



## BACKYARD ADVENTURES -SPIELBERG STYLE

Janine Pourro

Nothing is more intriguing or exciting than the tantalizingly intangible possibilities of 'what if...' What if there were a genuine pirate ship with a hold full of treasures yet to be discovered? What if you could hop in a sports car and travel through time? And what if these unlikely adventures were ready and waiting to happen in your own back yard? For producer Steven Spielberg—the master of transforming impossible daydreams into plausible cinematic realities—the challenges of rendering these incredible notions credible proved irresistible. Backed by his Amblin Entertainment production company and with the ablebodied direction of two of Hollywood's finest, Spielberg has once again ventured into the world of speculation by way of his two most recent summertime diversions, The Goonies and Back to the Future.

Films containing such unusual plot requisites as avalanches, pirate ships, time traveling and flying cars have traditionally called for the extensive application of special effects, but both The Goonies and Back to the Future make judicious use of only a few well-placed illusions. The task of creating the handful of effects shots — Goonies eventually tallied eighteen and Future twenty-seven, as compared to the 300-plus optical composites typically needed for a big-budget special effects opus — fell to the veteran crews at Lucasfilm's Industrial Light and Magic. And although ILM had already committed to several other large projects, all scheduled for release within mere weeks of each other, taking on the few additional effects shots needed by Amblin had seemed a simple and straightforward enough chore. For Arthur F. Repola, Amblin postproduction supervisor on both The Goonies and Back to the Future and former production coordinator at ILM, the assignment proved anything but simple. "When Amblin first hired me last November, they weren't exactly sure what my job was going to entail. Originally, I was going to be in charge of feature postproduction and I wasn't going to get involved with visual effects at all. But since they make movies in such rapid succession — five pictures were in production at the same time — they're usually off shooting the next one before they have time to finish the first; and I found myself taking on more and more responsibility. Standard operating procedure at Amblin is to have Kathleen Kennedy in charge of preproduction while Frank Marshall follows through with postproduction; but since they were so busy and scattered, I found myself doing the things with ILM that they did when I worked at ILM — going through storyboards, budgets, contracts, coordination and taking care of the day-to-day matters that would inevitably come up. For a job that when they hired me they weren't sure I could find enough to keep busy full time, it turned out to be total insanity. We had sixteen weeks to get Goonies done and nineand-a-half weeks to finish Back to the Future once they had completed principal photography."

Although the two films were in production simultaneously, the postproduction schedules overlapped only by a matter of days with the first-to-be-released slated for priority consideration — The Goonies. Under the direction of filmmaker Richard

Donner — the man behind such diverse fare as *The Omen, Superman, Inside Moves* and *Ladyhawke* — Steven Spielberg's childhood fantasy of discovering hidden pirate treasure was boisterously and enthusiastically realized.

The film's swashbuckling scenario revolves around seven teenage kids — nicknamed the 'Goonies' — whose beloved 'Goon Docks' are about to be foreclosed upon by some rich society folks with plans to build a new country club on their coastal homesites. In search of diversion, the boys investigate the forbidden confines of an attic used to store museum pieces for the local historical society. When they discover some old pirate relics — including an ancient map and a curious-looking doubloon — the dreamer of the group, Mikey (Sean Astin), recounts the legend of One-Eyed Willy and his great hoards of plundered wealth. Then and there the Goonies decide to set out on a treasure hunt of their own. What better way to add some sparkle to a dreary day and find the money needed to help their parents out of debt?

For director Donner, the appeal of working with seven energetic kids and a storyline straight out of every child's imagination seemed like an amusing distraction, and he optimistically delved into the Goonies project while still in the final stages of Ladyhawke postproduction. It became immediately apparent, however, that he was in for more than he had bargained. "When I read Goonies — it was called Goon Kids at that time — I really felt that it was just a cute story about a bunch of kids. I thought it would be easy, fun and delightful to work with young people for a change and that getting the film out in a short period of time would be a snap. But then, of course, all the problems inherent when working with children soon became clear safety factors, scheduling to work within the required four-houra-day limit — and it became somewhat of an impossible task. The project just kept developing and developing, and all of a sudden it started to take on a scale that was a lot grander than I had anticipated."

For the Goonies crew at ILM, the reverse was true. "When I initially became involved with Goonies," said visual effects supervisor Michael McAlister, "the project was much larger in terms of special effects. There were probably two or three times as many shots as ultimately made it into the movie. And then, like most effects shows, as the producers started learning how much it was going to cost, they started taking the pen and scratching out scenes. So by the time we finally started working

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directing a second unit at

In front of his new corporate

headquarters on the Universal

lot, Steven Spielberg —

Goonies and Back to the

executive producer of The

Future — poses with a key

prop from one of his two

Amblin Entertainment

Spielberg and Goonies

shooting. Based on an

discuss the script's

summertime releases. /

director Richard Donner

subtleties during location

Donner's invitation.

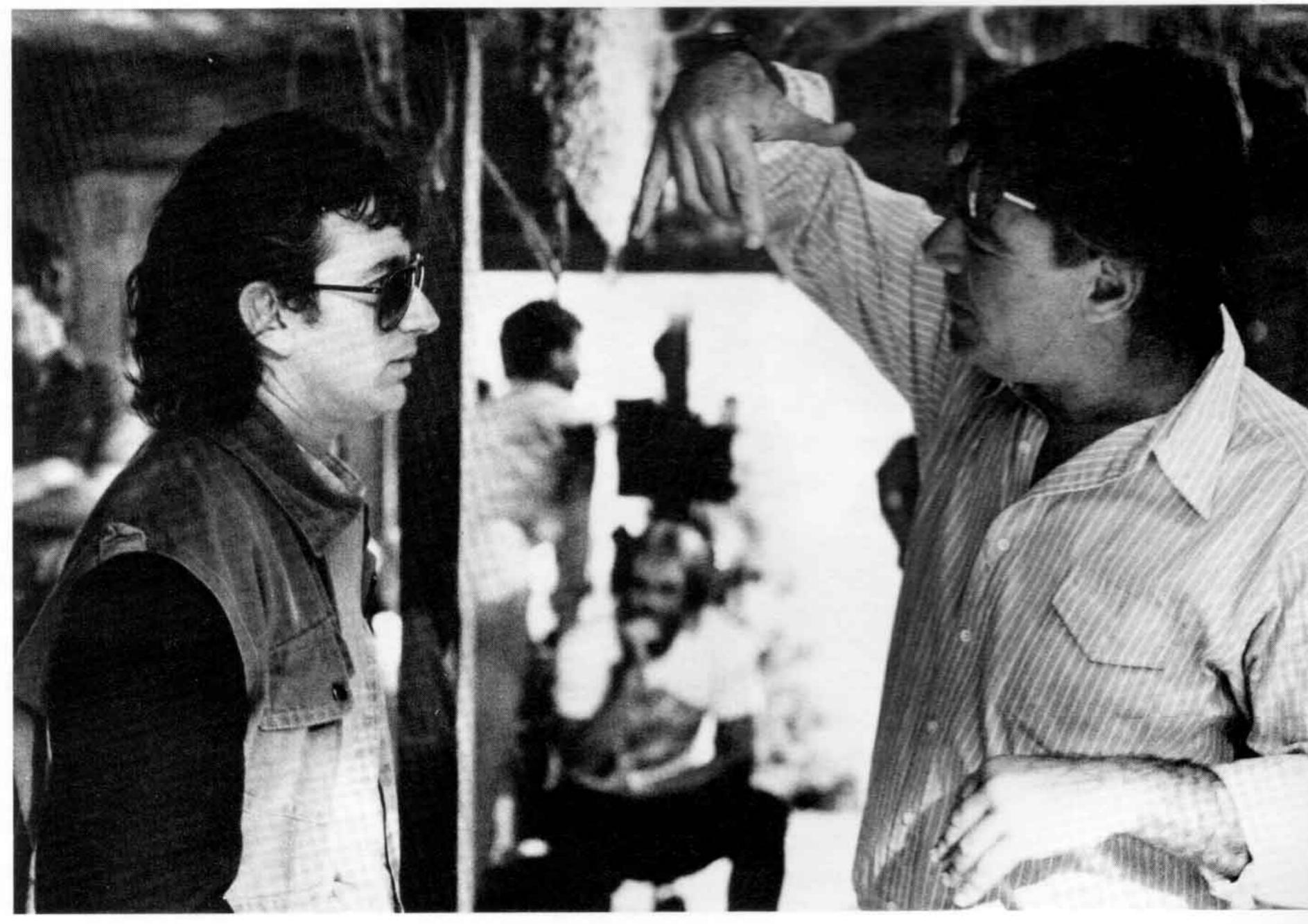
on Goonies, the movie had been cut down to only about eighteen effects shots."

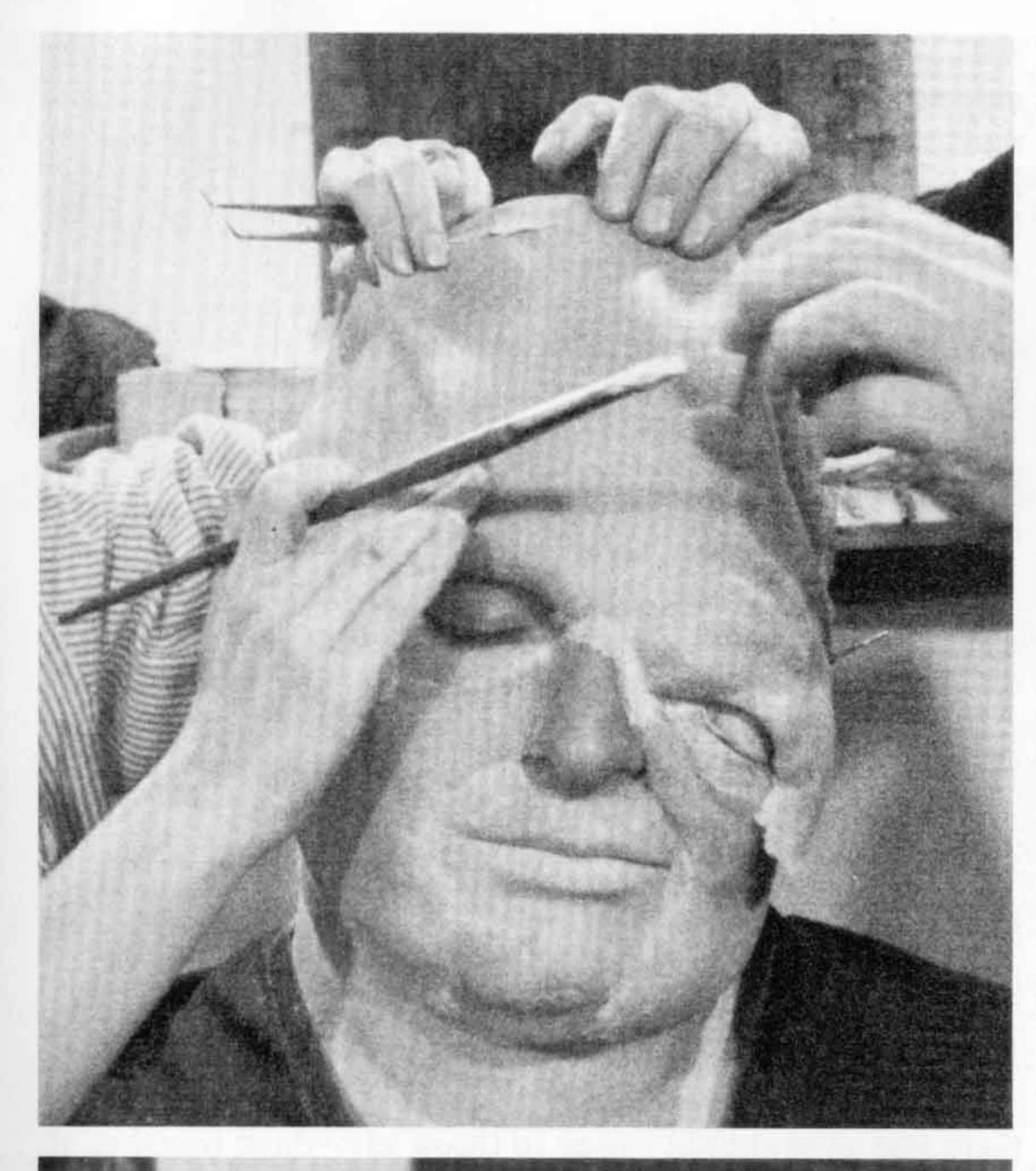
There was also a real push throughout to try and transfer work from ILM to the production itself," said effects art director David Carson. "And because they were always involved in doing at least some practical work for each sequence anyway, it became very cost-effective for them to say, 'Well, how much of this can we do ourselves?' In addition to the financial aspect, there came a point when the story crossed over the line of reality into fantasy. For example, a lot of the initial effects had to do with things like sword-fighting skeletons that come to life in the treasure room. Ultimately, though, Steven Spielberg felt that the film should not be a fantasy. He also felt it should come down in scale — not for cost reasons but because he wanted the film to be something that kids seeing it would think: 'That could happen to me. If I were to find an underground cavern in my town, this could happen.' So the multimillion dollar effects film screenwriter) Chris Columbus had conceived became a much smaller adventure film in the end. And although it was somewhat frustrating to see a lot of interesting work get scaled down and even slip away, the work we did was good." With the storyline more clearly established, The Goonies was transformed from a fantasy-adventure to a fantastic adventure, and although ILM's contributions were greatly reduced in quantity, the effects were nonetheless vital.

