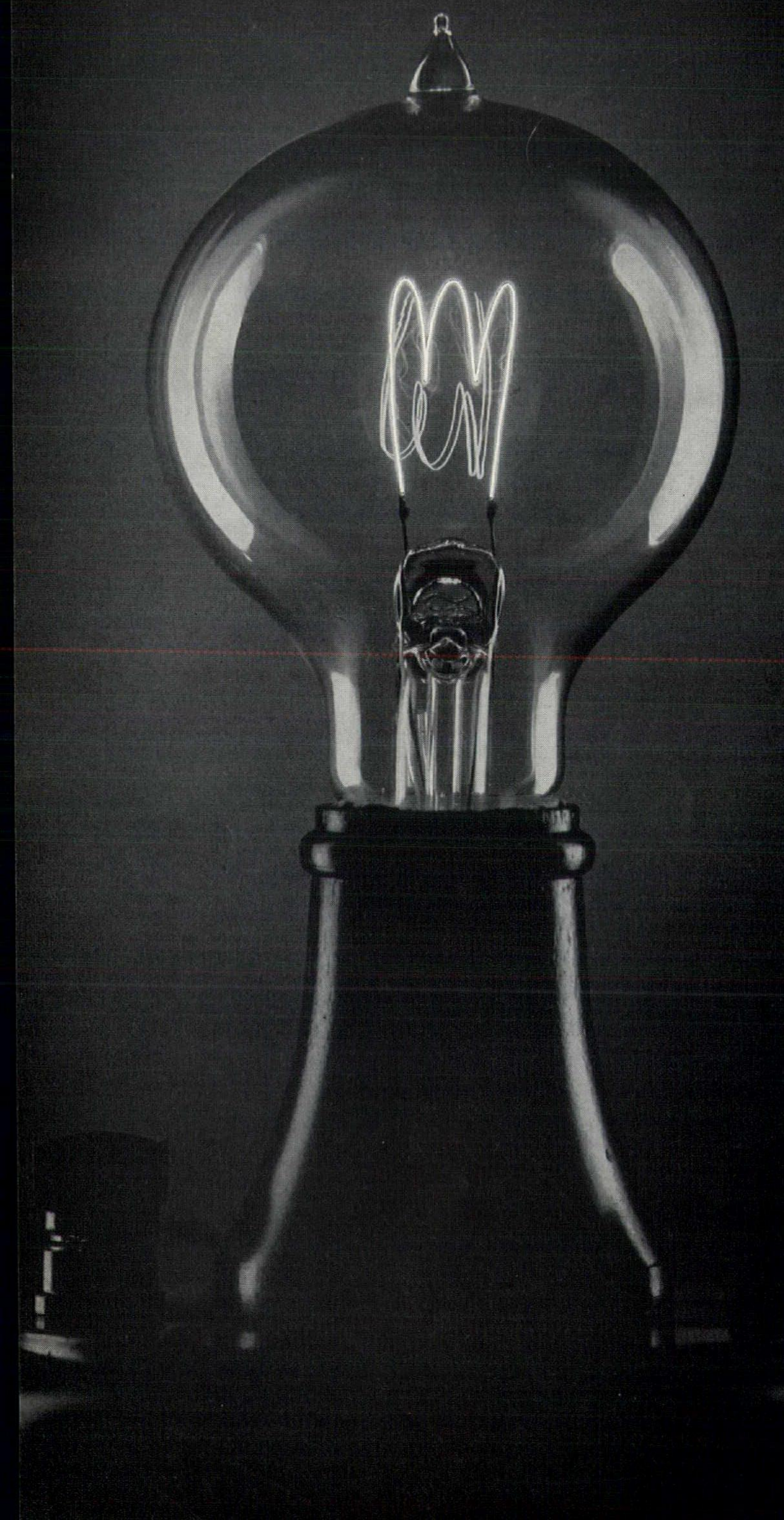
indiana architect

January, 1970



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indiana architect/ Official Journal, The Indiana Society of Architects, The Northern Indiana Chapter, The Central-Southern Indiana Chapter, and the Indianapolis Chapter of the American Institute of Architects.

JANUARY, 1970 VOLUME XIII, NUMBER 5

ISA ART EXHIBIT

Paintings and sculpture by members of Contemporary Arts Infinite now on display at the ISA office, 300 East Fall Creek Parkway, Indianapolis, include:

"FARM IN THE CITY," by Wilbur Meese (water color)

ADAM and EVE," by Dave Love (sculpture)

"AIRPLANE," by Dave Taylor (jesso drawing)

"DESIGN 311," by Marcia Schroeder (ink impression)

"RILEY HOME," by Larry Roesler (water color)

"SOLITUDE," by Jesse Collins, Jr. (mixed media)

"LOG CABIN," by Robert Doyle (tempra)

"SPACE WITHIN," by Howard Frank (mixed media)

"SPRINGTIME IN WILLIAMSBURG," by Dick Wilcoxen (water color)

"STILL LIFE," by Bill Heckler (oil)

"RED AND GRAY," by Frank Persell (water color and ink)

"LIGHT THEME No. 2," by Frank Persell (water color)

"WINTER IN THE PARK," by Ray Doyle (tempra)

EDITORIAL STAFF

Editor
DON E. GIBSON, Hon. ISA

Art Director
LARRY ROESLER

The INDIANA ARCHITECT is the sole property of the Indiana Society of Architects, a state association of The American Institute of Architects, and is edited and published every other month in Indianapolis, Indiana (editorial-advertising office address 300 East Fall Creek Parkway, N. Drive, Indianapolis, Indiana 46205; phone 925-4484). Current average circulation per issue, 3,200, including all resident registered Indiana architects, school officials, churches and hospitals, libraries, public officials, and members of the construction industry. Detailed information available on request.

News

Two Indiana architects are chairing national AIA Committees this year, one is president of the national AIA Foundation, and ten serve as national committee members.

Indianapolis Architect H. ROLL McLAUGHLIN AIA, architectural preservationist and partner in James Associates is chairman of the renamed Historic Resources Committee (formerly the Committee on Historic Architecture), and CHARLES SAPPENFIELD AIA, Dean of the College of Architecture and Planning at Ball State University in Muncie is chairman of the Joint Committee on Education.

