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In *Ghostbusters*, Bill Murray, Dan Aykroyd and Harold Ramis play erstwhile college professors who decide to test the realities of the free enterprise system by opening up their own small business. Self-professed experts in the spiritual realm, they choose — quite naturally — to start an extermination service aimed at helping the busy New Yorker rid himself of those pesky household ghosts that seem to be popping up in the most inconvenient places. What the three paranormal scientists soon discover, however, is that there is more afoot than just a few obnoxious spirits — an ancient, evil force is returning to destroy New York, and quite possibly the entire world.

Lesser men would no doubt crumble in the face of such adversity, but in the comedic hands of Aykroyd, Murray and Ramis, the scientists face their foe with a cool sense of style and humor. But while their one-liners might seem lighthearted and spontaneous on the screen, making the big-budget *Ghostbusters* a cinematic reality was no laughing matter. It meant a whirlwind deal that gave producer-director Ivan Reitman (*Stripes*, *Meatballs*) just one year to bring together the comic forces of his stars, the acclaimed cinematography of Laszlo Kovacs (ASC), and the multi-Oscared talents of production designer John DeCuir and visual effects supervisor Richard Edlund (ASC). It also meant filming on a dangerous \$1 million set, redesigning a major effects facility, snarling traffic for blocks in New York City and detonating live pyrotechnics in a downtown Los Angeles hotel. In short, making *Ghostbusters* proved to be very serious business indeed.

The film begins on the day the psychic researchers encounter their first real ghost amid the stacks of the New York Public Library — and subsequently get fired from Columbia University. Undaunted by the singular lack of faith demonstrated by their university fathers, the three decide to go into the ghostbusting business. In short order, they buy an old firehouse, turn a used ambulance into an Ectomobile, develop a quasi-scientific method for capturing ghosts and officially open their doors for business.

At first, nobody calls. But then, as their aggressive advertising blitz starts to take effect, they begin to see their first cases. Rejoicing in their good fortune, the Ghostbusters respond to an ever-increasing demand for their services — unaware that they are dealing with anything more than a few restless spirits. Only when they encounter a hapless cello player named Dana Barrett (Sigourney Weaver), who comes to them with a bizarre account of finding another dimension inside her kitchen refrigerator, do they begin to suspect something more ominous. Investigating, the Ghostbusters soon discover that Dana is living in a high-rise building that moonlights as headquarters for the Gozer, an ancient force from another spiritual plane. Dubbed

'Spook Central' by the ghostbusting task force, the historic apartment building becomes a focus for the action, as Dana and her neighbor Louis (Rick Moranis) are pursued by two very 'possessive' Terror Dogs — and the Ghostbusters find themselves battling an entity that could destroy all mankind.

The odyssey of *Ghostbusters* began with Dan Aykroyd, who first burst onto the American scene as a member of the original *Saturday Night Live* troupe, and then in films like *The Blues Brothers* and *Trading Places*. For him, *Ghostbusters* represented more than just a chance to do another comedy — it offered the opportunity to recreate a popular style of movie comedy. "*Ghostbusters*, I think, has its basic roots in American humor and American film. Abbott and Costello, the Bowery Boys, Dean Martin and Jerry Lewis, Bob Hope — everyone did a ghost picture. I thought it would be great to write one for this decade, updating the form by using the special effects technology of today. Besides the comedies, *Poltergeist* was a key model for the film because it gave me an idea of what could be done in terms of special effects. It was also a great story. Our goal was to get all those values of special effects into a comedy and make them funny.

"I was also intrigued by the idea that no one had ever advertised before as ghostbusters. Parapsychologists have long been plagued by the fact that only one in ten report their experiences. I thought: 'What if you advertised on TV or in the Yellow Pages and said: "Hey, we believe you, we understand you?"' I thought it would help. That was the birth of the commercial enterprise of ghostbusting. After all, Abbott and Costello were not that aggressive in terms of sales and promotion. Our guys, on the other hand, are like blue collar service men who go out to individual homes." While *Ghostbusters* may be comedic, Aykroyd's interest in the occult is serious, and he did extensive research into case studies of hauntings while writing his first draft script. In addition, he drew from his own experiences growing up in an old farmhouse in Canada, where family seances and unexplained phenomena were common occurrences.

Aykroyd worked on the *Ghostbusters* script over several years, slowly developing his ideas. When he completed his first draft, he showed it to Bill Murray, who agreed to join the project, and together they approached Ivan Reitman to direct and produce the film. Reitman, in turn, approached Columbia and, within one week in May 1983, had the deal for the project finalized. Eager for a summer comedy in 1984, Columbia agreed to finance the picture — but only if it would be ready for theatrical release on June 7, 1984, giving Reitman and his production team just one year to complete what would become a \$30 million movie.

Once the deal had been struck, Aykroyd and Reitman asked Harold Ramis to sign on as one of the Ghostbusters and to rewrite the screenplay — which all agreed needed to be refined. Ramis, an SCTV alumnus who costarred with Murray in *Stripes*, also served as a cowriter on *National Lampoon's Animal House*, and director on *Caddyshack* and *National Lampoon's Vacation*. Although not a believer in the occult, Ramis had a general interest in the subject — perhaps derived from having lived a

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article by  
**Adam Eisenberg**



year on a small Greek island purported to have once been infested with vampires. "When you live on an island where there is almost no media, tales of the supernatural seem to become kind of a pastime and everyone has a story to top the last. I was always terrified to walk alone at night because there were so many ghost stories — I hate hearing that kind of stuff. What I loved about Dan's first script was that he took those things that had always been very chilling to me and made them seem perfectly mundane. The fact that the Ghostbusters were like janitors who encountered such problems with casualness demystified a lot of it."

Together, Ramis, Aykroyd and Reitman worked to restructure and refine the *Ghostbusters* script. "My first draft was written in a way that your basic acceleration physicist might have enjoyed more than the mass audience," Aykroyd conceded. "I used a lot of technological words and phrases. Also, my original story was more eerie in tone, and it started right off with the crew busting ghosts. The first frame was the garage door opening up at the firehall, the Ectomobile roaring out into the night and the guys going on a bust."

"The range of ghosts Dan had in his original script was also much broader than we have in the film now," Ramis added. "Really, the big difference was that he skipped how they became ghostbusters. The script just jumped in with them operating a full-blown company, and it started off with four busts in a row. The budget would have probably been \$100 million with the number of ghosts he had included. There was a phantom biker, for instance — a skeletal Hell's Angel that just rode up and down the street and terrorized an entire town. That was the origin for the skeletal cab driver now in the film. What we did was to reshape the script and share with the audience how the Ghostbusters began, and how their equipment and technology evolved."

In addition to rewriting the story, Ramis also worked to refine the technology. Aykroyd, who has a good layman's knowledge of physics and quantum theory, had created a vast array of instruments and equipment, and Ramis wanted to make certain that his idea of how to capture a ghost was not completely far-fetched. "I was very concerned throughout this film that the physics of it make some sense, and that intelligent people wouldn't look at it and say it was ridiculous or totally impossible. We even went to the trouble of having physicists tell us what the real physical qualities of a ghost might be so that our equipment would be suited to the real physical phenomenon."

While the script was being refined, Reitman and associate producer Michael Gross were searching for an effects facility that would be able to handle the film's vast array of visual illusions. Gross, a successful artist and one-time art director of *Esquire* and *National Lampoon* magazine, had worked with Reitman twice before — as production designer and associate producer on *Heavy Metal* and as postproduction effects coordinator on *Spacehunter*. Intimately versed in the horrors of shoestring effects work, both were convinced that *Ghostbusters* — though comedic in tone — should demand the very best in state-of-

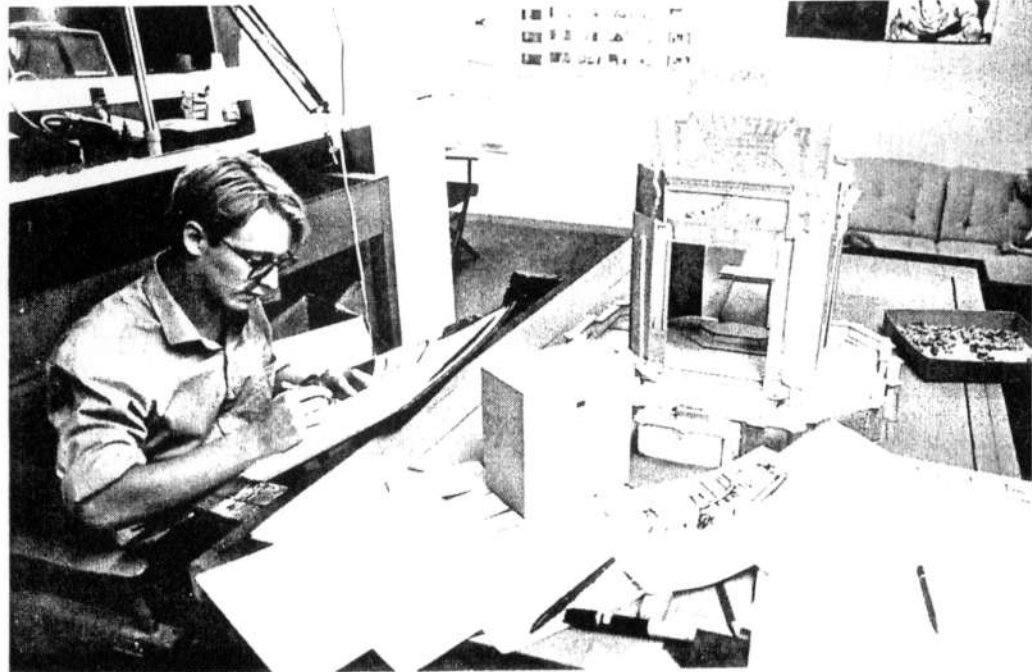
the-art film magic. Unfortunately, most of the major effects facilities were already involved with other projects. "At first, we weren't sure where to turn," Gross recalled. "*Dune* was over at Apogee, ILM couldn't take us because it was finishing *Return of the Jedi* and beginning *Indiana Jones* and *Star Trek III*, and to get the level of work we needed and the experience, we weren't sure where to go. Dream Quest was a very viable option for parts of the film — they could do it and wanted to — but they were the first to admit that there were a whole bunch of effects in our film that were beyond their realm of experience. In fact, short of spaceship models in space, *Ghostbusters* involved every kind of special effect there is, from animating puppets and a man in a suit to matte paintings and opticals — everything. So it scared us very much, and as soon as we heard that Richard Edlund was leaving ILM and going into business for himself, we contacted him. We consider ourselves very lucky to have been able to put that connection together because, frankly, if the situation with Richard hadn't occurred, I don't know if we could have done the picture."

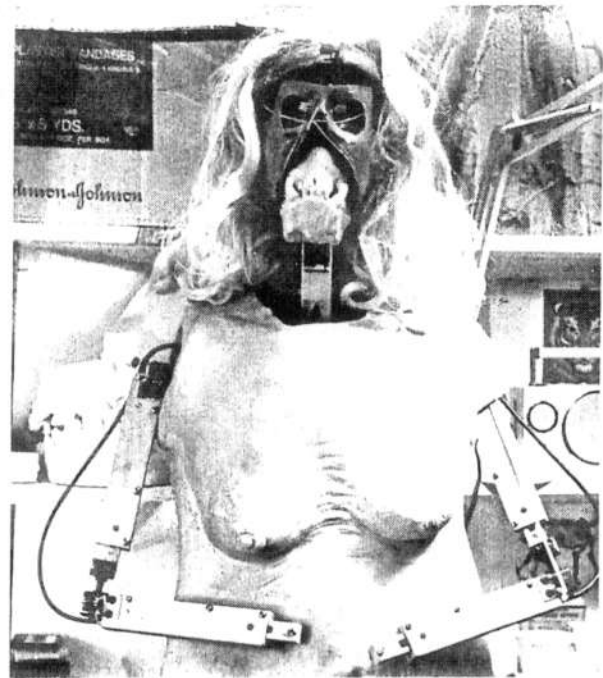
For Edlund, *Ghostbusters* represented his first opportunity to supervise the effects of a film away from Industrial Light and Magic — where he had worked for the past seven years — and a chance to return to Los Angeles. "I'm a naturalized Angelino," Edlund explained, "and I initially balked about going up north to build an effects studio in Marin County, because it was like entering the Foreign Legion, Hollywood being the heart of the business. I had a wonderful time working on *The Empire Strikes Back*, but when it was completed, I knew I just wasn't a Marin County person and that I wasn't going to retire there." At that point, Edlund decided that he would finish the *Star Wars* trilogy — with *Raiders of the Lost Ark* and *Poltergeist* sandwiched in between — but that he would then consider returning south to Los Angeles. Along the way, Edlund had several discussions with Douglas Trumbull about the possibility of one day working together at Entertainment Effects Group in Marina del Rey. "When *Jedi* was wrapping up and I was thinking about what to do next," Edlund commented, "Doug was doing *Brainstorm* and really wanted to direct pictures, promote his Showscan process and shed the effects wizard mantle. Likewise, Richard Yuricich, who had run EEG with him, wanted to pursue being a director of photography, as he had on *Brainstorm*. So we came to an agreement that I would become a partner and bring pictures into EEG and run it myself." The effects produced under the new partnership would still be credited to Entertainment Effects Group, but the formation of a new company would require Edlund to establish the title Boss Film Corporation (BFC) for payroll and other legal reasons, with Laura Buff serving as studio manager.

Intrigued by the proposition of taking over EEG, Edlund then faced the problem of finding just the right project to initiate his move. "*Dune* was the first project we considered. Earlier, I had discussed the possibilities of doing it at ILM while I was still with the company, but it would have been ridiculous to take on another enormous project when we were already work-

Visual effects supervisor Richard Edlund reviews *Ghostbusters* storyboards with art director John Bruno. Edlund — formerly the senior cinemagician at Industrial Light and Magic — departed Lucasfilm after *Return of the Jedi* to establish his own effects organization at Entertainment Effects Group. *Ghostbusters* marks his first independent production. / In an early production meeting, Edlund discusses effects concepts with director Ivan Reitman and production designer John DeCuir. / Working from a cardboard mockup of the Gozer temple provided by DeCuir, storyboard artist Brent Boates sketches out ideas for the film's climactic sequence.









ing on the most enormous one — *Return of the Jedi*. When the producers agreed to push back the *Dune* production to meet the effects needs, I discussed doing the project with Doug. But for various reasons, *Dune* fell out. After that, Ridley Scott came on the scene with *Legend of Darkness*, and my lawyer entered into deal negotiations. Then, right in the middle of that, *Legend* also fell out. I was depressed for a week. Without a confirmed project after *Jedi*, I wasn't sure what I was going to do. Then I was approached to do both *2010* and *Ghostbusters* just days apart from each other."

Taking over the reins of a major effects facility and preparing it to handle two large, overlapping productions was no easy task. As designed by Trumbull and Yurich, EEG was not really equipped to handle more than one picture at a time. Now it was being asked to accommodate two — each for a different major studio. "It was a real juggling act for us at first," Edlund explained. "I had to learn how to make deals Hollywood-style, and it was complicated because we had to make a deal between Columbia and MGM/UA, and effectively put them in bed together so they would both pay into our company for the same equipment and for certain people to be split between the two productions. Jim Nelson acted as my 'Godfather' in these negotiations. He's been a friend of mine since I met him on *Star Wars*, and he was instrumental in making everything happen."

Once the various legal ramifications were resolved, Edlund next faced the task of restructuring the facility and assembling a staff. "Basically, we had to totally change the place. Each existing department was reorganized, and several additional ones — including a stop-motion animation department and a 'creature shop' — were built from scratch. Plus I was able to assemble what I believe to be the best special effects group ever. Every department head is very experienced and has all sorts of battle ribbons covering every successful special effects film made in the last eight years. Fortunately, *Ghostbusters* was a project which we, as a group, could easily move into, having covered some of the same terrain in *Poltergeist*." Though he found the equipment on hand to be uniformly excellent, Edlund's own *modus operandi* dictated some immediate alterations and additions. As a result, electronics engineer Jerry Jeffress and machinist Gene Whiteman — among others — were promptly put to work building a reflex high-speed 65mm camera, a new optical printer, a different matte camera system, a giant cloud tank, several blue screens and a reconfigured and computerized animation stand.

Among the existing treasures at EEG was the Computerized Multiplane System, otherwise known as Compsy. "Compsy is a great system," Edlund said, "and we made it a bi-camera for both 65 and 35 anamorphic. It was basically designed to do graphics, and was extensively used on *Brainstorm* for shooting the heaven sequence, which involved a mind-boggling number of elements. Compsy will shoot all night and repeat itself. It's really great. We're using it as our matte camera. It operates on a pan-tilt-roll system, which is actually better for rear projection than the Automatte system I initiated up north. On that

*The Ghostbusters encounter their first real specter — an elderly librarian found floating among the stacks of the New York Public Library. When they approach the seemingly harmless entity, however, it turns on them and transforms into a fearsome beast. / Mark Wilson sculpts the final and most ferocious form for the ghost, which was ultimately deemed superfluous and hence never completed. / The undressed armature for the librarian ghost. / Teresa Burkett makes last-minute adjustments to the mechanical figure's costume prior to photography. / Cable mechanisms operated by concealed members of the 'ghost shop' crew, transform the elderly librarian into a hideous demon.*





*One of the film's more humorous manifestations is the Onionhead ghost, a gluttonous creature first discovered devouring leftovers on a room service cart in a posh New York hotel. / Originally conceived as a totally cable-operated artifact, Onionhead ultimately came to life in the form of a cable-enhanced foam rubber suit worn by Mark Wilson, whose legs extended beneath the figure and were draped in black velvet for maximum concealment. / Steve Johnson adds finishing touches to a miniature clay prototype. In all, three full-size Onionheads were constructed — one for smiling, one for looking frightened and one for use in drinking scenes.*

system, the camera tracks east-west and moves north-south, so the hot spot on the rear projection screen caused by the rear projector bulb tends to move. Through his photographic ingenuity, Neil Krepela (ILM's matte cameraman) was able to deal with that, but it's really much better to pan and tilt the camera rather than actually move it in relation to the projection lens — which is something I hadn't thought of."

Krepela, who now serves as EEG's matte department supervisor, also designed a rear projection system for Compsy similar to the one he had designed for the Automatte. "I feel pretty lucky having been a part of building the Automatte, which is an extraordinarily sophisticated device. Towards the end of *Jedi*, though, I thought that if I were to build another piece of equipment like it, I would build one along the lines of Compsy. Then, when I came down here and saw Compsy, I pounced on it. We realized it would be good for a matte camera, and I began exploring what it could do." Among its many abilities, Compsy can record the camera movement in a supplied background plate and then repeat that movement exactly while filming one of the elements to be composited into that plate.

Perhaps the most fundamental switch made by Edlund, and the members of his crew coming down from ILM, was from the VistaVision format to 65mm. "It was a real interesting proposition for us," said Edlund. "I had never worked in 65mm, and it is the ultimate format. You can't get any better quality today, realistically, than by shooting in 65mm and then compositing in 35mm anamorphic. The equipment is based on similar optical and electronic approaches that we used up at ILM, so that adjustment was not so difficult. I used to complain that it was much harder to get the film stocks for 65mm, and that the cameras were more bulky and that it required bigger miniatures. But we have a very good relationship with Kodak, and they help us by supplying the special order stocks we need; and it's really better to work with larger miniatures. On *Star Wars*, for instance, we could get away with smaller miniatures because everything was moving so fast. But if you have elements that don't move as fast, then the audience can inspect what you're photographing; so larger and more detailed models are necessary. When you consider finished screen quality, 65mm is unquestionably the best."

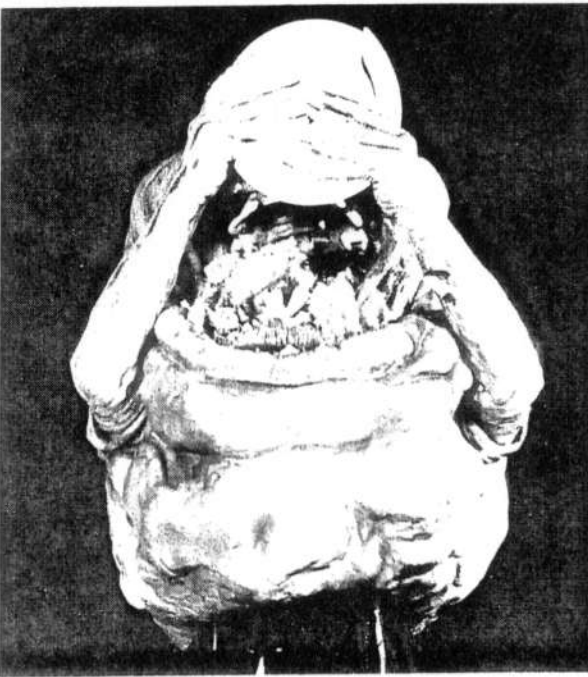
While Edlund was recruiting a staff and reorganizing his facility, Dan Aykroyd and Harold Ramis were finalizing the script. Concurrently, Michael Gross began supervising early design work on the film's stable of monsters and ghosts. "When Richard became involved with the project," Gross recalled, "most of the design work was already underway. But the designs would continue to change because of the realities involved in bringing them to life. It's amazing how much we conceived that never went into the film. We went through so many alternatives just for what the Gozer was going to be. At one point, for instance, he wasn't even a person. We thought he would be the Devil himself, or perhaps some tremendously powerful god. In the film, he first appears as a girl, and then turns into the Stay-Puft marshmallow man and is destroyed. Originally, though,

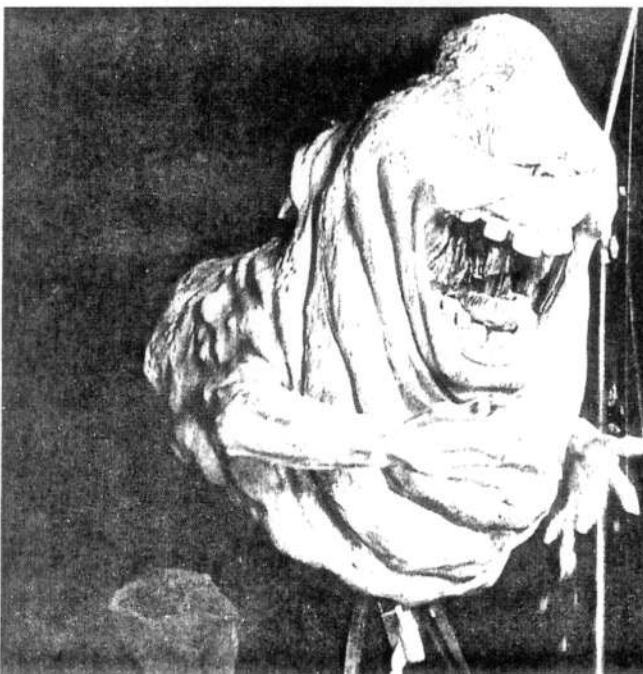
it was to be a man first, then the Stay-Puft, and then he would rip away the marshmallow and inside we would see this horrendous creature.

"At another point, he was going to transform into something still bigger, something that would literally tower over Manhattan and occupy the heavens. I mean, he was just going to be the biggest creature ever. We had all kinds of concepts of him, from being from Hell itself to being some kind of alien or even a cloud formation of pure energy. So we were doing all kinds of conceptualizing on that, and finally it all went into the dumper and we never used it. The same is true with the ghosts. At one point, conceptually, every time you saw ghosts you were going to see twenty different kinds of ghosts at once. We even planned a sequence in which people sitting in a theater watching a 3-D movie saw a stream of real ghosts come out of the screen. However, all of the scenes with multiple ghosts were eventually taken out because of limits on budget and time."

As *Ghostbusters* moved closer to first unit photography, Michael Gross and a team of artists began preliminary storyboards to give Ivan Reitman a sense of how the various sequences might be visualized in the film. These boards were in turn redrawn by EEG art director John Bruno — who had previously worked with Edlund as animation supervisor on *Poltergeist*, and with Gross and Reitman as director of the "Taarna" segment in *Heavy Metal*. "On *Ghostbusters*, I first did a set of boards to fit the film as a whole. Then, knowing what we were being asked to do, I redesigned the shots to fit the effects, based on what we could and couldn't do. For instance, we couldn't have a creature burst through the wall behind which our mechanical operators would be standing, or have actors in the way of where matte lines had to be. Then, once the boards were done — and cleaned up by Brent Boates and Terry Windell — John DeCuir incorporated our needs into his set design. In boarding the picture, I basically pushed for really hairy visual scenes; and having worked with Ivan before, I knew how to talk with him and basically worked in a very rough state so there could be a lot of ideas exchanged. I did tons and tons of drawings, and taped them all along one wall and asked Ivan what he liked and disliked."

"John's boards did two things that I thought were amazing," Gross commented. "First, he created specific illustrations which took into account where the matte lines would be, what angles were best for the effects and what could specifically be delivered by EEG. As a result, the final effects shots were almost exactly as they had been originally boarded. Second, John began designing the end sequence of the film before the Gozer temple was even built, when all he had to work with was the floor plan and a two-foot-tall cardboard model that John DeCuir had constructed. From this, he was able to analyze the angles and sketch out the scenes. Later, when the set was finished, the actors were there and we began setting up the plates, we realized that John was almost right on target to the last detail — what he'd boarded many months before was exactly what we were seeing through the camera."









