories enable the planes to tak and land on water or snow. A wide selectic colorful nylon wing foils allow pilots to person their crafts with decidedly artistic overtones.

Bionic Bat
Human Powered Airplane

Jumbo jets replete with meals, movies and dı obscure the primal attraction of flight to man mystery is made familiar. We still gaze envi at birds and wish to fly using our limbs as w But with our poor ratio of weight and su area, human-powered flight was obviously a sion.

And then Paul MacCready designed his dr a human-powered flying machine. Looking

like its earthbound cousin, the high speed bi this is a streamlined cycle with wings. Th pound "Bionic Bat" is nearly twenty times efficient than the gas powered ultralight. Ma kevlar, mylar and polysterene, the Bat need over half a horsepower to remain aloft.

Prior to takeoff, the rider-pilot pedals e through an improvised electric motor fr model airplane. This electricity is stored in nickel cadmium batteries to be used when n

Pioneer FlightStar, ultralight aviation

ng flight. Recently MacCready won Britain's mer Prize of $30,000 for the Bionic Bat's ·essive performance of 22 MPH average over le long course.

acCready, president of the International ıan Powered Vehicle Association, is now cing about a human powered craft with the ty to soar. Rising with the aid of thermal air ents, pedal power would be used for auxiliary ·r and take-offs. With engineering bodhisat- like MacCready, it's evident that the sky is no ·r the limit.

te of the Art Wheelchair

yone has a favorite chair that molds to the . As one sinks into it, one's tensions dissipate ɔne can relax in comfort. What if this were only chair? For the disabled who work, eat ravel in their wheelchairs, a standard model en uncomfortable, slow and awkward. Far being a favorite chair, it is often looked upon ıny as a kind of prison. For years wheelchair ıers did little to correct this image and inad- ıtly gave the phrase "*confined* to a wheel- ' an uncomfortable interpretation.

t Bill Bash questioned why one should be cted to chairs "no more comfortable than the average church pew." Given the go-ahead by the Minnesota company Theradyne, Bash utilized the latest technological developments to create a more efficient chair. Light, compact and comfortable, it offers the disabled a smooth ride and flexibility.

With its pliant back and adjustable center of gravity for varied seating positions, it contours to the body like a Recaro seat. The 16-pound Titann, made of titanium (the same rust proof material used on space crafts), is basically two wheels and a three inch urethane ball upfront for maneuverability. It is narrow enough for airplane aisles and can be folded and stowed overhead.

With its functional beauty and clean, compact lines, the chair looks inviting even to those with no need for it. For those who do, the Titann is the favorite chair for which they have been waiting.

The New England Handcycle

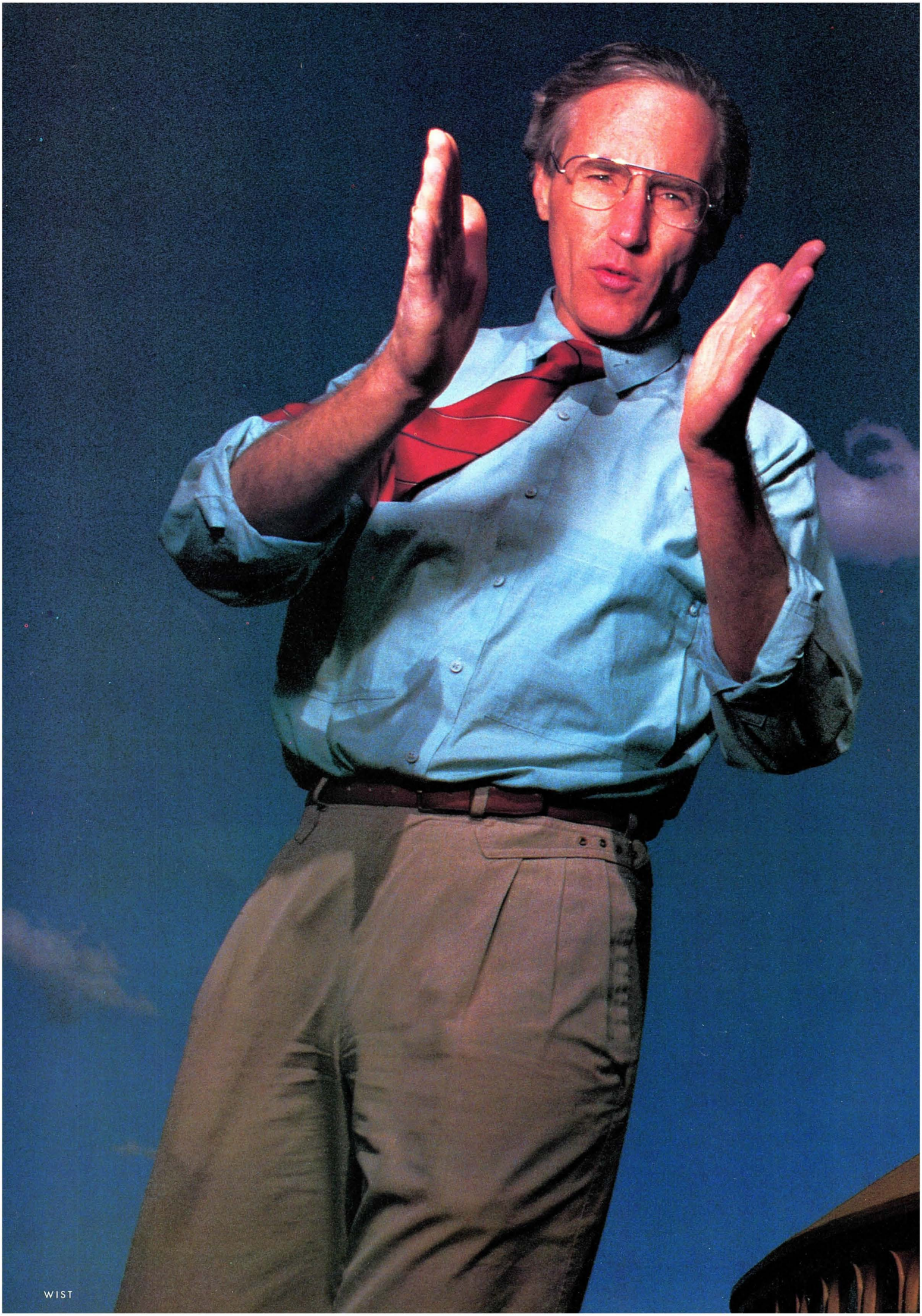
For the handicapped seeking the exercise and freedom of cycling, there's the New England Handcycle, a 24-speed, handpowered tricycle. The 35-pound aluminum vehicle utilizes current bicycle technology such as alloy components, drum brakes and standard bicycle derailleurs.

Created by Bill Warner, an avid cyclist before a spinal cord injury put a stop to his participation, the trike originated as part of his senior thesis at MIT. After graduation, he and craftsman Chris Hager began producing the "wheelchair user's bicycle" in his basement. The machine cruises at speeds of about 15 MPH and remains quite stable going downhill at up to 35 MPH. During the "Arms Race" segment of the 1983 Human Powered Speed Championships, Rory McCarthy, a disabled athlete, achieved 23 MPH in the handcycle on level ground.

Aside from pure, non-polluting pleasure the trike rolls over stereotyped perceptions of the disabled. Often observers are so delighted by the cycle they don't realize the rider is handicapped. They see an athlete—not an invalid. "How often do people come up to a handicapped person and say, 'I really like your wheelchair'?" Warner asks.

As inventors utilize today's technology, they demonstrate the ability to synchronize science with nature. These individuals see no need to ravage the earth when she poses so few real obstacles. PMTs are not machines for the masses yet, but they are being used by individuals now, and symbolize another step in our journey to self-sufficiency.

Maureen Costello and **Robert Cotter** are freelance writers.



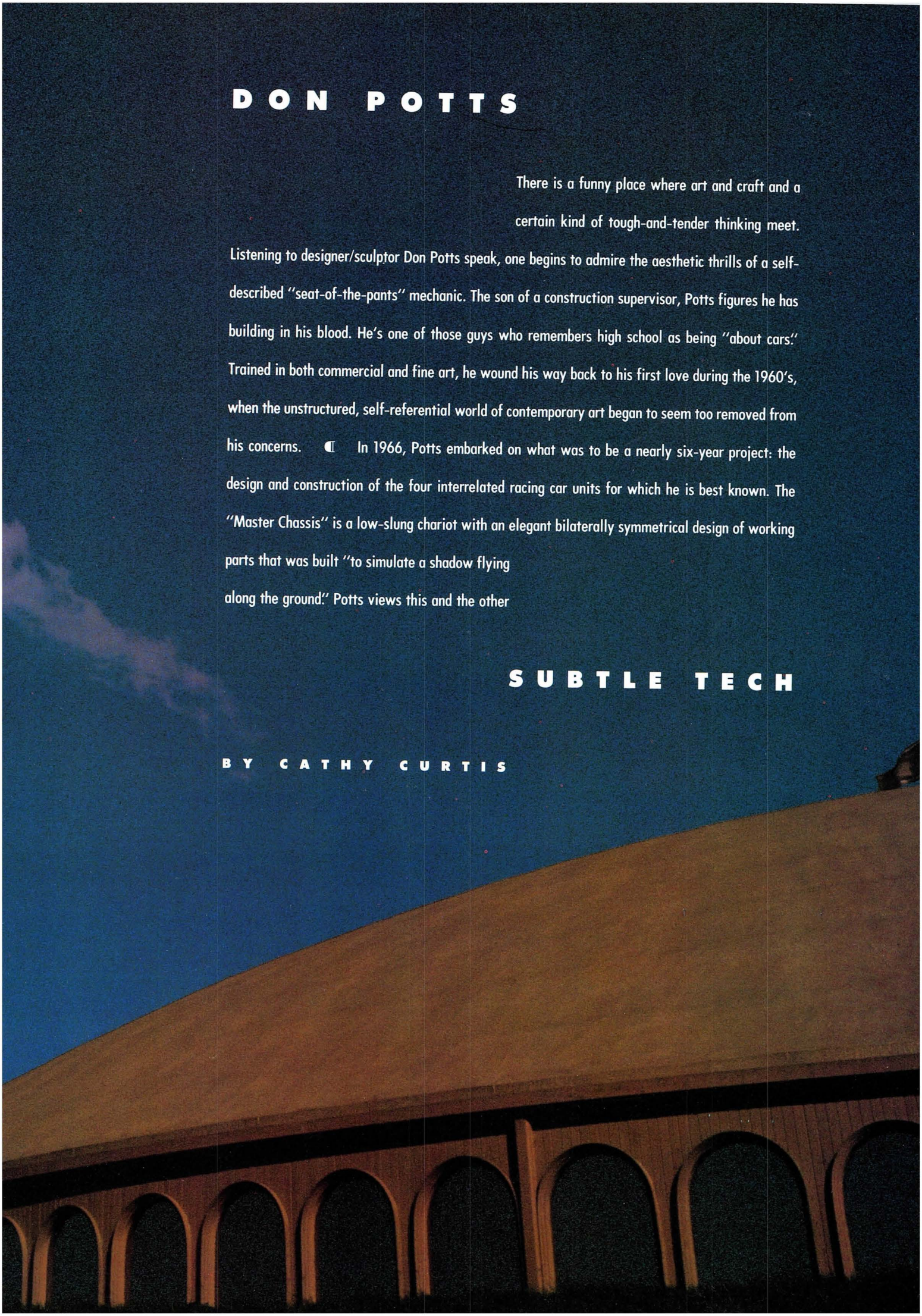
WIST

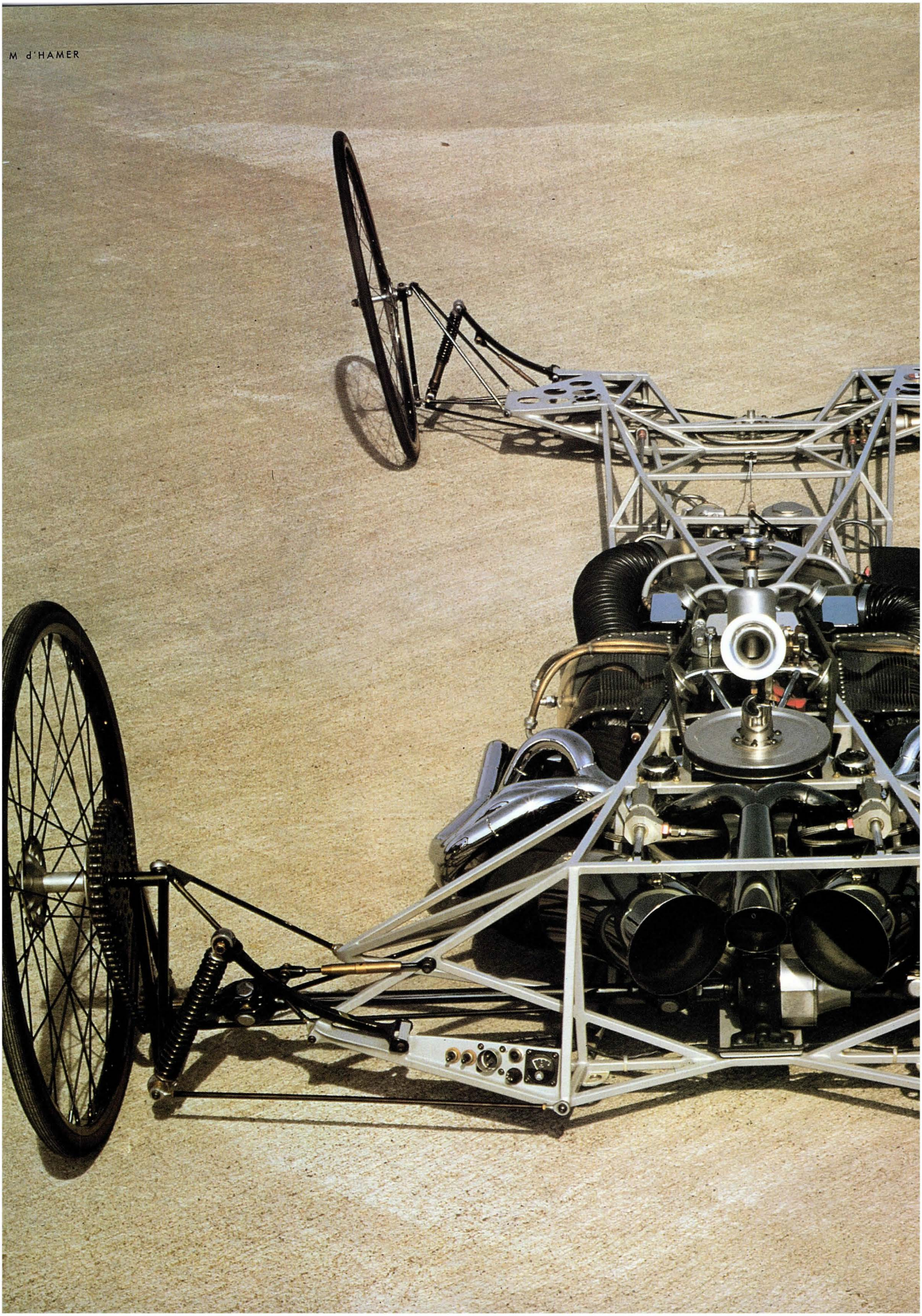
DON POTTS

There is a funny place where art and craft and a certain kind of tough-and-tender thinking meet. Listening to designer/sculptor Don Potts speak, one begins to admire the aesthetic thrills of a self-described "seat-of-the-pants" mechanic. The son of a construction supervisor, Potts figures he has building in his blood. He's one of those guys who remembers high school as being "about cars." Trained in both commercial and fine art, he wound his way back to his first love during the 1960's, when the unstructured, self-referential world of contemporary art began to seem too removed from his concerns. ◐ In 1966, Potts embarked on what was to be a nearly six-year project: the design and construction of the four interrelated racing car units for which he is best known. The "Master Chassis" is a low-slung chariot with an elegant bilaterally symmetrical design of working parts that was built "to simulate a shadow flying along the ground." Potts views this and the other

SUBTLE TECH

BY CATHY CURTIS

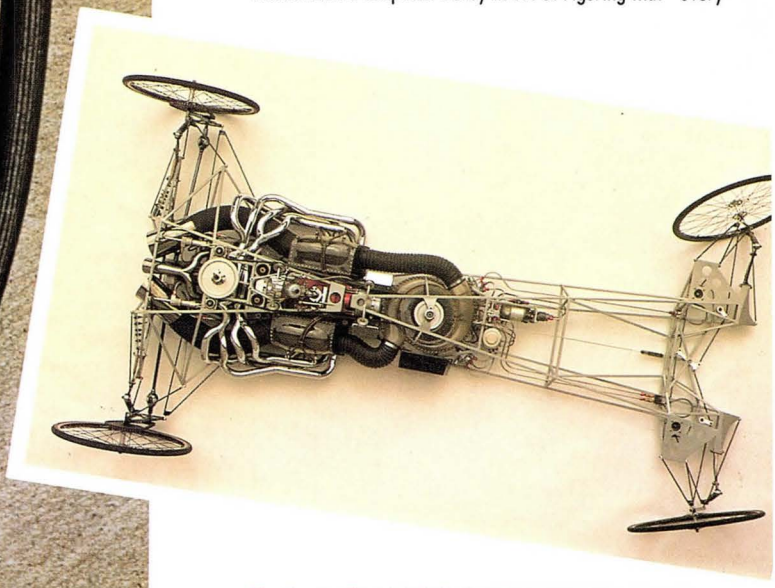



M d'HAMER

cars as "internal organs with the skin removed;" the four chromium pipes on either side are suggestive of ribs ("encasing, overlapping and protecting certain softer and more delicate parts below"). The "Basic Chassis" is a spare spruce wood skeleton, initially designed to support an accessory body of fabric and wood. Potts later designed another body made of light-gauge stainless steel tubing woven into a membrane and wrapped in translucent white dacron. The fourth component of the series is made of stainless steel, with curved blades that act as "spoilers" or air deflectors. (The set will be included in the *Automobile in Culture* exhibition at the Museum of Contemporary Art in Los Angeles.)

"People ask, 'Is it art? Is it craft? Is this guy a hotrodder?'" says Potts. "I'm making something very correct in a surface reality sense, but at the same time I'm dealing with very subtle things." The cars presented numerous technical problems, all of which Potts managed to solve as he went along. To design the suspension system, he spent an afternoon flipping through *Road and Track* and *Car and Driver* to absorb the basics. Racing cars, Potts explains, have wide, flat tires—"the trick is to keep them on the ground." He knew that the bicycle tires in his models would lean inward on the turns, forcing energy up the spokes. Playing around with cardboard and pins, he devised a geometric pattern that would accommodate the strain without giving way. The idea was to suggest "the visual essence of movement without actually having to prove that it moves." Some aspects of the cars are due to happy accident. When the force of sandblasting deformed the blades on the "Stainless Steel Body," Potts discovered he was able to create graduated curvatures that would be aerodynamically useful. As a child, Potts admits, he never had the patience to finish models or drawings. ("I wanted to take them further and my hands couldn't do it.") Making the cars was a special achievement—"as if I finally finished high school."

