

Digital Art/Paint System Survey

ROBERT RIVLIN

The most fundamental question to be addressed in this survey is, What is a digital art/paint system? Secondly, the survey provides a basis for comparison among the different systems, designed to show where they are similar, where they vary, and prompt you to directly contact those manufacturers whose systems you wish to evaluate seriously.

It is clear, now that the dust from last year's NAB show is beginning to settle, that we have seen, in the course of just the past year alone, the birth of a brand new type of image creation product—the digital art/paint system. Its predecessors pre-date it by several years, including the NEC Action Track/Digital Strobe Action unit that uses extensive digital processing and a digital framestore to generate often abstract images out of existing video pictures, and the Interand Telestrator which, for several years, has been being used to draw images directly onto a TV monitor using a unique blend of analog and digital processing.

But there is nothing quite like the digital art/paint systems which appeared in such numbers at the NAB show, and the unlimited graphics possibilities they open up. By way of definition the systems outlined in this survey are all products available for purchase and installation in broadcast plants and teleproduction facilities. We're not talking about proprietary computer animation systems used by production companies which specialize in creating computer graphics for others (for these companies, see the stories on East and West Coast special effects houses elsewhere in this issue). Nor are we talking about the kind of computer graphics systems which use large and small computers to simulate motion, or

three-dimensional letters, or complex computerized "mapping" designs, then output the results a frame at a time, usually onto film, taking up to six minutes to assemble each frame of a complex sequence.

The systems outlined here are designed to perform "down and dirty" artwork—artwork which is, in the words of Peter Black of Xiphias, "short turnaround/short burst." In typical newsroom applications, the images will be created within minutes, then displayed, usually compressed into a box wipe, for seconds. Though some of the systems possess the ability to perform "limited animation"—by having a finished picture build up from scratch, for instance, or by having colors flash on and off simulating motion, these systems are not designed to produce animation effects. The images are, for all intents and purposes, digital stills.

System types

In a narrow definition, only certain of the systems included in this survey would be considered digital art/paint systems, having been developed strictly for the purposes outlined above. They are the Ampex AVA, Aurora Digital Videographics, Digital Effects Video Palette, Logica Flair, MCI/Quantel Digital Fine Arts, N.Y.I.T./Computer Graphics Lab IMAGES and Xiphias Videograph. For the sake of comparison and because they can often accomplish the same purpose, however, we have included several other types of systems. From Adwar and Video Associates Labs are modifications that allow the low-cost Apple II computer's graphics package to be used in an NTSC video system. From For-A is a "video writer" allowing a light

(opposite page)

A gallery of images created on digital art/paint systems (clockwise, from upper left): Aurora Imaging Digital Videographics System; Ampex AVA; Digital Effects Video Palette (Andrea D'Amico, artist); IMAGES from Computer Graphics Lab created on the system; MCI/Quantel DFA-7000 Digital Fine Arts system; Logica Flair.

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pen to create images directly on a video screen. The Interand Telestrator uses a proprietary stylus to achieve much the same effect, but far more complex. The Thomson-CSF Vidifont Graphics V is an extremely advanced character generator/graphics system with a drawing tablet and other art system features. And, from McInnis/Skinner, Spectra Computer Systems (formerly Weathercaster) and Weathermation are art systems which evolved from programs to add graphics and movement to weather radar and map displays.

Hardware

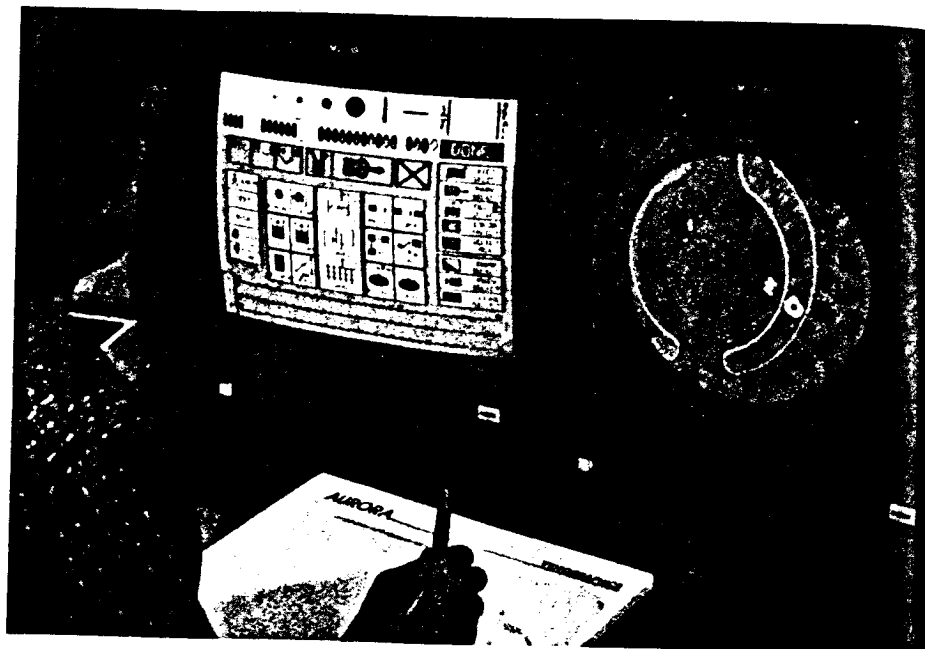
Almost all the systems are based on microprocessors or mini-computers which have graphics programs to translate the digital data and its manipulation into graphics images; this data is generally written into a digital framestore which is the active "canvas area" for creating images and displaying the illustration being worked on.

The basic computer graphics programs are generally accessed through a computer console keyboard, though the amount of keyboard interaction varies considerably from system to system. On units with the most advanced software, the interaction is limited to virtually turning the computer on with the keyboard; in others, the computer-prompted, keyboard-entered commands do much of the work.

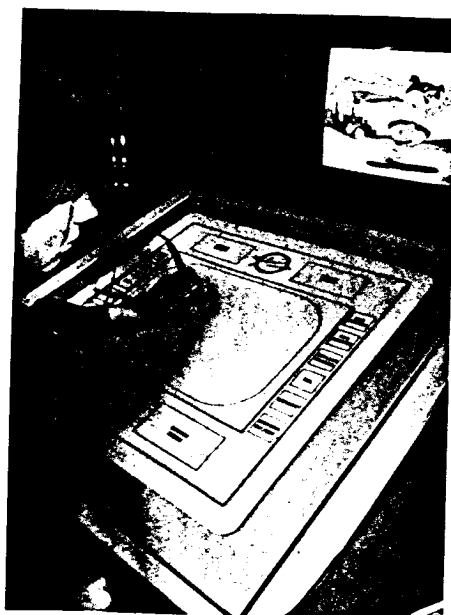
Again, almost all the systems have a graphics tablet on which the artist "draws" and "paints" with a stylus, providing magnetically-encoded instructions to the computer through the graphics tablet. In some of the systems, the size of the active drawing area is variable so that the artist can select the size of the area he or she wants to draw in, with the scale between the drawing area and the picture monitor scaled accordingly. In some systems, the drawing area is completely separate from the menu selection process, though the same stylus (or the keyboard) can be used to choose operating modes. On the other hand, some of the systems—like Aurora and Digital Effects—have the menu display and the illustration in the same monitor.

Paint/Draw/Rubber Stamp

The "painting" process is perhaps the ultimate refinement of these systems, for it allows the artist to first define the stylus as a "brush," then define its shape, then dip it in the "paint pots" palette, and paint on the screen with whatever shape and color have been selected. In some systems, the sizes and shapes of the brushes have to be pre-determined. In others, the artist first defines the size and shape of the brush, then "captures" it as a

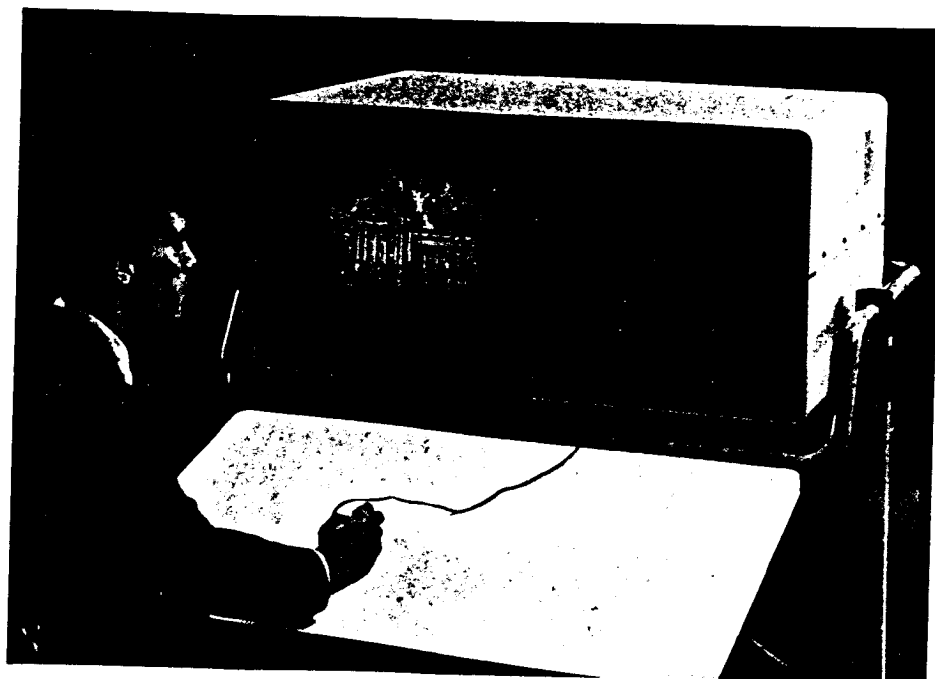


The menu display on the Aurora system (above) uses a full-color graphical menu to indicate modes.



Logica's Flair system graphics tablet (left) has pre-selected menu areas; transparent, it can be used to trace artwork.

Below, the Ampex AVA system's interactive graphics tablet.



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shape so that painting with rather strange shapes can take place. Artist-defined shapes can often be used as "rubber stamps," with the form being duplicated wherever the stylus is touched down on the screen. Brush and rubber stamp shapes can be stored for later use as defined by the artist.

The computing power of the system is also often used to create geometrical shapes, a line being defined by the artist as two points with the computer plotting the straightest path between them; similarly, a circle can be created by indicating a point as the circle's center with a certain radius.

Colors

Since the paints in these systems are electronic, most can use a system of red, green and blue/hue, saturation, and intensity values to create more than 16 million colors. On a practical basis, not that many colors can possibly be used in a single illustration, so a "palette" is formed with a certain number of colors likely to be needed, with the possibility of returning to the basic RGB/HSI table if necessary. Individual palettes can be stored like brush sizes and called up as needed.

Various software refinements are

associated with the color programs. "Fill" means that, once the stylus is touched down within an area on the tablet, the program will begin to fill all non-contiguous boundaries—either inside the polygons or outside to form the background. "Color Match" allows the artist to duplicate a color that has already been used in the drawing without returning to the color palette; the stylus is merely touched to the illustration in the appropriate place, and the system instructed to match the color. This can be particularly effective when working with an image that has been scanned into the system from an external video or reflective artwork source. As MCI/Quantel and others demonstrate, if one doesn't like the skyline in an image, the color of the clouds in the background can be matched and the offending building simply painted out.

Similarly, most systems enable the artist to "clear" or "erase" selective portions of the image without affecting the whole.

"Color blending" indicates software that allows an artist to actually mix electronic paints like the real thing, taking two different colors and moving them together, then picking the exact area of the intermixed color to be used. In very highly evolved systems, paints can be distinguished as oil paints, watercolors, etc., and drawing lines rendered as chalk,

pencil charcoal, etc. An "airbrushing" technique is also available, allowing the artist to smooth out the hard edges of an image (the program actually takes the pixels at the boundaries of the image and selectively mixes them with the surrounding background color). A "drop shadow" function, as in a character generator, allows forms to be provided with a hard, contrasting edge.

Magnification/Compression

To aid in composition, the image can often be magnified to allow detailed, pixel-by-pixel work to change colors, forms or textures. The image is then shrunk back down to normal size for display, or it can be retained and displayed in its magnified state.

Scan-In, Outputs

In addition to being able to call up pre-stored patterns and shapes, and drawing and painting with the stylus, some systems enable the user to digitize both already-created videotapes and/or reflective artwork for further processing.

Though not specifically covered in the survey, almost all systems have input/output (I/O) ports enabling them to be connected with other digital systems such as still stores, character generators, etc.

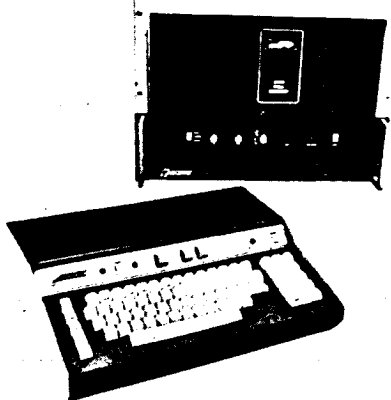
Also not covered in the survey, but worthwhile investigating, are the means

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by which the images created on the system can be captured. While some of the units provide only for video outputs, others have attachments for adding Polaroid and/or 35mm cameras.

Cut & Paste

"Cut & Paste" is most often a separate mode, like "Paint." Its primary function is to allow the artist to manipulate already-created parts of the image, duplicating them in the same illustration, rotating them, flipping and/or mirroring them, and in general treating them like images in a collage. A series of increasingly larger or smaller replications of the same image is simply created in this mode, using the stylus as a stamper. In some systems, this mode is used to call up forms from the computer memory.

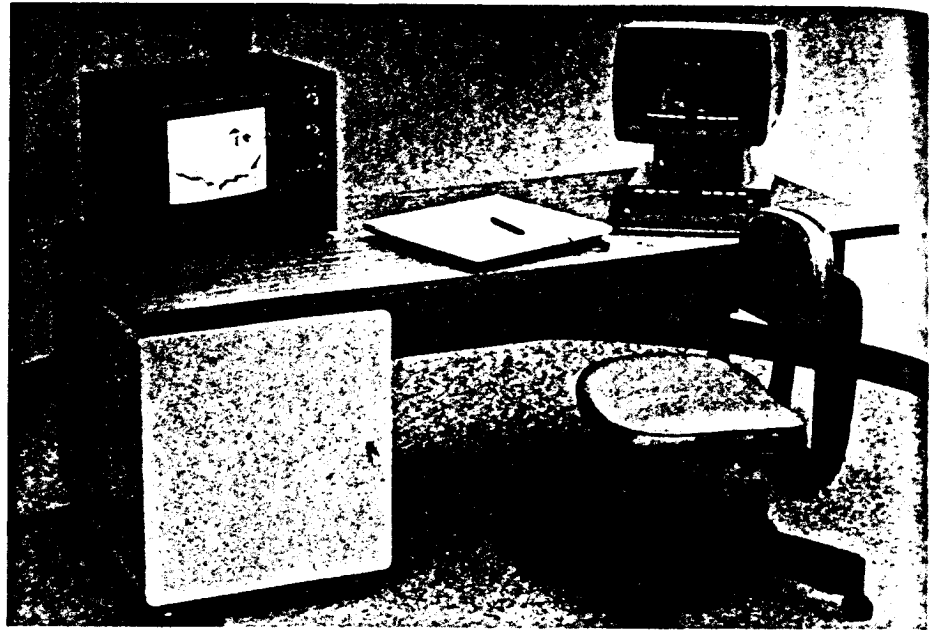
Character Generation

Most of the systems which rely on a computer keyboard store character sets in their memories in the same way as character generators. Sets of graphic symbols and forms are often stored in the same way, and entered into the image through the keyboard. In other systems, individual letters are "picked up" by the stylus, as colors are picked up by the brush, and positioned in the image by the artist.

