What's a Nikon F3 Doing in the Temple of Doom?

Special-effects technologists teach a still camera to shoot motion pictures

Frame-clip from the exciting mine-chase sequence of "Indiana Jones and the Temple of Doom." The sequence was photographed on a miniaturized motion-picture set—not by a movie camera, but by a Nikon F3 that was especially modified for its role.

By Fred Rosen

Indiana Jones. His name conjures up images of lost arks and Himalayan snowstorms. But in the recent film "Indiana Jones and the Temple of Doom," the cliff-hanging archeologist wasn't the only star. He shared accolades with a Nikon F3 that was modified to shoot motion pictures.

In the climactic sequence that subsequently emerged as the film's showpiece, Jones and his companions are chased by Indian Thugee murderers through a mine. With the good guys in the lead mine car and the bad guys chasing them in a similar one, the cars race through labyrinthine tunnels, over pits of molten lava, streaking toward a dead end and almost certain destruction.

The problem for producer George Lucas was that if the entire mine-chase sequence were to be shot with tunnels built to scale, the expense would have been greater than the budget allowed. So Lucas and director Steven Spielberg decided to shoot just a small part of the chase scene on a sound stage and to shoot the bulk of the scene in miniature at Industrial Light and Magic (ILM), the special-effects arm of Lucas Film.

By using various camera angles and by building the sets and puppets of the actors to approximate human scale, the miniature scene could look as large as life. And when combined with the real-life shots, it would look as if the actors really were in jeopardy during the entire mine-chase sequence.

But before shooting could begin at ILM, the producers had another problem to solve. Much of the miniature work would require a camera that could follow the mine cars through the tunnels, but the technicians found there was not one movie camera small enough to fit through those tunnels.

The task of solving the problem fell to Dennis Muren, the chief visual-effects supervisor at ILM. It's Muren's job to solve the technical problems that develop on a motion picture.

"I asked myself," Muren said, "did we need to spend money and time to invent a

Animator Tom St. Amand manipulates models of the actors in a miniaturized mine car. The stop-motion animation sequence required him to change the models' positions slightly between each frame exposed by the modified Nikon F3. Twenty-four such exposures resulted in one second of time on the screen.

The still-camera-turned-movie-camera rides in a little motorized camera car through a labyrinth of miniaturized mine tunnels. This innovative technology enabled the filmmakers to efficiently shoot the showpiece sequence of the movie.

special movie camera when a camera already existed that could meet our needs? All we needed was a lens and a film-transport mechanism. A long time ago, I'd been thinking about still cameras being ideal in size for some shooting situations." He speculated that it might be possible to modify the small Nikon F3 to shoot the miniature chase footage.

With his assistant, Muren shot a test with an off-the-shelf Nikon F3. They found that the film occasionally slipped as much as one perforation as it passed through the gate. While this might amount to only fractions of an inch, those fractions would translate into excessive motion on the screen; it would look as if the film had not been registered properly.

"I knew if we could figure out what caused the slippage, we could probably solve the problem through trial and error and get it to work. So I called in Mike McAlister, who then was the chief visual-effects photographer for ILM," Muren explained.

McAlister and his assistant did a battery of tests with the Nikon. They found that the excessive speed the film attained as it went through the gate, causing the slippage, was the result of the power of the motor drive. By reducing the voltage to the motor drive, they were able to slow the film down so it didn't slip through the gate. They added brass edge guides to further keep the film from slipping, and they inserted a pressure plate to push against the film as it passed through the gate.

McAlister's next consideration was constructing a magazine to hold enough film for at least one take. He tried using Nikon bulk loaders, but found that the film was best registered when it came out of a standard 35-mm cassette. "We built a magazine that duplicated as much as possible the film path of one of those cassettes, but could hold a 50-foot load." The custom-crafted magazine was then attached to the camera's backplate.

McAlister's designs for the magazine and modified F3 were constructed in ILM's machine shop, and what emerged was an exceptionally small Vistavision-format movie camera. Once they knew they could make the Nikon work, they started to build the sets. With a regular Vistavision camera, the mine tracks would have had to be eight inches in pitch; using the Nikon, the tracks needed a pitch from only 3½ to four inches. This saved ILM a lot of money. With the Nikon, the tunnels only had to be 50 feet long; they would have had to have been 100 feet long with a */continued on page 98*

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Vistavision camera. The height of the tunnels was also correspondingly smaller.

During the actual filming, the Nikon was used from both a stationary position and following the action in its own camera car. The entire mine-chase sequence was done using stop-motion animation. This required moving the mine car and its puppet occupants at regular increments. For each increment, one frame of film was exposed. The car and puppets were moved again, another frame was shot, and so on. Twenty-four such exposures create one second of time on the screen. The result was a fluid sequence in which the mine cars appear to travel at breakneck speed. The movie contained about five minutes of this footage, comprising 50 shots of four- to five-second duration, taken with the modified Nikon. It took four months to shoot.

"Our Nikon F3 can do any of the exposure times a normal Nikon can do. The shutter is triggered with a remote control. That, in turn, is programmed by a computer," said McAlister.

Unlike many visual effects, the sequences produced by the Nikon were completed shots, ready to be inserted into the movie. The Nikon did all the work. "It would have cost 30 to 40 percent more to shoot *all* those shots to scale," Dennis Muren concluded.

Muren and McAlister received an Academy Award for their work. You'll see why the next time you watch "Indiana Jones and the Temple of Doom" at the movies, on cable, or on videocassette. Look closely at the mine-chase sequence. I dare you to figure out which shots were done to scale and which ones are the miniature. ●