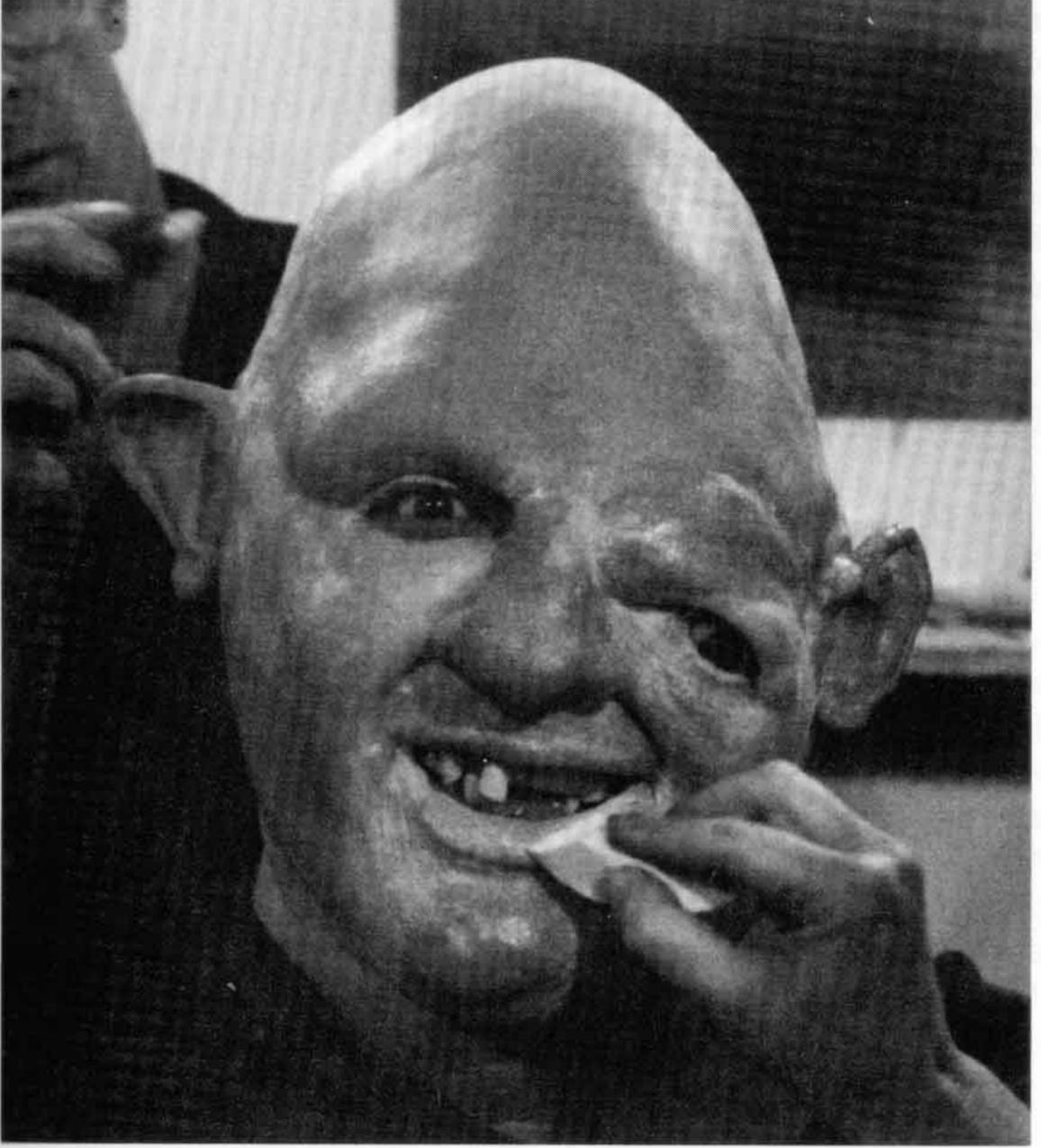
With doubloon and treasure map in hand, the youthful adventurers begin their hunt. And when they line the cutout doubloon up with an abandoned lighthouse and a rocky outcropping on the horizon, the exact locale of the legendary treasure is affirmed with X-marks-the-spot certainty. The shots featuring the boys' sighting through the doubloon were among the effects rendered by ILM. "There were two cuts in that little scene," explained McAlister, "where we put the doubloon and the kids into the shot using bluescreen. While we were on location in Astoria, Oregon, we had shot a background plate with a little bit of landscape in the foreground and the ocean in the background. Since the existing rocks out in the ocean weren't quite what we wanted, we painted in a couple of rocks and then did a bluescreen shot of the kids and a separate bluescreen shot of the doubloon. The end result encompassed the ocean with the two rocks in the background, the kids in the middleground and the doubloon Mikey is holding in the extreme foreground. As he's looking past the kids, he's lining up the holes in the doubloon with the two rocks that we painted in as well as with the lighthouse."

"In addition to matting in the rocks," elaborated optical supervisor John Ellis, "we used a matte painting of the island and the lighthouse on the horizon because they weren't there in the real scene, either. So along with the background plate of Astoria, the shots of the boys against bluescreen and the additional shot of the doubloon against bluescreen, we married all the elements together. The only problem was that Mike McAlister wanted to simulate a rack focus so that when the doubloon is









held up, it would look like an actual focus change."

Because infinite depth of field over such a wide range would have been a clue that an 'effect' was in progress, the subtle touch of rack focusing made the shot appear as it would had it been done live-action. "The way we did the rack focus," explained McAlister, "was by doing a precomp with the background and the middleground kids and then another composite with the kids in the background and the doubloon in the foreground. That way we could throw the kids and the background slightly out of focus and keep the doubloon element sharp when we wanted people to look at the doubloon. When we wanted people to look past the doubloon and see the rock, then we'd shift the focus to the background."

With the doubloon pointing the way, the boys find themselves at the ramshackle Lighthouse Lounge — actually an authentic-looking set created by production designer J. Michael Riva and crew — in which the dastardly Mama Fratelli and her fugitive sons have taken refuge. When the Fratellis drive away, the gang decides to explore the forbidding structure. Winding their way down into the basement, they discover—to their horror — a counterfeiting machine, a dead body hanging in the meat locker and some mysteriously terrifying noises coming from an adjacent room. The Fratellis' unexpected return forces our heroes to hide in a grate-covered passageway in the floor which, coincidentally, is the opening of their tunnel to adventure. Only Chunk (Jeff Cohen) is separated from the group and captured by the Fratellis, who lock him up with the originator of the scary noise. As Mama, Jake and Francis follow in hot pursuit of the others, Chunk finds himself face-to-face with the third Fratelli brother, Sloth. The unfortunate sibling — an enormous, deformed, growling monster — has been chained to a wall in the basement and left to watch television all day. His menacing countenance only adds to Chunk's alarm. But after the initial panic subsides, Chunk finds in Sloth a kindred spirit, and the newfound friends set out on their own quest to rescue the Goonies.

Defining and developing the Sloth character proved to be a challenging group effort. Rendering the paradoxical qualities of the monster with a heart of gold called for an intricate combination of traditional makeup techniques, unusual appliances and mechanized facial movement — with the process going through a labor-intensive evolution before it was ultimately realized on film. To transform the concept of Sloth into a viable entity, Amblin first called on effects makeup artist Craig Reardon, who had previously created some of the bizarre manifestations needed for Spielberg's Poltergeist and Twilight Zone - The Movie. "When I originally met with Steven Spielberg, Richard Donner and Michael Riva, Steven told me about this character in the film called Sloth who was to be a big 'Baby Huey'-type character. He wanted Sloth to be very large and, although initially threatening and upsetting-looking, rather childlike and loveable. He was also supposed to be slightly deformed, with a misplaced eye and a funny kind of bald head. As Steven began to

The Goonies — seven misfit kids on a perilous quest for pirate treasure — begin their adventure with a narrow escape from the scurrilous Fratelli family. Exploring the fugitives' hideout, one of the Goonies discovers a growling monster chained in the basement. / Sloth (John Matuszak) — the Fratellis' malformed and misunderstood brother was intended to appear initially frightening, yet engaging and nonrepulsive to young audiences. The concept, developed by makeup artist Craig Reardon, was ultimately refined and executed by the Burman Studios. / The Sloth makeup — a multi-piece construct which included flapping ears and a misplaced, radiocontrolled eye — required a daily four-hour stint in the makeup room. Polyurethane foam pieces were applied by Tom and Bari Dreiband Burman, while Ellis Burman rigged the mechanics.

outline what he wanted physically, I immediately recognized the characteristics of the Charles Laughton Hunchback of Notre Dame. So I asked Steven to make a sketch, and it was obvious what he was getting at. He didn't want anything the least bit realistic if that made it frightening or threatening or distasteful to kids. He wanted this character to be an anodyne, loveable, deformed, goofy-looking thing — but more goofy than scary. Also during that initial discussion, he indicated an interest in the misplaced eye having the capacity to move and the character's slightly large ears being equipped with the ability to flap. And because Sloth has a passion for chocolate, Steven wanted the nose to reach out quivering like an aardvark in order to sniff."

Equipped with Spielberg's rough doodle and his notes from the meeting, Reardon began developing the Sloth makeup with a few initial sketches. "Now the problem, as always, was to translate a definite sounding character breakdown into satisfying concrete visual terms, so I tried to render the character in a realistic way as it might have appeared on the set. When I met with Steven a week or two later, it was clear the sketches weren't quite what he had in mind. So I went home and did some quick cartoon-like drawings which turned out to be much closer to what he was thinking of, and yet still weren't exactly right. Rather than once again leaving to come up with an entirely different design, I stayed at the meeting and tore bits of paper to cover up and then redraw the various features. This way, I could make the necessary changes by shifting the pieces of paper around until we came up with a satisfactory composite. I covered the concoction with a piece of glass, carried it to the xerox machine, ran it off and the end result was a blueprint for Sloth."

Although Jake Steinfeldt — the 'Body by Jake' exercise impresario — had originally been considered for the part, the role of The Goonies' gentle giant eventually fell to former All-Pro defensive lineman John Matuszak. Once the decision had been made, Reardon immediately made arrangements to begin the Sloth makeup at the logical beginning — by obtaining a plaster body cast of the actor from which he could, in turn, create the necessary foam latex appliances. When Matuszak arrived for the sitting with a full beard and moustache, Reardon was more than a little dismayed. "Sloth wasn't supposed to have a beard and moustache and there were going to be various facial construction changes necessary for that area. But when I explained that to Matuszak, he said, 'Well, I'd be willing to shave it in two weeks.' Unfortunately, two weeks would have been too late; and rather than insisting that he shave, I went ahead and took the cast. So I ended up with Matuszak's form — complete with beard and moustache — and just whittled away at it, trying to imagine what he looked like clean-shaven. That was the first in a series of mistakes and bad decisions. I also got the bright idea to create a makeup that could be removed almost as if it were a piece of apparel. I realized that by nature, Sloth's big, childlike face complete with big schnoz and wiggling ears — would be allencompassing and that nothing much of John was going to remain. He would obviously be wearing so much construction makeup that he'd completely disappear — not to mention that most days he could look forward to eight to twelve hours of simply being in that makeup. So I went off on a tangent and tried to design something that could come on and off almost like a big mask.

"From the time I took the cast to the time John was needed in Oregon amounted to a scant three weeks — which is usually ample for a character makeup — but because of the unique situation where there had to be an eye capable of moving and ears that had to wiggle and flap, three weeks proved to be insufficient. Another complication was that I initially wanted to do Sloth's eye flush to the face rather have the bulging orb typically used to conceal the inner works; so to help backstop me on the mechanics, I engaged David Kelsey who had worked on The Thing. But for one reason or another, things just didn't work out. I attempted a couple of approaches using a membrane stretched over a form to give the impression of spherical movement without having to have a big sphere in there. It was one of those discouraging things where we were getting towards the solution, but time simply ran out; and when that happened, my notion of creating a removable overhead mask with animatable facial structure also fell through. I still believe it's a practical idea; but suffice to say, I failed miserably in coming up with it in time.

"When it got to the point where we had to go up to Oregon, there was an overnight frenzy to throw something together. It was a real jerry-rigged thing — the eye didn't work, the ears didn't work and it was pretty much a mask. Nothing worked because nothing had ever really been worked out. So we put this mess together and they filmed it. I was humiliated and embarrassed. Well, lo and behold, we looked at the dailies and it was a fairly engaging character — people laughed and got a kick out of it. After this scene, I had a week or two before Sloth's next call in which to do whatever I felt had to be done to get it right. And what I decided had to be done was a complete change. I redid the entire makeup."

Drastic measures were in order as Reardon launched into an all-out attempt to revamp the Sloth makeup. Taking into consideration such Spielberg-dictated alterations as a wider grin and smaller head for the character, a three-day herculean effort yielded thirteen separate molds and transformed a one-piece, mask-like construct into a complicated sectional makeup utilizing eleven separate appliances. "I hate piece makeups," commented Reardon. "I think that by and large they're impractical and unnecessary, and I've had a lot of success with large pieces. But there's a school of thought in makeup descending from Dick Smith — from which I politely dissent — that it's easier to apply and shift around multipiece makeups. Well, it finally became apparent to me that maybe this was the way to go. Unfortunately, the mechanical part was never properly constructed, and we had to face the music that it was necessary to have some sort of orb out there after all. On top of that, we had all kinds of

The Goonies' subterranean journey is fraught with impediments — not the least of which is the organ chamber, located precipitously above a dangerous cavern. ILM composites for the sequence included various shots featuring matte paintings and miniatures in conjunction with bluescreen footage of the actors shot on the live-action set. / A stalactite-ridden miniature set was built for a low-angle shot in which a section of the organ chamber floor falls away toward camera. / Effects art director David Carson, visual effects supervisor Michael McAlister and artist Chris Evans confer during the first step in the matte painting process. A live-action clip from the organ chamber sequence has been carefully rotoscoped onto black-painted glass to provide the artist with precise positioning of live and painted elements.







CINEFEX 24 ► 45

problems even fitting the pieces on Matuszak — it was ungodly. We'd put the poor guy in the chair for what should have been a two-hour makeup job, but which expanded into something like four-and-a-half hours — simply because things wouldn't fit. We'd apply the various sections and discover, to our amazement and horror, two-inch gaps where they didn't come together. For example, there was a publicity photo taken for 'Baby Ruth' candy bars in which a nose or chin was stuck way up on his head, completely out of place, as a patching piece. You can't tell in the picture, but that's the kind of desperate measures I was driven to. Absolutely nothing went together right. I died a thousand deaths. It was the most miserable experience I've ever had on a film. Altogether, I remade the makeup from scratch three, going on four times. I went down fighting."