Animation

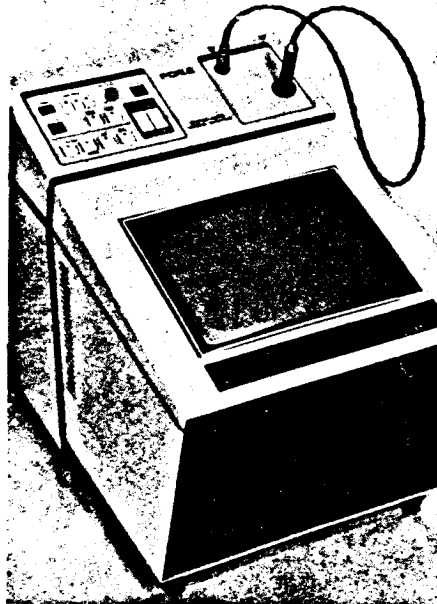
Though these systems are not really designed to create moving, animated images, some limited forms of real-time animation are possible. Almost all the systems, for instance, can build up an image from scratch, either assembling it line-by-line or having the creation program played back step-by-step so that the image comes to life on the screen in the steps originally created by the artist. Depending on the memory capacity and the recall time, frame-for-frame animation can also be accomplished by having the system change pages, or elements within a drawing, up to a maximum speed of 30 times a second (30 fps).

Because they are digital systems, however, another type of animation—"color cycling" or "color map lookup"—is possible. This type of animation allows the computer to continually change selected areas of the illustration frame by frame, cycling through either random colors or colors defined by the artist to be included in the cycle. The illusion of motion is the same as that achieved on a juke box by chasing lights. A similar type of animation is achieved by having selected portions of the image revealed and covered at different times, making it appear that the image is moving from second to second across the screen, whereas all the figures are always there with only one revealed each frame.

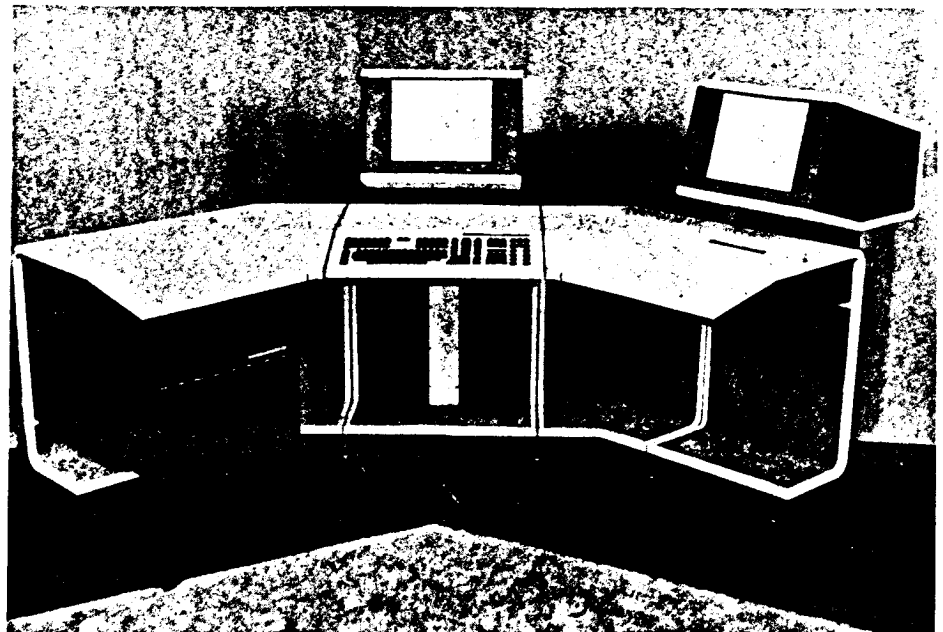


The McInnis-Skinner Weathergraphics system (above) uses both a computer terminal and an interactive graphics tablet.

For-A's Videowriter (left) uses a light pen to write directly into digital memory.



The Thomson-CSF Vidifont Graphics I unit (below) has extensive text composition capability as well as graphics/paint programs.



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Resolution

"Resolution" is a highly important factor in evaluating a system, since it is the chief determining factor not only of the image quality, but how complex the images can be. Resolution can be evaluated in two ways. "Pixels" refer to the minimum picture element size, and come down to only a few "bits" of digital information. Pixels are normally quoted in horizontal x vertical format, with the vertical format reflecting one pixel per scan line height. Some systems have larger vertical pixel formats since the output can be used not only for NTSC television, but for still graphic illustration, too—in which case square or vertical format illustrations may be necessary. Resolution in nanoseconds indicates the smallest horizontal spacing between distinguishable picture elements. The smaller the resolution in nanoseconds, the more detailed the lines.

Storage/Recall

Internal storage in these systems can either be limited to the frame being created in the framestore or, if a larger system is used, internal storage may comprise several frames located in computer files. External memory storage

on floppy discs or Winchester hard discs is almost universal, with artists able to walk away from the system and take their artwork with them on the disc. When loaded back up again, the artwork can be transferred to the framestore for further work. "Recall time" describes how long it takes to get an image assembled on the screen, even from external memory—a valuable figure for determining whether the system can be used for on-air presentations.

Special features

Not included on the chart, but worthy of consideration when evaluating the various systems, are the special features so many of them contain. Aurora's unit and the Vidifont Graphics V, for instance, are somewhat unique in that they can have multiple user stations with artists stationed throughout the facility able to make use of the same central computer for creating artwork. (The Aurora system, by the way, invented by Richard Shoup, "father of the paint systems" at Xerox, is in use at KRON-TV, San Francisco. The Ampex AVA is used at Skaggs Telecommunications Services in Salt Lake City and at the CBS network center in New York City.

The MCI/Quantel unit, displayed in prototype form at NAB and still undergoing some modifications, is truly a "fine art" system, offering such software

features as a "watercolor paint" mode in which, like true watercolors, painting over an area will keep darkening the color until eventually it transforms from translucent to opaque.

Each manufacturer has an individual story to tell and will be happy to discuss its system with interested readers.

For more information on these systems, see the following reports in Millimeter:

Ampex AVA ("A New Palette for the Broadcast Graphics Artist" November, 1980, p. 48); Aurora Digital Videographics ("NAB Report" June, 1981, p. 194); Digital Effects Video Palette ("Latest Development in Digital Imaging," March, 1981, p. 64); For-A Videowriter ("NAB Report" June, 1981, p. 197); Interand Telestrator ("NAB Report" June, 1981, p. 197); MCI/Quantel DFA-7000 ("NAB Report" June, 1981, p. 200); McInnis-Skinner Weathergraphics ("NAB Report" June, 1981, p. 198); N.Y.I.T. Computer Graphics Lab IMAGES ("N.Y.I.T. Puts Computers to Work for TV", June, 1981, p. 70); Spectra Computer (Weathercaster) ("NAB Report" June, 1981, p. 198); Thomson-CSF Vidifont Graphics V ("New Graphic System At NAB" May, 1981, p. 134); Video Assoc. Labs VB-1 ("NAB Report" June, 1981, p. 202); Weathermation System II ("NAB Report" June, 1981, p. 198).

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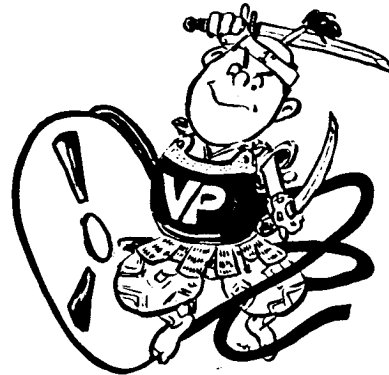
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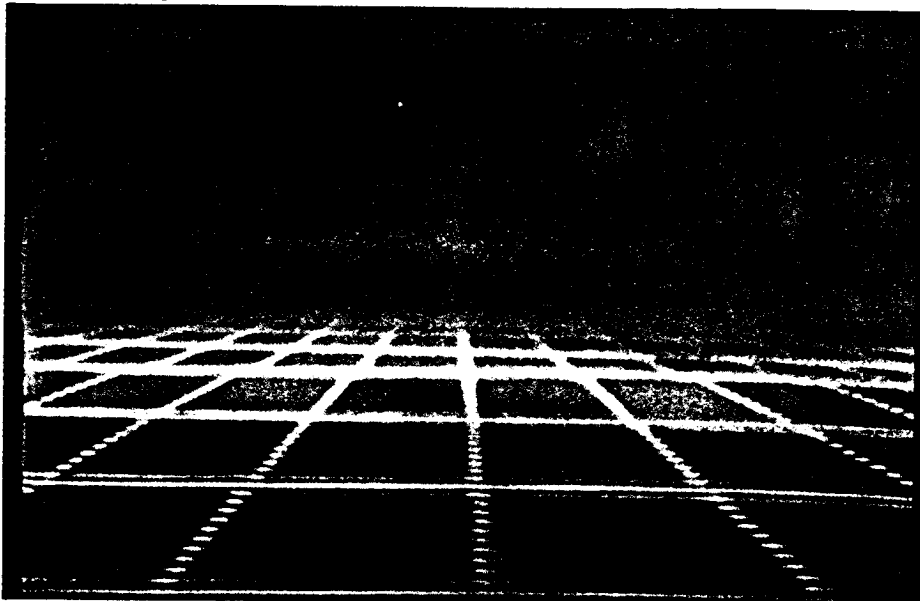


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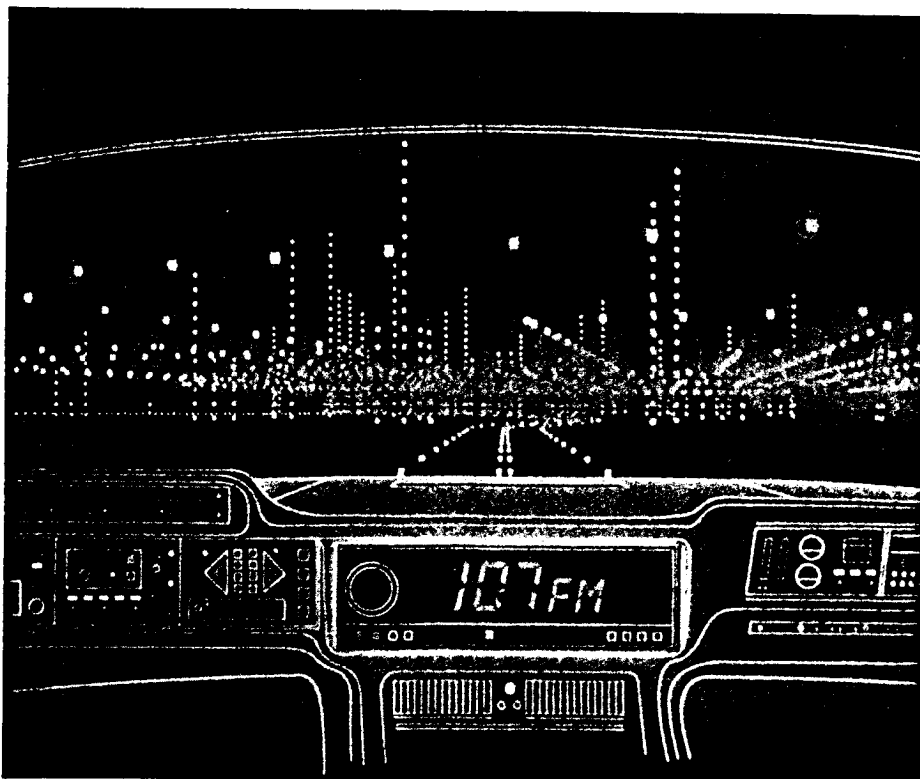
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COMMERCIAL SPECIAL



To generate this effect, Image West first creates the background on its computer. Next, the clients' three-dimensional logo zooms in from out of frame.



Marks and Marks' projected digital computer special effects system enables artists themselves to create spots, to be filmed directly off the screen.

PAT GLOSSOP

JIM SEALE

Novocom Springs from Marks & Marks

The graphics and special effects animation of Marks & Marks production company in Los Angeles has gotten so big that president Harry Marks has split it off into a new company. It's called Novocom, which Marks has formed in association with Jim Gerken. Along with the birth of the new company will soon come the installation of a new computer special effects system which puts the artist and not the technician in control.

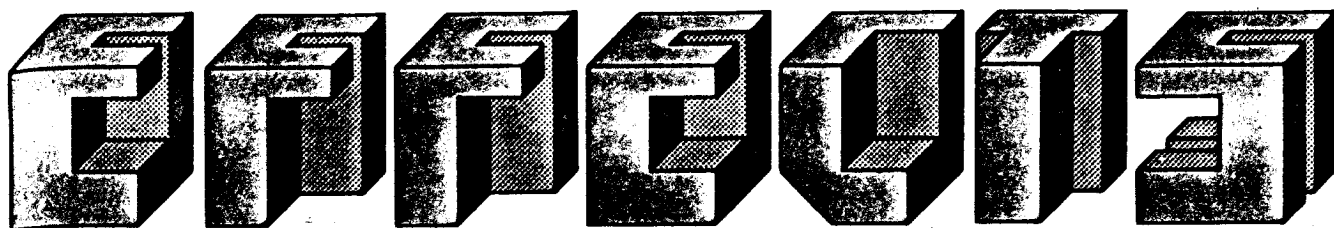
"The whole thing is designed to let artistic people sit down and create their own spots," says Doug Kay, developer of the system with George Joblove. The device is a digital computer system which generates images and moves them, the picture quality so great that one can film directly off its video screen. "This means that once the art director says it's okay, that's it. He really doesn't need to worry about what it'll look like when the film comes back from the lab," Kay adds.

Pre-Novocom, Marks & Marks is responsible for enough special effects animation commercials that its work is seen in more than 60 countries, states Harry Marks. When the Disney Studios needed an opening for its new series on CBS, it relied on Marks. ABC, anxious to come out ahead in the fall ratings, had Marks work his magic in coming up with a new package of promos for its fall campaign (see story elsewhere in this issue).

Motion Graphics Creates Skyline for Carpenter

One of the highlights of John Carpenter's film *ESCAPE FROM NEW YORK*.

