

DIGITAL RETOUCHING

The End of Photography as Evidence of Anything

by Stewart Brand, Kevin Kelly, Jay Kinney

"Your honor, we cannot accept this photograph in evidence. While it purports to show my client in a motel bedroom with a woman not his wife, there is no way to prove the photograph is real. As we know, the craft of digital retouching has advanced to the point where a 'photograph' can represent anything whatever. It could show my client in bed with your honor.

"To be sure, digital retouching is still a somewhat expensive process. A black-and-white photo like this, and the negative it's made from, might cost a few thousand dollars to concoct as fiction, but considering my client's social position and the financial stakes of this case, the cost of the technique is irrelevant here. If your honor prefers, the defense will state that this photograph is a fake, but that is not necessary. The photograph COULD be a fake; no one can prove it isn't; therefore it cannot be admitted as evidence.

"Photography has no place in this or any other courtroom. For that matter, neither does film, videotape, or audiotape, in case the plaintiff plans to introduce in evidence other media susceptible to digital retouching."

—Some lawyer, any day now



STEWART BRAND: Time magazine does it. USA Today does it. National Geographic does it and has caught some flak about it. Very soon nearly everyone will do it, and the culture will be different as a result.

They all use high-tech page makeup processes that involve turning photographs into computer data, where it is so easy to fiddle with the images that the temptation is overwhelming. This new capability comes from the merging of laser technology, used to scan the original photographs and convert them into digital data, and computer technology, whose increasing power at decreasing cost allows sophisticated manipulation of the no-longer-photographic image.

National Geographic moved one of the pyramids of Giza to suit their cover design. Popular Science put an airplane from one photo onto the background of another photo on one of their covers and then bragged about how they did it inside the magazine. In a book of photographs of France, the photographer removed unsightly telephone poles from the picture of a Basque shepherd (see back cover). The Whole Earth Review, in questionable taste, appealed to mass credulity with a completely phony "photograph" of flying saucers on its cover.

One of the major manufacturers of the electronic retouching equipment, Scitex, stated in its 1983 Annual Report, "Publications produced on Scitex's systems range from leading magazines and journals to high-quality fashion cata-

Two things not apparent in this promotional demonstration for Pacific Lithographic: First, this set is one photograph, not two in sequence; and second, the magic is not a disappearing show, but a reappearing act. The camera's film captured the intricate grain of the scene: four hikers against distant mountains. It was then digitized. Clicking on the cloning option on the Chromacom machine, two cursors appear in the picture about an inch apart. The operator can vary that distance, and slide the duo anywhere on the photograph. One cursor will copy the color of the point it rests on over to the nearby cursor. Waving the cursor copies a patch of color. Identical in color and brightness, the texture of an adjacent area is replicated point by point in a new spot. Distinctive patterns are copied exactly. Thus the people standing in the picture were not beamed out of the scene; rather they were washed over with sky and mountain paint, stolen nearby. Closing the distance between cursors results in ever-finer degrees of seamlessness. Done with skill (it is almost a routine operation; the main thing to watch for is incestuously cloning what has already been cloned once), the phoniness is completely convincing.

logs, the annual reports of Fortune 500 companies, national ad campaign materials, and glossy promotional brochures. Scitex systems are found in almost every country in the industrialized world."

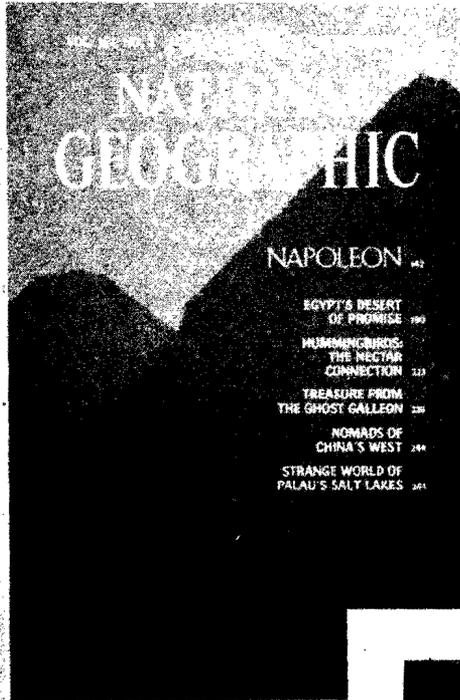
Nothing particularly sinister or ill-intentioned is going on here. Publications are using Scitex-type technology for a lot of unquestioned benefits — more rapid and exact page layout, for example, and higher-quality photo reproduction, and rapid transmitting of entire issues of graphics and text to simultaneous remote printers, greatly shortening the lead time to print of *Time* and *USA Today*, among others. The problem arises in the day-to-day detailed temptation to "improve" the images.