"In order to make visual effects work," Bruno explained, "you have to work the camera into position during the live-action so that when the special effects come, the audience is not expecting them and the effects don't stand out. You can't just go from the camera being in one spot for the live-action and then move it abruptly for the effect. You have to try to make a smooth transition between shots so that people won't know the effects are coming unless you want them to. I tried to design the boards to take this into account — I tried to stage the shots for effect."

"After the boards were completed and received Ivan's approval, we had meetings at EEG to determine how the scenes would be achieved. For instance, how would we get the guys looking over the ledge of the building with their weapons pointing down at the marshmallow man as he walked up the street towards them? We had to decide that the shot would involve a matte painting of the building, a bluescreen of the guys, a miniature of the street and a man in a suit; and we also had to decide where the camera should be positioned for the plate. We had a number of meetings on that and then numbered the shots to see how many we had. Then we took all of the boards to Ivan and negotiated how many scenes we thought we could really do, given our deadline, and then pared out the individual shots we didn't think we needed. A lot of those kinds of changes occurred until we actually started shooting."

Though EEG was still in a transitional state when principal photography began in October, Richard Edlund — along with Neil Krepela and Alan Harding — went off to New York to film background plates with the first unit. Filming on location in the Big Apple proved to be a difficult, though ultimately successful venture. The production company shot in and around Manhattan, often blocking traffic and incurring the wrath of frustrated New Yorkers who didn't like having their lives disrupted. Perhaps the most difficult location was Spook Central, the building on which the Gozer temple would be placed and the center for much of *Ghostbusters*' second half. Located at 55 Central Park West, the building was a perfect site for the story, but not the most convenient site to film.

Since it was directly across from Central Park, there were no tall buildings nearby to afford an elevated view. As a result, Edlund had to go up in a helicopter and circle the building in order to get a clear view of Spook Central from a position above street level. Under those conditions, the best he could do was take Hasselblad snapshots of the building, which would later serve as reference for matte painter Matthew Yuricich and the model shop crew. Edlund had considerably more success capturing the classic Manhattan skyline, but not until the production unit struck a rather strange deal. "We wanted to go to the top of the RCA Building in order to get the shot of New York. The view from up there is really fabulous, and it looks downtown at the Empire State Building and the World Trade Center. However, in order to get to the top of the building, we had to take out an insurance policy in case anything happened — for \$3 million. There were only four of us involved, and all we

*Sculptor Marc Siegel at work on one of the full-size Onionheads. The original prototype, sculpted by Kurt Conner from drawings by Thom Enriquez, looks over his shoulder from the corner of the room. / Onionhead, photographed against a blue screen at EEG, quzzles a bottle of champagne. Oversized props had to be used so that when composited with live-action, the ghost could be made to appear smaller than human-size. / Although Mark Wilson provided the major movements for Onionhead, a team of puppeteers — wearing helmets or behind plexiglass in this food-throwing scene — produced the more subtle, cable-actuated expressions. / Most of the Onionhead footage was shot against black, with much of it rephotographed on Compsy for repositioning and movement through the frame. / Onionhead astride a rotating rig, also built to accommodate the cable operators.*

wanted to do was get a 65mm plate of New York, but we still had to take out that policy."

During his four trips back to Manhattan during the three-and-a-half week location shoot, Edlund witnessed a lot of the production. "In New York, we sometimes shot during the day, sometimes half-and-half and other times all night long. When we shot the background plates for the marshmallow man coming down into Columbus Circle, we had about five hundred extras climbing over cars and acting like they were trying to get out of his way. Laszlo Kovacs and the New York gaffer really lit up Columbus Circle one night, and it was a big job. They must have had every lighting instrument in the city there, and there were generators all over the place. They lit all the buildings with lights blocks apart — banks of nine lights that would illuminate whole sides of buildings. It was quite a show."

Two nights were devoted to the climactic assault on Spook Central, and while filming the plates themselves was fairly straightforward for Edlund, the experience of blocking a major New York thoroughfare was not. "We stopped traffic throughout Manhattan. It was stunning. The whole shoot was very expensive in itself, and at one point we had sixty-five drivers alone — just to drive. We were also filming on a Friday night when it's really busy in Manhattan. We would block traffic for a while to shoot, then let some cars go through during the breaks. We were right in the path of the 59th Street Bridge, and there were a lot of people who wanted to get on that bridge. Cab drivers were making enormous fares for going six blocks, because they would have to sit and wait for twenty minutes. We stopped traffic on 62nd Street and it backed all the way up to 30th Street — you could hear horns honking all the way back to infinity."

Also included in the New York location photography was *Ghostbusters'* first live-action effects sequence. After a bureaucratic snafu results in dozens of captured ghosts being released from the firehall, one unsuspecting and totally oblivious human patron steps into a taxi driven by a decaying corpse. To bring the skeletal remains to life, creature shop supervisor Stuart Ziff engaged makeup effects technician Steve Johnson — one of Rick Baker's principal assistants on *An American Werewolf in London*, *Videodrome* and *Greystoke*. With only three weeks to design and construct the undead driver, Johnson devised a concept much like one used for the decomposing body of Jack Goodman in *American Werewolf*. First he took a plastic skull, put eyes in it, stretched sculpted cast foam rubber over the face to simulate skin, and then pinched on additional latex to suggest desiccated flesh. When finished, the puppet's cable-actuated head could turn around, its eyes could blink and move, and it could smile and move its jaw. To make certain that the spectral driver would not be perceived as someone simply wearing a mask, Johnson mounted its eye controls on a gimbal below the head so that he would not have to extend his arm up through the neck — thus allowing it to be much thinner and more bony. Johnson also exposed one shoulder bone through the cabbie's leather jacket so its movement would be visible. An articulated hand was built by Bill Sturgeon. On location, Johnson and a

crew of three operated the mechanized artifact through its required closeups. For long shots of the cab racing through New York, a simple rubber mask was worn by a stunt driver.

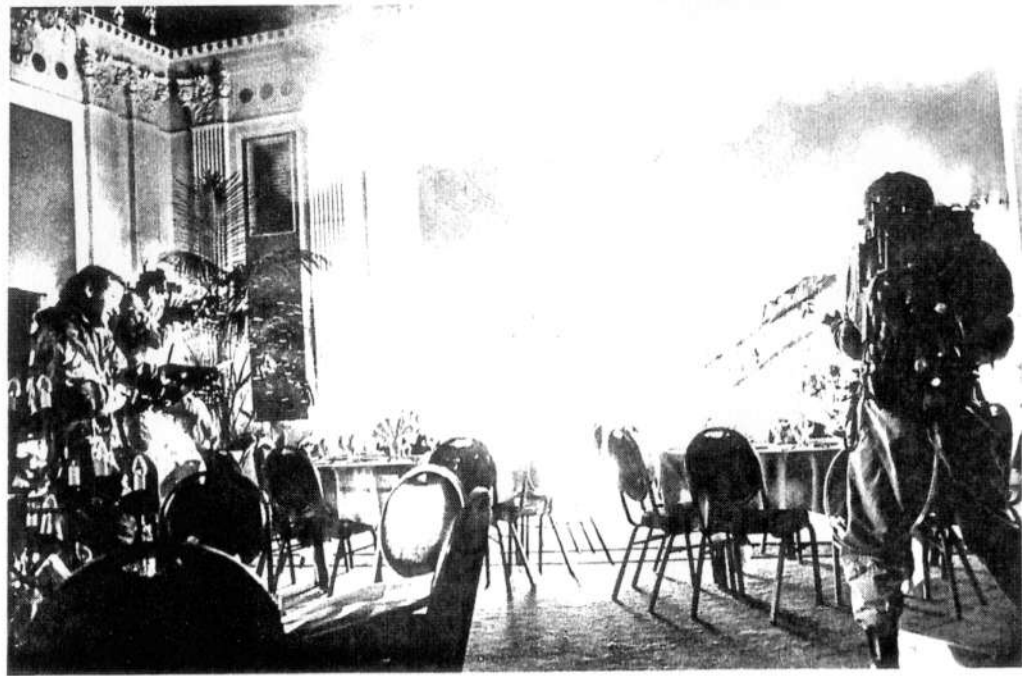
In addition to the work being done by EEG, the New York shoot required a large number of physical effects, provided by Chuck Gaspar. A veteran of 22 years in the film industry, Gaspar built the full-size helicopter for *Blue Thunder*, provided the physical effects on many of Clint Eastwood films, including *Firefox* and *The Gauntlet*, and had the dubiously pleasant task of constructing a giant breast that roamed the countryside in Woody Allen's *Everything You Always Wanted to Know About Sex*. For *Ghostbusters*, Gaspar supervised the physical effects in Los Angeles and — with the aid of Joe Day — in New York.

"The physical effects people on this film were incredible," explained Joe Medjuck, *Ghostbusters'* other associate producer. "An example of both set decorations and special effects occurred when we shot the sequence in Columbus Circle. The fountain was going in the background, and I noticed that our special effects guys seemed to be controlling it. I asked if we had gotten permission to do that, and they said, 'No, this is ours.' What? I walked over and they had placed their own water pump inside the real fountain and were spraying up the water in the fountain's pool. The art department had decided that the real fountain wasn't picturesque enough, so the special effects people put in their own."

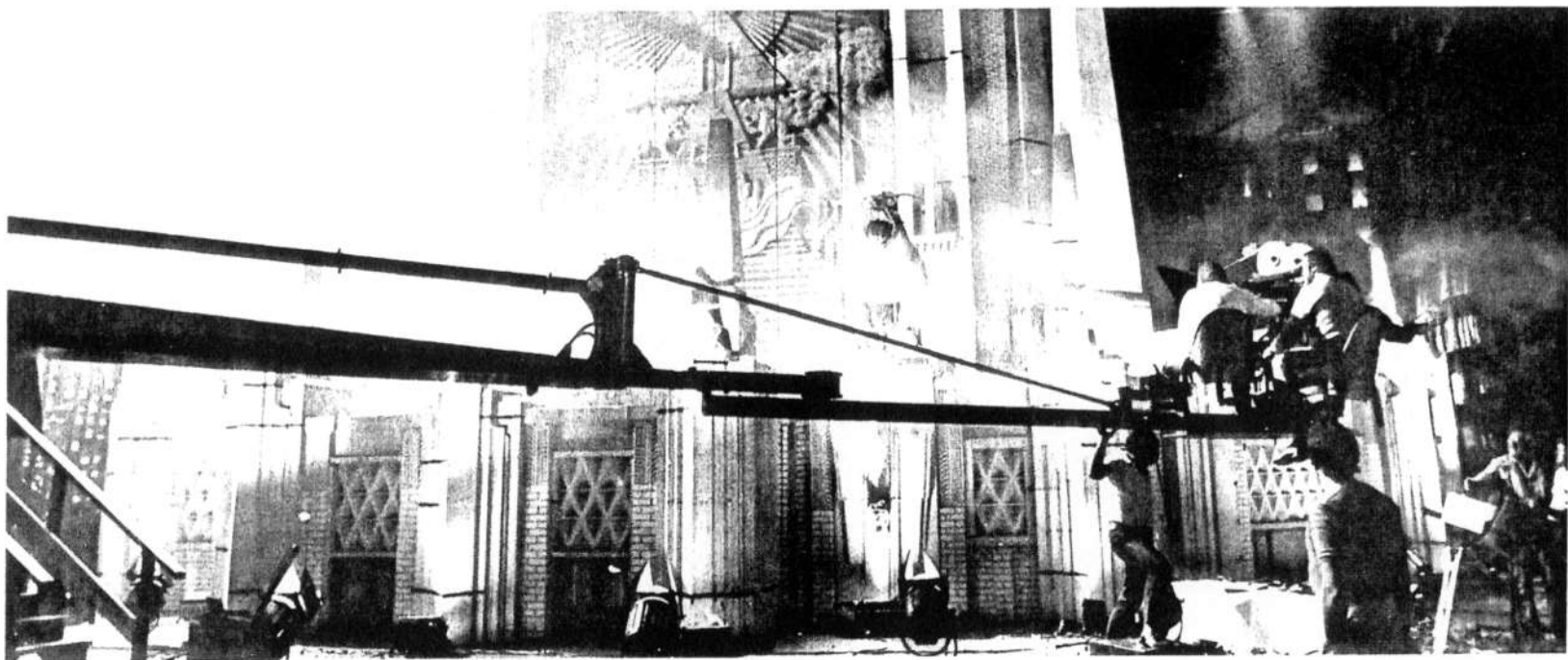
"Every day there was something to do on *Ghostbusters*," Chuck Gaspar noted. "When I picked up the script and first read it, it didn't suggest as many effects as we eventually did. In New York, we worked twenty-two hours on the day that the earthquake in front of 55 Central Park West was filmed. John DeCuir had built pieces of the broken street so it looked like the street had opened up. You could never see down into the pit. All of the pieces were shipped back on trucks to New York. We also cut the front end off of a police car and stood it up at an angle so it looked like it was pitching down into a hole."

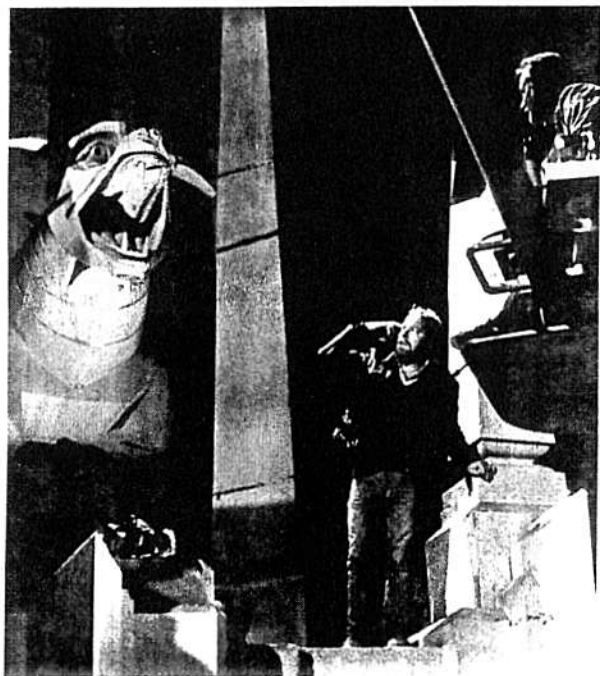
Later, the sequence would be completed at the Columbia Ranch in Burbank, where a full-size mockup of the building's first floor entrance was constructed. In front of this, a large hole was dug where the street would collapse under the *Ghostbuster's* feet. "The hole was covered with a series of wooden panels, cut into the shapes of broken pieces of the asphalt street. Each panel was on a metal frame which was operated by two hydraulic cylinders — in all, twenty cylinders were used to move the ground up and down. The panels were painted black and positioned so each could move freely without binding on any of the others. Then we filled the gaps between them with pieces of hard black styrofoam, and covered those with a soft liquid foam that would blend the street together. The styrofoam was needed not only to provide support for the soft liquid foam, but also to simulate asphalt breaking up when the street started to crack apart." An escape trench was built into the hole to insure that the stunt doubles could not get trapped, and as a further safety precaution, the man operating the hydraulics that dropped them — and the police car positioned on the street

Egon Spengler (Harold Ramis) reacts with surprise to the first field test of the team's Nutrona wands — whose incendiary rays were produced in postproduction by employing a variety of animation techniques. / Physical effects supervisor Chuck Gaspar engineered a number of interactive pyrotechnic effects for the energy beams, including an exploding chandelier filmed on location at the Biltmore Hotel in downtown Los Angeles. / In pursuit of the Onionhead, the trigger-happy *Ghostbusters* spray arcing swaths into the walls of the hotel's banquet facility — another physical effect achieved by embedding pyrotechnics into wall-size panels that were then erected over actual wall surfaces in the Biltmore.









— was also in the hole so that he could watch and make certain that no one got caught up by accident.

During the battle that follows between the Ghostbusters and the Stay-Puft man, giant masses of molten marshmallow drop to the streets below. To help dress the set appropriately, Gaspar and his crew had to develop a marshmallow-like substance that could be sprayed on the New York location to match the large, marshmallowy set pieces that they had constructed. "We knew that snow would not have hung in thick enough on the street," Gaspar recalled, "and the next thing that came to mind was using shaving cream or whipped cream. We started contacting different companies and found a place called Puritan Products that could provide us with the foam itself. Shaving cream in cans is propelled by propane; but that didn't really agree with us, because we had to use such large quantities. So we mixed freon for the propellant, and premixed and shook them together in big tanks before spraying out the foam. It really did look like huge blobs of marshmallow."

When the Stay-Puft man gets blasted by the Ghostbusters and starts to burn away, a large glob of marshmallow falls on top of EPA administrator Walter Peck. For that effect, Gaspar once again used his special foam formula; only this time, it could not be sprayed from the tanks. Instead, he had to take a slightly different approach. "We used a huge plastic bag that was six feet in diameter and eighteen feet long, and attached it to a crane. The bottom center of the bag was cut open, and then pulled up to the top of the crane to create a cavity inside the bag, like an upside-down cake. We filled the cavity with foam and then, when we released the bottom, it fell down and allowed the foam to dump out all at one time. One test proved the system would work, but we also did it with a stuntman to show William Atherton — the actor playing Peck — that he wouldn't be hurt. Someone had mentioned that the stunt involved two hundred pounds of foam, and while it wasn't like two hundred pounds of lead, it was enough to throw the actor off. So we did one test with a stunt double, and it was very safe — but boy, did that foam go all over the place."

Despite the problems of traffic control, not to mention the dropping of marshmallow blobs, Joe Medjuck felt the New York shoot went amazingly well. "Joe Day and Chuck Gaspar did an extraordinary job, especially considering the number of effects they had to do — from small things like constructing the Ghostbusters' proton packs and Nutrona wands, to building the Ectomobile, to making it look as if there had been an earthquake on Central Park West. They were always very calm, too. I was most worried when we dropped the Stay-Puft man's giant hat in the midst of three hundred extras. It wasn't exactly a light hat, since in order to make it fall properly, it had to be aluminum-reinforced to keep its shape — and it was eighteen feet across. I kept asking Joe Day, 'Where is it going to land?' And he'd say: 'I don't know. It depends on which way the wind is blowing. I think he was joking with me a bit, but I was never quite sure. It never would have really hurt anybody unless they stood directly underneath it, and certainly they would have had

*Filming on the Gozer temple set — a towering six-story representation of the uppermost portion of a New York skyscraper, constructed on stage at The Burbank Studios by production designer John DeCuir. / Ivan Reitman calls out directions as the camera boom moves in on the wind-swept set. / As the spiritual forces of the Gozer prepare to manifest themselves, the foot on an imposing rooftop statue crumbles away to reveal a living claw beneath. / Stagehands make adjustments to the mechanical claw, controlled by rods and cables running down through a hole in the set. / Associate producer Michael Gross discusses with Reitman and camera operator Bob Stevens a subsequent scene in which a glowing red eye protrudes from the crumbling statue.*

time to get away because it was hooked to a very high crane and it sort of parachuted down." Though successfully filmed, editorial pacing resulted in the elaborate gag being cut from the final release.

While the New York shoot was reaching its successful conclusion, the EEG staff back in Marina del Rey was completing the studio's reorganization. One of the departments that had to be built from scratch was the 'creature shop' — or, more appropriately, the 'ghost shop.' Headed by Stuart Ziff — who had co-supervised the *Jedi* creature shop at ILM — and fellow ILM alumnus Jon Berg, the EEG department would become the supplier of many of *Ghostbusters*' unusual ghostly characters. "The ghost shop was very much bigger than the ILM creature shop," Ziff explained. "We did produce many more different creatures for *Jedi* — some twenty or thirty, while for *Ghostbusters* we produced only five or six. But in *Ghostbusters*, each of ours was highly articulated and had multiple additions. As a result, we actually made a total of fifty-six creatures. The Onionhead character, for instance, had a fully articulated smiling face, terrified face and drinking face — each completely mechanized. On *Jedi* only Admiral Ackbar, Nien Nunb and Three Eyes — which wasn't even used — were fully articulated. Jabba and Yoda were done completely by the English crew."

Specifically, the EEG ghost shop was in charge of constructing five primary creatures — the Onionhead ghost, the Stay-Puft man, the subway ghost, the Terror Dogs and the librarian demon. Of first priority were the Terror Dogs, which were needed for principal photography on stage at The Burbank Studios. Like so many of the creatures in the film, these had a gradual evolution into their final form. "At some vague early spot," Michael Gross explained, "the Terror Dogs were thought of as something from the other side, as being from the ghost side — and that's when we didn't know what the ghost side was. Were we talking about life after death? About some other dimension? That was always a problem for us to sort out, so the dogs went through many design changes. At first, they looked like something that resembled long-dead dogs, quite close to what a real dog might have looked like after it had been dead for awhile. Then, they were ugly, toad-like things. Gradually, they started to move closer to what they became — vicious, predatory kinds of animals that precede the coming of the Gozer. As we went through the concepts, we changed the visualization of the dogs completely, from something that John Landis might have used in *Thriller*, to lumbering silly creatures, to their final form as somewhat frightening, imposing beasts."

To help bring the Terror Dogs more fully to life, Stuart Ziff hired Randall William Cook, a sculptor and stop-motion animator who would not only redesign the dogs, but would also execute a number of elaborate stop-frame shots that would be intercut with full-size dogs built and operated on the set. Cook, who has also been an actor, an illustrator for the *Los Angeles Times Sunday Calendar* section, and the director of educational films, did stop-motion animation for *The Thing*, *Caveman* and *The*

*Crater Lake Monster*. On *Ghostbusters*, he was first presented with over fifty different designs for the dog, all drawn by Thom Enriquez. "They were what used to be called inspirational sketches rather than model sheets," Cook noted, "and they became a jumping off point for the design of the Terror Dog. All of Tom's drawings were really wonderful, but the one initially chosen seemed to have a lot of *Forbidden Planet* influence in it — the Id monster in particular — and there were a lot of problems with it. For instance, the way the creature's mouth was drawn — wide open — it could not have been made to close realistically. I also thought the legs were a bit too stubby for something walking around on all fours. Basically, while the illustrations were successful as such, they had a stylized quality about them that would have been difficult to turn into a more naturalistic rendering."

"With Randy's experience," Gross commented, "he was the first to know that the muscle structure we had designed could never have looked realistic on a stop-motion puppet. Randy effectively redesigned the muscle structure, and sculpted skin with a series of wrinkles that enabled the legs to look perfectly natural and move believably. The Terror Dog design changed a lot based on his knowledge of what could be convincingly brought to life. As a result, the creature became more scary and organic, and less like a cartoon."

In redesigning the beast, Cook drew from his knowledge of many different animals including iguanas, hyenas and bats. In addition, Richard Edlund suggested a more human approach to the subject. "The Terror Dog is basically a real tough, swaggering, macho animal," noted Cook, "and Richard proposed that I give it a big barrel chest and a tight, bulky behind. So I patterned it after an overly-developed weight lifter, like one of the guys you might see hanging out at Venice Beach pumping iron all day. I just put him on four legs instead of two. I was looking for something that was ridiculously macho, and incorporating that into a bestial form was not that big a stretch of my imagination."

Initially, there was some discussion that the Terror Dog might be portrayed by an actor in a dog costume, but Stuart Ziff realized how difficult that would be to do convincingly. So instead, the creature's scenes were divided between those which could be done with a full-size puppet on the set and those which would have to be done in miniature via stop-motion animation. Over a period of several weeks, Cook sculpted the stop-motion puppet and — with Ziff — supervised Mike Hosch, Linda Frobos, Steve Neill, Steve Johnson and Mark Wilson in scaling up the full-size dog from its small stop-motion counterpart. The film actually called for two dogs — nicknamed Brutus and Cleo — but since the sole difference between the two sexes was that the male had longer horns, only one set of each size had to be sculpted and cast.

"Watching them sculpt the two sizes of dogs at the same time was really amazing," Gross recalled. "Normally, you would finish the stop-motion dog first and then build the large ones based on that; but because we didn't have time, the two had to be

Concert musician Dana Barrett (Sigourney Weaver), an unwitting resident of the building upon which the long-dormant temple sits, becomes an early victim of its demonic forces when an overstuffed chair in her apartment suddenly sprouts arms and propels her into the kitchen for an audience with the Gozer. The arms were constructed in the EEG ghost shop and worn as glove appliances by three puppeteers who positioned themselves beneath the chair or otherwise out of camera range.



built simultaneously to be a perfect match so they could be intercut. As a result, Randy would sculpt the small one in absolute detail, down to every bump, notch and wrinkle, while in the next room, Mike and the others were sculpting the full-size one. They would come into Randy's room, measure a detail on anything from the leg to the eye to the bone structure, scale it up and then do it on the big one. What was remarkable about it was that when they were finished, both sizes worked for their individual purposes. The big one worked in terms of being believable on the set, and the little one worked as a stop-motion puppet. Both could be intercut and we couldn't tell them apart. There was virtually no difference between the two. I was really impressed."