Gary Architect and former AIA Treasurer Raymond F. Kastendieck FAIA is the current president of the American Institute of Architects Foundation, Inc.

Other committee assignments for Indiana architects include:

JAMES M. TURNER AIA, Hammond, Committee on Administrative Office Practice (contributing member).

WAYNE M. WEBER FAIA, Lafayette, Committee on Building Industry Co-ordination (contributing member).

E. H. BRENNER AIA, Lafayette, Housing Committee (contributing member).

EUGENE C. BROWN AIA, Indianapolis, Housing Committee (contributing member).

WALTER FLAGG AIA, Indianapolis, Housing Committee (contributing member).

EWING MILLER AIA, Terre Haute, Committee on Architecture for Education (contributin member).

JOHN C. FLECK AIA, Indianapolis, past ISA president, Committee on Architecture for Health (contributing member).

WILLIAM J. BACHMAN FAIA, Hammond, Committee on Future Conventions.

DAVID HERMANSON, ISA Assoc., Muncie, Historic Resources Committee ((contributing member).

THOMAS R. KEENE AIA, Elkhart, Documents Review Committee (contributing member).

Kentucky, Indiana's sister state in the East Central Region of the AIA, provides two committee chairmen and six committee members.

Regional Director A. BAILEY RYAN AIA, of Louisville, remains chairman of the national Public Relations Committee, and Donald L. Williams AIA of Louisville chairs the Regional Development and Natural Resources Committee. Committee members from Kentucky include:

K. NORMAN BERRY AIA, Frankfort, Joint Committee on Public Education (contributing member).

DONALD E. SCHNELL AIA, Louisville, Committee on Building Industry Cordination (contributing member).

HARLEY B. FISK AIA, Covington, Committee on Architecture for Commerce and Industry (contributing member).

BYRON F. ROMANOWITZ AIA, Lexington, Joint Committee on Education (contributing member).

ROBERT E. OLDEN AIA, Lexington, Component Affairs Committee (contributing member).

CHARLES P. GRAVES AIA, Lexington, Task Force on Classification of Membership.

———AIA———

Gilbert T. Richey AIA has retired after 35 years with the Indianapolis architectural firm of McGuire, Shook, Compton and Richey, Inc. Mr. Richey graduated from the University of Michigan and joined the firm (then McGuire & Shook) as head of the drafting department in 1934. He was made a partner of the firm in 1960, and became president in 1966.

Mr. Richey served on the Advisory Committee of the Indiana State Administrative Building Council and has long been active in professional committees and activities.

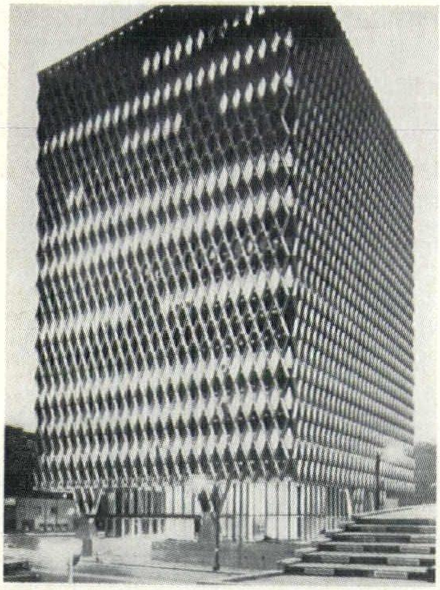
———AIA———

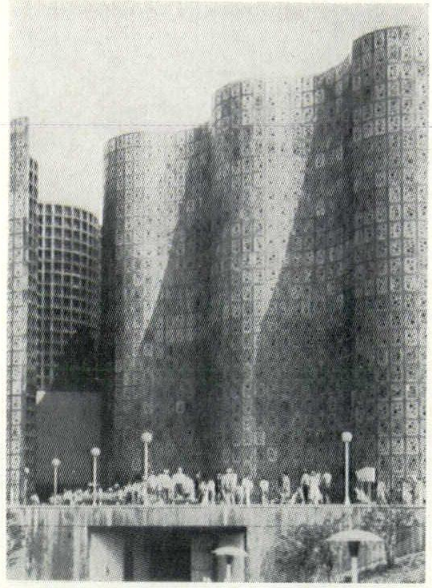
Bohlen, Burns & Associates, Inc., Indianapolis architectural firm, has announced a change in the firm name to Bohlen, Meyer, Gibson & Associates, Inc., Architects and Engineers. Mr. Melvin Meyer AIA and Mr. John Gibson AIA, both of whom have been associated with the firm for the past twenty years, join Mr. August Bohlen AIA in the firm name. As senior member of the firm, Mr. Bohlen has been practicing architecture for more than sixty years.

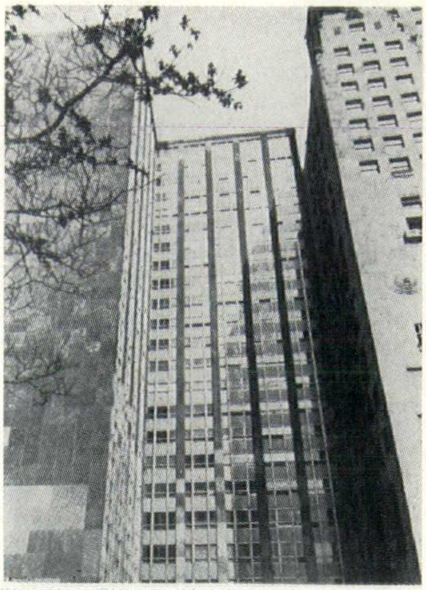
The newly named firm continues the practice of architecture founded as D. A. Bohlen & Son in 1853.

———AIA———

New officers for the Northern Indiana Chapter AIA were elected at the Chapter's annual membership meeting in December, with Fort Wayne Architect James J. Schenkel AIA taking office as president. Keith L. Reinert AIA of Hobart, was elected vice-president; Paul O. Tanck AIA of Valparaiso elected secretary; and Robert W. Stevens, Jr., AIA, of Huntington, elected treasurer.