Potts also made a car for the San Francisco Museum of Modern Art's Soap Box Derby in 1975. Figuring that "every-



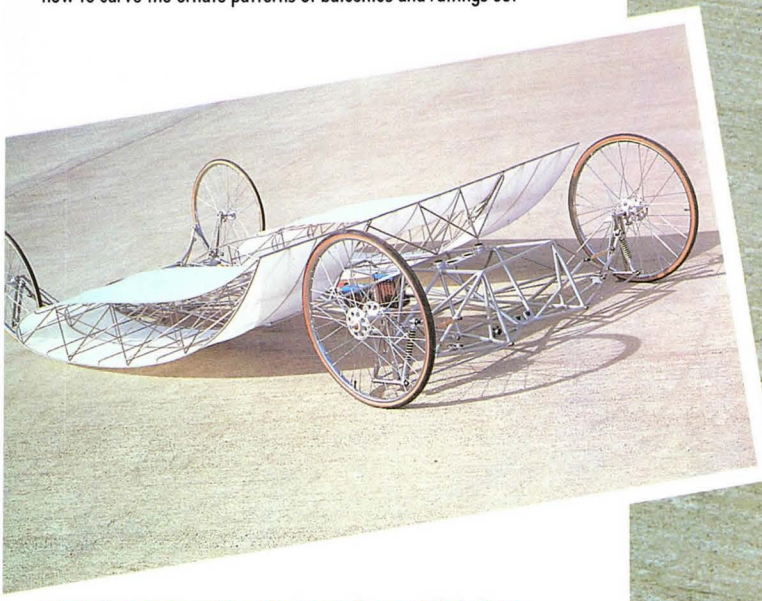
The Master Chassis is full of anthropomorphic elements: exhaust pipes/lungs, struts and frame/skeleton, radio/brain

one serious about being fast would get the best bearings and wheels," he aimed to be "the most slippery" contender by "punching the smallest hole through the air." Stuck with bicycle tires again, Potts worked out a way to "hide behind the tire, turn sideways and pop my head out...twisting the notion of how it could be done." Photographs show the artist, a lean six-footer, encased in the slender bubble of the car, his racing number printed sideways on his shirt to be read right-side-up.

Today, Potts is rueful about the time, expense and amount of manpower it took to complete the racing car units. He did very little else during those years, and worked with no hopes of financial return or bouquets from the art world. Yet the seemingly endless nature of the project and the need to convey his ideas to many assistants appealed to another side of him. Potts moved out of the Bay area last year to join the community at Maharishi International University in Iowa, where he had previously been a visiting artist. He looks back on such collaborations with the fervor of one who believes in the natural power of ideas radiating from one person to another.

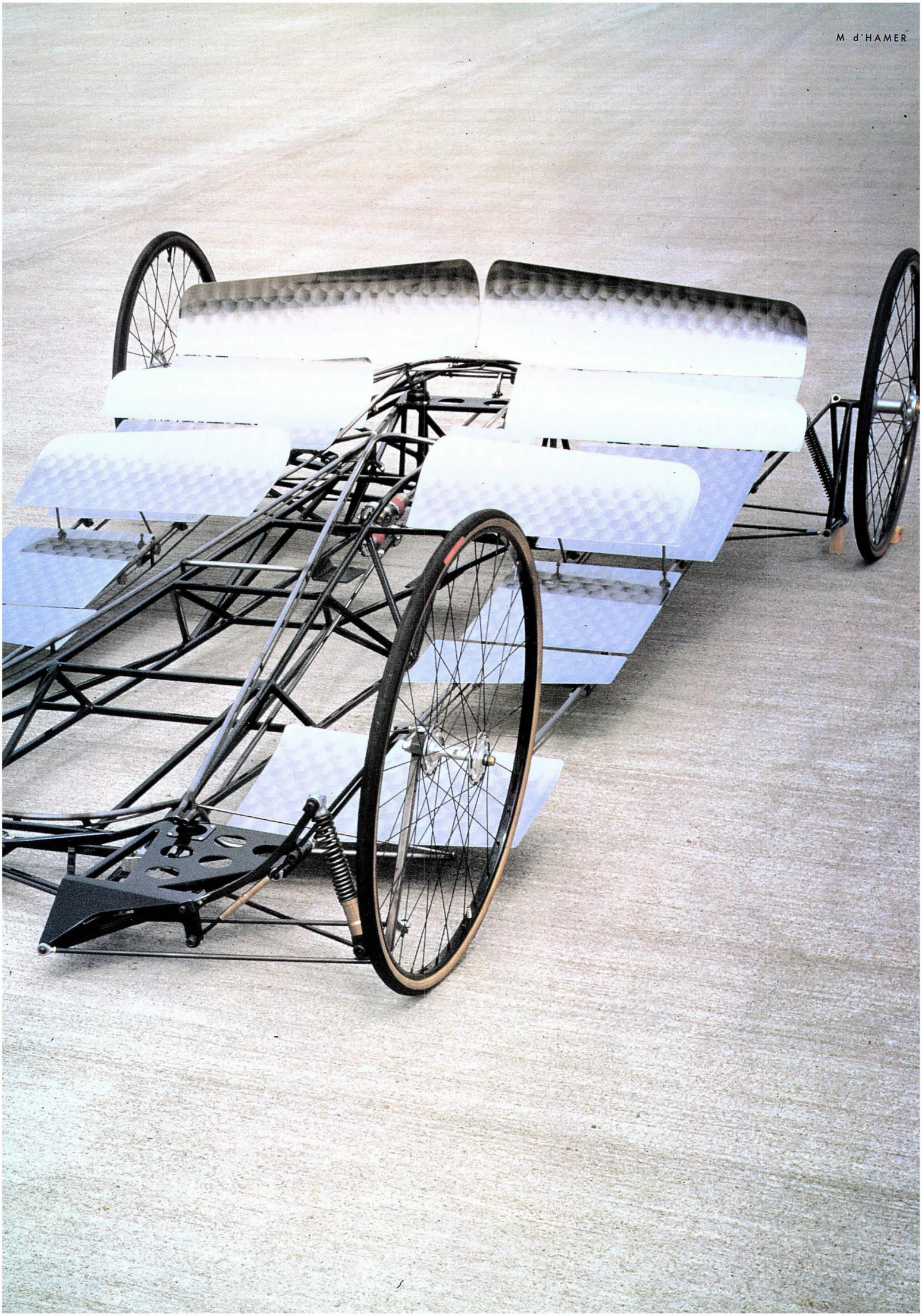
His most recent team project was to design and build a group of wood models of familiar San Francisco sights. Commissioned by Skidmore, Owings & Merrill, his work would be exhibited in *AIA SF 100,* an exhibition at the San Francisco Museum of Modern Art celebrating the 100th anniversary of the AIA in the city. Potts had 16 assistants, most of whom had never worked with wood, and many of whom were unaccustomed to miniature-scale manual labor. "Some were very, very slow," Potts admits, "It wasn't an efficient use of the time at all." In conversation, his innate craftsman's sense of frugality occasionally wars with his idealistic notions of community. Yet, he says the model-making was "...really a front for another activity—this beautiful comradeship. I was flowing through these people...We are really one system; we just feel we are separate parts. I happen to be a valve..."

Constructing the models presented a major difficulty—how to carve the ornate patterns of balconies and railings out



Above **The Fabric and Steel Body recalls a model airplane**

Right **The Stainless Steel Body with its steel "feathers"**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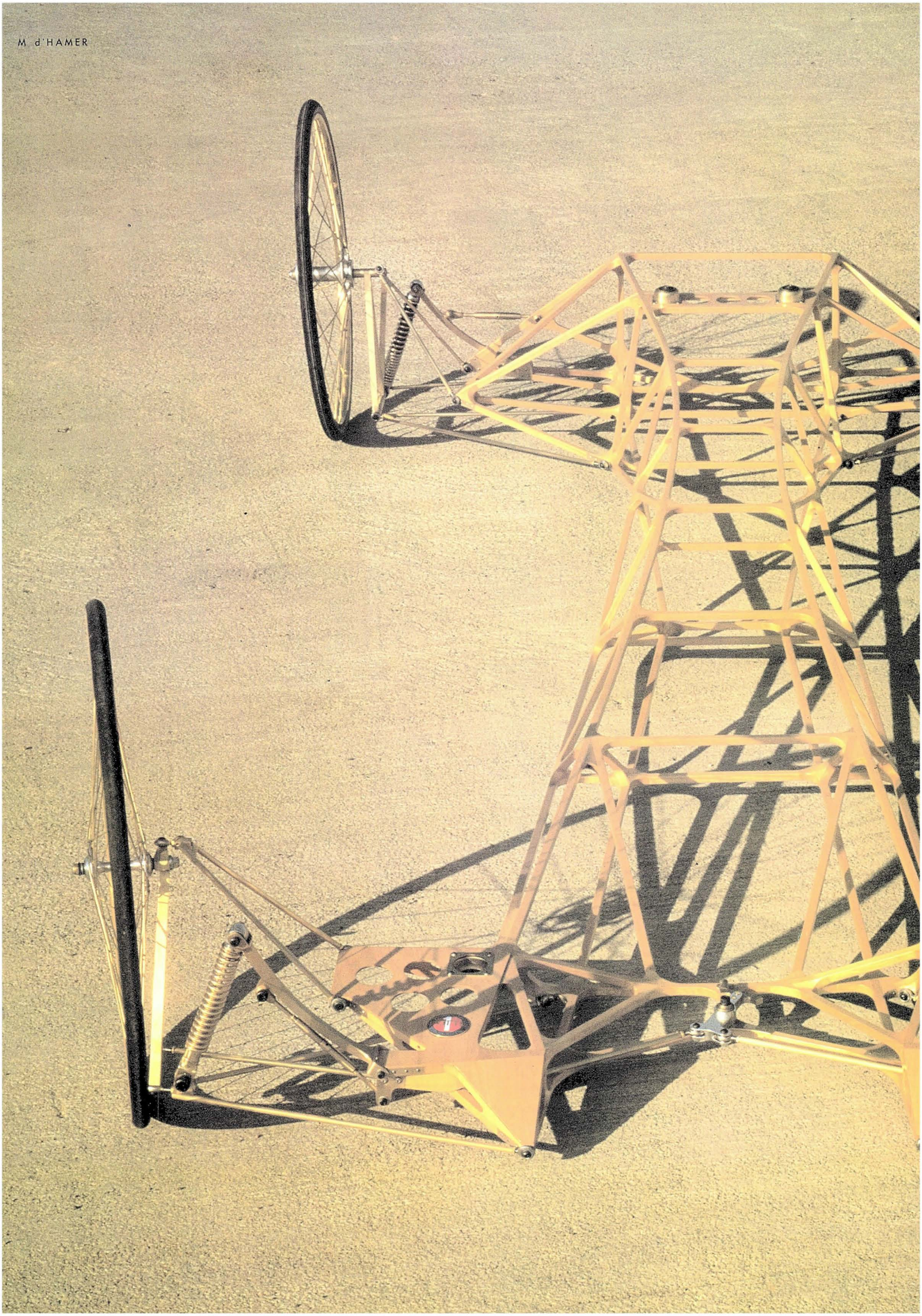
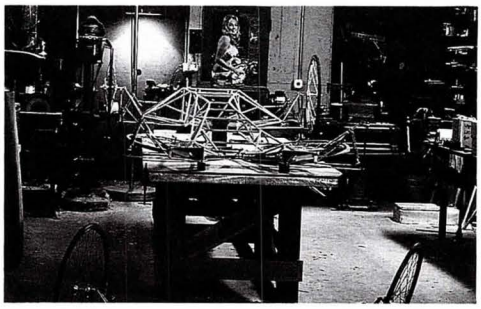


of wood that sometimes was no thicker than 1/32 of an inch. "I took the job not knowing how to solve it," Potts says. Typically, he was unwilling to fake the look of wood with molded plastics. Talking with friends, he wondered how novelty store items with intricate patterns were made. A toymaker explained that the fancy cuts were made with lasers. Potts had him adapt the process to create flat parts that could be overlapped to create an illusion of three-dimensional form. ("It's very simple—like using a stencil.") With the laser, excess wood would vaporize without jarring the delicate design. Once each pattern was made, it could easily be reproduced, saving a great deal of time. Even so, Potts began dreaming of new complexities, such as building a "subtle wood mosaic" to simulate the reflections of buildings seen in the glass surface of the Hallidie Building. The idea was later abandoned because it would interfere with the integrity of the models.

Potts feels that his work can be more rewarding to the viewer on a certain level than an incomplete perception of a painting. "With a very fine painting, you say, 'Oh, look at that beautiful painting,' and the whole thing is finished...but if you walk up to something and you can't quite grab it"—"Your mind becomes lively and undirected," interjects his wife, Suzanne—"the letting-go process begins to happen. Maybe you actually see something unexpected instead of seeing what you want to see..."

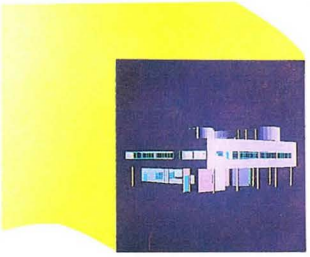
Potts is currently designing an unusual house/studio for himself. "I'm trying to design the space like a great nozzle, to lure energy the way you catch an animal," he says. Listening to him rhapsodize about the way two curving walls meet ("that beautiful mitre...like the inside of a shell, the feeling you're in mother-of-pearl, almost like a baby's bottom..."), one sees how Potts' influences—the art training, the builder's eye and the transcendental worldview of the Maharishi—merge into an unexpected harmony. For Potts, sculpture is "a group of materials with the thread of life running through them." He wants to harness the "power" of form to effect positive change in the world. "That's the technology," he claims. "Technology on the highest, subtlest level. It becomes subliminal. Instead of 'high tech,' it's 'subtle tech.'"

Cathy Curtis wrote about museums in *Arts and Architecture*



Left The Basic Chassis suggests the skeleton of a mythical beast; clear spruce wood emphasizes its clean geometry

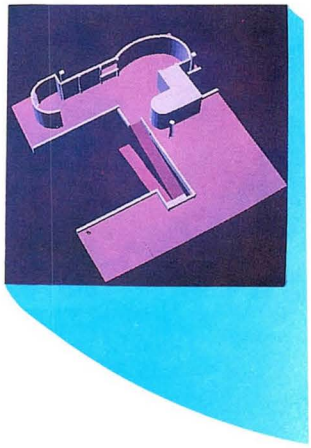
DEBORAH MEYERS

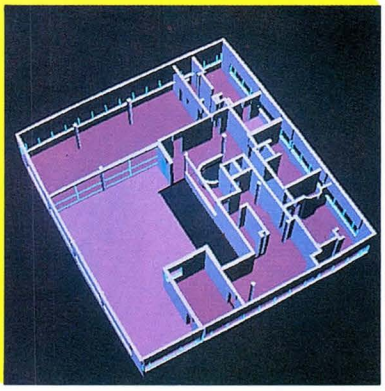


WILLIAM MITCHELL

Computing The Forms Of Things Unknown

erybody knows, by now, that you can duce graphics very rapidly on digitally-trolled devices...cathode ray tube dis-ys, pen plotters, laser printers, and the . This possibility has actually been with or a long time; there was a cathode ray e graphic display device on MIT's early irlwind computer in the 1950's, and the fornia company Calcomp (now joined nany competitors) has been making digi-plotters for decades. Over the last few s, though, the cost of producing com-r graphics has dropped precipitously, e the quality that can be achieved has rising. Computer graphics are now





being closely allied with other powerful technologies: scientific and medical image processing combines computer processing with video and scanner technology, videotex and graphic teleconferencing combine it with digital data transmission, and electronic publishing combines it with word processing and new printing techniques. Within a few years, most of the graphic imagery that you see will be computer-processed and produced on computer graphics output devices. We are experiencing a quiet but massive revolution much like that which took place in medieval Europe when the printed book began to replace the hand-produced manuscript.

Computer graphics are not merely the digital control of high-speed drawing devices, though. It is also use of a computer to execute many of the operations that are involved in the synthesis of an image. Some of these are very elementary: inserting and erasing lines or patches of color, for example. Then there are geometric transformations: translation, rotation, reflection, scaling and various kinds of deformation of drawings and parts of drawings. You can transform color, too, by shifting hue, or varying saturation or brightness.

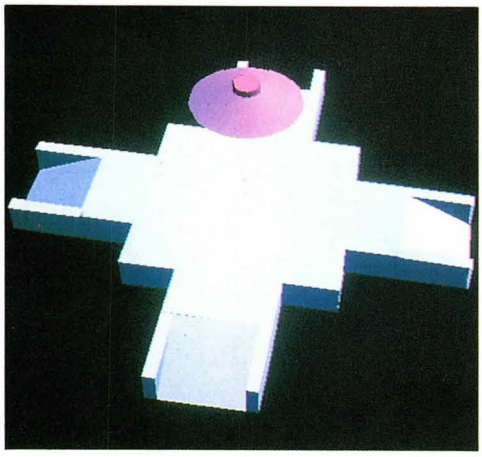
An interactive drawing processor is a computer system set up to allow one to construct and edit a drawing using some set of these operations, to store it, and eventually to produce a final copy—just as a word processor provides facilities for input and editing, storage, and production of text documents. Two basic kinds of drawing processors have emerged. A drafting or two-dimensional CAD system handles large, complex, high-resolution line drawings (such as architectural working drawings), and usually produces final copies on a pen or electrostatic plotter. A paint system handles drawings composed of areas of tone or color on a faster CRT display. The display might then be recorded photographically, or on videotape or disk, or it might be reproduced on some kind of printer. Increasingly, cheap personal computers will offer both word processing and drawing processing capabilities. (The Apple Macintosh is the first to do so in a reasonably sophisticated and useful way.)

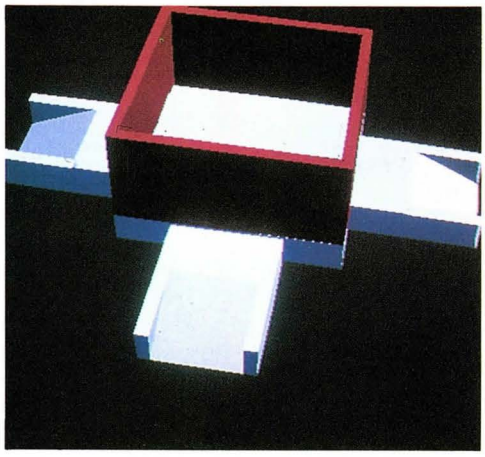
Two-dimensional graphics may, of course, be an end in itself, but in many fields (architecture in particular) drawings are made to represent three-dimensional physical objects. Here the computer has another use; we can use it to handle three-dimensional digital models rather than two-dimensional drawings. A three-dimensional digital model is much like a cardboard working model, except that it resides in computer memory. Just as on can photograph a cardboard model from different viewpoints, one can automatically generate displays from a digital model, in perspective, orthographic, axonometric or other projections, and from any specified viewpoint. Sections can be cut at arbitrary planes, too. When a cardboard working model is assembled, operations of selecting, reproducing, shaping, combining and spatially locating three-dimensional elements are performed. Similarly, a three-dimensional digital modeling system provides analogous operations for constructing and editing digital models of three-dimensional compositions. These operations are specified at a computer graphics workstation, and the results appear (in two-dimensional projections) on the screen display.