"Kick up that blue a little more."
 "Let's see the whole thing with more contrast. More still. Can you mute the sky a bit?"
 "Uh-oh, brown eyes, blue blouse. Try the blouse in green. No, darker."
 "Can we get rid of that Pepsi can? Thank you."
 "It's great except for that guy with the weird look behind them. Could he go away please?"
 "You don't like that guy, how about this guy instead?"

It's yet another case of a new technical capability forcing the re-sorting out of a set of moral and ethical choices. Nuclear technology forced new decisions about what's right and wrong in war and energy. Medical technology is forcing new decisions about what's right and wrong in birth and death and parenthood. Digital retouching, though not yet a very public issue, is in the thick of how we will think about communication and "truth" and editorial responsibility — the broadcast fabric of civilization.

KEVIN KELLY: Why did we believe photographs for so long? The computer folk discovered early on that manipulating words is no work at all compared to manipulating pictures. The Confucian proverb "a picture is worth ten thousand words" is off by eight hundredfold when it comes to a photograph — one 8 x 10 photo will occupy the computer memory space of eight million words.

Most other media have broken our trust in their honesty long ago because in their shallowness they are easily bought off. They are, compared to photographs, skinny in the only flesh they have — information.

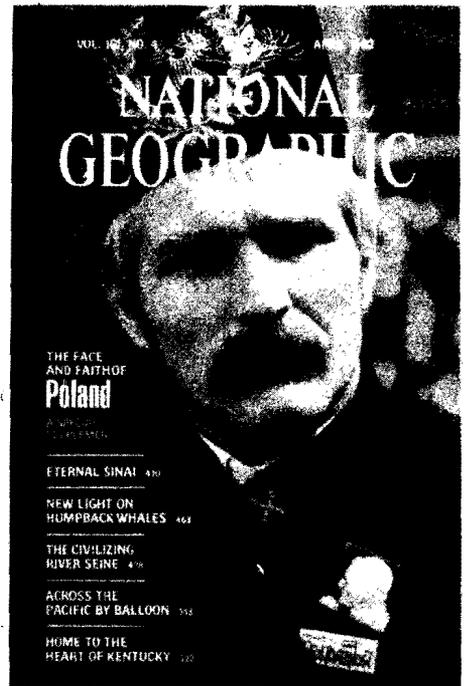


Two somewhat notorious covers, from February and April 1982. In both cases the requirements of strict cover format tempted the National Geographic editors to electronically tamper with the photographic images so that they would fit. (Left) The Giza pyramid was moved sideways a bit so it would appear within the frame of the cover. (Below) The top of the Polish gentleman's hat was added from another slide, about one cover-inch's worth. There's no visible trace of the Scitexing in either case.

We haven't even realized that we don't believe them anymore. Galloping right behind every advance of sound recording were sound creators, fabricating new sounds that sounded real, or reconstructing familiar sounds when the real ones weren't handy. We who so politely listen to the electronic telephone operator repeat the area code shouldn't fake surprise when later the same circuits put authentic-sounding words into our mouths.

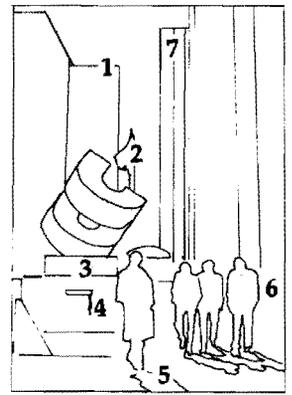
The remarkable thing about photography is that it was so far ahead of its time. The basic chemical process has been the same since shortly after the first photographs were devised over one hundred years ago. Yet today, computers and all, there's still no other technique that can store as much information in as compact a form as photography. It's taken a gang of brute-minded computers to torture its integrity until finally it too cracked.

We've been spoiled by a hundred years of reliable photography as a place to put faith, but that century was an anomaly. Before then, and after now, we have to trust in other ways. What the magazines who routinely use these creative retouching machines say is "Trust us." That's correct. You can't trust the medium; you can only trust the source, the



people. It's the same with text, after all. You can print a lie in 100,000 subscriptions and it looks the same in ink as the truth. The only way to tell is by the source being trustworthy. The only way my words are evidence is if I don't lie, even though it's so, so easy to do.

