



***Need for Speed*, shot by Shane Hurlbut, ASC, allows viewers to ride shotgun during a cross-country car chase.**

Jay Holben

Photos by Melinda Sue Gordon, SMPSP, courtesy of Walt Disney Pictures.

On *Act of Valor*, cinematographer Shane Hurlbut, ASC pushed the small-camera envelope, shooting the feature almost entirely with Canon EOS 5D Mark II HDSLRs (AC Feb. '12). For his latest project, the video-game adaptation *Need for Speed*, Hurlbut combined the latest in small-camera technology with a few established digital favorites to create a visceral action experience, putting viewers in the driver's seat in cars traveling over 180 mph.

Directed by Scott Waugh (a co-director on *Act of Valor*), *Need for Speed* follows Tobey Marshall (Aaron Paul), a mechanic by day and racecar driver by night. After reluctantly teaming with a former NASCAR driver, Dino Brewster (Dominic Cooper), in an effort to save his struggling auto shop, Marshall ends up being framed for the murder of his best friend. Two years later, out of prison and hungry for revenge, Marshall lands a spot in a super-secret, winner-takes-all race against Brewster. To get to the race, he must get across the country in 45 hours. Brewster doesn't make it easy, however: he places a high bounty on Marshall's head.

"We did a slew of camera tests for this movie because we wanted to make sure to find the tools that would best tell the story," attests Hurlbut. "It was a five-day test involving interiors, day exteriors, night exteriors, night driving and a trip to Willow Springs International Raceway, where we took the cameras up to 180 mph to see how they held up. We put nine cameras to the test: Red Epic, Sony F65 and F55, the Black Magic Digital Cinema Camera, Canon EOS 1DC and C500, GoPro Hero3, Arri Alexa and an Arri 435. We put them all through their paces, including racing around the track at full speed to look at rolling shutter and the stresses of that kind of speed. We assembled all the test footage and then went to Technicolor, where we worked with [colorist] Mike Sowa to create the look we had in mind for the final.

“Scott and I sat in the screening room and watched all the footage, with no identification as to which camera was which. At the end of the screening, we agreed on Camera #6, which was the Canon C500 — an underdog in the test for sure! The images just felt alive, very real, and we all loved that. So, that became our A camera for the entire shoot.”

The filmmakers also tapped several other cameras, exploiting each for its strengths. Hurlbut explains, “The Alexa has great latitude, so we used an Alexa Plus for day exteriors and interiors that involved extreme contrast, often putting it on a Russian Arm. I knew I could put the Alexa on that and just let it run, and it would handle the deep shade and bright sunlight. The Canon C500 requires much more precise exposure, and I’ve found that it’s a lot like exposing film. It energizes subtle colors like film does, with great color depth; it was perfect for our car interiors, when we were often seeing deep-green grass out the window, cyan sky ambience in the chrome, or red bounce in the car from sunlight kicks on the hood. I also think skin tones on the C500 are superb; the sensor sees flesh tones the way Kodak film stock does.”

A big concern to the cinematographer was the number of night sequences in the film. “We wanted our nights to have a very polished, urban feel, and with the C500, we saw great detail at night — depth I’ve never seen before, actually. We were able to shoot a race starting on the outskirts of town and heading into the city center — about a 4½-mile stretch of asphalt — without one Condor! In some spots on the outskirts, we added Cobra-head street lamps, but in most cases we’d just send our Bucket Truck team out with cans of Streaks-n-Tips to spray down existing streetlights or kill every other one to increase contrast. I would crank the C500 to ISO 2,500 or 4,000, which had about the same noise as the Alexa at 800 ISO. That enabled us to shoot the action like a sequence in a play, using just a few additional lights to create depth. We’d shoot the full 4½-mile stretch in one take, first pulling the cars, then pushing them, bringing in the helmet cams and other rigs. Here and there I’d add a touch of light, but that was it.