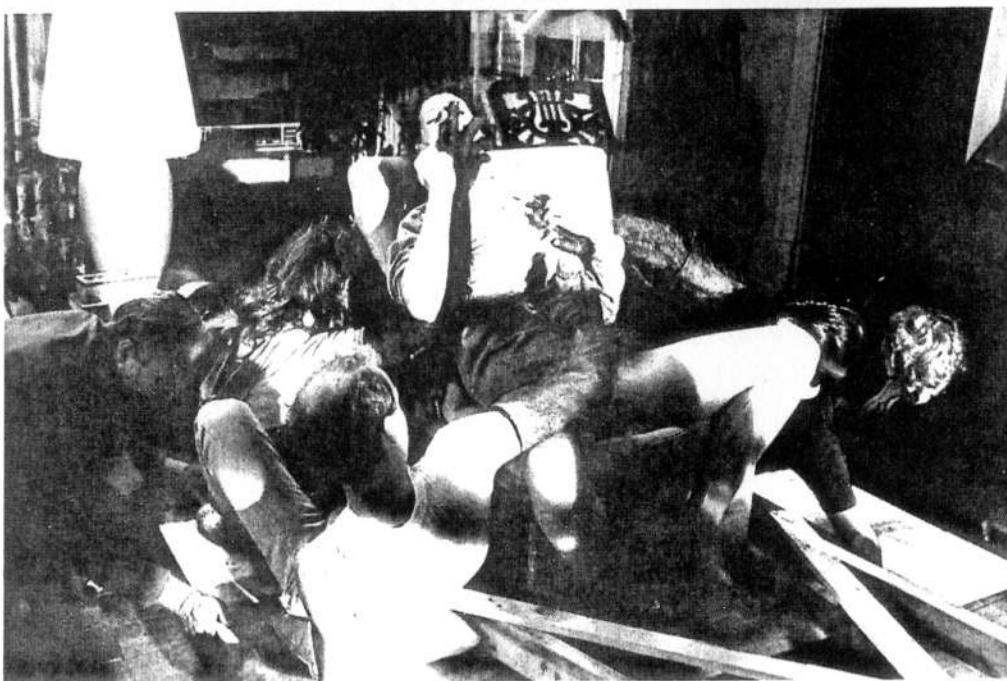
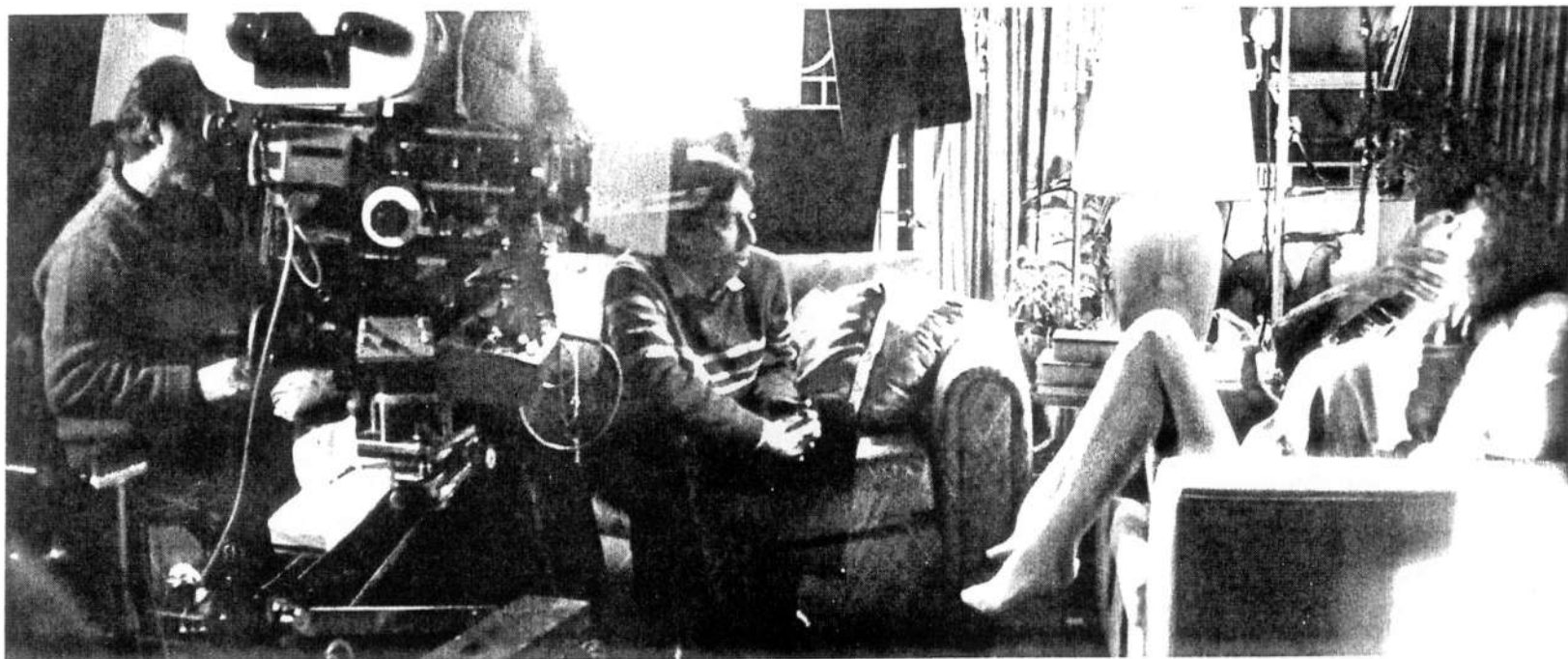
The small dogs were designed to animate some of the broader activities of the dogs, from running up the stairs of the Gozer temple to rushing out into the street, narrowly avoiding being hit by a car, and then diving over a wall into Central Park. While the stop-motion sequences occur on screen for only a matter of seconds, animating them was a slow, painful process during which Cook and his crew — cameraman James Aupperle and assistant Michael Hoover — would put in many a sixteen-hour day. Even so, the stop-motion animation corner at EEG was invariably one of the most lively, if not inspirational, since Cook loves to listen to everything from Gilbert and Sullivan to the Jim Kweskin Jug Band as he carefully adjusts the puppets for each frame of each shot.

"Randy is incredible at stop-motion," Stuart Zill commented. "One day, he and his crew were doing a very difficult scene. They did like four takes on it. Three of the takes didn't work for different reasons, and for the fourth, they stayed up until three in the morning working on it. When they came in the next morning and started to break down the setup, the cameraman unloaded the film from the previous night's shoot only to discover that someone had forgotten to turn on the torque motor and the result was spaghetti inside the camera box. Randy was very upset, and he told me he didn't want to do the shot again. I suggested he do another shot and return to that one in a couple of weeks, but he said he had to finish it now."

"The next night, they tried the shot again. It was something like a five-second shot — which would take *hours* to animate — and they were literally four-and-one-half seconds into it, with eighteen frames to go, when a stepper motor burned out and fell, causing the puppet to knock over the animation gauges. Randy put the puppet back where he thought it had been, and the next morning came in after the motor had been replaced and continued the shot. He finished the take and it worked. A lot of people doing stop-motion might have gotten flustered and had to start over — some get flustered by *any* interruption. But with Randy, you can go over and talk with him, the stepper motor can blow out, the film can not feed, and the next day he will remember the position of the puppet and continue. Who could want anything more? He went through the shots as fast as possible, and produced technically perfect stop-motion."

On *Ghostbusters*, Cook had no particular problems using





65mm for the first time, but he did find working with bluescreen a difficult adjustment. "I think blue screens are very good for certain things, but they take so much out of your own hands. On *Caveman*, I built a miniature cliff, and then painted it to match the images on a miniature projection screen by looking through the camera and painting what I saw. I like to be involved in all the different aspects in a given animation shot, and to help it along all the way through. But using a blue screen, I couldn't see the background elements while I was animating because they were put together later in optical. I couldn't look through the camera and immediately react to what I saw, or balance the color of the integrating elements. Fortunately, on *Ghostbusters* we had Mark Vargo in optical to make the elements work; but for me, it was not the same as having all of the elements in front of me when I'm animating."

While Cook's animation would take many months to complete, the full-size dogs were needed earlier for first unit photography on the film's largest set, the Gozer temple. Designed by John DeCuir, the temple was a towering, six-story-high structure featuring thirty-foot-tall doors, elaborate gargoyles and a lighted plexiglass stairway reaching up into the heavens. Originally, DeCuir had hoped the temple could be built on top of an actual building in New York, but when that proved impractical, he set to the task of creating the illusion on Stage 16 of The Burbank Studios. For DeCuir — who had years of experience building enormous palaces and city streets for such films as *Cleopatra* and *Hello, Dolly!* — that task seemed not at all out of the ordinary.

To help capture a real sense of the temple being in New York, DeCuir built a huge cyclorama of the Manhattan skyline to surround the set, encompassing nearly 300 degrees. Depending on how it was lit, this panoramic backdrop could go from a bright daylight sky to a dark night sky, and was complete with painted skyscrapers and city streets. At night, windows in the buildings were lit from behind and auto lights on the streets were simulated by fluorescent light tubes covered with spiraling strips of black tape. By rotating the tubes — which looked much like barbers' poles — the simulated car lights appeared to be moving down the street.

The Gozer temple itself was a huge, imposing structure requiring 3000 man-hours and \$1 million to complete. One of the largest indoor sets ever constructed in Hollywood, it drew enough electricity to light a town of 4000 people, and filming on parts of the studio had to be halted whenever it was in full operation. Illuminating the set was such a complicated matter, in fact, that on the first day of filming, it took the crew over eight hours to experiment and adjust the lighting for the first shot.

"We basically had no problem on the big set from a special effects point of view," John Bruno stated, "but the set itself was dangerous. Just the scale of it. There were a lot of crew-people up top, and lights could have burst and dropped glass 65 or 70 feet to the floor where close to one hundred members of the crew were working. The set was restricted, not so much

because of secrecy, but because it was dangerous. For instance, when they built it, they figured the heat of all those lights could set off the sprinkler system, and so they shut it down and had the fire department up in the rafters all during the shooting. One day, it was discovered that when the large stage doors were open at either end of the building, the air pressure would cause the cyclorama to move back against the bulbs. Once, a hole was almost burned in the backdrop. It didn't catch fire, but it could have. All this helped keep tensions a little on edge during the filming."

A pair of Terror Dogs was used on the temple set for the scene in which the Gozer first appears in the form of a woman. As she emerges from the pyramid-like temple top and slowly walks down fog-covered steps, she stops to pet one of the dogs before turning to declare the doomed fate of the Ghostbusters. Well below the action and the sleekly-designed surface of the temple was a tangle of pipes and beams — the structure that gave the set its shape and support. Hidden amid this labyrinth of scaffolding was an area known as the 'treehouse,' where the Terror Dog operators could insert themselves up into the body of the beasts and make them come to life. Each foam rubber dog required two puppeteers — one inside the foam rubber monster to move its head and shoulders, and one outside to operate the eyes. Since they were intended only for distant shots, and because they had to be made quickly to meet the early deadline, these particular dogs were not able to open their mouths or have extensive articulation to their movements. In fact, their feet were locked off so that only the shoulders and head could move. For puppeteers Harrison Ray and Mark Wilson, making the lumbering, barrel-chested beasts come alive was an interesting challenge.

"It was so strange being inside the dogs," Ray explained, "because we were surrounded by foam and cables. We had a small Watchman TV monitor in front of us to see what we were doing, a headset to communicate with the people near the director, an air feed into our noses to give us fresh air, and a big hose coming up through the body to ventilate the puppet and keep the temperature comfortable. We had been told when we first started that the temperature on the set would probably go up to 120 degrees because of all the lights, but once the air was being blown in, it was fine. Still, it was really strange to be inside there — like you were a lone astronaut in a starship cockpit somewhere out in deep space."

Considering the size of the set, the headsets were particularly important in maintaining communications between the director and his puppeteers. Cook, Ziff and assistant Duane Clark stood near Ivan Reitman, relaying his instructions to the Terror Dog operators — a task that was not always the easiest to accomplish. "Working on the set, we would stand back near the camera and have to communicate with people inside puppets that were literally a hundred feet away," Clark recalled. "As a result, responses were sometimes not immediate. And if there were any problems with the headsets, then it became a real hassle, because to convey instructions directly meant go-

*Ivan Reitman coaches Sigourney Weaver during the armed assault. / For a closeup as the chair pivots about prior to sliding into the kitchen, both camera and chair — with arms removed for easier access by the puppeteers — were mounted on a manually operated rotating platform. The shot, which showed the room whirling behind the struggling cellist, was ultimately cut in favor of an overhead view. / Veteran EEG cameraman Dave Stewart, recruited for ghostly duties, was dressed in a billowing white gown and flown about the effects stage on wires. The resulting footage was optically altered and incorporated into the sequence in which the Ghostbusters' ectoplasmic captives are released from their holding cell.*



*Key participants in the film were the otherworldly Terror Dogs, which went through a prolonged conceptualization process before a final design was settled upon. During preproduction, a number of artists were engaged to generate literally dozens of widely divergent proposals for the dogs' appearance, only sketchily described in Dan Aykroyd's original script. Among them were (left to right) a spiny hammerhead creature designed by John Daveikis and used by Aykroyd as a preliminary concept to help sell the project, a skeletal canine proposed by Robert Kline, a lumbering dim-witted creature by Thom Enriquez and a more predatory lizard-like dog by Berni Wrightson. After vacillating between the humorous and the horrific, an approved concept was delivered to sculptor Randall William Cook who refined it and modified it and made it work. / Terror Dogs materialize outside the Gozer temple.*

ing back behind the set and climbing up into the scaffolding."

"The director would talk to me and say he wanted more or less movement, or perhaps even a precise movement," Cook noted. "We had already rehearsed with the puppeteers a number of potential cues that might be used, because we knew they would be basically reacting to the Gozer and the Ghostbusters. At that point, they were more observers than participants in the scene, more stage dressing and not meant to take center stage." Sometimes, reacting to what the actors were doing was not always easy. "I didn't have any problems interplaying with the Gozer when she petted the dog," explained Mark Wilson. "None, that is, except for when I gored her with the horns. I just wasn't paying any attention to my monitor, or for some reason I didn't see her, and I turned real fast and struck her with the horn. I didn't cut her, but she really jumped."

The limited-action temple dogs — used only in long shots — were meant to be intercut with a more involved, fully articulated dog that would be shot later when it was completed. Sometimes, though, on the temple set, there were feelings expressed that the dogs didn't seem alive enough. "Based on our schedule, all EEG could give us was long-distance, limited dogs," Michael Gross said. "The good-looking, closeup dog would not be ready until February, and we were going to shoot on the big set in December. The limited dogs were always meant to be in only one or two quick cuts — and remember, by this point in the movie, the audience has already seen the dogs run through the streets and burst out of Louis' apartment. I didn't think anyone was going to suddenly stand up in the theater and say: 'Hey, look! Limited dogs!' They were always just meant for background. But then, when you get them up there and start working with them every day for five days and see all the dailies, after awhile, it became: 'Jeez, look at the dogs. They look dumb and terrible.' Everyone started getting down about how much they looked like puppets all of a sudden. Well, when we did the final cut, they were used for just what we said they would be — a few, quick background shots. They looked terrific, too, and worked well with the closeup dog intercut with them."

"We built the long-distance dogs just as we were putting the shop together," Ziff added, "and they were made out of foam rubber supported by fiberglass structure underneath. To give the closeup dog a more realistic look, we covered it with Schram foam, which bends like real skin. It's very elastic, but it's also heavier than the foam latex, more difficult to paint, and it deteriorates more quickly when it's exposed to air. So it was a tradeoff for us, but I think one that ultimately worked well." The closeup dogs also featured articulation mechanisms built by Ziff and Bill Sturgeon.

When the closeup dog was ready for action, it was filmed mostly during second unit photography — primarily on the set of Louis' apartment and the hallway just outside. While not nearly as elaborate as the Gozer temple, this set was still built up five feet above the soundstage floor. To operate the dog, a hole was cut into the floor of the set where the creature was to be positioned, once again allowing puppeteer Harrison Ray to climb

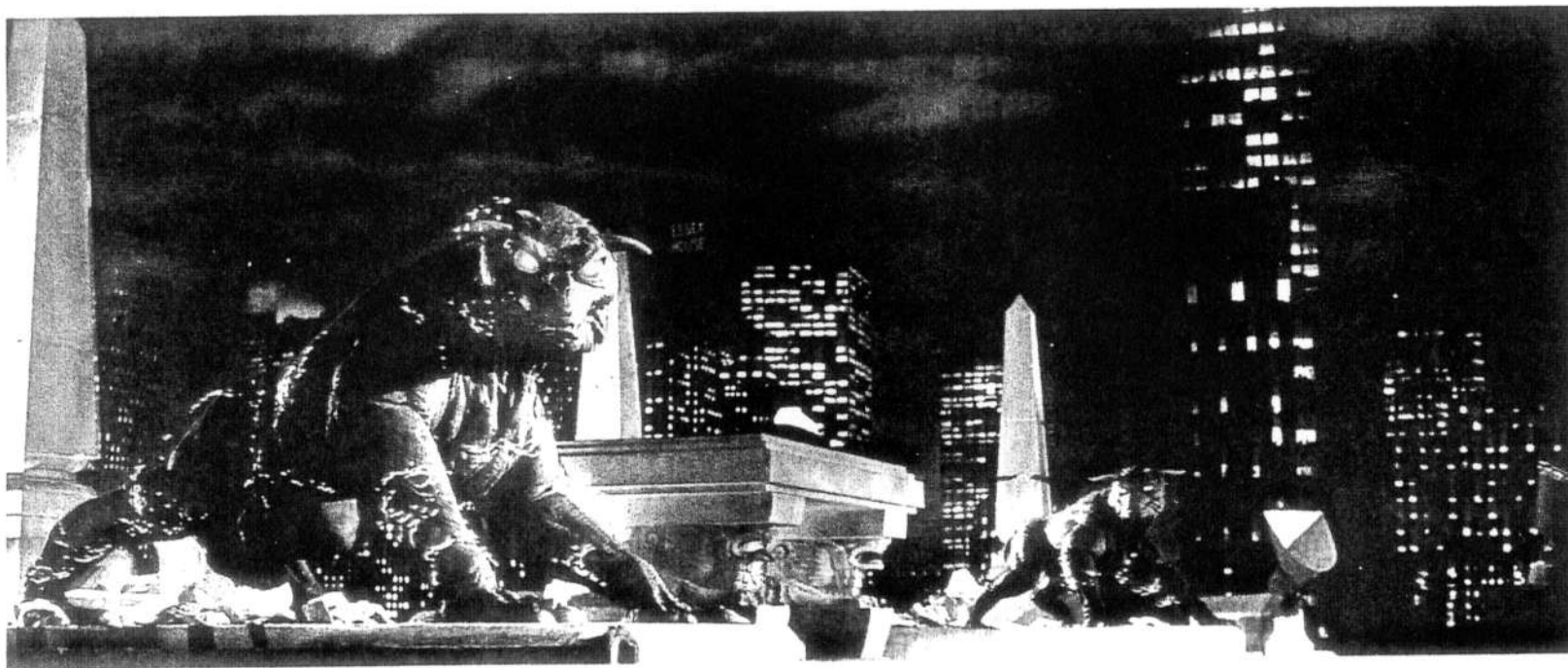
up into the puppet from below. "The closeup dog had cables operating the ribs, the nose, the mouth opening and closing, the eyes blinking and moving, and the legs which had claws that could curl open or retract," Ray explained. "For me, it was still basically the same as before — only now I had up to fourteen people to try and coordinate with."

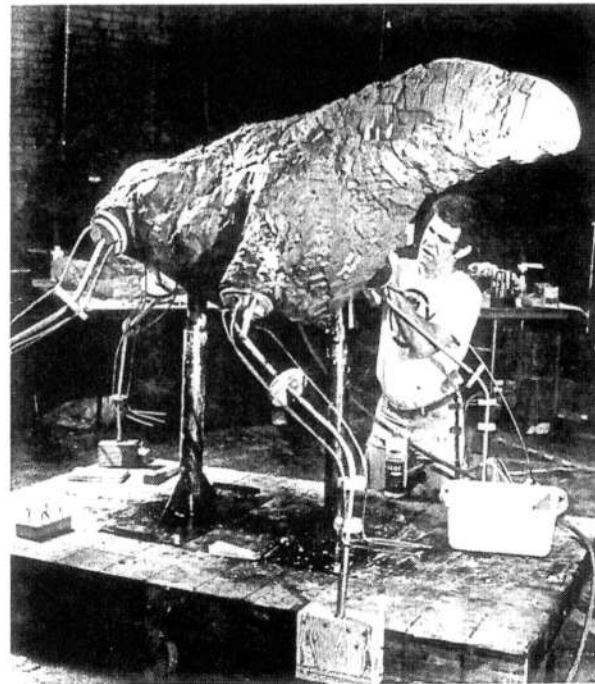
On the set, Ivan Reitman and Stuart Ziff would discuss the shots, and then Ziff would use a headset to convey necessary instructions to Ray and the other operators. Suddenly, the powerful beast would come to life, moving its head from side to side, gnashing its teeth, rolling its eyes and gripping its claws into the carpet. Meanwhile, down below in the belly of the beast, bellows weezed, cables were pulled, and the puppeteer operating the mouth growled and roared to help get himself into the proper mood. Once again, a video hookup displayed what the camera was seeing, enabling the operators to observe and shape their individual performances accordingly.

For the man inside the monster, the closeup suit did provide some additional problems. "The closeup dog had a fiberglass body which made it more difficult to move around," Ray noted. "Also, when they were shooting scenes that involved sound, they had to shut off the blower inside the puppet — so I couldn't get as much air up in the chest cavity. In fact, the toughest time we had was right after we did the bedroom scene in which the dog first appears in the apartment. They set the dog up on the floor of the living room without the benefit of any air being piped in. It was just a quick shot of the beast after it'd crashed through the bedroom door and landed in the middle of Louis' buffet table. Besides the fact that the blower was shut off, they also stuck me up in there without the video hookup, so I couldn't see — and without a headset, so I couldn't hear. Instead, Ivan yelled directions to me through a megaphone. He probably had the thing right up to the head of the dog so I could hear."

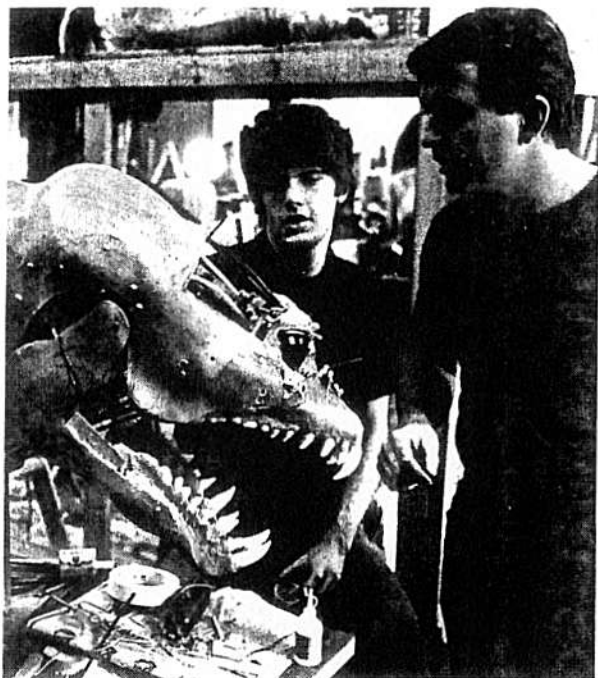
In addition to the on-set Terror Dogs, the ghost shop also provided the three bestial arms that burst out of a chair in Dana's apartment and grab her. Designed and sculpted by Steve Neill, the arms were worn as arm-length gloves by three puppeteers who positioned themselves beneath the floor or behind the chair out of camera range. The chair itself was slightly larger than the original one normally employed on the set, and its upholstery was prescored with a razor blade so it could be burst through easily. The scoring was concealed from the camera by the fabric's textured pattern.

Sigourney Weaver proved to be an enthusiastic victim. "I had to keep encouraging the guys with the arms to get rough with me. They were trying to be nice, and that didn't work. The arms really had to look like they were hurting me, and I had to encourage the operators to slap me harder. I had to tell the one who had to slap me in the face that if he would just find my chin with the palm of his hand he wouldn't hurt me. He was afraid that the nails of the hand might put my eye out — which probably was a good fear to have — but we just kept working at it so he could really push me back in the chair and make









it look real."

Once the hands have grabbed Dana, the chair swivels abruptly and then slides quickly into the kitchen where the forces of Gozer await her. For this shot, the arms were stuffed rubber shells which were either wired in place or held in position by Weaver herself. The chair — hooked to a cable drum — traveled along a track which was easily concealed between tiles in the set's parquet floor.