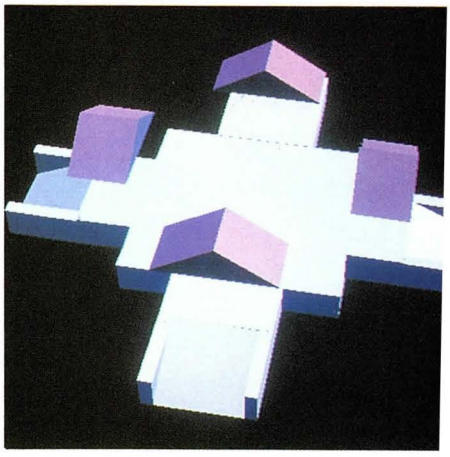
A lot of things can be done with a digital model. One, as I have already noted, is to produce projections and sections as required in the design process. If you just have very simple software to project lines from three-dimensional space onto a plane, then you get a wire-frame rendering. More elaborate software can allow one to specify surface qualities (opacity or transparency, color, reflectivity, texture), and produce displays in which hidden surfaces are removed. A further step is to model the characteristics of light sources (position and direction, color and intensity, concentrated diffuse), and use very complex (and still very pensive) ray-tracing software to render effects shading, cast shadows, color, texture, reflecti transparency and diffraction with the utm fidelity. This kind of modeling is generating a n curiosity and excitement about light and surf that recalls the fascination it had for Van Eyck a Vermeer. And we need only recall the Corbus play of "masses brought together in light" to re ize where it can take architecture. Few of us h the time, and even fewer have the skills, to stu light on surface by making careful watercolor w renderings, but computer graphics is giving dimension of design back to us, and in a va more sophisticated way.

Another possibility is the production of a c puter-generated animation that renders the ex rience of moving through a building. (I can't h wondering what Siegfried Giedion would h thought of that.) Some arcade video games you the effect of this in real-time; you control motion with a joystick, and blast oncoming ir ers as you go. Flight simulators used for training are rather more elaborate, realistic expensive versions of the same thing. The putational demands made by real-time anim are enormous, so relatively inexpensive real animation tends to be very crude and lin while realistic real-time animation of con three-dimensional scenes is hugely expensiv ther way, real-time animation technology i yet of much use to architects. But it *is* increa feasible to produce computer-generated ani film and videotape of movement throug around a building.

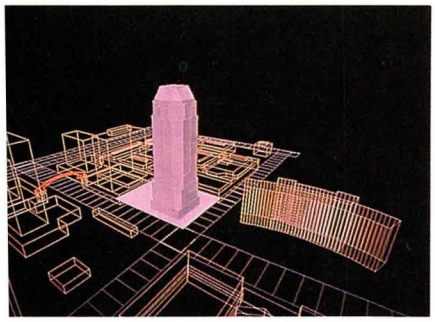
Since a three-dimensional digital model, propriately constructed, can be a consisten ambiguous and relatively complete represen of a building, one can also analyze it. If one h appropriate software, one can automatically

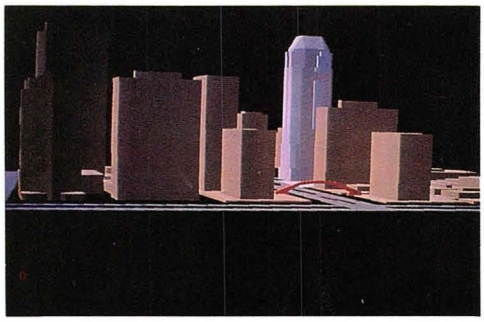


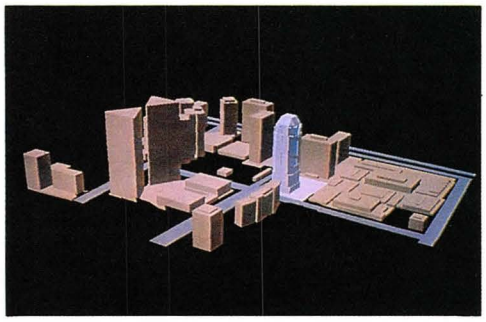




In learning to use the computer, UCLA architecture students "compose" Palladio's Villa Rotunda by duplicating its component volumes

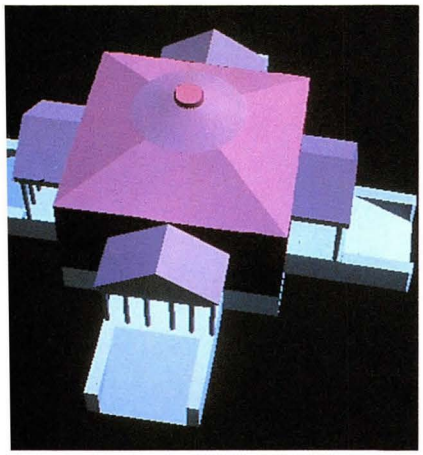






Computer-generated perspective drawings illustrate the changing visual impact of Welton Becket Associates' proposed Century City high-rise

ıantities and generate cost estimates, and ıce analyses of structural performance, ther- erformance, and so on. Notice how this inte- the spatial and visual side of architecture he engineering and cost control side. Since ssance architects identified design with ıg while Galileo was discovering how to cal- beam sizes, the two sides have diverged. ects and their engineering and cost consul- vork with different media, and tend to have



ıt skills and values, and the integration of and technical subjects is an endless source ble in schools of architecture. But a good ystem, built around a three-dimensional building modeling capability, changes the ıd rhythm of the architectural design process, and the way that information is brought to bear on design decisions, so that the two sides are reunited. In the trial-and-error process of design, the input and editing facilities of the system can be used to define or modify a design alternative very rapidly, its visual simulation facilities can explore spatial and visual qualities, and its analysis facilities can tell one immediately whether critical cost and performance targets are being met.

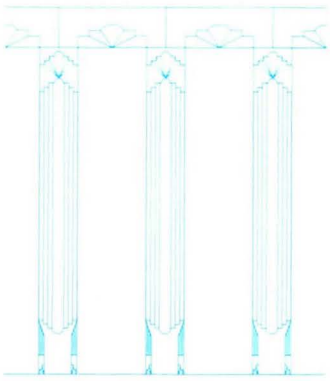
Don't get too excited just yet, though. Although the CAD industry is booming (there are about 80 vendors of CAD systems in the U.S., the industry has had growth rates of around fifty percent per year, and annual sales are around a billion and a half dollars per year), the systems that are available right now tend to be too expensive for most architects, and to be essentially two-dimensional drawing production systems rather than real three-dimensional design systems. This will change, and quite rapidly too, as successive generations of computer processors and memory chips reduce the cost of computer hardware further and further, and as successive generations of CAD software get better and better. But for the moment, a typical architectural CAD system is likely to be found in a large office that does highrise, commercial, industrial or hospital work, and is likely to be used mostly for production rather than design.

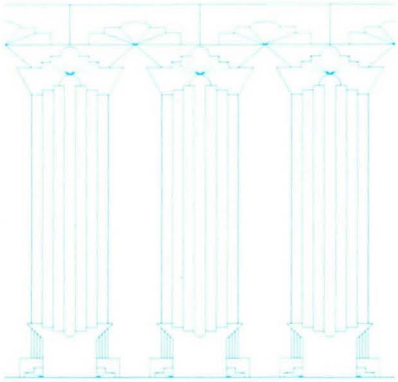
A more subtle problem is that very few good designers have not yet had much hands-on experience with good computer graphics systems, so an understanding of the characteristics and potentials of the medium has not yet become part of the culture of architecture, and the medium is rarely used fluidly and confidently. Computer graphics is not a medium, like watercolor, that requires highly developed hand-eye skills, but it is intellectually demanding (at least if you want to do something that is not trivial and boring). You must learn to understand drawings (or three-dimensional compositions) in terms of computational constructs, and to use computational constructs to put drawings together. Digital music synthesis is similar, incidentally; hand-eye performance skills get eliminated, but musical structures must be understood in computational terms.

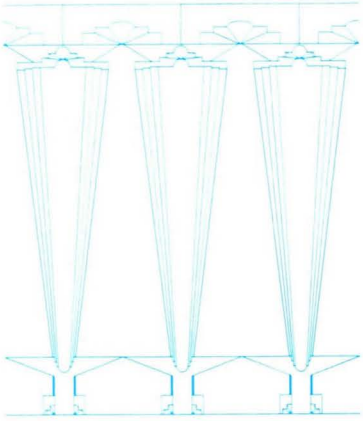
The best way that I know to develop the necessary understanding is to write simple computer programs to generate drawings of interesting buildings. One can think of this sort of programming exercise as the 1980's equivalent of the Bauhaus introductory design exercises. It teaches one how to think computationally. It also teaches one a lot about architectural composition; every teacher of architecture knows that one must draw a building carefully in order to understand it fully, but one will understand it at a deeper level again if one writes a concise and elegant program to generate the drawing.

The grand and wonderful Renaissance intellectual synthesis, that assimilated design to *disegno*, is

Continued on Page 71







Students in Charles Jencks' design studio used the computer to manipulate column designs

COMPUTER ART

BY TONY LONGSON

Equilibrium, Alvy Ray Smith

Sometimes, working with new materials or media can generate fresh ideas. At other times the idea may come first, and the artist will look for an appropriate vehicle to make the idea visible. Either way, computers hold a great potential for creative activity: they are a medium, a process, and a generative source where the ideas that they spawn may have a direct visual equivalent. In short, they are a very powerful tool for the artist.

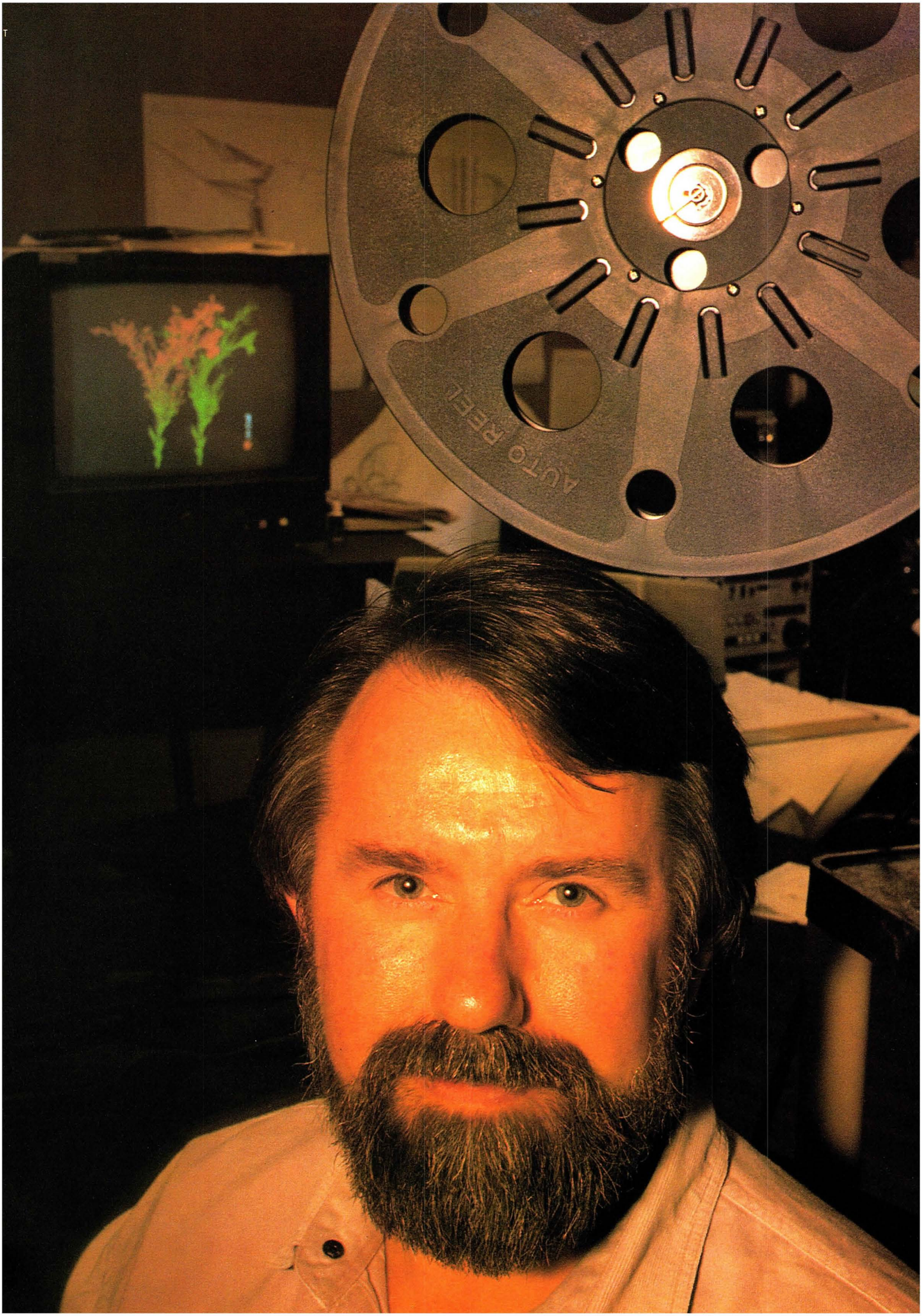
Alvy Ray Smith from Lucasfilm and James Blinn, from the Computer Graphics Laboratory at the Jet Propulsion Laboratory, are scientists and programmers who have produced some exquisite computer graphic work. While there are valid commercial reasons why realism should be such a desirable goal in computer graphics, it is interesting to note that historically, many media have tried to establish value through their ability to realistically depict the world. Ironically, early photographers were so able to "duplicate" reality that they made their work acceptable by photographing the kind of still-life groups that were the stuff of contemporary oil paintings.

Blinn's elegant simulations of space are accurate physical models of space and time, which depict the planetary encounters of Galileo and Voyager on their journeys through the solar system.

Whereas Blinn works pretty much alone, Ray Smith heads a team of scientists, programmers and artists at Lucasfilm who collaborate on productions. While the contributions of these

White Sands (1983), Alvy Ray Smith of Lucasfilm, Ltd.

With · Without, Alvy Ray Smith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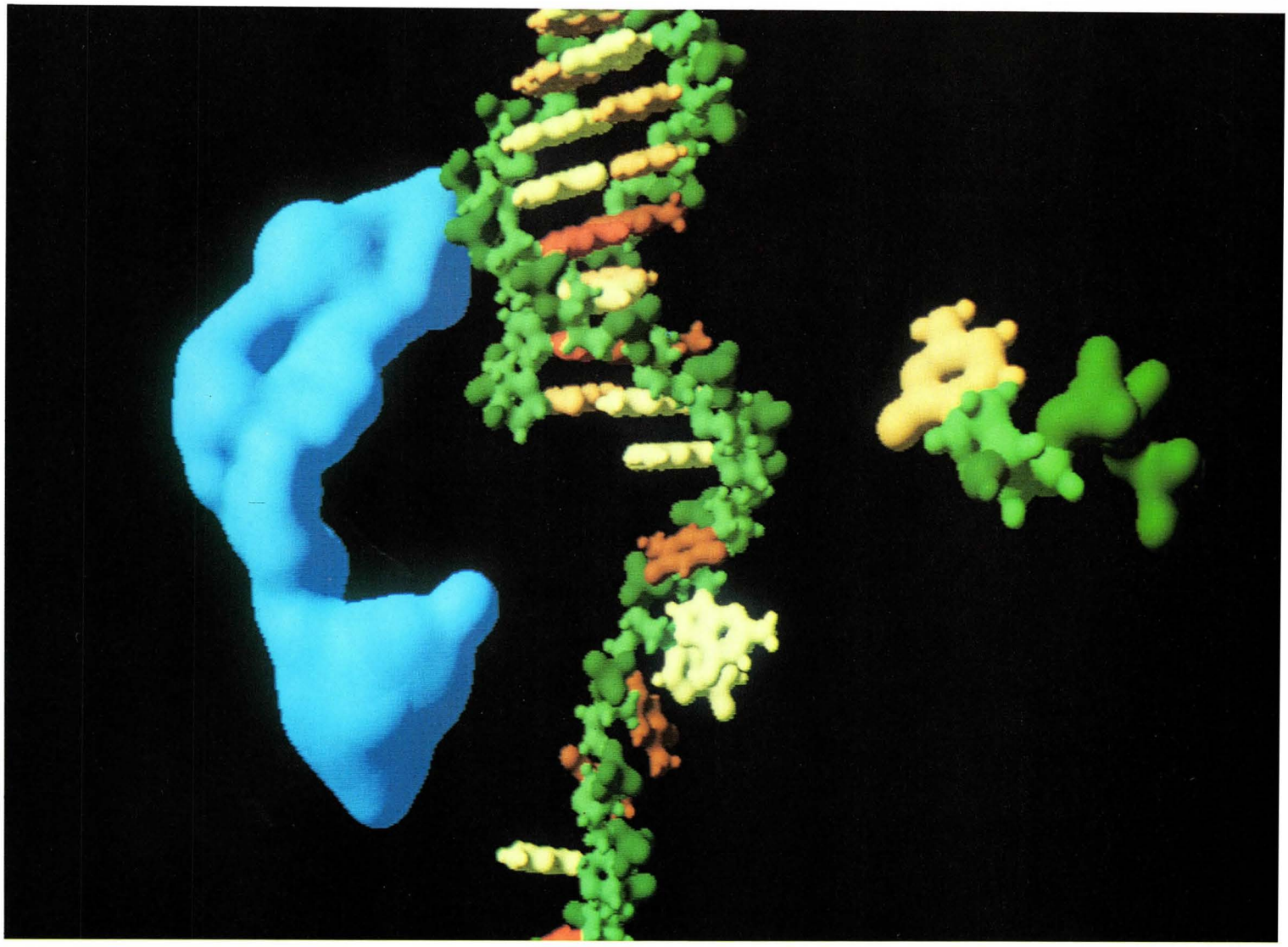


people is more or less equal, a parallel with the Renaissance studios can be drawn, where the master would share the task of a large fresco with his apprentices who, based on their expertise, would take responsibility for a particular area, such as sky, or drapery, or hands.

Just as the Renaissance had its patrons, Bob Holzman has, over a decade, guided developments in computer graphics that have crossed the boundaries between science and art. Holzman is head of the computer graphics lab at JPL, and Dean of Letters and Sciences at West Coast University in Los Angeles, where he has established a vigorous "artist in residence" program.

Max Almy is the artist most recently associated with the university. She established her reputation in the 70's with video/installations and performance works such as "Modern Times." Lately, she has produced single-monitor video pieces, called "Leaving the 20th Century" and "Perfect Leader," which are laced with humor and satire. Almy tests the limits of the medium, and it is no surprise that in recent work she should start to explore the capabilities of computer graphics. There is still a significant gap between the two technologies; it is a requirement of video to generate or change images in real time, whereas a computer-generated image can take many hours, depending on its complexity. It is true that the technologies are getting closer, but at the moment they meet most comfortably in the post-production phase.