“I also knew we could use the C500 for high-speed work,” he adds. “It can do 120 fps, and when we shot that material I didn’t need to adjust my lighting; I just increased my ISO. To shoot high speed on film in the old days, we had to light everything for 120 fps, scrim down for 24 fps, and then pull out the scrim to shoot high speed. But with the C500, we lit it at 1,600 ISO at T2.5, and when we went to 120 fps, I just increased to 4,000 ISO.”

Hurlbut notes that 4,000 ISO is “a little noisy” for his taste, but he knew *Need for Speed*’s post work would include Cinnafilm’s Dark Energy image processing, which he had used on *Act of Valor*. “Dark Energy just vaporizes digital noise and compression artifacts in the image, and it did a great job of cleaning up the 5D footage on *Act of Valor*,” he observes. “We did a Dark Energy pass on the entire movie this time, removing the digital noise and then going back and adding film-grain texture that feels organic and burned in.”

No matter how good, every new technology involves growing pains, and using the C500 as the A camera on a major feature production was no different, according to Hurlbut. “The camera was released about two months before we tested it,” he recalls. “It looked like a Hasselblad — no electronic viewfinder to speak of, and it was really not set up like a film camera. We tested all the third-party accessories available at the time, and none of them worked flawlessly. But we just

loved the camera's size — it's only 4-5 inches long, which is phenomenal if you want something you can embed in tight spaces. So, two weeks before principal photography, I consulted with my camera team. We realized specialized gear would be necessary to turn this camera platform into a system, and my key first AC, Darin Necessary, led the innovation at Revolution Cinema Rentals with reps from Element Technica. Element Technica really stepped up and created custom hardware for us, including a new cage, a power base with p-tap power, four video outputs, a top bracket and block-powered side supports. And they did it all in two weeks.

“As a result, we were able to shoot 80 percent of *Need for Speed* on the Canon C500,” continues Hurlbut. “The Alexa was our B camera, a [Canon EOS] 1DC was our C camera, and our D camera — the one we'd blow up, light on fire or toss off a bridge — was the GoPro Hero3. Most people use GoPros for 12-frame or 24-frame cuts, but we used them for 4 to 6 seconds. There's an amazing shot where the GoPro is on a car as it goes off a bridge and crashes onto the rocks below; that was all real and all GoPro.”

Not everything went perfectly, however. “We ended up accidentally destroying two C500s and two 1DCs,” Hurlbut admits. “One of the C500s got hit at 90 mph, and all that was left was the circuit board. About an hour later, a homeless man brought us our 14mm Cooke lens, which had ricocheted two blocks down the street!”

Hurlbut estimates the production's final camera package comprised 15 C500s, four Alexas, 11 1DCs and 20 GoPros. (A Vision Research Phantom Flex was brought in for a few 300-fps shots.) Such an arsenal of cameras required a camera crew the size of a small army, but Hurlbut notes that the production “started with 13 camera assistants and actually found that was more than we needed, so we cut down to 11. We basically had all of the cameras pre-rigged for anything we might need. We had cameras rigged for handheld or crane or car mounts, all ready to go at a moment's notice. I divvied the assistants up: one was helmet cam and GoPros, one was responsible for studio-mode rigs, one dealt with all the crash cams, one was assigned to action cameras on the Russian Arm, and so on. “As with any production, stunt sequences required more cameras to cover the action. But on this production, “more” typically meant 28 to 30 cameras all rolling on a single stunt. There are no computer-generated cars in *Need for Speed*, no greenscreen process-car driving shots, and no CGI stunts. However, CGI was used to put the actors behind the wheel in dangerous sequences, and all of the camera rigging on the cars involved in stunts had to be painted out. “We didn't do a stunt more than once,” recalls Hurlbut. “We would rig as many cameras as we could and cover it from numerous positions. The real CG work was painting out cameras and rigs — and occasionally us — but all the stunts and all the driving are real.”