Chuck Gaspar supervised the traveling chair, and worked with Weaver on a number of other stunts. Perhaps the most unusual was rigging the scene in which Dana first welcomes the Gozer's spiritual forces. Their entrance is, to say the least, a big one when they blow out one entire wall of her apartment. "The wall explosion was an effect that was not originally in the script," Gaspar explained. "Ivan came over to me one day during production and said: 'A couple of weeks from now, I want you to blow this wall out and have Dana standing right in front of the window.' When we did the shot, I actually had her back off about seven feet so she wouldn't feel a thing. Everything was away from her anyway. John DeCuir built the hole he wanted to see after the wall was blown out, and then we filled it in with balsawood bricks and breakaway glass and frames — so it was really just hanging in space. We had fans behind Sigourney, just to create that little bit of an eerie effect, and then when the wall blew out, we had more fans to blow her dress and hair around.

"To blow out the wall itself, we used fifteen air mortars, each holding 150 psi of air and about two quarts of wet sand. The mortars acted like shotguns. The sand was in the tubes, and once it left the mortar it spread out. There was enough of an impact with that fine sand to take everything out, although you never see the sand itself. Sand is ideal because it breaks up when it hits glass or whatever, and you can't see it. The mortars were placed on either side of Sigourney and above her, all pointed towards the wall. We also used a few cables out in front to pull down the ironwork handrail on her balcony — which was actually made out of rubber — and to move plants that were also on the balcony. The camera was protected by a thick piece of plexiglass and, while it wasn't going to be too noisy, I gave Sigourney earplugs so the sudden noise wouldn't startle her."

"It was great," Weaver exclaimed. "I'd love to do it again. It was just like being behind a tidal wave, or being the only person in the world inside an explosion. I was a little afraid because they told me not to move a muscle or even blink an eye. I got a lot of debris on me, but I just played it cool because Dana was possessed and wanted what was happening. Before the stunt, I did ask around, making sure it was safe — because you always read about accidents and you wonder why the actor didn't realize the stunt wasn't safe. But I was assured it was and, actually, I like having special effects happen around me. I've never worked with a special effects crew that didn't really take good care of me. In fact, I feel safer doing a special effect than I sometimes do in real life." Weaver found it more

*Referring to the clay prototype he had earlier rendered, Cook sculpts a final Terror Dog to be used in generating a mold for his stop-motion puppets. / Only those shots requiring the Terror Dogs to run or move about, however, would be done via the single-frame technique. Most of the footage would be achieved on stage using full-size articulated puppets. In fact, while Cook sculpted his miniature dog, Mike Hosch and a team of sculptors were at work on a scaled-up version of the same creature. / With sculptural refinements still underway on much of the body, chief moldmaker Gunnar Ferdinandsen takes a casting off one of the completed forepaws. / Bill Sturgeon and Steve Dunham examine the cable-operated fiberglass underskull which would give the full-size dog its range of facial articulations. / Larz Anderson and Mike Hosch at work on the Terror Dog claw mechanism.*

*The articulated Terror Dog — not yet completed — is erected on a platform for an early test at EEG. As it would be on stage, the dog is positioned over an opening in the floor through which a human operator could insert his upper body directly into the creature to effect most of its major moves. Other more subtle movements and expressions were accomplished via cable-actuated mechanisms controlled by an external team of puppeteers. / Since the operator inside the dog was unable to see, closed-circuit video cameras were directed at the beast from outside and the resultant signal transmitted onto a mini-TV monitor mounted within the suit. / Effects technicians position the articulated Terror Dog on a cutaway bed for its initial appearance in the apartment of Dana Barrett's neighbor Louis Tully.*

difficult dealing with the kinds of effects she couldn't see. "For one scene, I was in the kitchen and I opened the refrigerator door and Ivan was inside there with a camera, telling me to act scared. It's very hard to act really frightened when you don't have something really frightening to react to. On *Alien*, it was a lot easier, because everything we saw was real, and all of the effects happened right in front of us."

One *Ghostbusters* effect that *was* real was the levitation, and it proved to be a new experience for both Weaver and Gaspar. "The levitation was a first time for me," Gaspar explained, "because Ivan wanted her to roll. We had done straight levitations before, where you just raise a person up and down, but we never had someone do a ninety-degree roll. We used a stunt double first to work out the problems. Usually you make a fiberglass body shell that can be hidden underneath the levitating person's clothing, and then attach it to a bar directly behind them that can travel up and down the wall out of the camera's view. To do the roll, we had to build a bearing to go with the shell and run it by electric motors."

"The levitation was fun," Weaver noted. "We did about twenty rehearsals for it, and the first time I went up I thought the cast was so tight and uncomfortable that I would never be able to do it. They had made the cast using a double, and my body fitted differently as a result. But Chuck had us rehearse it over and over so that by the time we filmed it, we were all old hands at it." The effect worked well on the first take, and everyone was satisfied until later in dailies, when an editor not on the set during filming noticed the shadow of the support bar moving up and down the wall. While none of the thirty or so people on the set had seen it, the shadow was very clearly there, and so the shot had to be repeated.

Gaspar was involved with numerous other effects during the production, including the eggs in Dana's kitchen that burst out of their carton, land on a formica countertop and start sizzling. "All of the eggs had to be prescored using a small electric motor saw that was like a dentist's tool. Then the scoring had to be filled with plaster, sanded down and painted over to blend in with the rest of the egg. By then injecting air into the bottom of the egg, we could cause the prescored part to split and the yolk to pop out. The eggs were also rigged to vibrate. The air hose was hooked up to a motor which we could speed up or slow down to make an eccentric motion. In order to make the effect appear more random, we had six eggs rigged and placed in different areas of the carton. The counter was actually aluminum that we cut to look like tiles and then sent out and had teflon-coated. We used two propane burners underneath the counter where we thought the yolks would land, and we weren't that far off. We had to do just two setups — and then only because the first time, the eggs went out of frame."

Gaspar also supervised the physical effects involved in shooting the hotel interiors during the Onionhead encounter. While the exteriors of the hotel were shot in New York, with most of the more action-filled interiors done later on a studio soundstage, some of the more expansive banquet hall scenes

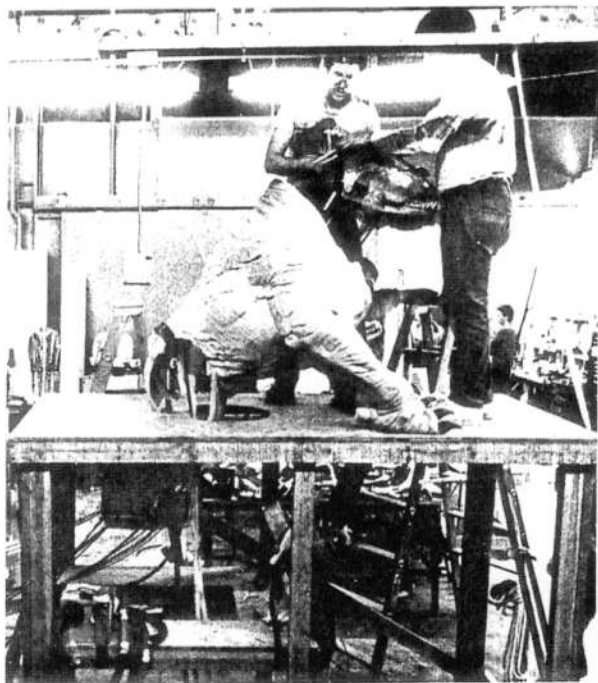
were filmed on location at the Biltmore Hotel in downtown Los Angeles. "We had to go into the hotel and try not to destroy anything while dropping two chandeliers and simulating laser burns on the walls," Gaspar recalled. "The fire department didn't want us to do it at first, and we had a difficult time getting a fire permit. For understandable reasons, they were concerned about us creating smoke in the hotel and scaring people. The Biltmore is a high-rise building, and they have enough problems in hotels anyway, without someone going in and intentionally making a fire. We had to use a lot of fire protection as a result, and blowers and fans to take the smoke out."

To simulate blasts from the *Ghostbusters'* Nutrona wands, Gaspar and his crew made fake walls which they placed against the real ones in the hotel. "We would stack three fake walls against each other so we could shoot one, then take that one away and shoot the next one. It wasn't that easy to do because they were big. We routed out our walls and laid black match fuses into the grooves. We also placed in some sparkler granules. Then we covered that up with mylar, to smooth out the groove, and repainted it. When ignited, it burned very rapidly and with a lot of sparks that would shoot fifteen feet out. The whole place was blinded by the light because it was a pretty violent ignition. To help protect the hotel's carpet, we laid plywood and then our own carpet over it."

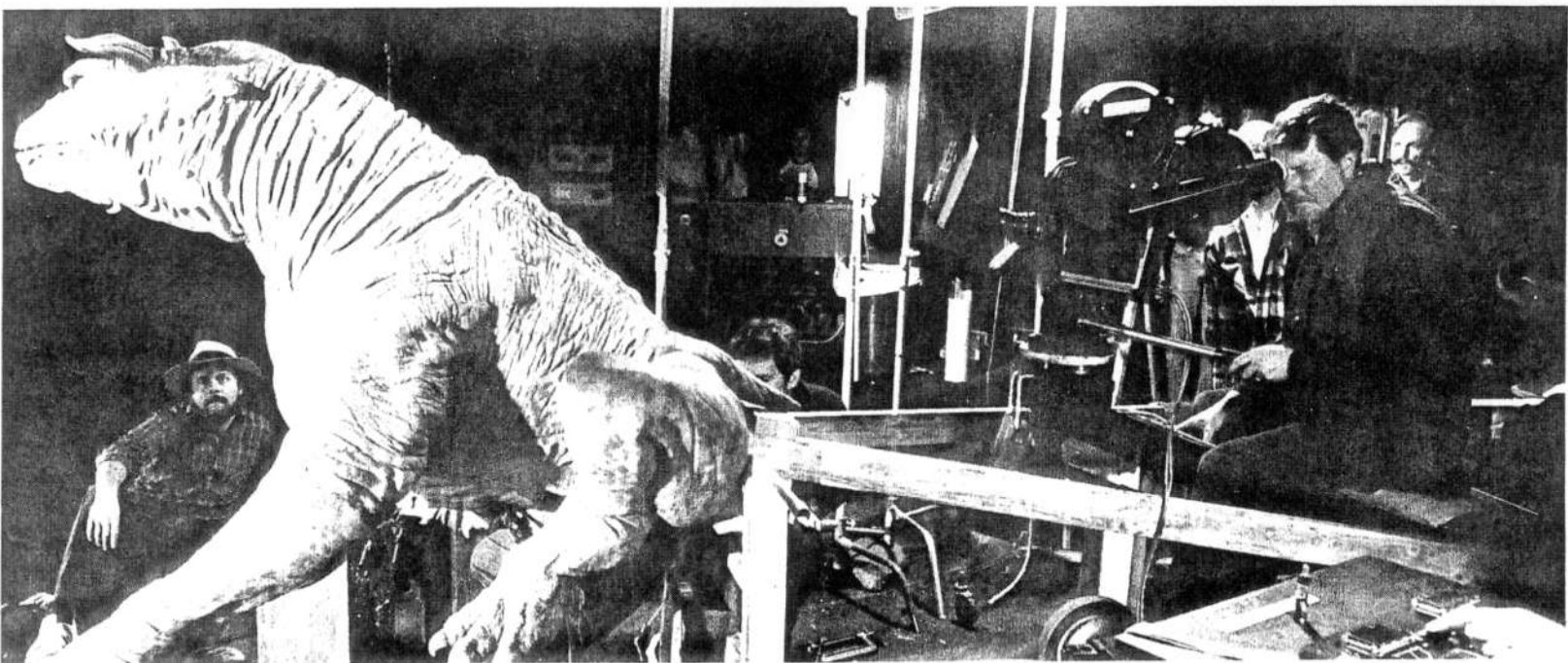
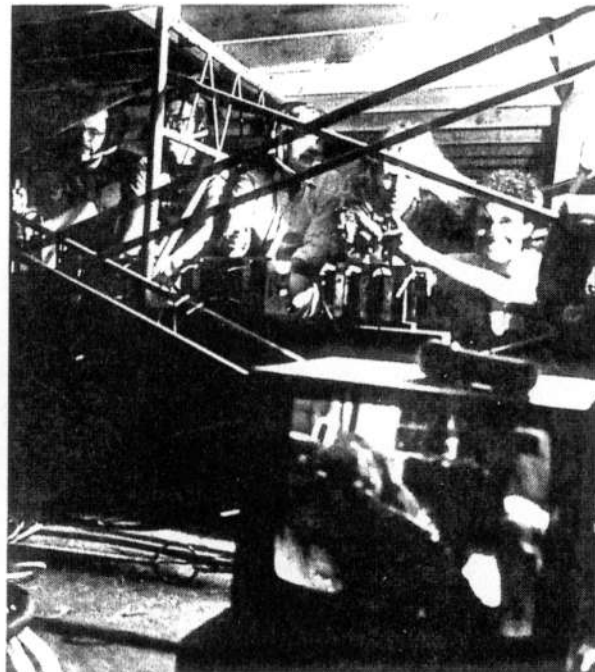
In their spirited pursuit of the Onionhead ghost, the *Ghostbusters* demolish a crystal chandelier in the Biltmore's banquet facility. To effect the shot, Gaspar's unit constructed two prop chandeliers — copying, as closely as possible, the ones already installed — and mounted one in the center of the room where none was present. "Then we attached an electronic cable cutter and rigged the chandelier with some sparkles and explosives. When the sparks and blasts were set off, we triggered the cutter to cut and the chandelier fell to the floor and smashed into pieces." Although the first take was near-perfect, Ivan Reitman felt that it could still be improved upon, and so the second chandelier was also rigged and detonated in like manner.

"On location at the hotel, Laszlo would light the shots and I would adjust them for the effects," said John Bruno, who supervised the 65mm plate photography. "We shot the scenes with three cameras — one high-speed 35, one regular master and our effects camera — so there would be coverage of all the action. Prior to shooting, I had boarded the sequences; but since I had never seen the hotel, the boards had to be adjusted when we got there, in terms of what could actually be done. I also did some early tests with Chuck on designs for the wall burns and how they should blow up. I had pushed for longer burns, but the flashes were approved at one-and-a-half second burns by Ivan. Overall, the hotel photography went smoothly, especially in the banquet hall, even though we ended up using more than twice as many explosions as we had originally planned, because once we got to the location, Ivan decided he wanted more action."

In contrast with some of their more elaborate effects, Gaspar and his crew used simple wire gags to float books through the









stacks at the Los Angeles Public Library for the Ghostbusters' encounter with a phantom librarian. And they also developed the mixture that would serve as ectoplasmic goop throughout the production. In reality, the sticky, slimy substance was made out of methylcellulose ether — or Methycel, for short. Generally used in pharmaceuticals and food thickeners, the Methycel powder was mixed with water and food coloring to the gooey consistency desired for the film.

Meanwhile, back in Marina del Rey, the ghost shop was busy preparing the different manifestations that would soon have to be filmed on the EEG stages. Steve Johnson, for instance, was finishing up work on the librarian ghost. In their first real brush with the spiritual realm, the Ghostbusters stalk their quarry through the stacks of the New York Public Library, ultimately coming upon an elderly, semi-transparent woman floating a foot above the floor and reading a book. When they try to grab her, however, the old woman quickly turns on them, transforming into a particularly horrific demon. The startling effect involved two stages — the first with an actress portraying the librarian, and the second with a mechanical figure that featured an understructure that could initiate a series of cable-operated moves and body contortions.

"When the shot begins," Johnson explained, "Dan Aykroyd and Bill Murray have just jumped away from the image of the actress in makeup and she turns towards the camera and starts going through a move. As her hands get to a certain point, we lap-dissolve to our figure, which sculpturally looked exactly like her except that we'd already had a changing mechanism under it and her eyes looked different. During the dissolve, we had the mechanism start changing just slightly so that at first, there was no dramatic change. The mechanical figure was completely locked off and machined to do one set of moves. The head lowered on the body, the rib cage burst out, the body grew seven inches, the waist thinned, the arms lengthened eight inches, the eyes sank in and the teeth came out so that the face started to get an alligator look to it. All of this was tied to just two handles. John and Nicholas Alberti, who designed the articulating mechanisms, are just amazing. They created a structure that practically allowed you to just sit back and smoke a cigarette while you pulled two levers and watched an old lady turn into a demon." An additional stage of the transformation was initially planned in which the ghost would become even more monstrous; but with the footage they already had, both Edlund and Reitman concurred that further elaboration was unnecessary.

Perhaps the most outlandish spirit to haunt the Ghostbusters is the Onionhead ghost — a greenish, foul-smelling lump of transparent ectoplasm that terrorizes the unsuspecting patrons of a posh New York hotel. Unlike many of the other creatures in the film, Onionhead's design did not change drastically from its early conceptual stages, but the approach used to bring him to life did.

"When I first got involved with him," Steve Johnson recalled, "we were going to do Onionhead as a cable-operated puppet.

*In Tully's living room set, John Bruno discusses an upcoming Terror Dog scene with Ivan Reitman. / Under the stage floor, puppeteers activate the various cable mechanisms required to produce facial expressions on the beast. Like the interior operator, the cable-pullers had to gauge their activities and coordinate with one another by observing the results of their actions on a video monitor. / Effects cameraman Bill Neil photographs a bluescreen element of the Terror Dog rising into the frame. Bluescreen was necessary for the shot — of Tully frantically trying to gain entrance to the Tavern on the Green — since the live-action element had been photographed during the New York location shoot, long before the dog itself was completed. / EEG crew members prepare for another over-the-shoulder shot to be incorporated into the bedroom sequence. / Filming in the hallway after the Terror Dog has burst through the door of Tully's apartment.*

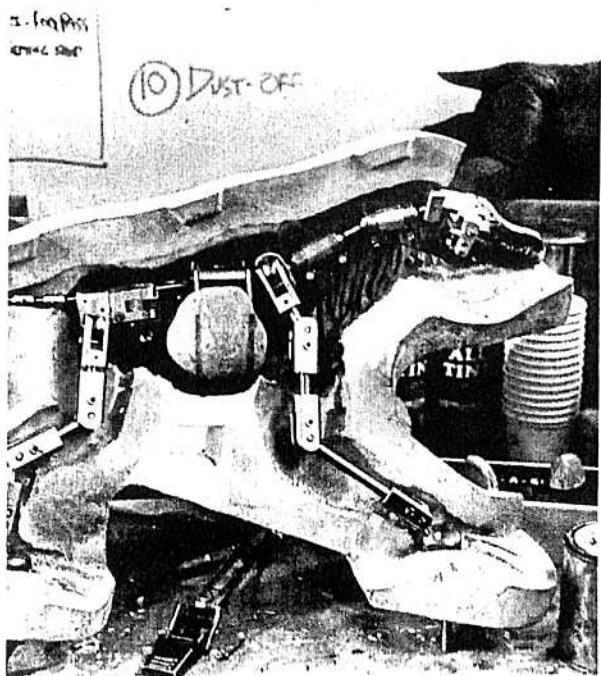
We thought that would be the easiest way to do him, with completely puppeted arms and everything. But then we got into a deadline crunch, and Richard thought it would save a lot of time if we could do him as a suit worn by a puppeteer. We made the suit out of foam rubber, reinforced with spandex, and originally we thought we were going to have to support the suit from above with cables to help the puppeteer hold the weight of the suit. But once we put Mark Wilson in the suit, we realized that wasn't a problem because the suit wasn't that heavy. Another reason we were going to put him on cables was so we could have him swing around really unbelievably for shots of Onionhead skating around corners. But if we'd put him on wires, there would have been difficult lighting problems to deal with because they would have had to light an enormous area." Ultimately, it was decided that the more eccentric moves could be effected by having Neil Krepela project and rephotograph the Onionhead imagery on Compsy. Mark Wilson — in the Onionhead suit — could be lit properly in a stationary position and then during photography tilt and undulate his body so that desired size and positioning aspects could be created later.

On stage, Onionhead was filmed almost totally against black, with a team of puppeteers operating the various cables off to the side and out of camera range. Sometimes, puppeteers were also needed to help move parts of the suit — the bottom of the mouth, for example, was controlled by a bar that came out from the underside of the suit — and they were cloaked in black to blend into the background. For one particular shot where Onionhead twirls around in place, John Bruno had a spinner rig built to allow the cable operators to ride below while Wilson was standing on top. Another puppeteer, also dressed in black, turned the rig around. Wilson, who was essentially covered in the suit from the waist up, wore latex rubber Onionhead arms over his own, and his legs were cloaked in black. Occasionally, cameraman John Lambert would pan or tilt slightly while he was recording the action, but more complicated movements were added later on Compsy.

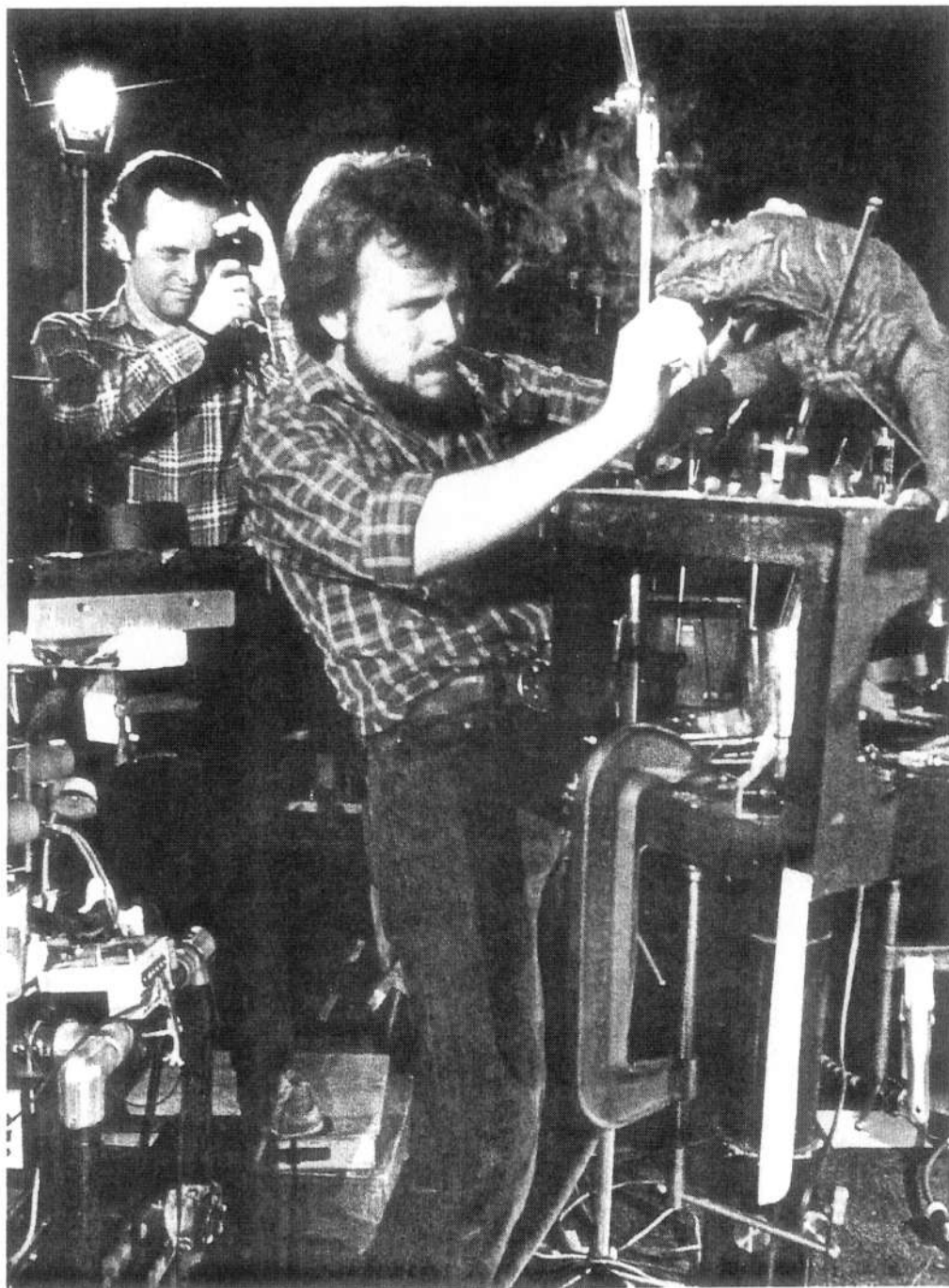
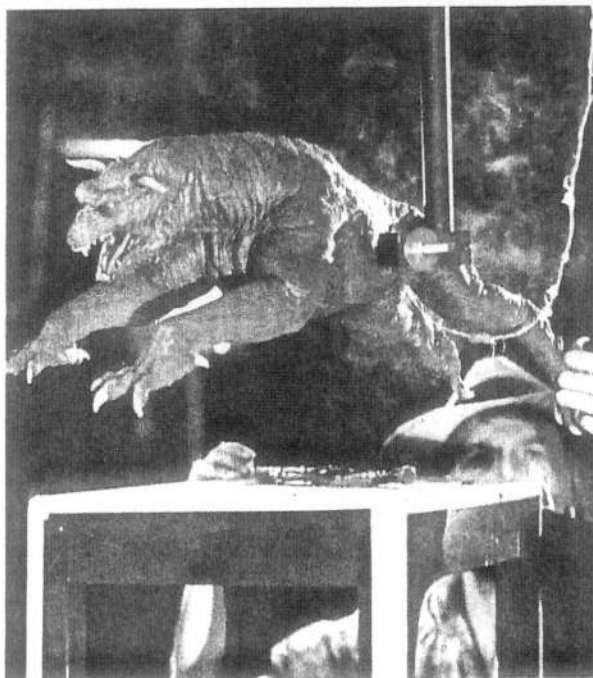
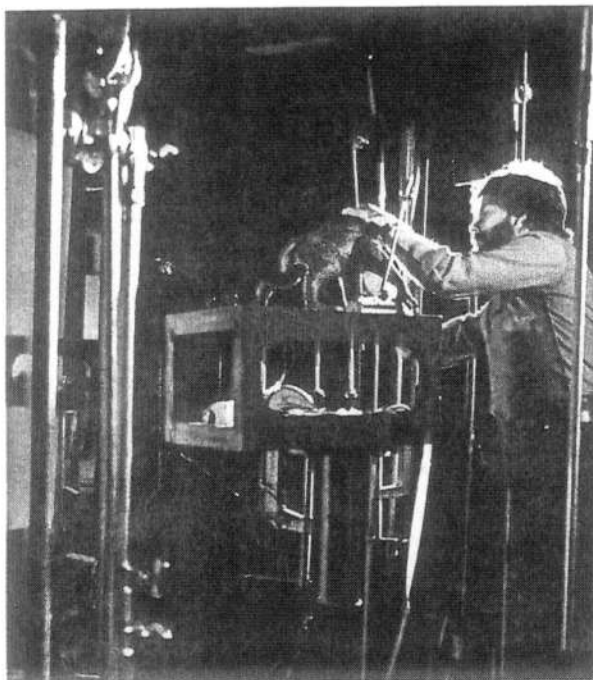
"With the Compsy system," explained Neil Krepela, "we could add many different types of moves to the Onionhead shots that couldn't be done easily on the stage. For instance, since the suit was worn by a human and tended to be large and therefore not easily rotated upside down or turned in other unusual ways, we could rephotograph static shots of him taken on the stage and flip him over, make him dart across frame or appear to be streaking away very fast. By doing these moves with the Compsy, it helped add some ease to shooting Onionhead on the stage, because it allowed Mark inside the suit to concentrate more on his performance."

