Jon Fauer ASC www.fdtimes.com July 2020 Issue 103

FILM AND DIGITAL TIMES

Art, Technique and Technology in Motion Picture Production Worldwide

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FILM AND DIGITAL TIMES

Art, Technique and Technology

Film and Digital Times is the guide to technique and technology, tools and how-tos for Cinematographers, Photographers, Directors, Producers, Studio Executives, Camera Assistants, Camera Operators, Grips, Gaffers, Crews, Rental Houses, and Manufacturers.

It's written, edited, and published by Jon Fauer, ASC, an award-winning Cinematographer and Director. He is the author of 14 bestselling books—over 120,000 in print—famous for their user-friendly way of explaining things. With inside-the-industry "secrets-of the-pros" information, *Film and Digital Times* is delivered to you by subscription or invitation, online or on paper. We don't take ads and are supported by readers and sponsors.

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This edition would have appeared sooner had it not been for countless hours on WebZoFloGoSkyZoom video chats. With inexpensive webcams as scarce as pandemically rationed toilet paper, this over-the-top webcam (above) was assembled with a Sony α7R IV, Cooke S7/i Full Frame 40mm, AJA U-Tap, Preston HU-4, Atomos Shogun 7, and LG 32" 4K Monitor. When would you use something like this, other than for fun? Actually, it is helpful for Cinematographers, Directors, Set Designers and VFX teams to previs and discuss looks, lenses, filters and styles. Oh, and B&H Photo Video now has an inexpensive webcam in stock.

Cover: Seiji Shibuya, sub director and photographer with a SIGMA fp camera on the film *Sin-Sin*. He is usually a professional photographer working in Modern Art. Director Yu Yamanaka wanted him to advise on the direction of the film and to take still photos for visual references. Hence the new crew title "sub director and photographer" created by Director Yamanaka.

SIGMA fp: le caméra stylo

If the Cannes Film Festival had not been canceled this year, a beautiful film from Japan would have premiered there. *Sin-Sin*, directed by Yu Yamanaka, is the touching story of a young boy navigating a life made tough by grown-ups.

Read the interview with Yu Yamanaka that follows.

You would be right if Antoine Doinel comes to mind in *The 400 Blows (Les quatre cents coups)*, François Truffaut's 1959 film that won Best Director at the Cannes Festival in 1959.

Truffaut was 27 years old at the time. *The 400 Blows* was a major coup for the French New Wave (*La nouvelle vague)*. Little wonder. Previously, Truffaut had been a film critic at Cahiers du Cinema, espousing a new vocabulary for film students to memorize in the following years: *auteur*, the director as author and *le caméra stylo*, writing with the camera as if it were a pen.

Actually, a lot of this theory was just that: theory. There was, of course, an entire crew around the camera, behind the author and

SIGMA fp: le caméra stylo

Sigma fp camera. 2020

the pen. Henri Decaë was the brilliant cinematographer of *The 400 Blows*. He is remembered for his work in "liberating the camera from its fixed tripod."

It has been said, at times ironically, that the new wave owed much to the fact that you could avoid pesky Parisian film permits by shooting without a tripod. Nevertheless, Decaë's Eclair Cameflex and Camé 300 cameras, that had nothing to lose but their tripods, were not exactly petite. Truffaut and Decaë would have weeped with joy had the SIGMA fp, no larger than a pack of Gauloises, arrived 60 years earlier.

The SIGMA fp camera is the embodiment of an entirely new and liberated camera, an auteur's *stylo*. SIGMA CEO Kazuto Yamaki called it "a deconstructed camera that allows for free and flexible styles that adapt to any genre. It is a camera for the next new wave."

The SIGMA fp shoots beautiful stills and video—and also happens to be the world's smallest and lightest mirrorless camera with a Full Frame sensor. It is pocketable, nimble, versatile and, amazingly, shoots 12-bit 4K RAW to an external SSD drive. (Or 8-bit 4K RAW internally.)

The SIGMA fp launched less than a year ago. In that time, it has gained admiration and acceptance as the elegant, essential, tiny camera for productions large and small.

Eclair CM3 ca. 1961

Above: Truffaut and Decaë shot *The 400 Blows* with an Eclair Caméflex CM3 Standard similar to this one, ca. 1961—darling of the new wave and one of the first comfortable shoulder-resting cameras.

At right: Eclair Camé 300 ca. 1949. Decaë used a similar model on *The 400 Blows*. It was a studio silent reflex camera that designers André Coutant and Jacques Mathot based on the M.O.S. Caméflex.

Both of these Eclair cameras reside in the Collection de La Cinémathèque Française in Paris. Photos courtesy of Laurent Mannoni and Collection La Cinémathèque Française.

Photos by Stéphane Dabrowski.

SIGMA fp. *Actual size.*

At 112.6 × 69.9 × 45.3mm / 4.4" x 2.8" x 1.8"
and weighing 370g / 13.1 oz (without battery and SD card),
the SIGMA fp is the world's smallest and lightest full-frame mirrorless camera at this time. It has a back-illuminated 35.9 x 23.9 mm, full-frame, 24.6 megapixel Bayer sensor. The L-Mount has a flange focal depth of 20mm and is compatible with Leica SL and Panasonic S1 series mirrorless camera lenses.

SIGMA fp

Dimensions: 112.6 × 69.9 × 45.3mm / 4.4" x 2.8" x 1.8"

Weight: 370g / 13.1 oz (without battery and SD card),

Sensor: back-illuminated 35.9 x 23.9 mm, full-frame, 24.6 megapixel Bayer sensor.

The L-Mount has a flange focal depth of 20 mm and an inside diameter of 51.6 mm. The L-Mount is the same type used on Leica SL, SL2, CL, TL and Panasonic S1 series mirrorless cameras. So you can work with an already substantial and increasingly large inventory of L-Mount lenses from SIGMA, Leica, Panasonic and others.

SIGMA MC-31

Attach a SIGMA MC-31 L-Mount to PL adapter.

The SIGMA fp now accepts almost any PL mount lens in the cine universe. PL mounts have a 52 mm flange focal depth and 54 mm inside diameter.

4K 12-bit RAW

SIGMA fp records 4K 12-bit RAW CinemaDNG to off-the-shelf SSD drives.

You do not need an external recorder or proprietary drives.

Connect a Solid State Drive to SIGMA fp's USB-C (USB 3.1) connector.

Samsung SSD T5 1 TB and 2 TB drives are recommended.

Shown here with a LanParte SSD-T5C clamp. It screws into the SIGMA fp's ¼-20 threaded side socket and cradles the Samsung Solid State drive.

SIGMA fp with Samsung Solid State drive connected via USB-C cable to camera's USB-C / USB 3.1 port. The SSD is attached with a LanParte SSD-T5C clamp.

With L-Mount 45mm F2.8 D G DN prime lens

Adjustment of 1.5mm hex stopper pin on SIGMA MC-31 PL mount to L-Mount adapter.

Most PL mount breech locks have a stopper to prevent overtightening. But sometimes the PL mount of a lens can be too thin and the lens wobbles because you can't tighten the mount past the stopper pin. The MC-31 has an adjustment to release the stopper pin so you can tighten the breech lock further. Of course, be careful you don't tighten to the point of not being able to loosen it again.

SIGMA fp as “A” Camera

SIGMA fp with MC-31 PL to L-Mount adapter, shown with SIGMA Classic Art Full Frame Prime (enhanced flares, vintage look).

These primes come in the following focal lengths, all with 95mm front diameters:

14mm T3.2	40mm T2.5
20mm T2.5	50mm T2.5
24mm T2.5	85mm T2.5
28mm T2.5	105mm T2.5
35mm T2.5	135mm T3.2

SIGMA fp as Director’s Viewfinder (and PL mount Cine Camera)

FF High Speed Prime with PL mount.

MC-31 PL to L-Mount Adapter

SIGMA fp Full-Frame camera

LVF-11 LCD Viewfinder with diopter

SIGMA FF HS Primes come in the following focal lengths, all with 95mm front diameters:

14mm T2	35mm T1.5	105mm T1.5
20mm T1.5	40mm T1.5	135mm T2
24mm T1.5	50mm T1.5	
28mm T1.5	85mm T1.5	

Yu Yamanaka on *Sin-Sin*

Yu Yamanaka, Director.

Yu Yamanaka directed *Sin-Sin* using the SIGMA fp camera recording 12-bit RAW, SIGMA FF Classic Prime and FF High Speed Prime lenses.

He was born in Yamanashi Prefecture and founded the BLUE DOCUMENTARY Company in 2010. His work includes *Paper Garment* for an Issey Miyake Exhibition, *Tema Hima (The Art of Living in Tohoku)* for the Tema Hima Exhibition, the NHK taiga drama *Yae no Sakura (Creators Part)*, the Sony Aquarium short film *Teori wo Naru Tori*. www.bluedocumentary.com

Yu Yamanaka is also the filmmaker behind SIGMA's films brand image films *SIGMA Aizu, Japan* and, most recently, *blur*.

Jon Fauer: I watched *Sin-Sin* several times—at first through tears and later with wonder and admiration. Congratulations on a truly moving, beautiful film. It reminded me of Truffaut's *The 400 Blows (Les Quatre Cents Coups).*

Yu Yamanaka: Thank you so much. I am very honored. *Les Quatre Cents Coups* is like a Bible for me and I had that film in mind when filming *Sin-Sin*. I even talked with my staff about whether to put the name of Truffaut and *Les Quatre Cents Coups* in the end credits. There are so many tricks in that movie and I wanted to figure them out.

It is interesting how you created a story so sad and so pretty at the same time. The cinematography is stunning and the images from the SIGMA fp camera are outstanding. Casting, directing and acting are also outstanding.

The fp camera is amazing. It is almost frightening. The images are strong in the dark areas without giving way to artifacts or noise. It feels like the information that entered onto the sensor is recorded as it is.

