

State of the Art Part I: Production Tools

By David Geffner

A look at innovative film and digital production equipment in the industry

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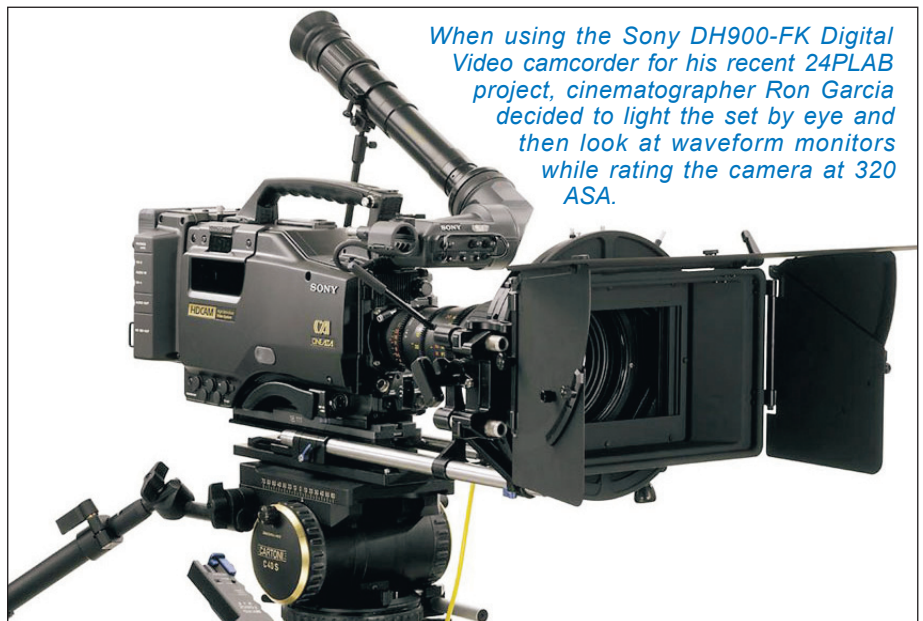
Ron Garcia, ASC, is always eager to test new production technology. But when Sony 24PLAB Project (headed up by Phil Squires) invited Garcia to participate, it was déjà vu all over again. Twenty years ago, Garcia was asked by Vittorio Storaro, ASC, to help gather an IA shooting crew for Francis Coppola's *One from the Heart*. Using Sony Betamax equipment, Coppola was "pre-visualizing" the production process by integrating film and electronics in a hybrid environment. This experiment led to Coppola testing a prototype NHK/Sony High-Definition Analog video camera system. "It was incredibly beautiful, seeing a video monitor with no visible NTSC lines and in a (1:85) film aspect ratio," Garcia recalls of that prototype. "My impressions of the 24p system were a reminder of that experience."

In his recent 24PLAB Project, Garcia used a Panavision Cine Alta system, consisting of the Sony DH900-FK Digital video camcorder and the Panavision 6 to 27mm (T1.8) Primo digital zoom and the 25 to 112mm digital zoom. The monitor was a 24-in. Sony HD24sl. The set was a 20 ft by 20 ft three-walled kitchen with a window. Garcia shot two different day scenes and one night scene. "I decided to light the set by eye and then look at the waveform monitor," Garcia explains. "I was told to rate the camera around 320 ASA."

The final format was to film output."

For the first day scene, Garcia used a 5K tungsten with full blue coming through the window onto an actress sitting at the kitchen counter and projected a 2K tungsten with full blue through double opal for the fill light. "For the second day scene," Garcia continues, "I wanted a late afternoon look so I changed out the blue on the 5K with Rosco VS straw and bounced the 2K (removing the full blue) into a 4 x 4 bead board 15 ft away from the actress. I was impressed that I had the choice to either use the camera as a camcorder or run a simple cable the size of a regular video tap RF cable to the Hard Drive recorder."