Wilson was not completely locked into position during his scenes. To bring Onionhead to life, he had to move around and gesticulate broadly with his arms and body. He also did moves that showed changes in perspective and angle on the creature itself. For instance, if he were supposed to be moving away from the camera, he would have to show more of the side of the suit at the beginning of the shot, and then more of the back towards

*Actress Sigourney Weaver meets her cinematic alter ego during a visit to EEG. / A Terror Dog armature positioned inside its plaster mold prior to injection of the foam latex used to produce the final stop-motion puppet. / In contrast to his prior stop-motion experience — which involved split-screen rear process compositing — Cook animated his Ghostbusters characters against a blue screen for later optical compositing with the live-action plates. / Cook adjusts the Terror Dog puppet for its initial leap into Louis Tully's apartment. / While Cook works, cameraman James Aupperle takes a spot light reading off the stop-motion setup.*









the end. Such changes in perspective could never be shot using Compsy, but the rear-projection system was particularly helpful in creating other more complicated moves and could match movements in the background plates that had been shot in the hotel corridors.

"We could take a plate that we'd shot in 65mm and roscope it through the camera," Krepela noted. "There was a program in the system that allowed us to plot every frame, point by point, and then record it in the camera. Then we could recreate that movement and add it to one of the stage shots of the Onionhead. For instance, if I needed a tilt on him to match a tilt on the background, I would just chart the move on the plate with Compsy and then recreate it on the rear-projected image of Onionhead. Later, when the plate and Onionhead elements were combined in optical, the movements matched perfectly."

With the technical aspects of how to film Onionhead resolved, the next question became how he should act. Under Johnson's supervision, Lance Anderson, Steve Dunham and Joe Franke manufactured three different cable operated faces — for smiling, looking terrified and drinking — each showing a wide range of expressions. But, even so, any mechanical can look unnatural without the right inspiration behind its movements. Onionhead was a character, and we had to think of him in terms of character and acting," Stuart Ziff explained. "In terms of directing the scenes, John Bruno and I tried to think about what Onionhead's motivation and focus was, and why he was doing what he was doing. We would then take a consensus of the puppeteers, the cameraman and Mark Wilson inside, and then try to do a take. One thing that really helped us all was viewing *Animal House*, because early on we had heard Onionhead was supposed to be modeled after John Belushi."

"Dan Aykroyd created Onionhead," Joe Medjuck explained, "and one day we were all talking about it and Ivan said the character was sort of like Bluto in *Animal House* — like the ghost of John Belushi, in a way. Danny, who was obviously a good friend of John's, never argued with that. Even so, we never officially said that and we never mentioned it in the script. It was just one way to look at the character, because Onionhead's grossness is like Bluto's in *Animal House*. We certainly never expected anyone to recognize him as such, although somehow the word did get out and we received some calls from a few newspapers saying they'd heard we had the ghost of John Belushi in our movie."

While Belushi's ghost would not be in *Ghostbusters*, the *Animal House* inspiration did provide a very useful point of reference. "I think watching the film was real valuable for all of us who were going to be involved in puppeteering Onionhead," Steve Johnson said. "John Belushi showed an amazing range of expression in his face, and especially with his eyebrows. Not only that, but his body movement was also very funny. We got a lot of Onionhead's body movement from watching Belushi, because our main concern was that the body would seem too static while his face was being animated. There were a lot of scenes in *Animal House* that provided inspiration for us because

of the classic Belushi physical comedy, like the eating scene in the cafeteria and the scene when he's up on the sorority house lawn and he stops every few feet and freezes to see if anyone is watching him approach."

"Onionhead was much harder to perform than the Terror Dog," Wilson asserted, "because with the dogs on the temple set, all we had to do was point their bodies in a particular direction. For Onionhead, it was acting. I'd be told, 'Okay, now, act terrified.' *Animal House* helped a lot because it gave us a sense of comic timing to the movements. I also tried to think about how much of a slob Onionhead was, and that he was like a little kid in a candy store or someone who had just been released into the world. We also talked through the scenes, and I could look through the camera and see a slide of the background plate. That helped me see how big Onionhead would be in the shot and, if he were small, I knew I had to tell more with his arms than with his face and that I needed to create broader movements."

"We went through a whole coordination sequence early on, so we could learn how to work together and coordinate the movements. We tried systems like counting where Stuart would say: 'Okay, on the count of three, the mouth should be here, the body should be there and the arms should be up.' But that didn't work too well, so we eventually ended up using cues that had the word 'and' in between them to add a beat. For instance, the cues would go: 'And, strike, and, happy, and, attack' — with the 'and' providing a beat so everyone could get ready. Then on the cue, I would move the body and the other puppeteers would pull the cables to get the expression we wanted. All of the puppeteers were really talented, having various backgrounds in performing, so they were able to ad lib if they saw me doing something different."

One of Onionhead's favorite pastimes is eating, and when the *Ghostbusters* first spot him in the hotel, he is ravaging the wastes left on a room service cart. For this shot, Wilson once again wore the suit, but this time had help from Mark Segal, who operated the tongue with his hand, and from Steve Johnson, who worked the ghost's cheeks. Wilson was handed a plate that was smothered with real food — everything from lettuce to Jello and gravy. "To help me get into the scene," Wilson recalled, "I grabbed the plate full of Jello and yelled, 'Jelloooo,' dumped it into my mouth, and it ran all down the front of Onionhead's body. I didn't even realize what I had done; but afterwards, I could hear everybody laughing on the stage. I guess it's a weird thing to say, but it helped as motivation. Actually, I tried to do a lot of sounds to help me get into the character — but fortunately, most of them were not audible from the outside."

To help diminish Onionhead's apparent size, oversized props were often used. For instance, in one scene, the ghost guzzles an entire bottle of champagne, only to have it all fall right through him because he is, after all, just a spirit. "We got an oversized champagne bottle which weighed seven or eight pounds when it was filled with water," Wilson said. "Because of the position of my body in the suit, the weight made it a

*Terry Windell — who co-supervised the animation department with Garry Waller — studies a 65mm film element. Nearly all of Ghostbusters' two hundred effects shots required some form of animation — from energy blasts and lightning to articulated roscope mattes. / Possessed by the spirit of Gozer, Dana Barrett levitates over her bed while Peter Venkman (Bill Murray), undeterred, attempts to converse with her. / Members of Chuck Gaspar's physical effects team make adjustments to the levitation rig designed to both lift and roll Sigourney Weaver — encased in a fiberglass body shell — by means of an electrically powered rotation device affixed to a concealed support rod.*



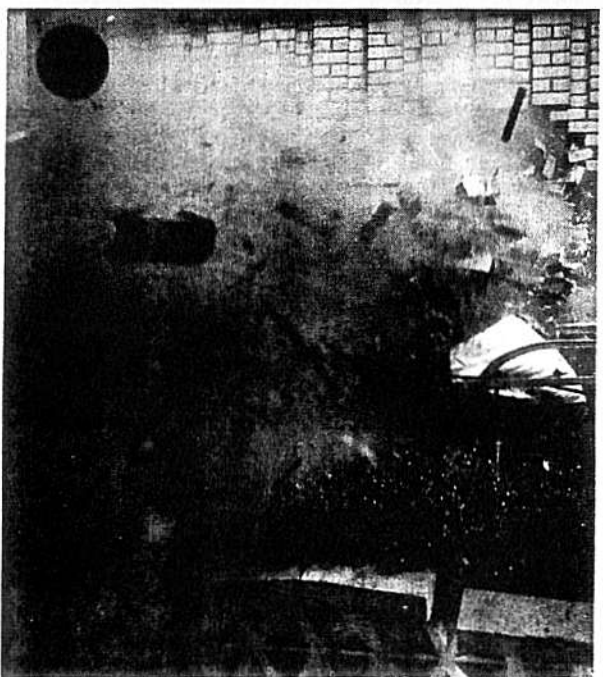
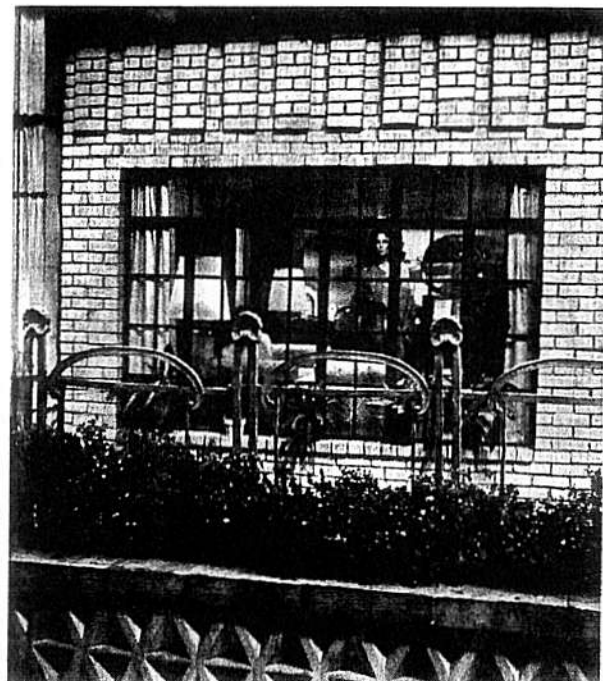
*While Dana stands transfixed, the forces of Gozer blast out an entire wall in her penthouse apartment. To achieve the shot, John DeCuir designed and constructed the set as it was to appear after the explosion. Then Chuck Gaspar and his crew filled it in with balsawood bricks and breakaway glass. Inside, fifteen air mortars were mounted and filled with wet sand — which when fired under pressure acted like invisible shotgun pellets to blow out the wall and windows. At the same time, concealed wires collapsed the flexible rubber handrails on the balcony. / Inside the room, Sigourney Weaver's stand-in takes her place during the prolonged setup. The interior of the breakaway wall and two of the air mortars can be seen. / Matte artist Matthew Yuricich at work on a painting of Spook Central. When completed, the small dark area in the upper front corner of the building will contain a rear-projected live-action plate of the Ghostbusters peering out the blown-away wall of Dana's apartment as the camera pulls back to reveal the full vista.*

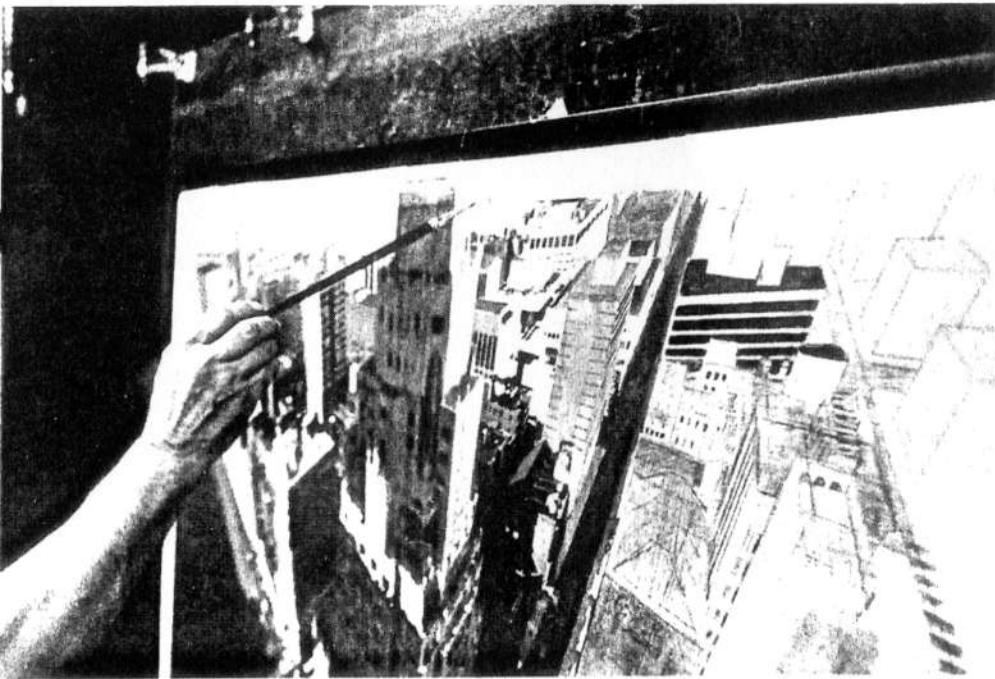
very grueling shot. Also, while I could look out the back of the mouth when we used the smiling face, I needed a Watchman monitor for this shot, because we were using the drinking face which had the lips puckered up very tightly. On the last couple of takes, we decided to just have me pour the water right into the mouth, which caused it to come cascading down all over me and short out the monitor. Unfortunately, when we got the takes back, the bottle didn't show up well against the black backdrop because it was so dark, and we had to repeat the shot all over again using a lighter-colored bottle." In addition, the drinking face was deemed out of character with the smiling face that had been used for most of the other scenes, so the shot was redone using the smiling face, which could be made to contort into the drinking expression. Besides Wilson in the suit, Onionhead was also portrayed by a puppet for one shot in which he flips over and pushes a room service cart away, and a small mockup was used by the animation department for several long shots of the ghost streaking as he traveled quickly through the hotel corridors.

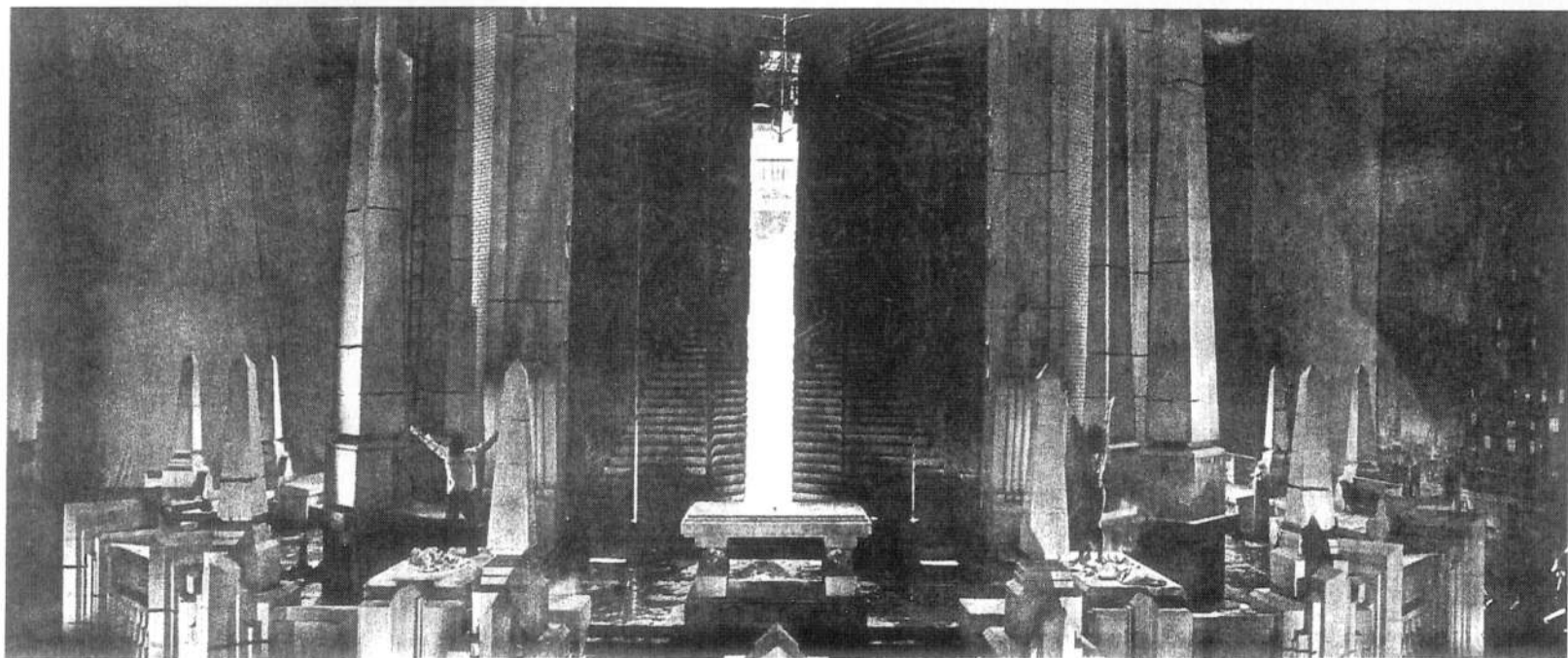
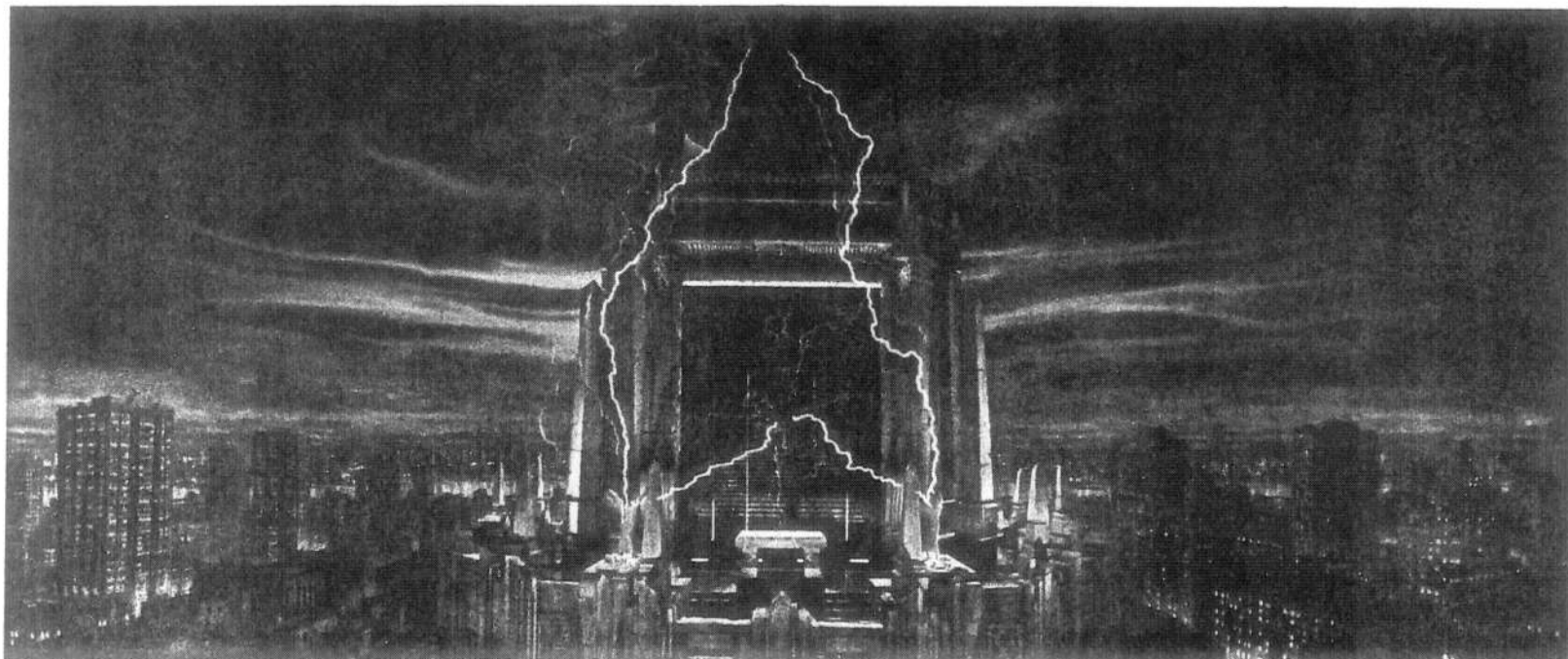
"Shooting the Onionhead scenes often seemed to take forever," Bruno added. "Since they weren't completely boarded — because no one ever knew exactly what the ghost was supposed to be doing in every shot — I talked with Ivan a lot about how he wanted Onionhead to act. Sometimes we would shoot twenty-five takes of one scene, and then discover in dailies the next day that the first take was the best. The problem was, we couldn't tell how it looked until we saw it on film because the shots were all somewhat experimental. We were filming the scenes using a 65mm Panavision camera that could go as fast as 60 frames per second, but we actually found that slowing the rate down created the funniest action. We first tried filming at 24 frames per second, then dropped down to twenty. Then one day I suggested we just see what it would look like if we really went slow — like 8 frames per second. We did it for the shot where the Onionhead pounds on his chest and charges towards a frightened Bill Murray, and it really looked funny.

"During the shots, I would hold a stopwatch and call out the time so everyone would know how much was left in the shot. Since we were filming at such a slow rate of speed, everything had to be acted out twice as long. Overall, we tried to do some funny cartoon takes — and certainly, with eight people operating Onionhead, he did take on a total personality. I didn't realize how much Mark as the actor added, for instance, until he was sick one day and Stuart stood in for him. Not that Stuart is not a good actor, but because of his stance and the way he held his arms, the creature took on a completely different personality."

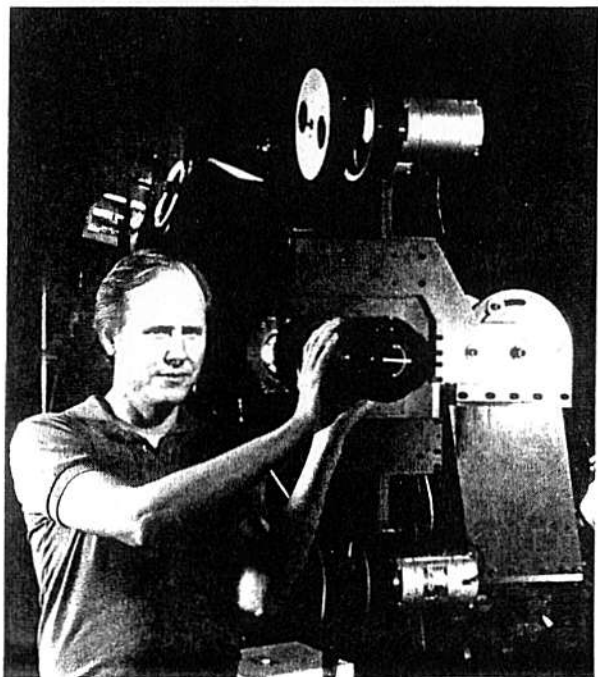
*Ghostbusters* reaches its climax when the three scientists face their ultimate challenge — battling the ancient Gozer. Proving himself a force to be reckoned with, Gozer assumes one final form to destroy the Ghostbusters and New York City when he becomes the Stay-Puft marshmallow man. While all of this may seem like outlandish comedy, it did have some grounding in reality. "Gozer was a name that appeared in a haunting in











England," Dan Aykroyd explained, "the one *Poltergeist* was based on. The name mysteriously appeared written on the walls throughout the house. For our film, we figured we might as well take something that had been reported as a real occurrence and use it for our main demon and supernatural force. Mr. Stay-Puft, on the other hand, was really just a brand symbol like the Michelin Tire Man or the Pillsbury Dough Boy that has come out of the American consciousness and is then thrown back in our faces by the Gozer. I think of him as being this nice, cute little guy walking down Broadway, hurling sucrose blobs at everybody."