Director of Photography Hiromitsu Uehara said, "The camera was much smaller than I imagined." How did that help your style of shooting, in tight locations, maybe with a small crew?

The fp camera enabled us to work with small rigs and small specialized equipment. Where we would have used a Fisher Dolly on earlier productions with bigger cameras, now we have changed to the smallest Ronin-S.

As a result, the fp made a small crew possible. It contributed to reducing the whole cost.

Did the size of the camera affect the style of the film?

Yes, the size is the smallest of all other cinema cameras, and there is almost no distinguishable noise (artifacts, color noise), so the picture is very strong. I think the coexistence of the two—small size and superb image—is so amazing.

I feel disappointed that the fp camera is not yet so well-known to everyone. I want to say to everybody, "Hey! Come on. Give it a shot. You will be very pleasantly surprised."

What does *Sin-Sin* mean?

Sin-Sin is a Japanese word that explains quietness as if the sound has been sucked into somewhere else. It is also a word often used to describe the sound when snow falls. Actually, since there is no sound when snow falls, maybe I should say "quietness." For the English title, it could have been "shin" because that is the way it is pronounced, but I stayed with "sin" to add the meaning of guilt and crime.

Where did the idea come from? In the opening titles, you say "inspired by true events in 2007 and 2011."

Child abuse has long been a social issue in Japan and I had a

Yu Yamaka. Photo: Kitchen Minoru.

strong awareness of this problem. The 2007 event was a small incident that most people would not remember. In Osaka, a father told his son to pretend to be homeless and made him beg for money from people walking on the street. After the father was arrested, he confessed, "My son did it on his own." And the son said, "It's not my dad's fault."

The response of the public to this incident was full of antipathy towards the father for making his child do such thing. However, I imagined that the father and son had a strong bond. They were poor and in need, but they had the feeling to help each other. I do not know the truth though.

Social security is also one of the things I am most interested in right now. In Japan, social security expenditures account for much of the national budget. In 2011, a social services worker and a doctor colluded in Hokkaido on a disability pension fraud scheme in which they asserted that some of their clients were deaf. There are many other fraud cases related to illegal welfare schemes and I think these will increase in the future in Japan.

Where were the locations?

The locations were in Choshi, in Chiba prefecture.

The actors were excellent. Can you tell us more about them?

I agree. I really think we had great actors gathered for this film. Daiji Asakawa, in the role of Kenta (the boy), did a great job. He immediately fulfilled our requests and made the part his own. In the crying scene, he said, "I have little experience and I am not confident." But as we started, he was very good at it. He is very smart.

Kyounosuke Nishino, in the role of Ryohei (the father) is a comedian. However, he was stoic in his acting and performed wonderfully. In general, it can be even more difficult to act a humorous character than a cool character, but he did a great job.

Please tell us about the lenses.

Most scenes were done with SIGMA FF High Speeds. I feel the HS FF lenses are very clear, straight, serious. So it gives the film a sense of reality in minute detail. There are no unnessesary effects.

I like them so much. They are my first choice every time in every case.

The flashbacks of the mother used the SIGMA Classics.

The SIGMA Classics, aimed at a window, provided an ethereal quality. What other scenes could you imagine using these lenses for in the future?

The SIGMA Classic lens is truly amazing. I would like to use it for anything—documentaries, music videos, commercials, etc. It will make every scene dramatic.

What happens when you are not pointing these lenses at a window or strong source?

Even with weak light, a little flare occurs, creating a soft expression. However the subject can be captured very sharply. This is an effect never obtained with a filter.

I assume the interiors were wide open? How did your Camera Assistant keep sharp focus so well, even with the Ronin-S shots as the camera moves in for an ECU?

We mostly shot at T2.0. Our Focus Puller used a wireless remote focus control and he was working with great spirit and accuracy.

There are some production photos of the SIGMA fp camera with SIGMA L-mount still lenses. Were these for additional photography?

The L-mount lenses were used for still photography, not for the movie.

You also used the SIGMA fp as a Director's Finder?

I did a little bit and it was very easy to use because of the compact size.

Where did you rent the extra grip and lighting equipment?

From a rental shop called i-7. It is a company of Uehara, the Cinematographer.

Please discuss grading and finishing the film from 12-bit CinemaDNG.

Colorist Haruka Okutsu graded in the post production studio "i-7" with DaVinci Resolve. She said the data was very easy to handle and held up very well for touching up.

The entire crew was very pleasantly surprised by how beautiful the images of the fp were. It was like straight, clean, pure, fresh grapefruit juice, not concentrated and reduced juice.

I'm curious about the backstory. Why did the father want to "go straight" and give up a life of crime?

It is very hard to live as a Yakuza in Japan today. Since very strict laws on Yakuza have been enacted, their lives have become very tough.

Also, if your father is a Yakuza, your family will be shunned and

you will not be able to establish relationships within the community. Ryohei decided to quit the Yakuza, thinking of Kenta.

Were the Yakuza in the film real people or actors?

No! (LOL). I would never want to owe anything to a Yakuza.

Why was the fish-seller's daughter friendly to the father and son (giving them fish) and wanting to take care of the boy in the end?

In the Japanese countryside, it is customary to give gifts to one another in a neighborhood. You share what is left over at home. It is a very good culture.

In the case of Azusa (the fish-seller's daughter), she has a good feeling about Ryohei and she knows about Kenta, so she has a strong desire to help.

What commercials or documentaries of yours used SIGMA HS Primes?

I shot a TV commercial for Tokio Marine Nichido, an insurance company. The location was Khao Samroi Yot National Park in Thailand. Since the shooting was done with a DJI Ronin gimbal stabilizer on the top of a mountain, a lens with high resolution and mobility was required.

The Japanese crew, the Thai crew and I, as Director, unanimously decided to go with SIGMA HS Primes. (Except the shot with the monkeys. This was done on a still telephoto zoom.) The results showed that these were good choices.

The lens depicted a young Japanese actress as very fresh and beautiful. I remember that the result had a very good reputation at the post-production studio. It is online:

Commercial: youtu.be/Q2BrK24MrFo
BTS video: youtu.be/Tfpz_c0o6HQ

Please tell us a little more about yourself. How did you get started in film?

I first became interested in movies while studying physics at university. Movies provided a simple joy that was different from other forms of artistic expression. I was hooked. My world revolved around watching movies and working at a video rental shop every day. I devoured about 5 movies a day.

After graduation, I began studying at the school of a film company while gaining hands-on experience working in V-Cinema (Japanese direct-to-video). I subsequently went freelance as a film director at the age of 28.

I have always held an interest in documentaries. Maybe it was from watching too many movies, but I gradually became tired of fiction, enjoying something that was based on a true story instead. Take gangster movies for example; the rawness between one based on fiction and non-fiction are different. Just take the gangsters wiping up spilled coffee. Just that makes something more grounded in reality.

Where do you derive inspiration?

Anything. Anywhere. In the car, in my garden.

Japan has shifted from winter to spring to summer and there is a lot I learn from the four seasons of Japan and nature.

I try not to stay in the studio too much but rather go out and spend time with my family, go for a trip, spend time and live a life as an ordinary person which tells me a lot.

There is also a lot to learn from America's films and literature too.

I am especially influenced by Charles Bukowski and Paul Auster.

These are two people with completely different personalities, but both of their work goes back and forth between reality and fiction and their storytelling grabs the hearts of people.

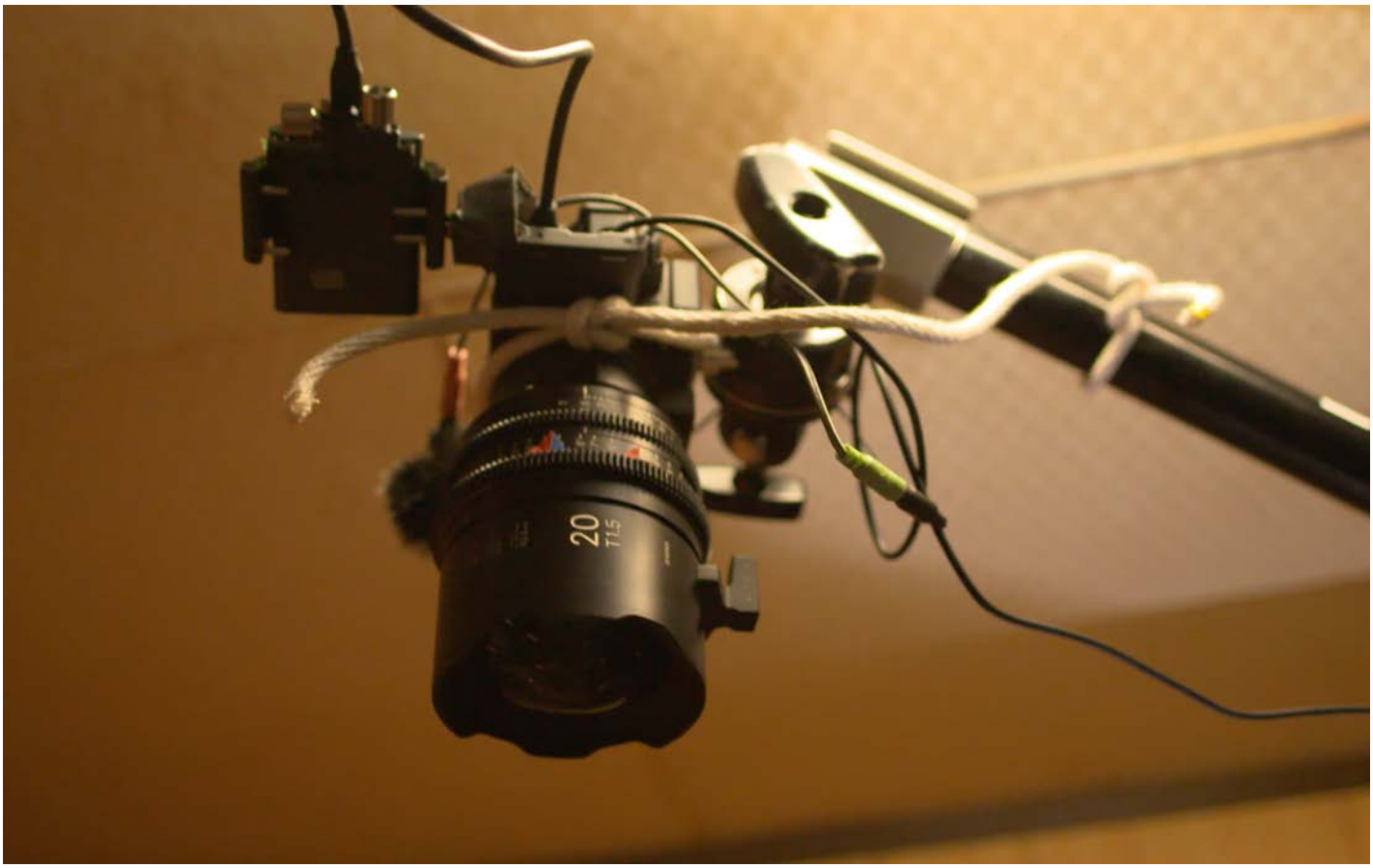
Stream *Sin-Sin* online:
https://www.sigma-global.com/en/about/sin-sin/

