

NEW FRONTIER

Brian Chirls learns about the differing Red One workflows of Steven Soderbergh's *Che* and Arin Crumley's *As the Dust Settles*.



DI COLORIST TIM STIPAN. PHOTO BY: MARK DOYLE

With this year's release of Steven Soderbergh's double feature *Che*, the long-awaited Red One camera proved itself in the field, but the device presented new challenges to the director and the team at Technicolor in postproduction.

The Red One, the first offering from start-up Red Digital Cinema, is billed as the first digital camera capable of competing with 35mm film. It captures images at 4k resolution (4520 pixels by 2540 pixels) on a sensor large enough to achieve a depth-of-field equivalent to that of a 35mm film camera. The camera generates image data at up to 36 megabytes per second, which can accumulate into multiple terabytes on a feature film. Red uses a wavelet-compression algorithm called Redcode, which requires storing the recorded images in a proprietary file format that is incompatible with Quicktime and other industry standard video formats.

The Red One camera body costs \$17,500, which is a fraction of the price of top-of-the-line HD cameras. However, the Red Web site recommends a \$30,000 basic-accessories package just to start shooting. Many filmmakers are enticed by the combination of film quality and digital convenience at a relatively low cost. However, as *Che* demonstrated, the costs of handling the enormous data stream and nonstandard technology can offset some of those savings. "It's a dangerous time," jokes Christian Zak, the vice president of Independent Feature Films at Technicolor. "Everyone is talking about the price of the camera, but they're not looking into what goes into making a professional finish. It's like when *El Mariachi* was made for \$8,000. Well, yes, but how much had to be spent to properly finish it?"

After Soderbergh shot *Che* on the first two manufactured Red One cameras on location in Spain, Puerto Rico and Mexico, he worked closely with Zak to set up a postproduction workflow across Soderbergh's New York City office and 10 Technicolor facilities around the world. Zak estimates that the total footage for both films came to about 120 hours, or about 10 terabytes of data, which had to

be backed up and moved around physically on hard drives and digital tapes because the files were too large to transfer over a network. "When you start working in this type of workflow, you really need an experienced data manager on set and as part of the postproduction process," Zak said.

Technicolor's DI engineer Mike Whipple helped Soderbergh set up his own digital intermediary studio in his office, where he did all the creative editorial work and a rough color correction. Soderbergh purchased for his studio an Assimilate Scratch system and several workstations running Final Cut Studio. At the time, these were the only software solutions that directly supported the Red "R3D" files without converting them to a more standard format. Final Cut reads a small "proxy" file, which points to the R3D files and allows editing of the Red footage at 2k without having to re-render to preview the cut after each edit.



ARIN CRUMLEY'S *AS THE DUST SETTLES*. PHOTO BY: MIKE HEDGE

Editorial was able to edit with the proxy files throughout the cutting process. Once the picture was locked, Soderbergh and Technicolor used Scratch to color grade and render the complete film from the native R3D files. "Think of the original code as your camera negative and the proxy as your standard def telecine tapes," Zak said.

After Soderbergh finished the cut and initial color correction, he transferred the Scratch files to Technicolor's colorist Tim Stipan, who fine-tuned the color with Soderbergh. Technicolor finally rendered the film as 2k Digital Picture Exchange (DPX) files, which were used to create the 35mm film prints and the Digital Cinema Package (DCP) for digital projection. Zak says it's possible to stay in 4k through the process, but an increase from 2k output to a 4k output is a significant increase in time and money due to the increase in file size. To maintain consistent color representation across multiple systems, Technicolor maintains a wide library of lookup tables to translate from one color space to another. V.P. of Imaging, Research and Development Josh Pines did a lot of color research to write tables to match the monitors at Soderbergh's studio with the DI theaters in Technicolor's facilities. Pines also created tables to represent exactly what footage shot on any given camera will look like when processed on a specific film stock, either for matching to the target projection print or for simulating the look of a certain type of film. "The two films were printed on different print stocks," says Zak. "*The Argentine* printed on Kodak Vision and *Guerilla* was printed on Fuji. We had to make unique look-up tables to profile both the Red cameras and the print stocks. And when you are going to digital cinema you don't pick up that characteristic of stock, so in our look-up table conversions we digitally bake it in." Even the two Red Ones used on the *Che* shoot required unique lookup tables, since the two cameras did not match due to hardware revisions that Red made between builds.

