

Born Philadelphia, 1930  
Resident New York City

By the end of 1968 several of the corporations contracted to A & T produced or used laser equipment and thus had the capability of making holograms. We had received several proposals from younger artists wanting to work with holography, but these struck us as being potentially uninteresting, too-literal approaches to a technique which, by its very novelty and exoticism, presented pitfalls. MT had for some time thought of this medium in connection with Andy Warhol. In February 1969, Warhol visited Los Angeles for several days and met with us to investigate corporations. We mentioned to him the notion of working with lasers to make 3-D images, and Warhol was distinctly intrigued. At that time, there was an exhibition of self-portrait holograms by Bruce Nauman at the Nicholas Wilder Gallery which Warhol saw with us; Warhol seemed quite taken with Nauman's images, and this served for us as a reference point in visualizing the kind of effect he might pursue.

We arranged for Warhol to visit RCA's Burbank division. This proved rather unfruitful in terms of concrete media that might be explored. Just before Warhol returned to New York, he and his entourage toured Ampex's Redwood City facility accompanied by Dr. Charles Spitzer. The examples of holography available there were not particularly striking, especially in terms of scale. The most interesting aspect of that visit was a demonstration video tape recently produced by Ampex which showed various special effects in video cutting, etc.

On Warhol's return to New York, we sent him some literature on holography and annual reports from Ampex and Hewlett-Packard which he read. Andy then had constructed, at his expense, a series of mock-ups with which some sort of 3-D image might be combined. We had only a remote conception of what these were about until some weeks later when in April, 1969, Jane Livingston went to New York and saw the three mock-ups at Warhol's studio. In one of them, small polyethylene particles were agitated in a circular motion by air blowers to simulate whirling snow flakes; this was encased between two glass faces embedded in an approximately six by eight foot rectangular wood frame. There was also a rain machine of similar size, but not enclosed by glass; it consisted of a simple pump system through which water circulated, falling in strands from apertures in a top section of pipe into a trough concealed beneath an artificial grass bed. The rain was side lighted to create an effect of sparkling beads. There was also a wind machine, simply a wooden box encasing an air blower. Each of these was intended to work in conjunction with a 3-D image; behind the rain, for example, would be a hologram or video screen; the snow machine would incorporate a holographic image in the center, through and around which the plastic flakes would circulate; the wind machine would vibrate and a 3-D holographic sphere would vibrate as well. At this point Warhol had

no set conviction about what the images might represent, and when pressed spoke vaguely about simple geometric shapes such as a sphere or cube.

By the time Warhol was really committed to the project, the only contracted corporation able or prepared to execute an elaborate holographic display—Hewlett-Packard—was already engaged in collaboration with Rockne Krebs. Even Hewlett-Packard could perhaps not have produced holograms in large enough scale for Andy's requirements. Thus we turned to investigate a medium recently seen on postcards—plastic 3-D printing—with a view to substituting this kind of image for holography in Warhol's project.

In June 1969, Hal Glicksman, at the request of MT, made a study of various 3-D printing techniques. According to Hal's report, dated June 17, 1969,

The first commercial process for 3-D printing was developed by a Los Angeles inventor named Sam Leach who worked with Eastman Kodak and Hallmark cards. The first process was called PID—Printing in Dimension. Hallmark now holds the patents for the process and grants licenses under the name Visual Impact. In this process the image is printed on the back of lenticular plastic. The lenticular plastic is made by Rowland Products, Inc. Rowland also makes patterned plastic with the appearance of depth called Rowlux. They do not do any 3-D printing themselves. Large, back-lit 3-D pictures are made by several manufacturers under license from Visual Impact. They require a very thick lens and are very expensive. The image is usually a transparency on film, not printed. These are made by Three Dimensionals Inc., 3764 Beverly Blvd., L.A. 90004, Harvey Prever. (Mostly religious subjects sold door to door for \$1.00 each.) This process is suited to unique items and large sizes. Prever claims to have worked three by six feet; also Victoria Productions, 'Veraview,' New York.

The Cowles Communications process is called Visual Panagraphics. Their representative is Stan Harper, presently in Boulder, Colorado, but will be at 5670 Wilshire Boulevard, California, after July 10. Harper also knows a great deal about the other processes and people in 3-D. The Cowles process utilizes a similar camera, lenses, etc. to original Visual Impact process, but Cowles' process prints the picture directly on the magazine stock and then coats the image with plastic and embosses the lenticular screen on instead of a thick pasted on addition. It is also much cheaper in the million plus range of magazine printing. Stan Harper claims the next issue of *Venture* will be much higher quality because of new lenses and new 300 line screen. Harper will send samples and investigate the cost and feasibility of larger images. Cowles might be willing to sponsor us . . . .