With Sloth's physical appearance barely established on film — and virtually no time to spare — Craig Reardon was unceremoniously relieved of his Goonies assignment by producer Harvey Bernhard, who promptly turned to Tom Burman for assistance. Burman — an appliance makeup specialist who had previously worked with Bernhard on The Beast Within - was already on the picture, having just devised the skin and body of a thirty-foot octopus for use in the underground, water-filled cavern. When Burman received the producer's December telephone call for short-notice help on the Sloth character, he and his associates decided to accept the challenge. "We took the job on while the production was closed down for Christmas hiatus, and had nine days to reconstruct the entire makeup and the mechanics necessary to wiggle the ears, open and close the eyelid and move the eye itself. In those few days, my wife (Bari Dreiband Burman) and I redid the design, while my brother Ellis Burman devised the radio-controlled mechanics."

With humble beginnings as a doodle conceived by Steven Spielberg and further modification and development by Craig Reardon, the Sloth makeup eventually completed its evolutionary process at the Burman Studios. "It was a very difficult makeup to do," commented Tom Burman. "Extremely difficult. And I'm sure Craig went through pure hell trying to make this thing work. But for us to make it work, we had to start from scratch; and aside from maintaining the same aesthetics that Craig had established, we redid the entire thing. We began by taking a brand new cast of John Matuszak — doing a full head impression, an impression with his eye open and also one of his teeth because Sloth required special teeth. Then we sculpted a look in wet clay and sent that to Dick Donner who was in Hawaii for the week. We communicated with him over the phone and tried to accommodate the changes he indicated as well as make the design a little more practical from our standpoint. From there we did all of our master molds and then sculpted the whole thing again, this time in plasteline clay and allowing an area for where we thought the mechanics would go. We got the new sculpture to my brother right away so he could build the mechanics and radio control equipment at the same time we were working on the makeup. From there we went through the process of overlapping appliances and floating the clay off the head, by which time Ellis had finished up his mockup for the mechanics."

With the mechanical mockup completed, Tom and Bari Burman were able to estimate the completed size of Sloth's head by adding the mechanics to the dome and making yet another full cast — resulting in seven master molds. Then, taking into consideration the space necessary for sculpting, the clay pieces were removed and the section for the mechanics was cut away from the inside. Most of the mechanics were housed under the domed head. The drive units for the ear-wiggling function and the various eye movements were all powered by small heavyduty servos measuring an inch-and-a-half by one inch. Fine stainless steel direct drive rods — as opposed to cables — were fed through housings which connected to the radio control receiver located down Matuszak's back.

"The completed makeup weighed about three pounds and required fifteen separate pieces," Burman continued. "We determined the number of pieces by examining the sculpture and estimating where the blend lines had to be, where the overlaps would go, taking into consideration the thickest points and keeping in mind the various pieces that needed to be incorporated into the makeup. We knew some sections would shrink up a little, so we compensated by adding, for example, an eye bag to blend with a big, full-size cheek. In order for it all to fit together perfectly, we embellished with little sections as needed — like pieces in a puzzle — thus completing the makeup. The back of the head required only one large section in which we housed all the mechanics. To make the head sturdy enough, it was important to construct the bulk of it out of a different material than the typical foam rubber, so we used an expandable polyurethane foam based on the old George Bau formula for all the facial pieces. The polyurethane resists shrinkage while at the same time imparting a nice fleshy look. The whole thing was covered with urethane skin. We used a silicone-A adhesive which is a medical adhesive — to adhere the makeup to John. It seems to be much easier on a person's face over the long period of the day as compared to spirit gum which has a tendency to dry, crack and irritate the skin. To blend all the overlapping pieces together, we used a formulation of our own made of base rubber and B-adhesive — which is an acrylic emulsion. This gave us a real good bond for the overlapping sections, and is especially durable for situations where there is a lot of heavy perspiration — and a three-hundred-pound, six-foot-eight-inch guy has the tendency to perspire a little."

The application of the Sloth makeup was a family affair. While Tom and Bari Burman painstakingly covered Matuszak's face with an array of foam features, brother Ellis labored over the servos, cables and receiver encased in the rear. "We'd start working on John at four in the morning," said Bari Burman, "and finish by around eight o'clock. Frequently, he wouldn't be needed on the set until six that evening, so he'd sit around or lie all day — and that's a pretty grueling get-up to wear. We tried to

After their near mishap in the organ chamber, the Goonies shoot down a hidden slide and into an enormous, water-filled cavern. There they discover the majestic Inferno, pirate One-Eyed Willy's legendary ship. Although it was the producers' original intent to suggest the mighty vessel via partial sets, matte paintings and a highly-detailed miniature, production designer J. Michael Riva determined that it would be more cost effective to build the cavern as a large single set — complete with full-size Inferno.

see that he was as comfortable as possible while at the same time making certain that the makeup adhered. There was only one occasion when we had to apply the makeup twice in one day, and that was on the last day of shooting. John was an absolute angel throughout the entire ordeal; but on that last day, while they were photographing everyone in the water-filled cavern, it just got to be too much and he simply went under. They still got their shot, but the big foam rubber head filled with water and started to sag and all the servos shorted out."

In all, Matuszak donned the cumbersome makeup for twentyfive shooting days, many of them devoted to the journey of Sloth and Chunk who set out to follow the subterranean trail already blazed by their fellow Goonies who have met with an array of obstacles — rigged centuries earlier by the nefariously clever One-Eyed Willy — during their attempt to escape the rapidly approaching Fratellis. One such encounter involves a macabre 'bone organ' fashioned from the remains of an ancient, grinning skeleton and with keys made from human bones. A quick reference to their map defines the rules of this contest: "To move on, play the tune, As each note is said, For too many mistakes, Ye will surely be dead." The map provides the necessary notes, but the only Goonie with musical experience is Andy (Kerri Green) whose talents are, at best, minimal. As she haltingly picks out the tune, each correct touch causes a stone drawbridge to lower by degrees, revealing a hidden passageway. Every error brings the gang closer to disaster as the organ chamber's floor begins to collapse into a treacherous cavern below.

While the organ chamber illusion was achieved in part by Matt Sweeney's floor effects crew and an authentically shuddering set, the room's ambience of height and jeopardy was contributed by ILM. And like most of the other effects in Goonies, the organ chamber sequence was radically streamlined from its storyboard inception. "As originally conceived," said Dave Carson, "the organ chamber was not only a much bigger room which would have given the camera better access — but there were supposed to be floor shots from down below which would have allowed the kids to be seen way up high. There was also talk at one time of the ocean rushing in and crashing. The shaft below the kids was to have been a straight man-made setup which, as it went further down, appeared to become a natural shaft with water crashing in at the very bottom. So I boarded shots not only from the point of view of being up above and looking down at this disappearing-into-infinity shaft, but also from down below looking up — which really would have established the scale. The best way to convey the enormity of the chamber would have been to make the room itself big enough so the camera could be positioned high above. Then, when looking down the shaft, the kids could be seen standing on the floor above.

"Well, as preproduction progressed, the room got smaller and smaller, and finally a choice had to be made. You could either look more obliquely at the kids or you could look straight

down the shaft with nothing to give any kind of scale reference. It became a very difficult sequence to achieve. The shots from way down below were cut out, along with a straight reaction point-of-view shot of one of the kids looking down the shaft. And that was the beginning of most of our problems, because without that straight point-of-view early on, there was never the opportunity to really see what was going on. By the time it was apparent, the sequence was over. So our solution to the problem was to paint a vertical shaft to try and open up the scene so that the organ chamber would appear to be over a very large cavern. But the first mattes that were done for the storyboards appeared to be looking about eight feet down a shaft, and there was just no sense that the kids were in danger. So we ended up with a compromise solution at best."

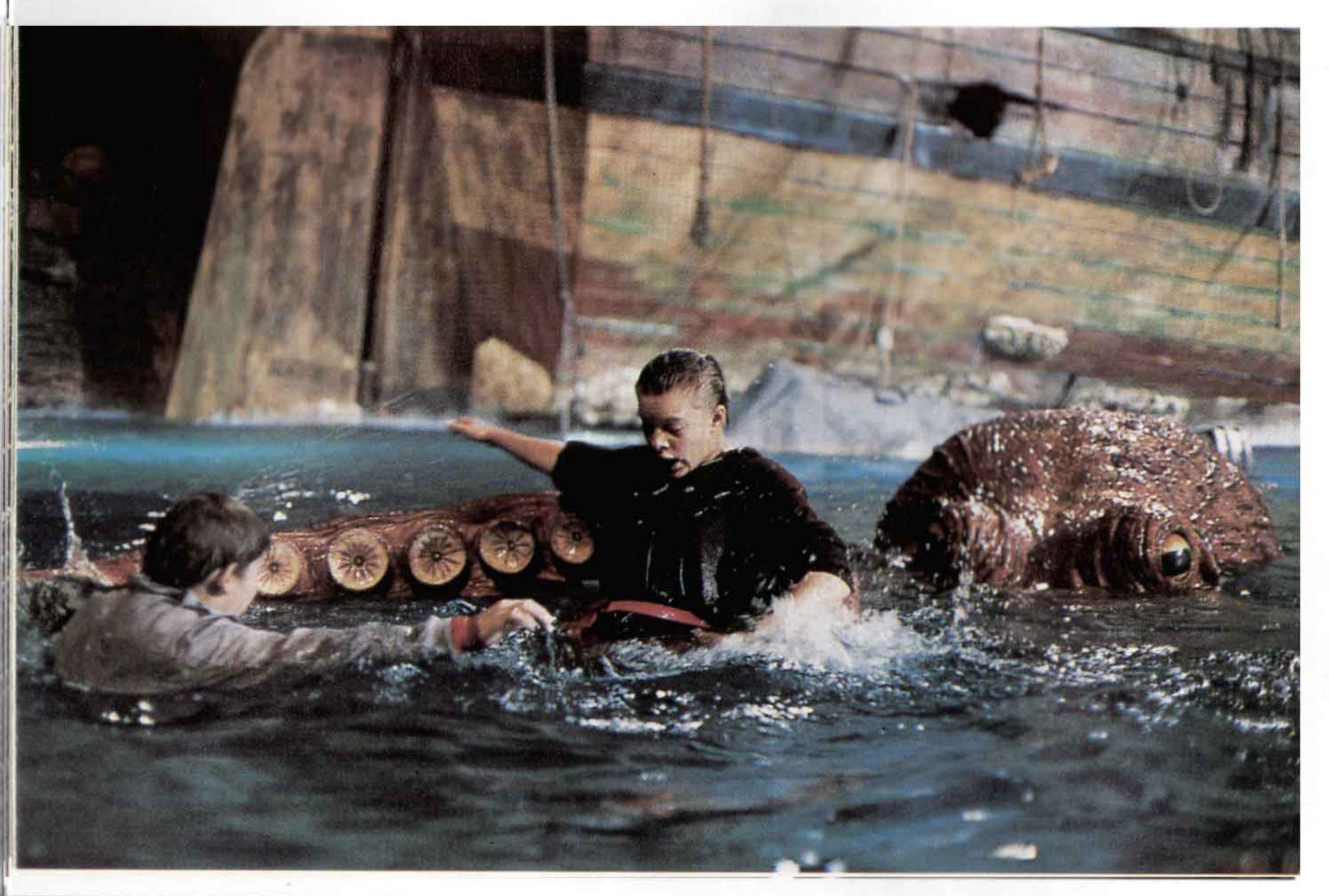
The compromise solution included the drastic cutting of half the sequence's planned shots — from ten down to five. "Unfortunately," elaborated Mike McAlister, "the shots that were cut were the ones that really sold the depth. They were needed in order to create a sense of jeopardy. So I went down to Los Angeles — all the live-action portions of the organ chamber were shot on Stage 15 at The Burbank Studios — along with a very skeletal third unit camera crew. We set up our VistaVision equipment and tried to match the lighting to what the film's director of photography had established. Then we basically waited around until the kids were available for the background plates and shot them against bluescreen. Although the physical effects people had devised some breakaway floors, we decided not to use them for our angles and had the floors torn out. What we ended up with, instead, was a big hole where the floor was supposed to fall away. We then propped up a portable blue screen — in one case we actually had to build one in the position of the hole — so that the actors were silhouetted against blue while they were flailing about.

"Then we brought the plates back to ILM and started playing around with designs for the low-angle shot. We quickly discovered that because the organ chamber itself had a very claustrophobic feeling, we were restricted in what we could do from that lower angle. We had envisioned the organ chamber at the top of a big mine shaft-like cylinder going straight down; but because the cylinder was so small in diameter, the only way possible to see far down into the pit was if the camera were suspended overhead and aimed directly down. And there were no shots in the movie designed that way. So we did matte painting after matte painting and never could get that mine shaft concept to work. Finally we had to scrap the whole idea."

With the mine shaft notion no longer feasible, the organ chamber was relocated above a vast and perilous cavern. "We started thinking about big huge caverns," continued McAlister, "with dangerous stalagmites and stalactites and billowing smoke and running water. The whole idea was that whatever image was down there was supposed to be immediately recognizable as danger — everything you ever imagined falling into that could possibly be bad for you. But we had a lot of trouble

The upper regions of the ship's masts and rigging, as well as the cavernous background, were not completed on the soundstage. Several matte paintings provided those missing elements, and also served to conceal the catwalks and lighting equipment positioned in the rafters above. Because arc lamps created a blue smoke haze during principal photography, separate paintings were rendered of the sails and rocks to afford the optical department more control over the color timing. Artist Frank Ordaz roughs in the section to be painted. / The finished ILM composite, complete with matte paintings. By pulling a high-contrast matte from some generic waterfall footage, optical supervisor John Ellis was able to augment the shot with a

thinly-matted waterfall.





getting anything to look that dangerous."

Recognizable danger was ultimately achieved via miniatures and mattes. Although the breakaway floor designed as part of the full-sized organ chamber was used during live-action photography, a large miniature set was built for the effects shots. Supervising modelmaker Barbara Gallucci, along with Chuck Wiley and Randy Ottenberg, constructed the sixteen-by-twenty-foot set complete with stalactites, pools of water and fog for use as the cavern's distant background. One-third-scale falling rocks were then photographed at high-speed to be used for the collapsing floor sections. In addition, the sequence required a total of five different matte paintings which were created by Christopher Evans, Frank Ordaz and Caroleen Green.