I talked with Jerrad Lelievre, chief of operations for *Time* magazine. He told me that they do not perceive the Scitex machine as raising any new



Altogether seven changes were made: 1) several floors removed from building; 2) flags and flag poles vanished; 3) Time & Life transposed; 4) dangling plug with extension cord removed; 5) shadow of man eradicated; 6) additional businessman cloned; and 7) architectural vertical grid in building removed.

The company newsletter for Time magazine, "fyi," demonstrated the abilities of their new Scitex machine with this pair of photographs. On the left is the street scene on 52nd Street, New York City, outside the Time/Life headquarters. On the right, its altered clone. "By electronically moving a cursor across the screen, [Time's] technician initially makes changes that are barely noticeable. He shaves a few stories off the top of a building. He transposes the name on the base of the sculpture in front of the Time & Life Building and then alters several other details in the image — without ever touching the original photograph. . . . Such tricks to show off the system's capability would never, of course, be used to doctor a photograph in a Time Inc. magazine."

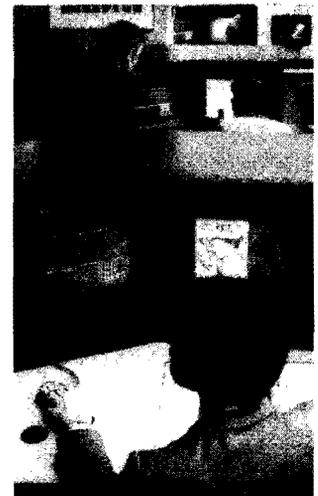
issues. He said *Time* pays a lot of money for the best photographers to get the best photographs that don't need altering. He said categorically that "Time does not mess with or doctor photographs. We don't re-touch photographs. If [new Soviet Premier] Gorbachev has a birthmark on his head, we aren't going to remove it. The machine is used only for color enhancement — that is, to make sure the printed colors match the original colors of the photograph, and to assist in cropping." I asked about black-and-white photographs that have appeared in *Time* which used an added gray tint in the background to spotlight a figure in the foreground. "That's normal contrast enhancement — where we may use white paint over the background to make something pop out." Do you do that with color? "No. The only thing we may do is to enhance colors to match the original. For instance, we may use it on flesh portions of a picture to make sure the flesh tones look correct. Actually the Scitex machine is great for drastic modifications, moving stuff around, but for color enhancements the old way of doing it, dot-etching [where the halftone dots on the photographic plates are

selectively etched with acid to alter the color slightly in a specific area, a standard printing practice], is easier, and I personally think gives better quality."

Does *Time* have written guidelines spelling everything out? No, just standing policy from higher-ups. Lelievre was aware of no discussions with other magazines about this topic.

I talked with Loren Carpenter, who works on synthetic photography and film at Lucasfilm. He was acutely aware of the implications of this technology. Six years ago he saw a machine at MIT that the hackers used to alter photos off the AP wire service. He says, "You can throw out photographs as evidence."

I asked about computers being able to detect computer alterations. He said that the one possibility he was aware of (not that anyone was doing it) is to examine the background noise of different sections of the photo and fingerprint that against the section in question. If it was added to or altered significantly, it would not match the rest of the picture. But "don't trust a photograph if anything rides on it."



Installed chiefly for page makeup and reception of satellite-transmitted photography, Time's VISTA System occupies the basement of the Time & Life Building. Among other apparatus, the system includes a Crosfield laser scanner and a Scitex.

This new technology has the potential of undermining our faith in photography as a reflection of reality.

— Edward Klein, editor, *New York Times Magazine*; quoted in *Folio*, March 1985.

What I am learning from this Scitex machine is that "sure evidence" is a luxury. The same engineers who built computer retouchers will eventually make machines that will sniff a photograph and say how real it is. Few of us would have one of those, so photographs will be advertised to the masses as "unaltered, unretouched, unenhanced," much like the industry that offers unpasteurized, unpre-served, organic apple juice. With no