Garcia notes that by lighting the set to his eye first, then looking at the waveform monitor and seeing the



When using the Sony DH900-FK Digital Video camcorder for his recent 24PLAB project, cinematographer Ron Garcia decided to light the set by eye and then look at waveform monitors while rating the camera at 320 ASA.

relationships of the white and black levels, Gamma and midrange tones just as he would a sensitometric film curve, he was basically able to ignore the fact he was shooting electronically, and proceed as on a Panavision show shooting 320 ASA film.

Garcia, whose career prior to cinematography was designing computer system manuals in the aerospace industry, felt that the main drawback of the Sony HD Camcorder was the black and white, high contrast eyepiece. "I need the operator's input on composition and density in a scene," Garcia explains, "and it's hard to see those relationships through that eyepiece. It definitely fatigues the operator's eye. Until they improve, I would rather set a 5 x 7-in. LCD monitor in front of the eyepiece and use it like the old viewfinders on the rack over Mitchells."

Regarding the quality of image for the HDW F900 24P, Garcia states, "Many people have commented that the new video digital technology has dragged down the level of image capturing. While that is technically true when it comes to dynamic range, resolution, issues of back focus, too much sharpness, and the excessive depth of field, it's being resolved fairly quickly."

Marrying, rather than comparing, film to video, is the goal of Thomson's new Viper Filmstream Camera. Thomson's system was designed, with sister company Technicolor, to produce a 10-bit logarithmic format per color (30 bits in total), that maintains full resolution and true-progressive 1920 x 1080 pixels for every color. The Viper FilmStream does away with traditional video processing tools within the camera that are often irreversible in post; compression, color sub-sampling, and filtering are all absent, offering signal processing that the company calls "completely non-destructive and transparent."

The Viper's parallel to a film camera is clear: by eliminating time-consuming video engineering to calculate exposures and lighting indexes, cinematographers are free to fine-tune the dynamic range and resolution of the image in post, as they would in the lab after shooting film. In creating the Viper, Thomson designers reasoned that a production set is not the optimal location to gauge electronic imagery, with digital video offering too many varying parameters that do not equate to the environment in a movie theater.

The Viper's HD-DPM+ sensors allow switching among several different formats, including 1920 horizontal pixels by 720 vertical lines at a rate of 60 frames/sec, making



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the camera an option for digital cinematographers working with slow-motion effects. Mark Chiolis, Senior Marketing Manager, Acquisition & Production at Thomson, explains, "The unique Frame Transfer technology of the sensors allows the Viper to not only do a native 16 x 9 aspect ratio, but to also switch the CCD to 2.37:1, and utilize the entire vertical surface area, performing what can best be described as an electronic anamorphic. By using the entire CCD, the Viper is able to provide better resolution throughout the process, and doesn't have to do any "chopping" of the image to get that widescreen look. The image can be taken into post, manipulated in its entirety, and then sent back to storage for future anamorphic projection as you would on film."

Dave Stump, whose credits in effects cinematography include *Mars Attacks*, *Blade*, and *X-Men* believes the Viper Filmstream pushes HD effects imaging into new territory. "If you're trying to shoot blue or green screen in any of the compressed video formats, like D-5 down to HD-CAM," Stump relates, "you get artifacts along blue screen edges that inhibit the quality of blue screen compositing. If you have less information and less resolution, the mattes look less transparent at the edges, especially where things are blurred or fine detail happens. Part of that is due to the resolution output of compressed video, and part of it is due to the color space itself. The Viper



Cinematographer Bill Bennett uses the Viper for a handheld shot.

uses greater bit-depths formats than normal 8-bit linear color space. It offers 10-bit log, DPX format, which is an outgrowth of Eastman Kodak's Cineon format that digitally replicates the full range of film print stocks. Viper also works in 12-bit linear, their raw data format. Both 10-bit log, and 12-bit linear provide several stops more latitude of exposure range, which we sorely need. HD is deficient at the high-end in the overexposure area. The Viper provides finer resolution and less re-sampling errors (which occur with video compression), through these greater bit-depths of color. The result is much more highly resolved blue and green mattes to pull from."