Early exhibitions of "computer art" had more of a novelty value than anything else. "Cybernetic Serendipity" was probably the first such show. Held at the London Institute of Contemporary Arts in 1968, it was a demonstration of advances in technology rather than the arts, though there were artists around at that time in whose work the computer played a significant role; for instance John Whitney in California and Peter Struycken in Holland. Now, of course, there is a large number of artists using computers, and I expect that in a few years it will no longer be remarkable that such technology has a place in creative activity.

The photographs of Rebecca Allen's work are still-frames from an animation. Allen is concerned with human movement, a problem which represents a significant challenge to computer graphics. She uses programs developed at the New York Institute of Technology by Bil Maher and C Burwell which simulate the movement of a bo space. Allen directs this figure on a compute play screen. She can determine the attitude a positions in a sequence of movements, and h program fill in the motion in betwee "Catherine Wheel," Allen collaborated with Tharp to produce a filmed ballet on the story Catherine. The dancers seem to share the with Allen's St. Catherine, who moves with a earthly grace. Her figure is transparent, a surface of her body is composed of hundr short lines which occasionally dissolve into ing, and then aggregate in another form.

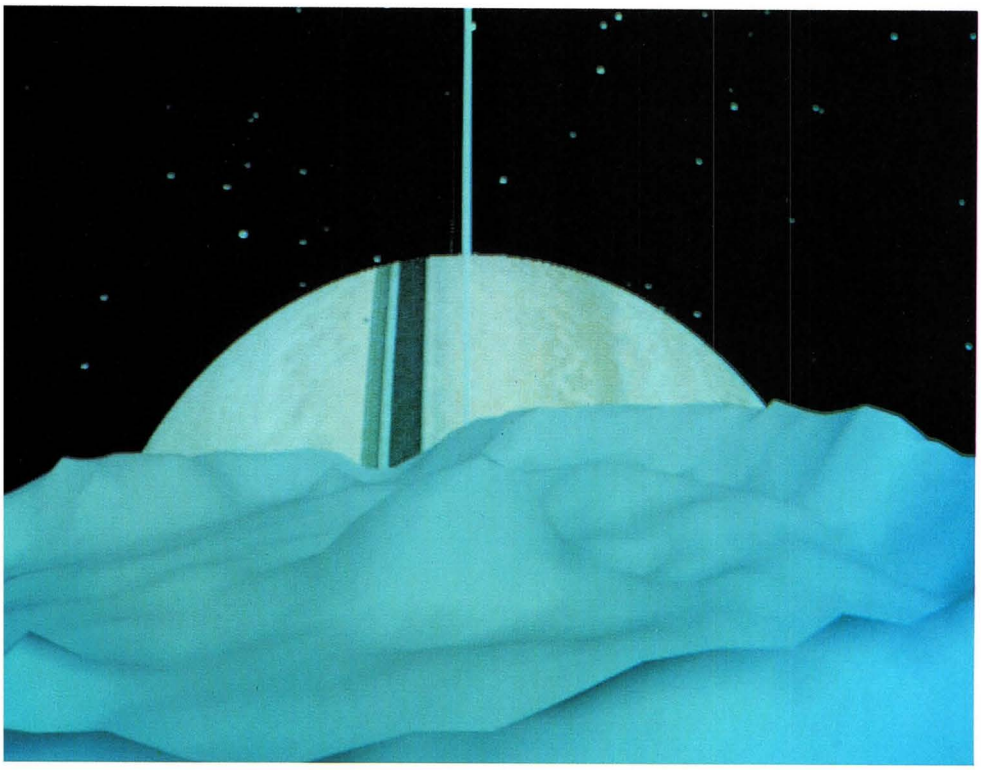
Allen's skills in these pieces are those of a ographer, though the computer-simulated that she has to work with is "untrained." I not know about gravity, for example, an Allen's ability to control the posture and ment of the figure which make it so believabl develops these dance routines on the con after studying videotapes of live dance "Smile" she looked at break dance. Two h stylized figures made of colored cones and s mirror each other's movements with exact s

ırly exhibitions of computer art had more : a novelty value than anything else . . . this is by no means the case today

so that at times they look more like abstract es than simulations of human beings; it's a irony to see the computer imitate the robot-gestures that characterize break dancing.

Smile" was filmed from a frame buffer, which ıe most common output device in computer hics. It's actually a special purpose area of puter memory where each memory location esponds with a position on a TV monitor. se positions ("pixels") are the elements that e up the picture on the screen. Their color is rmined by a number generated by a program, stored in that location in memory. The range olors that a pixel can have varies enormously ı machine to machine. Crude frame buffers v a binary state; the pixel can be either on or Home computers may offer a range of 8 or 16 rs, whereas 256 colors are considered the min-n requirement for a realistically colored and ed scene. Since the TV monitor produces , each pixel is made up of varying proportions ıe light primaries (red, green and blue). In e sophisticated display devices that offer an almost infinite range of colors, these primaries are often treated as separate color planes, not unlike the color separation printing process.

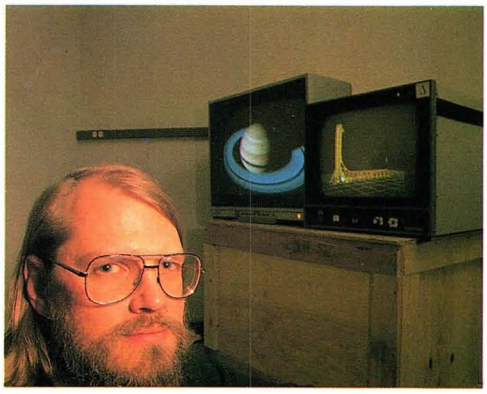
Frank Dietrich's work explores the characteristics of the frame buffer. In the "Softy" series, he wrote programs that generated billowing shapes bounded by sinuous curves. They give the impression of three dimensions though there is no depth in the image. He found, perhaps by accident, that superimposing different images from this series in the three color planes gave a strong feeling of transparency, greatly adding to the apparent depth, and this experimentation led to the "C-Mix" series. In an earlier performance piece called "Digital Reflections," Dietrich has a video camera connected to a monitor through a primitive frame buffer. The camera gets an image which is gradually displayed on the monitor as it is slowly scanned in to the frame buffer. While it takes several seconds to build up the complete picture, the camera reacts instantly to any change in the scene, and so by the time the scan is complete, the image is a static record of events in time.



ıe DNA molecule's double helix structure is made understandable by Jim Blinn of the Jet Propulsion Laboratory *Above* Jim Blinn's ıster simulation of Voyager's encounter with Saturn provides a realistic sturdy model for study *Right* Scientist /programmer Dr. James Blinn of the Jet Propulsion Laboratory in Pasadena, California

Making finished images on a frame buffer does present a problem to artists who want to show or sell their work. A photograph does not have the luminosity of the original image on the monitor, and the notion of an "original" has to be reconsidered when the "original" is not an object at all, but a series of numbers recorded in computer memory. As long as the data remains intact, the image is endlessly reproducible, with the last copy as good as the first—really an *un*limited edition!

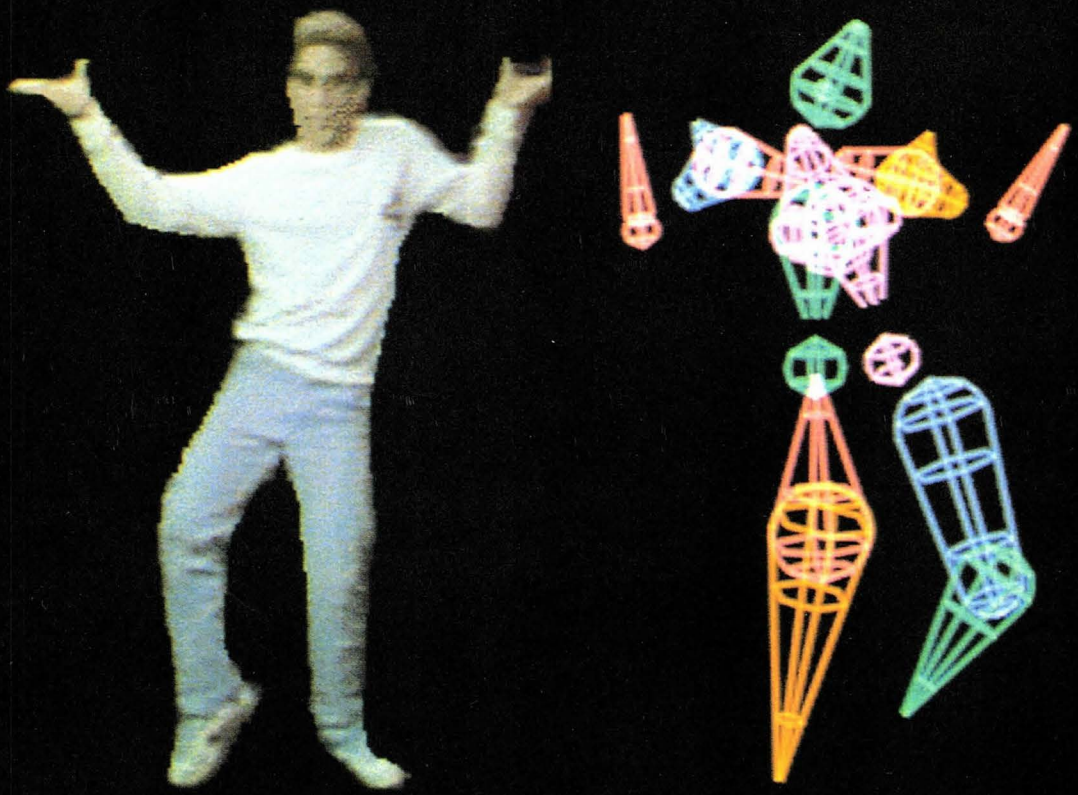
Norman Zammitt does not work with light. He uses paint and canvas, producing large colored works which appear to emanate light. The canvases are composed of narrow bands which shift gradually through different colors. Zammitt measures proportions of paint by weight to get these consistent progressions, and therefore is in complete control of the result. Ten years ago he was delighted to have the luxury of a desk-top calcula-



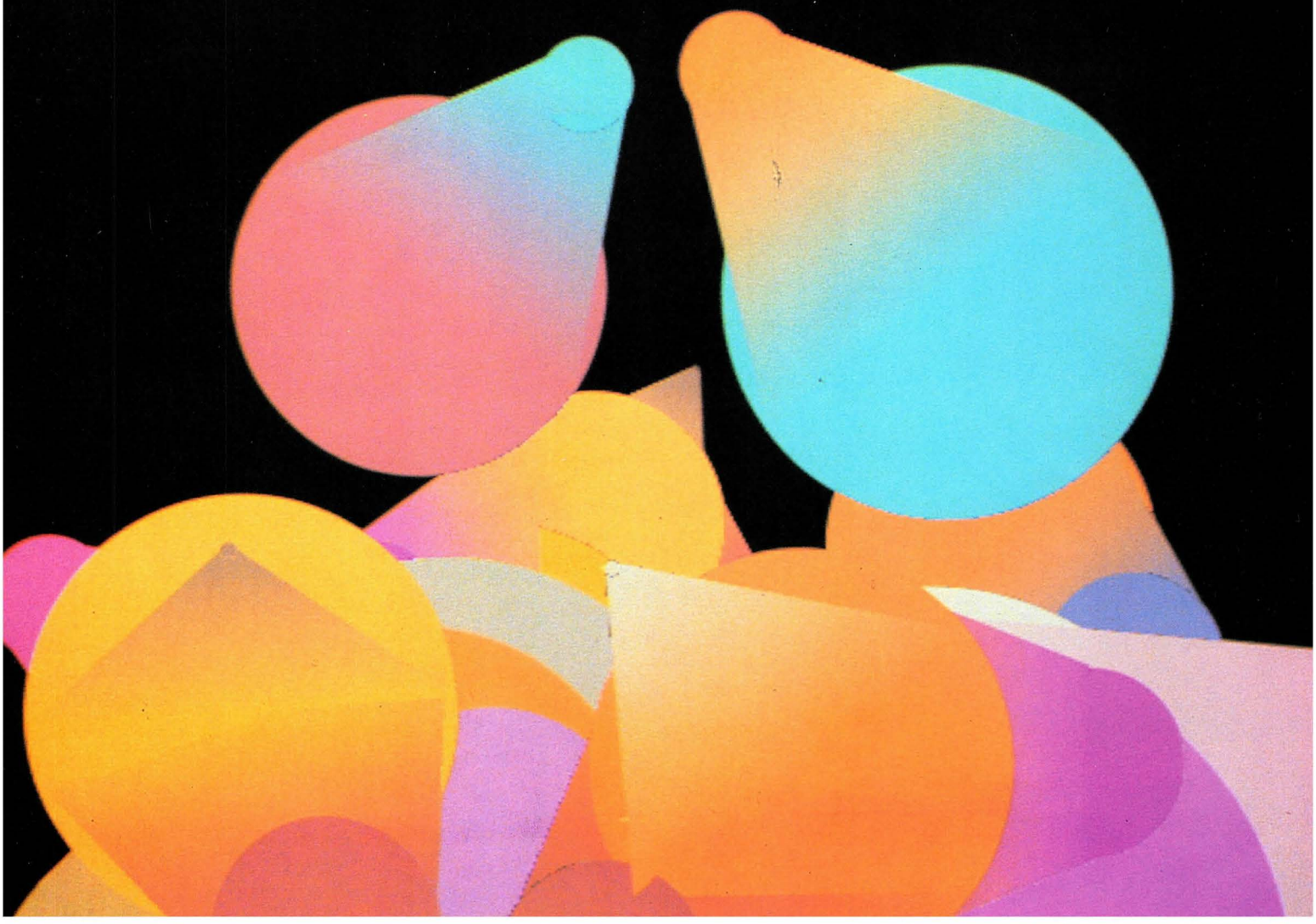
tor to work out these relative weights of pigment. Now he has a personal computer to do the job.

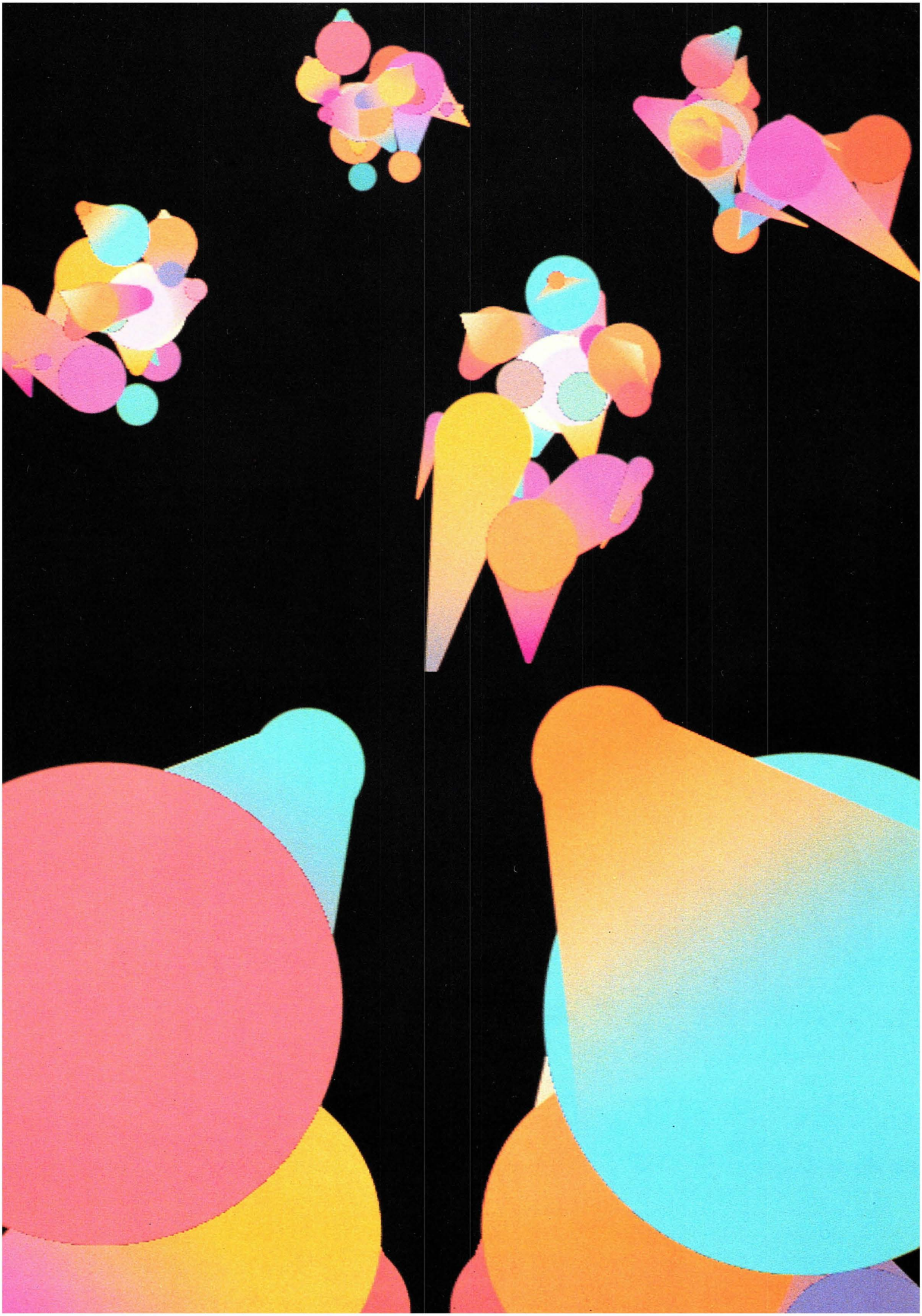
The program displays a curve on his TV screen. The curve is a representation of the proportion of two colors (each of which may have been the product of other curves), and Zammitt can coax the curve into a different shape to give a different mixing of the two colors, and corresponding table of weights. He makes trial paintings from this information, and after looking at the results may go back to the computer to adjust the shape of the curve several times before making the final painting. One could argue that deciding on the shape of a curve is a long way from making fine decisions about the way colors work in juxtaposition, though for Zammitt this is just a means to an end; he has designed and improved a special purpose tool with which he is thoroughly familiar.