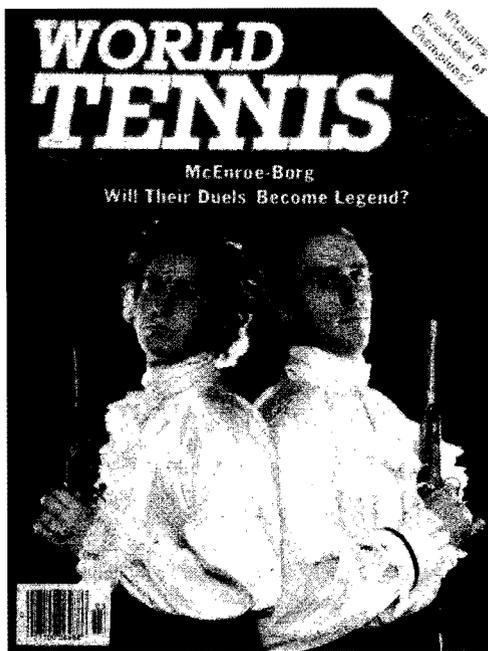
way to prove it, a few privileged publications will convince their readers that they serve only "organic" photographs. It'll be a matter of faith. To know for sure will never again be as easy as looking.

STEWART BRAND: My discussion was with Jan Adkins, Associate Art Director of *National Geographic*. It turned out they're in the midst of considerable debate on this very subject, Jan on the side of NO messing with the content of photographs — "It's wonderful for advertising, but it's the death of great photography." However, he sees as "well within the editorial purview" such things as adjusting the contrast in a photo, or dampening glare, or adjusting warmth and coolness — all effects that have been going on for years in the choice of film and the making of prints. "No film is honest." Cropping — what you leave out of the picture entirely — is the most ubiquitous of censors, and no one complains or expects otherwise.

I asked about the rumor that one *National Geographic* cover had a whole inch of image added. "It wasn't exactly added; it was moved from one slide onto another with the Scitex. We did move a pyramid once, and it was reported in the *New York Times*. I'll send you a copy of a letter that Bill Garrett, our Editor-in-Chief, wrote to a reader who complained."

Mr. Garrett's letter (February 15, 1985) said in part: "We moved one pyramid enough to fit the picture into the frame of the cover — and did this only because we could not crop the cover. Had it been inside there would have been no need to do it. The effect was the same as if the photographer had moved over a few feet. More important — or as important — how much did the use of a telephoto lens move the pyramids? How much did the color change because of a filter? Were the camels there naturally or were they brought there for the picture . . . ?"

"The *New York Times* could have mentioned that one of the most blatant bits of dishonesty in recent years was done by them. They took a picture of our president, Gilbert Grosvenor, standing behind a model of our new building, smiling as he pointed to one of its features. What they published was an engraving with the building neatly removed and a profit-and-loss chart in its place showing Mr. Grosvenor pointing to those figures.



These two famous athletes didn't really meet back to back. To convey the competition between tennis champions Bjorn Borg and John McEnroe, *World Tennis* magazine arranged to portray them in an eighteenth-century duel on the magazine's March 1981 cover. Susan B. Adams, explaining on the editor's page of that issue how the cover was shot, said, "Finding a simultaneous hour in the hectic lives of the world's best tennis players . . . proved the most frustrating detail. As it turned out, we failed. With deadlines staring us bleakly in the face, we'd have to put them together photographically." The two cooperating tennis pros were photographed in separate places, three days apart. The editors relied on image manipulation to impart the sense of intimate rivalry.

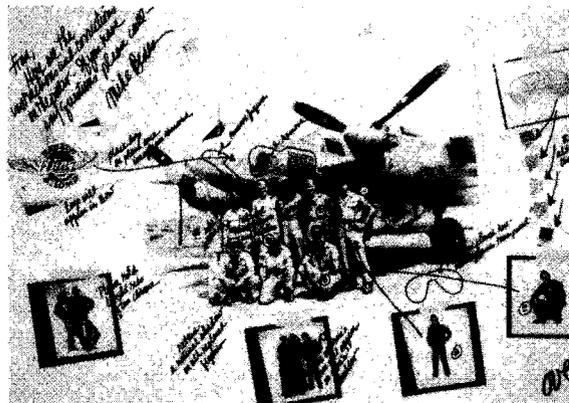
"Be assured that nothing about the cover was dishonest nor are any other pictures in the *Geographic* altered to make them dishonest either by the photographers, the labs, the editors or the printers. Thank you for your concern."

I confess I am not assured. In a magazine which makes its livelihood printing photographs which are amazing but true, the photos have to be perceived as infallibly true in order to be amazing. Any erosion of the one demolishes the other. The advice to photographers from the *Geographic* is: "f/8 and be there." (The standard middle aperture setting on cameras is f/8.) If content in photos can be electronically and subliminally added and removed, why bother to "be there"?