IBM Building, Pittsburgh, Pa.


New York Museum of Science & Technology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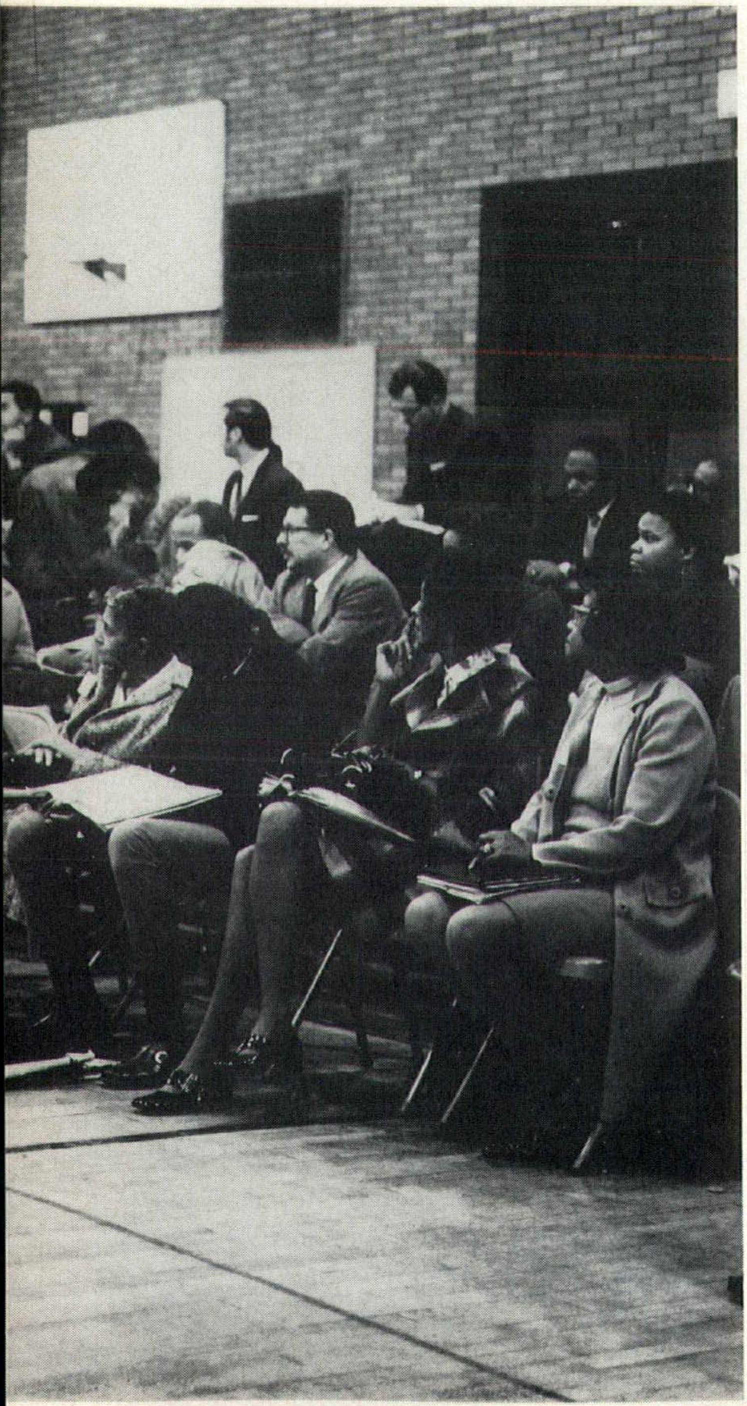
CHARRETTE

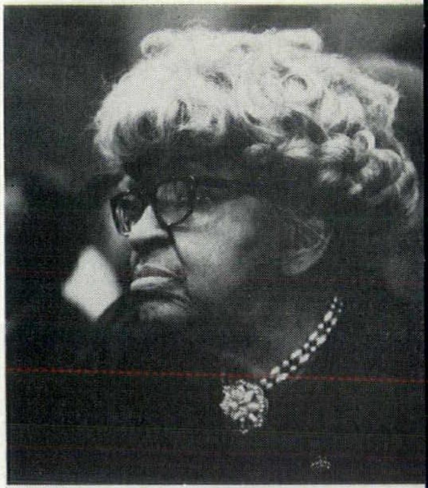
Indianapolis hosted an unusual experiment in education and architecture last month — an Educational Facilities Charrette.

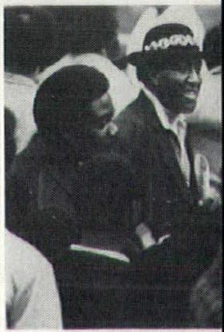
Conceived as a technique for studying and resolving educational facilities development problems within the context of total community planning needs, the intensive discussion- planning sessions covered eight solid days. The U.S. Office of Education, the Indianapolis Public Schools and the Indianapolis Model Cities office sponsored the Charrette, with signifiant help from the Ball State College of Architecture and Planning students.

The experiment invloves a majority representation of community residents as clients, and community leadership direction of a multi-disciplinary group — educators, planners, architects, engineers, economists, psychologists, business representatives, local public officials and students — intensely studying community problems in open public forum to achieve creative solutions. Primary emphasis is given to educational facility and program as the natural catalyst for revitalization of the total community. The principal purpose is to arrive at implementable plans and solutions to community problems in a compressed time period.

The school project "charretted" was the proposed elementary school to be constructed at 25th and Ralston Streets in the Model Cities area of Indianapolis. Indianapolis Architect Evans Woollen has been selected as architect







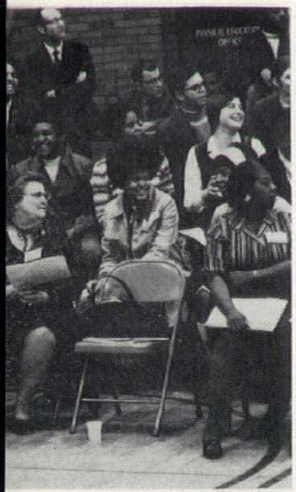
for the project,
and he served as a member of the Charrette steering committee.