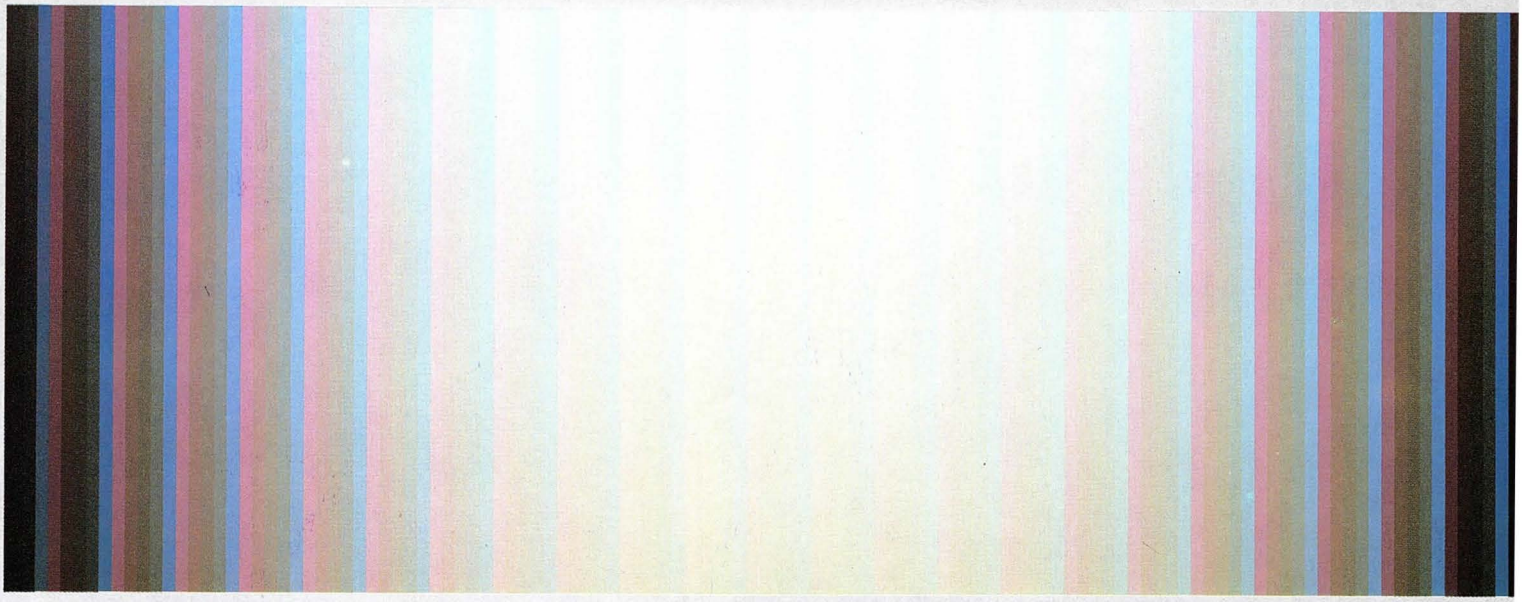
Zammitt's early paintings used a small range of colors. More recently, because of the way that he has developed the program, he has been able to move through a larger number of colors, perhaps three or four main colors in the same painting. "Blue, Burning" has all the livid light of the Los Angeles evening sky.



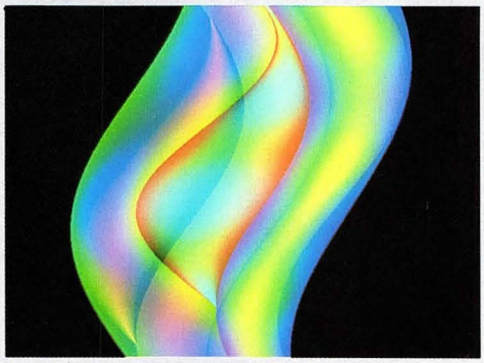
From Rebecca Allen's *Smile*



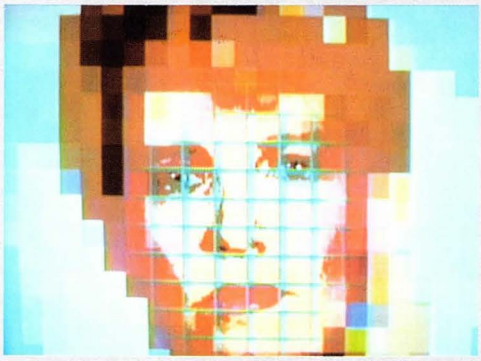




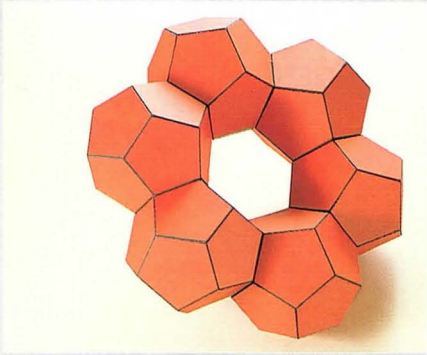
***Untitled #27*, Norman Zammitt, 1978**



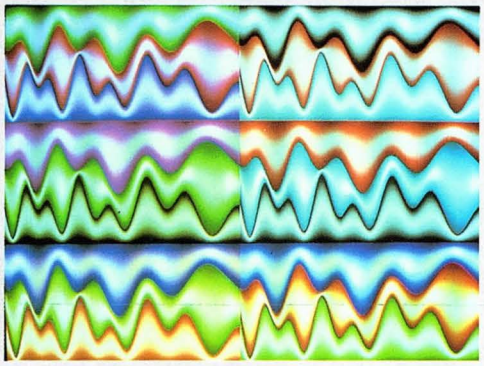
From the *C-Mix* series (1983), Frank Dietrich



***Leaving the 20th Century – Arrival*, Max Almy**

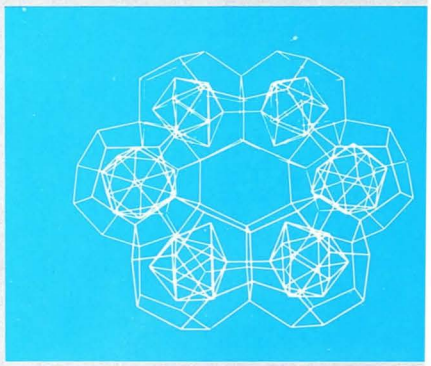


Space Warp Ring model, Bob Dewar, 1980



From the *C-Mix* series (1983), Frank Dietrich

Another phase of *20th Century (1982) – Departure*



Computer-generated free vision fusion

Bob Dewar makes sculpture, or perhaps it should be said he "grows" his sculptures. While they look as if they are made of geometric solids, they could not exist if they were. "Space Warp Ring" has six dodecahedra, each of which is slightly distorted so that they will fit together to form a circle. The distortions are not obvious, and yet the object has a strange relation to space. Dewar has developed a formula which describes a curvature of space around a point. Each point attracts or repels other points according to their proximity, and it is this special relationship that gives Dewar's constructions their unusual form. Using a computer display he populates space with a number of particles which jostle around over a period of time in an attempt to settle into a stable state. While the computer is a great display device for watching this process, the artist uses the information to construct a sculpture with conventional materials. "Space Warp Ring" is a maquette for a monumental sculpture, which has a fluidity that may well be a direct consequence of its origins.

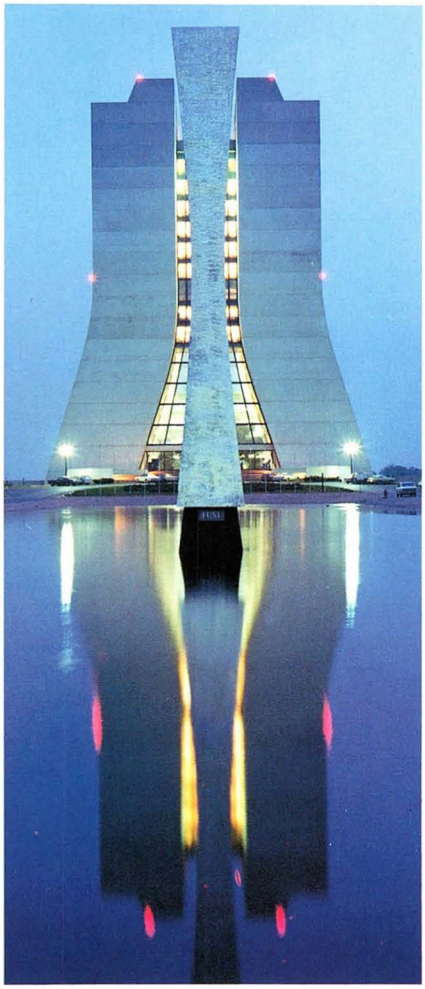
Each of these artists use computers in a cı context, and the range of their work is ind of the strength and diversity of the medium are further united by their ability to recogn potential in apparently different disciplines, periment, and to come up with fresh ideas, (and images.

Tony Longson teaches art at Cal State U sity, Los Angeles, and is Director of the Cor Center at West Coast University.

An aerial view of the main accelerator ring at Fermilab

AN INTERVIEW WITH ROBER WILSON

BY LINDA DACKMA



Robert Wilson's administration building, Fermilab

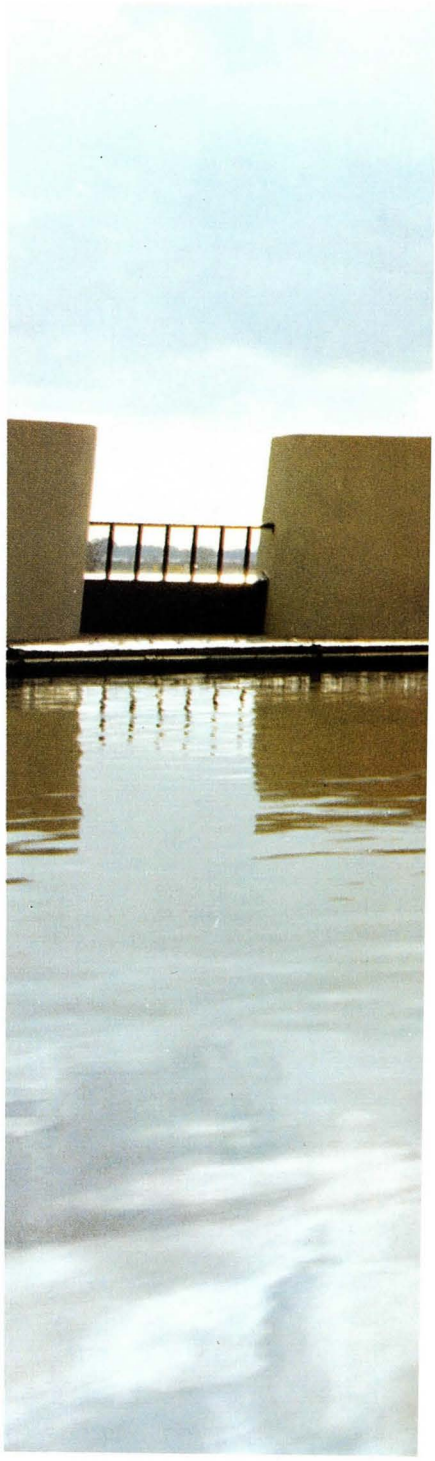
Robert Rathbun Wilson is an internationally respected physicist and an established sculptor. Now 68 years old, his career has spanned nearly the entire history of the nuclear particle accelerator: the engine of modern physics.
The Fermi National Laboratory's giant accelerator at Batavia, Illinois, has a diameter of 1.3 miles. Wilson was the laboratory's chief builder and director for 15 years. In the words of Philip Hilts, "The machine Wilson built is one of the monuments of Big Science, a monument that the future may find a fitting symbol of our technological culture—as the great pyramids, the gardens of Versailles, and the great cathedrals of Europe are symbols of the cultures that produced them. It represents the highest aspirations of physics—to discover what the world is made of—and includes aspirations of culture and art. It is a machine and a laboratory that was built to do more than function."

Dr. Wilson, how did you manage to bring together two seemingly disparate currents in your life—physics and sculpture—in a project financed by the government to the tune of $250 million?

As a physicist, I had planned to take a sabbatical and see if I couldn't make it as a sculptor. Instead, this other adventure came along. I had that on my mind when accepting. Furthermore, because the Atomic Energy Commission w somewhat desperate to get a director I cou make some conditions. One of them was th although we had a definite budget, I want quite a free hand in spending it—how much building, how much on science, and an oc sional expenditure for something of some s nificance from an architectural point of view managed to get that in writing and I must s that throughout my 15-year tenure, that pol was always honored. As long as I didn't spe any extra money, it was OK. This isn't triv when you consider that we were dealing w the bureaucracy of which it has been said tl when they put up a building, it doesn't have be cheap, as long as it looks cheap.

So you undertook to create the Fermilab, world's largest particle accelerator, with aesthe on your mind?

The basic idea was to have a place of the wo and fields and to get the scientific equipm together in one place as much as possible. fell heir to farm buildings that I had to figh keep. Eventually we turned them into a little lage that became living quarters for people v came from all over the world to work at the I But I did go there feeling that art and archit ture are necessary conditions for buildin good laboratory.



Above A pumping station at Fermilab built in the form of an archimedes spiral. Right: Wilson welded small pieces of stainless steel to form this mobius strib, which sits on the Fermilab auditorium roof, in a reflecting pool.

Most of my life I've done both sculpture and physics. I don't say, "Now I'm being a sculptor" and try to be romantic, and then say, "Now I'm being a physicist" and try to be cold and mean and nasty. I never notice any difference, particularly. I'm an experimentalist. When I design something as a physicist, it's not that I make a lot of calculations which all come out as straight lines and was all prefigured. You make a calculation about some part of the physics that's significant. Then calculate something else that's significant. And then you unite them with nice, smooth lines. You put a world of experience into the way you design something, in the way you draw those lines. The aesthetics of it have always been important to me and I think they have been important throughout history. If you go to Paris today and look at those instruments that the people who discovered electricity created—the ammeters, voltmeters and galvanometers—they're works of art.

How did your plan for the Fermilab ultimately differ from the original, discarded plan?

I would say largely by simplifying the design. I think it became a more aesthetic design. The previous design depended on computers. I thought that the human mind could do a lot better than the miserable computer. And it could.

How?

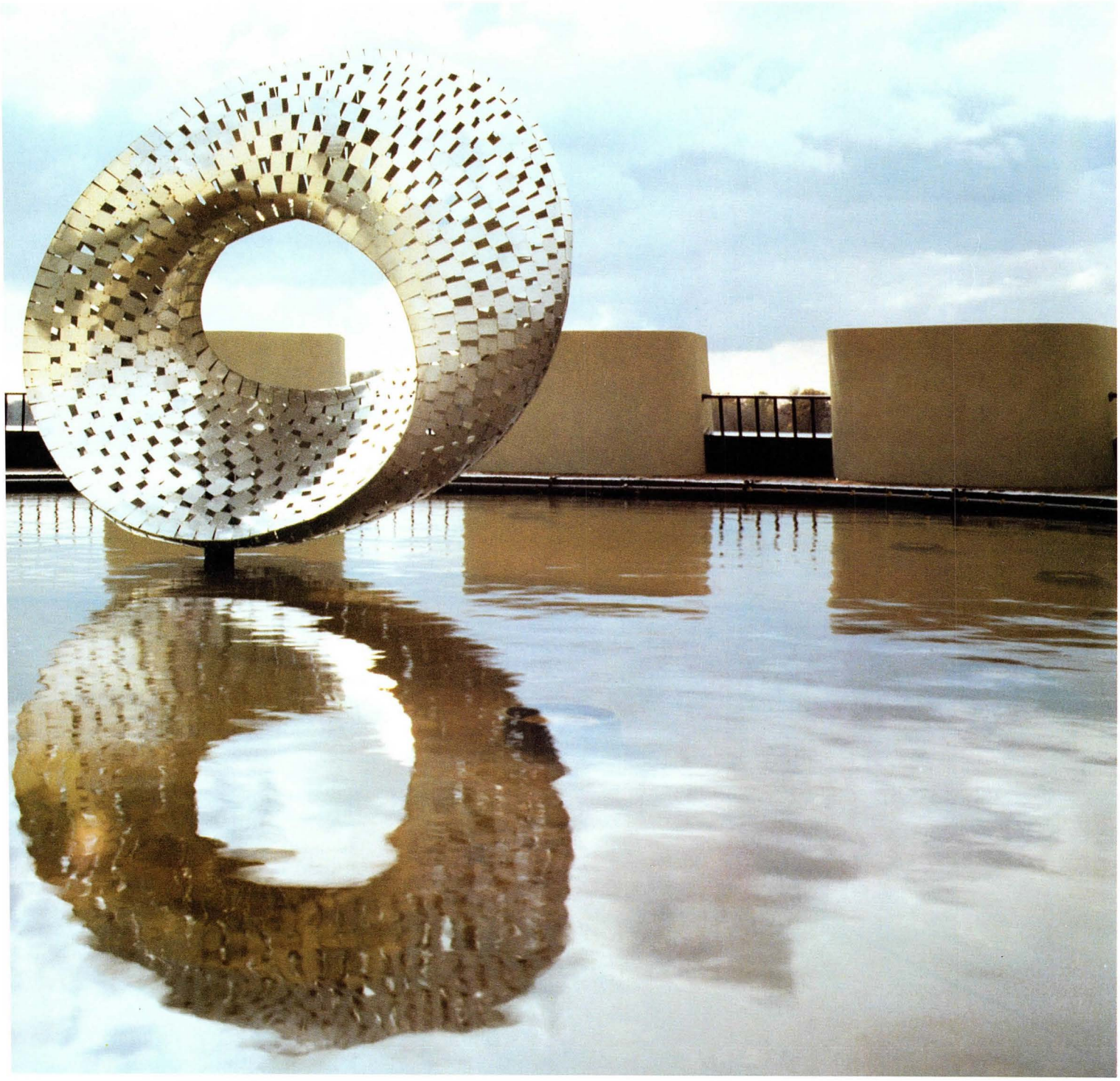
Essentially, by redoing the calculations. You know, even when you are drawing a live model in a studio you take a sight reading using your thumb sometimes. That's a measurement; essentially, a calculation. It's clear that even an art student drawing a figure will sometimes use mechanical aids, calculations. You can make the figure eight heads high, the arm's a certain length and all that. Now that's a theory, a theory based on the fact that more or less, that's how it feels.

Let's say you look at it again and it's just a pin head, nine heads rather than eight heads in height. So you change everything around. That's intuition. You don't put in all of the lines, you just put in some of the lines. What aspects of the model do you put down and what don't you put down? That's also a kind of theory. You can even be very academic and do as Michelangelo and show all of the possible projections.

In designing an accelerator, the first thing you have to do is also determine the scale to do a drawing. That's a calculation. It's a choice, an arbitrary choice. And you make lots of calculations because the damn thing has got to work. For example, there has to be a certain vacuum, there has to be a magnetic field. You make a magnetic field by having turns of copper inside iron. How thick does the iron have to be? How many turns of copper and what current? All calculations. So you sit down and start calculating. At the same time though, you sort of look at the calculation, just as when you take sight on the human figure.

So with Fermilab, you made calculations and intuited in between?