I'll bet that within a year growing public knowledge of digital retouching technology forces the *National Geographic* to make a public statement in the magazine that it will not electronically edit the content of its photographs. And then it will have to rigorously enforce that or lose the century of trust it's built up, the most envied reader loyalty in the magazine business.

Kevin's right. It's going to be an interesting truth-in-labeling problem. When magazines and books assert

it's advertising that has paid for computer digitizing machines. Color catalogs use them all the time to alter a product's color, enhance its shininess, tone down its shininess, remove blemishes. Art directors use them to accomplish what photographers couldn't or didn't do. And, according to the operator of the Chromacom who did our cover photograph, and who has sat through more than one quarrel, ad agencies use the imaging computers as arenas for battling out their visual fantasies. Bausch & Lomb Sunglasses used the Scitex to insert models into an old WWII photo and to alter a few other details to their liking.





"We don't cheat," people will take that as news that they might.

Once you start looking for problems, they're everywhere. The low-resolution images of broadcast TV are routinely fiddled with. One of the networks is pushing for wider TV screens eventually, so on their studio-to-studio interviews, they show a wider TV screen being talked to in the studio. It's not quite real. The part with the talking head is real, but the rest — usually curtains or other innocuous background — is "cloned" in, because they don't really have wide TV images yet. Your cheery weather person, gesturing at maps and satellite photos, in real life is gesturing at a blank wall; the map is added electronically. Your on-the-scene reporter may be holding a mike which is disappeared along with hand and arm, live, at the station.

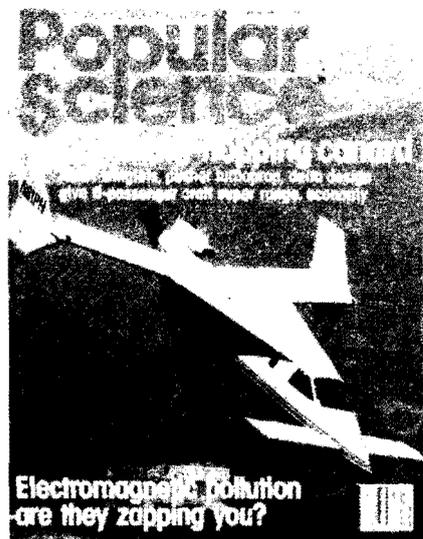
Healthy paranoia immediately wonders: what political images are being fiddled? How, why, by whom, and how would we know? And how would we know if it got drastically worse?

I had the pleasure of dinner with a high state (not California) official recently, one with national aspirations. He graciously asked how *Whole Earth Review* was doing, and we got talking about this article. I said we could publish as compromising a photo of him as could be imagined. "Like hugging Yassar Arafat or something?" he asked. "Sir," I said, "we could put your tongue in his ear."

But you don't need digital retouching to do that. You can do it with airbrushing, or with posed actors, or with a whole palette of darkroom tricks. It's just that the computer technology makes it so much easier.

And how much is too much paranoia? Should we outlaw toupees and cosmetic surgery in public officials?

What's unique, what was unique, about a photograph is that it is an analog representation of reality. It is a directly true transform of the original complex, awkward view of things. Every detail is in there, like it or not. The commonest, and to me profoundest, technique of digital retouching is "cloning" — taking part



Unable to rephotograph an innovative plane because it was partially disassembled for modifications, *Popular Science* juggled two existing shots on the Scitex until they fiddled out one they liked. The preferred photo of the plane zooming in at a right angle had a fatally dark background (top). The one with the ideal background (center) had a staid, ho-hum portrait of the plane. So the magazine digitally superimposed the better of the planes onto the better of the backgrounds. But that left the nose and rear right wing of the poorer plane image sticking out. Turning loose the cloning mode of the Scitex the aerial landscape was painted over for the final cover shot (bottom), dated December 1983.