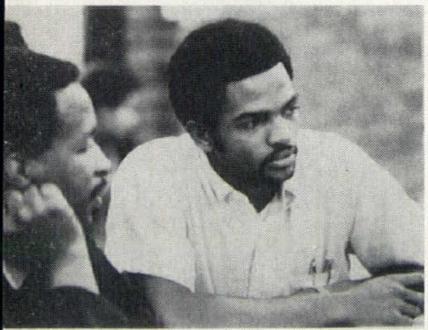
The eight days of brainstorming included committee investigations into full educational programs transportation, employment, goods and services, health, library facilities, community organization and manpower utilization. The program developed envisions a facility far more than an elementary school, serving as many needs of as many community residents as possible on a 24-hour-a-day, twelve-months-a-year basis, through a health center, employment office, nursery, government assistance office, activities and entertainment center, training center, and school.

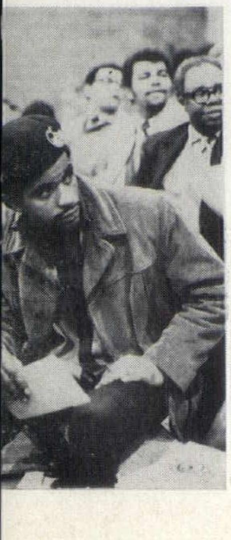
Thirteen Ball State architectural students attended the committee meetings and public forums, then translated the needs and desires of the community into graphic presentations. The "product" of their efforts covered three entire walls of the gymnasium which housed the forums.

Those participating were: fourth year students Eric Anderson, Jim Bailey, Bill Braswell, Jack Houghton, Ron Lake, Norm McDermott, Greg Gammons, Dan Ludington, Jay Korte, Terry Minor and Harry Eggink, all from Professor Marvin Rosenman's educational facilities design studio. Also involved were Elwood Jee, fourth year and Mike Cummins, freshman.

The students worked under the direction of Architecture Professors Rosenman, Dick Pollak and Tony Costello and Landscape Architecture Professor



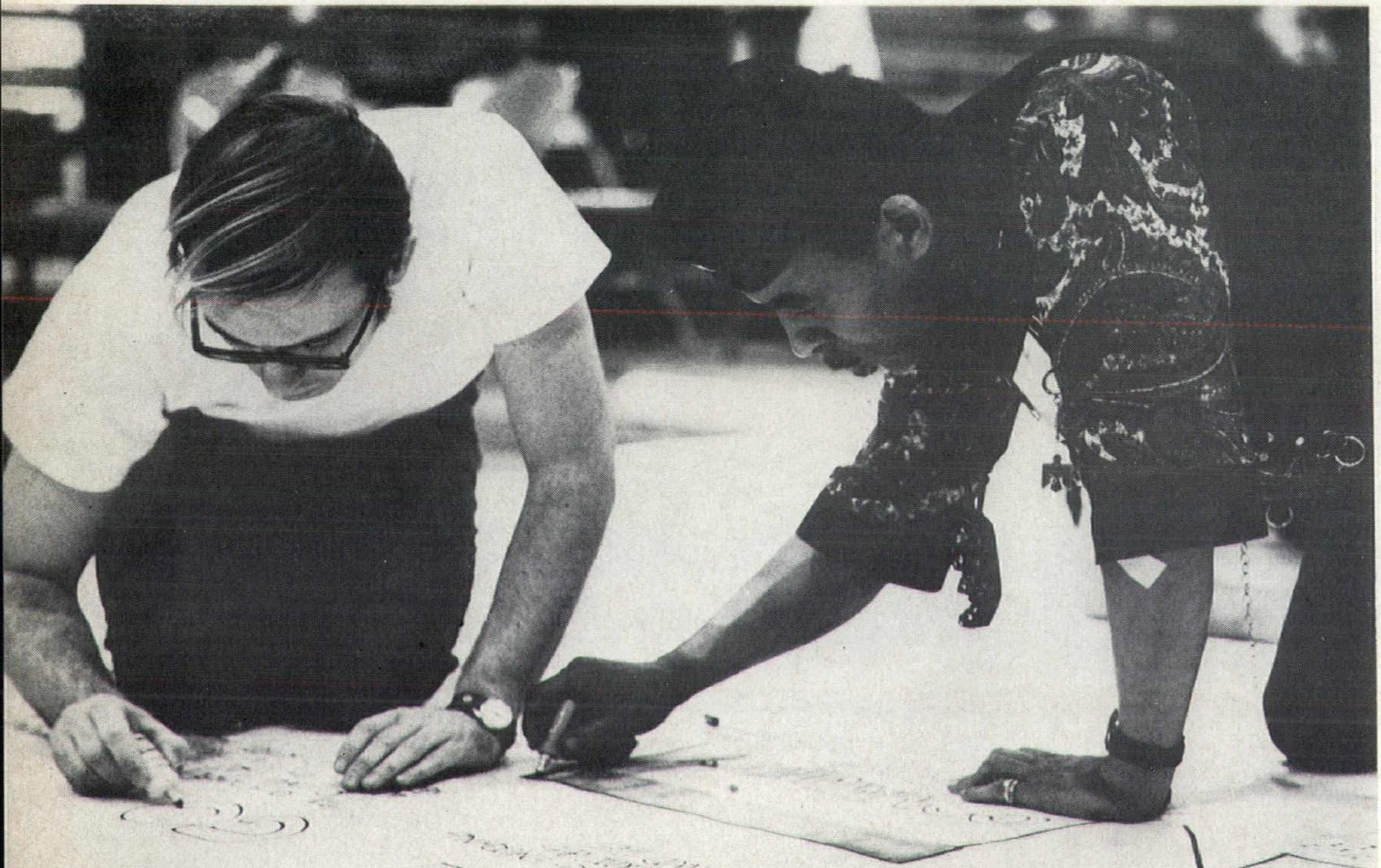




John Lantzius. Six of the students spent most of their Christmas vacation working on other Model Cities activities, directed by Professor Pollak.