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There are several Japanese 3-D processes—all are variations of the Visual Impact (Hallmark) process. The Japanese cannot photograph in the U.S. because of U.S. Patents, but they can ship finished pictures to the U.S. . . .

In late June, 1969, we made contact with Allen F. Hurlburt, Director of Design for Cowles Communications in New York [1]; Hurlburt had worked with Warhol in the past and was in principle enthusiastic about joining with A & T to collaborate with Warhol. From the beginning of our contact with Hurlburt it was understood that the project would be considered for display at Expo. Warhol, for his part, was definitely interested in the 3-D printing process, though it is of course entirely different from holography and required a rethinking of his work. Cowles joined A & T as a Sponsor Corporation in July.

Allen Hurlburt wrote to Andy Warhol on July 3, 1969, I have talked to Maurice Tuchman and he tells me that you are interested in working with us on the Art and Technology project.

You have had a brief look at our Xograph facilities and whenever you are ready to make use of this equipment, I would like to work closely with you so that we can produce the effects you want. Cowles is also prepared to assist you in the construction and fabrication you may need to complete the art.

If it would be helpful for me to come to your studio and go over the material at any time, I would be happy to do so.

On July 15, Hurlburt wrote to MT, Here's the signed contract for our involvement with you and Andy Warhol on Art and Technology.

I have seen Andy's construction (the rain machine) and both he and Harold Glicksman have had a look at our facilities here. We are interested and anxious to use these facilities in any way we can.

I am only concerned about one thing—the nature of Andy's project does involve outside construction which cannot be controlled by us. I would hope that we would only be required to spend a reasonable amount (a few thousand dollars) in this area. I don't wish to place any limitation on the potential of this work of art but I do hope there is a way of keeping this under control.

I am very excited about the possibilities of this collaboration and we will make every effort to bring it to a successful conclusion.

By August, when the collaboration had been officially underway for about a month, Warhol and Hurlburt had still not decided upon what kind of image should be depicted. Andy asked us to suggest ideas for images to him. The notion of using a flower, or flowers, to be photographed and repeated serially, was presented to Andy and Hurlburt. Andy liked the idea and decided to follow it through. Cowles then photographed a number of colored, plastic flowers against beds of artificial grass and plastic foliage, in various formats measuring about four by six inches. In September, 1969, a meeting was held at the Cowles New York office with Hurlburt, Warhol, David Sutton (representing the USIA Expo Design Team) and us. The 3-D flower photos made by Cowles for Andy to compare were shown, and one of them—four daisies against green foliage—was selected more or less on the basis of communal preference, with Warhol's agreement. [2]

The following memo was sent September 19 from Allen Hurlburt to Messrs. Andy Warhol, MT, Jack Masey, Ivan Chermayeff, Don Dorming, Ron Glazer, David Sutton:

Subject: Art and Technology Meeting  
Held Sept. 18, 1969 at Cowles Communications, Inc.

This meeting was held to review the progress on the A & T project, and to determine future plans in assisting Andy Warhol in the development of an art work for the Los Angeles County Museum of Art program, and the exhibition to take place at Expo 70 in Osaka, Japan.

Several photos taken in the 3-D process were exhibited and one showing a group of four daisies was selected. It was agreed that this image would be reproduced in quantity.

It was generally agreed that the images should be mounted on a curved panel behind the curtain of rain provided by the rain machine. There was some discussion about three options for the construction of final work of art. These were:

1. Construction of a mock-up in New York to be later duplicated in Osaka.
2. Determination of a plan by experimentation here but without a mock-up.
3. The development of a total construction in New York that would be transportable to Osaka and wherever else the art work might be exhibited.

There was general agreement that the third alternative was best if problems such as costs, construction and mobility could be solved. It was agreed that Mr. Masey and Mr. Sutton would pursue the feasibility of this approach and procure estimates of its cost.

In the meantime, Cowles Communications, Inc. has agreed to cover the cost and assume the risk of 3-D reproductions. We must receive and approve an estimated cost of construction.

The rain machine through which the panels of 3-D images would be viewed, it was then agreed, would be contracted to the New York firm Today's Displays to be designed and built; Today's Displays would also design the panels themselves and secure the Cowles images to them.

This letter was sent from Joe Grunwald of Today's Displays to MT, Sept. 26, 1969:

As explained to me by Mr. Warhol and Mr. Sutton, there are three possible interpretations of the basic idea, the most economical of which would be a straight wall approximately 12' high x approx. 18' long, covered with three-dimensional photos provided to us.

For this wall we have budgeted the amount of \$2,000 to \$3,000.

The next possibility would be a curved wall, approx. 12' high and approx. 25' long. Again this wall would be covered with three-dimensional photographs provided to us. The budget for this would be \$3,000 to \$4,000.