Additional details about Yu Yamanaka:
sigma-sein.com/en/seekers/yuyamanaka/

Sin-Sin Framegrabs

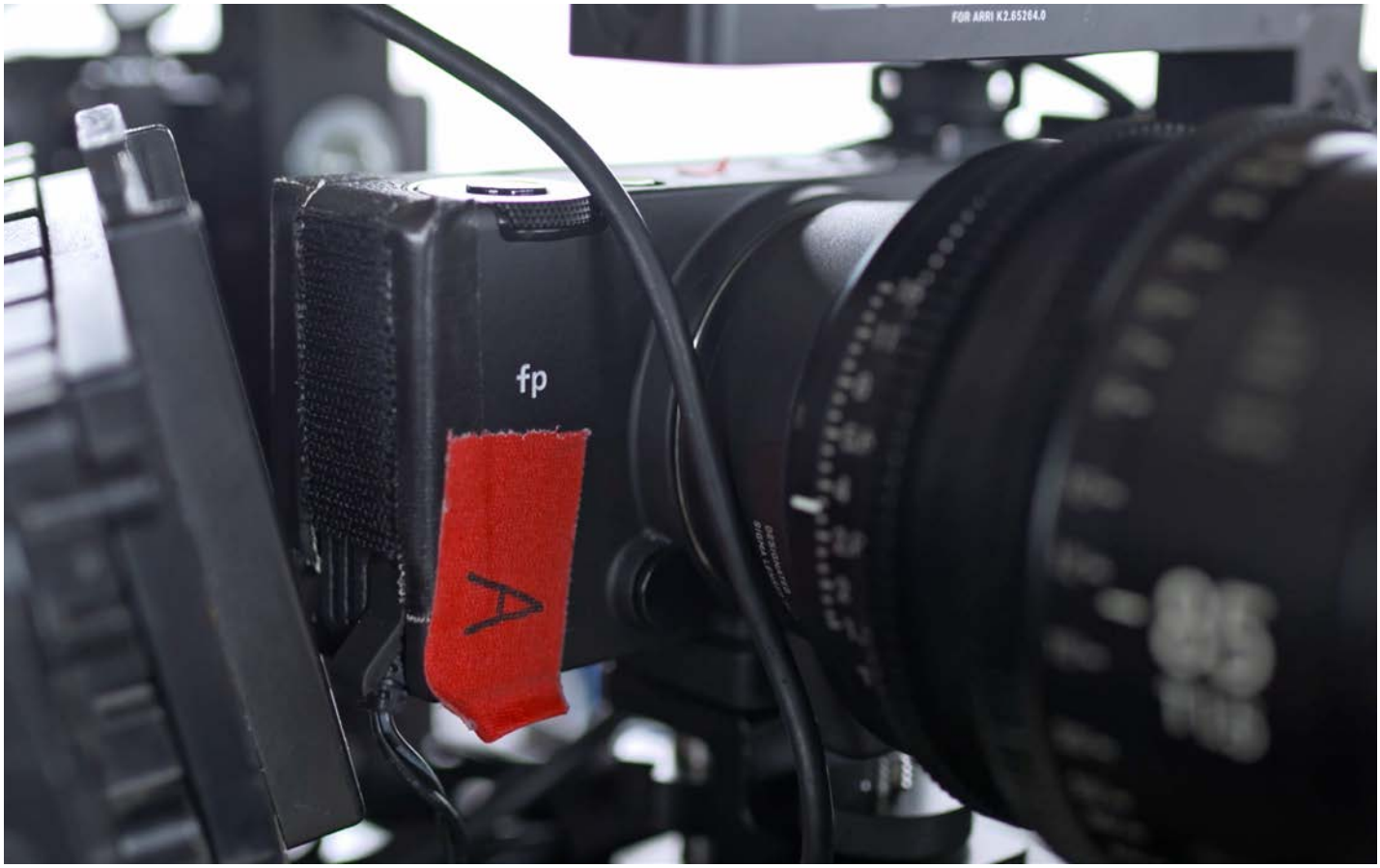
Sin-Sin Framegrabs

Sin-Sin Production Stills

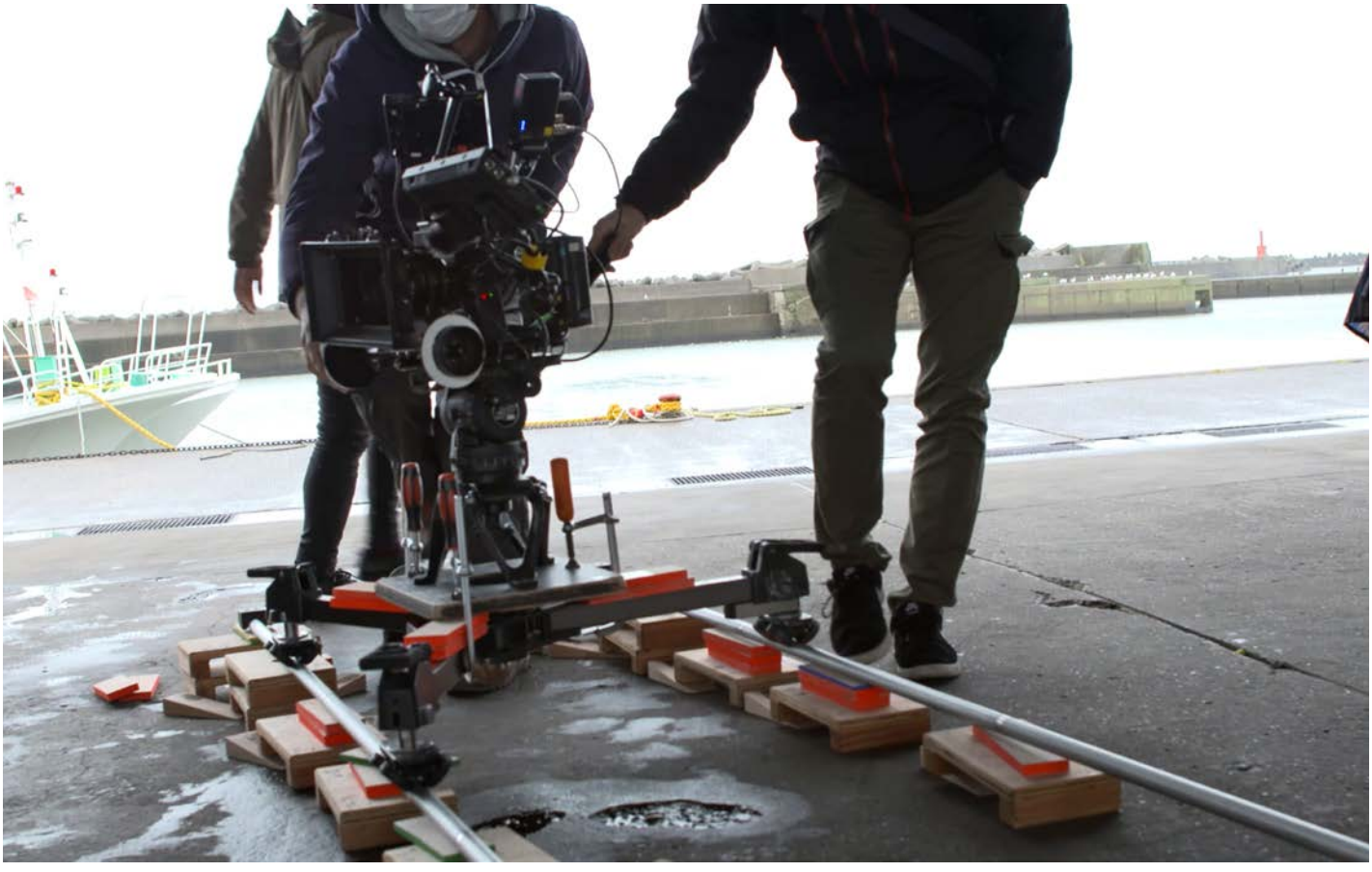


Sin-Sin Production Stills

Sin-Sin Production Stills



Sin-Sin Production Stills



SIGMA fp in Directors Finder Mode

SIGMA fp 2.00 Update

Just hours before publishing this edition, SIGMA announced a major firmware update for the fp camera.