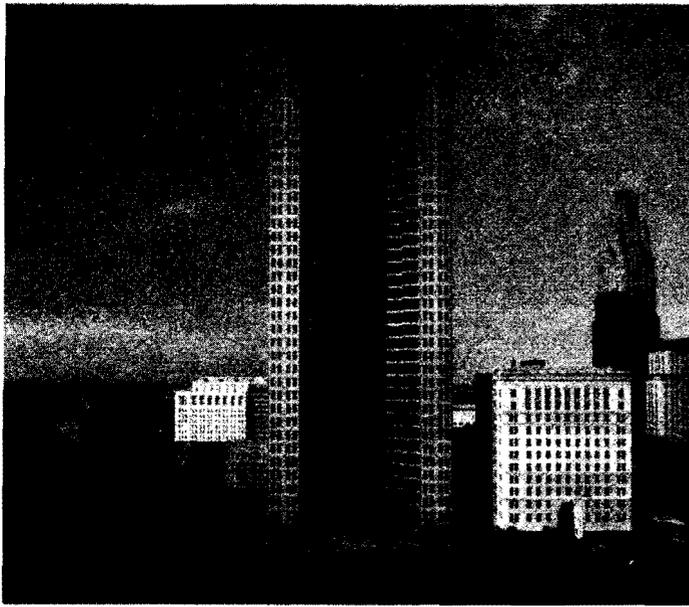
Equipment for digital retouching is bulky, pampered, and costs hundreds of dollars an hour to run. It lives far from the editor's desk at the moment. You might find it in large printing plants. This photograph by Constantine Diakos was published in the *New York Times Magazine* on April 3, 1983. A gap in the hillside in the original picture was electronically filled in with shrubbery by an aesthetically-inclined printing technician, unhampered by the editorial ethics of the *New York Times*. He did a good job. The *Times* claims it didn't notice the alteration until later.

of an image and erasing another part with it. You're adding redundancy to the picture, reducing its total information, and introducing disinformation.

The technique is digital — the vast leverage of using information in discrete bits, as falsifiable as written words. (Gregory Bateson once pointed out that writing introduced a level of dishonesty impossible when people's faces and voices and bodies and relationships were attached to their words. "Context-free" information is different information.)

I prefer an analog watch (the kind with hands) because it gives me a glance truth instead of the excessive detail of a digital watch, which asserts the time is 10:22:56, when I know it probably isn't and I wouldn't care if it was. "High tech, high touch," said John Naisbett. There's an analog rebellion shaping up to match all this digital power. There's also another round in the centralization/decentralization battle coming . . .

JAY KINNEY: With highly graphic personal computers such as the Macintosh comes a blurring of the boundaries between art, reproduced images, and life. Up to now photos have had special authority as arbiters



Huntington Bancshares is a Columbus, Ohio-based bank holding company. Banks are largely dependent on image. To boost theirs, Huntington featured the Columbus skyline in a four-page color foldout inside the bank's 1984 annual report. The skyline, not surprisingly, is dominated by the 37-story glass-and-stone Huntington Center. Their competitor's (Bank One) building is also prominent, a little too much so for such a glorious annual report. So Huntington officials used a computer to remove the 13-foot-tall letters that spell "Bank One" atop the building. Gone. While they were at it they decided that the parking lot next to the Huntington Center might be "in a better light" as a grassy green lot. Done. None of this, of course, was mentioned in the report.

of the "real" — though any professional photographer knows that the hidden manipulations of the dark-room (masking, double exposures, retouching, etc.) have always made that reality more malleable than many people realize. This illusion of reality carried over into film. That is now breaking down with the era of special effects and video manipulation. MTV rock videos flaunt their deft artifice, while the computer-generated TV commercials' use of perspective grids and zooming logos and cars are so commonplace that they've become cliches. More than ever before, television and movies have become magic theaters where all is illusion and nothing can be wholly believed.

Computers like the Macintosh are in the process of shifting these confusions of art and artifice, reality and illusion, into our own hands. Surprisingly inexpensive digitizing software and hardware have recently

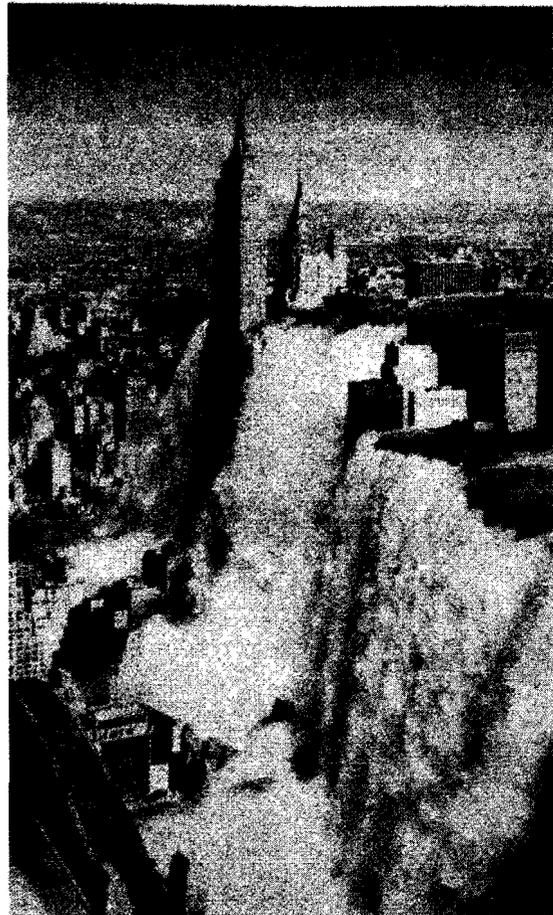
become available for home use (see p. 41), adding techniques of image manipulation to the personal computer owner's graphics palette.