Like any new tool, the Viper system is still under refinement. Stump would like to see "a simple, variable frame rate control" on an HD camera like the Viper, as well as a viewfinder that goes from video finding to optical finding so cinematographers and operators can see through the lens. "Working in effects, you may have to execute a 3 frames/sec motion-control shot, a 72 frames/sec explosion, or a ramp from 24 to 96 frames/sec for a bullet-time shot," Stump laments. "If we're going to start doing special effects pictures for theatrical exhibition in HD, then we need as many tools as the engineers and designers can provide."

Stump's call for a versatile, film-like HD camera may already be a reality

with the introduction of Panasonic's AJ-HDC27F Varicam system. According to Randy Gomez, CEO/co-owner of Camera Support, the integration of Camera Support's Cinovation system with Panasonic's HD Varicam offers cinematographers the most versatile HD system yet. "The Cinovation 24P HD system adds high-definition 15 in. plasma monitors in concert with the Panasonic Varicam AJ-HDC27F," Gomez notes. "The Varicam is a HD720p format camera with continuously variable speed rates from 4 frames/sec to 60 frames/sec. It allows access to the same under crank and over crank capabilities available in a film camera."

For Dave Stump, who has created special effects in virtually every film and video format available, improved HD systems like the Viper Filmstream or the Panasonic Varicam, indicate a merging of film and video image technology. "To have an HD acquisition device [like the Viper] that fits in with a familiar effects production chain—a Cineon or an Inferno workstation, or a film workstation that I would use to judge comps and mattes—makes the video process more comfortable," Stump concludes. "This is not waveform monitors and Digi-Beta. This is a real filmic production tool."

New production tools aimed at ratcheting up the film

Camera Support's Cinovation 24P HD system adds high-definition 15 in." plasma monitors in concert with the Panasonic Varicam AJ-HDC27F to offer a very versatile HD system.



experience would have to include ARRI's new Locpro 35, which offers a powerful option to the vagaries of seeing location dailies on videotape, or shifting among different screening facilities if booking becomes an issue, as was the case with Steven Poster, ASC, on *Stuart Little 2*.

"The decision to use the ARRI Locpro was an easy one," Poster recalls, "due to the nature of the production. *Stuart Little 2* was an effects-driven movie, and we needed to closely examine our dailies, rocking and rolling back and forth at various speeds, with the director and visual effects supervisor present. We were unable to lock down a single screening room for the balance of the shoot in New York City, so setting up a screening room in the hotel room next to the editorial suite was a fabulous decision. The Locpro projected our dailies onto a perfect 7-ft screen, and allowed us to freeze frame and rock forward or backward without losing any light through the image whatsoever."

Poster calls the Locpro, which fully assembled weighs in at approximately 125 lbs, "astounding" in image clarity and consistency. "Once the focus was set, it never drifted or slipped. The image was pristine; it was easy to set up, quiet, and truly portable. I would use it again on any show, effects-driven or otherwise."

The Locpro 35 that Poster utilized relied on a 400-watt HTI light source (5400° Kelvin) to deliver a flicker-free image. The manual-focusing f2 50mm lens projects the film image onto a pair of angled mirrors, which then direct the image onto the screen or wall with no distortion. The Locpro offers an auto-stop feature that prevents rollouts 6 ft before the end, high-speed forward and reverse shuttling at 200 frames/sec, and a self-threading mechanism.

ARRI's assistant vice-president of marketing, Franz Wieser, notes "The new version of the Locpro will offer a Xenon bulb to more closely reproduce color temperatures and characteristics seen in theater projection

systems, as well as an iris for brightness dimming and two filter slots." According to Wieser, the new Xenon light source will feature a honeycombed condenser that "achieves an incredibly even light output."

Poster was particularly impressed by the Locpro's consistency of light, noting an average 14 to 16 fL when placed 10 ft from the wall or screen (yielding a screen width of about two meters). Synch dailies with the Locpro, from either a digital or analog source, are easily achieved via an RS 232 connector. The Locpro puts out a Time Code

signal or Bi-phase for synchronizing sound with magnetic film, DAT, or hard disc recorders.