Pat Glossop is a writer living in New York, specializing in the entertainment industry. Her articles have appeared in Future Life, Nuestro, Latin/NY, 3-2-1 Contact, and the Christian Science Monitor.



was the computer imagery of the New York skyline, and how those effects contributed to the futuristic look that helped make the film work. Those sequences were designed by Motion Graphics of Los Angeles, and the irony is that their creation did not involve the kind of computer hardware that generates digital images so popular in LA. Instead, as Motion Graphics designer/director John Wash explains, the futuristic images were created using very old fashioned film techniques.

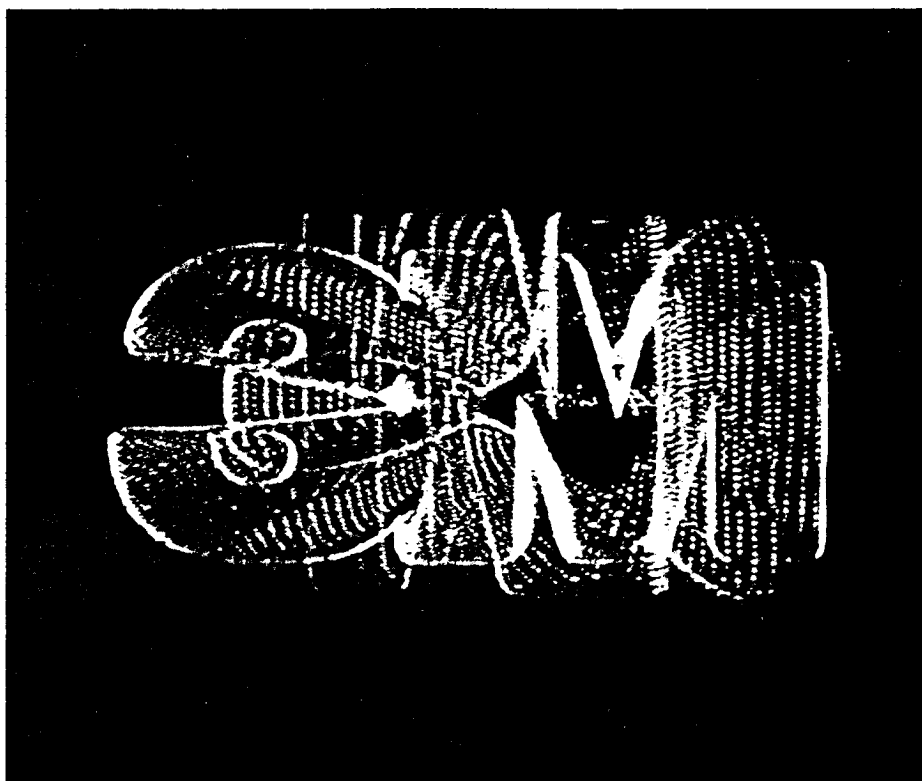
Carpenter gave the company basic ideas of what was needed; Motion Graphics made storyboards which Carpenter approved. Wash could have had the computer imagery generated on one of the many computer graphics systems being used for special effects. "That was explored, but their budget was limited. However, they did want a good three-dimensional outline effect," he recalls.

Motion Graphics' solution was to build three tabletop models of the New York City skyline and shoot them in black and white. The footage was then used to generate artwork. The artwork was put together with its background images by the computerized motion control camera of Dream Quest, another LA special effects company.

Shooting the tabletop models of the skyline presented its own special problems. It could not be lit like other miniatures, since it was supposed to look like a computer-generated image and no shadows could be cast. "We had to rig a lot of indirect, bounced light to illuminate it but create no shadows," Wash explains. Motion Graphics' footage was used by Carpenter in several ways. Some of the sequences were preserved as film cut directly into the movie, others transferred to tape and played on video monitors which were shot as live action on the sets.



Motion Graphics used Dream Quest's computerized motion control system for a futuristic effect, combining footage of three models of New York's skyline with background images.



Along with its special effects work, Digital Image is developing new technology. Its current project, *Aura*, combines real time video with the technology of computers.

Tom Seale is a freelance writer who lives in Hollywood.

Image West/Hollywood Anticipates Record Year for Electronic Animation

"The biggest misconception around by agencies is that they have to go to film to get a quality job. But I do see attitude toward computers changing slowly, especially with the cost of film production going up so much," says Cliff Brown, president of Image West of Los Angeles, one of the world leaders in electronic animation and special effects.

The growth of the company over an eight-year period has shown that more and more producers are indeed taking advantage of video and computer special effects. Tom Heyes, VP/Marketing of Image West Limited, foresees a record sales year for 1981, and points to a broad expansion of its domestic and international marketing activities. "Last year was the most exciting year in Image West's history and we certainly are not letting that momentum subside in 1981," Heyes said.

"During 1980 our domestic production of animation and special effects reached an all-time high, with many exciting projects passing through the studio, including show openings for the World Series and work on commercials such as Spalding, Sizzler, Bridgestone, Northwestern Bell, and Osterizer. The year wound up with a flurry of activity when we produced the new show-open for 'Wide World of Sports,' as well as the opening for 'Super Bowl XV' for NBC."

The company also garnered its share of awards last year, with two gold awards, a silver and a bronze, at the International Film and Television Festival in New York for the program opening for NBC's

"Sportsworld," and Polyglycoat television commercials, the "Baseball Game of the Week" opening and for a series of Brazilian commercials.

Image West has recently embarked upon a sizable expansion program for its studio, with an updated stage for motion control and commercial production, facilities for post-production, plus increased areas for graphic design. In addition, the company has acquired an adjacent building to house added management and sales offices along with a new research and development department. "We are now actively investigating a variety of directions where we believe animation and special effects are heading, and to that end we are developing our own computer systems," Heyes went on. Eyeing the growing competition from the television stations currently investing in their own graphics systems, Brown states, "A station manager may spend \$200,000 on hardware, even though the quality it produces is not as good as what we can do. But the stations don't have as sophisticated equipment or the time to develop the kinds of designs we come up with."

In addition to serving a variety of international clientele—nearly 60 countries in the last year, according to Brown—the company has added an extra dimension to its international sales activity during 1980 with the development of the World Effects video library for World Effects, Ltd. Calling it a revolutionary communications step, Heyes states, "The World Effects video library is an all-encompassing, pre-produced package of more than 400 special effects and backgrounds amounting to over 5½ hours on seven reels of videotape for use in TV commercials and program production." VP and Executive Producer Brian Ross adds, "What makes it revolutionary is that now for the first time the

smaller-budget client in countries outside North America can have available at fractionally low costs marvelous new creativity to inject into their productions which heretofore was cost-prohibitive for them."

With the increasing interest shown in the library after its appearance at this year's M.I.P. Festival in Cannes, Image West believes it can look forward to another growing aspect to its already formidable foreign market.

Digital Image Blazes Computer Trails

Not content with the dizzying advances being made in computer and video animation, a company in Berkeley called Digital Image is working as hard to develop new technology as it is to produce special effects. Digital Image has both digital and analog computers. An analog Rutt/Etra Synthesizer takes a video image and puts it into a high-resolution monitor, where it can be manipulated and distorted in as many ways as the animator can think of. The image is then put into a colorizer and mixer unit to add any kind of coloring.

Other hardware includes a JVC video disc system which records as many as 600 frames of video shot one frame at a time for time lapse taping. "It allows you to compress things or expand them in time," animation director Howard Gutstadt explains. The company's Harris digital framestore allows one to take full frame stills from any video source.

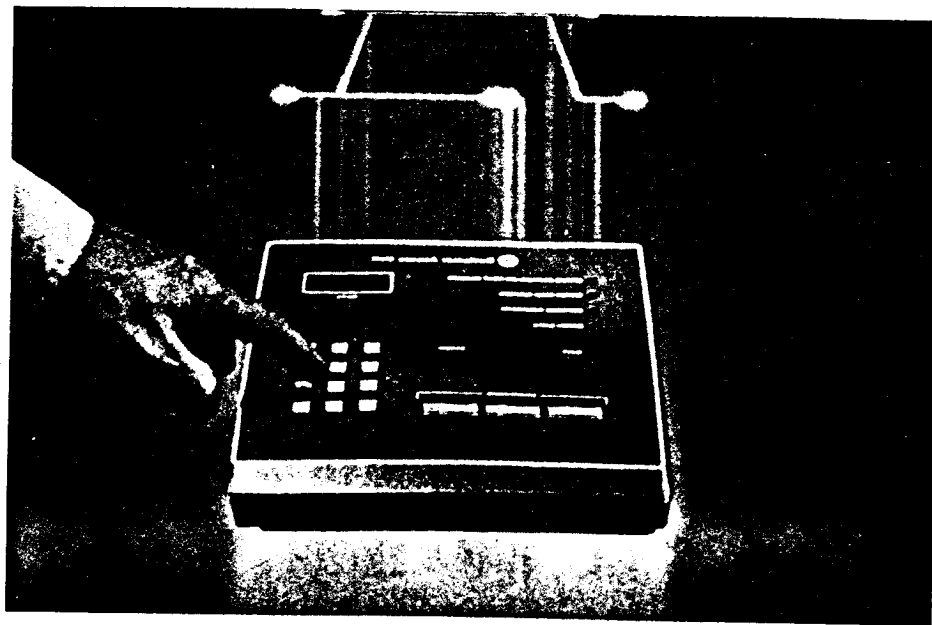
Now in its last stage of development, but already used for special projects, is a prototypical device called Aura. It is being developed by Digital Image and an Australian company, and is a digitally-controlled video system that gives a broad range of color and reconstruction of a tape image by using a computer. "It combines real time video with computer technology," Gutstadt states.

Zeplin Runs the Gamut of Effects

"In the last year and a half," says Zeplin Productions' Sam Alexander in New York, "almost every job we've done involved composites of live action and other effects. In fact, a recent job for AT&T Horizon Business Systems combined everything we do—live action, model making, stop motion, and, of course, special effects and motion graphics."

"First we had a spaceship effect where a telephone-type unit comes in mysteriously," explains Alexander. "But since screen time is so short, we had to create an instant, compressed illusion of mystery. Then we had to create a metaphor for the concept—expanding spaces and the fact that with this new Bell system when you add more offices, you simply program in more phones, up to 100 of them."

Working with N.W. Ayer art director



A recent spot for AT&T Horizon Business Systems ran the gamut of Zeplin's effects—live action, model making, stop motion, special effects and motion graphics.



Triplane Films and Graphics' Jane Simpson was director/designer for this dazzling logo sequence produced for Filmways Television.

Bruce Wilmoth and producer Elaine Dia, Alexander did the product shots at the Zeplin insert stage in New York. For the very complex sequence that pans up and over the offices, he went to California, where 12 actors, a huge set and 250,000 watts of light were involved on the \$75,000 three-day shoot.

Another Zeplin job also ran the gamut of effects. Advertising two new combine harvesters, Allis-Chalmers wanted a very futuristic approach. "They had no footage of the new machinery and they wanted a very specific Hi-Tech look," says Alexander. "So we had a grid that became a globe, then the combine followed the contour with its harvesting."

This time, Zeplin's model-making expert, Robert Mrozowski, and his staff put together a field of 800 stalks of corn, then another with 3200 sheaves of wheat. "Our guideline was: if it looks fake, they won't buy the commercial," remembers Alexander. Stop motion footage was combined with other effects, such as digital graphics of the harvester mechanism.

Triplane Flies Filmways Logo

Jane Simpson's Triplane Films and Graphics, Inc. of Hollywood has been called on by companies to provide dazzling images for their products. One of

Triplane's recent clients was neophyte Hollywood film company Filmways Pictures which wanted a strong logo treatment to precede its theatrical films and television productions.

Working in association with Douglas Boyd Design of LA, designer/director Simpson conceived a storyboard that appealed strongly to the senses. "The people at Filmways wanted to be dazzled by color in their spot. They wanted amorphous, soft color instead of distinct lines and shapes."

The sequence features a horizon out of which come dazzling shapes of color, gradually giving way to a shape which becomes the Filmways logo. In addition to slit scan, Simpson used such techniques as tapered streaks, tapered comets, lens flares and regular streaks.

"The idea of the spot is the birth of the logo out of a swirl of shapes and colors. The Filmways symbol starts off with hot colors and then 'cools down' to more bluish type colors." Technical director was Jim Gerken, with Les Bernstein as the cameraman.

Simpson used some of the same techniques for another recent job, a package of five different tags and an opening for the "PM Magazine" syndicated television show. It is the third year PM has hired Simpson to do a new opening,

which is based on a trip down a surrealistic road.

Londoners Join Hal Friedman Clients

Benton & Bowles' London operation recently came to the Harold Friedman Consortium in New York with a commercial for a new air freshener called Flo-Thru. "We were flattered they came to us, instead of the trend to bring English directors to the U.S.," states Alfie Schloss, creative supervisor on the job.

Various different techniques were used on this one spot by designer/director George Parker. "Bernie Hirschenson did the live action product shooting," notes Schloss. "Then we integrated live lasers, plus graphic, computer and conventional animation. Good and bad air were illustrated by animation and a living room and kitchen created in neon that were then matched to a real set, with a real toaster burning toast in the foreground." London reports back that it is having great success with the commercials, currently on-air in 20- and 30-second versions. Producer on this spot was Susan Rubin.

Meanwhile, the Consortium is now working on a series of five spots for the Circle K chain store for Bozell & Jacobs in Phoenix, Arizona. Full animation this time, the spots are being produced in record time at three or four weeks apiece. Designer/director is Fred Crippen, producer D. Rufus Friedman. And Hal Friedman's team just completed its fifth Bubblicious commercial for Ted Bates/New York, this time using rotoscope animation to depict a space station watermelon and introduce a new watermelon flavor. Designer/director was Arnie Wong, producer Alfie Schloss.

Small Is Beautiful for John Gati at Action Productions

Two jobs recently completed at New York's Action Productions bear out the Schumacher adage about the Lilliputian view of life: small is beautiful. Using a miniature of a Long John Silvers Restaurant enabled John Gati to get a clean look, with no distracting real-life buildings or electrical wires to confuse the picture. Working with Leo Stuckhus, VP of Abbott Advertising in Lexington, Kentucky, who was creative director on the job, Gati injected the four seasons for the openings and closings of commercials advertising the national restaurant chain.

Another spot had a 16-inch R2D2-type metallic robot in a blue beret—palette in one hand, paintbrush in the other—painting the logo for the Michigan-based People's National Bank & Trust Company. The animated robot, made by well-known Long Island model maker Tom Newberry, was operated by the armature inside and moved frame by frame. "We are back with

Lucas and Harryhausen," notes Gati. "They do that and we do, too."

After completing this spot, Gati flew to last month's international festival of puppet animators held in Odense, Denmark. Among the entries were Gati's "Flutey and the Knights," a pilot for a children's TV series.