With barely seconds to spare, Andy successfully completes One-Eyed Willy's melody and the Goonies escape both a fall into the cavern and falling into the hands of the Fratellis. But it's out of one scrape and into another as they shoot down a hidden water slide into parts unknown. Shaken and thoroughly drenched, the Goonies emerge to find themselves unharmed and in the breathtaking presence of One-Eyed Willy's pirate ship — the majestic *Infermo*. Within the water-filled confines of an enormous cavern, the mighty vessel has remained intact for centuries and lies waiting for the children to explore.

Although the initial Goonies scripts called for quite a few shots requiring the use of a highly detailed miniature version of the Inferno — including some within the subterranean cavern — as the project was scaled down in general, so was the need for the ship. "If you were to see the miniature pirate ship in person," commented art director Carson, "it would seem to be the best example of overkill of anything we've ever done at ILM — unless you know the story behind it. Originally, it was intended for use in a number of shots. In fact, the original idea was to build only the outer shell of the hull on the large set at The Burbank Studios, and the interior as a set in a separate area altogether plus an additional set for the deck. But as production designer Michael Riva looked more and more into building these sets, he reached the conclusion that it was economically feasible to actually build the hull and deck and second floor as part of a ship. Of course there was some resistance, both from Dick Donner and especially from Steven Spielberg — they felt that it would be an expensive way to go. But the more they considered the idea, the more they could see Michael's point, which was that instead of building three or more separate sets — which would mean a certain amount of duplication — it would be simpler and less expensive to build only one. Ultimately, they built a pretty good chunk of a ship on an absolutely enormous set, which meant that a lot of shots ILM had planned to do with the miniature were now unnecessary. Other sequences were cut, and gradually we saw the number of shots involving the Inferno begin to dwindle. There was a point where we could have made the decision to do a smaller scale and less-detailed ship which obviously would have saved a lot of money for ILM and the production company — but the number of shots to be used in

Goonies was coming and going on a weekly basis. So we completed the large, highly-detailed miniature in the event that it might be required, rather than taking a chance on it. As it turned out, they never needed the ship on that scale, but it's a beautiful model."

Above the impressive Inferno set — which was built into an realistically cavernous surrounding — hung the usual array of lighting equipment, catwalks and rafters intrinsic to any soundstage. To conceal the stage and impart authenticity to the ship's upper region, ILM provided the necessary matte paintings. 'While making the master shots of the ship in the cavern," McAlister explained, "five or six shots were designed so that it was possible to see above the ship's mast and the fake wall built on the set. So our matte painters painted in rigging and the top of the wall and anything else that was supposed to be at the top of the frame. They were very difficult paintings to do because of the subtlety of color and because there were about a dozen arc lamps burning on the set which created a constant blue smoke haze — and haze is a very difficult thing to match in a matte painting. Even though we aired out the stage before each shoot, there was only a certain amount of time available for that task. So the painters had to contend with a lot of blue haze in their attempt to match the colors of the rocks on the wall and the colors of the sails on the ship. To do it, they ended up trying something different. They did one painting that had the rocks and the ceiling and the walls, and then a separate matte painting for the sails. That gave our optical people more control over the color timing in the shot. If the rocks tended to go a little browner and the sails a little bluer, optical had the flexibility to adjust in either direction. It's quite fortunate that we ended up doing it that way because balancing the color for those shots would have been a nightmare."

Along with the need for an intricately accurate ILM pirate ship, another alteration that came about as a result of the story's development and ongoing financial considerations involved an enormous, thirty-foot octopus. As the Goonies wade toward One-Eyed Willy's wonder, the script called for the octopus to surface from below, grab one of the kids and lift him into the air. That sequence was subsequently deemed too fantastical—and costly—and was modified into a considerably toned-down appearance by the sea creature. Burman Studios designed and built the octopus of highly plasticized urethane using a sculpture by Mark Segal, who devised the body and a separate tentacle which was duplicated eight times. The body was then mechanized with inner workings provided separately by the resident floor effects crew. Though photographed and edited into the movie, the octopus would never be widely seen.

"The day before we finished the film and turned it over to the studio," said Art Repola, "the entire minute-and-a-half sequence was completely edited out. We'd shot the octopus coming up and attacking the kids, and it was simply getting negative feedback from our previews. The octopus was fine under water, but there were a lot of shots of it coming out of the water where

it looked mechanical — and mechanical enough that it ruined the credibility. The cards that were coming back from our previews all said the same thing. Everybody hated the octopus. And it really had no payoff. The octopus attacked the kids and Data inserted a rock 'n' roll tape into his Walkman and threw the blaring machine into the octopus' mouth. The octopus then breakdanced away. Fortunately, it was an easy change — neither end of the cut affected any music cue, so we could actually just make the cut and splice it together and go. If we'd had to do any redubbing or anything major, we could never have done it."

Once on board the *Inferno*, the Goonies begin their tentative search of the ship and eventually come upon the skeleton of One-Eyed Willy himself, sitting in an opulent cabin surrounded by jewels. The thrill of discovery is short-lived, however, as Mama, Jake and Francis interrupt the encounter armed with a pistol and, of course, pirate swords. Just as the Fratellis are about to force the Goonies to walk the plank, Sloth and Chunk arrive on the scene in the great tradition of all swashbuckling heroes — coming to the rescue in a dramatic slide down the main sail. While Sloth engages in an Errol Flynn-like duel with his brothers, the children swim to safety. The sequence ends with a bang when Data (Ke Huy Quan) lights what he believes to be a flare but is, in fact, a stick of dynamite — causing a massive explosion and instigating an avalanche.

"The avalanche was one of the more complicated shots in terms of numbers of elements and editorial work in Goonies," said effects editor Howard Stein. "It included the point where the avalanche begins and where the fissure in the wall appears — there's also a lot of action happening at the same time. We started with the actors and the set piece of the ship at The Burbank Studios and then added a painting of the ship, the avalanche element and a lot of falling bluescreen rocks." The avalanche element proved to be a rather complex undertaking, and although the shot itself was brief, the effect included such realistic touches as falling rocks and a fissure opening up in the wall with bright sunlight flooding in to light up the ship and the water.

"First of all," explained McAlister, "to achieve the avalanche effect, we made a background plate of the large ship on the set in Los Angeles to use as reference. Then, for the wall behind the boat where the fissure opens up, we used a very large miniature — probably about fifteen feet tall and twenty feet wide — made out of paper, foil and polyethylene foam that we sprayed on the back to give it some rigidity. The front of the large miniature wall was completely covered with real shale—attached by a very weak plaster mixture — and then rigged with little mechanisms set to create a landslide of sorts. The mechanisms were actually small boards inserted through holes in the wall and then stacked with more shale. The setup was plastered lightly to the wall so that when the shelf-like rig was pulled, the rocks would slide down. We had four people up in the rafters with rocks, and about a dozen little shelves set with shale. On the appropriate count, we would roll the camera, people would pull

Inside the cavern, the script called for a thirty-foot octopus to surface and grab Stef (Martha Plimpton) while Mouth (Corey Feldman) comes to her rescue. The scene was shot and edited into the film, but suffered last-minute deletion after receiving negative response from preview audiences. / Tom and Bari Burman add finishing touches to the plasticized urethane sea creature designed and built at the Burman Studios. Mark Segal produced the original body sculpture and a single tentacle which was then replicated eight times. Inner mechanics were provided by Matt Sweeney's physical effects crew, which also operated the creature on the set.

out shelves, the wall would start tumbling and then the crew up above would throw rocks down from the top. It was quite effective actually; it worked very well. Then, to help the blend between the miniature wall and the real water, we laid in a little dry ice fog."

Creating the fissure involved some experimentation. "At first I attempted something that was essentially stop-motion animation," McAlister continued. "I painted a piece of glass black and placed a bright light behind it so that it shone directly into a camera — but through the blackness so you couldn't see anything. Then with a little needle, I scraped away the paint and animated a fissure going across the piece of glass. We then superimposed that over the wall background with the rocks tumbling down. Unfortunately that idea didn't work too well, because there was no interplay between the falling rocks and the fissure. What we ultimately did instead was draw the shape of the fissure on plexiglass, black out everything outside the fissure, and then angle the plexiglass and build a shelf on the bottom. We stacked real rocks and mesquite charcoal up on the shelf in front of this fissure — which measured about four feet - and then filled up all the cracks in the rocks with sand and bark. Then, shooting at high-speed, we'd drop the little support out from beneath the rocks and they would tumble away. This gave us a very natural kind of uneven rough and random pattern — and as the debris fell down, it really looked like rocks falling away from the fissure. We superimposed that over the avalanche and did two separate passes with the sync slipped a little, making it look like twice as many rocks. Since the frame was totally black except for the fissure, the fissure opening up was done as a burn-in element. We totally washed out the negative wherever we wanted the fissure, and any image that was there before was simply burned off. We shot some light shards also, so that when the fissure opens up, the light shines through. It all worked very nicely with what we'd done in lighting the live-action plate. We timed it so that at a certain point in the plate, arc lighting would come on and splash light across the front of the ship and sails. It tied in beautifully with the opening of the wall."

As the fissure opens, it is accompanied by rocks which fall from the cavern ceiling as the crack widens. These rocks were shot as separate bluescreen elements to be added later. "We composited rocks falling into the water to enhance the feeling that there was an earthquake occurring and that the cavern was about to cave in," said McAlister. "The rocks were photographed in miniature by Charlie Mullen in animation. We used miniatures partly because the water on the real set was only four feet deep, and if they dropped a real rock it would hit the bottom of the tank, crumble and get the water all messy. The main reason, though, was because they didn't want to risk possibly hitting one of the kids. The rocks were real rocks — maybe one to two inches in diameter — shot against bluescreen on our motion control animation stand and then matted in to correspond with the splashes that were already in the plate."

Modelmaker Chuck Wiley aligns a section of the miniature Inferno's bulkhead. The authentic sixfoot model — built by chief modelmaker Bill George and crew — was fashioned of wood using traditional shipbuilding techniques. / Because it was initially intended for more extensive use, the smallscale vessel was imbued with painstaking detail. Even the deck was garnished with an assortment of minute touches, including carefully placed Victorian dollhouse furniture and a stowaway R2-D2. / Master shipbuilder George attaches rigging to the bowsprit. The heavy silk thread used throughout for rigging presented problems when photographed, however. Because the model

The plate's existing splashes, however, proved less than satisfactory. "The splashes on the set were created by air cannons," said Howard Stein, "plunger-like devices rigged under the water and activated by remote control. But we discovered that they ended up looking pretty wimpy, so Mike McAlister shot some separate, static splashes while on the set and double-exposed them over the original splashes. He was able to isolate them by shooting with all the stage lights off except for the highlighted splashes. Once we got the timing on the splashes so the color of the water matched the other water in the scene, it was impossible to tell that they weren't actually there."

As the cavern is being reduced to rubble, Sloth helps his newfound friends to safety and bravely returns to rescue his family. The Goonies have reached the end of their journey and happily find a crowd of people — their families and a rescue party — waiting on shore. The kids are unharmed, the Fratellis are apprehended, Chunk's family adopts Sloth, and Mikey has salvaged enough of One-Eyed Willy's jewels to save the 'Goon Docks.' As the celebration commences, the *Inferno*, freed by the avalanche from its lair, sails majestically out to sea — one of the few appearances made by ILM's miniature pirate ship.

Because it was originally slated for considerably more use throughout the film, the miniature Inferno had been designed and detailed to withstand the relentless scutiny of closeups. And although built by a crew more accustomed to devising spaceships and speeder bikes, the 16th Century sailing vessel was approached with the same professionalism and commitment necessary to render an unbelievable object believable. "My initial reaction to the pirate ship project," said chief modelmaker Bill George, "was to make a shape and vacuform it and then detail the model. I like working in plastic, and since the majority of work we do at ILM involves space movies — with models that seem to lend themselves to plastic — that medium is very familiar to me. But the more I thought about it, the more logical it seemed to construct it like a real boat, because then the detail would be built-in. So that's the basic approach my crew — Chuck Wiley and Randy Ottenberg — and I decided to go with."

when work commenced on the miniature. Blueprints were made for the ILM crew to be used as guidelines in duplicating the ship on a smaller scale; but because both projects were being developed simultaneously, there was a lack of existing information — which in turn caused a certain amount of confusion. "We weren't able to go down to the live-action set, take photographs and match our miniature ship to them," explained George. "So we took the blueprints, did research and came up with our own model. I did a lot of reading on the subject. I bought books on boat building and boat history, and then went to the library and checked out more books because we didn't have that kind of information on hand at ILM. We even went to the maritime museum and down to the Balclutha — which is a large ship in San Francisco — just to see how it was constructed. Maybe all

was so heavily backlit, the

coarsely textured material

created an aura-like glow

against the blue screen.

the extensive research wasn't necessary, but it gave us a good idea of how boats are constructed and got us very excited about the project."

George and company ultimately decided to use the traditional shipbuilding technique known as 'rib and planking' to construct their small-scale Inferno, and began by making a basic model out of plaster. Blueprints from the larger version of the ship were mounted on posterboard, providing four or five sections, with the bulkheads—the ship's framework—fashioned out of thin cardboard after the large boat's profile blueprints. George then poured plaster over the top of this basic pattern, sanding it smooth when it dried. The shape was then sliced into sections like a loaf of bread, resulting in a model for the final version of the vessel's bulkheads. The bulkheads themselves were made out of birch plywood and planked with individual strips of balsa and basswood. Holes were cut in the hull for cannons which were turned on a lathe and then cast. Detailing — such as barnacles, Victorian dollhouse furniture and a tiny above-deck R2-D2 — was added to complete the miniature; and although ILM's modelmakers worked independent of the Inferno's Los Angeles crew, the highly detailed, lightweight miniature achieved a remarkably close match.

"The main hull of the ship ended up being about four feet long," said George, "and then, of course, there were all the attachments. The bowsprit was a couple of feet in length, and the masts measured almost exactly the same height as the boat was long. That's one element we had to determine for ourselves. The large set built in Los Angeles didn't include all the masts and rigging — they were added later as matte paintings — so at a certain point we had to take over and do research and find the proper proportions for the period. Every decade or so styles would change as more advanced sailing techniques evolved, and we wanted to make things like the masts, bowsprit and crow's nest as authentic as possible. The *Inferno* actually turned out to be an 18th Century Spanish galleon.