"The Locpro was a distinct advantage over using video dailies," Poster adds. "It was a strong approximation of [watching dailies in] a lab environment." The Locpro's benefits on *Stuart Little 2* so impressed Poster that his only notes to ARRI for improvements were to add some form of automatic masking in various aspect ratios. "I'd also like to have some variability with regard to color temperature and light," Poster concludes.

Versatility is the buzzword for Aaton's popular A-



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Introduced two years ago, Aaton's popular A-Minima Super 16mm camera has been gaining steam with television, effects, and low-budget cinematographers.

Minima Super 16mm system, introduced two years ago, but just now gaining steam with television, effects, and low-budget cinematographers. Designed to resemble a DV camcorder in its elegant, lightweight design, the A-Minima features a quick-change magazine that accepts 200 ft (61m) film loads in a new daylight friendly format on a core with flexible flanges. The camera only weighs 5 lbs and at 10 x 4.5 in. in size, is easy to carry and easy to rig. With a body cost of \$15,000, Aaton designers describe the A-Minima as “the world’s most efficient HD compatible image capture device.” Lens choices include PL or Nikon mount. When equipped with a PL mount, A-Minima is compatible with practically all Super 16 and 35 format prime and zoom lenses, including lenses as wide as the Optex 4mm. All 35mm format Nikon-mounted still lenses can be used when the A-Minima is equipped with a Nikon mount. Built-in features include an incident meter, time-code masterclock, and intervalometer. Distant eye viewing allows operators to place their eye to the finder or take it away in mid-shot, offering the flexibility of a camcorder.

Ian McCausland, sales manager at Abel Cine Tech in Hollywood, describes Aaton’s early objective with the A-Minima as “offering an affordable, yet advanced tool for high-quality motion picture image capture. Aaton’s target users were film students and cost-conscious independents who didn’t want to sacrifice image quality for the sake of telling their story,” McCausland notes. “Lately, there’s been a great deal of interest from cinematographers shooting sports, television dramas, features, stock footage, underwater, music video, and documentary because of A-Minima’s size and creative possibilities. The A-Minima has been strapped to skateboards, bicy-



The Arri’s new 5-link movement, with dual-pin registration and dual transport claws, was created to ensure optimal image steadiness as well as ultra quiet film transport.

cles, and a mechanical bull, and used handheld on fighter jets, speedboats, stock cars, and in other situations where the camera would normally need to be rigged. It’s also an ideal B camera for multicam concerts, sports, TV series, and features because it is lightweight and ready to go with no fuss.”

The A-Minima’s unique 200 ft load spools, integral to the camera’s efficient low-profile design, were co-designed with Kodak. The A-Minima requires film that is packaged in plastic A-Minima specific daylight spools manufactured exclusively by Kodak. Currently available Kodak stocks for the A-Minima include: Kodak Vision2 500T, Eastman Plus-X (black and white), Eastman EXR 50D, Kodak Vision 250D, Eastman EXR 100T, Kodak Vision 200T, Kodak Vision 320T, Kodak Vision 500T, Kodak Vision Expression 500T. The roll configuration is Spec 445, a new format that consists of 200 ft (60 m) of film with single perforation, wound emulsion out on a core with flexible flanges. This format can only be used with the A-Minima. Because A-Minima spools take up emulsion out, camera reports and

film can labels must clearly indicate “A-Minima-Emulsion Out.” The spools have a life of 3 or 4 uses as take up spools before they begin to wear and affect performance.

“The compact size of the A-Minima, and the fact that it takes a PL mount so I can use all the same lenses as my Aaton XTR prod,” notes *Scrubs* DP John Inwood, “is what sold me on the camera. The A-Minima can be rigged in places I just can’t get to with other cameras.” Inwood described how his key grip, Sean Crowell, was able to rig the A-Minima inside a ceiling panel for a shot looking straight down on the *Scrubs* hospital location/set. “The space was really tight up there,” notes Inwood, “yet

with the A-Minima, it was a fairly simple piece of rigging.”