Rebecca Singer Moves to More Theatrical Look

"Instead of STAR WARS effects in everything, we are getting to do a more theatrical kind of visual approach," notes Rebecca Singer of the Rebecca Singer Studio in New York. "Instead of super-real, many of our recent jobs are super-theatrical, super-fantasy." One recent job for the Byrne Arena at the Meadowlands Complex in New Jersey combined traditional elements with modern techniques, giving a very contemporary dimension.

On first seeing the arena, Singer remembers, "I was very impressed seeing 200 workers welding, soldering, and so on. The scope of the project was amazing. I felt I wanted to really play up the fact that this was an arena and made it very Roman-looking. We treated it using two colors and describing a geometric form."

The colors used also represent a new direction. "After the recent emphasis on bright, bright colors," points out Singer, "we have been trying to change our palette a little. Greys are not used that often in film graphics, but here we butted two greys against black and red, which

gave a very hi-tech effect."

Four ID pieces Singer just completed for Warner Amex cable also had a fantasy look. She put a chrome model of the logo type in seasonal environments in four separate vignettes. Spring had a soft, Renaissance sky, a field of grass, and flowers that popped open in time-lapse photography. Summer had glitter sparkling in the sand to give a shimmer, hot atmosphere, while a beach umbrella popped open in stop motion. Winter had a swirl of snow blowing away to reveal the logo, and fall, autumn leaves and rich colors.

From Films to Tuxedos at Moore Graphics & Film

"For the past year, we've been producing a one-of-a-kind film for a one-of-a-kind theater," says David Moore of Moore Graphics & Film in L.A. The theater is a permanent world's fair currently being set up in the United States. The film is computer-generated, and the whole project is top secret for the moment.

Among the other jobs was one for RCA Selectavision. Instead of a Whirling Dervish, this 30-second spot had a VCR whirling across the screen. As it turned, the V became an A, the R flipped, the C turned over—and the VCR became RCA, with Selectavision flaring up underneath.

Moore, who works with a full-time staff of 10, plus numerous freelance animators, also just completed the computer section of a Hawaiian Telephone commercial and a promo spot for singer Rickie Lee Jones' second album, "Pirates," for Warner Brothers.

"We are delivering this with a tuxedo look," adds Moore, "doing a lot of computer images and cross dissolves on positive images. Beautiful black and white continuous-tone photographs going from negative to positive to negative again, which is a rather unusual approach for television, where people rarely do things with negatives."

APA Develops Self-Matting System

It may be illegal to reproduce stamps of the realm, but it was all part of the job when APA's Lee Howard did a commercial for the U.S. Postal Office. Working with cameraman Dave Quade, he blew up a photo of a new stamp, then made a replica of the picture: a heron standing on a log set, set in a pond, surrounded by grass. "We set it up so it looked absolutely dimensional," explains Howard, "zoomed in until it matched, then dissolved to the stamp. When you're dealing with real and fake life, it's critical to have it exact. We added feathers and other moving parts, so the bird actually quivers a little. It's a flat cut-out, but you'd never know it."

The next job for APA was the animation half of a five-minute film for TelePrompster Cable (Rudi Goldman did the live action sequences). Here Howard used the unique self-matting system he has developed whereby he can shoot two, three and four different elements in a single pass, all in register.

The job involved a cable traveling down a miniature street in a quiet little village one dark and dreamy evening. The cable laser-hits each house, which lights up and glows in color. The self-matting technique was vital, since double and triple passing would have been impossible. Also, doing this as a separate element system for optical printing would have been very time-consuming and would have ended up with third and fourth generation images, instead of the first generation images APA got."

Zeller Creates Movie Havoc at Special Effects Studio

Plastic engineer and polymer chemist Gary Zeller provided breakaway items such as a juke box, pinball machine, gas pumps and a barber shop that were manhandled by Richard Keil in the new Warner Brothers' movie SO FINE, starring Ryan O'Neal. Zeller was also special effects coordinator for Columbia Pictures' NEIGHBORS, starring the Belushi Brothers, where he did breakaways, a fright wig for a dog, and burned down two buildings on Staten Island.

And if that's not enough, Zeller—in collaboration with Ed Drohan—also provided special effects for the film RAGTIME, not least of all the explosion where Coalhouse Walker blows up the firehouse that gave him so much



Blending traditional elements with modern technology gives Rebecca Singer Studios' new super-theatrical, fantasy-style approach a unique look.



Don Amundson of Precision Film Group puts finishing touches on a B-17 model which was shot and used to generate animation for Columbia's HEAVY METAL.

trouble. Other recent credits include work on SCANNERS, where Zeller copied an actor's face, then exploded the model head with a slogan. While on Sylvester Stallone's NIGHTHAWKS, Zeller—again working with Ed Drohan—was responsible for the bus that explodes in the river.

For this effect, they rigged up a drive unit. Not wanting the scuba diver operator to show, they also rigged up a separate seat behind the original driver's seat. Holes were drilled in the bus, bullet hits wired up, then the bus surface was refinished.

Zeller and his wife/partner Joyce Spector of the Special Effects Studio report no accidents in his 20-year career in screen adventure. "The key is precision, knowledge, and much, much safety," says Zeller, who recently outlined some of the tricks of his trade in the "ZEL GEL Manual: The Art of Fire Stunts," which costs \$50 and is available from Gary Zeller, 40 West 39th Street, New York, NY 10018.

Doug Trumbull and Richard Yuricich Establish Independent Facility

Douglas Trumbull and Richard Yuricich

recently announced the formation of Entertainment Effects Group, a comprehensive widescreen photographic effects studio, located in Venice, California. The new 20,000 square foot facility, outfitted to produce the effects for STAR TREK: THE MOTION PICTURE and currently completing work on BLADERUNNER, includes a screening room, machine shop, offices, stages, editorial facilities, optical printers, animation cameras, matte painting and photography, and motion control equipment. The operation is equipped almost exclusively for 70mm photography, and has an extensive inventory of 70mm cameras and associated equipment.

In addition to their work on BLADERUNNER and the upcoming motion picture BRAINSTORM, E.E.G. is engaged in many facets of entertainment including Showscan film productions (Trumbull's high speed 70mm process), amusement parks, expositions, and other special photographic projects. With their combined experience on such special effects film as 2001: A SPACE ODYSSEY, CLOSE ENCOUNTERS OF THE THIRD KIND, THE ANDROMEDA STRAIN and

STAR TREK: THE MOTION PICTURE, Trumbull and Yuricich feel E.E.G. will meet the growing need for a Los Angeles facility housing the most up-to-date effects technology and the most knowledgeable personnel available. Trumbull emphasized, "Our major advantage is having a group of people who can interpret visual concepts on an artistic level, and know precisely the technology required to bring those concepts to the screen."

Loebel Boasts New High-Speed Camera

Loebel Productions recently bought its own Photo-Sonics high-speed 35mm camera, "the only one on the East Coast," boasts Herb Loebel. The studio has been renting the camera for years on numerous jobs, including one where a Minolta camera was blown up and filmed in reverse to show the camera reassembling itself.

Loebel's Photo-Sonics films up to 2,500 frames per second. "It can go up to 3,250," adds Loebel, "but 2,500 is ideal for our purposes. Shooting at such high speed enables us to show explosions that in reality last fractions of a second, so the eye can see things it's never seen before. In the case of a recent wine spot, for instance, it took eight seconds for a drop of wine to reach a wine glass."

In addition, Loebel has added a video assist, which allows playback of a shot in extreme slow motion, plus stop motion facilities. These were first used on a job advertising Moulinex, the European food processor (the agency was Compton in Germany). "A snorkel lens panned through a field of vegetables until it came to a carrot, then we had a matched cut to a stop motion sequence of the carrot being shredded," explains Loebel. "The camera moved on till it came to an onion, and again, a matched cut to the onion being diced by the Moulinex."

The snorkel lens was again used on a job for Armstrong Floors (BBDO) which shows the making of a floor tile—this time using synchronized snorkel moves which allow split-second timing as tiny colored beads were dropped onto a tile grid. "It looks as though the tile is created in one sweep," explains Loebel, "whereas we did it in four or five takes, each time filling in a little more with a different color on different sections."

Cinetron Wins Academy Award for Computer Control System

Last March, Atlanta-based Cinetron Computer Systems received the Academy of Motion Picture Arts & Sciences Technical Achievement Award for developing a versatile general purpose computer control system used on animation stands and optical printers. The Cinetron System utilizes precision

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stepping motors to control its assigned axes with extreme accuracy. Eight models are currently available (Nos. 300, 350, 350X, 360, 390, 500, 800 and 1100), with users making their selection according to the number of axes they wish to control.

The Cinetron 1100 comprises a 64K computer, software package, color display terminal with tape and disc input, hardware and power cabinet, and precision stepping motors. The system can be fitted to optical printers, animation stands, or special-purpose devices for complete control of all motion or manipulation.

Cinetron control systems are in operation across the country in centers like New York, Los Angeles, Chicago, Cincinnati, Portland, Nashville, and Toronto. Meanwhile, Cinetron has its own 16 and 35mm production capability in Atlanta, located in Norcross.

"There we currently have two Oxberry animation stands and one Producers Service Optical Printer with beam splitter," explains Harold Pearson, "each equipped with an 1100 system to aid us in motion picture special effects and graphic treatments." As Pearson sums it up, "We've come a long way since Snow White."

The Optical House Performs for Circus World

One spot that really put The Optical House through its paces was a 60-second commercial for Circus World in Florida. "The client wanted to appeal to a teenage audience which has gotten very sophisticated in terms of opticals," explains Dick Swanek. "So they wanted to really load it up with effects."

Swanek's team pulled mattes, created images, and turned one scene that was shot in broad daylight into night, as they incorporated roller coaster rides, performing animals and a diver set on fire. The piece was full of graphics—multiple titles, animation, strobes, diffused lighting, push wipes, pinwheel wipes, even 10 wipes in eight seconds. One "broken glass" effect had the various fragments of a moving picture gliding off with different speeds of action within each fragment.

Audiences are still reeling from some of the effects devised by The Optical House and special effects director Bran Ferren for ALTERED STATES (mushroom fields, people turning into pure energy, and so on). More recently, the studio has been at work on effects for the movie DEATH-TRAP.

Meanwhile, The Optical House has been moving heavily into graphics and computer-generated images and expanding its equipment in the last year or so to meet this emphasis. Three of its

optical benches are attached to computers, one a full-blown Cinetron, the other two mini-computers. There are two Eastman Kodak Color Analysers, plus a CompuGraphic* to provide in-house typesetting. The company is now also obtaining a super animation stand made by Mechanical Concepts on the West Coast.

"An Elicon follow-focus will provide very fine variation in focusing. But the big advantage is that the computer is set so that instead of normal shooting at 1/8 of a second, by the touch of a dial we can go from that up to 10 seconds per exposure, so we will get much greater depth of field," concludes art director Dick Rauh.

R/Greenberg Buys East Coast's First Elicon System and DC Back-Lit Blue Screen

R/Greenberg Associates has added a horizontal tracking system and a 10- by 16-foot back-lit blue screen that is depowered and dimmable. Both unique on the East Coast, according to executive producer Robert Greenberg, the only other Elicon system in operation right now is at Roger Corman's New World in California, though several are on order. For Greenberg, the Elicon is the final key to making the company totally self-sufficient so it can do all its effects in-house. (Unlike most optical houses, the company does no outside optical work, concentrating only on its own productions.)

"We've been handling live action as well as animation and optical work in the past 18 months," explains Greenberg, "but the Elicon provides the missing element of motion control *horizontal* tracking. Previously only able to go stop motion and frame-by-frame on track, we now can go sound speed, as well as high speed and time exposure. The Elicon has repeatable accuracy to 1/2,000th of an inch, as opposed to the best currently available only to 1/100th of an inch. Other features include video record and playback so you can preview the moves."

Larger shots will still be done at one of the large blue screens on the West Coast, but for commercial purposes—product and group shots of up to six people—Greenberg will use its New York operation. A black and a white screen that have also been added will provide additional backgrounds for special effects purposes.

"The Elicon is really what we need in order to be able to shoot things live action and also control the motion of the camera at the same time," states Greenberg. "In the past, we've had to rent cameras, dollies and tracks that don't control the camera to the proper tolerances for special effects."

For the new American Airlines campaign, Greenberg Associates included

props such as a four-foot mockup of an airplane plus lush location shooting in Mexico, Hawaii and Canada, directed by Richard Greenberg. For the opening to John Landis' new movie, AN AMERICAN WEREWOLF IN LONDON (the company also designed main title sequences for ALIEN, ALTERED STATES and SUPERMAN I), the Greenbergs had an eerie, bloody moon over a moor, actually shot day-for-night behind a shopping center in New Jersey. Other recent credits include openings for BLOW OUT, ENDLESS LOVE and RAGTIME, along with commercials for General Motors, Computer Command Control and Newsweek.

Abel Keeps Producing Clio Winners

The man often credited with starting the electronic age of special effects has not been resting on his laurels, but is finding new ways to expand not only television commercials' visual horizons, but also the hardware and software that produce the effects.

While looking optimistically into the '80s, Robert Abel voices a cautionary note about the present state of commercials' state of the art. "I have seen enough slit-scan, streak and candy apple to last me a lifetime and I think that almost all of the production houses currently using these techniques are on the verge of obsolescence. Clients are asking for new and varied ways to produce their spots and the time may be here soon when all the people currently producing these effects that we pioneered won't be able to effectively market them. Unless they expand these systems efficiently, they may also be looking at a hodge-podge of jerry-rigged and expensive equipment with a very limited future."

It is because of this that Abel has developed a whole new line of software, as well as hardware, to produce his commercials during the last year; uniquely, he's also offering it for sale.

The hardware system called the Evans & Sutherland Picture System II, allows Abel not only to preview his commercial productions, whether the commercial be live action, miniature, computer graphics, or standard animation, but allows him to combine any or all of the above in a single commercial. When coupled with Abel's LORI Motion Control System, the E&S Picture System II allows him to turn out an amazingly diverse series of commercials. For Levi's "Working Man" his company previewed an entire live action commercial with the E&S, then went back in post-production and added all sorts of rotoscope animation back into the shot by using the E&S "preview" to control and plan their motion control graphics cameras.

Startling and unusual variations of these techniques have been used during the last year to create the famous Canon PSD Palm Printer, the Braun "Micro-Hair" commercial, the AT&T "Energy Building" (which starts out as a real helicopter shot

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and ends up with cutaway fly-through of a "living blueprint"), and the TWA "Armada" commercial which featured 16 computer-controlled miniature airplanes matted into a real time-lapse sky.

Currently on Abel's drawing boards are a spot for a new model Toyota car, TRON (Disney's new multi-million dollar computer animation film), and a commercial for Magnavox Odyssey II video games which Abel describes, in an understated tone, as "one of our more insane masterpieces."

Able states, "The agencies have been coming to us with the simple directive of give us something new, different, and wonderful...the kind of freedom that you always dream of. The wonderful thing is that we are all reaping the rewards: ourselves, the agencies and the clients, of a whole new dimension of visual exploration."