Yes. Certain things have to correspond t
ity. But then reality can often be astou
Talk about intuition! We found a devoted
builder. The first thing he said was, "Sh
the dirt. Show me the dirt." So we took hi
side and he said, "No, that's not the dirt
It had stones and oxidized plants and soil
turned out that there were some boring s
over in the library, so we got him over the
eyes lit up once he saw the dirt. He go
excited and he took the dirt out and w
shaking. He took some and put it in his
and chewed it. Then he threw it away ar
some more. After a while he said, "C
that's very good. You can certainly buil
nel here." It tasted right! A lifetime of



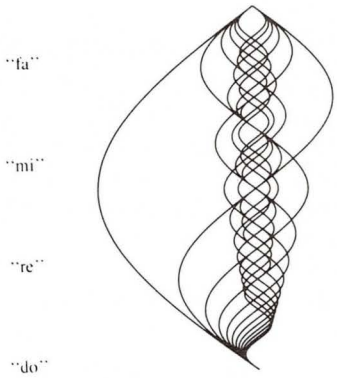
was coming out from having eaten dirt.
n one of our chemists came up with a great
He took tin cans, cut the ends off of them
tacked them together, put them on a piece
ored plastic and painted them with epoxy.
we put plastic on the other end so we had a
vich board you could see through that had
ent colors. We made each a nine foot tri-
. The result resembles a modified geodesic
of stained glass and honeycombs. It got
I thought it was a beautiful thing. We had
rchitects make the bottom part and we
well, the physicists will build the top
-which we did.

nds as though "the physicists"—meaning you—designed and built the whole project. What was the professional architect's role in all of this?

That's a very interesting problem. That's the heart of it really. We had some people called the "architect engineers." Their original idea was that they would hire the staff, they would build it and turn over the key to me and I would get my staff and start doing the physics. They made a presentation showing all that. At the end of their presentation, I rather arrogantly pushed their easel off to one side and then I, being a professor, drew my own charts on the blackboard. Their charts had boxes showing how architects and different kinds of engineers could all be organized at the laboratory. In one little corner it showed how the laboratory—meaning me—was essentially to *receive* the key. So I went to the board and I drew a different kind of chart, just as complicated. I showed *their* firm in a box down at the bottom and suggested that they might locate themselves in one of the outhouses in the village. Then I stomped out.

But in the end we got along very well. They had expected me to make all the decisions about the way the buildings looked. I criticized their plans. If I didn't like something or if it cost too much, I would tear it up or throw it on the ground and jump on it. I had to be strong because they were strong people. And I could do it

Continued on Page 75



Differential dynamics.

Music and the Mind's Eye

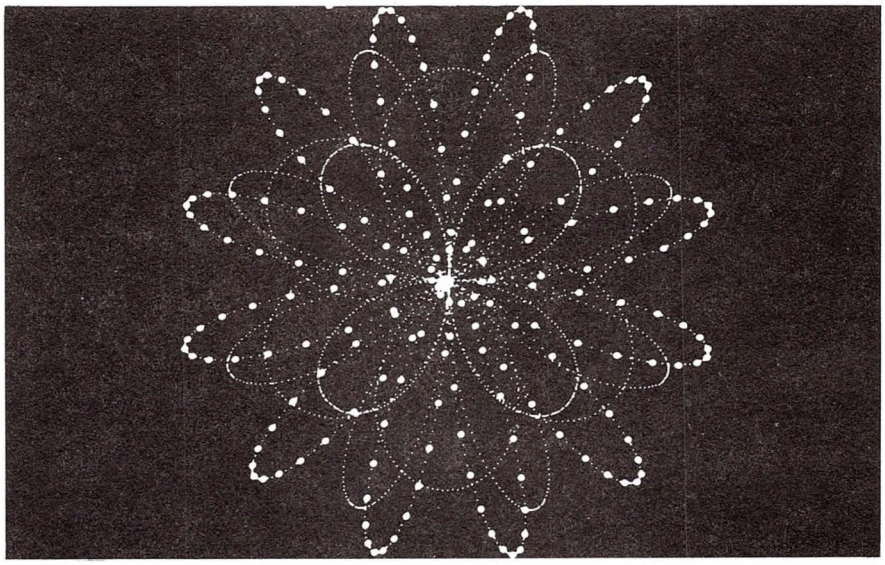
Digital Harmony Music and Visual Art

by John Whitney
Byte Books/McGraw-Hill, New York, 1980.
235 pp., illus., $21.95 cloth.

John Whitney is one of the earliest pioneers of motion graphics. He has been an inspiration and a teacher for many of the people who have gone on to create the amazing images we have been treated to over the years, from the psychedelic "star gate" scene in *2001: A Space Odyssey* to eye-catching, dreamlike commercials on television. But John Whitney himself has had very little involvement in any of these more commercial aspects of motion graphics. This is because he has been on an artistic quest his entire adult life. Whitney's goal is to approach the imagery that one sees in the mind's eye while listening to music.

Whitney's quest started while he was traveling through Europe in the summer of 1938 during a break from college. He had a film camera with which he tried to compose "music" out of the motion of the camera and the world. Whitney discovered that the film world is visually static compared to the "liquid architecture" one visualizes when listening to something like a Beethoven piece for string quartet.

At the same time, Whitney was exposed to Arnold Schönberg's principles of 12-tone serial composing. This concept of a series of tones that could be transposed, reversed, and inverted to form an array of elements from which a composer could draw could also be applied to a film sequence. Whitney's early experiments with this concept proved unsuccessful. This was mainly because he was still trying to use the movie camera as the input device for forming the musical elements of his films. The camera is primarily a recording device, "good for documentation or drama. How could a reproducing instrument serve to contribute to a new visual art, any more than, say, a sound recording machine [could] contribute to the art of music?" Not until he was introduced to the digital computer did Whitney find an instrument capable of real experimentation with the tone-row concept.



al harmony
rn generated by
cal computer
ram.

Whitney's first experiences with the digital computer were in the 1960's. Even though IBM was generous with its grants, Whitney's projects were given low priority with regard to access to equipment and computer time. Whitney longed for a personal system even then. Despite technical difficulties, he was able to begin to develop his visual grammar. He studied the nature of time and motion in existing visual arts, asking questions about the function of motion in art. What are the relations of motion and emotion? How can one manipulate a field of visual elements so that the parts contribute purposely to some temporally structured design?

It was during this time of reflection and experimentation that he began to develop his technique of harmonic visual resonance, which he describes as a way to control the total dynamics of a visual sequence by activating.

> . . . all graphic elements through a motion function that advances each element differentially. For example, if one element were set to move at a given rate, the next element might be moved [at] two times that rate. Then the third would move at three times that rate and so on. Each element would move at a different rate and in a different direction within the field of action. So long as all elements obey a rule of direction and rate, and none drifts about aimlessly or randomly, then pattern configurations form and reform.

The goal of visual music, like aural music, is to sculpt or shape time. Whitney believes that to shape time (which is a primordial continuum), one must create a set of discrete steps as a way of establishing this continuum. The scales are a way of fixating the all-too-fluid medium of sound. Whitney spends several chapters showing some of the ways that he has explored visual space. In the chapter titled "The Instrument; Not Pure Hypothesis—Not a Piano," Whitney becomes more specific concerning the idea of differential motion. He shows that differential motion can be applied to any visual element, from a simple line to a complex three-dimensional object. He also shows some possible visual "scales."

Whitney goes on to describe his theories of visual harmony in more detail, including the importance of whole-number ratios, the relationships between the movements of visual elements to music, and the role of color and how color relates to tone. He briefly explores what he would like to see in his ideal audio/video synthesizer. He is more oriented to a system for composition than to one for performance. Non-real-time synthesis with control down to the smallest element and iterative compositional capability seems more important to him than intuitive real-time play. Such a system does allow one to create exact complementarity between the audio and video.

To make his ideas more concrete, Whitney devotes a chapter to an in-depth analysis of one of his more recent films, *Arabesque*. This is useful because the reader is given a glimpse of the process involved in generating a complete piece; technical and musical information is provided. What is really wonderful is that there are listings of some simple Pascal programs that demonstrate some of the basic graphics principles he used in the film! (If only more people would include code in their articles and books!)

Digital Harmony is an especially important book for those of us who are interested in computer graphics and visual music as art forms in their own right. When a medium is so new, powerful, and flexible, there is a need for some structure, some theories of hypotheses of action, even if they will be eventually torn down and replaced by new ones.

This review was excerpted from *Computer Music Journal* with permission.

Robert Berger is project director of Digital Arts Project, a part of the Boston Film and Video Foundation.

Man on Earth – How Technology Changed the Face of the World

by Charles Sheffield
Macmillan Publishing Company, New York, 1983
160 pp., color illus., $29.95 cloth

Travel into outer space can arguably be the most encompassing achievement of technology. Space travel will, in time, affect the earth in all likelihood as much as Europe's colonization of the Americas and the Orient. *Man on Earth* is a collection of color satellite photographs and accompanying text. The photographs were taken over a ten year period beginning in 1972 by satellites launched by National Aeronautics and Space Administration (NASA). The first of these was launched under the name of ERTS-1 (later termed LANDSAT-1), and was followed by LANDSAT-2, -3 and -4. Each photograph was taken from a height of 570 miles and was transmitted back to Earth via electric pulses at the rate of one million "items" per second, with each image the collection of 30 million items.

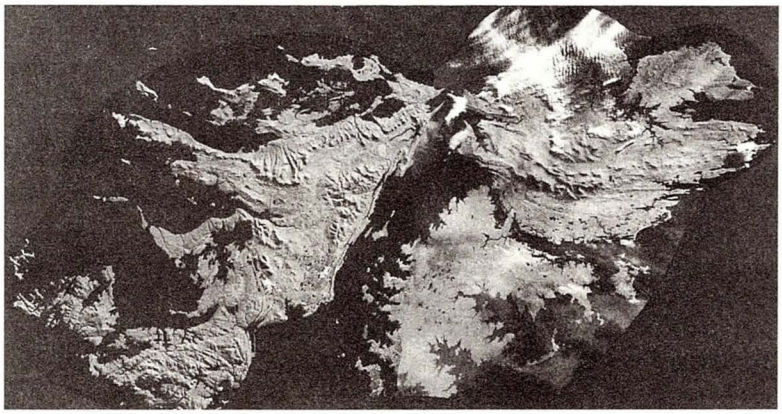
The notion of describing the photographs as images is appropriate. The satellite-produced images are recorded not as the human eye would see the Earth, but in "false color," (Sheffield's quotes) where the results are a combination of visible and infrared light, reassembled in the visible spectrum so that vegetation is depicted in red, water in black, urban areas in white, green, pink, blue or grey. The author's selection of images includes the obvious (New York, Rome, Moscow), but the unfamiliar as well (the Chott Jerid, the Takla Makan Desert, the Ubolratna Dam). One can perceive the images as literal or abstract compositions of unintentional surreal beauty. One image of Paraguay focusses on a Mennonite settlement in which the white dashes and lines resemble a fusion of Mondrian painting and Roman site planning.

The author has consciously directed the book to the general public. Adjacent to each image are two maps, one identifying the general area surrounding each image so that unfamiliar places can be located, and the second reproducing the image as a larger diagram noting details shown. The text introduces the techniques and history of the NASA program which made the images possible and provides a general background for the book. Beyond this introduction, the chapters are organized along the lines of social criteria; e.g., Ancient World, Capital Cities, Commerce and Trade. According to Sheffield, the images are typically used by world governments to monitor flooding, natural resources and other factors that have an impact on the Earth and in turn, how the earth affects man. The writing does not emphasize this concern, but rather puts the images into context with present or past actions of society in that region. The writing is a mixture of admiration, criticism, and detailed fact; for example, in writing of the Aswan Dam:

> . . . Built by Egyptian workmen under Soviet supervision and located at the first cataract of the Nile, this dam is 111 meters (365 feet) high, more than 3 kilometers long, has 180 sluices, and holds back 130,000 million tons of water.

As carefully written as the text is, in the end the photographs dominate the book, showing the transformation of the earth under the influence of a similar technology that produced the means to observe itself and the natural forces working on the planet.

John Clagett is a designer who has closely followed the technology of aerospace culture.



Landsat photograph showing the rough terrain of the Falkland Islands.

Future Life

by Michel Salomon
Macmillan, New York, 1983.
295 pp., $19.95 cloth.

When it comes to the future, we never dream alone. Our dreams are catalyzed by the imagery and headlines of books, magazines and film, often leaning toward the simplistic and the cautionless. We have been warned from such sources, fact and fiction alike, that the future is too hot to handle, too furious to self-adjust, too shocking to absorb within our own lifetimes.

Still, in this year named for a long-standing future, we would hate to be caught building for a neo-past, a present on the edge of becoming obsolete. By refreshing contrast, a book like *Future Life* speaks to us with professional authority about a time not far from now (five to twenty years for the most part), but one very different from our own.

Future Life (L'avenir de la Vie; "the future of life") is a collection of interviews with 18 distinguished scien-

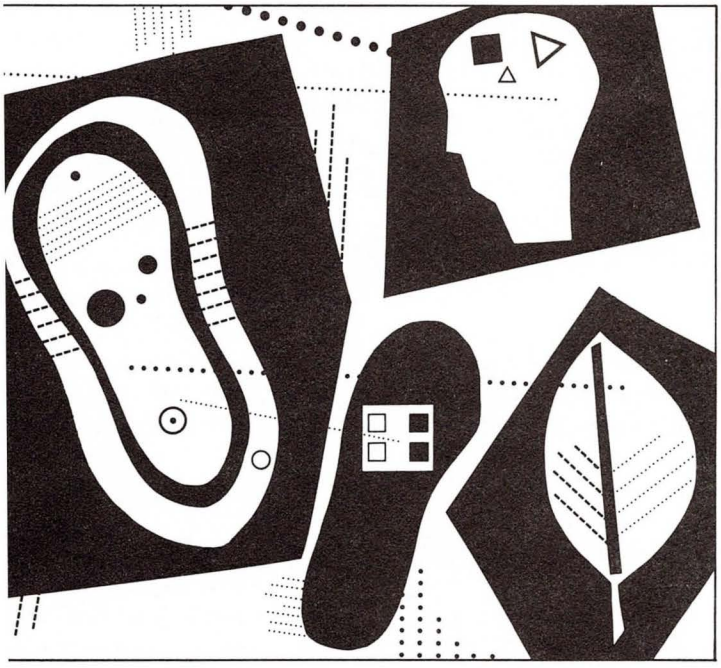
tists, six of them Nobel Prize win
It has been put together by Mich
lomon, a physician and editor o
French journal *Prospective et S*
and who like many of those i
viewed, has a more pronounced
tation on the continent than he d
the United States. The interview
ultimately centered around recen
projected advances in biochem
but are about life functions in a
and valuable sense.

Participants share their con
about contraception and choles
genetic engineering, DNA,
transplant, allergies, schizoph
euthanasia, exercise, ecology, vi
fections: subjects one would exp
find in such a book. The resp
though, are sometimes unexpect

But there is also talk about
talent, guilt, obesity, fear, beau
sistance to radiation, sexual res
sleep, learning and intelligen
nility and memory; how and
drugs will be able to prevent,
or eliminate some of the abo
what such consequences migh
for the social-political arena.

A book that displays the an
tions of so many individuals wo
be expected to present a unifie
on many topics. Certain
monalities, however, seem to e
The medical profession of the
will turn to immunology and
forms of prevention as a primar
egy (rather than the curing
sick), like the way the Salk v
distributed *en masse* on a vol
basis some 30 years ago, vi
wiped out polio in this country
by the way, is one of those
viewed.) Microcomputers that
placed under the skin, in the co
the eye or pinpointed in cerebr
will become warning systems
formation relays. Psychotropi
will be capable of varying nea
state of mind, correcting serio
lems of mental health, changin
ation, altering political tende
is a point in favor of *Future I*
its scientists express awarenes
societal dangers in the moni
control of individuals, the p
undesirable consequences that
advances may involve.

Sometimes *Future Life* sur
old categories are discussed i
new ways. Aging, for exam
process we now tend to see as
mous and inevitable. By c
more and more, aging will b
stood as specific, curable mala



ıg our youthful creative powers
ne 50 years. As Konrad Lorentz
l Prize, Medicine and Physiol-
.973) observes, "Some people
that antibodies cause old age;
ıan, or any long-lived organism,
course of a very long life, be-
allergic to himself, destroys his
issues by antibodies, and that
ıs caused by antibodies. And this
een actually experimentally
ı in some fish. If you keep them
ry low temperature, where they
stratively cannot produce anti-
, then they will live forever."
re is a brief aside on aging from
: Good, director of the Sloan-
ing Center for cancer research
/ York to the effect that, "Can-
o close to life, life in the sense of
mmortal. The cancer cells have
d to keep replicating without
ɔut."
mon's choice of the interview
than the technical article or the
de book) is worth some consid-
. His questions are nearly al-
entical for each of the scientists
er their specialties, leaving *Fu-*
fe at times with answers that
lundant and, like the ones on
ısia, sometimes unenlightening.
interview has advantages: The
ıations are nearly always con-
ɔnal, i.e. in language the non-
st has no trouble understand-
ıe interviews are also good
nal indicators, reflections of
lity differences, measurements
ıts of involvements and degrees
gé. And interviews leave open
ities for anecdote and auto-
hy in a way professional pieces
do not.

The largest failure of *Future Life*, however, is that it is all male; that not a single woman was turned to in its 300 pages. There is no question that no points of view regarding the biological life of women, bringing into focus everyday female concerns as well as a feminist stance on health and pregnancy issues is a serious omission. The book is also unproportionately represented by those in their 70s and 80s. And it seems to ignore whole sets of relevant future domains like the prospects of laser technology for surgery, the space experiments that necessitate zero gravity and the dreadful specter of omnicide, the destruction of life itself in all its forms on this planet.

Future Life exhibits strong doses of optimism about our common fate, something refreshing in a world laden with cynicism. But there are unmistakable pessimistic voices here too, ones like Nobelist Niko Tinbergen's, talking about the full gamut of human life: "Unless we change our way of life," he warns, "including international disorder, I see no future for mankind. It looks very much as if we are an evolutionary freak, a mistake that can live only for a very short time . . . that our grandchildren will have to endure terrible suffering is very difficult to bear."

Overall, *Future Life* speaks to us with a responsible voice. It is a book worth the time expended, one that Salomon has sharply and accurately directed to some of the more pressing visions of things to come.

David Goldblatt is a writer and professor of philosophy at Denison University.

High Tech and What Follows

Euroluce

***Euroluce,* the lighting** portion of the *Salone del Mobile,* the recent furniture show in Milan, confirmed the emergence in lighting design of a trend already apparent in architecture and art. This trend toward more vital, individual expression has been influenced by the increasingly active market of art consumers.

In the 1970's, a new group of consumers came of age. Art was chosen as an investment and as a statement of cultural awareness, of the buyers' arrival. Unfortunately, the kind of art they had studied in school and seen in museums was more than they could afford. Available was mostly new minimalism, while they desired human figures, color and emotion.

With this potential for a new market, the shrewder gallery owners began collecting and showing more figurative artists, veering away from the conceptual melancholy that had beset the scene. Hence galleries were full of neo-Expressionists and the trans-avant-garde, proving wrong the myth that artists are poor, starving waiters. Although the integrity and artistic talents of some of the new wave of dealers and artists can be questioned, the return of the human element was inevitable.