The official press release begins, "Since its launch in October 2019, users have been able to explore their individual ways of imaging expression. The positive reactions received from users enjoying both still and cine digital imaging perfectly reflects the core concept of the SIGMA fp—Seamless and Scalable."

I would add that the fp name derives from "fortissimo-pianissimo," although you could also remember fp as "film-photography" or "full-frame/pocketable."

The announcement continues, "This major firmware update of the SIGMA fp is released with the aim of meeting our customers' needs in order to enhance convenience and provide further possibilities of creativity. This firmware update includes functions that had been planned but were not available at the fp's launch, and are in addition to the updates announced in March 2020."

SIGMA will continue to develop additional updates for the fp.

Summary of SIGMA fp V2.00 Update

- **DCI 4K 12-bit / HDMI RAW output.**
- **RAW recording via HDMI** with Atomos Ninja V monitor-recorder. (Free AtomOS firmware update for Ninja V is required).
- **Blackmagic RAW** recording via HDMI with Blackmagic Video Assist 12G models. (Requires firmware update of Video Assist 12G models using Video Assist Update 3.3.)
- **HDR** in video shooting.
- Still and video shooting in Director's Viewfinder mode.
- Support for Cinemagraph creation and playback. (Cinemagraph is a short, boomerang style video loop created in Cine mode, like the moving pictures in The Daily Prophet read by Harry Potter.)
- CinemaDNG playback.
- Still capture during live view and video shooting in Cine mode.
- Still image capture from video files (CinemaDNG, MOV) shot with the SIGMA fp.
- Camera control is compatible with the ZHIYUN Weebill S gimbal. Firmware update of the Weebill S is required. See ZHIYUN's firmware release information about functions supported. Since not all functions will be supported in this firmware update, both SIGMA and ZHIYUN will continue working on this to make more functions compatible in future firmware updates.
- Camera control support in USB mode. The SDK (Software Development Kit) for controlling the camera is scheduled to be available by early July.
- Instruction message appears when attempting to use grayed-out items in the SHOOT menu

Enhanced or modified functions

- Dual Base ISO (ISO 100 and 3200)
- Improved AF (Autofocus) performance
- Improved accuracy with evaluative exposure metering.
- Improved image quality.
- CinemaDNG 25 and 29.97 fps (UHD 12-bit) shooting.
- CinemaDNG 100 fps (FHD 12-bit) shooting.
- CinemaDNG 100 fps and 119.88 fps (FHD 8-bit and 10-bit) shooting.
- "OFF" option available in Color mode.
- Exposure adjustment available in QS (Quick Set).
- Tone control setting "Auto (Mild / Strong)" available during movie shooting.
- USB Video Class (UVC) setting adjustments while the fp is connected to USB.
- Time code generation.
- Compatible with BWF format.
- Supporting file size changes at 7:6 aspect ratio.
- Supporting changes of shutter sound effect.

Bug corrections

- The phenomenon of occasional flickering in dark areas of video scenes has been corrected.
- Bugs in USB Video Class (UVC) setting when connected to USB or during movie shooting have been corrected.
- Improved recording stability with recording media.
- Other minor bugs have been corrected.

DNG RAW Still Files

To develop RAW still photo data (DNG files) from the SIGMA fp with firmware Ver. 2.00, using SIGMA Photo Pro 6.7.4 software is required. Download the free update to SIGMA Photo Pro 6.7.4 when applying the fp ver.2.0 firmware update.

Resources

- **To download SIGMA fp firmware:**
https://www.sigma-global.com/en/download/cameras/firmware/
- **Videos about SIGMA fp firmware Ver 2.0 and the new, updated CINE features:**
youtube.com/user/sigmaglobalvision
- **For more information about SIGMA fp:**
https://www.sigma-global.com/en/cameras/fp-series/
- **SIGMA fp instruction manuals and menu maps:**
https://www.sigma-global.com/en/download/cameras/brochures-manuals/#fp

Apple ProRes RAW for SIGMA fp on Atomos Ninja V

Just in time for publication, Atomos and SIGMA announced Apple ProRes RAW recording over HDMI with the fp mirrorless camera and Atomos Ninja V HDR monitor-recorder.

The SIGMA fp connected via HDMI to an Atomos Ninja V will record ProRes RAW at up to 24 fps in DCI 4K or up to 30 fps in UHD 4K.

Dan Chung of Atomos says, "It will also be the world's first mirrorless hybrid photo-style camera to record RAW via HDMI in 1920x1080 HD at 120 fps. The SIGMA fp also becomes the smallest camera combination to record ProRes RAW, opening up a wide range of shooting options.

The small and light package of fp and Ninja V lets you shoot with RAW almost anywhere: on a drone, gimbal, stabilizer rig, body cam, mini remote head — or even on a tripod. Imagine the POV shots or stunts that could be conjured up with something this tiny. It opens up an entire realm of new possibilities because reduction in camera package weight and size translates to lighter and more adaptive grip and mounting possibilities.

The SIGMA fp and Atomos Ninja V package together become an excellent "A" camera system as well. Dan points out, "With a cage and other accessories, the fp can also be built out into a fully rigged cinema-style camera with the option to use a wide range of L-mount lenses natively, or PL mount, EF mount and many other lenses with the use of adapters."

The 5" 1000-nit display of the Ninja V lets you view the SIGMA fp RAW signal in HDR with a choice of HLG and PQ (HDR10). The monitor's touchscreen gives access to tools like 1-1 magnification, peaking, waveform, vectorscope and false color. The Ninja V can also record 422 ProRes and DNx video up to 4K 30 fps as well as HD up to 120 fps from the 8-bit HDMI output of the SIGMA fp. ProRes RAW or standard video files are recorded to AtomX SSD mini SATA drives in the Ninja V.

Atomos CEO Jeromy Young said, "With SIGMA joining the Atomos RAW-over-HDMI family, we now have an exciting option for filmmakers to shoot Apple ProRes RAW with a tiny full-frame camera that also excels at 120 fps high frame rate shooting. This camera brings SIGMA's unique approach to the photo industry into video and we are happy to be innovating together with them to enable the fp to shoot in this the most versatile RAW codec. The Atomos Ninja V, SIGMA fp and ProRes RAW open up a whole range of creative opportunities."

SIGMA is the latest major company to announce support for Apple ProRes RAW over HDMI.

ProRes RAW is like the digital equivalent of a motion picture film camera original negative combined with the efficiency of the long-familiar ProRes codec. ProRes RAW provides great latitude when adjusting the look of images and stretching the limits of brightness and shadow detail. SIGMA fp+Atomos Ninja V support both ProRes RAW and ProRes RAW HQ (less-compressed). File sizes are manageable, transfer are faster, media management and archiving are simpler. ProRes RAW is supported in Final Cut Pro X, Adobe Premiere and other apps.

ProRes RAW recording on Atomos Ninja V requires the free SIGMA V2.00 firmware update for the fp available today, and the free AtomOS update for Ninja V which will be available in Summer 2020.

SIGMA 100-400 mm F5-6.3 Zoom

SIGMA has introduced a new ultra-light, ultra-compact, and ultra-telephoto zoom lens. The 100-400 mm F5-6.3 DG DN OS zoom comes in L-Mount for SIGMA, Leica and Panasonic cameras (20 mm FFD) or E-mount for Sony (18 mm FFD).

It is the long lens you'll want as a constant photographic companion. It's tiny, lightweight, fits easily in a backpack or camera bag, and can go anywhere.

This new 100-400 will offer interesting possibilities not only on hybrid cameras like SIGMA's fp or Sony's alpha series, but also on cine cameras like VENICE and FX9.

I also dream of L-Mounts on more cine cameras sometime soon from members of the L-Mount Triumvirate Alliance.

This is SIGMA's fifth DG DN lens (Full Frame, for mirrorless cameras). The rest of the SIGMA DG DN family, so far, includes:

45mm F2.8 DG DN | Contemporary
35mm F1.2 DG DN | Art
14-24mm F2.8 DG DN | Art
24-70mm F2.8 DG DN | Art

SIGMA mentioned that the DG DN lenses have been designed specifically for cameras with a short flange focal distance (FFD), resulting in a salubrious combination of optical performance and compactness that could not have been possible in lenses for single-lens reflex cameras. With stepping motors optimized for both phase detection AF and contrast AF, the SIGMA 100-400mm F5-6.3 DG DN OS | Contemporary zoom delivers smooth and accurate focus in both still and video modes.