Computer Creations Expands in New York and South Bend

Computer Creations, developer of the VideoCel digital computer animation system, is expanding its New York offices which are currently headed up by Jim Lindner. (Computer Creations main facility is in South Bend, Indiana.) Plans include the installation of a remote computer terminal site where clients can preview key scenes of CC's work as it is sent out from its South Bend-based Digital Equipment PDP 11-50 computer. The terminal will interact with a color display monitor so that some modifications can occur, and according to Tom Klimek of CC, a digitizer might be added, but this is not yet definite. The availability of a

remote terminal site in New York will eliminate the need to mail cassettes containing key frames to clients; and information concerning changes which are suggested by clients can be sent via the terminal.

Other new developments occurring in the South Bend facility include the addition of Evans & Sutherland multi-picture systems at each one of three artist stations. These systems allow an artist to compose a line drawing on a vectorgraph display so that the progress of his or her work can be monitored. Sequences of these drawings can also be monitored so that the animation can be checked. Frame buffer systems have also been added so that after the artist enters the pictures and color definitions, the line drawings can be converted into raster formats, and those images can be recorded on a quad VTR, using a slow-motion disc system for single-frame assembly.

Sunwest Hatches Effects for Pioneer Chicken

More companies than ever are boosting sales by turning to special effects animation, and that's exactly what happened when Sunwest Productions' special effects division, which includes producer Steve Soffer and director/designer Jay Jacoby, was hired to produce a commercial for Pioneer Chicken through agency Asher-Gould of Beverly Hills.

The sequence produced by Sunwest opened and closed the commercial, and featured a glowing neon tube of the word "new" which floated into frame from infinity and past the viewer. That is followed by the company logo, which flares up. The flare is immediately cut with a similar flare on a live action knife as it cuts through a piece of chicken. The spot is closed by a tag symbol of the

company.

"That was the most successful commercial in the company's history in terms of each store's sales, which each sold 500 more pieces of chicken," explains a proud Soffer.

The storyboard was designed both by Sunwest and the agency, with the spot itself employing backlit animation. While some have predicted backlit cel animation will wear out its popularity due to overuse, Soffer believes that "until somebody invents something terrific that's affordable, it's here to stay. It's better than regular title cards."

Pacific Titles Supplies Lion's Share of Movie Credits

What Hershey's is to chocolate, Hollywood's Pacific Title and Art Studio is to movie and TV main titles. Not only does Pacific Title do more main title sequences than anyone else, they've been doing it since 1919. But that isn't all the company does. It has six optical printers, including Oxberry aerial image, Acme and Cinema Research, on which most of the fades and dissolves seen on episodic TV are made.

"We're a nuts and bolts operation. We get the job in and out in a few days," explains Gordon Hubbard, president of Pacific Title. A list of its title and optical work reads like the contents of *TV Guide*: "M*A*S*H," "Trapper John," "Lou Grant," "The Dukes of Hazzard," plus many other television shows and feature films.

Just about anything needed in the production of main titles can be found in Pacific Title's facilities. There is a fully staffed art department for designing special lettering or illustration work for titles, posters or logos, and there is a fully equipped print shop.

The methods of producing main titles have not changed much in recent years, though few sequences use hand lettering any more, Hubbard notes. "Twenty years ago much of the title and lettering was painted on glass. That's pretty much nonexistent today. Now it's almost always done on a printing press."

Heavy Metal Created With Precision

The line between special effects and animation was always blurry, but now it has disappeared entirely. Special effects movies are relying heavily on pen and ink drawings to heighten live action reality, and animated films are making use of traditional special effects techniques.

One company experienced at both is Precision Film Group, with a principal creative team including president Alex Funke, VP Don Amundson, and director/designer and producer Michele Small. A Precision team used computerized motion control photography of miniature models recently for Columbia's animated fantasy feature HEAVY METAL.

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Storyboards given Precision by HEAVY METAL effects director John Bruno and production designer Michael Gross called for a long, complex pan over a sprawling, detailed, extraterrestrial landscape—a task beyond the capabilities of traditional cel animation. So Gerry Allen constructed a 20- by 32-foot large model landscape of Polyurethane and painted it black with white lines specifying contours.

Precision's task was to perform the complicated single-take camera movement over the sprawling "miniature" set on black and white film stock. That stock would be made into paper prints which would become animation cels with color added to the shapes and forms later by the animators.

Elaborate shot preparations included suspending the 32-foot track over the set (which filled a large room) and mounting the camera onto an eight-foot boom arm in order to shoot the film in one "continuous" take. The computer controlling the camera was programmed for six axes of movement, which resulted in a smooth aerodynamic simulation of a bird's eye view flyover of the landscape. Because the frame-by-frame movement was over a single set, lights and blackout curtains had to be moved during the shooting.

Flint Puts Timex In Space

Roger Flint is not a special effects man, but a filmmaker whose commercials happen to contain a lot of effects, and none of his recent works were filled with as many different ones as the Timex "Night Skies" spot. Done through Grey Advertising of New York, the Timex spot consists of a rock hurtling through space in slow motion and exploding, a flying watch against a background of red landscape and blue horizon, and other strange vistas.

Flint shot a rock wired with four strings of monofilament painted black at 96 to 120 frames per second (to achieve slow motion) in a studio. "It was tricky lighting it so that the monofilament wasn't showing," Flint adds.

An explosive charge was added to the rock and exploded on cue in front of the camera, which was protected by a sheet of glass. Flint explains that the rock footage was then rotoscoped and used as a matte for the Cinema Research Company to add in a starfield background. Other watch footage was shot on the computerized motion control camera system of Dream Quest, another Los Angeles special effects house.

The major live action portion was shot by Flint on a highway outside LA at night, with 20 sets of lights arranged to face each other as a car was driven down the street between them. Flint's production team included producer Hal Greenberg, execu-

tive producer Gregg Ackerman, cameraman Lennie Evans, associate producer Jane Kellard, assistant directors Robert Weinstein and Maurice Hewitt, gaffer Les Kovack and grip Guy Baron. John Greene produced for the agency. Casey Wojciechowski was account executive.

Versatility Marks Coast Effects

Located in North Hollywood, Coast Productions special effects unit is supervised by Phil Kellison. It is a division of Coast Productions of Hollywood. Coast's miniature builders were called on recently to construct models of the three Christopher Columbus ships, which were used in a crucial shot of a 30-second Sperry-Rand commercial. The commercial began with a pan over New York City's Hudson River, with a quick cut to an overhead shot of the ships. They were actually shot in Coast's shop on a computerized motion control camera with bi-pak matting and inserted into a scene of the Hudson River.

"One problem for us was matching the atmospheric haze in the New York footage, so we eventually shot the ships as double exposures to soften the image a bit," Kellison explains. The agency was Scali, McCabe and Sloves of New York.

A very different technique, old fashioned stop motion animation, breathed life into three baskets of singing flowers for a Florafax flower delivery system commercial. Coast animator Laine Liska animated plastic flowers in three baskets which were singing to a music track. The daisies were designed with leaves that acted as hands and held a microphone, which the flowers pass around. The mouths appeared to move by aid of stick-on decals, changed for each frame exposure to show a different mouth position.

Surrealism Springs from Apogee

Oscar winner John Dykstra became one of Hollywood's most sought-after craftsmen after creating the effects for George Lucas' STAR WARS, which rushed in a new era in special effects. Dykstra's company, Apogee, has not rested on the laurels of its founder, but has continued to produce special effects for movies and commercials. In fact, it won a special effects Clio last spring for a 60-second spot it did for Mercury Cougar. (See story elsewhere in this issue.)

The surrealistic spot opens up on a woman standing in front of ivory walls that seem to recede into infinity. Then the Mercury Cougar is unveiled, with scenes of striking clarity reflected in its sleek side. The images could not simply be optically superimposed on the car's exterior. The shape of the car required that the images be contoured to the auto body while retaining perfect clarity.



A recent 20-second spot for a new Kodak color negative film features a tour through the color spectrum from watermelons to sunsets, courtesy of the Image Factory.

The solution of optical supervisor Roger Dorney was to actually project the scenes onto the side of a Mercury Cougar model. The projection was done onto a Cougar specially painted white, then the images were optically matted in with the live action film of the car. "We had a lot of problems getting the images to come out strongly on the car. We just had to make it work," Dorney recalls.

Mixed Bag at The Image Factory

The Image Factory in New York just completed a tour through the color spectrum for a 20-second spot advertising a new Kodak color negative film. Called the Kodak Color Series, it is just that. Opening with a shot of a Kodacolor film box, the trip begins with a Cub Scout painting a wall chrome yellow. Next stop is a vivid green watermelon, then a Blue Girl—Image Factory style, not Picasso, this time round. Then on to red, and so on, till it ends in the hot orange glow of a sunset, and back into the box.

"It's very lyrical, very soothing, slow-paced picture motion animation," reports George McGinnis, who was creative director on the spot, working with cameraman George Muhs and J.W. Thompson producer Larry Dalton.

McGinnis and Muhs also worked together on a 30-second spot for New England Bell. Beginning with a shot of a finger holding a microchip, the camera zooms through the finger onto the microchip, which expands to fill the screen. Then back into the hand, which touches an old black phone that metamorphoses into a new computerized phone. A combination of live action and special effects, including rotoscoping and

slit scan, the spot was for the Boston agency Harold Cabot & Co.; the agency producer was Lou Stamoulis.

Magic Lantern Lights the Way for Features, Spots

While many effects companies in LA narrow their range of capabilities to either mechanical or optical effects, Magic Lantern is capable of mechanical effects, special props and miniatures, special cinematography, stop motion animation, front and back projection, cel animation effects, and prosthetics. It reflects the varied backgrounds of its four principals: Bob Greenberg, William J. Hedge, Thomas H. Payne and Anthony Dublin.

Instead of exclusively catering to the commercial trade, Magic Lantern is also heavily involved in feature films. That perhaps explains why it keeps its hand in mechanical effects at a time when everyone else is going to opticals or electronics. As Greenberg explains, many feature film directors want an effect done on the set.

The company's talents were integral in one of the more memorable vignettes of Mel Brooks' HISTORY OF THE WORLD, PART I, the "Jews In Space" episode. It involved miniature model spaceships built by John Curtis, laser animation by Greenberg, and a special "blackscreen" matte technique that involved opticals supervised by Bob Costa. The company also executed the "angled crawl" main titles which, a la STAR WARS, appear to roll off into infinity.

"Usually an artist is dealing with pencil, paintbrush and such," says Tricomi. "In this case the tools were a little bit different—forceps and scissors. It was rather like a graphic operation. But

it worked well, as the symbol of a sampler fit very nicely with the product, which was a heat pump to make the home a little more cost-efficient." Nancy Esserman produced the spot, which was written by Rich Halten.

Energy Features Time Lapse

Energy Productions has provided some of the best remembered time lapse photography seen in commercials or movies in recent years, as well as special animation for a CBS-TV pilot mixing cel animation with live action.

A commercial highlighted by Energy's time lapse footage won an award at the Chicago Film Festival earlier this year. Shot for LA's K-Earth radio station, the Roger Flint production featured several vivid time lapse shots of Los Angeles streets. The 15 to 20 shots were pulled from a theatrical short done by Energy's director/producer Lou Schwartzberg.

A time lapse of a sunrise for a recent Security Pacific Bank commercial found Schwartzberg shooting in 12 to 14 locations all over California to capture the best possible sunrise. For Ken Russell's ALTERED STATES, Energy provided much of the footage used in the hallucination scenes, including moving clouds, poppy fields, and swimming fish.

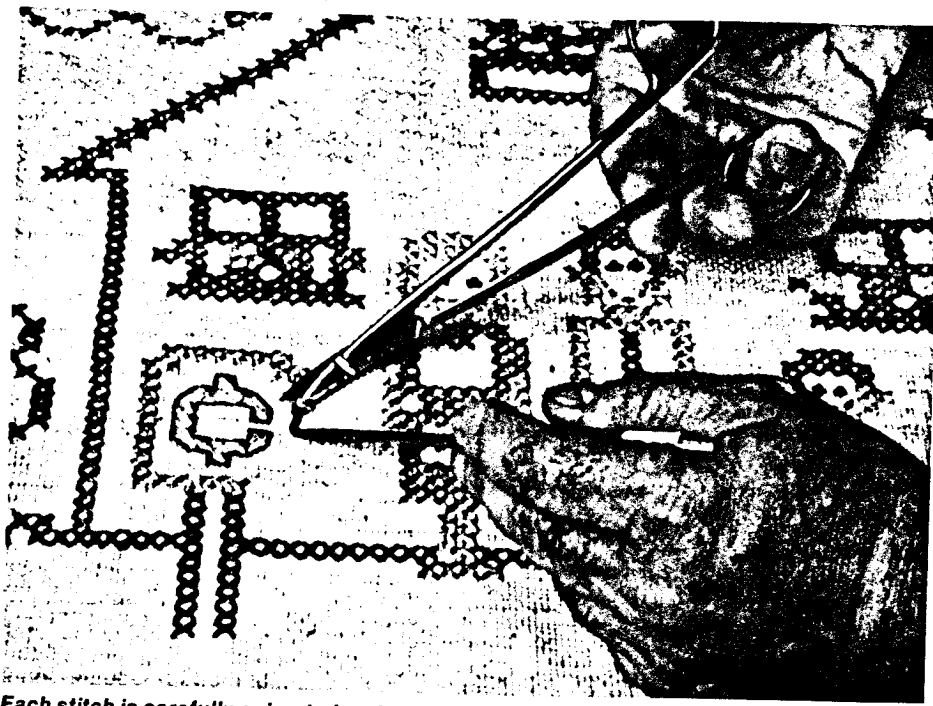
Schwartzberg was one of the creators of "Pen 'N Inc.," a CBS television series pilot not yet aired which concerns a cartoonist whose characters come to life with sometimes wacky results. (See *Millimeter*, August 1981). Schwartzberg produced the animation sequences, which involved cartoon characters who interact quite subtly with the live action actors.

Computer Camera Service Offers the Exotic

Some camera services have standard camera equipment that shoots animation cel artwork; others, like Computer Camera Service, are more specialized. "We're a small company which does exotic effects. We specialize in the believability of combining effects and live action," states president Ray J. Kerns.

Besides three computerized motion control camera systems, Computer Camera Service offers more. Its three-color additive light box allows a designer to change a color during a streak action in backlit effects animation, an effect which otherwise cannot be done without a costly and time consuming lap dissolve in the lab. Another unit can provide 8- by 10-inch transparencies of any frame from a piece of film.

Its equipment and capabilities were called upon during the shoot of a Dupont Lannate insecticide spot produced by Coast Productions. The commercial showed lightning striking worms crawling along leaves, and emitting streaks as they fell. The leafy backgrounds were flat



Each stitch is carefully animated and cut off in this 30-second spot for Alabama Power. Designer Ed Tricomi of I.F. Studios in New York shot the 720 frames of stop-motion embroidery in reverse.

artwork, and the animated worms were specially shot to "blur" a bit as they were struck down. Since movement exposed one frame at a time will not blur in the same way continuous movement will to the naked eye, Kerns' solution was to produce a blur by moving the artwork a bit while the camera was exposing the film.