Since the 1978 *Salone,* Ettore Sottsass' Memphis group, has caught the eyes of many people with a line of brightly colored, multipatterned furniture, lamps and glasswork. Sottsass' efforts to redefine functionalism resemble a combination of constructivist sculpture and 50's kitsch design, loosely translated by Ludwig Giesz to be "artistic rubbish." As alluring as some of the lighting fixtures are, they amount to little more than colored Tonka Toys with a light bulb. The quality of light is often harsh and has little to do with the overall design.

Although used sparingly in the lighting designs, Memphis' main contribution is in their use of the beautiful patterns created by Nathalie Dupasquier. A combination of new wave graphics and trompe l'oeil, her designs bring a painterly hand to mass-produced pieces.

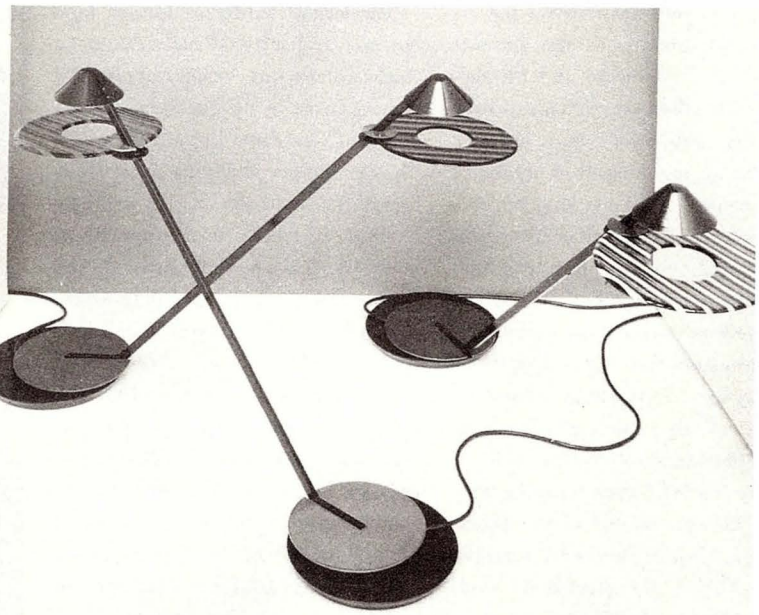
Fortunately designers are once again able to smile and express this new freedom in their designs. We are seeing more optimism and a desire to explore while being entertaining. (Frank Gehry's fish lamp of Formica's ColorCore is a luminous shrine of absurdity, as well as an imaginative use of material.) Although there are still signs of hesitance and self-consciousness, the overall outlook is for a promising warming trend. The traditional glass globe is being redefined by two Italian groups. Foscarini, in a clever blend of technology and Murano craftsmanship, presented the "Rolli," designed by Urbinati-Ricci and Vecchiato. The table lamp uses a doughnut-shaped, multicolored glass disc to blend direct and diffused light. The constructivist-looking arm and base in flat black and red, contrasts with the "artsy" striped disc and distinguishes the lamp as a truly original piece.

Another successful use of glass is VE Art's "Easy." The ceiling lamp uses a Moorish globe in aqua or white, held in place by an embracing black wire arm stem and base are also in a textured finish. The casual elegance of the desi sults from the excellent modern desig pled with traditional elements.

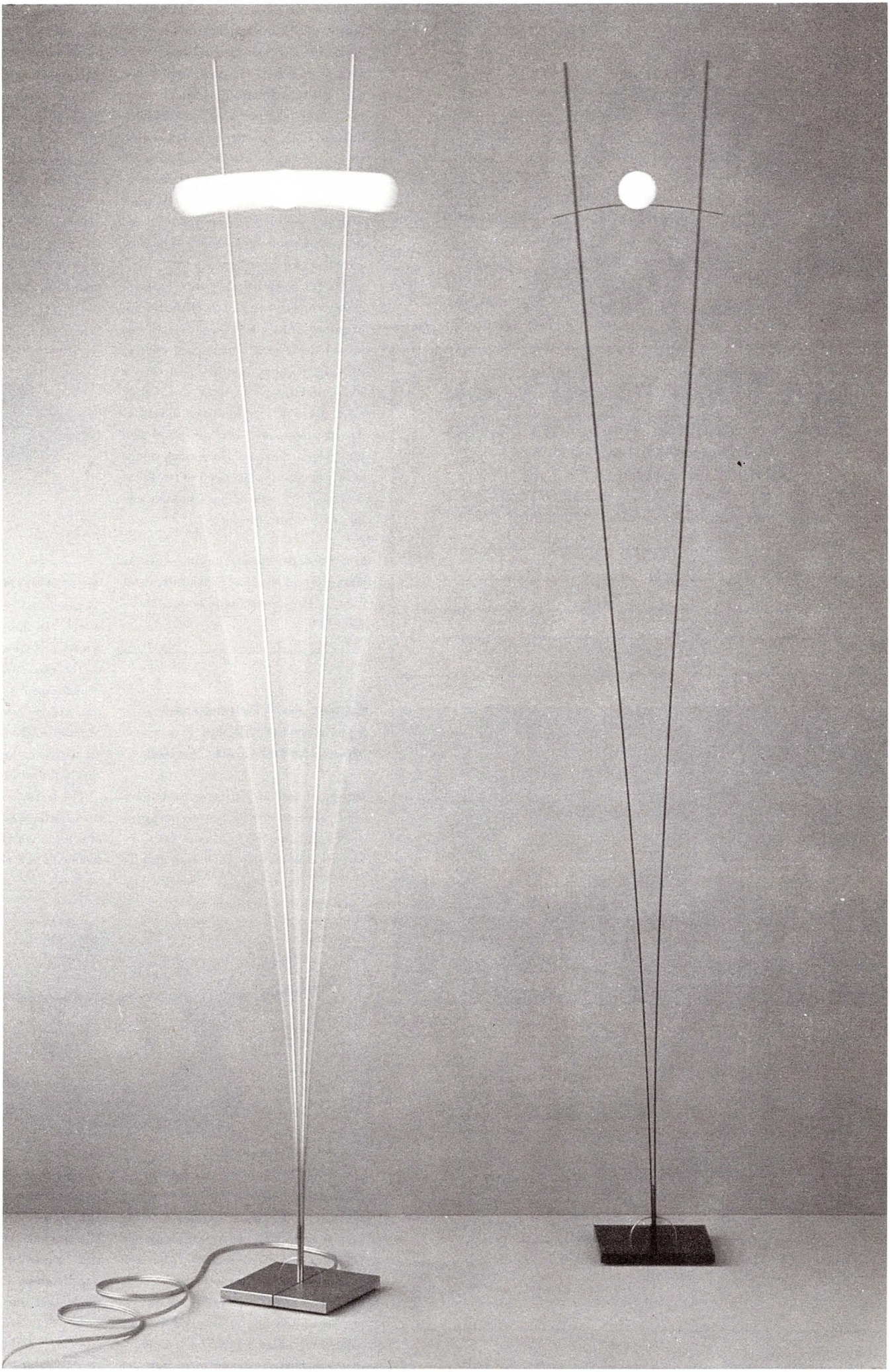
The growing dissatisfaction with tech is due to the strictness of its l tions. The pursuit of its ideals—l functional, efficient lighting and des has materialized excellent pieces such "Tizio" by Artemide. There is littl within the high-tech style to be exp but as exhibited with these new de lessons learned from high tech are n gotten.

There are certainly still a number signers tirelessly pursuing designs in "higher" tech. An example of this flog dying horse is the "Nastro" from Sti An innovator in high tech, Stilnovo ha sistently turned out good designs, b fortunately the "Nastro" does no their standards of either design or n quality. The reptilean-looking head wardly adjusted by a "flexible" multi-colored wire ribbon. This flaw major and only function renders th worthless.

Ingo Maurer of the Munich-based M group continues to make fresh ments using the minimalism and fu elements of high tech. Maurer, w pieces in MOMA's permanent colle against contortions of technology effort should be in relation to the res says. "I love when a design is not rious in spirit but wears a smile. I the seriousness of most Italians, too for my way of thinking and liking." rious example of Maurer's humor *Bibi*" (Chick Chick), a table lam orange chicken legs suppo lampshade/body and head/plumag



Foscarini's original "Rolli" table lamp uses colored glass discs to blend direct and diffused light.



amp from
ice show

Maurer's designs are the missing link between high tech and what follows. His new floor lamp, "Ilios," is an elegant blend of classical styling and material functionalism. A small translucent disc, illuminated by a 50-watt halogen bulb, appears to float between two metal pieces that are anchored to the base. The balance of the lamp allows it to sway back and forth when brushed slightly. Maurer incorporates into all of his designs a sense of motion, either actual or inferred.

After a period that *Vanity Fair* recently referred to as "the surgical appliance look," lighting design has joined the retreat from high tech to rediscover color, texture, and even a sense of humor. As these are simply elements of design, I hesitate to formulate or project an "-ism" or grand plan into which they fit. Their importance is as indicators of the need to revitalize design. They will bring a human element back into the focus.

Eric Poulson studied architecture at Harvard and the Boston Architectural Center. He now designs lamps, shoes and clothes.

Eames Sofa Introduced by Herman Miller; Noguchi Table Re-Issued

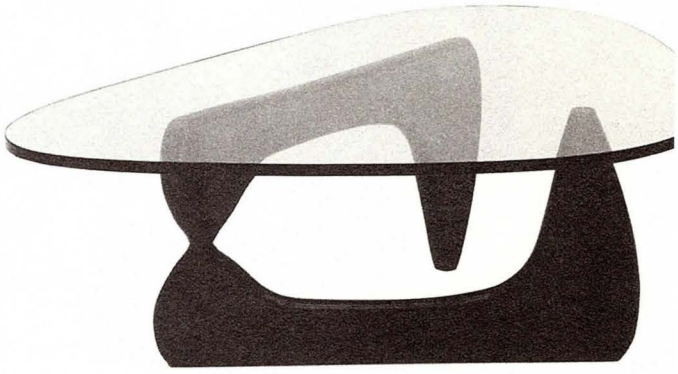
Herman Miller has announced a select offering of its finest designs produced in the 1950's and 60's by Charles Eames, George Nelson and Isamu Noguchi. Two outstanding pieces from the group, the only ones which are not in Herman Miller's existing line, were introduced at CONDES, the Dallas contract design show. They are Isamu Noguchi's organic coffee table of 1947 and Charles Eames' posthumously manufactured leather sofa with padded arms. The remainder of the pieces are being introduced at WestWeek, the Los Angeles d show at the Pacific Design Cente

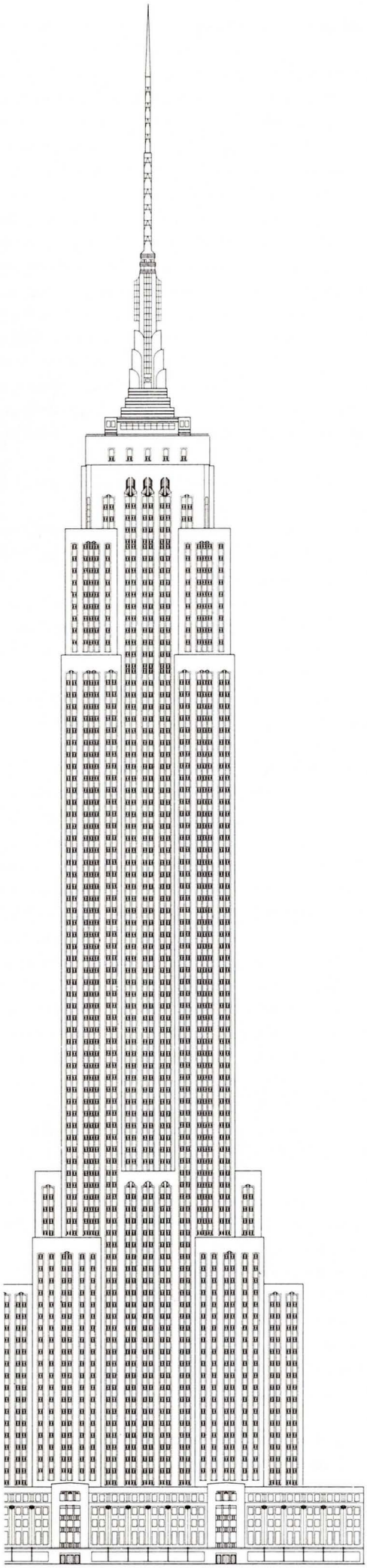
One of America's most tinguished sculptors, Isamu No managed throughout his caree unify brilliantly private sculptur chitecture, outdoor environm theater design and utilitarian o in a satisfying totality," accordi art historian Sam Hunter, in his *Isamu Noguchi.* His table is desc as "a classical example of post-w sign in its nearly perfect balar sculptural quality and functior

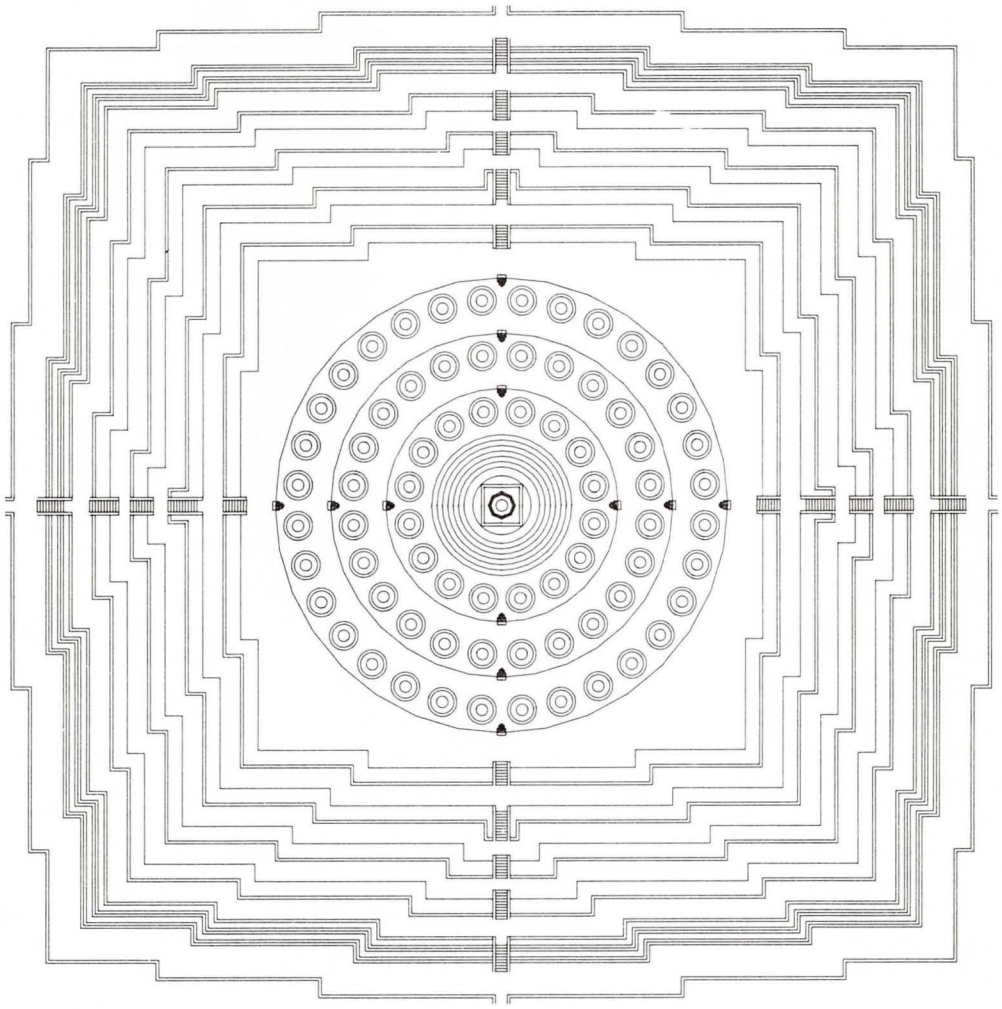

Herman Miller's new Eames leather sof

Through the heavy plate glass to curely anchored and expertly anced, one views the cunning inte of the curved and angled wood compromising neither artistic q nor utility. Such a translation organic unity and sculptural lo an abstract, three dimensional f rarely found in furniture today.

The last piece of furniture des by Charles Eames is the other offering from Herman Miller to troduced at CONDES. Unlike E two previous sofas, his 1954 Sofa pact and his second generation 1963, this last design derived Herman Miller's request for with arms, on which one coul naps. Eames had begun the des the leather sofa in the late 1960' posed it to Herman Miller, an working on the detailing of a f prototype at the time of his dea


Noguchi's 1947 coffee table





Computer Architecture Continued from page 51

finally collapsing in a flurry of Prismacolor. It taught us (for both good and ill, it seems) to separate the act of designing a building from the act of making it, and to explore design ideas by drawing rather than by directly manipulating construction material. (Some, now, don't even think that the making is necessary.) The computational synthesis is teaching us to take a further step: to separate the act of structuring a design, that is of explicitly specifying the conventions, rules and algorithms that generate it, from the act of executing a drawing. We hardly know how to think this way yet. But we are slowly beginning to understand how a computationally schooled imagination might pattern the forms of things unknown.

Case Studies

An architectural firm that wants to begin using computer graphics today has several choices. It can acquire its own system, or it can make use of a service bureau. It can use one of the many available turnkey CAD systems, or a tailor-made system. It can focus upon design functions, drafting functions, or both.

Among the most conspicuous examples of firms that have built their own systems are SOM of Chicago, HOK of St. Louis, and Albert C. Martin of Los Angeles. Turnkey system vendors usually can achieve economies of scale and levels of research and development expenditure beyond the reach of architecture firms, so the rapid growth of the turnkey system industry since the late 1970's has made the build-your-own strategy increasingly unattractive. Indeed it is now out of the question for all but very large firms with exceptionally high levels of expertise in the CAD area.

There are now dozens of turnkey CAD system vendors in America. Most of them began with orientations towards application areas other than architecture (typically mechanical engineering, integrated circuits or mapping) and have only lately given serious attention to the architectural market. The market leader is Computervision, followed by IBM, which has a number of different CAD products. Generally, vendors treat architecture as part of a more broadly defined architecture/engineering/construction (AEC) area which includes architecture firms, space planning firms, architecture/engineering and engineering firms, construction companies and process and power companies. In this particular area of CAD, the leading vendors currently are: Intergraph, Computervision, IBM, Autotrol, Calma, Applicon, Calcomp, Holguin, Summagraphics, Sigma, Bruning, McAuto, Cadam and Synercom. The top three account for more than 50% of all sales.

Continued on page 77

Lichtenstein, Claes Oldenburg, James Rosenquist, George Segal, Jean Fautrier and Antonio Tapies. Most of the pieces were acquired by Panza shortly after their creation, often from visits made to the artist's studios.

"Count Panza's collection," said Koshalek, "is characterized by its commitment in depth to a number of artists, and by its careful selection of pivotal works of the highest quality. The 80 works which are coming to the Museum are extraordinary pieces of the Abstract Expressionist and Pop Art periods, that, through their originality and importance, marked the emergence of a style. These works are considered by many to represent the key period in each of these artists' careers."