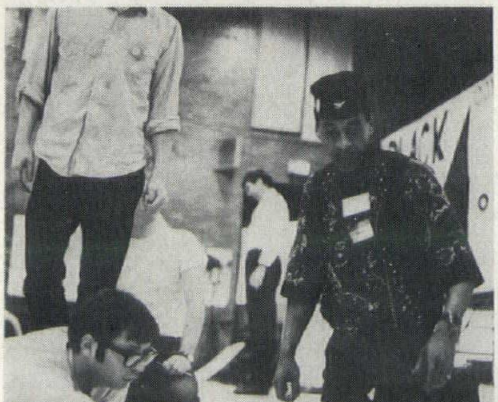
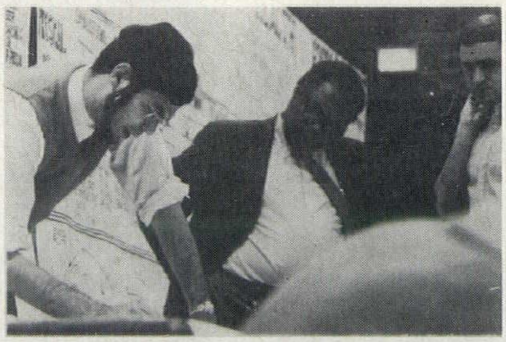
Primarily a Charrette is people, and some of the emotion, the intensity, the spirit of the Indianapolis Charrette were captured in these photographs by Greg Gammons.

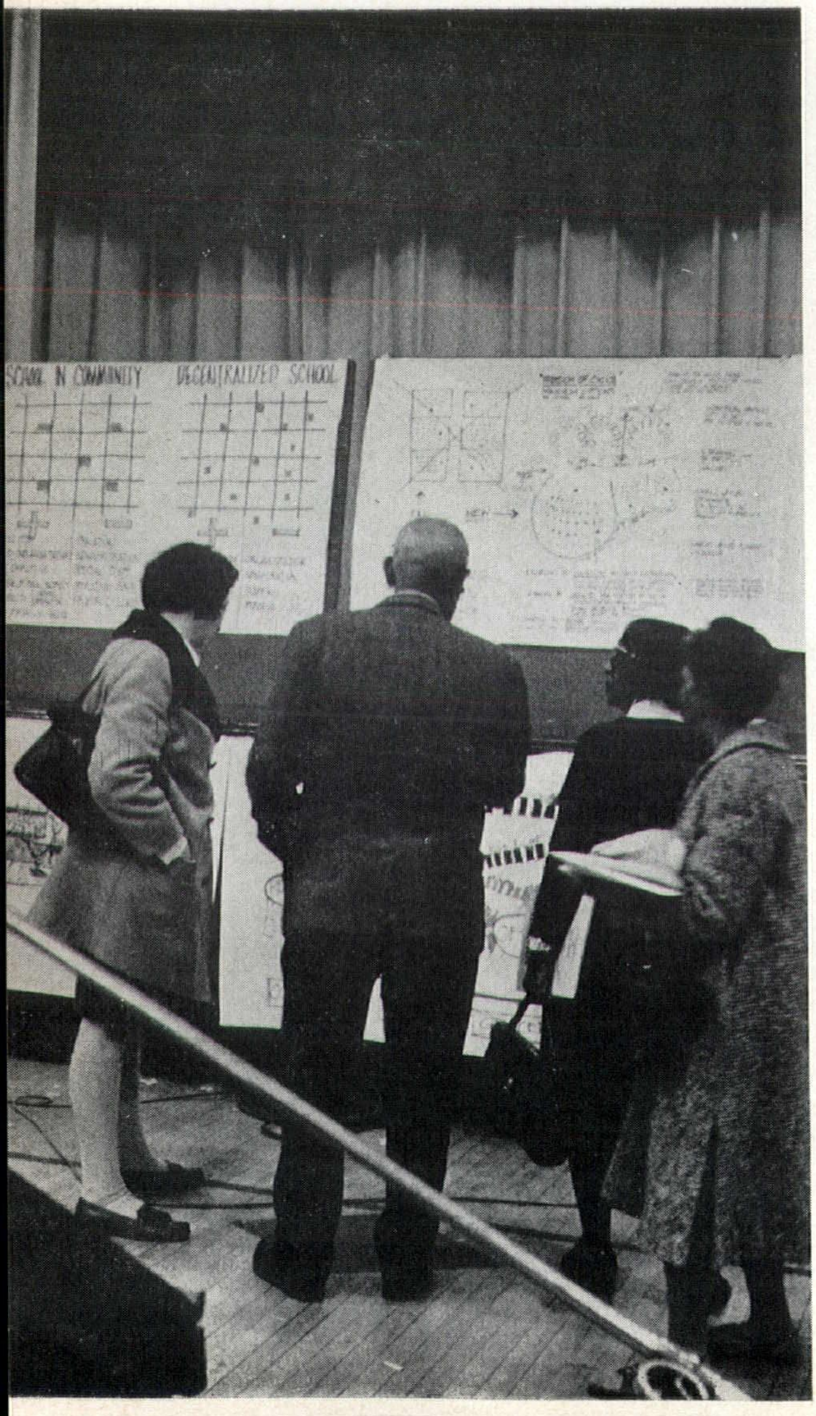
Composition is by Professor Rosenman.

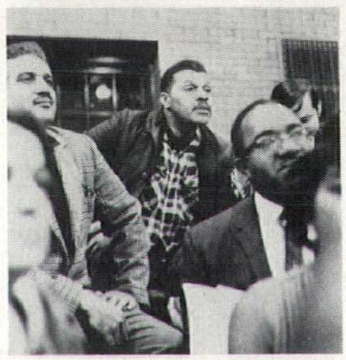





SCHOOL


DECENTRALIZED SCHOOL




operate

HOLOGRAPHY AND ARCHITECTURE

By ALAN MONKEWICZ

Introduction

Throughout the ages the architect has been plagued by the problem of how to represent space in such a manner that the viewer will have a realistic idea of the architect's intentions. Various techniques have been tried with more or less success: Model building, projective geometry, two-dimensional drawings from three different views. However, in the long run it has been the model which has been the best form of communicating the architect's idea to the prospective client. It is in the model that the viewer can see the three-dimensionality, the relative sizes, and in essence, the total picture of what the architect proposes. It is is in the model that the true beauty, shape, form, and architectural philosophy of the design is presented most completely.