"The sails were a big problem because of the difficulty in getting them to look the proper scale. Any material too thin and opaque just wasn't convincing as a real sail, so we made them out of silk. Originally — since the ship was a wreck — we planned to use a very tattered silk fabric which would have allowed the pieces to flow and fly in the wind. But then the decision was made to have the ship look as if it were under full sail — and besides that, the little rag portions just didn't look right. So we starched the sails, and then blew the wind on them so they stayed almost perfectly rigid even after we'd turn the wind off. We used silk for the rigging, too — a coarse thread which caused its share of problems. When the lines were shot against blue-screen — because the model was so heavily backlit — the silk thread rigging glowed like an aura."

The model was mounted on a device that created a rocking motion intended to imply a believably bounding main. During bluescreen photography, a gimbal beneath the ship was balanced on a fulcrum and then counterbalanced to achieve a

natural, random rock rather than attempting a mechanized motion control rock. "The miniature ship was photographed at high-speed against bluescreen," explained McAlister, "with wind blowing on the sails to make them full and flapping. Then someone would carefully bump the ship and just let it sit there rocking as it normally would about its center of gravity. We also had the camera panning a little. It ended up working very well."

ILM's miniature *Inferno* ultimately saw three separate tours of duty at the end of the film. "The first," offered McAlister, "was a telephoto open shot, where the ship is emerging from the rocks — from nobody's point of view particularly — and then there was a shot with the ship far away on the horizon. That one had very strong backlight on the water and was supposed to be a really beautiful shot at the very end of the movie with a golden sunset and the ship merrily sailing on toward the horizon. All of those shots were actually quite hard to do because the matte work was so very difficult. We also had a lot of unsteadiness problems in our plate and ended up compositing it about twenty times. It basically boiled down to some movement problems in the camera. I shot the plates at Bodega Bay — 'Goat Rock'—and it was very windy that day and the wind was buffeting the camera. We also had some steadiness problems in the printer. It just seemed to be the one shot in the movie where everything that could go wrong would go wrong."

"Perhaps the most fundamental difficulty we had with that shot," commented optical supervisor Ellis, "was in the way the ship was revealed — it came slowly out from behind rocks. In the past, when we've had an object come out from behind something, it's usually moving at a tremendous speed — like a spaceship — and is revealed in three or four frames rather than the fifty needed for the pirate ship. The shot was designed for a very dramatic entrance, but on a bright sunshiny day at the beach with the ship being revealed at a snail's pace from behind those rocks, the shot picked up every flaw possible."

Another awkward aspect of the pirate ship sequence was in obtaining the appropriate amount and color of haze over the vessel. Ordinarily, haze is created by a simple flash exposure, but because the detail of the ship — the masting, rigging and sails — was so fine, a straight flash made the shot appear to be matted in. "Another problem," added Ellis, "resulted from the position of the ship itself. In the very beginning, the boat was already out from behind the rocks in the open. So what I did was a percentage of exposure, with and without the matte, where I let the background influence the colors and tones. It looked just like flashing, but it was flashed with just the background. In other words, we dropped the matte and did an exposure without the holdout matte. That allowed some of the clouds and haze in the natural shot to wrap around and mash everything out which made the ship appear to be way out in the distance. When they decided to move the ship back behind the rocks, it made it a little tougher because we had to come back and do a separate flash against the bottom half of the ship while the top half was against the sky — and we had to do a separate flash double for

Mike McAlister makes lastminute adjustments to the vessel's gimbal mount prior to high-speed bluescreen photography. The backside of the Inferno was left incomplete, thus allowing easier access to the fulcrum upon which the vessel was carefully counterbalanced to achieve a natural, random rocking movement without motion control programming. / Barbara Gallucci finesses one of the Inferno's tattered silk sails - which were heavily starched and then blown dry, causing them to remain in a billowing formation without benefit of wind. / A composite of the live-action plate — shot at Bodega Bay with the bluescreened ship sailing out to sea. The long shot included torn paper 'wave' mattes rendered by the animation department and some optically-induced haze. The Goonies' parting image was one of only three shots utilizing the highly-detailed pirate ship.

Spielberg's second backyard adventure, Back to the Future, offers a slightly different mode of transportation — a timetraveling DeLorean motorcar. Based on an idea by coauthors Robert Zemeckis and Bob Gale, the singular time machine concept was developed by artist Ron Cobb, illustrator Andrew Probert and production designer Lawrence G. Paull. Crews working under construction coordinator Michael Scheffe and floor effects supervisor Kevin Pike then modified a total of three DeLoreans purchased for the film. The multifarious 'time slice' effect was a primarily animated illusion rendered by Industrial Light and Magic. / Director Robert Zemeckis during principal photography on the Universal backlot. / Marty McFly (Michael J. Fox) travels through time to 1955, where he meets his parents (Crispin Glover and Lea thompson) as young people.

that so you couldn't see the horizon line."

To eliminate any problems with water-edge matte-fitting along the hull, a large-format color transparency was made of the *Inferno* and then shot on the animation stand, together with its matte, by animation supervisor Charles Mullen. "This approach proved entirely acceptable for the medium and long shots of the ship," Mullen explained. "However, I still needed to devise a way to imitate the lapping water around the hull of the boat. This was accomplished by panning the rough edge of some torn paper on our animation stand while the table rotated and surged slightly up and down. When two different passes of this were precomposited and used, the water effect looked quite realistic."

The film's final shot features the *Inferno* sailing majestically out to sea with the sun hanging hazily above the horizon — an image first conceived in a somewhat different way. "The film was originally to have taken place in a small fishing community on the east coast," explained Dave Carson. "And it seemed natural for the ship to sail out to sea at sunrise after the kids had spent the entire night in the caves. It would have been a beautiful end shot with the sun just coming up. When they decided to relocate the setting to Oregon, however, it became obvious that it was impossible to shoot a sunrise at sea facing the west coast. So the solution was either to shoot a sunset instead of a sunrise, or to shoot a sunrise in reverse and run the film backwards." The dilemma of determining whether The Goonies would end with a rising or setting sun was eventually skirted entirely with the film's parting shot being simply that of a sun and the ocean — and the titles as they roll on by.

While the Goonies' exploits in their local underground cavern were being recorded on film, a backyard adventure of another kind was also in the works at ILM and Amblin — Back to the Future. The notion of a teenager who travels through time — not to the occasion of a monumental historical event, but thirty years into the past of his very own hometown — was clearly a premise to be taken seriously. So executive producer Steven Spielberg joined forces with director Robert Zemeckis and producers Bob Gale and Neil Canton to bring the original Zemeckis-Gale screenplay electrically to life.

In Back to the Future, Marty McFly (Michael J. Fox) is given the rare opportunity to meet and understand his parents not as the unhappy, disillusioned adults they've become, but as the promising young people they once were. The only mother Marty knows is a prudish, overweight tippler (Lea Thompson), while his dad (Crispin Glover) is a simpering milquetoast — as well as a doormat for the same town bully who made his life miserable as a youth. And although the McFly family legend has it that mom met dad after he was hit by a car in front of her house and later fell in love with him while dancing at the high school prom, it's clear the spark of romance no longer exists between Lorraine Baines McFly and her husband, George. While Marty struggles to become an adult himself — as well as pursuing his

dream of being a guitarist in his own rock 'n' roll band — seeing in his parents the despondency of lost hope fills him with frustration. Marty's perspective is permanently altered, however, when his eccentric scientist friend, Doc Brown (Christopher Lloyd), inveigles him into witnessing an incredible experiment and he finds himself taking an accidental spin around the clock in Doc's plutonium-powered DeLorean time machine. The teenager of the eighties is thus reintroduced to his parents as teenagers of the fifties — and suffers both confusion and culture shock during the unusual turn of events.

The cinematic aging of an actor from teenhood to middle age is customarily achieved by the simple substitution of an older actor for the younger one. But the producers of *Back to the Future* felt such sleight of hand would weaken the film and decided to approach the idea in an experimental way. Although not convinced the ploy would be effective, they engaged the services of old-age makeup expert Ken Chase (*Roots II* and *Eleanor and Franklin - The White House Years*) to run a series of test makeups on the young actors — with initially discouraging results. "I did a test on Crispin Glover that turned out to be a disaster," admitted Chase. "I made a whole neck for him — back and front — a skull cap and a transparent receding hairline. The effect was overwhelming. It soon became clear that a very subtle transformation was in order; and after a lot of trial and error, we found out that less really is more."

After a few false starts, it was determined that the technique of combining foam latex appliances and special makeup color — along with the proper lighting and camera angles — transformed the fresh-looking teenagers into careworn parents rapidly approaching fifty. "It's difficult to sculpt something so simple," commented Chase. "It's much more fun and interesting to sculpt a fantastic characterization—as in Little Big Man, for instance — and easier, too, because an old-age look has the advantage of creases and folds to cover any mistakes that might occur in the makeup. Additionally, that type of makeup employs a great deal of rubber, and when a person's face is covered ninety or a hundred percent with the substance, there's no inconsistency in the textures. It is also more difficult to sculpt skin texture for women because they have finer pores and, obviously, no beard. On Back to the Future, we used appliances so sparingly that it was a real challenge to blend the makeup properly — it's much easier to use all rubber or all skin. It was also difficult to instill the various changes that do occur in a person's face after thirty years and yet keep the actor's true identity clear. If their identity had been lost, there would have been no point in keeping the same actors."

To begin designing the makeup for each character's alter ego, casts were taken of the actors and duplicated in plaster. Chase sculpted over the resulting forms until a suitable look was determined and then made an assortment of foam latex appliances. "Lea Thompson was fitted with a foam latex jowl, and there were little bags under her eyes. Her body was padded, too. And because her character was that of a woman who had lived a

very unglamorous life and was at the bottle quite a bit, we really tried to reflect that in the way she looked. For Crispin Glover, I augmented the full sides of his face with foam latex to create a broken jaw line. And rather than giving him a receding hairline, as I had originally considered, his hair style was simply altered instead. The character of Biff showed the most exaggerated change. His face was fattened somewhat; and since he was a very obnoxious teenager, we tried to make him a very obnoxious adult. We combined silly-looking long sideburns with thinning hair combed to look as if he were trying really hard to cover up a bald spot — sort of a 'Mr. Polyester' look."

To blend the appliances with the skin, Chase called upon optical illusion and applied the makeup in a multihued technique known as 'stippling.' "Because rubber doesn't reflect light the way skin does, the secret is to add as many colors to the face as possible. The result is really much more intense than can be perceived, but it tricks the eye and serves to conceal where the foam rubber stops and the skin begins. And stippling is different than just doing an ordinary makeup because many colors—usually orange-toned—are applied in a very broken pattern. I've had great success using an interesting product for painting on foam latex called PAX, created by Dick Smith. He came up with this acrylic paint formula and has been most generous with it.

"There are restrictions with that type of makeup, however. For example, it's not a good idea to go into head closeups; and although there were times when the camera came in pretty close, the lighting was always carefully designed to permit such moves. When you do this type of makeup, front lighting is ideal because it washes away any little imperfections. Diffusion is another thing that helps. You can do amazingly close shots if there are certain lighting techniques and diffusion, but it almost seems to be an Amblin Entertainment policy not to use that kind of lighting. Yet Bob Zemeckis had a lot of integrity and he would do anything he could so that the age makeup worked. It's always easier to let mistakes show, but between the collaboration of Bob's direction, careful editing and the wonderful lighting and photography, I had a great, secure feeling that they weren't going to let anything on film that wasn't correct."

In addition to three teenagers making the thirty-year leap from youth to mid-age, it was also necessary for Doc Brown's visage to indicate the passage of time. "When we did the initial testing on Chris Lloyd," recalled Chase, "there were some appliances made for him. But Bob Zemeckis and the producers chose not to use them. They decided not to alter his look significantly because they really liked Chris' personality and wanted it to shine through. So his makeup was done in a more old-fashioned way — it was all latex applications. No appliances were used. I simply painted on latex using the tried-and-true technique of stretching the skin and applying layers of latex so that the skin crinkles when released. The rest of the look was all painted on — liver spots, lines, highlights and shadows."

While the makeup effects were rendered during the course of

principal photography—as was the full-size DeLorean time machine modified by vehicle construction coordinator Mike Scheffe and physical effects supervisor Kevin Pike — most of the remaining illusions were achieved by the already beleaguered staff at ILM during postproduction. And completing Back to the Future within the confines of the film's breakneck postproduction schedule was an amazing triumph of teamwork and intense organization. "We thought working on Goonles was insane," said postproduction supervisor Art Repola, "but then Back to the Future came along. We were supposed to have nine-and-a-half weeks from the day principal photography was completed to the release date; but because the answer print had to be turned over a week-and-a-half before that, we actually had eight weeks to finish the film once they stopped shooting. But one of the really nice things about Back to the Future — in spite of the hectic postproduction schedule — was that none of the effects shots was compromised. There might have been a couple that ILM would like to have redone had time permitted, but they were very subtle things that most people wouldn't even notice."

One of the first visuals ILM provided for Back to the Future was an element intrinsic to any respectable time travel story the time travel effect itself. When Doc Brown first puts the DeLorean through its paces, he sends the vehicle a few minutes forward in time in a brief, but stunning show of light and color. To achieve the illusion —which was to become known as the 'time slice' effect — director Zemeckis had a very specific look in mind and was able to convey some distinct, if not conclusive, impressions. "No one can describe what they want in a shot like Bob Zemeckis can," said effects supervisor Ken Ralston. "He's got some amazing ways of describing things. He wanted something really powerful — everything in the show had to be very fast and very violent. The way he put it was: 'Time travel is not pretty.' It's as if he wanted us to give the pen with the ink for the animation to a bunch of cavemen and let them do the artwork to create something very primeval and primordial. Essentially, he wanted the resulting image to be very sharp-edged, nothing too soft and rounded and animated-looking — more of a bold, crazed approach."