Count Panza was one of the eight internationally prominent collectors of contemporary art who contributed works to MOCA's inaugural exhibition, "The First Show: Painting and Sculpture from Eight Collections, 1940–1980," which closed February 19, 1984 at The Temporary Contemporary, MOCA's interim exhibition facility in downtown Los Angeles.

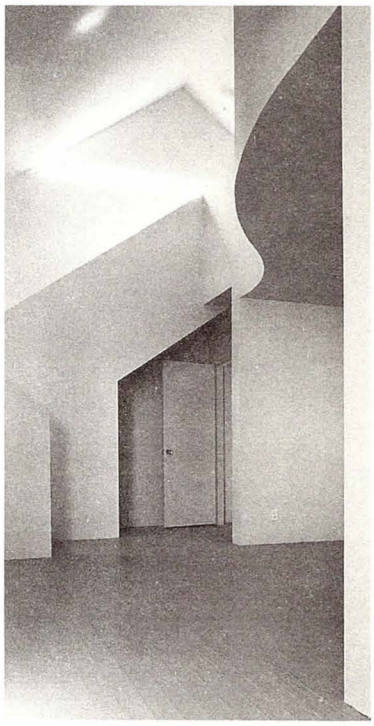
Turrell at Capp Street

Artist/architect Robert Ireland sold his newly constructed, 65 Capp Street building (see *Arts and Architecture*, Volume II, Number 1) to collector Ann Hatch in June, 1983. Hatch appears to be the ideal purchaser; Ireland had wanted to sell the project to a museum interested in housing guests or special events, and Hatch's concerns are similar.

Ireland describes himself as a "post-discipline" artist. He designed and built Capp Street for conceptual purposes alone. The two-and-one-half-story structure's exterior is corrugated steel; its interior is composed of smooth, multi-level planes, edges, and light which is clearly the reason Ireland created the space. Light is omnipresent and in complete control.

Director Ann Hatch and curator Leah Levy want Capp Street to function as a living experiment for site-specific artists. Admission to the project is not easy to obtain. An advisory board invites a chosen group of artists to apply for further considerations. An accepted artist must live at Capp Street for two to three months, and create an art work specifically for the space. The completed project is publicly exhibited. Finally, the project is removed and the space is restored to its original pristine state: just as each artist finds it, and as Ireland created it.

James Turrell, the artist/occupant during May and June, creates site-spe-



Interior by David Ireland

cific work appropriately comparable to Ireland's use of light and space. Turrell is keenly interested in the perception of space and how an individual inhabits that space. Physical surroundings are second only to the atmosphere of the artist's environments, which he sees functioning as objects. Light and color play secondary roles as well, serving as reinforcements to the act of perception.

Turrell's ongoing project is the Roden Crater in Arizona. Unlike the Capp Street space, where an enclosure already exists, Turrell's crater piece is centered on the audience's ability to enclose their own spaces, ideally using the stars at night as a boundary. (The artist was less specific as to the creation of a boundary during the day). A highly personal awareness of sky and space results, according to Turrell. For Capp Street, the artist will utilize the same metaphysical approach, the only plan of execution which he brings to the project.

Upcoming artists chosen for Capp Street are Phil Simkin, Joan Logue, Barbara T. Smith, Bob Jones and Tony May. The future of Capp Street, says curator Levy, ". . . will be determined by the art more than the artist. We want to let it [the art] go and see how it evolves."

Olympic Arts Festival

Over 400 performances as well as 22 exhibitions will occur in Los Angeles during the Olympic Arts Festival, June 1 through August 12. When festival director Robert Fitzpatrick was asked how one would choose among the best of the offerings, he responded, "Anyone would be a fool to miss anything."

With 30 companies performing in Los Angeles, theater is the most visible of the arts. Also included are 25 dance troupes, 21 music companies, 29 exhibitions, festivals and film events.

Fortunately, not all Olympic arts events are easily categorized. One example is "Olympic Trials, A Chick Hazard Mystery," a semi-improvisational theatre production (the audience is invited to help solve the play's mystery), performed by Los Angeles' Groundlings, at the Groundlings Theatre. Another is Pina Bausch's Wuppertaler Tanztheater, a radical dance/performance company from Germany which will be performing "inventions" at the Pasadena Civic Auditorium. This was the only event Fitzpatrick was willing to note above all others, "for its juxtaposition of opposites," a quality which has been made an unofficial trademark of the festival. "One doesn't expect dancers to speak and her dancers do," Fitzpatrick added. Certainly the entire happening is full of the traditional and the new.

The revolutionary Piccolo Teatro di Milano will be at UCLA's Royce Hall, where the Royal Shakespeare Company will also appear performing *Much Ado About Nothing*. LA Theatre Works performs *Agamemnon* at MacGowan Hall, also on the UCLA campus, and Los Angeles Actors' Theatre presents the world premier of *Sherlock's Last Case*.

The Pasadena Civic Auditorium is home to most of the dance events, which are particularly varied. Los Angeles' Lewitzky Dance Company will perform two concerts, including an untitled world premier. Twyla Tharp Dance gives two performances, both of which will include the notorious "Bad Smells" which combines dance and video. The Merce Cunningham Dance Company and the Los Angeles and San Francisco ballets perform concerts as well. Japan's erotic and yet mechanistically rigid Sankaijuku Dance Troupe will make its United States debut. Also making its American debut is France's Group Emile Dubois, will perform "Ulysse," a my piece inspired by James Joyce's *ses*, at the Japan American The

Michael Tilson Thomas co the Los Angeles Philharmonic Hollywood Bowl on July 27, the before opening ceremonies Games. Soloists Placido Don Paul Plishka, Florence Quivar a nita Valente will accompany the harmonic. Also at the Bowl wil six-hour jazz marathon, and a r tion of Handel's *Messiah*. CalAr nual Contemporary Music Fest being held at the Japan America atre. The Royal Opera of Coven den will give 11 performances Dorothy Chandler Pavilion, m another United States debut f festival.

Robert Graham's *Olympic Ga* sculpture will be unveiled duri inauguration of the arts festi June 1, at the Los Angeles Me Coliseum. Seven-foot male and torsos are surmounted on the high bronze structure.

"The California Sculpture S organized by the California In tional Arts Foundation, at Fisher Art Gallery will exhibit 1 scale works by well-known Cal artists, including Robert Ar Charles Arnoldi, Manuel Ne Michael Todd. The Museum o temporary Art's Temporary Ca porary will hold two major exhil "The Automobile and Culture" onstrates the effects, both men physical, cars have had upon n society. Twelve established and ing artists have been commissio "In Context," in which both and previous works will be ex by each participant.

A retrospective of Los Angele Carlos Almaraz' work will be th one-man show in the festival. T hibit will be held at the Los A Municipal Art Gallery in Ba Park.

The American Film Institu hold a video festival on its camp 13 through July 15. The Los A International Film Expo (FILMEX), to be held July 5 t July 20, will salute the Olympi a 50-hour marathon of 30 film use sport as a metaphor for the condition.

For specific dates and ticke mation, call (213) 741-7777. brochures are available at First state Bank branches in Califor

capacitor bank in the Fermilab master substation

ıel of the main accelerator at Fermilab

/ilson *Continued from page 63*

well as a sculptor. I could criticize their As a physicist, I could calculate what the ers had done and say that this was heavy d, that they had put in two factors of too many.

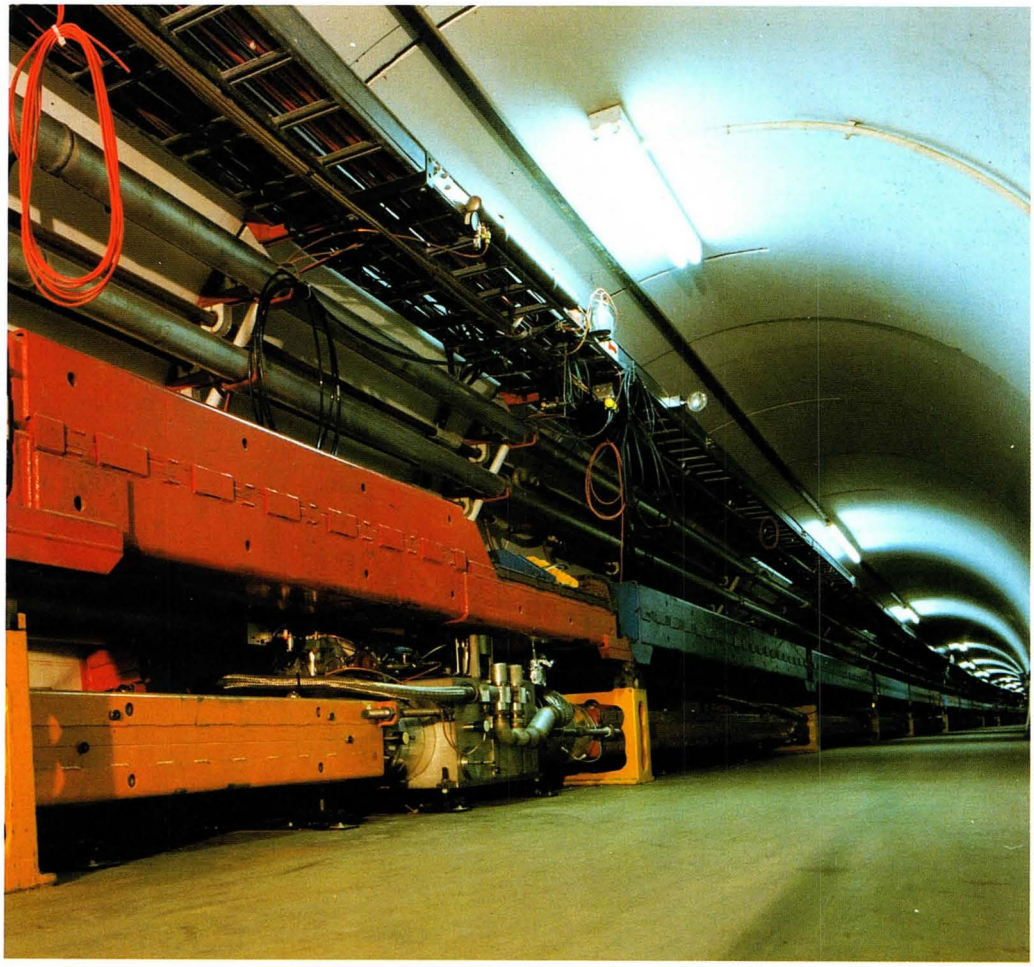
what happened with the power poles?

gineers were just outraged when I said ıe power poles they wanted to put up uite ugly. I didn't want them going across e, dividing the field. I thought they were e. So I designed my own power poles and ted the design. The poles were slender e experts said that they wouldn't hold up, blow down. They were used to putting poles on a fairly narrow strip of land. But ll the land in the world, so we could run out far enough to support them.

first reaction was look, you design the ator and we'll design the power poles. said no, I didn't like their power poles. ad a tremendous amount of experience in pole design and I didn't. They asked me ould I feel if they said they wanted to the accelerator? I said I'd feel pretty bad that. The difference was, though, that I e one who was paying them.

hen, was your primary concern: to have a ful physics laboratory or simply a beautiful ory?

ed to me that the conditions of its being a ul laboratory were the same conditions being a successful laboratory. It had to derstood. If something has an aesthetic to it that means it has some reasonable ty underlying it. In a scientific work as in an artistic work, being understood is a communication. People in the lab understand that they are a part of it. They participate in an artistic way, in a felt way. So I don't think there is a great deal of difference.



I understand that your approach to Fermilab's access road was also somewhat unorthodox; you made no land surveys, but just took a walk through the woods and said, "I don't want to chop that tree down."

I didn't want to chop *any* trees down. I went out and walked through the woods and essentially put down stakes so that we didn't have to cut down any of the big old oaks. We cut down some little trees. A civil engineer laid the road out in a straight manner while my road was a very curvaceous road. It was impossible to travel it fast. I guess I was imposing a value of mine on everybody who was going to come down that road thereafter. They were going to have to take it slow and enjoy the woods. Well, the engineer was outraged at the idea of putting in such a road. Roads must have a certain degree of straightness. They have a logarithmic curve. They go slowly. They have their own beauty. He felt strongly about that, so he resigned. I thought that was fine. To him a beautiful road was a road that had a gentle curve of a particular kind. It should be mostly straight and then go into some nice gentle rhythm. To him that was much more beautiful than some trees. He really felt that he could not compromise, so he quit. I was impressed that he would do that. It wasn't just a job. He was going to do that job in the right way.

So ultimately everything you touched became a personal sculpture—the road, the power poles, the accelerator ring. Is the pond a work of art, too?

Water was an important element. By having a pond we avoided having to use air coolers for the accelerator, very ugly things. What I did was make a pond which I thought was quite pretty and then put the pond to work. It's a kind of continuous stream which goes down and is pumped up again and down and pumped up again. The water cools the magnets in the accelerator. It's sort of like an Escher piece, it just goes 'round and 'round, always going downhill because you can't see where it's getting pumped back up.

Apart from the sculptural quality of the laboratory, do you believe that aesthetics can play a role in science?

I think that in sculpture and painting the purpose is understanding. It explains what we see. Usually, it simplifies. Sometimes it provides some-

ıew that we haven't seen before. And I ɜ that science is exactly the same. It is a : seeing nature that is different from what seen before and makes it simpler. In- ıf a tremendous complexity, suddenly it's ɜd together in beautiful symmetry. I don't ɜ difference. And usually scientific princi- e founded on an aesthetic whole. People ıstein and others who have discovered ırinciples used their sense of aesthetics in the way for discovery. If their theory ook beautiful it was discarded. In many the evidence seemed to point toward a omplicated way of looking at things—at ts. But these scientists felt very strongly ınust be simpler in order to be beautiful. ɜld their grour.d and eventually their the- d turn out to be simpler. So aesthetics is a looking at nature. The way that science es nature is based on aesthetic decisions. is very close to art in the sense that ou examine nature on a small scale, you iversity in nature, you see symmetries in you see forms in nature that are just ut- ɜlightful. Eventually, in the way that one t sculpture or art, people will also begin at those great simple facts.

)ackman is Public Relations Director of loratorium in San Francisco. Her articles o appeared in *Artweek*.

hostile towards the flashy pragmatists of the "Venice" school of architecture, architects like Frank Gehry and Eric Moss who might otherwise be seen as Eames' natural heirs in their precious use of the common building products: sheetrock and stucco, chainlink and asphalt shingle. But, let's be generous. Perhaps the only program of these architects is liberation from the tyranny of hut and machine alike; a quest for poetry in the actuality of building economy, its cheap materials, its impermanence, its expediency. Theirs is a low regret strategy with its own tradition in Los Angeles; here today and gone tommorow, so what? it seems to say.

Now, that attitude may be subversive with respect to the traditional premises of architectural ideology. It seems to renege on moral obligations, to accept the unacceptable, and to lead us only to social and cultural stagnation. Jencks sees these architects as leading a seductive but decisive drift towards a "tawdry pathos." For Frampton, theirs is an attitude of "genial yet narcissistic cynicism." I see something different. I see a decisive rejection of both hut and machine in favor of a pragmatic relationship with material reality, an acknowledgement of the ephemeral nature of modern building, and a groping quest for an appropriate posture in which to await the true death of modernism which will only happen when material and financial conditions change for the first time in 200 years.

The sin of this position, in the eyes of traditional critics, is that it is an "acritical and false avantgardism that deals in the wholsesale displacement of signifieds" (Frampton). Precisely. It is a response to irreversible and universal changes in the order of things exemplified by the dominant technologies of today—shortlived, microscopic, vulnerable, static and inscrutable, a far cry from the biplanes and grain silos that inspired the moral positions of modernist ideology all those years ago.

From this new perspective even the most refined of today's high technology architecture seems quaint and scenographic, or at least irrelevant. Thus the Venice school *is* critical, but critical of the self-deluding inadequacies of weary ideologies that cannot fulfill their promises. They are waiting out the millenium along with the new-wavers. "With a culture like this who needs art" might be their slogan. Until then, as Ada Louise Huxtable points out, "modernist and post-modernist buildings can all make the same bad music, only in different keys."

Andrew Rabeneck is a principal at the Ehrenkrantz Group in San Francisco.

Applied Research of Cambridge (England) was a pioneer in developing and successfully marketing CAD systems designed specifically for architects. Their GDS and BDS systems are distributed in the U.S. by McAuto. A recent Silicon Valley startup which targets the AEC market is Tricad. Another particularly innovative and interesting new entrant is Formative Technologies of Pittsburgh.

Almost without exception, turnkey CAD systems have been designed, marketed and used primarily as drafting productivity tools. Entry costs have been high (typically several hundred thousand dollars), and the direct yearly cost of a workstation has typically worked out at about $50,000. They have mostly been used, then, by larger firms that have a high and steady flow of drafting work.

Computer drafting service bureaus make the technology available to architecture firms that are unable, unwilling, or not yet ready to make an investment in an in-house system. Their numbers are growing, and the competition between them is becoming intense. Two pioneering service bureaus in California have been Continental Graphics of Pasadena (with a McAuto GDS installation) and Design Logic of Oakland (with a Calcomp system).

There has been little regular use of turnkey CAD systems for design rather than production drafting. There are three main reasons for this. First, most systems have functions and user interfaces much more directly suited for drafting than design. Secondly, with current CAD technology, it is usually more cost-effective to allocate workstation resources to drafting. Third, presently very few design architects have sufficient direct experience with CAD to feel comfortable with it. There are exceptions, of course; most firms that actively use a CAD system can boast one or two adventurous designers who have begun to recognize and explore the special potentials of computer graphics as a design medium.

This situation will slowly change, as the cost of CAD systems continues to drop, as these systems begin to support a broader range of design functions, and as schools of architecture produce graduates with strong computer graphics backgrounds. We can eventually expect it to become as commonplace to design directly on a CAD system as it now is to write directly on a word processor.

William J. Mitchell is head of the Architecture/Urban Design Program at UCLA, and principal of the Computer Aided Design Group, Santa Monica. His forthcoming books include *The Logic of Architecture* and *Using Computer Graphics*.

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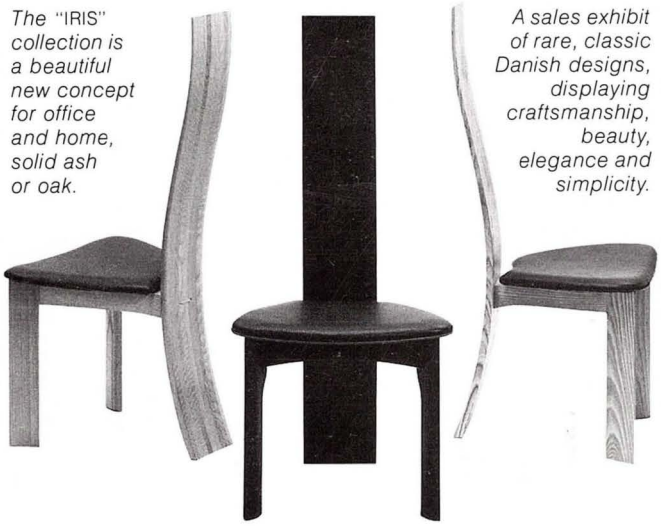

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