Unfortunately, as the times have changed, and people have scattered, it has become less simple for the architect to present his model to those interested in viewing it. When presentation of his design necessitates travel to other parts of the country, the carrying of a model can become cumbersome, if not impossible! In these cases, the architect may resort to drawings of one type or another or he can underwrite the expense of transporting prospective clients and interested viewers to the location of the model.

Another method, which can be used and has not been mentioned, is that of photography. Black and white or color photographs of various aspects may be taken and used to partially demonstrate the building concepts of the architectural design involved. However, again the limitation of representing a three-dimensional object in a two-dimensional form is encountered. It is with these thoughts in mind that I propose the use of a three-dimensional tech-

Professor Alan A. Monkewicz, Ph.D. (Physics), is Assistant Professor of Electrical Engineering at the University of Notre Dame. A graduate of Catholic University of America, Professor Monkewicz currently is involved in research in Mie Scattering Applications, Brillouin Scattering in gases, uses of holographic interferometry, and application of holography in architectural display.

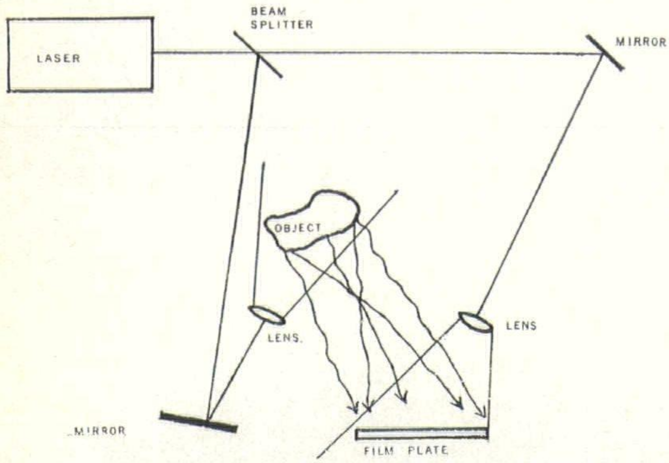


FIGURE 1

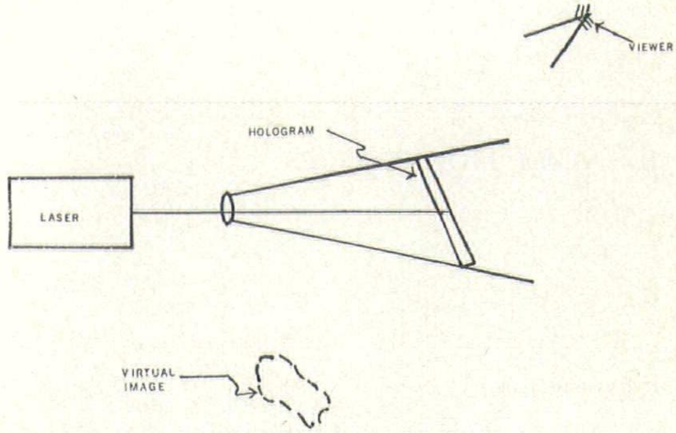


FIGURE 2

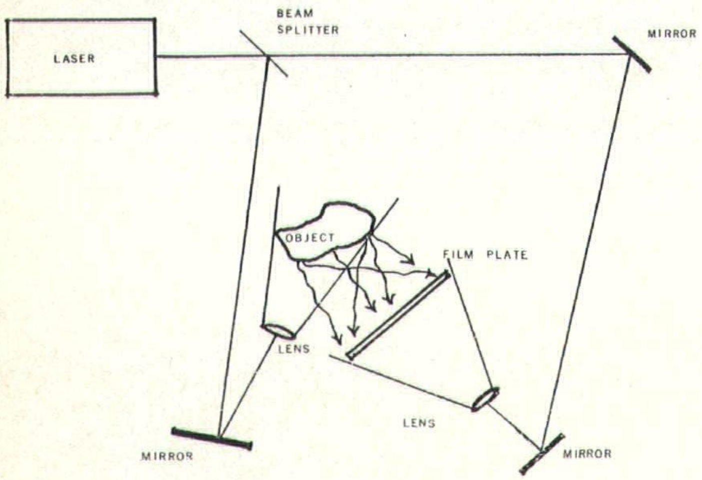


FIGURE 3

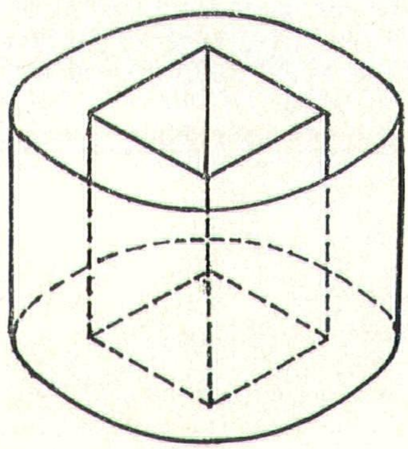


FIGURE 4

nique as a solution to this dilemma of the architect. This technique is called holography.

Intuitive Views of Holography

The advent of holography in a sophisticated, commercialized manner is offering to the architect a means of "transporting his models" with him in a two dimensional form. However, before I continue with the delights, advantages and promises of the magnificent hologram, it would be more enlighting if I were to describe what a hologram is and develop the concepts of holography. For ease of understanding, I will introduce two intuitive views of the hologram. One is to liken the hologram to a phonograph record and the other is considered it is a window in space.