On a major stunt, Hurlbut assigned the cameras that were to be operated to A-camera action operator Chris Moseley and A-camera/

Steadicam operator Jodi Miller, and there were typically up to 30 more in fixed positions. Second-unit cinematographer Michael “Billy Goat” Svitak was “the guy we'd send up a hill or down the road to get the bigger shots,” says Hurlbut. “He had a splinter van, and we'd deploy him to get the more remote coverage. They all did an amazing job.”

Lead actor Paul did most of his own driving stunts, after training with professional performance-driving instructor Rick Seaman at Willow Springs International Speedway. “Seaman said Aaron was a natural,” says Hurlbut, “and when our stunt coordinator, Lance Gilbert, saw Aaron’s driving, he said, ‘Okay, we’re putting him in the car!’”

Because so many scenes take place in cars, Hurlbut had specially designed windows installed that did not have a trace of tinting. “These were all very high-end cars, which meant that custom windows had to be created by hand — there are no real third-party parts for them,” he says. “We needed all the natural light we could get in the cars to really see the actor in the driver’s seat.”

Though Hurlbut did all of his camera tests with Panavision Primo lenses, budgetary considerations led the production to shoot with a mix of Canon Cinema and Cooke S4 lenses. The Canons were zooms, a 14.5-60mm T2.6, a 30-300mm T2.95-3.7 and a 15.5-47mm T2.8, and Hurlbut used three full sets of Cooke S4 primes. “I wanted a prime set with as many focal lengths as I could get,” he says. “With the three sets of S4s, we could do six cars at a time, and the variations in focal lengths were the difference between being able to do the camera position we wanted or not. When you’re in really tight quarters, sometimes a shot will work with a 21mm but not a 25mm, and if I’d had only a 25mm, I would have had to move the camera to a different position or go outside the windshield. Scott and I really wanted to keep the camera in the car.

“If I’d had to slide the camera to the side for a longer focal length, it would have taken the camera out of the actor’s eyes, and that would have meant less emotional connection,” he adds. “Just 4mm can be all the difference in the world between being right in the actor’s eyes or in a three-quarter profile. We’d embed three cameras in the car at the same time so we could get close-up, low angle and wheel-well shots all at once.”

The production recorded Canon Raw and Arri Raw to Codex S recorders. (The C500 doesn’t have a built-in recorder.) The IDCs recorded 4K 7:1 compression motion-JPEG to Compact Flash cards.

To get the audience even closer into the action, stunt drivers were able to wear a helmet cam while driving at full speed. This was a Canon EOS IDC mounted to the side of a helmet with a 15mm Zeiss ZE lens; counterweights were mounted on the other side of the helmet to keep a solid balance on the driver’s head.

Shooting at high ISOs meant very little lighting, even inside the cars at night. “We actually did a lot of our car-interior lighting with an iPad!” recalls Hurlbut. “The drivers use an iPad embedded in their cars to communicate and track their progress. For dash lights, we used Rosco daylight-balanced Litepads, which we greened up a little, dimmed way down and diffused slightly, adding egg crates to keep it from spilling everywhere. I just wanted to fill in the shadows a bit and allow the light from outside to key the actors.

“We were using natural light most of the time when shooting car interiors, and the result has a very real feel,” he continues. “There’s a scene early in the movie when Marshall is at a drive-in theater, and we used a 2K projector to put Bullitt on a big screen about 150 feet away from his car, and the bounce off the screen was enough to key the actors with the C500 at 4,000 ISO!

“This was a very different kind of film,” Hurlbut concludes. “Scott wanted to do as much of the action for real as we could, and he wanted the actors to react to what was really happening. So many filmmakers approach action by panning the camera around like mad and shaking it, but we didn’t want to do that. We wanted to immerse the audience in the live action.”

TECHNICAL SPECIFICATIONS

2.40:1

Digital Capture

Canon EOS, C500, 1DC; Arri Alexa Plus; GoPro

Hero 3; Vision Research Phantom Flex

Canon Cinema and Cooke S4

Stereoscopic Conversion