This summer, director Arin Crumley took a different approach, leading a crew of 25 into the Nevada desert with three Red cameras to shoot *As the Dust Settles*, an "auto-documentary" covering the experiences of a dozen filmmakers at the Burning Man festival. Crumley and producer-d.p. Mike Hedge aim to complete the film on a budget of about \$25,000, compared to *Che*'s \$58 million, with most of

the time volunteered and the equipment borrowed. Even with limited resources, Crumley, who earned a Spirit Award nomination for Best Cinematography on his previous film, *Four Eyed Monsters* (shot in standard definition 24p), expects to deliver a professional-quality image for digital projection.

Apart from the budget, the *As the Dust Settles* postproduction workflow is dictated by the team's creative process. Each of the 12 filmmakers has been given a copy of all the footage collected from the three Red cameras as well as several other cameras, including several handheld HD Canon PowerShot TX1s, a digital still SLR and a low-res wearable "spy" camera. Each filmmaker will edit a portion of the film from their own perspective, and Crumley will bring them all together to assemble the full feature. They are all using Final Cut on their own computers, many of which are laptops with portable hard drives, and most of them, including Crumley, will be working while traveling.

The distributed editing process required Crumley to give each editor a copy of all the footage small enough to fit on a laptop for use on an airplane. In addition to the R3D files being too large, he was not pleased with the accuracy of the proxy representation in Final Cut. He also found it difficult to incorporate footage from multiple cameras. After experimenting with many recompression configurations, Crumley found the best compromise of size and image accuracy by using Red Rushes software was to convert the 4k footage to Apple Pro-Res and then to conform that and all other footage to Photo JPEG 75 percent at one-fourth of the target 2k resolution using Apple Compressor. (The Rushes software was not able to output directly to Photo JPEG, so the extra, lossy step of going through Pro-Res became necessary.) After the final cut of *As the Dust Settles* is completed, Crumley will conform all footage to a 4k master. The Red footage will come straight from the native 4k files, some composited scenes will be rendered to 4k in After Effects and video from the other cameras will be up-resed to 4k.

After otherwise disparate workflows, both films will have used the very expensive Scratch software for final color grading because it is the only application currently capable of working with the R3D file format. Crumley attempted to use a Pro-Res intermediary so he could work in Color, which is bundled with Final Cut Studio, but he discovered that Pro-Res "totally sucks in terms of how dynamic the color space is." Fortunately, he found someone willing to donate a few hours on a Scratch system, which Zak says "looks like the cockpit of an airplane" and "not something that somebody out of film school is going to go purchase." Unlike the *Che* team, who had access to Soderbergh's Scratch system as well as the two belonging to Technicolor, Crumley and Hedge only have one chance to make it perfect. So they will hold several test screenings of the film in 2k Pro-Res before locking picture and performing their one final color grade.

While Crumley was able to obtain to a Scratch system, independent filmmakers unable to afford such access may wind up screening their 1k or 2k proxy file versions while they raise money for post. "Working in the proxies enables filmmakers a way to show a lower resolution version of their film," says Zak. "They can always go back to the native 4k files for a high resolution finish."

Soderbergh, on the other hand, was able to make multiple edits to *Che* since beginning the color-grading process, even after the film's premiere at Cannes. While the creative editorial process was smooth, every revision after the color-correction process required hours of re-rendering.

Steven Soderbergh's high profile and his position as the first feature director to use the Red camera afforded the team an unusual level of support in overcoming technical obstacles. "There were a lot of workarounds that we all had to figure out together," Zak said. "Because the technology was so new both Red and Assimilate were working together with us and constantly making upgrades to hardware and software." However, even without special access, Crumley and Mike Hedge were able to find all the support they needed on the forums on Reduser.net, from both Red employees and members of the user community.

From far opposite ends of the budget spectrum, Crumley and Zak have both come to the same conclusion: The Red cameras are great, but there is a lot of work to be done before the full potential of the convenience of digital workflows is achieved. The lack of industry standards and support for the R3D file format are

the most significant obstacles. In the meantime, Zak advises filmmakers to work with one postproduction facility throughout the process to avoid multiple, incompatible workflows. There is still a lot of research and development required, he said, but “this camera and this technology are clearly not going away.”