Conclusion: As our methods of recording reality become increasingly digitized, the sheer power in our hands may force us to reconsider our values — and, in fact, our very notion of consensus reality. With luck we'll emerge from the challenge favoring quality over quantity, originality over derivation.

Just as likely, however, is the possibility that this increasing slipperiness and elusiveness of truth will encourage an exhaustion where attempts to distinguish between reality and image are abandoned. In this situation — which most resembles a psy-war battle between competing propagandists — those with the most powerful transmitters, aided by repetition, are likely to come out on top.

"Every medium creates a primary illusion, as Suzanne Langer clearly suggested in her seminal publication Feeling and Form (1953). The novel creates an illusion of memory; music creates the illusion of passing time; drama creates the illusion of history. She implies that photography creates the primary illusion of fact."

—Richard Misrach, *Aperture*, Spring 1985 ▶



For years retouching photographs has meant airbrushing. Few photographs used for advertising or publicity made it to the printed page without passing under the miniature nozzle of an artist's airbrush. Girlie photo magazines became synonymous with airbrushed retouching. In the hands of a maestro the illusion is faultless. An anonymous airbrusher moved a thundering, misting Niagara Falls into downtown Manhattan, New York, by combining two photographs with virtuoso retouching skill.

This is a total fake. This particular can of Comet was never photographed. It was never in a studio. It never existed. Taking digital retouching to the extreme, Alan Green and C. Robert Hoffman III, two animators for Digital Effects in New York City, added thselly gleams and reflections to a computer-generated image fabricated from equations. Retouching a phantom, starting from nothing.



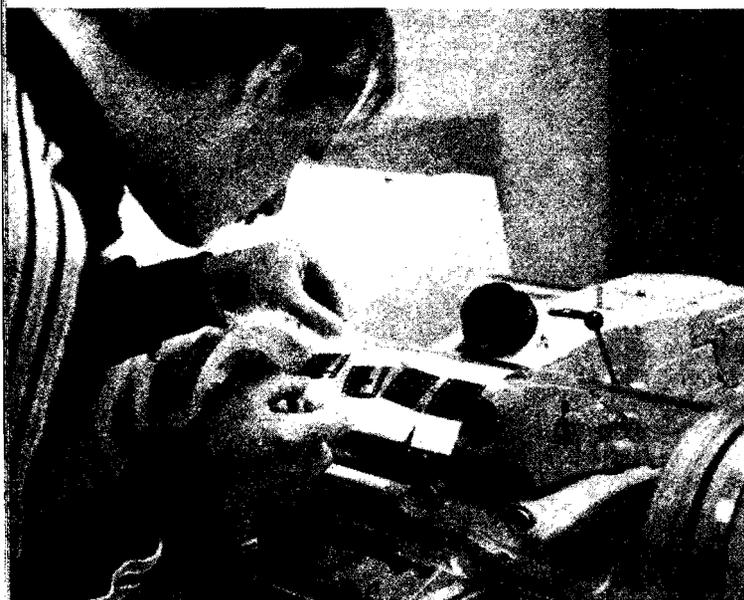
FLYING SAUCERS IN SAN FRANCISCO

STEWART BRAND: It was the illicit thrill of a photographer's lifetime. My right hand grasped the digitizer — a mouse-like device — pressed its yellow button, and slid it. On the high-resolution color computer screen the image of the middle-sized flying saucer slid up the photograph. I was aiming for a street light just outside City Lights Bookstore on San Francisco's Columbus Avenue. Ahh, the saucer slid in neatly between the light and the Transamerica Pyramid behind it.