- 22 elements in 16 groups, with 1 FLD and 4 SLDs
- Full Frame angle of view: 24.4°-6.2°
- Number of diaphragm blades: 9 (rounded diaphragm). Front Filter size: 67 mm Ø
- Maximum aperture: F5-6.3. Minimum aperture: F22-29
- Minimum focusing distance: 112 (Wide) -160 (Tele) cm / 44.1(Wide) - 63.0 (Tele) in.
- Maximum magnification ratio: 1:4.1 (at 400mm)
- Maximum diameter x length: 86mm Ø × 197.2mm / 3.4 Ø × 7.8 in.
- Weight: 1,135 g / 40.0 oz. (Front lens cap PT-31 included)
- Dust- and splash-proof, high precision brass bayonet mount: L-Mount for SIGMA, Leica, Panasonic or E-mount for Sony
- Compatible with lens-based optical correction (on cameras that support this. The fp does.)
- Compatible with high-speed autofocus. Optical Image stabilization (OS). AFL button
- Focus limiter, Zoom lock switch (locks the zoom ring at the widest end, preventing it from rotating and causing the lens barrel to extend under its own weight during transportation).
- Compatible with new SIGMA 1.4x and 2x Extenders TC-1411 / TC-2011 (for L-Mount only). Functions as a 140-560 mm AF F7-9 with SIGMA 1.4x Extender, and as a 200-800mm F10-12.6 AF ultra-telephoto lens with the SIGMA 2x Extender.
- Made in Aizu, Japan

Teradek SERV PRO

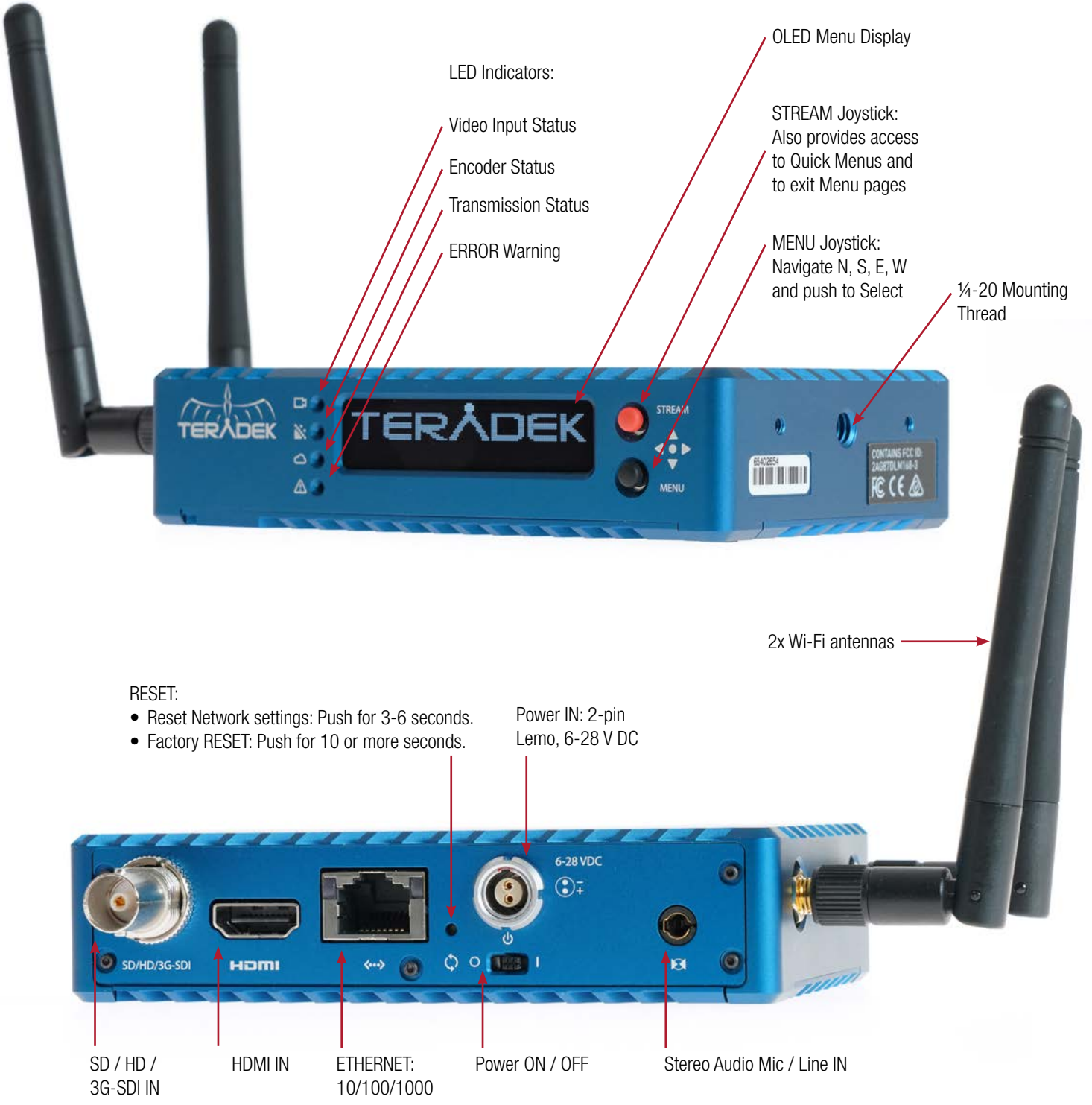
Wouldn't it be nice if your iPads, iPhones and Android devices could serve (ahem) as on-set monitors to see what the camera sees?

You can. Teredek's SERV PRO is a Wi-Fi video and audio transmitter with a range of 300 feet. Connect it to the SDI or HDMI output of your camera or video village feed. Up to 10 devices can receive the signal with minimal latency (about a 2 frame delay).

So, while the Director, DP and Focus Puller will most likely be watching monitors connected to zero-latency Teradek BOLT Transmitters and Receivers, additional crew members can benefit from this simultaneous and affordable system. No longer will Script Supervisors, Hair, Makeup, Wardrobe, Props, Set Decorators, Sound, Electric, Grip, ADs and others have to peer over someone's shoulder.

And, if you're working on an independent, corporate or educational production, SERV PRO offers an economical alternative.

SERV PRO streams over 2.4 / 5Ghz Wi-Fi or Ethernet to devices, like your iPad, connected on the same local network. You view video and listen to audio by using Teradek's VUER app that is available as a free iOS or Android download.



Teradek SERV PRO

SERV PRO streams live 1920x1080p video via Wi-Fi. It sells for around $1,799. You probably already have the monitor: an iPad. If you need even more Wi-Fi range, add Teradek's LINK to the setup to extend the reach to 1,000 feet. This system it is still a fraction of the cost of most BOLT systems. Admittedly, the trade-off is a slight delay in the image, but the benefit is ubiquity and simplicity.

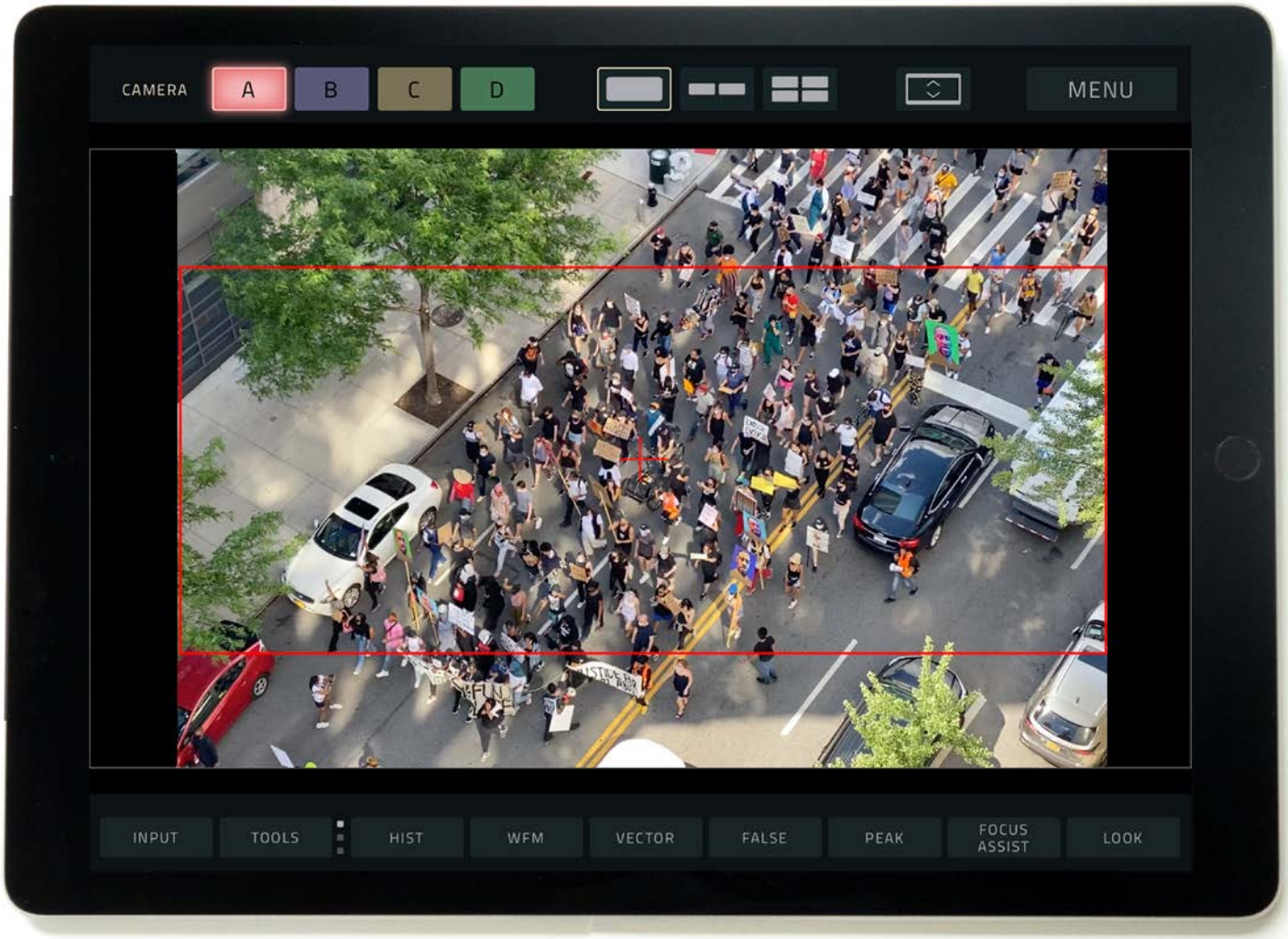
It's difficult to imagine that, for so many years, being on set for many was like a radio show, hearing the actors but being disconnected from seeing the video feed.

Teradek VUER App

Live video from your camera can be displayed on 1 to 10 iPads, iPhones or Android devices simultaneously.

Script Supervisor Marianna Harrison commented, "The ability to not be tethered to a video village monitor is fantastic."

The FRAME GRAB button lets a script supervisor capture stills and store them in Frame Grab Manager for reference and comparison at any time. There are many additional helpful features. Some of them are explained in the pages that follow. For a complete guide, search for VUER Reference Guide in the support section at *teradek.com*.