In sound reproduction, the phonograph record plays the following familiar role. Sound vibrations from a singer or musical instrument impinge on an electronic converter, i.e., a microphone, which converts the sound pressure into electrical pulses. These electrical pulses are then transformed back into pressure pulses that are implanted on the surface of a plastic disk — a phonograph record. By placing this phonograph record on another machine (record player) the pressure indentations are transformed back into electrical impulses which activate a speaker. In this manner one obtains sound reproduction. Quality of the sound reproduction depends on the microphone, on the type of record, on the amplifying and speaking systems. An analogous role is played by the hologram in the field of light, or optics. In this case, light is reflected from a three-dimensional object, and impinges upon a photographic plate (object beam). On the plate the light from the object is combined with the light from a reference source (reference beam), and the interference pattern due to the combination of the beams is recorded on the photographic plate. This pattern in no way resembles the original three-dimensional object but consists of lines, swirls and a seemingly random concoction of light and dark fringes. After a normal photographic developing process the plate, which is now called a hologram, is ready to be played back. By playing back, we mean that a laser or other appropriate light source is transmitted through the hologram in approximately the direction in which the reference beam impinged on the film plate originally. Voila! The image of the object is seen! As with a phonograph record, the clarity of the reconstructed image depends upon several quantities; the quality of the original film, the nature of the light source, and the techniques of operation.

Therefore, when we say that the hologram plays a role in optics which is similar to the role that the phonograph record plays in a acoustics, we mean that the hologram is a two-dimensional means of storing information concerning a visual scene which we wish to reproduce at some later time.

Now the normal monaural record can be likened to the usual two-dimensional photograph, whereas the stereo record and its associated equipment can be likened to the hologram. Monaural recording yields the tonal reproduction but without accurately placing in space the positions of the various instruments, musical sounds or accoustical qualities.

Two-dimensional photographing reproduces a scene for us, but with it we lack parallax and distances become warped and relative to whatever lens mechanism is used. In the stereo phonograph record, not only is the tonal quality reproduced, but the space location of the various instruments is also reproduced, i.e., sound is "present" in three dimensions. Similarly, the hologram is a three-dimensional representation of the visual space.

In order to better understand the meaning of "three-dimensional representation of visual space" it would be advantageous to consider peering through a window. By standing relatively far away from a window of size, say 8″ by 10″, we experience a certain limited view which is defined by the dimensions of the window itself. If we move either to our right or to our left, this scene changes, at least in the relative position of objects we are viewing (parallax effect). (Parallax is a standard mechanism by which we, as human beings, determine the

relative location of objects. Those of you who have pursued this method have found that parallax is a relatively accurate means of locating exact positions). As we move, new objects may come into the scene; old objects may go out of scene. The same is true of a vertical motion also, either upward or downward. Again, the parallax effect is noticed and because of the limited view objects enter into and depart from our sight. Upon moving closer to the window, we notice that more and more comes into our field of view. Aspects and/or objects which were originally cut off by the aperature of the window are now seen simply because the angle of acceptance for visualization has increased. In addition, the parallax effect remains. Holograms can be considered as windows in space, i.e., the visual aspects of viewing scenes through windows are identical to what is experienced in viewing a hologram. True three dimensional viewing is possible.

By now, we have a somewhat intuitive picture of the hologram, i.e., it plays a role analogous to that of the stereo record in sound reproduction and can be compared to a window through which we view a scene. For the architect, the window analogy is particularly important since it means that by producing a hologram of a model, taking it with him and by playing it back with appropriate techniques, he can present to those interested a view of the model exactly as it would be seen by looking through a window of the same size as the hologram. Moreover, the viewer not only has a three dimensional view of the model, but at the present time, he has a colorful and exciting scientific phoenomena to observe! At Notre Dame our windows are usually four inches by five inches. However, within the field of holography, these dimensions have been extended to as large as two feet by two feet, a very sizable window, indeed:

Producing a Hologram

The actual making of a hologram, a relatively simple process, is illustrated in (Figure 1) which shows a representation of a laser, the object of which we wish to make a hologram and the location of the film plate. Notice also that a portion of the laser beam is striking a mirror, diverged by a lens and is impinging upon the photographic plate. By use of a beam splitter (partially reflecting mirror) at location (1), mirrors and diverging lenses at the positions indicated, it is possible to illuminate the object using the same laser.

It is essential in this type of hologram that the same laser be used to illuminate both the object (with what we called the object beam) and the film (with what we called the reference beam). This is necessary since the hologram depends upon an optical concept referred to as coherence, which is a measure of the phase relationship between different beams, i.e., how do the two beams interfere with each other, either in a constructive or destructive fashion. The coherence is the ultimate critera as to the quality of a hologram and as to the feasibility of making a hologram of an object of a certain size.

Returning to the figure; we have impinging on the film plate both a reference beam and a beam reflected off an object interfering with each other at the surface of the film. This interference, as I mentioned, can be either destructive or constructive, i.e., there can be either an increase in the amount of light or a decrease in the amount of light. The intensity variations are then recorded by the emulsion. This record is a series of lines of alternating intensity. These lines' may form loops or swirls they may be straight, may be curved . . . the pattern is very complicated and depends primarily upon the object and secondarily upon the reference beam. Those of you who are familiar with the concept of a diffraction grating might find it easy to consider a hologram as an extremely complicated diffraction grating which has been formed by the interference effect between the object and reference beams. When the film is developed this grating is permanently recorded within the emulsion. With the aid of a microscope it is possible to look at

the film and to observe the alternating dark and bright fringes.

By employing the photographic technique of bleaching (replacing the silver chloride crystals by some other medium) the brightness of the holographic image can be increased. Bleaching has the effect of decreasing the absorption associated with the negative thereby causing the negative to be relatively transparent. For normal photographic purposes, the amount of bleaching we use would in essence wash out the negative. However, the replacement of the exposed silver chloride crystals by another medium, introduces a variation of the index of refraction and allows the hologram to be played back in exactly the same manner; but, with increased efficiency, i.e., more of the light impinging on the hologram comes into the eyes of the viewer.

Playing Back The Hologram

After making the hologram, the question is how do we play it back? One way to play it back is to use the laser itself and simply send the reference beam back in the manner as shown the figure II. The image of the object will be seen by the viewer in the location indicated. This image is a virtual image and is physically located in the space shown. It is possible by means of parallax methods to determine exactly the position of the object relative to the holographic plate, i.e., by making a hologram of a model and sending it to someone who is interested in the model, he can, by using his finger or pencil tip, locate in space the major points of interest and determine the approximate size of the model.