"I think the concept of the Stay-Puft man made everybody a little nervous going in," Michael Gross commented. "Early on, whenever someone read the script, we'd ask them what they thought of the idea, because we were real worried it would take the movie over the top. Harold really struggled to keep the whole film within some kind of reality and believability, but then when it gets to the end and suddenly a 150-foot marshmallow man starts walking through Manhattan, we were all thinking: 'Oh, no! Godzilla time!' Then, when we thought about the problems of doing it realistically, we knew that was impossible — I mean, you put a guy in a rubber suit and you know the audience knows it's a guy in a rubber suit. But when we saw the early tests and rough composites, we knew it would work. What I think really convinced me was even before that, when the guys were on the set reading their lines and doing takes of their expressions when they see him coming. They really set him up, and I thought the audience would love it."

Bringing that marshmallow man to life, however, was not that easy to arrange. At first, not even the size could be determined. "We knew he had to be big, but we didn't know how big," Gross added. "That's because when Ivan was shown little models of the design, there was one representing the Stay-Puft man at 100 feet and one representing him at 125 feet, and there were arguments going back and forth over which one would work better. Ivan finally said: 'Forget it. Put it in the middle.' So we said, 'Okay, he's 112.6 feet tall.'"

Once the full-scale dimensions and designs for the monster had been determined, the next step was to create the human-scale suit to be filmed at EEG. "We had to do a lot of experimentation before we could develop the right suit," said Bill Bryan, a sculptor and designer who had previously worked at Krofft Entertainment and had built suits for the upcoming *Dune*. "On the first one, we just laminated two layers of Scott industrial foam together. The inside layer was made up of different pieces that were meant to hold the shape together, while the outside was large pieces of Scott foam that were stretched over this. When the suit was completed, we found that it didn't have enough firm support so it tended to look baggy, and the outside foam always wanted to go back to being flat. The suit just didn't hold the shape indicated in the drawings."

"We continued to do a lot of experimentation with different types of foam, but when we started getting down to the wire, I came up with the suggestion that we use stiffer L-200 foam

*The Gozer temple erupts with psychic power as Louis Tully and Dana Barrett are struck by lightning and transformed into Terror Dogs.*

*Supplementing the live-action stage element — Rick Moranis and Sigourney Weaver on the full-size temple set — is a Matthew Yuricich matte painting of the New York skyline, which also includes the upper portion of the foreground building and the top of the temple. The turbulent skies were produced with paint clouds injected into water by Gary Platek, and the lightning bolts are animation effects created under the supervision of Garry Waller and Terry Windell. / Assistant matte artist Michelle Moen blocks out a view of Spook Central for another of the film's forty-plus matte paintings. / Matte supervisor Neil Krepela employed EEG's reconfigured Compsy system for the Ghostbusters matte photography — also for rephotographing and repositioning some of the Onionhead elements.*

to hold the shape and still give it movement. Since we were getting real close to the deadline, I had one day to order up the foam, make up all the patterns and build the suit. Fortunately, in that one day, we were able to make up one of the egg-shaped bodies and it did hold its shape better than the initial suit did. It also proved to be much lighter than fiberglass ever would be, so we were able to go with that approach." With the test a success, the body part of the suit was constructed using the L-200 foam material on the inside for structure, with a sheet of Scott foam stretched over the outside. The arms and legs were also made from Scott foam, with hands and head cast out of Schram foam. Two 'hero' suits were ultimately constructed — one with zipper and seams on the back for front views, and one with zipper and seams on the front for back views.

While the body portions of the suit were being generated, Linda Frobos was sculpting the head and trying to determine the different expressions that would need to be incorporated into the Stay-Puft man's face. Frobos, who worked with Bryan on *Dune* and with Tom Burman on *Star Trek III*, eventually had to design three different heads to capture the range of expressions originally desired. "The first head was of the Stay-Puft man smiling cheerfully, for the early scenes when he's just walking through the streets. This head had the ability to turn into a frown as well, because the eyebrows could turn down over the eyes. The next sculpture I did was for after he had been blasted several times by the Ghostbusters and was really melting. This one, which was not used in the film, featured a very distorted, gooey face. The head drooped over to one side; and inside its mouth, the marshmallow had melted into long, stringy strands that, because he was angry, looked almost like fangs. But the most difficult head to sculpt was the third one, because while the first one featured one expression with only a little variation, the third one had to go from a grimace — when he first gets hit by a Nutrona beam — to a look of surprise. When I first sculpted this one, I had in my mind what I wanted and I sculpted mockups of the two extreme expressions that the face had to show. But because the expressions were so extreme, I had to sculpt the head somewhere in between. As a result, it was a very bland sculpture, because the expressions had to be achieved through the articulation of the cables."

To make certain the head would have the flexibility needed, Frobos worked extensively with articulation machinists Steve Dunham and Tom Culnan as they made the many parts needed for the interior mechanics. "Steve and Tom are really the ones who made the face work and the expressions come alive. They did an excellent job constructing the parts and then helping articulate the face when we filmed it."

One of the prime difficulties with the smooth-skinned Stay-Puft suit was hiding the seams. "Usually, most creatures or monsters have faces that are covered with wrinkles and lines so you can hide the seams," Frobos noted, "but with the Stay-Puft man that was never the case and the seams turned out to be a real problem. Whenever we had to show a side view

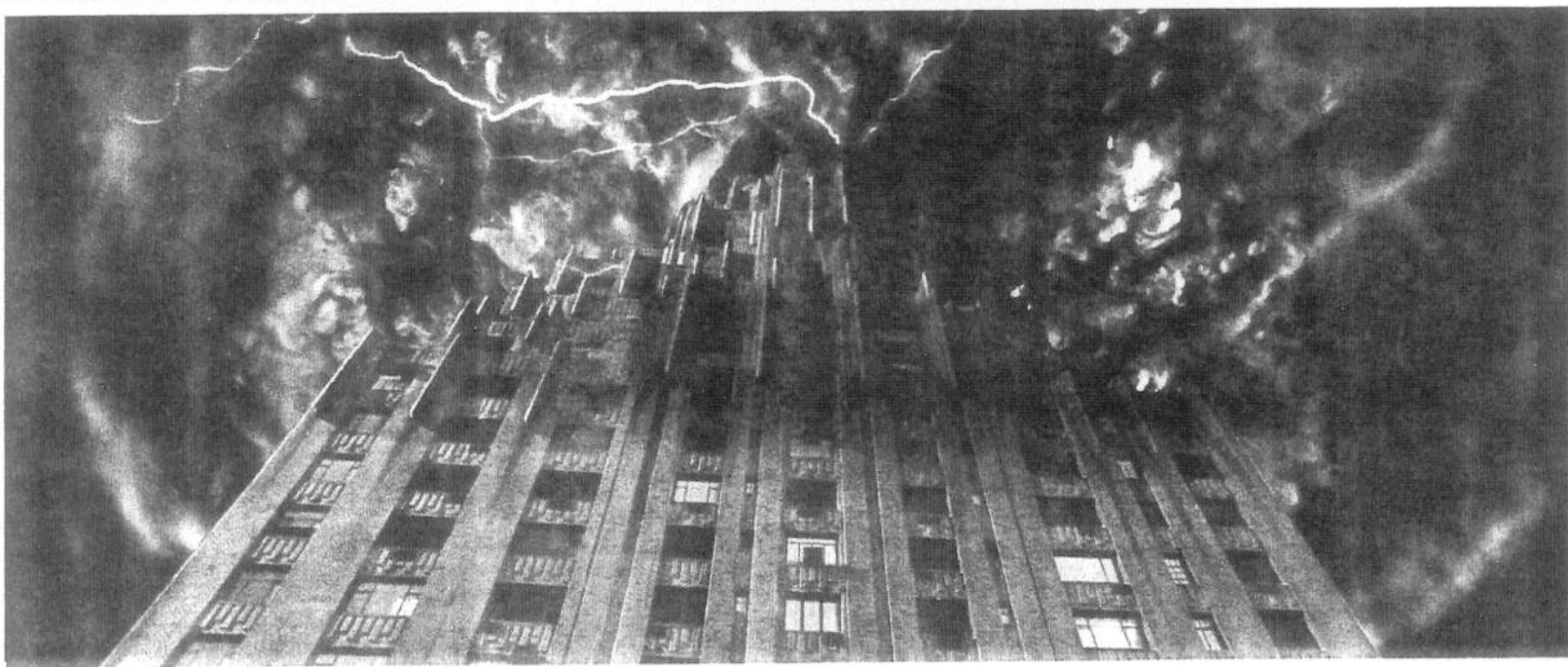
of the marshmallow man, they always showed up. We would use a soldering iron and burn away the excess foam and then cover that with a very thin coat of latex; but because the skin was so smooth, that didn't completely hide them either. The smoothness of the skin was also a problem with the third head, because any of the mechanics that didn't move right underneath would show up. That made it even more difficult to articulate that face as a result, because the changes in the expression had to be completely smooth." Ultimately, the seams had to be disguised in the on-stage lighting done by chief cameraman Bill Neil.

Once the complete suit was finished, shooting began — either against a blue screen or on miniature sets. One of the most interesting miniatures involved a large tabletop model of the street and part of Central Park directly across from Spook Central. Serving as the backdrop for the first time the marshmallow man sees the Ghostbusters, this miniature was built by EEG model shop supervisor Mark Stetson and his crew, and featured street lights, remote-controlled and string-pulled cars and a forested park. During the shooting, Bill Bryan, as the Stay-Puft man, walked down the middle of the tiny street towards the camera as the small cars swerved around his feet — their invisible drivers trying desperately to get out of the giant's path. Cables articulating Stay-Puft's face ran down the back of the suit and out near Bryan's foot, down through a slit in the rubber street to a cart beneath the set. Four puppeteers rode on the cart and controlled the marshmallow man's expressions as another pushed the cart slowly along below the street in time with Bryan's movement above. Once again, a video monitor was used to help coordinate the moves.

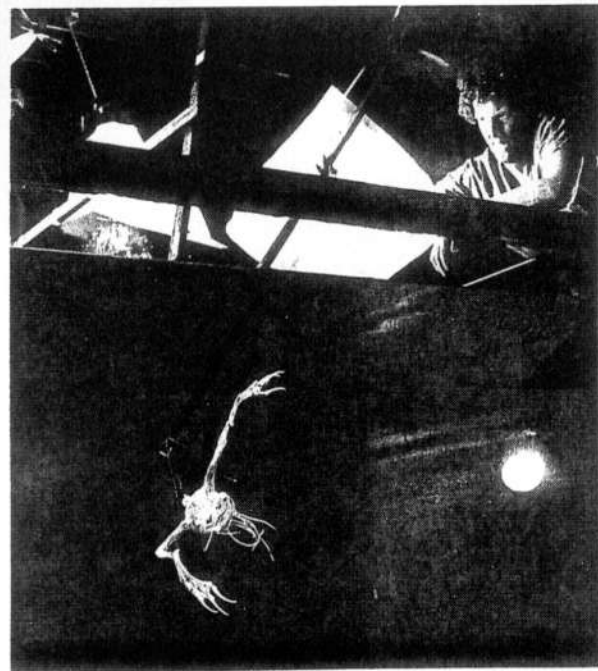
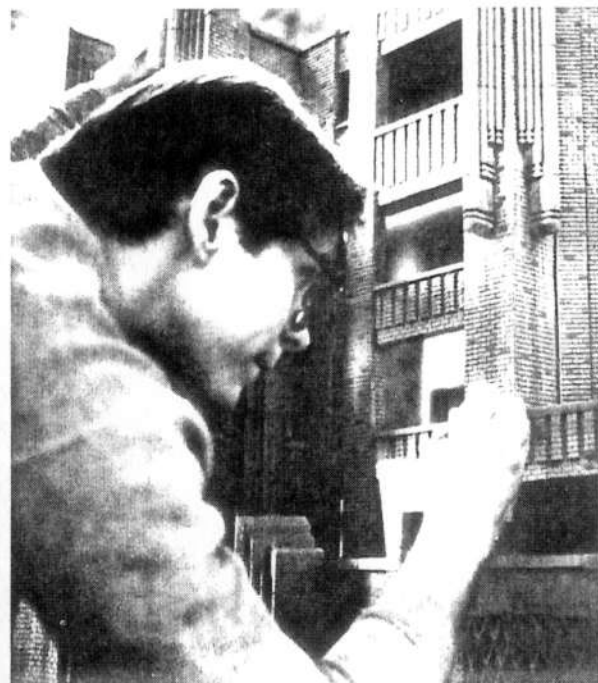
"The main problem with walking in the suit was the resistance," Bryan said. "It fought me every step of the way, and it was like wearing a combination sauna suit and Nautilus machine. I know I was in much better shape after the filming was done than I was when I first started. Once in the suit, I also realized that rhythm was very important to keep in mind while I was moving as the Stay-Puft man. Since the sequence was being shot at 72 frames per second, there had to be a specific length of time to do everything, and it had to be one-third the length of time that it takes to show up on the screen. It took us several takes before we could get that rhythm down. Other than that, as I walked down the street, I thought to myself, 'Boom, boom, boom' — trying to get into the feeling of crushing cars and having the ability to knock over buildings and devastate New York."

"Fortunately, the Stay-Puft man didn't require too much external direction," explained Bill Neil. "We were really lucky that Bill Bryan, who was the maker and animator of the creature, had the gift of making it come alive and appear vital. As a result, there was very little direction involved, other than just mechanical things like telling him where to look and when. John Bruno and I were concerned a lot about the eye-lines, because the head was basically inanimate and the operators down below couldn't know where the eyes should look or how the camera

*As the Ghostbusters arrive to save the day, a massive earthquake rocks the area around Spook Central. To achieve the effect, a hydraulically operated collapsing street was constructed at the Columbia Ranch, along with a facsimile of the front face of the building used on location. / During the earlier location shoot, the after-effects of the quake were simulated by positioning large slabs of fake asphalt over actual New York streets. A police car, cut in half and upended, helped suggest that there were indeed fissures in the roadway. / A dramatic up-angle on Spook Central was in fact a large-scale miniature of the actual building, enhanced with water tank clouds and animated lightning.*







would see them. So the direction was mostly in where the figure should look and how he should behave in the frame. The real acting performance came from Bill. We had almost nothing we needed to comment on. If anything, we needed to tone him down a bit in a few places because he was very excited about bringing the marshmallow man to life. He really did an excellent job."

In terms of articulating the face, Linda Frobos, Jon Berg and others worked with the puppeteers to give the Stay-Puft man just the right expressions. "Jon was real good with ideas for articulating all of the faces," Frobos said. "We discussed that we didn't want to overact with the character, that we wanted more subtle expressions rather than going for really broad ones. Jon also advised us during the sculpting stages and gave us suggestions all the way through."

"What always struck me about Stay-Puft," Berg explained, "was that he was like a living Macy's parade balloon floating through the streets of Manhattan. I tried to keep this in mind while we were filming. Finding the right timing for the movements was tricky because we were overcranking the shot to 72 frames per second. If Bill had overdone the slow motion, for instance, it would have been real bad. But he had a good understanding of the timing, and I think the articulation worked very nicely."

Timing also proved to be an important factor in the movement going on at street level. "The cars were on monofilament string pulls," modelmaker Pete Gerard recalled. "We did have a couple of 'hero' cars that were radio controlled so they could execute wide turns, but the majority were pulled by strings. It was really a complicated cuing exercise to get them all to do their own thing on time. We had as many as eight different car operators alone, and some of the wrecks that occurred happened totally by chance. It was meant to be — and was — a semi-organized panic. To help make the park area seem alive, we also had some people pulling on the trees. We had placed some small Christmas tree lights down along the park sidewalks and along the grounds and when the trees moved, it made the lights appear to twinkle as they were obscured by the moving branches. That helped give the park a more atmospheric effect."

"We spent a lot of time," John Bruno elaborated, "deciding which cars should crash, where the street lights should be, and where the little model motorcycles should be placed. It was really quite an interesting thing. Some cars we pulled on strings, others rolled by gravity; and basically, the only one who wasn't operating a car was Bill Neil, who was working the camera. If there'd been any way for him to operate one, we would have gotten a string to him, too. As it was, we had like twenty people pulling little pieces of thread — and since we were filming at 72 frames per second, we had to really yank those cars. When you see them on the screen, however, they just look like they're moving along."

"The miniature cars were really last-minute," Mark Stetson added. "Originally, we just planned to have them lit and parked

along the street. In fact, it was twilight and we hadn't really thought about lighting up the cars until we were much further along. Then, having them move was a throwaway — which editorial liked, so we kept it in. As a joke, we had the Stay-Puft man crush a car with his foot and then look at it as if he had just stepped on dog doo. They liked it and we redid the take, squishing the next car a little more, and then leaving behind a residue of white marshmallow stuff on top of it."

One of the biggest throwaways in the shot was having a car swerve to miss the Stay-Puft man and hit a miniature fire hydrant, causing a jet of water to stream up into the air. This effect proved to be easier said than done, because real water would have appeared too large in the shot. After experimenting with different liquids and jet nozzle sizes, Gerard hit upon another approach. "Ken Swenson suggested that salt had been used for things like this. I think powdered salt was in fact used in *Raise the Titanic* when the ship first surfaces and the water drips down over the gunwales. The salt gave it that frothy, delicate look that aerated water has at that scale. Rather than trying salt, however, I knew we had 90-mesh silica sand which was very fine and very pure — almost the consistency of beach sand. To set it up, I forced some of the sand down through a plastic bottle which had a vibrator attached to it on the bottom so the sand wouldn't pack in. There was also a bit of air pressure above it which was controlled by a valve.

"When the miniature cop car came across the street at an angle and knocked over the hydrant, I pressed the button and the air pressure drove the sand out of the bottle through a piece of tubing right up through the tabletop. It then became a matter of feathering the switch to get the height of the spray I wanted, which I did while the camera was rolling. With the sand backlit, and at the speed they were shooting, it looked exactly like water. On one take, though, the police car came to rest right on top of the hole, so nothing really happened until you looked carefully and saw this pile of sand growing around the bottom of the car. On the one they printed, the car stopped right in front of the place where the hydrant had been, so you couldn't see that sand instead of water was collecting on the curb. All you could see was the spray."

Besides the tabletop miniature of the park and street, the model shop also had to provide a street comprised of four miniature buildings, and a very large model of Spook Central — from the eighth floor up and with the Gozer temple on top. "The set of four buildings consisted of three *Blade Runner* relics that we renovated, plus one new one," Stetson explained. "In the tops of the buildings, we added the kind of detail you would normally find on a rooftop, but might not think about. We had wine bottles, for instance, and newspapers, rubbish, tar mops and buckets, signs, billboards, TV antennae that were twisted and bent, old mattresses and anything else we could think of. John Bruno suggested we have some pigeon coops also, so we could have some animated pigeons fly out as the marshmallow man walks by. John and Richard jokingly argued back and forth about that, so we did put some coops on the roof, but we made

*On stage at EEG, modelshop supervisor Mark Stetson makes wiring connections for practical lighting inside the fifteen-foot Spook Central miniature — virtually an exact replica of the building used in New York, but with the Gozer temple on top. / Modelmaker Nick Seldon adds painted highlights to a section of the building. / Jon Schreiber maneuvers a flexible vinyl creature through the EEG cloud tank to produce an image which, after optical alteration and diffusion, would become the ghost seen darting out of a New York subway station.*

*As the Ghostbusters warily approach, the Gozer — flanked by two Terror Dogs — makes her first appearance on the fog-shrouded steps of the temple. Filmed on John DeCuir's giant set, the sequence would later be enhanced dramatically by EEG. / A behind-the-scenes view of the upper temple set shows the plexiglass portal and staircase — over which dry ice fog would be pumped — and the hollow pedestals from which concealed operators could bring their Terror Dogs to life. / Energy blasts from the Gozer's fingertips sweep the Ghostbusters toward the edge of the building in a shot filmed live on the temple set — only a few feet off the floor — and then brought to full effect with a vertiginous matte painting and animated lightning.*

tiny dead pigeons for them so Richard could say to John, "Okay, you've got your pigeons."

The miniature of Spook Central was fifteen feet tall and featured window frames made in etched brass. "It was a very elaborate building," said Stetson, "which is the DeCuir style. But he provided us with a full set of drawings, so in terms of research, the information was all there, drawn by a set designer who knows how things get built. So the construction of it was pretty straightforward; but because of the elaborate detail, it was an expensive model to build. Milus Romyn headed up the building, and put it together real carefully and sturdily because the Stay-Puft man had to climb all over it as the Ghostbusters shoot at him."

For the grand finale, the marshmallow man would be acted by stuntman Brad Alan, wearing a special suit that would be set on fire when the Ghostbusters finally overcome him with Nutrona rays. For these shots, the Stay-Puft suit had an inner lining of grey pyrothane — rated as the most fire retardant foam available — and 100 pore-per-inch Scott foam on the outside. The two layers were glued together using a fire retardant foam that also sealed the pyrothane. In addition, Alan wore a Nomex suit inside the Stay-Puft suit, and was on supplied air. Because of the number of layers involved, some of the body parts were cheated to free up movement for certain shots. For instance, one arm was longer than the other on one shot to help create the desired camera perspective and to help the stuntman execute his moves easier. The head was still cable operated, with the puppeteers standing clear of the action.

"The scenes with the Stay-Puft man being blasted by the Nutrona wands were very important in making the audience believe the wands really had some power," John Bruno said. "As a result, the whole point of those scenes was to make the character look like he was really being hurt. The first time we shot him, however, the stuntman just waved his arms around, suggesting that he had been hit by only a moderate blast. Then we decided we wanted to change that and have him *really* get hit. In the shot, he was starting to climb up the building when he first gets blasted, and Ivan wanted him to rock backwards. Physically, the stuntman could never do that in the suit by himself, so I asked Thaine Morris to punch a hole in the suit and attach it to a cable connected to the model building. That way, the stuntman was rigged so he could fall back past his balance point, one of his legs could go up off the ground, and then he could be yanked back forward by the cable. We shot it from behind, and it really looked like he got blasted. In that shot, the Ghostbusters would also be visible, so we painted some GI Joe dolls to look like them and stuck them up on top of the model. Later, Terry Windell animated them. In another shot, we loaded up the chest with explosive charges, fired them off, and had the face grimace. It looked like he was really hurt — and, in fact, I felt bad afterwards."