The bold, crazed approach extended to the concept of the time machine itself. "In the DeLorean," continued Ralston, "you go through time in a funky, 1950s kind of way. And we tried to keep in mind that this time machine was built in someone's garage — it wasn't a futuristic contraption. I can't even describe the amount of pain that went into getting this effect. Bob knew exactly what he wanted so, of course, that's what we kept trying for. The concept also changed somewhat — a lot of the input was material we had done with preproduction artwork — and it continued to evolve from that. Then Steven Spielberg contributed his ideas; and with all of the development and input, it simply took a long time for everyone to get this effect congealed so that we knew in what direction we were heading. It was also tough to create artwork and print it correctly so that it didn't look like artwork for the most part. The time slice effect

Special age makeups were created by Ken Chase to transform teenagers George McFly and Lorraine Baines into Marty's careworn parents. Actor Crispin Glover's youthful countenance was disguised with foam latex appliances, an altered hair style and 'stippling' — a technique employing the illusory application of color. / Lea Thompson's special makeup included facial appliances and some body padding to impart a more matronly appearance. / Ken Chase begins the process of transfiguring Biff Tannen — the elder McFly's contemporary, portrayed by Thomas F. Wilson — from bullying teen to swaggering adult. Chase's physical applications were aided and abetted by careful lighting, direction and editing.

had more of an organic look to it. It wasn't really artsy-looking, but had a more pyrotechnic quality."

Although developing a convincing time travel effect involved

many different ideas and concepts, the task of devising the time slice eventually fell to the animation department. "Luckily I got in on this one right during the preproduction stage," elaborated animator Wes Takahashi. "So all of my ideas came from the storyboards and trying to develop those. The original boards included the creation of this time slice — electrical arcs that were supposed to envelop the car and rip open time. But when we took those ideas with some preliminary art to Bob Zemeckis, he decided he was against the look of anything electrical. At that time, The Terminator had just come out and there was a lot of electricity in that — so he wanted to get away from that look. He originally wanted the look of the time slice that was happening in front of the car to be a brilliant light which had opened up this crack in time. That wouldn't have been so bad, except for the fact that in the establishing scene we had to show the back of this hole in space and time, which threw a monkey wrench into the whole thing. We went through a lot of ideas from that basic inception — one being this wave of energy that just wafts over the DeLorean and then explodes in front of the car creating the time slice. Then there was a real neat idea which we got onto film that I called the 'cubist car' where the car would pop out in various sections. I actually brought it up as a joke, but (effects art director) Phill Norwood said: 'Yeah, we should do that. Let's try to get a look on that and work with the optical department, and have this car not only popping out in various sections, but enlarging.' The sections were to grow in proportion as they popped out of the car just before the time slice occurred. For example, a whole fender would pull apart as the car is driving down in the establishing scene. We would shoot that twice using the same scene, and then print an enlargement of that scene to isolate various sections of the car. The next step would be to matte out that area and create a window matte for a corresponding area on the enlargements. Then I went in with some artwork to make it look like there are whole sections popping out that are connected from the enlargement to the regular, normalsized scene. And so it looked as if these sections would first start glowing, and then pop out and get incredibly large until you would finally see the interior of these sections via airbrushing and making it look very metallic. It was a neat idea — in fact, Bob liked it — but when Steven Spielberg saw it, he said, 'That has got to go.' He thought it didn't look realistic enough, so we had just about two-and-a-half months to come up with some new looks for that effect."

The new time slice look consisted of a flashbulb-like effect emitting from the neon coils that had been placed on the car by the floor effects crew. "Jay Riddle worked out programs," Takahashi explained, "to determine what the flashbulbs would look like, and then we animated comets coming out of these flashbulbs. The comets were done as black-and-white artwork; and to give more dimension to the final composite, they were double-

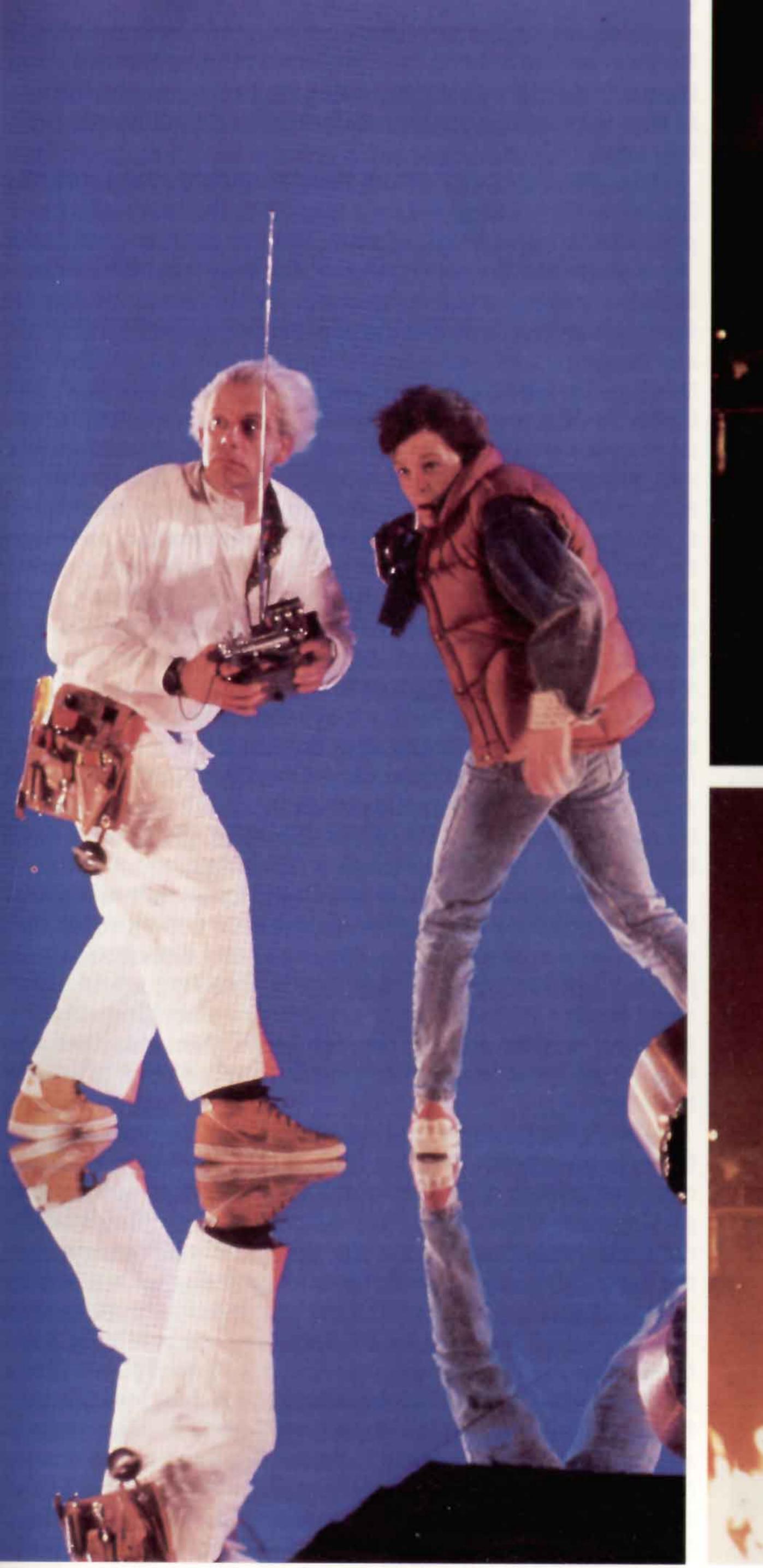
printed into the scene, changing the exposure, color and diffusion for each pass. These energy comets would shoot out; and at the same time they were shooting out, they would leave contrails trailing off the explosions. The comets would then hit in front of the car creating a flash or small explosion. We even had an animated wisp of smoke trailing off each flash. Then, as these small explosions that were generated by the comets firing out of the neon coils went off in front of the car, they created a growing time slice that looked like a large airbrushed, hand- or star-shaped figure that was being swept back by the force of the car's speed. The time slice is traveling in sync with the car. Then there are pieces of animated energy plasma trailing off the car too. And as the time slice grew in size as it tracked just in front of the car, a practical pyrotechnical element threw out multicolored sparks. When the car and time slice finally came together, an explosion was printed into the scene. The explosion was skip-printed and run backwards to create an explosionimplosion effect. Of course, all of this happens so fast it's impossible to detect the individual elements."

The time slice effect also included streams of fire trailing down the street, a physical effect rigged on location during live-action photography. "The crew had some slop that they put down and lit," explained Ralston, "and when we got the footage here at ILM, we were able to play with the printing of it—basically to speed up how it looked and how it moved forward, since it was actually a very slow process for that fire to move. Once the speed had been increased, we added some smoke residue to the area from where the car had just disappeared. Michael J. Fox and Christopher Lloyd were bluescreened and have light effects on them as the fire passes by—and there is also roto-work on Michael's feet to keep him inside the fire as it comes past his feet in that sequence."

Because the scene took place in a wet parking lot, the bluescreened actors were photographed on reflective mylar. "Ken had shot the two actors on mylar," John Ellis elaborated, "so he could maintain some of the reflection of the characters in the wet pavement. Ellen Lichtwardt did some mattes so we could isolate the feet and cut off the reflection. Next we'd shoot a pass of the bluescreened character without the reflection, and then go back and shoot another pass at a different exposure of just the bluescreened reflection. We also used a ripple glass to distort it so the shot wouldn't be just a mirror-image look. We also created reflections of all the effects that were going on in the car."

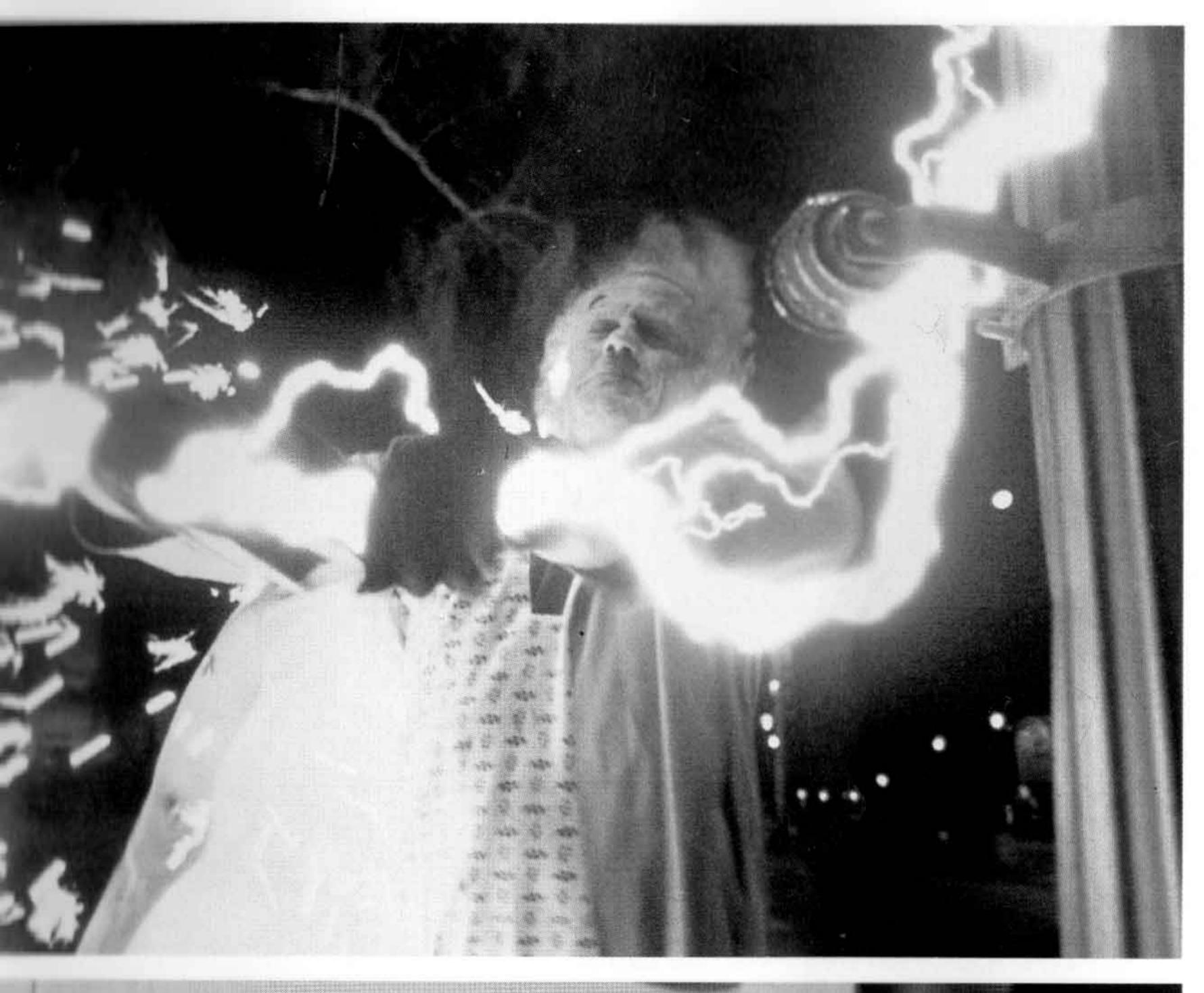
The practical fire that had been set underneath the DeLorean's tires was designed to initiate the whole series of effects, but unfortunately the floor effect had several shortcomings. "The fire on these wheels heated up more than anticipated," said Takahashi, "either the mechanism wasn't working properly or they had forgotten about it. As a result, the mechanism only worked for maybe two out of the six shots that were needed for the time slice. The flame effects were actually coming from right behind the individual tire using gas jets located in the