Immediately you say, "well, everybody doesn't have a laser so this doesn't seem like a very good idea." This point is well taken. However, it is possible to view the hologram with a mercury arc lamp and the appropriate green filter . . . perhaps not everybody has a mercury arc lamp and the appropriate filter. Most people have a pen or flashlight, although there may not be a filter handy. In order to surmount this problem, we can make a hologram by sending the reference beam in from the back instead of through the front of the film plate. (See Figure III). This makes what is referred to as a volume hologram which is easily seen in white light. Only the sun or a similar point source is necessary to view the volume hologram.

This terminates the description of the technique of making a hologram and of the technique of replaying the hologram. As you can see, it is a relatively simple process.

The optical equipment that is necessary need not be special optics by any stretch of the imagination and hence are not expensive. If you are interested, you can buy a complete holography setup coupled with a table on which to mount it for approximately $2,000.00 or, if you so wish, companies, (Construction, Inc., of Ann Arbor, Michigan), will make you a hologram. The price will vary anywhere from approximately $100.00 up to several hundred, depending on the size of the hologram that you wish to have made.

Let us hypothesize that you have decided to display using holographic techniques. You have a hologram made and you take it with you to display in various places. The client (a hard to please type) says, "Well . . . I would really like to have some pictures of this!" You say, "fine," and bring out your "Brownie." Taking a picture of the hologram image itself. We have taken a picture with an ordinary camera. While any type of camera would work, a polaroid camera with a 3000 ASA film, is more efficient. A polaroid is the more efficent simply because there is some question as to what the exposure time is and by means of trial and error one can get the proper exposure.

These concepts, the photographic techniques involved, the idea of having a photograph of a hologram, and the hologram itself, I feel, within the next few years will provoke quite a bit of interest among prospective buyers. Another enjoyable aspect is making of small holograms of your model, or particular parts of them and sending these with appropriate means of looking at them. Just the interest which is generated and the novelty of it, I think, would evoke the enthusiasm and imagination of many people.

Extending The Field Of View

Everything that I have said thus far, has dealt strictly with the making of the hologram with a certain field of view which is limited by the size of the film plate itself. However, in most situations, in order to really replace the model with the hologram, one is interested in being able to obtain a 360° view. This can be done in different ways. One is by the technique of taking, say, four separate holograms and then replaying them in such a way that they correspond to four different views, one say, from the North, one from the South, one from the East and one from the West. In this way, the individual sees a fairly complete view of whatever model he is interested in. A second way is represented in (Figure IV) in which we use the concept of a cylindrical hologram, i.e., simply a piece of film wrapped into a cylinder 369° with illumination and a reference beam such that a hologram is made around its entirely. Then it is very simple for the viewer to walk around the hologram getting a complete view of the model, or if you are interested, simply by rotating the hologram, the viewer may remain in one position and see the model in its entirety-whichever way seems to be the more appropriate for the display purposes.

Another method of obtaining a 360° view is the strip hologram, i.e., the hologram that is made by blocking off a portion of the film, exposing that portion, blocking off another portion, exposing, etc., until the hologram is composed of a series of strips, each one of which represents one view of the object. Then the object can be seen in 360° format by simply having the viewer move his head in front of the hologram.

Thus far, we have delved into what a hologram is from an intuitive point of view, have studied the method of reconstructing or playing back a hologram. In addition, we have discussed briefly the concepts of the cylindrical hologram and the strip hologram both of which are methods of obtaining 360° views of an object on a single hologram.

Color Holograms

As was mentioned earlier, holograms can now be made as large as two feet by two feet, a very large window of the spatial representation of the architect. I have seen holograms of this size and they are spectacular in themselves, beautiful and very appealing. Now some of you may ask the question: "Well, this is fine, however, what about portraying color? We're interested also in demonstrating to the viewer the color schemes we will be using." The answer to this easy. By making a hologram with three separate laser beams, each of which is a different frequency and by then reconstructing it either in white light or by means of three laser beams again, a beautiful color hologram image is obtained and the color reconstruction turns out to be very good.

Conslusion

It is my opinion that within five years the use of holography in fields such as architecture, highway displays, i.e., warning signs that present absolutely no traffic hazard to the driver, advertising displays in downtown areas thereby eliminating the unsightliness of models, neon signs, and replacing these with the spectacular holographic image, will be relatively commonplace. Also, by the mid-1980's three-dimensional television, based on the holographic concept should be at least in the investigation stage i.e., there should be demonstration type models available and a few years later they should be available to the general public. The hologram, its application, and its remarkable possibilities are yet in the infancy stage. Those of us who work in the field of holography can feel the excitement of the area, and the brilliant light which the hologram and its cousin, the laser, is offering to us in the field of imagery.

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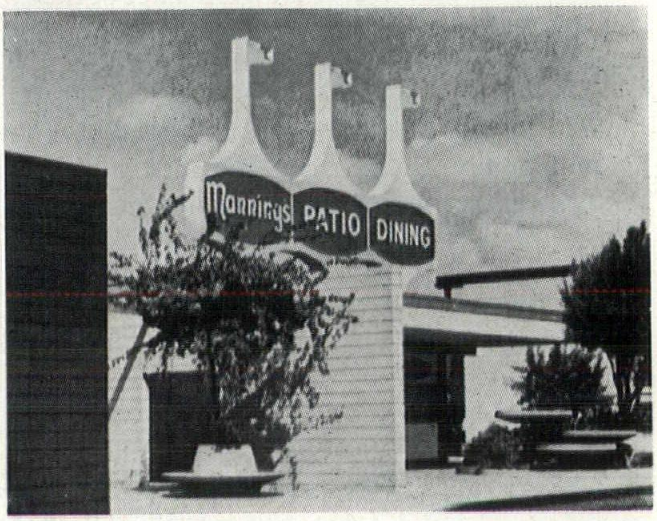

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