To engulf the Stay-Puft man in flames, Joe Viskocil — who did pyrotechnic effects for *Star Wars* and who recently won an Emmy for his work on *The Winds of War* — covered parts of

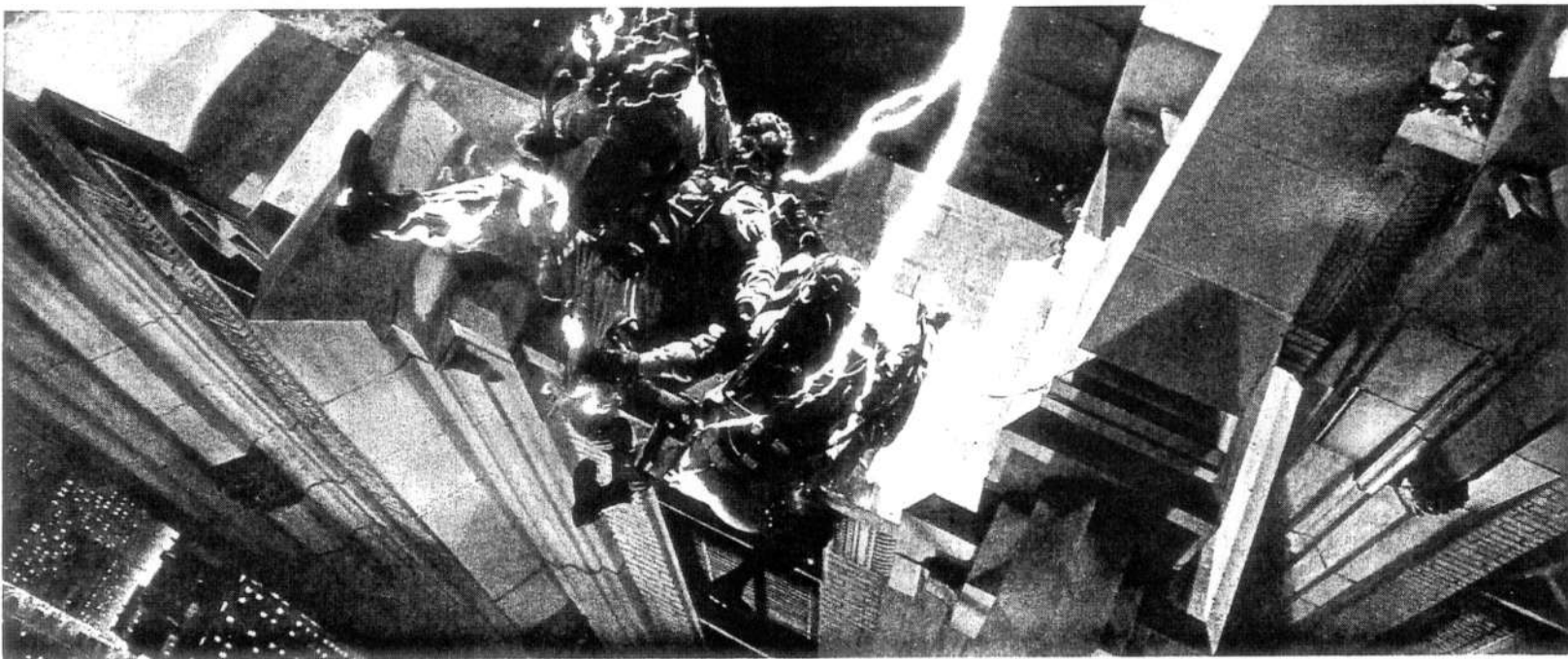
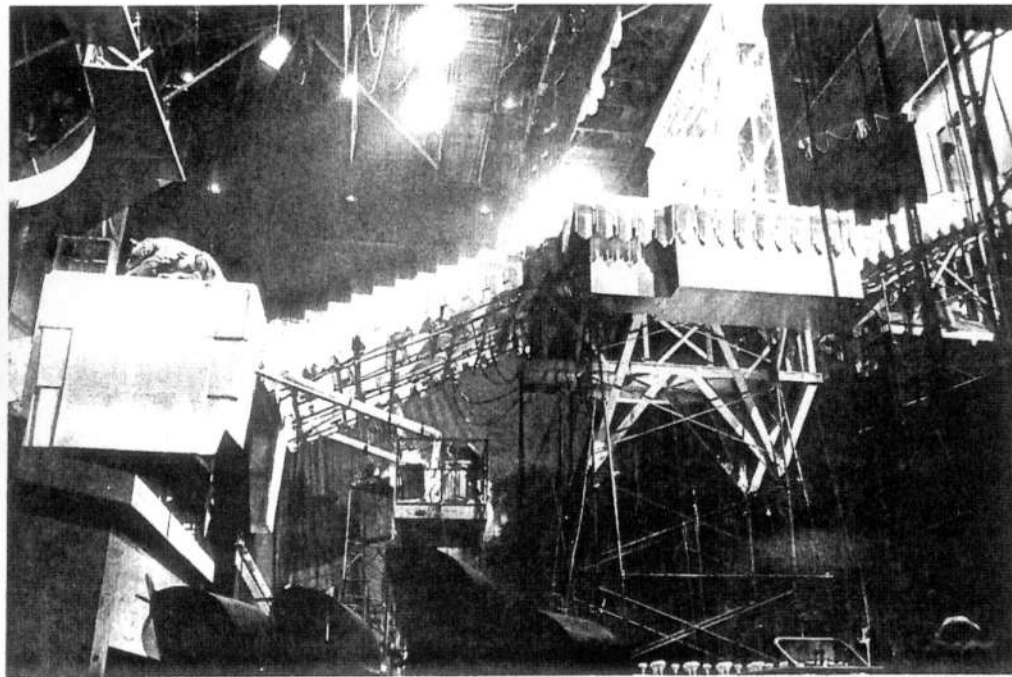
the suit with what looked like little cigarette butts. In actuality, they were pieces of flash paper rolled up with fireworks stars, which when ignited produced tiny red fireballs simulating the effect of the marshmallow man's skin melting away. For a closeup of the Stay-Puft man's face melting, EEG stage manager Thaine Morris took a plaster core of the head, cast a skin out of thermal plastic, and then attached it and the core to the miniature building. The camera, model and head were then all tipped on end — with three propane sheet rock heaters directed at the face. The resultant effect was filmed at one frame per second for the twenty minutes needed to melt away the skin. Then, for a second element — flames licking past the face — the plaster core was painted black and positioned on the reoriented building while propane flames were blown past the core. When the two elements were superimposed, the image was complete.

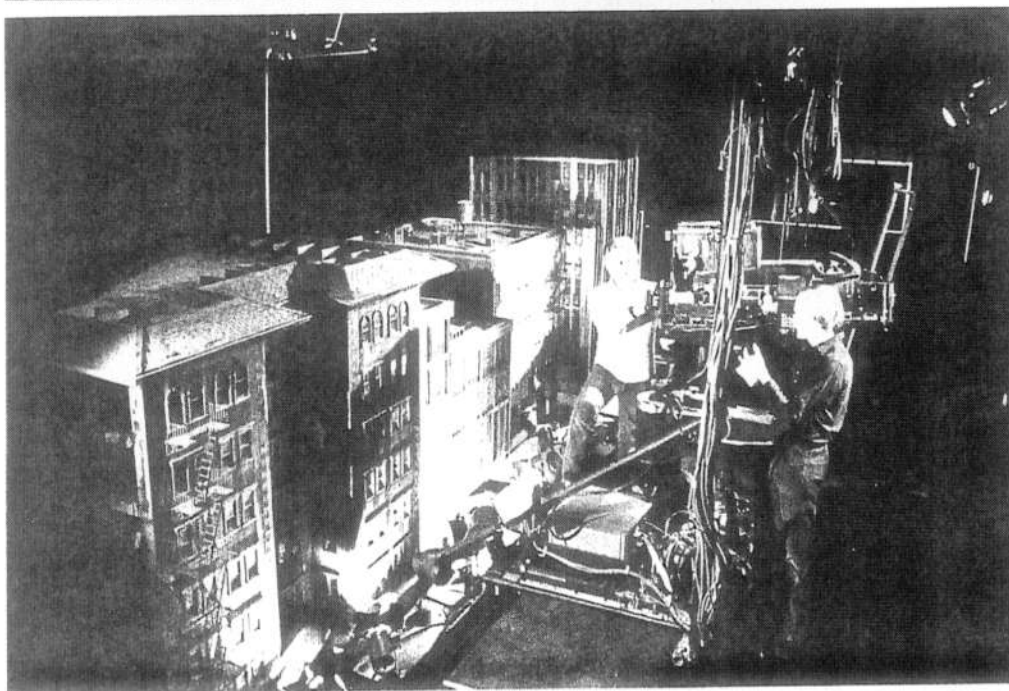
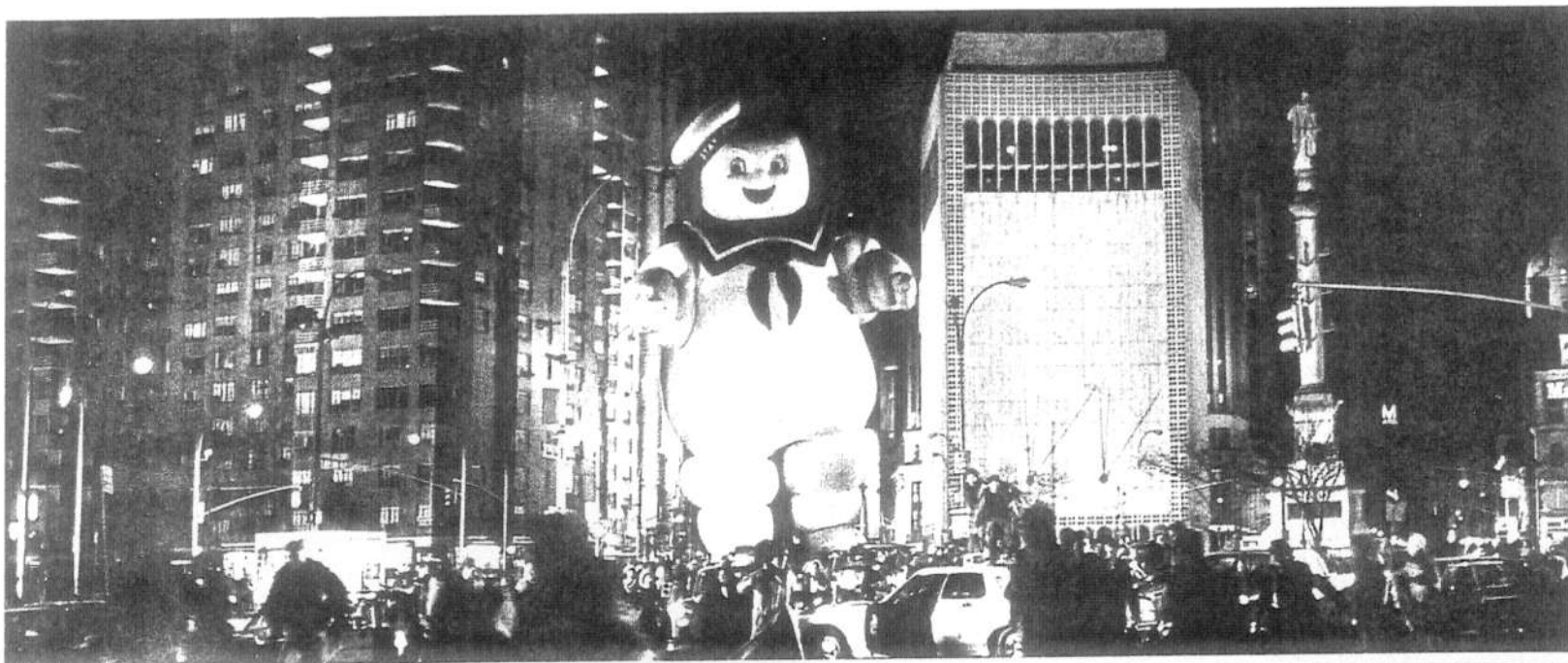
Aside from its use with the melting Stay-Puft man, the large model of Spook Central was employed once again for an explosion that occurs in the rooftop temple when the Gozer is finally destroyed. In anticipation of the shot, the top of the model had been constructed with a framework built from eighth-inch and quarter-inch steel — with the various temple pieces bolted to this frame. Then, during a night shoot in a parking lot next to one of the EEG stages, Thaine Morris ignited a flash powder naphthalene bomb which created a controlled explosion that burned out quickly. For a shot of a big tumbling explosion as it rages out towards the Ghostbusters, Morris went to Griffith Park and suspended a bomb between two 80-foot cranes. The bomb, which created a fireball, consisted of magnesium and aluminum dust, black powder, red and green fireworks stars and some naphthalene.

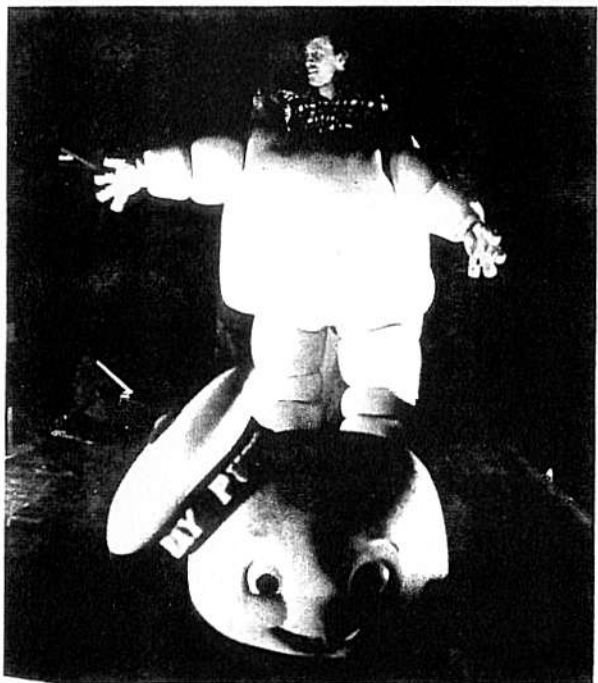
In addition to the problems inherent in blowing up models and rigging them for fire hydrant outbursts, consideration also had to be given to how the miniatures would be lit to correspond with actual buildings. "Matching the look of New York was not a particular problem," Bill Neil noted. "I take the position that everything has to be in keeping with what the first unit did so the effects shots don't stand out in any way. When we were on the set shooting plates, for instance, I invited Laszlo Kovacs to compose them the way he liked, because if there was some little oddity in the way he composes shots, I wanted the plates to be consistent with that. I didn't interfere unless there was some technical problem from an effects standpoint. Rather than try to inject my own compositional sense into the shots, I felt it was important for the images throughout the picture to match."

"I took the same attitude with the lighting. I followed whatever he did. On the large model of the building, for instance, I looked at Laszlo's plate and saw that he couldn't light the whole building. That was one of the physical constraints of filming in New York — you couldn't light the buildings completely. As a result, what he did was to wipe some light across the building. I tried to do the same thing, so instead of hitting the model with a bunch of light, I used smaller instruments and tried to









paint with the light to reflect what he was limited by. I could have lit the whole model up, but then it wouldn't have matched. I think the biggest problem with miniatures is matching lighting, because the instruments are of a different scale and the materials seem to behave differently on a model than they do on something full-scale. Even so, I tried to match as well as I could."

"The ending of the film really required a tremendous amount of work, involving every department in the facility," Richard Edlund commented. "It had stop-motion animation, clouds created in the cloud tank, matte paintings of New York, models constructed on the stage, the marshmallow man, animation and pyrotechnics. The Stay-Puft scenes alone involved almost everybody. For instance, the shot which I think is the best is when the guys are up on the temple on the right of the frame, and to their left, the Stay-Puft man is walking up the street towards them. That one shot involved our miniature of the forced perspective street, a bluescreen element of the guys which Bill Neil and I shot on the stage and a matte painting by Michelle Moen which had to cheat building perspectives to tie the whole shot together. Then Mark Vargo had to assemble all the elements in optical. On that sequence and throughout the film, all the department heads continually came together in the screening room to discuss various aspects of the shots. It was our way of allowing everyone to know what was being done in all the other departments and to offer suggestions to each other. The screening room became a real focal point for the operation and enabled us to better collaborate on shots."

After the Stay-Puft man sequences were completed, Bill Neil filmed the subway ghost — a fish-like creature with wings — that zips out of a subway terminal and terrorizes New Yorkers on the street. Constructed by the ghost shop out of Hot-Melt vinyl — a material used to make fishing lures — the subway ghost was designed to be filmed underwater in a cloud tank. During the shooting, the creature was puppeted only slightly, with strings attached to its wings so they could flap up and down and a rod to pull the ghost backwards — an approach employed to help the creature's tendrils move naturally through the water. The shot itself was filmed in reverse.

"It was a shotgun approach," Neil recalled. "We didn't know what worked until we saw dailies the next day. The creature was pulled backwards in the tank while I did a reverse zoom and panned slightly. Then I held for a moment — so the creature would appear to hover for just a second — and then I tilted it out of the frame. When you shoot something like that in reverse, it's very hard to know exactly where the creature has ended up in the frame because you can't stop to align the motion. You just have to go for it. We did three attempts on three different days. The first time we got the light and exposure down; the second, we made additional adjustments; and then the third time, we did about thirty takes out of which three had our moves in the correct positions."

The water tank was also used to produce different cloud formations — under the supervision of Gary Platek, who developed the techniques he employed while working on *Poltergeist* and

*In the film's grand finale, the Gozer — transformed into a hundred-foot-tall version of the Stay-Puft marshmallow man — strides gleefully into New York's Columbus Circle. / Assistant cameraman Alan Harding and matte cameraman Neil Krepela line up a shot on the four miniature buildings constructed to serve as foreground pieces for the marshmallow man's initial appearance. / Effects technicians make final preparations for a bluescreen shot of the Stay-Puft man to be incorporated into the live-action plate photography generated in New York. / Sculptor Bill Bryan, in charge of the team which produced the Stay-Puft suit, models the creature's cable-actuated underskull. / The final suit, constructed from a variety of foam materials, was worn by Bryan during the postproduction effects photography.*



*Raiders of the Lost Ark*. Using a 1500 gallon tank — 400 gallons larger than the biggest he had used at ILM — and a filtering and transferring system for the water that offered more control valves for easier access, Platek produced 69 cloud elements in forty different setups for the film's climactic temple sequence and for the sky above Spook Central. "Two different types of clouds were needed for the temple sequence," Platek explained, "clouds outside the temple and clouds inside. The outside clouds were dark grey, swirling, storm-like clouds with a center ring of motion occurring right over the temple. The inside clouds, on the other hand, were real white, light and fluffy, with blue light underneath and pink above — very heavenly looking. Richard wanted to achieve the look of a Dutch style of painting where there are different perspectives going on all at once. He wanted to do so by having two sets of clouds, with totally different vanishing points, coming up from behind the pyramid as this beam of light comes through them — almost as if there were a magical sunset behind the pyramid at the top of the temple."

To create the clouds, Platek drew from his prior experience. The inside clouds, for instance, were produced with a T-shaped probe that injected paint into the water. By swinging the probe forward, he could create the rolling clouds desired. The outside clouds were produced using a circular ring probe which forced the paint down and out into the water. The beam of light was produced using a computer controlled argon laser.

Platek and his assistants — Jon Schreiber and Jody Westheimer — also produced the 'talking' clouds which instruct the Ghostbusters to choose the form of their destroyer. "The talking clouds were actually three 500-watt photoflood lightbulbs — your basic home movie lamps — that we immersed underwater. We took them and hooked them onto this funny little armature we built real quickly, and then stuck them into the water right in the center of the circle probe so they would shine down toward the camera. Then each bulb was hooked up to a little mercury switch. There were three such switches hooked to the controlling switch, and when Jon moved the stick, the mercury would bounce around and cause the lights to flicker. Then editorial picked the take that randomly seemed to fit what was being said."

Perhaps the most difficult cloud effect was employed during the climactic destruction of the temple. For this, Platek was asked to come up with an effect like the one used in the ending of *Raiders of the Lost Ark* when the clouds part and the Nazi encampment is sucked up into the heavens — only different. The *Raiders* effect happened by accident when Platek tried jumping on the hose that ran out of the bottom of the cloud tank, creating a change in pressure which resulted in some water in the hose shooting up into the tank, causing the clouds to open up in the center. "For the *Ghostbusters* cloud, once again it was a fluke. I put another line into the tank which shot a jet of warm water up into the paint cloud. The lighting was raking in from the side so the cloud itself looked different from that in *Raiders*. When the warm salt water rose up and hit the

paint, it caused a hole to appear. Then when the salt water cooled and fell back downward, it caused part of the cloud layer to move upwards and out of the light so that it looked like the cloud just disappeared. To further heighten the illusion of the cloud suddenly vanishing, optical faded it out even more."

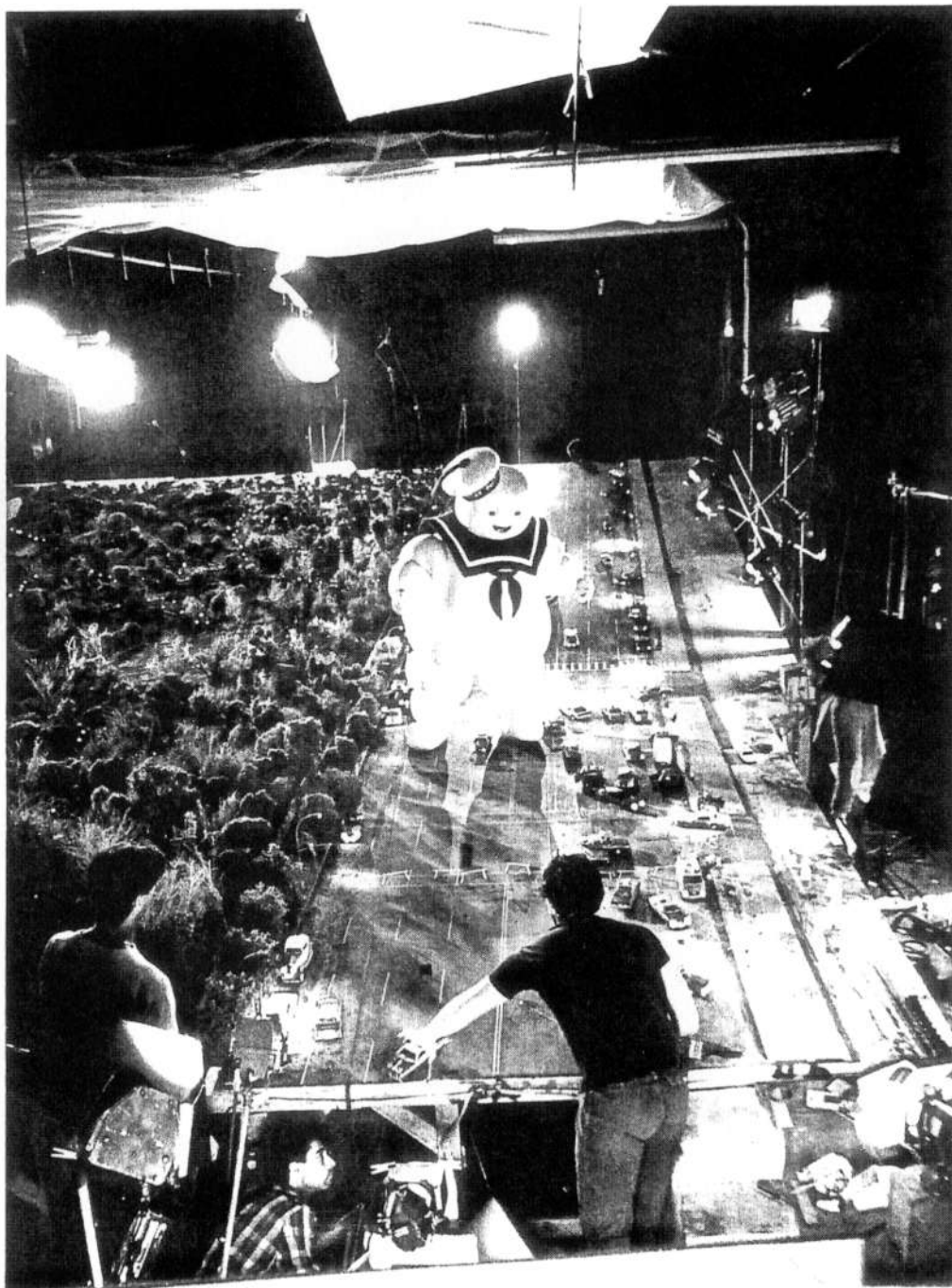
Matte paintings were also to figure prominently in *Ghostbusters'* thundering finale — and elsewhere. "*Ghostbusters* is based on matte shots rather than miniatures," Richard Edlund asserted. "I felt that if we were going to take advantage of New York, we would have to use paintings, since we could never have made enough miniatures to create a realistic-looking cityscape. We did build our main Spook Central building — which looked very good — and Mark Stetson constructed several other miniatures for us. But for the New York skyline, we needed paintings to capture its scope and beauty." To provide such paintings, Edlund turned to Matthew Yurich — a thirty-year Oscar-winning veteran of such films as *The Day the Earth Stood Still*, *Ben-Hur*, *North by Northwest*, *Logan's Run* and *Blade Runner*. "Matthew is a real old master. He's been involved with more films over the years than he can even remember. On *Ghostbusters*, he turned out an enormous number of paintings that took a lot of time and that were architecturally very complicated. Almost invariably, he would wake up at about three or four in the morning and get into the shop at 5:30. Then he would turn on his polka music and paint."

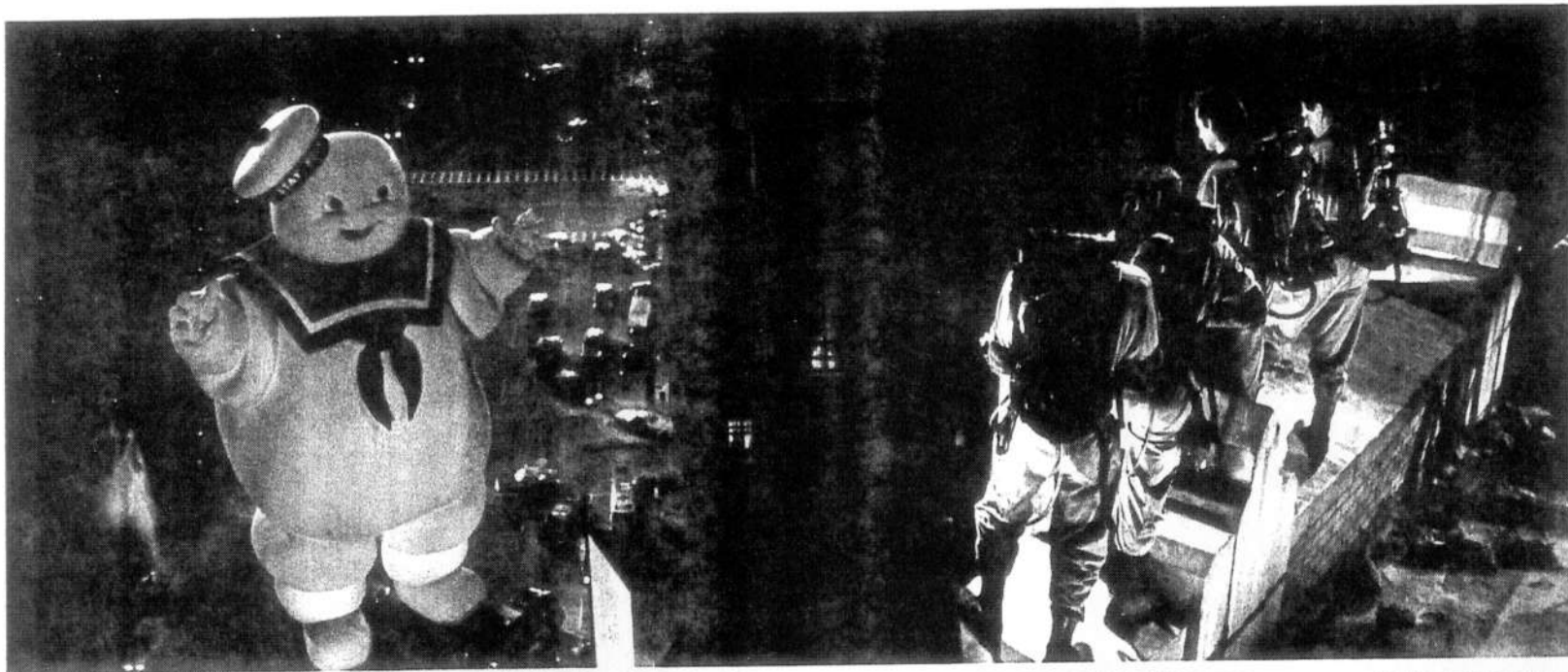
On *Ghostbusters*, Yurich worked with assistant Michelle Moen to produce over forty different paintings — some showing the vast skyline of New York, others focusing on different angles of Spook Central and the Gozer temple on top. For reference on the building, Yurich used the Hasselblad helicopter shots Edlund had taken in New York, supplemented by detailed design sketches provided by John DeCuir. The finished paintings were, in turn, photographed by Neil Krepela on Compsy.