Stop-Motion Embroidery Used by Ed Tricomi

The storyboard called for a real sampler to say family and home. The idea belonged to B.A. Albert, art director with Atlanta agency Cargill, Wilson & Acree, Inc. The execution belonged to Ed Tricomi, who is responsible for design and stop motion photography at New York's I.F. Studios.

The question on this 30-second "Good Sense Home" spot for Alabama Power was: Do we animate, or use some other special effect? "I thought it would be more real if we did it with an actual sampler," explains Tricomi, "and had the stitches stitch themselves on."

First step was to design the stitching and find out how many stitches would be involved in relation to the number of frames. Research was done to find the best type of stitch and the right materials—a somewhat coarser material was chosen to give the right effect in close-up. Then Rosemary Heyen, wife of propmaker/artist Jerry Heyen who often works with Tricomi, did the embroidery.

Camera positions were determined,

with the spot separated into five or six units, the overall picture plus closeups of a smile being formed, window-boxes, and so on. Then the commercial was filmed in reverse, with 720 frames shot thread as the thread unstitched itself.

Short Stroke Streaks from Lumeni

The emphasis at Lumeni Productions has shifted in the last year. Originally it was a camera service, and did the complex shooting of artwork designed by other production companies. Lumeni is still a camera service, but it also produces special effects commercials now, according to Lumeni's Tony Valdez, whose partners are John O'Connell and Gilbert Yablon.

They and staff art director John Millerburg together created a recent commercial for Banpais, the Bank of Mexico. The job, done through the Mexico City ad agency of Staff Publiciad, was a 10-second special effects logo tag. It began with a grid that moved from the top of the frame, with the Banpais logo emerging out of it and becoming larger as it rotated. The logo flares up with hot flashes of color, then cools down to solidify into the logo shape.

Through a technique Valdez calls "short stroke streaks," the logo appears to be made of glass. "It looks translucent and three dimensional, even though it is actually backlit artwork," Valdez points out.

Recently installed at Lumeni is a Mech-

anical Concepts animation stand, which Valdez says is "considered state of the art in terms of vertical cameras." It is hooked up by a Cinetron 1100 computer system to give swift, precise and complex camera moves over artwork and eliminate the drudge of manual operation.

"It's got twice the versatility of the original system we used, and it runs twice as fast. Any program can be put into it and actual shooting time is cut in half," Valdez says. The system's camera also has a broader range of movement than others of its type.

Gehring Develops Kinemorphics System

In a town brimming with sophisticated special effects equipment, Bo Gehring of Gehring Aviation has always been one of the first to develop the prototypes. He has used his expertise to direct and produce commercials such as a package of four Bank of America spots he recently did for LA ad agency Grey Advertising.

One, directed by Gehring and Deena Burkett, involved a checkbook revolving and curling up at the edges to form a percentage sign. It was created on the computer graphics system Gehring developed, the Gehring Kinemorphics.

The Kinemorphics is a digitally-based computer system on which images can be generated and made to move in any perspective. Its improvement over similar systems is the high quality of its image. Once the moving checkbook was generated on the system, the image was captured automatically frame by frame on animation cels.

Then hand crafting took over. "We hand-colored, cel by cel, various things on the checkbook. We made the printing on the checkbook several different colors, which enhanced it greatly," states Gehring. The different elements in the checkbook image and the blue sky background were put together on Gehring's computerized motion control camera system using bi-pak matting. Producing for Grey Advertising was Chet Maxwell with Claude Jacques art directing.

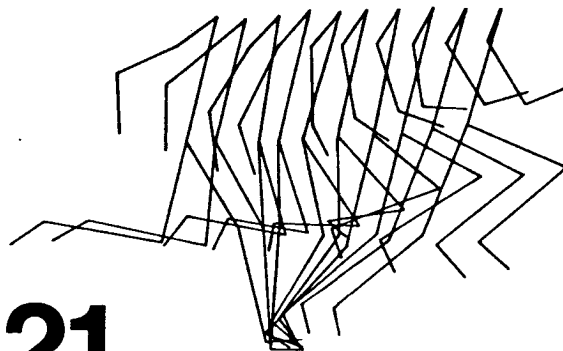
"This spot made full use of our computer graphics," Gehring points out, adding that agency producers and art directors will get best results from computerized hardware if they explore their uses before finalizing a storyboard.

Acme Cartoon's "Emulsi-Filter" Gets Film Look on Tape

Using a small computer with a large memory capacity, Acme Cartoon in Dallas, Texas, has been busy over the past two years developing software for its digital computer graphics system. The set up includes a central computer, an image array processor (a small computer that can store a picture's worth of information in

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SPECIAL EFFECTS

3/4ths of a megabyte), a video monitor digitizing tablet and pen.

The most unique application of this system involves the 'EmulsiFilter' program—a process that runs tape through digital processing for analysis. The tape is then digitally manipulated to make it look exactly like film. With Acme Cartoon's digital computer system, it is possible to produce a high-quality videotape that can be mixed with film without any distinguishable differences—perfect for matching various film and tape sources during animation.

Other programs available with the Acme Cartoon system include optical printing, squeezing and zooming, scan and slit scan, pixellation and mapping. These programs are designed for creating special effects for use in commercial animation, and for titling, etc. The system can take images and perform a number of effects with them, including rotations, tumbles, spins, and a special 3D program for adding depth and dimension to flat artwork. In the mapping mode, images can be placed on any arbitrary surface for manipulation and perspective distortion.

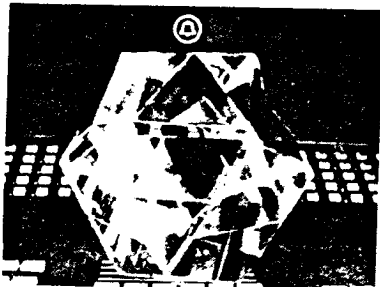
A painting program affords Acme Cartoon 16,000,000 available colors, all of which are stored in the computer's memory. In this mode, a digitizing tablet and stylus are used for picture manipulation and color matching. With this program, images can also be rotoscoped and neon effects added. Yet another program prepares finished cartoon sequences from supplied line drawings or animation.

Freedom in European Market for Midocean

The Clio given last spring in the foreign special effects category was for a spot for Schneider, a French company which produces color TV sets. It was produced by Midocean Motion Pictures of Hollywood, for several years one of the pacesetters in commercial special effects animation.

"It was one of those dream jobs," recalls Rod McCall, director/designer of the spot, and creative head of Midocean. "They were able to let me have full freedom in making it." While most directors must hew to a rigid storyboard worked out by an ad agency, the French firm allowed McCall to design his own storyboard.

"I wanted to pull the audience through something. Let them wonder what was going on, then let them see what it was. It's an abstract of color television. The spot also owes a lot to Stravinsky's Rite of Spring, which I'd been listening to. I had Joseph Byrd, a composer I work with a lot, get this 20-minute piece of music into 30 seconds. Then we took the sound and distorted it a bit and changed some notes."



AT&T N.W. Ayer, NYC



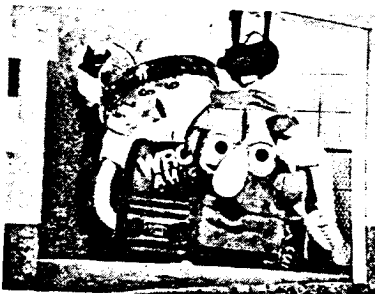
Canon "One Touch" Dentsu, NYC



U.S. Air J. Walter Thompson, NYC



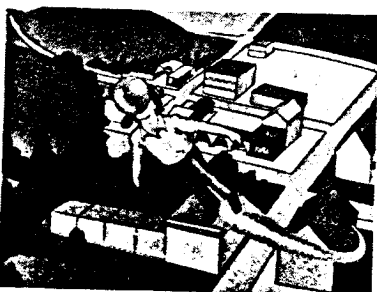
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Producer: D. Rufus Friedman

SPECIAL EFFECTS

The many elements in the commercial were produced by bi-pak matting on Midocean's three computerized motion control camera systems. Technical director for the job was Don Button, with Cameron Strewski assistant director and Clint Colver and Mark Hardin at camera. Landscape photography was by Charles Edwards.

The Schneider spot reflects a new trend in the Hollywood commercial production community: some of the most creative work is being done for European clients. "I think it's mainly because of (Hollywood) movies," McCall offers as explanation. "They see STAR WARS and RAIDERS OF THE LOST ARK over there and they're swept away by it, so they come to Hollywood to get that. And because commercials often play in theaters there, their advertising goes in more for entertainment than our ads do here."

Computer Image Unveils System IV

Over the last four years the Denver-based Computer Image Corporation has developed a massive computer program. This summer, Computer Image unveiled System IV, a hybrid computer to go along with it. Considered the fourth generation of its real-time animation technology, System IV will increase the speed of animation through operator controls which are coupled with the new computer program. The first models of this computer have already been leased to Radio Television, Luxembourg; and to Telerey Productions in Mexico City, for delivery this fall and winter.

Computer Image has designed, patented, and built its own analog and analog-digital computers (the Scanimate and CAESAR) used for commercial production both at its own facility and Dolphin (N.Y.C.) and Image West. The resulting real-time electronic animation process produces an infinite variety of optical effects quickly and easily, as well as disciplined animated moves from electronic patterns to lip sync character animation.

The method of production used is electronic manipulation of image, which can be art, video tape, color camera, or the output of the alternate computer. Only one piece of artwork is required for any given image, letter form or cartoon character. Key frame animation is set up by the operators for extremes in motion, then played back in real time. The computer produces all in-betweens at 30 frames per second. The animation cycle approximates the directing of live action and allows far greater creative interaction.

Some recent clients include IBM, NCAA Football on ABC, and The Phil Donahue Show, among others.

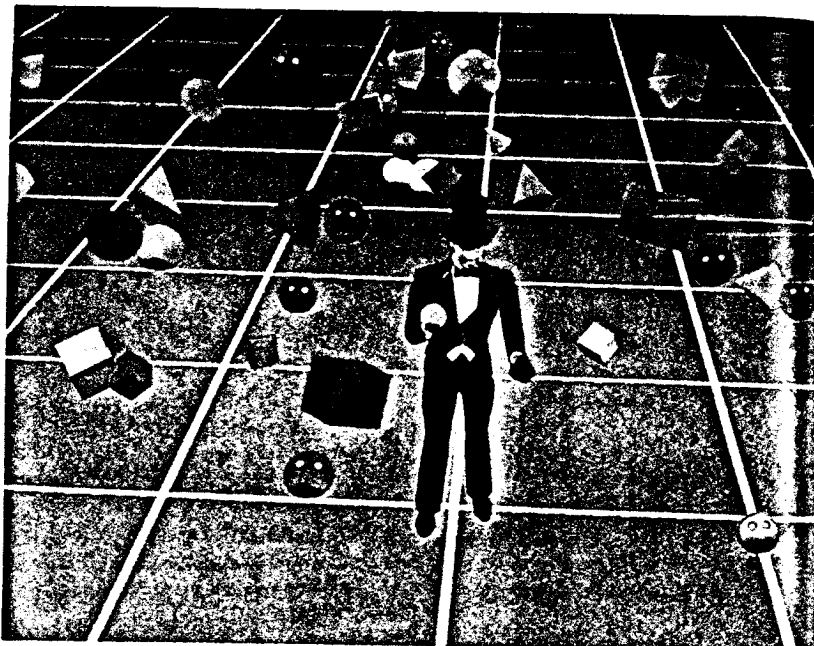
Electronic Scenery, Digital Optical Printers, Computer Imaging in the Near Future for Film Production

PETER SØRENSEN

Adam Powers is the first of a new breed of stuntmen, who has just made his debut in a few scenes that are on the Information International, Inc. (known widely as "Triple-I") demo reel. All he really does is juggle and do a few back flips; but he is a most promising protege at Triple-I because he can defy the laws of physics with utter impunity. If required, he could just as easily walk through walls, fly without wires like Superman, stretch his arm across the room, change his features or his sex (Eve?) and glow from within. Adam Powers is synthesized by computer.

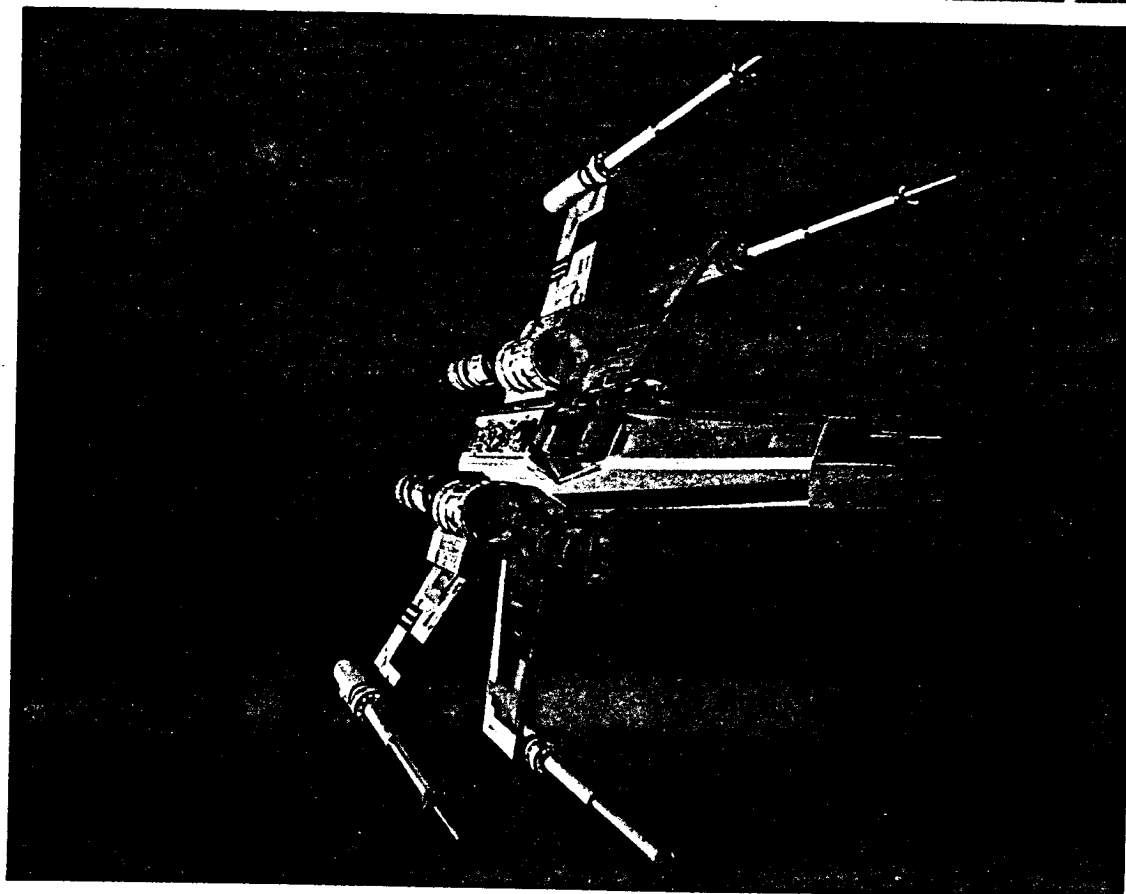
"People used to say, 'You'll never be able to do the human figure, you'll never be able to do anything organic!'" relates Richard Taylor, the senior effects director

Peter Sørensen is a designer/director of computer animation commercials and feature film special effects, living in Hollywood.