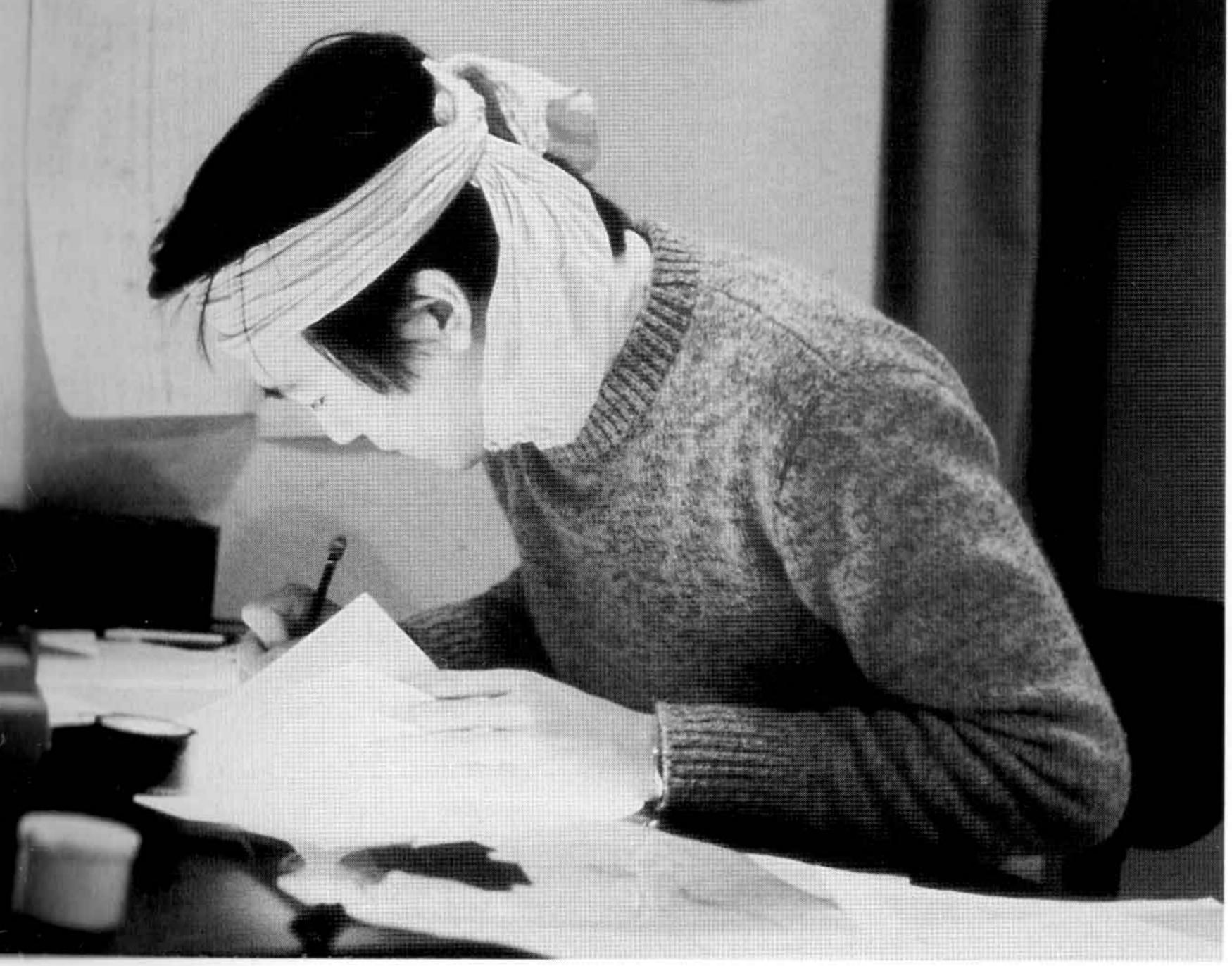
On ILM's bluescreen stage, actors Christopher Lloyd and Michael J. Fox are photographed on reflective mylar for later compositing with the live-action plate shot during the DeLorean's time traveling test run in a wet shopping center parking lot. / One element of the time slice effect included streams of fire rigged by the physical effects crew during location shooting. The completed ILM composite required special mattes to isolate the actors' feet, separately introduced reflection elements and animated flame augmentation.











wheel wells of the car. They ignited just as the neon lights came on. So to match the consistency from scene to scene, Peggy Regan animated fire and its reflections as the car traveled down the road. She did a great job in using the live plates as reference, as well as animating some more flames for the additional shots that needed them."

Once the time slice effect had been determined and the DeLorean successfully routed through it, the machine's reappearance to a more earthly plane was the next issue at hand. "Somebody had the great idea that the DeLorean should come back in sections," recalled Takahashi, "with one section appearing in a blinding flash, and the next section pounding into that and moving the whole section of the car forward a bit. Then the third section would appear, and so on. Phill Norwood and Charlie Mullen came up with the design and execution of the car coming back together, and it was all done by animation. The only problem was that the live-action plate had the car driving in from the east, skidding around and then going towards the right. We were supposed to take the car and make it appear in the middle of the frame — and have it skidding out and resuming with the live-action as it skids towards the right. So Charlie and Phill took a transparency of the car and physically sectioned off that piece, and were able to shoot it on the animation stand to make it appear in various sections — all done in the manner of hand-pulled frames. It was then optically printed with the rest of the scene — and after the last flash, it transformed into the first frame of the live-action car. Ellen Lichtwardt added a glow to the car as it came out from the future and there was a blue glow that was added when the car finally joined itself together. Once together, that glow dissipated."

"There were lots of little tiny details that no one ever sees," Ralston commented. "The time slice shots are quick — but that makes them work nicely, too. They don't feel like effects shots, just kind of like wham and suddenly the thing's going. Bob never wanted the audience to get ahead of what his gags were. He never wanted you to be able to think about what was happening, he wanted the car gone by the time you had figured it all out."

After going through the time slice, Marty emerges near his home town — created on the Universal backlot by production designer Lawrence G. Paull and crew — familiar, and yet displaying none of the urban decay seen earlier in the film. When he runs into his father — now a shy and bumbling teenager — at the local soda fountain, the chance meeting alters history forever. Crossing a street a short while later, Marty pushes George out of the path of an oncoming car and is himself hit — right in front of the house of his mother-to-be. Marty awakens in the bedroom of the beautiful and vivacious Lorraine Baines, who — much to his consternation — has fallen in love-at-first-sight with him. Marty seeks out Doc Brown and manages to convince him that he is indeed from the year 1985, and together they come up with a plan to get history back on course. Otherwise Marty and his brother and sister will never be born.

Marty's wallet photograph of the three McFly siblings is already beginning to indicate a rather bleak future, as his brother's head ominously disappears from view.

As the chronicles of time were originally written, Lorraine and George found romance while dancing at the high school prom. Through careful maneuvering, Marty manages to get his folks to the school gymnasium for the momentous occasion but must then see to it that George and Lorraine actually complete their fateful rendezvous on the dance floor. When a ruckus occurs outside the gym, George displays uncharacteristic valor and rescues Lorraine from Biff's unwanted advances. Unfortunately, the band's guitar player injures his hand in the fray, and the dance appears to be over. Marty's future looks none too bright until he resourcefully picks up the guitar and begins to play. It is clearly touch and go, however, for even though Marty joins in with the band, George and Lorraine are making slow progress in the romance department. Meanwhile, the picture Marty has placed in the neck of his guitar is growing alarmingly dim — not only have his brother and sister been completely obliterated from the scene, but he is beginning to feel rather weak himself.

To convey Marty's predicament, the decision was made that his hand should begin to dissolve, much as the image of his siblings has been dissolving on the photograph. For ILM, the resulting effect was slightly less than satisfactory. "Because of the time element," admitted Ralston, "we never did get the hand effect right. Originally, however, Bob Zemeckis wanted an effect that most everyone wouldn't even see — he just wanted the hand to go transparent. It wound up being so subtle that it doesn't quite work. My feeling was that since there have been the stills of Marty's brother and sister dissolving from the top down throughout the movie, the effect of Marty beginning to dissolve should have been more obvious — perhaps even including the sleeve of his jacket. I thought that might have been more in keeping with what was happening in the family photo. But Bob just wanted the hole coming into his hand, and unfortunately, it turned out to be too much of a hole — like someone shot him with a bazooka."

Just as Marty is fading quickly into oblivion, the spark between George and Lorraine ignites and the McFly family destiny is happily back in sync. Marty's strength returns and as he rips into a triumphant rendition of 'Johnny B. Goode,' the photographic image of his siblings springs sharply into completed focus — an illusion rendered by ILM as a last-minute addition to their already tight schedule. "Considering that the decision to have the photograph on the guitar came so late in the game," commented Ralston, "it worked out pretty well. We had to build a large section of the guitar neck and play around with dissolves — cutting some of the figures out because when the picture of the kids was shot initially, no dissolves were done on camera. The shots of the brother disappearing and then the sister had been done as stills and the light was changing all the time during the day. So when we tried to take the same pieces of film

and dissolve them, the background went crazy — trees were moving in the breeze, and it just didn't quite work right. So we took some of the photographs of the sister and brother, cut them out and pasted them onto one background. There was only one exception where that method didn't work. In one dissolve, the background was jumping around way too much and Charlie Mullen had to correct that in animation. He did a little move on the Oxberry so that it wasn't a locked-off shot — and it moves around as if Marty had the neck of the guitar moving around."

The guitar neck was built as an oversized section by Steve Gawley and crew. "When Bob Zemeckis decided to have a closeup showing the images popping in, we had only a couple of days to come up with a real quick guitar neck. It turned out to be about four times the size of a real guitar neck and we made strings out of cable shrouds—the bass string was a quarter-inch thick—and it worked out great. They looked just like giant guitar strings. Onto the guitar neck we attached a piece of plate aluminum to act as a cradle for the 11x14 pictures, and then gave the whole setup to animation." Animation supervisor Charlie Mullen completed the shot on the Tondreau Mechanical Concepts camera—placing a filmclip in the system's projector and carefully aligning each of the four progressive photographs as they sequenced through the shot.

With George and Lorraine's match fortuitously made, Marty wishes them well and leaves the dance for an urgent appointment with Doc. With his mission accomplished, the time has come for Marty to leave the 1950s and journey forward in time to the eighties — but unfortunately, his nuclear-powered time machine is out of fuel. Marty and Doc are forced to come up with an energy alternative. Through careful calculation, they determine that the electrical storm currently brewing is due to discharge a bolt of lightning into Hill Valley's clock tower at precisely 10:04 that very night. If their scheme is properly rigged and executed, the powerful bolt should provide the massive charge needed by the DeLorean to carry Marty McFly back to the future.

Economic and dramatic considerations routed the time traveling DeLorean through the town square during the thunderstorm — but originally, the sequence was envisioned in a considerably different context. "Instead of powering the car with a tremendous bolt of lightning," Ralston recalled, "Marty was supposed to get back to the future by driving into an atomic bomb — one of the early A-bomb tests. We were going to have a sequence like you see in the old black-and-white documentary footage where buildings are imploded and exploded — they pull one way and get jerked the other. We were planning to do it in miniature, in color, of certain sets used throughout the film. I was very intrigued by the idea — but as it turned out, the thunderstorm worked much better within the context of the story."

In determining the appearance of the storm, a substantial amount of research and development was invested to achieve a feasible effect. "Also," admitted Ralston, "since I had just fin-

During the course of Marty's decade-hopping, the DeLorean is drained of its plutonium-based power supply. In order for him to get back to the future, he and Doc Brown connect a cable to the clock tower which — at a precisely anticipated moment — will be struck by a bolt of lightning powerful enough to recharge the vehicle. Christopher Lloyd makes the fortuitous connection just in time. Incidental sparks were created live by the floor effects crew, but the primary bolt was hand-drawn in the ILM animation department. / Animator Wes Takahashi produced the lightning bolts featured in the thunderstorm sequence.

Machinist Udo Pampel and modelmaker Ira Keeler examine the wooden pattern produced by Keeler for the miniature flying DeLorean. After the initial master was made, Wesley Seeds created a rubber mold from which the auto shell was eventually cast in epoxy resin. The shells were mounted on an aluminum chassis, then intricately detailed and outfitted with internal lighting systems and rotating wheels. / Since high-intensity lights were built into the wheel wells, Mike Cochrane machined the DeLorean's tires from aluminum stock to withstand the resultant heat. On the finished model, the wheels were capable of extending outward and pivoting into a horizontal position. / The completed miniature — painted and detailed by Mike Fulmer was a one-fifth scale replica of the modified, full-size DeLorean.

ished supervising the visual effects for Cocoon, I didn't want to have two films that I was associated with having the samelooking effect. I wanted to have a unique quality for each movie. Cocoon needed some very strange cloud things going on; whereas in Back to the Future, the cloud effects and the threatening storm almost wanted not to be there. Another difference was the lightning effect. The effect we wanted for Cocoon wasn't a real lightning effect at all—we tried to achieve something that flowed very, very smoothly and wasn't quite real-looking. And although it wasn't real in *Back to the Future*, either, the implication was that the lightning was supposed to be realistic more of a violent, erratic approach. So the completed thunderstorm effect included the threatening clouds, the lightning which was timed to some pyrotechnics that were rigged on the clock tower — and, after the explosion on the tower occurs, a bolt which travels down the line zapping Chris Lloyd, crosses the street and sends the DeLorean into the time slice."

The clouds were made of fiberfill and placed on a large twenty-foot-square net surface built about five feet off the floor. To create the impression that the clouds were moving over the clock tower, the camera was placed above the setup, while Ralston was stationed beneath with a light. "There was an incredible amount of diffusion on the clouds; and we used some gels to blue it up making it very cool looking. When backlit even sometimes when there was no visible lightning—the clouds were given a lot of interactive lighting to imply that bolts were occurring within or behind the clouds. And occasionally they would light up when a lightning bolt came out, too. To achieve the erratic lighting, we didn't use flashbulbs at all. Since we were using such a slow rate of exposure, I was able to do the lighting myself by sliding around down under the netting with a 2K lamp and a rheostat control in my hand. I brought the exposure up and then down by using a very crazed, staccato, violent movement. For example, one moment I'd have the clouds all lit up and then the next frame would be entirely black — then for the next three frames I would bring the rheostat all the way up to full. Off-up. Off-up. We varied the exposure rates, but they came out to be about one frame for every two to four seconds. That gave me enough time to play around with the rheostat and make my way across the floor."