"The matte paintings in the film are extraordinary," Michael Gross commented. "Besides the whole views of the city, I was continually amazed by the shots of the building, where the bottom half was the real one in New York and the top was a painting. You could never tell where one ended and the other began. In futuristic films, you always know the cities are matte paintings, or that the burned-out remains of Washington D.C. after a nuclear war are not real. But in a film using more normal locations, good matte paintings are like good special effects — you never know they're there. I defy the audience to find most of the matte paintings in *Ghostbusters*. They're so good I can find only about half of them myself."

On any effects picture, animation always plays an important role in helping the images come alive. Sometimes, this role involves adding texture or details to a shot which would otherwise look very lackluster; at other times, it involves creating animation to show an effect that could not be produced in any other way. For EEG department supervisors Garry Waller and Terry Windell, *Ghostbusters* proved to be no exception, since virtually every special effect in the film required some element of animation to enhance it or make it more believable. "I think

Visual effects editor Conrad Buff coordinated closely with Sheldon Kahn, Ghostbusters' primary editor, and with EEG camera crews to help generate effects elements that could be composited and intercut readily with the bulk of the film. / For the sequence in which the marshmallow man appears outside Spook Central, the EEG model shop constructed a forced perspective miniature of the street with adjacent portions of Central Park. / The Stay-Puft man's facial expressions were controlled by cables which ran down through a slit in the elevated street set to a trolley underneath — manned by four puppeteers. Cars were either radio-controlled or pulled on wires, and the footage was shot at 72 frames per second.









the animation work in *Ghostbusters* is the most elegant I have ever seen in a live-action picture," Richard Edlund noted. "It's really beautiful, and the crew Garry and Terry assembled were able to transcend that cartoon look that's so difficult to get away from because they were able to make it more violent and erratic. As a result, I think it added a real aesthetic touch to the film."

Waller and Windell — both of whom worked on *Return of the Jedi* and *Poltergeist* — were able to generate such animation because of their two very different backgrounds. While Waller has more experience in the photographic side of animation, Windell has more knowledge of illustration. Together, they combine these disciplines to create more realistic-looking animation. "On *Ghostbusters*, we tried to do a different meld of the technical and artistic," Windell explained. "Our whole philosophy is to combine straight animation with photographic techniques which help make that animation seem more believable to the eye. For instance, to create the Nutrona wands, we used hand-drawn animation for the beams themselves, but we combined that with pyrotechnic explosions shot on a stage to give them more realism."

The Nutrona wands, in particular, reflect the Waller and Windell philosophy. "If the characters were explaining the Nutrona beams in the movie," Windell noted, "they would say that they were an energy source produced by the guns. When the guns fire, particles are extracted into the gun which produces the red core beam. Then another force pushes outward surrounding the beam, which is electrical and blue in color. The result is this back-and-forth directional beam that sucks in energy as it blows out electricity." Animating these beams involved many different elements, including a pinhole flare produced on the animation stand for the initial muzzle flash, five levels of artwork illustrating the beams, and small pyrotechnic explosions which were added to create the impression of particles sliding down the beams, sparking and popping as they travel into the guns. Live-action explosions were used to avoid the unrealistically perfect look of animated explosions.

While Windell supervised the animation associated with creating the Nutrona beams, Waller used photographic techniques for some of the Onionhead scenes. Employing a small puppet supplied by the ghost shop, Waller filmed the tiny Onionhead on the animation stand against black, as if he were filming the element on a stage. "Due to the deadlines throughout the project," Waller recalled, "Richard approached me early on to see whether it would be feasible to shoot the Onionhead on the animation stand. Using a gimbal constructed by Bob Spurlock, and two available channels on the motorized Oxberry, we were able to rotate the Onionhead 360 degrees and pitch him about 180 degrees to film him tumbling and have him fly anywhere throughout the frame. We lit the small puppet with light raking in from the side and a bounce reflector to add detail and shape to its underside. All of these techniques are a bit unusual for an animation stand, but they proved successful."

Waller also used the Oxberry to create pinhole streaks of light

*The Ghostbusters confront their arch-nemesis — the Gozer as personified in marshmallow. The left-hand portion of the frame was filmed on the miniature street set, complete with gushing fire hydrant; the live-action portion on the right is a bluescreen element shot on the temple set; and the building in between is a connective matte painting. / As the Ghostbusters unleash their Nutrona rays on the temple, the marshmallow man climbs up behind them. / For scenes of the Stay-Puft man bursting into flames as the Nutrona wands are turned upon him, a special fire-retardant suit was rigged by pyrotechnician Joe Viskocil and worn by a stuntman attempting to scale the Spook Central miniature.*

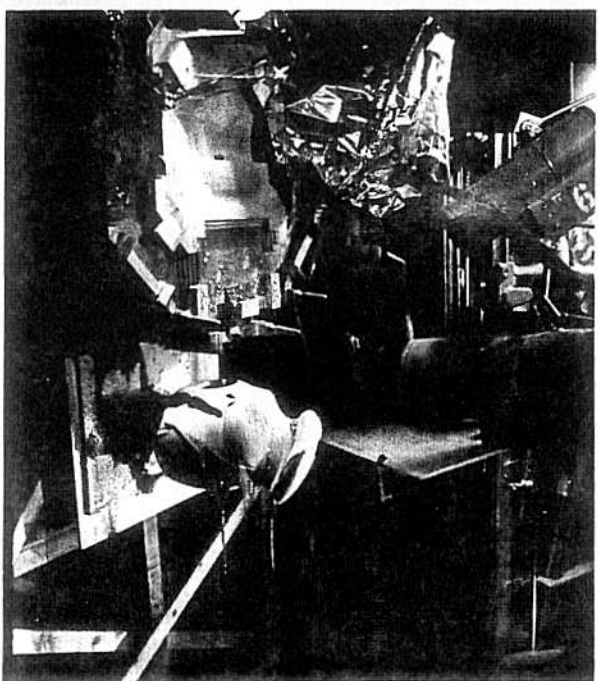
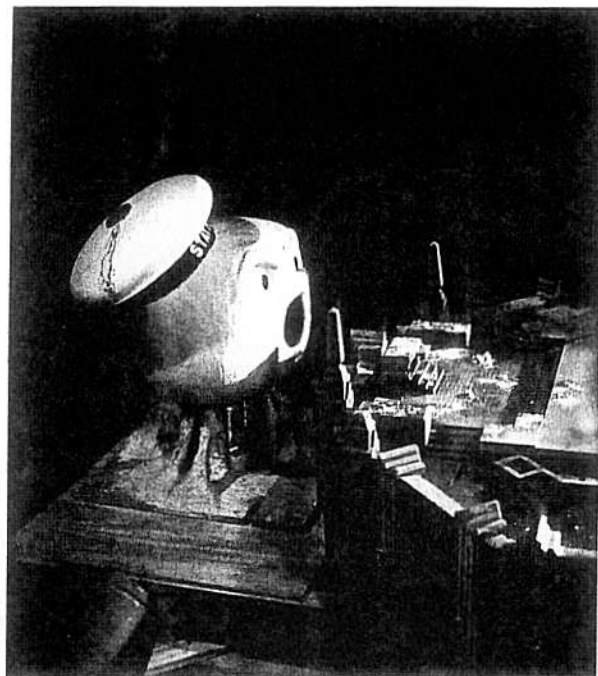
*For a quick shot of the marshmallow man's face melting away, a thin casting of thermal plastic was mounted on a plaster core of the head and then positioned adjacent to a miniature representation of the Spook Central rooftop. / Both were then placed on end, with three heavy-duty propane heaters directed at the face. The resultant effect was filmed at one frame per second for the twenty minutes needed to melt away the skin. / Chief cameraman Bill Neil prepares for a shot of the marshmallow man. / After shooting on the temple set for several weeks, the main unit proceeded on to other stages while John DeCuir's unit moved in and redressed the now-destroyed temple for its final scenes in the film. / Actor William Atherton was deluged with two hundred pounds of aerated foam for a scene in which his character — the priggish EPA administrator Walter Peck — finds himself bombarded by a giant blob of molten marshmallow.*

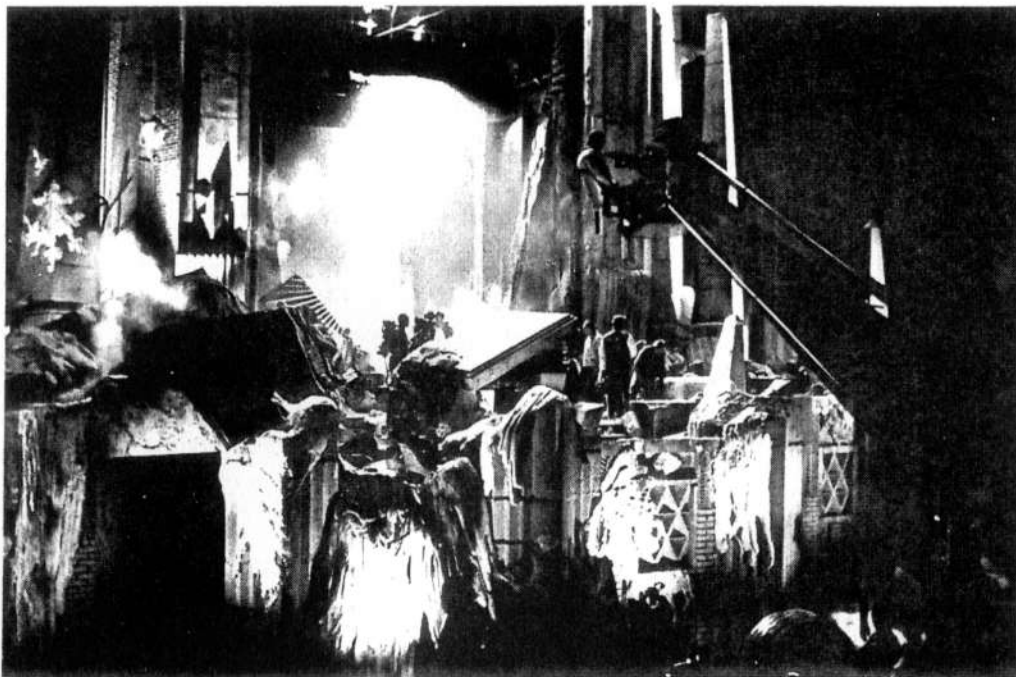
for the 'ghost geyser' that shoots out of the firehouse when all the Ghostbusters' captured ghosts are suddenly released. To get away from just a standard streak, Waller — assisted by Les Bernstein — shot a separate pass using a positive dot moire (clear dots on a black field) and a negative moire (black dots on a clear field). By overlapping the two during a pass, Waller was able to give the ghost streaks texture, plus hot and cold spots, that would continually change throughout the shots as the dots on the two opposing moires overlapped and separated. Often each streak required more than one pass, and with some passes taking as much as nine hours to complete, shooting the minute paths of light proved extremely time-consuming. In all, the brief sequence required about three weeks' work on the animation stand.

To help produce many of the effects required for *Ghostbusters*, Waller and Windell hired a crew of seventeen animators, including William Recinos, Bruce Woodside, Richard Coleman and Sean Newton. Newton, in particular, animated the transformation of Dana and Louis when they go to the Gozer temple, are struck by lightning and turned into Terror Dogs. This transformation involved four different levels of lightning bolt animation, glow elements for the body frames, and animated skeletons that appear over several frames as Dana and Louis get zapped by the bolts and transform into the dogs.

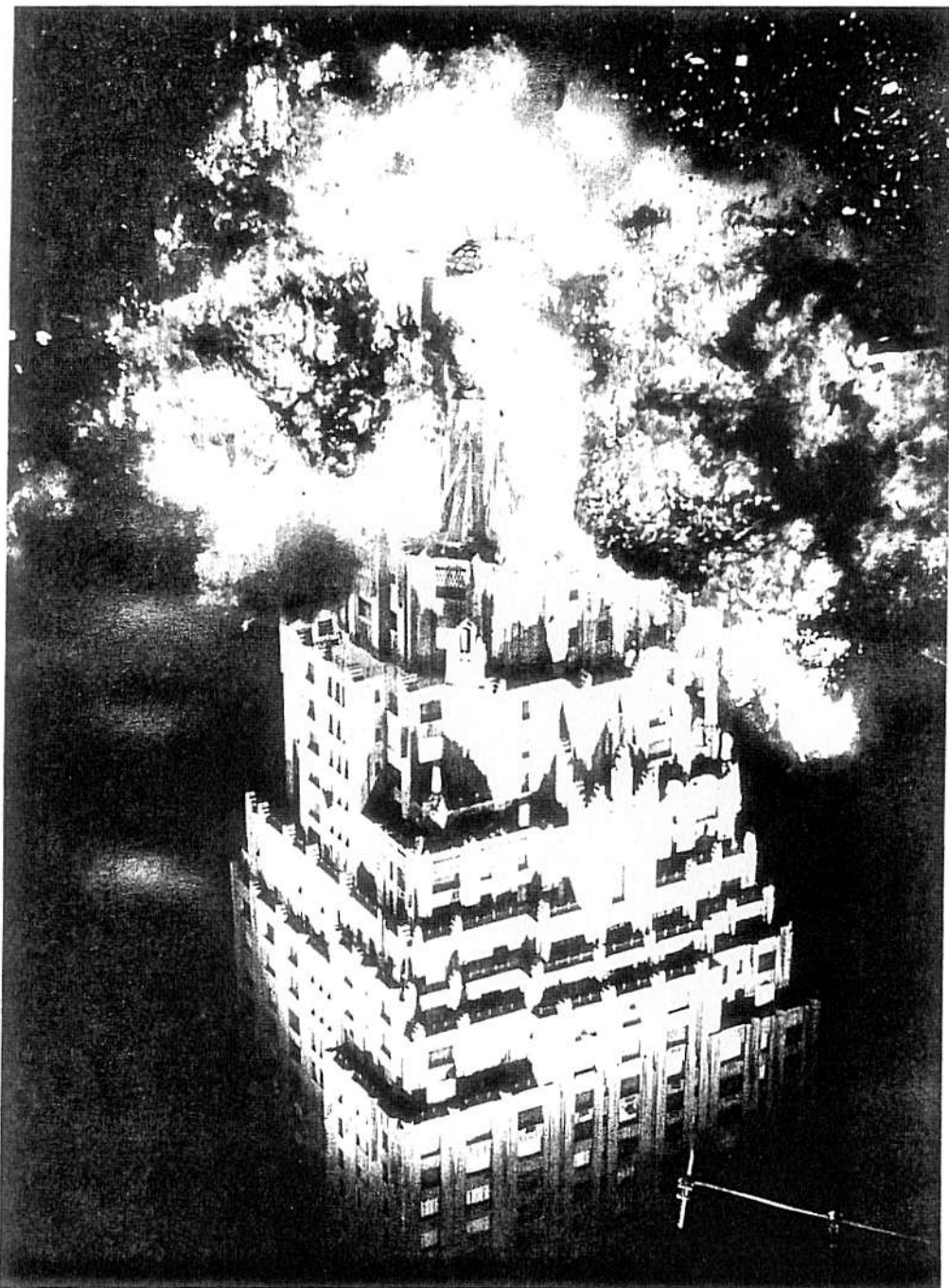
Some of the most difficult animation in *Ghostbusters* involved rotoscoping real people into scenes of the Stay-Puft man walking through Manhattan. "In Columbus Circle," Windell explained, "they had people running around in the streets and we had to incorporate the marshmallow man into those background plates. The problem was that because he wasn't really there when they filmed the plates in New York, people were just running around in every direction. We had to take those plates and then decide where to place the marshmallow man in the confusion — how far back in the frame — and decide which people should appear to be running behind him and which should appear to be in front. Every person that crossed in front of him had to be hand articulated, and that often proved to be difficult because it was a night shoot and some of the people wearing dark clothes or with dark hair tended to disappear into the night. As a result, you could sometimes see only people's faces streaking by, or just some article of their clothing, and those people had to be literally extracted and animated through the number of frames required for them to pass in front of the very visible Stay-Puft man. Annick Therrien and Peggy Regan were especially good at doing the painstaking rotoscoping through all of those kinds of shots."

Other problems included having to provide animation for parts of a ghostly activity, but not for others. When Onionhead was drinking his champagne, the bottle had to be completely visible while the ghost itself was transparent. "On that shot, we had to extract the bottle and animate the liquid as it excretes right through him and splashes onto the banquet tablecloth. The stain, which grows larger on the tablecloth, was done using practicals — with the fluid pumped up from below the table.









Then we had to animate the fluid as it came out of Onionhead and hit the table, timing our animation to the growth of the stain as he drank from the bottle."

One department that played a crucial role throughout the production was editorial. In fact, the effects editor was often instrumental in determining just how a specific sequence would finally appear on the screen. "The effects editor is the person who, other than the optical supervisor, really makes the shots work," said John Bruno. "A lot of people seem to think that the cameraman shoots the elements and then the editor does a merely mechanical exercise of putting the film together. Then it goes to opticals, where they do another merely mechanical process of pressing a button on the printer, and then the finished shot comes out the other end looking beautiful. That is not the case, however. Every scene is technically put together by the editor — and he often finds ways to make them work, even when no one else can because the elements don't seem to fit. On an effects picture, the effects editor is one of the gods."

For EEG's effects editor, Richard Edlund hired Conrad Buff, another veteran of the many award-winning effects films produced at ILM. "On *Ghostbusters*, as opposed to the more nuts-and-bolts hardware films, I was able to have more input up front because the live-action sequences would come to me first. Everything would filter through the editorial department and we were sort of the hub of information through which details about the shots were disseminated. This film was considerably different from the *Star Wars* films because instead of spaceships in deep space, it featured ghosts that had to react with live actors. As a result, timing of the elements was especially important. Shelley Kahn, the film's primary editor, would set the basic structure for all the scenes, and then I would work with the cameramen to help them produce elements that would fit what was initially cut."

In addition to advising the cameramen before effects elements were shot, Buff and his crew also had to wade through the thousands of feet of film actually produced. Sometimes they would discover pieces of film that would work for shots they weren't originally intended for, thus saving the time of reshooting elements that failed initially. "If an Onionhead that was shot for a specific scene didn't work," Buff explained, "I would try to rob one from another shot and not tell anyone. That sort of thing happens all the time — and hopefully, ultimately, the new elements don't look out of place." Sometimes a shot can be composed completely out of elements from other scenes, which was almost the case with the refrigerator sequence shot by John Bruno. In that sequence, Dana opens her refrigerator door to discover part of the Gozer temple and a Terror Dog inside. The sequence involved two shots, the first of which featured cloud elements shot for an exterior of the Gozer temple, an articulated section of the temple featuring the stairs and the pyramid. Flames shot for the melting of the marshmallow man's face, a bluescreen element of the stop-motion Terror Dog, footage shot on stage tracking through an area of smoke, and the edge of the refrigerator shot during principal photography.

The second shot in the sequence — a closeup of the Terror Dog roaring — featured the full-size articulated dog operated on a stage amid liquid nitrogen and dry ice smoke. Several bursts from some propane burners created flames that also lashed up in the background.

Invariably, the last department to be deluged in work is the optical department, which necessarily must wait for all the elements in a given shot to be photographed and timed before it can completely combine them to create a finished effect. On *Ghostbusters*, deadlines were particularly tight because of the lack of time that plagued the project throughout. "Even though we slammed the deal together in record time," Richard Edlund noted, "we still lost several weeks at the beginning of the project, which I knew would hurt us at the end. The upshot of that was that the optical department had to operate seven days a week, with everyone exerting a gargantuan amount of effort. Mark Vargo — whose middle name must be 'Take One' — was particularly amazing because he was able to do some very complicated four-hour composites that were right on target on the first take. As a result, his department was able to turn out an incredible number of shots in a very short amount of time."

One of the tools that aided Vargo and his staff was the 'Super Printer,' the new optical printer Edlund had designed and constructed when he first arrived at EEG. "It's really a beautiful machine," Edlund commented, "and it produces what I think are the best comps I've ever seen. Compositing down from 65mm directly to 35mm anamorphic, it gives us material that actually looks better than the live-action photography, because it's being duplicated on dupe stock. As a result, on *Ghostbusters* we were in the position of having to sometimes diffuse our shots because they were too sharp to match the surrounding live-action footage. Darker situations, in particular, gave us shots that looked so brilliant we had to tone them down so that the effects scenes wouldn't stick out from the rest of the picture."

"It's also quite probably the prettiest optical printer ever built," Vargo added. "Jerry Jeffress and Mike Bolles did a fabulous job engineering and designing the system, Kris Brown created some great software, and David Grafton oversaw the optics fabrication. It's a really first-rate system."

Even with the new printer, the nearly two hundred shots that had to be combined in a matter of a few months provided the optical department with many difficulties. "*Ghostbusters* was one of the most exciting movies for me to work on," Vargo noted, "because it meant discovering 65mm. But it was also one of the most difficult. In particular, the Gozer temple sequence was by far the hardest — not because of the number of elements involved, but because of the variety of those elements. The shots involved animation, bluescreen, live-action, cloud tank effects, matte paintings and laser light — and all of these had to be related to one another in one composite. Also, we were dealing with an organic or realistic situation, with real people on a real stage to which we had to add a lot of artificial elements and match the contrasts of both to bring an overall reality to the images."

Many of the sequences involving the ghosts provided their own unique problems. Combining elements for the Onionhead eating sequences, for instance, was particularly troublesome once the ghost started interacting with an object on the set. In the scene where Onionhead drinks from the champagne bottle, for instance, the bottle had to remain sharp while the ghost was transparent. "That involved critical roto work that was subtle and difficult," Vargo continued. "In *Poltergeist*, we never encountered this problem because the ghosts never grabbed anything or drank from a bottle and had the liquid just flow right through them. Once again, while Onionhead remained diffused, the liquid had to be sharp and distinct. The same goes for the librarian sequence, because she picked up a book from the bookshelf, read from it and then put it back — and while she was transparent, the book always had to remain clear and undiffused."

Perhaps the biggest question posed to the new optical department was whether bluescreen would work as well with 65mm as it had with VistaVision. "There was a myth before we came down here," Vargo noted, "that you couldn't do bluescreen in 65mm because of the inherent unsteadiness of the medium. Well, none of us batted an eye at the prospect of that being a hindrance. After all, we had the best machinist in the world — Gene Whiteman — and once he looked over the movements, changed a few pins around and ran some steadiness tests, we found the problem to be nonexistent. Ultimately, 65 is bulky and it takes up a lot more room, but we're thrilled to death to be working with it."

"The day we signed the contract to make *Ghostbusters*," Michael Gross concluded, "we knew it would be a race against time. We also knew all the problems that were ahead of us. And I don't think there were any great surprises anywhere down the line. There could have been horror stories about shooting on the streets of New York, but there were none. The Gozer temple set was monumental, but it was delivered on time. And the effects were staggering in their scope, especially given the time they had to be completed in. But they turned out wonderfully. Halfway through, the number of shots actually increased rather than decreased, but we saw an amazingly talented group of people work very hard — and deliver."

"Making a big picture like *Ghostbusters* is like fighting a war," Richard Edlund added. "It really is like battlefield conditions. Everybody comes to the set with all their equipment ready, sets up their tents and prepares to march on in and face the enemy — which is, more than anything, time. You deal with what you have; and if you need something you haven't got, you make what you do have work. And even though you're spending hundreds of thousands of dollars in order to do it, you still find out that you don't have enough. With our experience, we try to obviate as much of that as possible, but we still always get caught. Given those realities, we didn't really have enough time to do *Ghostbusters* — a film that was like doing *Poltergeist* and *Raiders* together, in half the time — but ultimately, I think we pulled it off."

*In a climactic conflagration, the Gozer temple explodes in the night skies over Manhattan. To effect the high-speed shot, EEG stage manager Thaine Morris rigged a pyrotechnic device consisting of flash powder and naphthalene, installed it within the steel-reinforced tower section of the Spook Central miniature and then detonated it in the parking lot outside one of the effects stages.*

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