In this article, SERV PRO and VUER scenes from the lockdown, protests and plywood. FDT office is around the corner from the mayor's mansion.

Teradek SERV PRO Start-up

1. Power up the SERV PRO.

2. The start-up sequence begins.

3. Network Start-up.

4. Encoder Initializing. There are several routes to go from here. What follows is just one of these.

5. When the start-up sequence is finished, push the MENU joystick in. Scroll down to NETWORK SETUP and push to Enter.

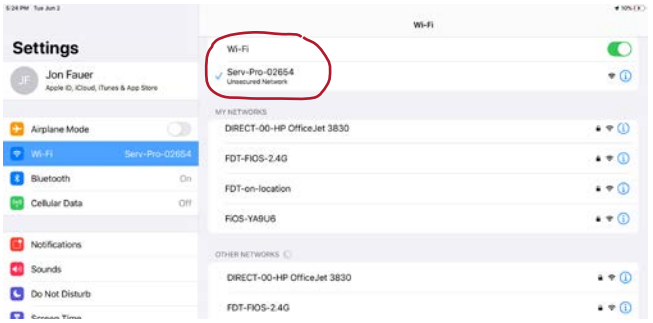
6. Select WiFi (as opposed to wired Ethernet).

7. Select MODE: ACCESS POINT. This is the default setting. Now it is time to connect your iPad, iPhone or Android device to the network. Think of the SERV PRO as your Wi-Fi Router.

8. You're connected. The screen above shows that 1 of a total possible 10 iOS or Android tablets or phones are connected—and the signal is transmitting at 1920x1080 with a data rate of 2 Mbps.

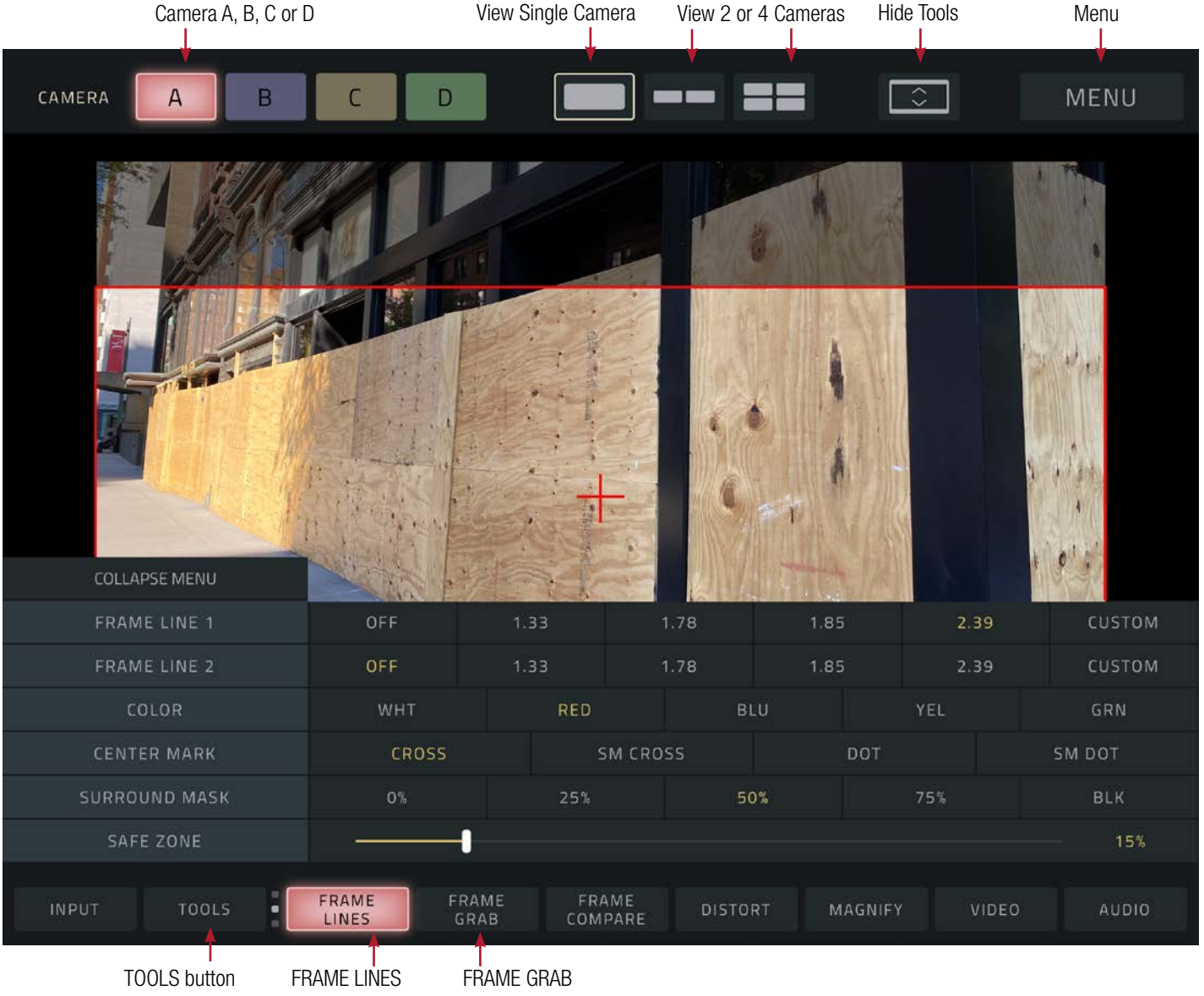
Teradek SERV PRO

9. NAME: Serv-Pro-02654 means that this is the Wi-Fi network name you will look for on your iOS or Android Device in its Wi-Fi Network Settings.



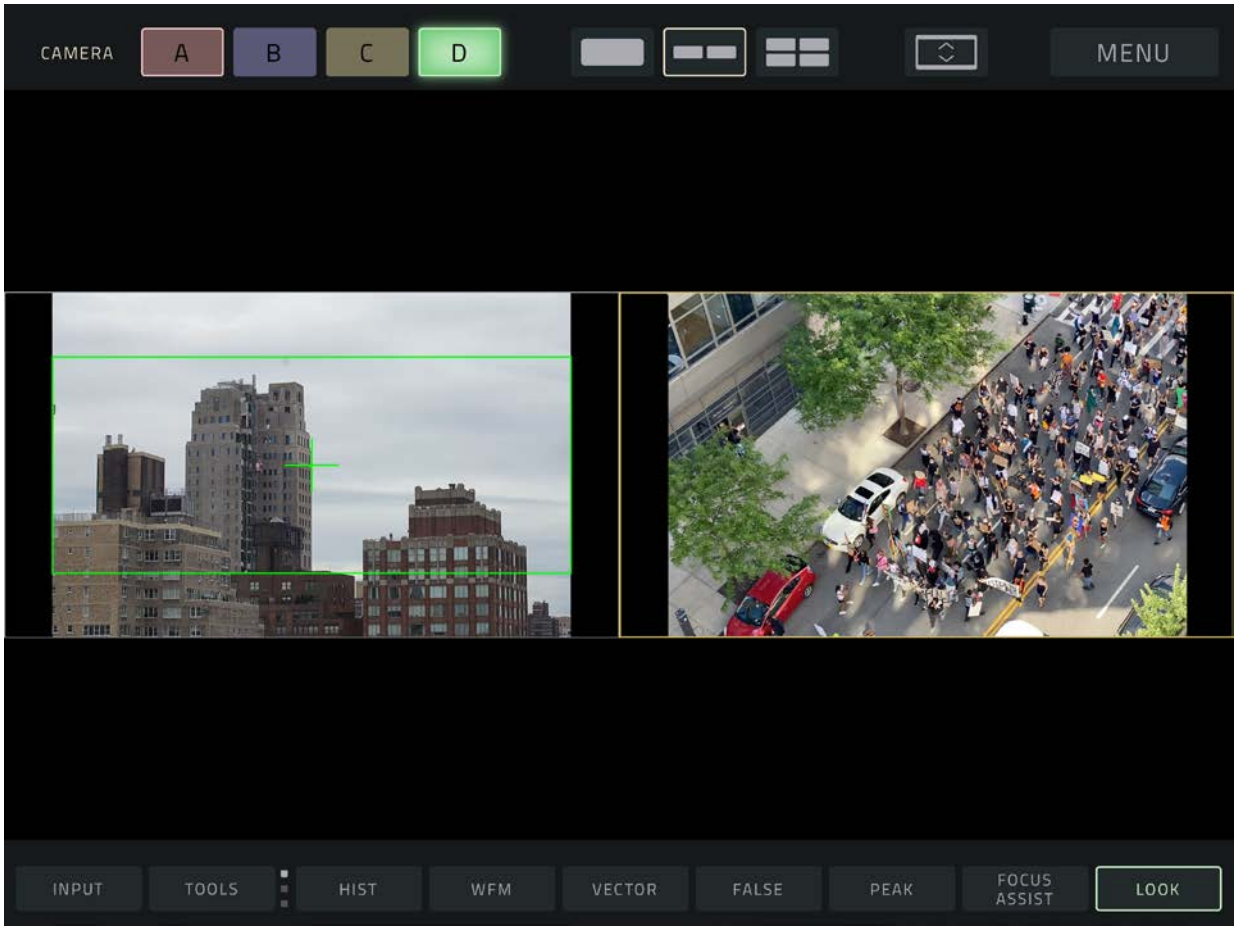
10. Wi-Fi settings on an iPad Pro should look something like this. Select the Wi-Fi network name that is listed on the SERV PRO. In this case, it is Serv-Pro-02654.