Adam Powers (above), stuntman and juggler extraordinaire, is a completely synthesized human figure with articulated limbs. Created by Triple-I, he may one day appear undetected alongside human actors.

This digitally synthesized spacecraft, created by Triple-I's John Whitney, Jr. and Gary Demos, was a test for George Lucas. Lucas liked the results so much he decided to form his own computer animation facility.



(opposite page)
For the Ladd Company's LOOKER, Triple-I digitally synthesized a model of actress Susan Dey's face and body. Lines painted on her skin were scanned into the computer, then image synthesis programs used to "flesh" out the model.

at Triple-I. But the results point the way clearly to the future, when Adam Powers can take his place alongside the live actors in a movie and not be detected until he does something impossible.

To put Adam in perspective, we should look back at least as far as 1975, when Dr. James F. Blinn synthesized with extraordinary grace a running human figure that was constructed out of simple geometric forms—rather like an artist's wooden mannequin. Then, in 1976, the movie *FUTUREWORLD* included a scene by Triple-I with the simulated face of Peter Fonda—not articulated, but very beautifully "sculpted," and easily recognized as Fonda. While it must be admitted that Adam wouldn't really fool anybody today, it is nevertheless obvious that "the full suspension of disbelief" is only a few years away.

Here it should be pointed out that in computer graphics, like laser technology, rapid growth and success have prompted a lot of wild speculation about the wonders that will be accomplished tomorrow. In reaction to that, the computer graphics community has become understandably conservative in its tone of speech, preferring to take the cautious route of doing first and talking afterward.

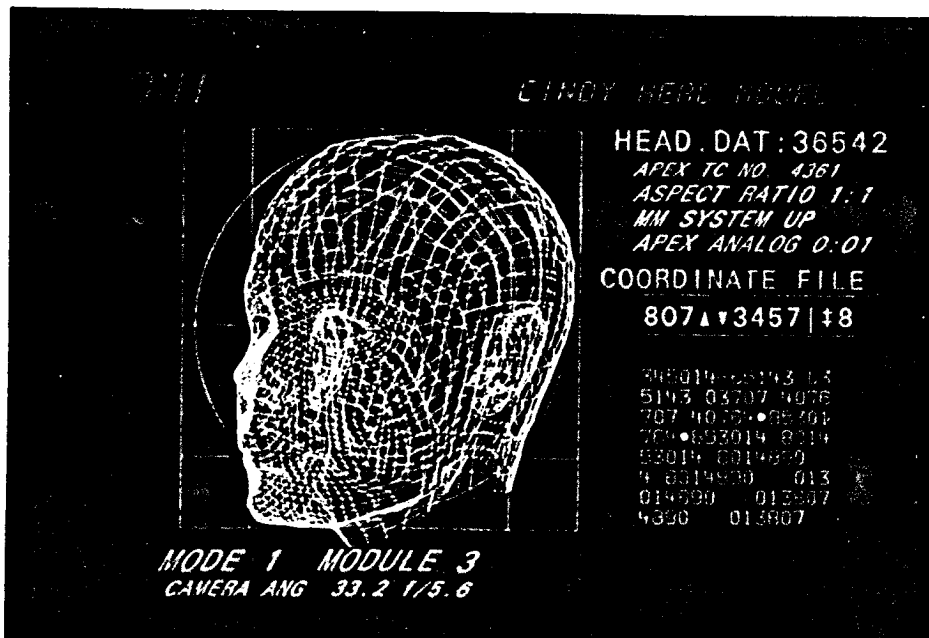
Dr. Blinn puts it succinctly: "On the periphery of computer graphics there are all these people going bananas with fanciful ideas. But, generally, the people who are shooting their mouths off are not the people who are going to be responsible for getting it done."

Nonetheless, extremely advanced work is under way. There are, in fact, at least three feature films in various stages of production that make use of dimensional computer image synthesis.

Ladd Company's LOOKER

The first of these films, called *LOOKER*, will be released this fall by the Ladd Company. Starting where they left off with the Fonda head in *FUTUREWORLD*, the Triple-I people this time have synthesized the entire human body which, although it doesn't have articulated joints like Adam Powers, is a painstakingly accurate anatomical rendering, in full color, turning in space—a digital sculpture of actress Susan Dey.

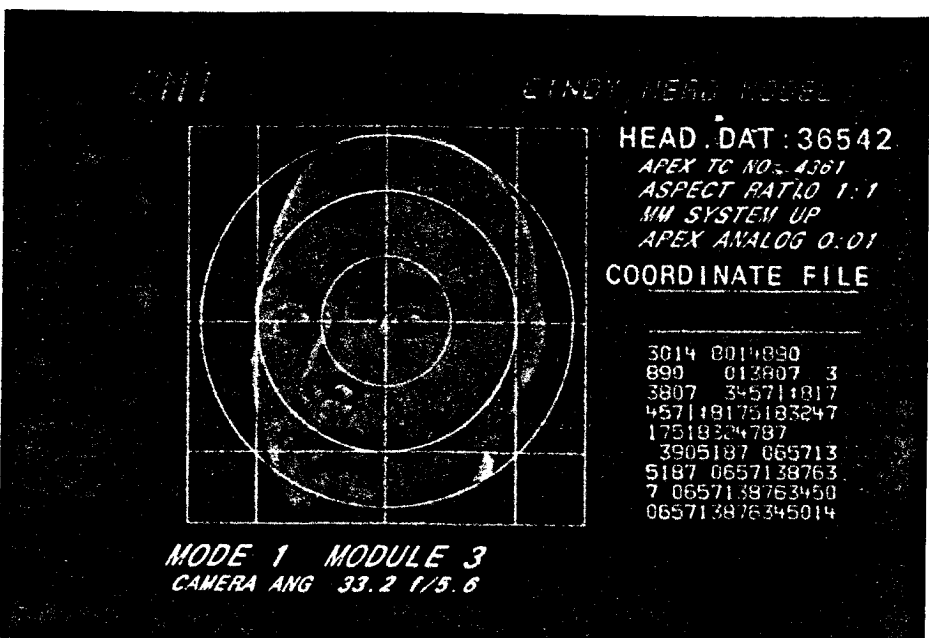
The principal step in creating an electronic portrait like this is obtaining a mathematical description of the person. In this case, Triple-I started by drawing patterns of lines directly onto the actress' body which followed the contours of her musculature. Next, she was photographed from four different angles simultaneously, and then these views were enlarged and projected onto a computer input device called a data tablet. By tracing the contour lines in the photograph with an electronic stylus, the programmer was able to feed the computer the mathematical description that it needed to synthesize her image.



MODE 1 MODULE 3
CAMERA ANG 33.2 1/5.6

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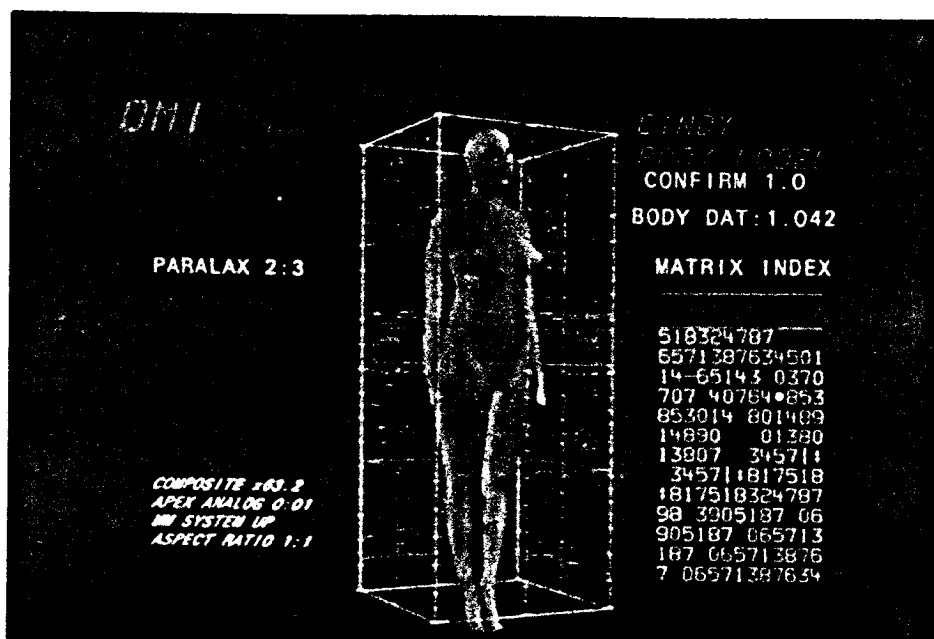
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MODE 1 MODULE 3
CAMERA ANG 33.2 1/5.6

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PARALAX 2:3

COMPOSITE #03.2
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MM SYSTEM UP
ASPECT RATIO 1:1

CINDY
BODY MODEL
CONFIRM 1.0
BODY DAT : 1.042
MATRIX INDEX

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905187 065713
187 065713876
7 06571387634

DIGITAL EFX

The film was directed by Michael Crichton, who has done a number of projects with Triple-I, including *FUTUREWORLD*. (Richard Taylor is in charge of the computer effects for *LOOKER*, while John Whitney Jr. and Gary Demos were responsible for the *FUTUREWORLD* animation.)

Disney's TRON

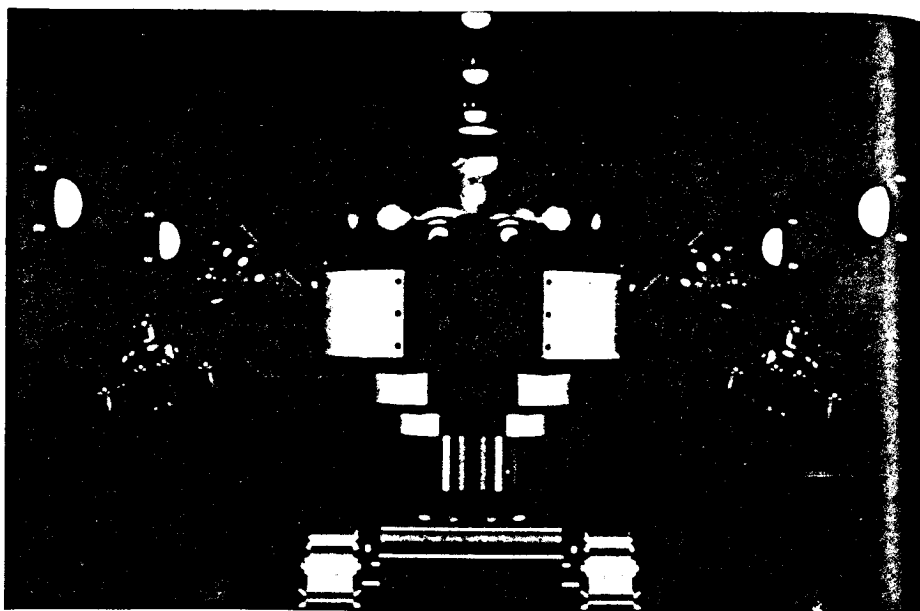
Next summer will see the release of the new Disney science fantasy film *TRON*, which also has a lot of effects produced by Triple-I. In addition there will be other segments of dimensional synthesis provided by Magi/Synthevision and Digital Effects, plus 60 minutes of optically processed live action, all under the creative supervision of Harrison Ellenshaw and Richard Taylor.

Written and directed by Steven Lisburger and produced by Don Kushner, *TRON* draws on the talents of Syd Mead, the grand master of chrome and glass, who designed many of the flying craft and other forms of transportation that glide about through the digitally synthesized environment of *TRON*. Mead, who has had an important influence on vehicle and product design since the '60s, is also a production artist for *BLADERUNNER*, the new motion picture being worked on by Doug Trumbull.

TRON will be the first feature to make use of sets and scenery generated by digital computer. It seems safe to speculate that scenery will be created this way with increasing frequency in the future and that *TRON* will be an historic benchmark in this regard. The ability to make alien towns on alien planets, and mighty space cruisers traveling the waves of space-time, all made entirely out of non-physical models, is obviously a lure that will stimulate the early efforts at making software sets. But then as the artform matures it could be used for contemporary and historic subjects as well, whenever conventional techniques would be prohibitively expensive or simply impossible.

In addition to being able to do hovering Martian palaces, synthesized scenery will offer intoxicating freedom to make changes in the scene, right up to the time of the final editing. It will be possible to view the scene in as many variations as are necessary to satisfy the director. ("Here's the shot with the castle made of marble, C.B. Shall we do the next one in granite or gold?")

To match the motions of a moving live camera with a synthesized scene, there must be either "witness points" in the scene that the computer can follow from frame to frame, or the camera making the shot must have sensors in its dolly wheels, pan, tilt and zoom mechanisms, which



This robot, from N.Y.I.T.'s film *THE WORKS*, incorporates some of the very latest digital imaging techniques.

will generate a digital record of all motion for the computers to digest. Since the computers take several minutes to animate one frame of film, the live action is usually done first, although it would be possible to do it the other way around by having the computer generate pulses to operate a motion-control system, should that be desirable.

TRON's "candy apple glow"

Brief mention should be made of the effects for *TRON* that Taylor and Ellenshaw are cooking up using the optically processed live action scenes. We can anticipate something of what these scenes will look like by reflecting on the work that Taylor did for many years when he was a designer/director at Robert Abel & Associates where the invention of the "candy apple glow" look that dominated TV graphics in the late 1970s originated. While that look has become over-imitated in commercials, it hasn't been used to any extent in feature films.

Very basically, the candy apple technique depends on shooting black-and-white images for optical printing through colored filters, offering the opportunity to do a wide variety of effects with the images, from glows to slitscans. The lion's share of the *TRON* live action was shot on 70mm black and white to take advantage of those opportunities. Much of that is being enlarged, photo-rotoscoped and then shot on an animation stand to get the effect of painting with light that Taylor is known for. Many of the costumes are designed by the French fantasy illustrator Moebius (*HEAVY METAL*) to take advantage of Taylor's effects and look as though filled with light energy. The idea is to create for the story a world of electricity and light, a parallel universe of computer games to which the hero is magically transported. "We have set up a fan-

tasy reality that will remind you of something you have never seen before," says Taylor. The combination of so many unconventional techniques as well as traditional techniques, will amount to a tour de force that will be a tough act to follow.