The de luxe possibility would be to cover both walls of the 21' triangle or a total of 42', again 12' high, with zigzags of approx. 11" depth. These zigzags to be covered with three-dimensional photos provided to us. The budget for this would be \$7,000 to \$8,000.

In addition to the above, is the 'rain machine' which would cover the 21' front of the area. Again there are various possibilities of realizing the basic idea. A minimum budget for this would be approx. \$5,000.—

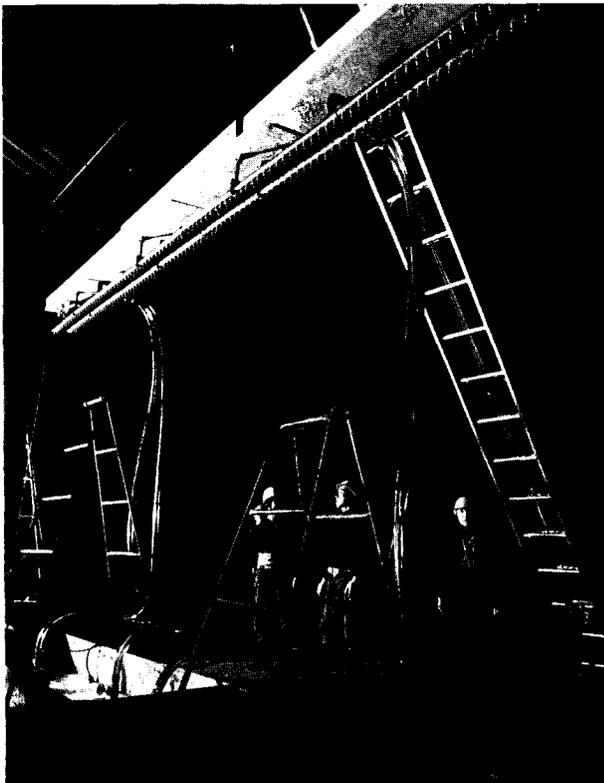
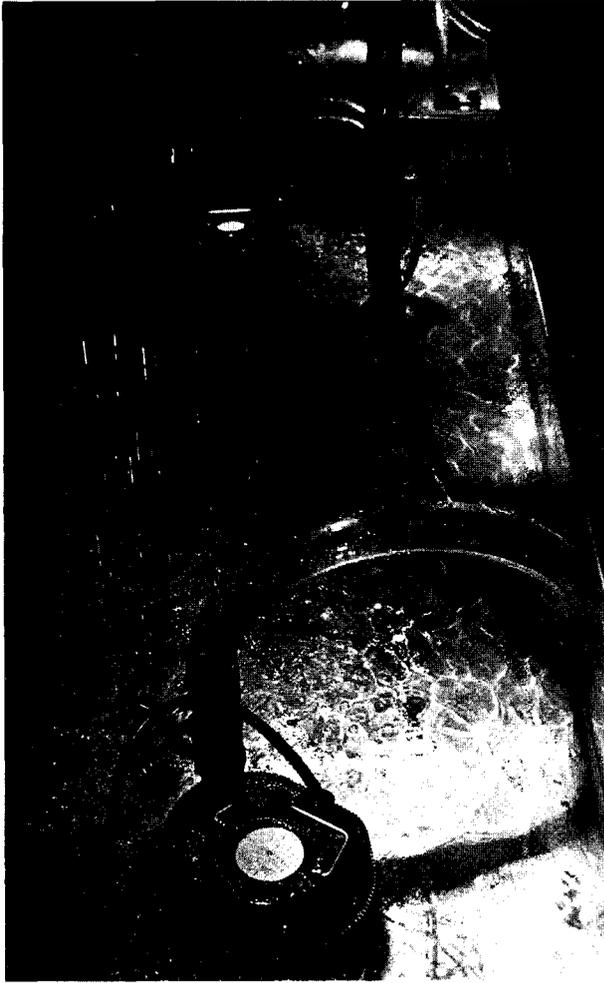
However, due to complexities of possible requirements in water pressure, use of one, two or three possible rows of jets and quantity of water involved, this item could go as high as \$8,000—\$10,000.

At various stages in the development of Warhol's project with Cowles, Andy prompted Hurlburt, Grunwald and us to develop alternative possibilities for the work. In each case—in the development of the photographic images, the rain machine and the constructed environment for these—Andy would view the alternatives and choose among them. Andy continually placed us in the position of weighing the merits and disadvantages of numerous possibilities. Sometimes he would discard altogether our proposal—as for example, in the case of the rain machine, which we visualized as an enclosed and



sophisticated mechanism, and which he decided should be presented crudely.