Teradek SERV PRO connected to VUER app on iPad

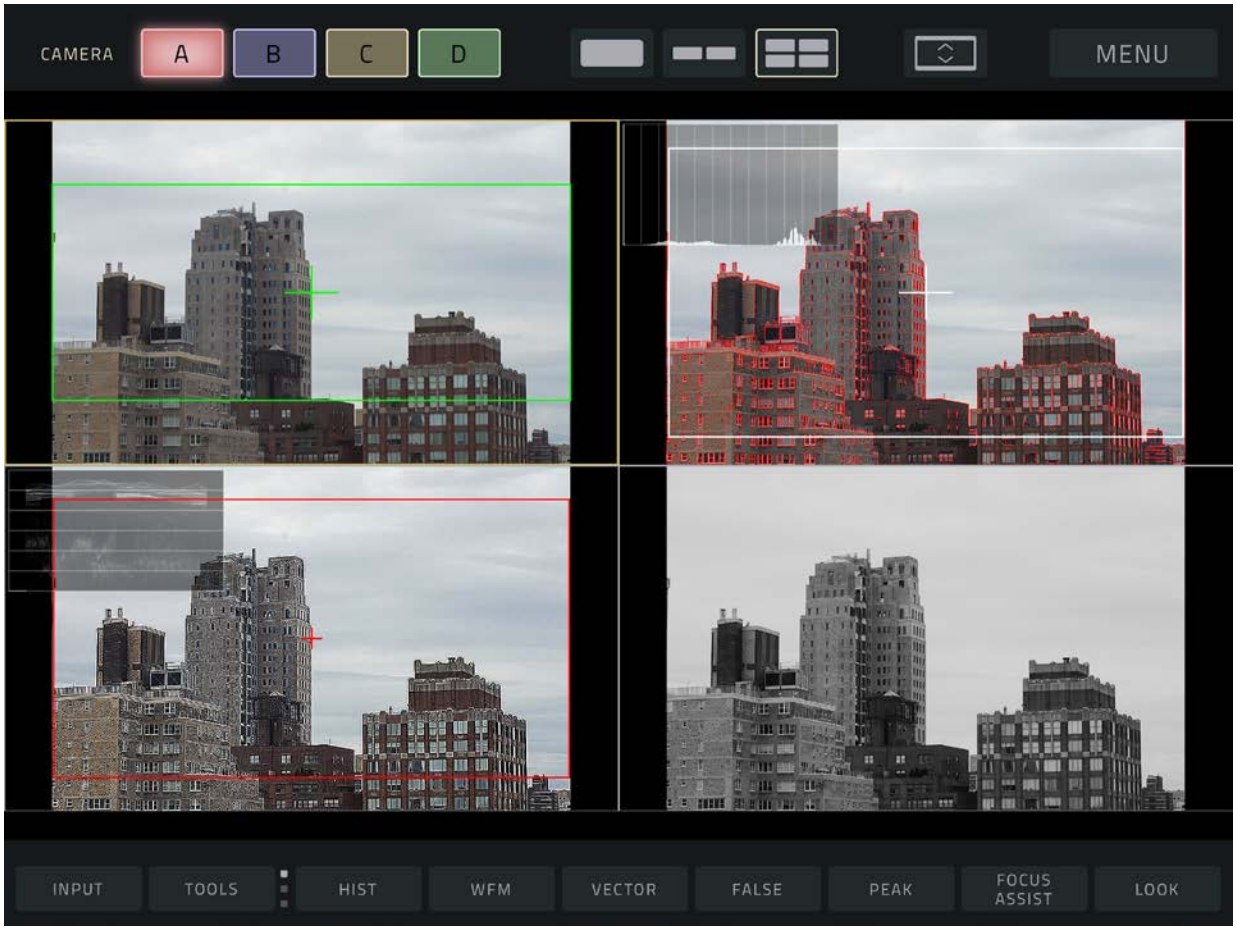


11. Open the VUER app on your iPad. Cycle through the TOOLS menu bar to show FRAME LINES.
Here, you can set one or two sets of frame lines, assign them a color, decide whether or not to show a center cross-hair or dot, keep the surround view clear, or shade it various amounts of gray. In this example, we're shooting 2.39:1 and have a 50% gray surround mask.

Teradek VUER, cont'd



Select and view multiple cameras in VUER.



You can also show the same camera angle in multiple screens displaying various tools.

Clockwise from top left:

- Regular view
- Focus assist with edge enhancement
- Waveform
- Black and white

Sam Nicholson ASC: Shooting on Location without Flying There

During this pandemic, how do we shoot on location without flying there? While some of us think green screen backgrounds are about as much fun as having root canal work, what if you could use affordable, consumer electronics, large screen LED TVs and projectors to let the actors interact in real time with their backgrounds on set? You can, and Sam Nicholson explains how.

Sam Nicholson ASC is the founder and CEO of Stargate Studios and an award-winning visual effects supervisor. He and I have known each other for a long time—sharing the thrill of racing to be first to try untried prototypes—including his work with the Blue Herring 36 megapixel ARRI / Lockheed-Martin digital camera the size of a Fiat 500 in the 1990s, demos for Sony F55, Canon C300 and more.

So it was fun when Stephanie Hueter of Blackmagic Design asked whether I'd like to talk to Sam about his latest adventures. I was on the phone a few days later listening to his ideas on keeping productions safe, cost-effective and efficient.

Stargate's ThruView real-time virtual production system brings backgrounds into the studio without having to be on location. Stargate worked on the HBO's new series Run. *The story follows the characters as they travel across the United States on a train, but production never left the studio in Toronto—except to shoot the background plates in advance.*

One of the great things about doing an interview with Sam is that you ask a question and it's like winding up the Energizer Bunny. He does not want for words.

HBO series *Run*

Jon Fauer: Please tell us about the story of *Run*, for people who haven't seen the show, what you did on it, and go through the technology that made it work.

Sam Nicholson: *Run* is a great example of the evolution of a production that relied on virtual production for a green light that had to go through all of the necessary steps to convince the studio, producers, director, DP, and everyone else involved, that it was possible. The story itself revolves around two people who get on a train and have an affair. They travel across the United States and unveil a tremendously complex story, but the whole thing occurs in transit. For the whole series, we estimated we would have approximately 300 shots per episode. Across 10 episodes, that's about 3,000 shots.

The train had a highly reflective interior, with a tremendous amount of glass. We theorized doing it on green screen, but that was both cost-prohibitive and also creatively constraining. Shooting with actors on a green screen for 10 weeks is very difficult—it is like putting on a green blindfold.

As much as we have pre-visualization tools from the past, and things that could give you an idea of what the final scene is going to look like, it also needs to make sense financially. It needs to be an even break from green screen. Ideally it should cost less, take less time and should produce superior results. So, we were trying to solve the "good, fast, cheap" triangle all at once. And we were supported by EOne, Mark Gordon and HBO.

I took a page out of what I did for the engine of the Enterprise back in *Star Trek: The Motion Picture*. I was still a student at UCLA in the late 1980s, and I had to convince Paramount that I could do it—create a 60-foot high column of light. I built eight feet of it and took it to Paramount Stage 9, swung it out in the middle of the Enterprise and said, "There it is. All I have to do is make it taller." Bob Wise and Gene Roddenberry looked at it and said, "That looks pretty cool at eight feet. Imagine what it would be like 60 feet high." Boom. I got the job. And it turned out to be a hell of a job to make it 60 feet high…but that's all another story.

For the train on *Run*, I decided to build a piece of the set to scale. At our studios, we had four windows and a vestibule (the fifth window) with four little tables and chairs. I showed it to HBO. We allowed them to sit on the train and take a look. We could shoot and test it. I believe about 14 executives came out that day from HBO, EOne and Mark Gordon. We shot plates from the Los Angeles Metro and determined how to shoot plates for the show. We went down to Best Buy and bought several 4K monitors. We had an LED wall there as well, so we could show the comparison between an LED wall at P2.5 and a 4K monitor at full 4K resolution (10 times more resolution) with interactive lighting tied in. When the executives came out and saw the demo, they were convinced and signed us up.

The Digital Age of Film

Going back in time to the beginning of the digital age of film, you have said things got easier and different all of a sudden. Was that between 2005 and 2009?

Yes. I think the transition to the digital era represented moving from a post-production lab—essentially "wait for your dailies to see the images"—to real time, where you could see your image as you were shooting it. Today, virtual production is going through the next evolution of technology. We can now see our visual effects as we're shooting them. In this way, the creative feedback loop becomes real time. I often say that trying to do visual effects on green screen is very much like trying to learn how to play an instrument and not being able to hear the music. You hit notes,

82-inch LED Monitors outside each window of the *Run* train set.

and two weeks later you finally hear the chord. On green screen, you learn at a very slow pace.

Hear the Music

Now suddenly, you can hit the keyboard and hear the music. You can look through the camera and see your composite live, and not as a six-frame delayed previs. It's really there. With Epic's nDisplay off-axis rendering, it is now possible to see an absolute finished product in the lens using LED walls and OLED monitors for the backgrounds. This has a tremendous effect on the psychology of everybody on set, because the actors can now see where the Eiffel Tower actually is, rather than imagining it from a laser dot on the screen. Cinematographers can exactly match the lighting between the foreground and the background. The director can block his or her shots by just walking and seeing them. The creative participation involves everyone on set. The key grip can say, "I was just looking through this window and I saw an awesome reflection…come and take a look." Then the DP goes out, takes a look and says, "What a great shot," and puts a camera out there.

Green screen, or chroma matting, is not going away by any means. It is a necessary technique, to which we will look back someday as being extremely archaic. As soon as we have depth matting and light field cameras, we will have no need for chrominance matting. Additionally, AI will greatly enhance depth matting, to determine edge definition and spatial dimension using LIDAR. These depth mattes will be tremendously advantageous, as opposed to no matte in post, in order to change the focus or to change the color of the background.