At the New York Institute of Technology the intention is to do just that, with a film it is producing itself called *THE WORKS*, which will be entirely synthesized. This huge undertaking will hopefully be released in the Summer of 1983. It represents the culmination of a long standing commitment by the school's president, Dr. Alexander Schure, to pioneering computer animation research.

N.Y.I.T.'s *THE WORKS*

THE WORKS is being written and directed by Lance Williams. It is about a planet populated entirely by robots who have satiric space battles and other adventures, all very humorous. The fancifully designed characters include a little guy with his arms and legs sprouting out of his head, named *Ipsa Facto*, who rides around inside a giant robot ant. Bill Maher, Dick Lundin and Carter Burwell are responsible to one extent or another for the production design and creating the software that produces the amusing robot characters.

N.Y.I.T., like the University of Utah, is a place where many computer graphics pioneers did a lot of their research. It already has the biggest computer installation for doing animated cartoons (see "N.Y.I.T. Puts Computers to Work for TV," *Millimeter*, June 1981), and obviously intends to be involved when photographically realistic synthesized images start to play a major role in the entertainment applications.

Dr. Blinn was with N.Y.I.T. at the time that he developed his running mannequin, mentioned earlier. He also contributed to

DIGITAL EFX

the software at Triple-I before he went to the Jet Propulsion Labs to work on the space flight simulations. His synthesized films of the Voyager missions to Jupiter and Saturn gave scientists and the public a preview of what to expect, long before the spacecraft reached their destinations. Scenes from those films were featured in Carl Sagan's "Cosmos" series, for which Dr. Blinn also animated DNA molecules replicating.

Lucasfilm's digital optical printer

Ed Catmull, who helped N.Y.I.T. get started with its computer graphics lab, is

now heading the team at Lucasfilm that will be synthesizing dimensionally animated space ships and software scenery in a year or two. Also with him there are several other big names in the field, including Alvy Ray Smith, Tom Duff, Loren Carpenter and others. (Dr. Blinn was there for a while, too, but recently returned to JPL because astronomy is his first love, and with all the information coming back from the space probes now he wants "to work with that data for the next few years.")

The computer graphics team at Lucas is being especially cautious about speaking before they act; in fact it's almost like the Manhattan Project up there at Industrial Light and Magic. One project they are

known to be involved with, however, is the development of a digital optical printer. Although Lucas already has the best optical printers in the world, he wants an electronic one for the greatly increased speed, quality and versatility it promises. This development task is spearheaded by Alvy Ray Smith.

A digital printer functions quite differently from its optical counterpart. Both combine elements shot on different pieces of film into a final composited scene; but the new process manipulates digitized pictures instead of the film images themselves. First the film elements are scanned by a point of light smaller than the grains of silver in the film to translate the images into numerical information stored in a computer's memory. Once in that form, the digitized picture information can suffer no generation deterioration, scratches or other ill effects, no matter how much work is done. Using techniques unlike either video or film, the images can be manipulated as if they were statistical data, keyed into each other, repositioned, color corrected and much more—all in one pass which gets scanned back onto film with a laser process only as the last step. And, because it is possible to preview scenes on a monitor before exposing any raw stock, the operator knows exactly what will be coming back from the lab the next day.

Taylor says that Triple-I is also working to develop a digital film printer, in the VistaVision format, which it hopes to have on line in six months. "The problem with traditional printers is that the film is more contrasty, more grainy and less color saturated. Fringing in hair is another classic problem. They are also very time consuming, labor intensive and non-creative to operate.

"Traditional opticals see the grain structure of the film and the best they can do is try to reproduce it. So, what we have done is design a system that compensates for those flaws. It is designed to know what the nature of grain structure is and eliminate that, so when it scans the picture on the high-resolution screen and it's rephotographed, there is no grain build-up. The printer has greater resolution than the film. It sub-scans the grain structure. It looks at the grain and it knows that the area should be a certain color. So, when it makes the new picture, it literally *knits* the image together.

"You can clean up film, enhance it, color correct it, anamorphically compress it, stretch it, take scratches out. It really gets to be magic when you stylize the film. You can get a living Maxfield Parrish image by enhancing color, adding texture and so forth."

There already is an electronic film printer available which is based on analog, rather than digital, technology. It was made by Frank Van Der Veer and Barry Nolan just in time to composite some scenes for the recent re-make of

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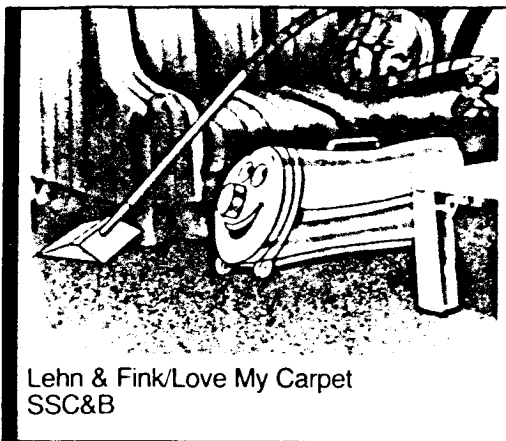
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DIGITAL EFX

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Live action matted with "electronic scenery"

Eventually, digital printers will mat up with image processing and artificial intelligence techniques to identify and track objects and actors as they move from frame to frame, enabling live action shot on film to be integrated with digitally synthesized backgrounds. Bill Kovacs, the senior technical director at Robert Abel & Associates, who is well known for his innovative vector graphics software has said, "The processing of real data—be it live action, landscapes or whatever—is potentially a much richer source of imagery than just creating objects synthetically. You could separate everything that's plaid from that which isn't plaid, look at and alter contour, outline and shadow. Movie companies could come in and save a scene, or replace somebody's head with somebody else, or turn a daylight scene into night. That's the big apple—intelligence matting."

Image processing will be able to remove scratches and dirt spots from footage by looking to adjacent frames to get the color needed to patch over the flaws. Techniques currently in use by NASA for restoring focus to out of focus images could be used to give infinite depth of field to any image—after it's been shot! Imagine being able to alter the focus of scenes already in the can, perhaps to draw attention to something in the scene, or simply to salvage a focusing error. The computer scans the blurred areas, and, given data on the lens used to shoot the image in the first place, it can follow formulas that will in effect push the light back into its proper place!

The main thing about digital printers is that once a picture is converted into numerical data, it is free from the physical limitations of lenses, light and the chemical properties of emulsions. At the risk of sounding starry-eyed, we can say that image processing is still in its own very early infancy, and the spectrum of possibilities opening up has barely begun to be explored.

Future of effects industry

While the future is obviously bright for those who are involved with the digital imaging arts, there is a developing sense of apprehension on the part of workers in the special effects field who fear that their livelihood will be put in jeopardy. Model makers, matte painters, optical printer operators, even some actors view the new developments grimly. Obviously one can't forecast with confidence precisely

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what changes will take place. But it seems reasonable to assume that the new hardware will be so involved with constantly blazing new territory that the established methods of special effects will find their home turf to be basically unthreatened. If a studio invests in a dimensional animation system, it would be well advised to keep its model makers and matte painters on, or else the new "toy" won't be free to do anything new. The majority of effects challenges will still be solvable by the more economical conventional means, and it would be

foolish to spend valuable computer time on those jobs.

In addition to the three films in production that we have discussed, there are others in the planning stages. A fad will no doubt take off, with all the good and the bad that that will bring... but when the dust settles the new tools will be here to stay, and the art of making motion pictures will be richer. "Stuntmen" like Adam Powers and little robots like Ipso Facto will become, in a manner of speaking, familiar faces on the lot.

In discussing his movie THE WORKS,

Lance Williams of N.Y.I.T. wrapped up his description of digital image synthesis this way: "Computer models are made of mathematical surfaces: spheres and ellipsoids, cylinders, cones, hyperboloids, paraboloids, polygons, and doubly-curved parametric surfaces. They are weightless and require neither wires nor pulsons to flout gravity. They do not need dusting, gluing, oiling, repainting, or brushed-aluminum Haliburton luggage cases with custom foam-padded interiors. They enjoy, in short, most of the advantages of fantasy over reality." □

LUCASFILM, ZOETROPE EYE COMPUTER GRAPHICS By Laurence Sarchin

Laurence Sarchin is a Seattle-based freelance writer.

The endless fluorescent hallways and steel-gray desks of the Boeing Co.'s computer center may be an unlikely place for the development of STAR WARS effects technology. But Luke Skywalker and his rebel friends would be very interested in the computer graphics work being done there.

The Boeing graphics system can already manufacture a three-dimensional landscape of anywhere in the world from satellite mapping data; add trees and other vegetation; move the viewer over, around or through the

scene; and portray it in different light or weather conditions. The system, now partly operational, will be used by Boeing's military strategy and tactics division to do realistic video simulations of war games so far advanced they will make the best computer graphics effects of today look like the early video "pong" games.

"The displays you see in movies today are pretty simplistic," says Mike Cyrus, the manager of Boeing's Simulations Technology Group. "Most of the algorithms in use in present computer graphics were designed before 1975. With the number of people entering the field doubling or tripling every year, the

technology is rapidly advancing."

Boeing's present system—a VAX 11/780 computer, IKONAS graphics system, Lexidata memory and video display—has been used to develop software that can produce trees on a bare landscape, show drifting fog or biological hazards, and view any portion of the Earth's surface "right down to the guy on the ground," according to Cyrus.

Computer graphics that can manufacture realistic ground wars are obviously of interest to film companies that have spawned a minor industry in space wars. The most recent probe from the industry was an inquiry from Francis Ford Coppola's Zoetrope Studios for a project called "Interface." Jack Fritz, a producer with Zoetrope in Los Angeles, says that Zoetrope approached Boeing in the fall of 1980 to do an animated computer graphics sequence for the film. "It's a rather ambitious effects project," says Fritz, "with a variety of special effects and animated graphics." Boeing was asked to do a 30-second to two-minute scene of an animated low-level flight over the desert, but turned the project down at that time because its management saw no prospects for continued business in the film industry.

Although the Boeing Co. hasn't been attracted to movie production, some of its employees have. Loren Carpenter, a former Boeing employee in computer graphics, went to Lucasfilm last year after producing a 16mm color film of a digitally-animated flight of a small object over desert and mountains, taken from a video monitor. "I wanted to work in a place where pictures are the end product," says Carpenter, who now works at the Lucasfilm Computer Development Division with Ed Catmull.

Boeing's computer graphics work appears to be ahead of the present state of the art in motion pictures, but researchers at Lucasfilm and labs such as the New York Institute of Technology are working on a slightly different track. Speed and real-time simulation are the goals at Boeing, where some video noise

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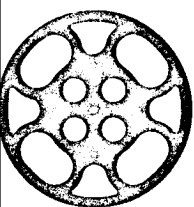
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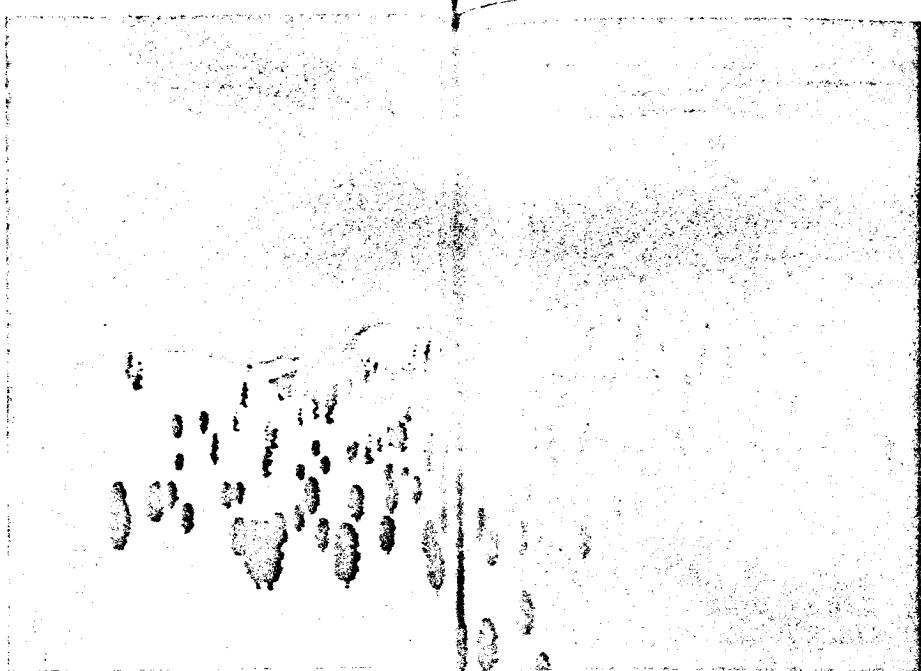
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Flight simulation programs developed at the Boeing Corp. can take satellite data from any portion of the earth's surface and create a digitally synthesized picture of it.

and limited accuracy are acceptable. At Lucasfilm, however, the emphasis is on complete realism—"if anyone sees a digital artifact in our graphics work, we've failed," says a source close to Lucasfilm.

Lucasfilm's computer division is now working on the entry tools for its system, VAX 780 and 750 computers from Digital Equipment Corporation. With the addition of some frame buffers and other off-the-shelf hardware, the Lucasfilm people are putting together a system that will allow matte artists to draw animated effects on the computer for later mixing with live action, or to produce complicated three-dimensional backgrounds. Lucasfilm sources say that major parts of the system will bow in at the 1982 computer graphics conference (known as Siggraph) in Boston a year from now, but until then, products from the Lucas shop probably won't contain graphics any more complex than the simple vector drawings that were rear-projected in the rebel base scene in STAR WARS.

There has been speculation that REVENGE OF THE JEDI will be the first big showpiece for the high-powered computer research department at Lucasfilm, but sources say that it is too soon for the complicated effects that the computer will eventually produce.

"Anything that would be done would have to be extremely high definition, and video just isn't ready for that yet. It takes as long to make a computer model

of a spacecraft as it does to make a plastic one, and the plastic one looks better—for now," the source says. "The Lucasfilm people have been doing some computer image manipulation and audio editing so far, but they have no facilities for hard copy [film] yet."

JEDI may use computer-enhanced images such as the artificial reflection of laser flashes against the actors' faces and clothing during blaster duels, but nothing has yet been planned. "They can't commit anything to the production schedule until it's up to full quality. It's possible that the software will be up and running in post-production, and it could be used then," the source said.

While the production of JEDI goes on in England, rapid development in the computer graphics field may make "impossible" visual effects possible before the next Lucas space epic. Lucas and Coppola were invited to Japan earlier this year to see Sony's new 1125-line high definition TV system. Software continues to advance, too; it took Boeing 30 minutes a year to produce 1,200 highly complex trees with leaves; the same scene can be done today in 40 seconds.

"There is a lot of pressure out there in the market to improve graphics," says Boeing's Cyrus. "Someone out there, before 1990, is going to invent a system that is VLSI-oriented (Very Large Scale Integrated Circuit—equipment with incorporated memory that can process digital and analog images) and the kind of realistic graphics we are talking about will be commonplace for home computers, not just for sophisticated things like STAR WARS." □