Inwood described another shot where the A-Minima was rigged to a hospital food cart: “The scene was a series of pratfalls involving Dr. Elliot (Sara Chalke) and culminating with a food cart bearing down on her out of control,” Inwood explains. “We wanted a stylized POV shot, so we placed the camera on one of the trays, looking out between two trays with food in the foreground. The camera bears down on Dr. Elliot and she leaps out of the way.” Inwood goes on to say that the shot would have been impossible with any other camera. “Even a Bolex or an IMO would not have fit, and neither can shoot super-16 or take PL lenses.” Inwood and his crew have also rigged the A-Minima to wheel chairs, gurneys, and cars.

Technical innovations are nothing new for ARRI, which has been earning Academy Awards in their 35mm motion picture camera group since 1967. With the new Arricam Studio and Lite camera systems—a combined effort of ARRI and Moviecam engineers—the company has taken another leap forward in product excellence. New features on the Arricam include an electronic mirror reflex shutter (adjustable from 0° to 180° while the camera is running), a lens-data system that graphically displays depth-of-field calculations, an in-camera slate, exposed with time code as readable text within the film frame, and new lightweight carbon fiber magazines including an ultra-compact active displacement design. The Arricam’s new 5-link movement, with dual-pin registration and dual transport claws, was created to ensure optimal image steadiness as well as ultra-quiet film transport.

“We are using both the Studio and Lite in our first unit work,” notes *The Haunted Mansion* cinematographer Remi Adefarasin, shooting in Los Angeles. “I have the Zeiss Ultra-Primes with the lens data connections, which is a great help. Everyone sees the camera speed and lens we are using displayed on the monitor. Our lens range is 16mm right up to 180mm [not all the Zeiss lenses employed are ultra-primés], as well as a 16mm to 30mm variable prime. Filtration is kept to a minimum with up to 1/2 degree Black Promist used for beauty shots.”

Adefarasin, who was nominated for an Academy Award for his work on *Elizabeth*, also used the Arricam on Peter Howitt’s *Johnny English*. “These new generation cameras from Otto Nemenz have improvements over the original system,” Adefarasin relates from the

Haunted Mansion set. “It’s a simple, reliable camera that can quickly do ramps—we are doing iris-linked speed ramps at present up to 48 frames/sec—run in reverse, and still economize with the rented package. Interchangeability of elements—matte box, lens motors, magazines, eyepieces, and general camera accessories—makes for speedy and efficient filming.”

For *The Haunted Mansion*, Adefarasin and his team make use of conventional dolly shots, Steadicam, and hot gears on a crane. They have done some Technocrane work and used the SpyderCam cabling system. Most of the film happens at night inside a haunted mansion. The challenge for Adefarasin is to keep the camera mobile, maintain the spooky atmosphere, and still reveal as much depth as possible. Adefarasin prefers to harness soft light using honeycomb textiles or metal grids. He describes the new Arricam system as robust and flexible, without any breakdowns or inconsistencies despite the heavy workload.

“I would love ARRI designers to build a storage chip into the camera that could save 50 or so images of past scenes,” Adefarasin adds. “These images could be fed straight into the monitor feed in a switchable, compare-type mode. This would be helpful in checking lock-off shots or matching compositions with previous scenes. Custom-made semi waterproof covers would also be welcome. As would a new design eyebrow shade with more configurations and an ARRI adjustable French flag.”

Adefarasin is not utilizing the Arricam in-camera slate because “we are projecting our dailies with jazz sound and we did not want to introduce another variable into lunchtime dailies.” Adefarasin is using Arricam’s improved speed control device to control the many speed ramps utilized on *The Haunted Mansion*. With the Studio version, the SCB (Speed control box) is on-board the camera, while in the Lite version, it works as a remote control. Adefarasin calls the SCB on the Arricam “very simple and more predictable than the multiple devices required on the Arriflex 535.”

New production tools, whether film or video or a merging of both, work in the service of cinematographers, not the other way around. Ron Garcia, a member of the ASC New Technologies Committee, notes, “The merging of all these tools to augment rather than compete with each other is where the image-making process is headed.”