"Up a little," advised Kevin Kelly. "Now down. That's it." I let up on the yellow key, and the saucer fixed in place as if it had always been there in frame 8a of the Kodachrome 64 slide. Of course, the guy who did all the work, Ron Hegarty, Chromacom operator at Pacific Lithographic in South San Francisco, had already dimmed the flying saucer a bit, adding a gauze of blue haze to match it to other structures at that distance in the photo. Now he zoomed



Identified Unflying Object, crafted in intricate detail by Paul Mavrides and Hal Robins, held with white gloves by Ted Schultz at the scene of the deception. If this photo were being computer-processed for reproduction, I would be tempted to remove that distracting pen in Ted's hand. But it would be wrong.



Laser-scanning the slides — one general view and three saucers — is Tim Watson at Pacific Lithographic in South San Francisco. The slides are angled so the saucers can be slipped onto the general view without having to be rotated. From this point on the photos are strictly digital information, no longer an analog of reality.



The dream machine at Pacific Litho, Ron Hegarty at the keyboard, me (Brand) in the no-shame put-it-a-little-higher advisory position. The \$1,000,000-plus machine — viewer, computer, scanner, etc. — is a Chromacom, manufactured by Hell of West Germany. The major competition, Scitex, is made in Israel.



These two photos show the sequence of blowing up the smallest saucer and then masking it with great precision. Using the digitizer in his right hand while watching the screen, Ron carefully outlines the saucer, then paints in the outline with magenta. The saucer is now a discrete piece of information that can be dropped onto the general view. Any detail discrepancies can be tidied up once the saucer is in position. The building could be made slightly transparent and the saucer viewed through it if you like.

"Lies. All lies."

the saucer and its new photographic surroundings up to enormous size and set about deftly blurring the saucer's hard edges, blending the model into its "distant" context.

Then we did the same with the saucer peeking through the balcony, with more blue, more blur. "Let the doubters wonder how we trimmed out that blurry balcony with an Exacto knife," I gloated to myself. Electronically it was a breeze. Ron Hegarty had isolated the flying saucer from another photo by masking digitally instead of with a knife. It was all just data: total rubber. The pixels — picture elements — could be smaller than the grain in the film if we wished. Any piece of picture could be blown up to any size and then fiddled pixel by pixel, i.e., in microscopic detail. We weren't trimming out the saucer; it was microsurgery. He did the same with the tiny, fuzzy balcony, then we eased the one piece of data behind the other, and art became illusion. "Reality."

A lot of our retouching time was spent making the "real" parts — the sprocket edges of the film — look real enough. Two of the sprockets and the "Ba" had been mangled by the slide-mounting process; they made the whole thing look dubious. So Ron replaced the torn sprockets with healthy ones and performed cosmetic surgery on the Ba. Then we came to matters of design convenience. The orange letters and numbers on the upper edge of the photo were black-on-an-orange-strip in the original — too garish. Ron reversed the colors. (The orange was still too bright to suit cover designer Kathleen O'Neill, so the color was toned down further in printing.)

Fakery upon fakery. The flying saucer is, in fact, made of dinnerware, three plates from thrift shops and a nice old piece of '50s Melmac. Also bits cannibalized from model kits — tanks, planes, motorcycles, ships, Japanese robots — and from a wristwatch and a refrigerator, as well as oddments from an architectural model supply store. The



Our full image in the color viewer after the first saucer has been positioned but before it has been trimmed along the top of the frame. I almost left it in this way for more dramatic and contradictory effect.

artists are Paul Mavrides, who draws "The Fabulous Furry Freak Brothers," and Hal Robins, another Rip Off Press cartoonist. They usually specialize in tiny replica dinosaurs (Hal) and grotesque doll and toy assemblages (Paul).

Photographing was the easiest part. Ted Schultz, Whole Earth's flying saucer specialist, stood at the corner of Columbus and Broadway gazing in astonishment at a placid Transamerica Building while I took a roll of tourist snapshots of the scene with my shirt-pocket Olympus. Then we stood Ted up in the back of a pickup nearby holding the saucer by a fishline and tilting it fetchingly while I took photos from various angles and

distances. The saucer pictures were made with a Leica and a less wide-angle lens than the Olympus, to put the saucers more in telescopic (i.e. distant) perspective — that was my theory anyway; I don't know if it made any difference. Passers-by were amused. It only took half an hour.

The retouching at Pacific Lithographic took six hours. Two for the laser scanning by Tim Waters, the rest for the Chromacom retouching. The illusion would have been better if Kathleen could have been there instead of out with a cold. She's a painter. Painters have been faking distance and perspective and all that for centuries.