In November 1969, MT met in New York at the St. Moritz with Warhol and Joe Grunwald. It was decided not to adopt any of the three proposals outlined in Grunwald's September 26 letter regarding the shape and size of the rear panel, but instead to build five separate panels, each four by eight feet. The key question was how to dispose the panels when the work was installed. Warhol was encouraged to make a series of drawings showing several possible arrangements of the panels, but he resisted having to work that way. He finally said to MT that he would prefer having the five units placed in a *random* arrangement, or, failing that, in simply a flat plane, abutting each other. It was agreed that MT would use his own discretion at installation time in placing the panels. The other important factor discussed in that meeting involved the rain machine. Warhol favored the idea of producing two parallel layers of water, and having the water move in a swishing manner, side to side, as opposed to creating a single screen of water pouring from a row of evenly spaced nozzles. Grunwald planned accordingly to execute the more elaborate, two-layered system.



It occurred to Warhol at this time that he liked the idea of simply displaying the rain producing mechanism forthrightly, rather than encasing the pipes and trough in a wooden structure, as he had in his earlier small model.

One of the artist's reasons for this decision had to do with his attitude about the 3-D printed images as such. He had said to MT, "You know, this 3-D process isn't all that glamorous or new or exciting." He wanted, therefore, to present the images in conjunction with a naked, unembellished and inelegant structure so that they would *reveal themselves*—maybe perversely—in their rather vulgar and certainly imperfect quality. His original idea for the holograms, to be seen hazily through water, or snowflakes, or vibrating and out of focus, held over in his approach to the 3-D printed images: he had wanted, in his word, a "ghostly" effect. However, the reality of the situation by the time the daisy pictures and rain machine were visualized together, fell short of this vision of ghostliness. Warhol thus adapted his approach to a changed esthetic.

Based on these decisions Today's Displays began work on the project. We felt it would have been helpful for them to build a mock-up for Andy's approval before constructing the final mechanism, but there was no time to do this and meet the Expo deadline.

Perhaps the most important decisions determining the work's final appearance in the U.S. Pavilion at Expo were made not by Warhol but by MT, the Expo Design Team members, and some of the other artists in the show. The entire installation operation was characterized by a sense of crisis, and there were moments when the piece seemed simply destined to ignominious failure. In the end, somehow, it worked: many people and particularly the artists who were there installing their own pieces, felt the Warhol to be one of the most compelling works in the exhibition because of its strangely tough and eccentric quality. Robert Whitman commented that "of course Andy's forcing everyone into the act;" the work itself, when completed, made that conspicuously evident, and yet it was unmistakably Warhol. When it was rumored at one point just before the opening of Expo that the work might be taken out of the show, as was suggested by several of the Expo Designers and by a visiting critic who was conversant with Warhol's oeuvre, the American artists who by this time knew the piece intimately objected strenuously.

Virtually every stage in the assembling of the work was problematic. The question of how best to distribute the five image-faced panels presented major difficulties. A "random" placement was tried and failed totally. At one point, they were to be arranged horizontally, one atop the other, in a single, flat plane; only four could be accommodated in the space, but this was judged to be the unavoidable solution, since the purpose was to

de-emphasize a certain unevenness in the rows of images caused by faulty gluing. However, something seemed profoundly amiss, and was. The effect of three-dimensionality would have been completely lost, since the parallel, raised striations in the plastic segments, which create the visual illusion of depth, cease to function optically when turned 90 degrees. Other alternatives were tried, and finally the panels were placed vertically, side by side, in a flat plane. The entire unit of adjacent panels was raised off the ground, at MT's suggestion, to create the effect of a hovering field of flowers.

The lighting of the work was extremely difficult. In order to disguise the disturbing unevenness caused by the slight pulling-away from the panel surface of the edge of each segment, light could not fall directly on the panels. To illuminate the falling water ideally, the lights should have been mounted in two rows facing each other on either side of the sheets of rain, but this had to be avoided to prohibit an overflow of light from interfering disastrously with Lichtenstein's screens in the adjacent area. Finally the rain was illuminated from the top. The water thus could not be made to sparkle as intensely as might have been intended by the artist, based, at least, on his original rain model.

It was not realized until the time of installation at Expo that the illusion of depth in the photographic images was apparent only at a distance no greater than from eight to ten feet. This understandably detracted from the impact of the work. An even more significant problem, however, was the scale of the images. This was never resolved satisfactorily, and it was determined that in reconstructing the work for the Museum exhibition, each identical image would depict not four but one greatly enlarged flower. Moreover, in developing new images for the second work, Cowles recommended that the 3-D effect be technically improved to allow the illusion to be discerned from a much greater distance—from eight to about twenty feet away.

Jane Livingston