The bolts of lightning were contributed by the animation department. "There were actually a lot of problems with the lightning," said Wes Takahashi. "The script had called for 'the largest bolt of lightning in cinematic history,' and it was initially intended that the bolt should last for over a hundred frames. Of course, it's very easy to animate lightning that simply flashes on and is gone, but to have the thing flash over any length of time makes it clear that the shot is obviously animated. So I must have gone through four different versions of it, every time cutting the number of frames down from 120 to seventy and then to about thirty frames. But each time we analyzed it, we ended up saying, 'No, I don't think we should go with that.'

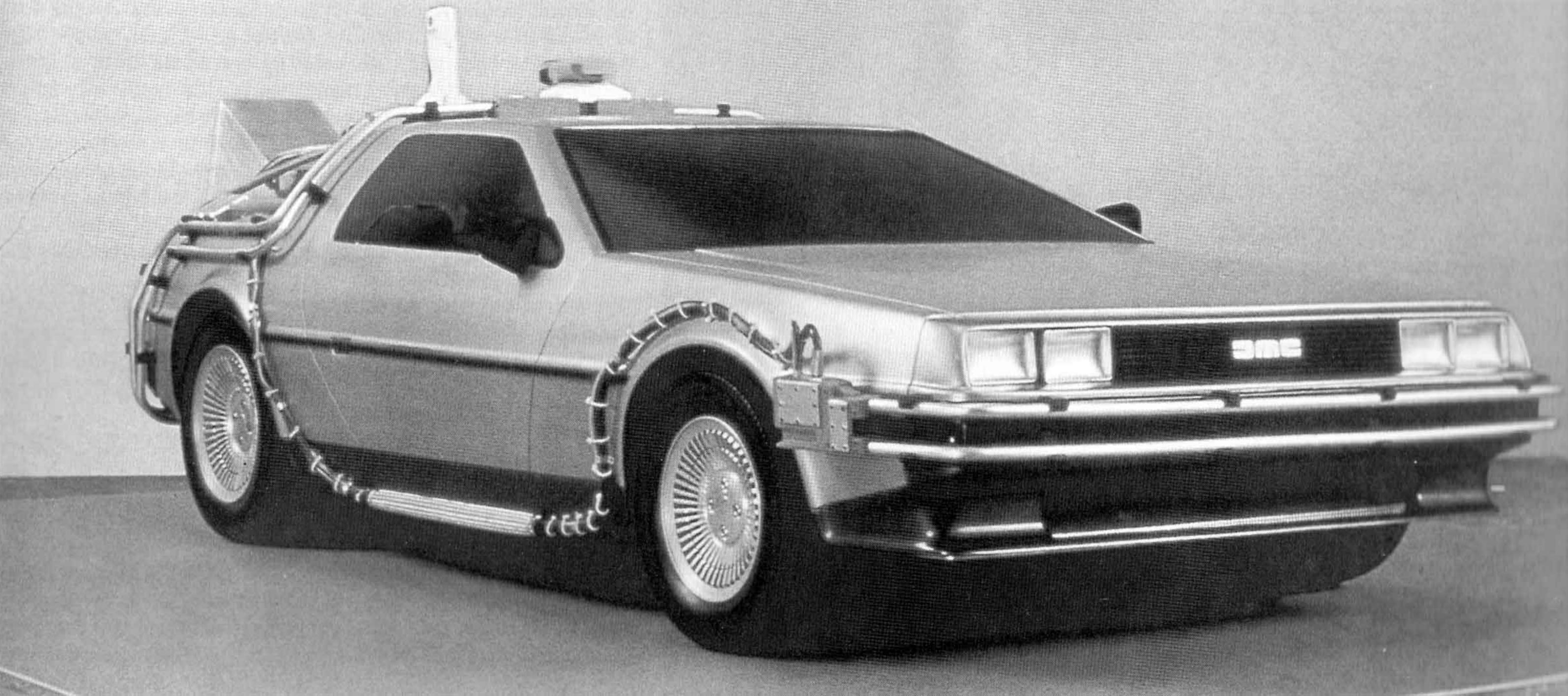
"Originally, the first wave of lightning was described — even

laid out — as erupting from way back in the distance. It was supposed to creep up and, when it finally comes to the foreground, snap and hit that tower. It was very hard to do without making it look like a snake — to get a feeling of randomness and yet have some kind of direction. Finally, Bob Zemeckis decided he simply wanted the lightning to come down from the top of the screen and last for only about twenty frames. And he was very specific about what he wanted the lightning to look like here. Phill Norwood and I had come up with a number of different animated lightning sequences that would work within the confines of ten-to-twenty frames and look like lightning as it hit the tower where a practical effect was rigged. But Bob knew exactly what he did and did not want, and he eventually pulled one specific frame out of the sections of lightning footage and said: 'This is what I want to do without wavering too much from that. I don't want any of these arms coming off of this, and I want it to travel in this S-shape and hit.' So basically, that's what he got. After that, some extraneous electricity was needed to dance on top of the clock tower and then travel down the wire, so I added that as well. Actually, the scenes looked pretty good without the electrical effects but they work even better now with the electrical animation."

The lightning and electricity were both animated and shot in black-and-white. The footage was then double-printed onto the background plate at two different exposures with diffusions creating a hot inner core and a diffused outer one. The background plate itself featured some truly old-fashioned special effects when Christopher Lloyd was photographed on a live-action set rather than against the now-standard bluescreen. The actor displayed nerve and verve atop the upper section of the clock tower — built on stage and approximately ten feet in height. But for the shots with the camera located above and looking directly down to the ground, Christopher Lloyd braved the clock tower in the grand tradition of Harold Lloyd — being actually tied to the full-size structure.

With the lightning bolt supplying a powerful-enough jolt, the time machine returns victoriously to 1985, Doc Brown's experiment a resounding success. After surviving their extraordinary ordeal, the two friends greet one another with enthusiasm and relief; and then Doc — in a more orthodox manner — quietly drives Marty to the door of the sleeping McFly household. After bidding his compatriot a fond farewell, Doc decides to put his time traveling DeLorean to practical use and zooms down the peaceful suburban street. Destination: 2015 — thirty years into the future. The next morning, Marty awakens convinced it was all a fantastic dream. But when he joins the family for breakfast, he discovers his domicile's familiar — yet unkempt and out-ofdate — decor has been transformed into a more tastefully contemporary style. His brother and sister look like the same people, but wear the trappings and attitudes of the upwardlymobile young people they are. Marty's biggest surprise, however, comes when George and Lorraine return from an early morning game of tennis — an obviously healthy, well-adjusted









and happily-married couple. When the bewildered Marty stumbles out to the driveway to greet his girlfriend, Jennifer, Doc Brown returns from the future, making a grand entrance in his now-flying DeLorean time machine. The trio embarks on a new adventure after Doc convinces Marty and Jennifer they are needed to come to the aid of their yet-to-be-born offspring.

The effect of the DeLorean time machine flying down the street and once again into the future was achieved by combining live-action, a miniature car and animation. "The miniature DeLorean was built by Steve Gawley and the model shop crew," explained Ralston, "and it's one of the most beautiful models they've ever built. It's only used in that one shot in the movie, and you can't really even see it that well — but it is gorgeous. If they ever decide to do a sequel, they'll have a great model to fly around the future in."

"The miniature DeLorean was originally intended for use in a couple of shots," Steve Gawley elaborated, "but it ended up in only one. The gag was that the car lifts off the ground, the wheels fold out and it blasts down the street — then does a pirouette and comes back. Because we didn't have any existing model kits to use, the entire car was built from scratch. We had looked into an eighth-scale Corvette model and perhaps using its tires, but we decided that wasn't going to work either. So we ultimately built our own model which turned out to be one-fifth scale of a real DeLorean — about thirty-two inches — and used the photographs we got from the existing stunt car for reference. For additional angles we photographed a DeLorean owned by a Lucasfilm employee named Charlene Gold. Several people were involved in building the car — first of all, Ira Keeler made the shape of the body and I laid everything out and did a lot of the drawing. After the initial master of the car body was made, Wesley Seeds took that and made a rubber solastic mold as well as some epoxy glass pieces. He made two or three bodies and cast up some tires that we used for a stage mockup. Then we made a chassis of aluminum, put in an aluminum plate and had two stepper motors that operated the wheels. The wheels actually had two functions — they had to be capable of exiting the body as well rotating down. Mike Cochrane did all the machining for the chassis and wheels. The wheels and tires were machined out of aluminum stock. We had a dozen high-intensity halogen lights in each wheel to simulate thrusting rocket motors, and those generated heat so the wheels acted as heat sinks. The wheels were also capable of rotating — though unfortunately we never got to show them in the picture. Essentially we made giant skates, like the old steel skates where the center stayed stationary and the outside rotated. Mike had an ingenius way of using one set of ball bearings — normally you have two for stability — but we had space limitations, so one of our other machinists, Udo Pampel, came up with this skate idea. We threw that together and it worked out really well. As the wheels rotated down into the rocket position, we were going to have them start to spin, which would have been a neat little trick, but the move of the car was changed and it simply lifted up and took

off straight. Initially it was going to hover like a helicopter, look around and then take off. We would have seen more of the car that way, but the pace of the picture dictated the final shot.

"The mechanism had to be worked out to get the wheels to rotate down, though, and Mike Cochrane and I came up with an idea using shelf sliders — almost like drawer sliders — that are made for precision equipment. They're really slick slides with ball bearings and were just what we needed to help move the heavy wheels. Then Mike Fulmer painted the car and we put all the detailing on it, had custom argon neon lights made and used projector bulbs for the thrusters in the back of the car. We also used halogen bulbs for the taillights — the car actually had four or five circuits on it. It could be held from both the front and rear, as well as the underneath and driver's side. We could mount it from other areas, too, but those were the only ones Ken felt necessary for that shot."

Though the car was ultimately programmed and photographed in a single day on ILM's VistaCruiser motion control system, matching its move to fit the background plate shot on location in Arleta, California, required considerable preparation. "Actually, it wasn't too hard to match the move on the crane shot," Ralston explained, "because it is a very slow, smooth crane move. But it took a while for them to plot out where the car was going to be at a specific frame to get under the tree, over the tree, to avoid going behind the tree too much, and all of that. It was just a matter of sitting down and plotting it out with graph paper on a Moviola and making sure that it lined up to these points. And building that into how it was programmed took a while. I didn't do it frame by frame, but rather about every twenty frames to plot out where it had to be. There were only a few moments that had to be in very specific spots. The rest I simply crane up in a generalized move."

The flying time machine was rendered as a traditional bluescreen shot; but because of the DeLorean's shiny exterior, it was necessary to carefully adjust the lighting in order to avoid the inevitable bluescreen bleeding. "There were an awful lot of light effects that we did on the actual model," said Ralston, "different paths with the back retros going off and other effects on that order. Animator Jack Mongovan provided an initial shadow effect that traveled through the entire shot — where the car rises up and the shadow is still on the ground — and continues to move with the car as it slides down the street and into the turn. Barbara Brennan in animation did a rotomatte to get the car to go behind the tree in the distance. Then when it comes out the other side — we had shot it so that the greenery is very dark against the light sky — optical was able to pull a high-con matte off of that to help keep the car behind all those leaves and things. The plate is moving around a bit, too, so animation had to help out a little bit. John Ellis did a great job on the matte and also gave us enough of a blue flash over the DeLorean to make it look as if it were the same car that had been sitting in the driveway. The shot doesn't look like you're being had. The only thing missing in that shot — although it's hard to tell — was that there are no shadows on the car, itself. There simply wasn't enough time. We had two attempts on that shot — which happened to be the very last one to go through ILM — and it was needed right away. We did three versions of the sequence in optical and I selected the best and sent it out immediately. I saw the sequence in dailies one day and that same night they were printing the damn thing."

"The first time I saw the flying DeLorean shot," Ellis confessed, "I didn't think it was going to work. It's remarkable in the first place, not only because the camera makes a move but because the plates were shot on a very windy day. We ended up having to pull a matte of the sky — there was enough contrast between the dark green of the trees and the light hazy Southern California day — and the shot ended up working out very well. Of course, then all the animated elements were added later — the car's exhaust, the rockets and all the liquid nitrogen to create the blowing effect when the car takes off from the McFly's driveway."

The already elaborate shot featured a carefully animated finishing touch — as the flying DeLorean prepares to round the corner, a turn signal flashes on and off. "The last shot of the film was pretty spectacular," said animator Ellen Lichtwardt. "And it was a very long, extensive, difficult scene to do. Long because of the number of frames as well as because of the many separate elements that went into it. Barbara Brennan animated the turn signals for the car using a system devised by Phill Norwood. He came up with a diagram of points on how many frames were needed between flashes. It was a pretty simple thing to do, just one of those nice little touches that always help. We really did just a few shots for Back to the Future, but we spent a lot of time on each one. For that last shot of the car going up into the trees, about ten people from rotoscope and animation worked day and night on it for about a week — and that was aside from the motion control work."

Challenges are inherent in the making of any given film. The long, involved journey from preproduction through postproduction rarely goes smoothly, and can be at times both confounding and exhausting. But for Amblin and ILM, the challenges were manifold. The tandem creation of The Goonies and Back to the Future made way for a myriad of extraneous complications increased proportionally by the omnipresent pressures of time. And because both films were slated for unusually fast-paced production schedules, each was completed by crews working sometimes around the clock, seven days a week. "But even during the thick of it," concluded Arthur Repola, "we were well aware that a standard was being set. It's the same old story — as long as it is proven that the job can be done once, it will become what's expected. Of course, even if you have three years to make a picture, things eventually get rushed and hectic and you still run out of time at the end. But the bottom line is that all the effects shots were done to the quality that has come to be expected from ILM. And as long as they continue to come through, we'll continue to ask."

Modelshop supervisor Steve Gawley checks the vehicle's internal lighting systems. Projector bulbs were used to represent the DeLorean's thrusters. Externallymounted neon runners duplicated those found on the full-size car, and an animated turn signal completed the package. / Doc Brown's revamped time machine lifts off from the McFly's driveway and prepares to zoom down the street thirty years into the future. The miniature DeLorean was programmed with point-by-point accuracy and photographed against bluescreen. The footage was then composited with the suburban background plate and embellished with liquid nitrogen exhaust and animated shadows.