We are still in the middle of a transition here. This is not the end game. The screens are becoming higher frequency which allows us to shoot high speed on them. The lights are becoming controllable to an extent where we can synchronize them with the camera shutter. The camera shutters are promising global synchronicity, or extremely high refresh rates. Therefore, it's much easier to synchronize your lights, display and camera. And that's really what we're going for. But right now, they're all running wild.

Mountain Climbing with Fingers on the Edge

It's crazy. Just walk onto any LED set and announce that you want to shoot 120 frames. Everybody will head for the exits. I feel like we're mountain climbing and we just have our fingers on the edge of this precipice. There's a whole mountain ahead of us and we're very gradually getting up that mountain. This is a significant step forward, but you need to have plans in place in case your tenuous finger holds slip a little bit.

Hypothetically, let's say you've been shooting a 24 fps dialogue sequence. Everything's going great. But then the director says, "I want to shoot through the window at 120 fps. Oh, and by the way, I want to rack focus from the background through the window." Your screens are going to moiré if they're LED. Perhaps you forgot to tell the producers they could only go to 48 fps. You want to have motion blur, but the screen is literally flickering at 60 or 120 cycles per second. Unfortunately, rapidly moving objects in front of that screen are going to strobe. When Merritt, the performer in *Run*, threw her handbag in front of the screen, you could see four handbags. It was not natural motion blur. So we had to go in and add natural motion blur back to all the objects.

Safety Net

One of the advantages of Stargate Studios is that we are a full service production company. We have the capabilities to not only shoot from the beginning to generate the material, generate the 3D assets for onset playback and prep, but if anything goes wrong, we also have the ability to have a safety net (i.e. to go in and fix it in post at little or no cost to the producer). This is why you really need that safety plan in place.

We did the pilot of *Run* a year before the series. It wasn't until 18 months after we had shot the pilot that we went into post and polished the final shots. And that did not become HBO's problem—we handled it. For instance, in one episode, we delivered 400 shots and 350 of those were final pixels on set with no post production enhancements. If you subtract the purely CG VFX shots, we repaired about five percent. Therefore, having a full-service approach on the entire concept, I think, is very important. Stargate Studios is not simply a preproduction, principal photography or postproduction service. We cover all three roles for any scale of production.

How does the current process differ from your Virtual Backlot with camera tracking?

Well, a lot of the philosophy is the same. We cover things photographically in 360 degrees, as if it was being shot on green screen. The difference is that now we can shoot in real time against emissive screens.

Pan Am Green Screen before and after.

We are interested in whether we take a virtual space—either photographic or rendered—and blend it with real photography to make it seamless. With our Virtual Backlot, we are creating an immersive world in the background—again, either photographic or rendered—in which you can look any direction. You can do any shot: up, down, sideways, two-shot, single, close-up, wide shot, anything. We also capture the move data of the camera in physical space: 6DoF, XYZ, yaw, pitch, roll. Even lens data, focal length, and aperture.

From Green Screen to 40x4K Streaming

Previously, if you knew your depth of field and everything else about a shot, the horsepower (from a computing standpoint) was insufficient to render photo realism in real time. With the *Star Wars Underworld* project, we proved that to George Lucas. Various shows like *Pan Am*, with a 400-foot green screen, looked great, but all we could render on set in a 50th of a second was a low poly model. Better than gray scale and okay for editing, but certainly not broadcast or finished quality.

Now 10, even 20, years later, the technology of the graphics cards from Nvidia is GPU based rendering. It's a single computer that is screamingly fast with multiprocessors that are all coordinated. The Unreal engine software has been a major step forward in terms of real- time rendering and off axis display and remapping.

We had 40 times 4K streaming video to an extreme amount of pixels to make it real on *Run*. This was made possible by the Blackmagic Design DeckLink 8K Pro cards with hyper quad feed of the 8K streams. Combined with our proprietary tracking, we've now made 14 trackers based on the Intel 265, which gives Thru-View absolute tracking of every single camera and object on set. Markerless, trackerless, and wireless. Imagine running down a silver tube, which was the train in *Run*, 150 feet long, with 40 4K screens outside the train windows on either side that are all tracking to where you are, and you have no tracking marks, no wires, and you're on a Steadicam.

Was that what you showed at Cine Gear last June?

Yes, that was a piece of it. That was one window. Now we have both sides of the train. We can see the reflections of one window off the other. And not to mention that we could do it with Samsung monitors that you could purchase at Best Buy. We just went and bought 40 of them.

What size monitors where they?

82-inch. It was a great business model because it looked fantastic in camera, it was affordable, and it saved the production approximately $100,000 an episode, which is pretty considerable. We were shooting with the Panavision DXL, so we wanted to shoot in 8K. Everything was completed in camera at 8K resolution.

The DP, Matthew Clark, could shoot with the camera and lenses he wanted, the actors could see everything. It was fun sitting on the train as opposed to sitting in a green box. You could watch things go by, you could talk about what's out there. And the resolution of the monitors were such that you could focus on them.

Even that rack focus you were talking about?

Yes. You can look directly at the monitor and focus on it with no moiré. But it is not for everything. For example, if you have a 70-foot balcony, you're not going to use an 82-inch monitor. I would say that our approach is display agnostic. We can have any combination at any resolution: LEDs, OLEDs, projectors from Canon and Sony. One size does not fit all. A modular, scalable approach is important. Every production and every scene has its own unique requirements. There will be fabulous $10 million setups like the *Mandalorian* where you walk in and it's an immersive environment. But you're working to the technology at that point, and I think it's got to be the other way around.

The Paintbrushes are Different every Time

The technology has to work to the production. You shouldn't have to change everything in your production so you can work with a particular camera. The creative necessity and requirements of the show should dictate the technology configuration. By the definition of production, the tools that we use, i.e. the paint brushes that you pick out to make your particular painting, are going to be different every time. They have to be dependable, they have to be proven, they have to be tested.

Virtual production is now Live Performance

Virtual production is now live performance. The burn rate and the pressure are much higher on a set than in post-production. A 3D artist or a colorist is no longer in a dark room with headphones on, in a perfectly silent, don't disturb mindset. On set, lights turn on and off, and people are unplugging your computer when you don't know it. Anything can happen on a set. It's a rough and tumble world, and you have to be ready for anything.

RED MONSTRO 8K cameras suction-cupped to windows shooting background plates on *Run*.

The AD is standing over your shoulder saying, "We're going to flip the schedule and can you be up and running in 10 minutes?" And, first team's on set and the actors' makeup is melting and "what do you mean the playback's not working?" Or, "What do you mean you're not getting tracking on camera C?" I would love to see a colorist at a major facility with a First AD sitting over him or her asking, "How many seconds before you are you ready?"

3 DaVinci Resolve Studios, 250 SkyPanels

On set, dynamics require a different mindset, much like that of DITs, who came into play because of the necessity for digital asset management. This is going to open up a whole new career path for many people, such as the on-set colorist. We have three DaVinci Resolve Studio systems complete with DaVinci Resolve Micro Panels that we're operating on set for *Run* because we're adjusting color of the foreground and doing real time compositing.

Our ThruView system allows us to adjust and control all the lights on set: *Run* had about 250 DMX-controlled ARRI SkyPanels. If you think about a train going into a tunnel, and yellow lights go by, everything has to be synchronized. Part of the ThruView system is the pixel-mapping of proprietary lights that we have built that have true kinetic control, 126 DMX addresses per light, so that you can "ripple" the light.

If you're in a car and a red bus goes by, there's red bounce light automatically from that bus. And as you jump downstream to do coverage from your wide shot, you have to be aware that everything still has to maintain the synchronicity. Therefore, you are also editing on set. So DaVinci Resolve Studio has been a key component in terms of playback and color control for us on set, but the operator is probably going to have to be controlling three or four of them at once. This is one of the positions that we can remote off-set to address today's production concerns.

I can't stress pre-production enough. Like a theatrical performance, when the curtain opens, is it perfect? Does it play? Five minutes of downtime on set is an eternity.

This is the shift that the visual effects artists must do to be able to handle the pace and the pressures of real time. If it doesn't work, the shoot continues anyway. Nobody's going to stop. It's like a parade and the visual effects people are sprinting in front of it and trying not to get trampled. Production doesn't stop. If you don't have your act together, you're going to see a green screen go up in about 20 seconds. And then, you're going to get a call from the studio, and you don't want to get that call.

Shooting the Background plates on *Run*

Live action shoots are subject to so many unpredictable factors. Like temperature. Who would have thought that temperature would change the color of monitors? For the *Run* pilot, we were in Toronto in the winter on an unheated set. For the background plates on *Run*, we rigged two train cars with multiple cameras and travelled throughout the United States. We did two separate shoots on the train. For the pilot, we did a shorter run as a proof of concept from New York to Chicago and it worked well. We shot with four RED MONSTROs in the daylight and two Sony VENICE cameras at night. More than 200 terabytes of original camera data were stored and backed up during the shoot using high-speed SSDs and portable RAID arrays from SanDisk and Western Digital. We played the 8K footage back on set with the help of Blackmagic Design and Nvidia in our ThruView system, with one 75-foot train car for the pilot and 20 monitors. We shot at a rate of about eight pages a day on the train. After HBO greenlit the series, we took a train across the United States for the rest of the season.

We had our own train cars. We mounted cameras throughout the caboose and a sleeper. It was one of the most pleasant shoots I've ever been on. We sat in big overstuffed chairs and watched the world go by. You could get on the radio in beautiful locations and say, "Roll cameras!" With so much original 8K material, it was about data management and how you reduce it to something the director, Kate Dennis in this case, could view and make decisions getting everybody on the same page with planning.

The principal photography production team at Stargate Studios is great. We generally shoot our own plates, and we make sure they're stable, high resolution HDR. The plates should be perfect. They can't have shake in them because you're not going to do post-stabilization. It's real-time playback. You have to be very careful about what you ingest in a real-time system.

For *Run*, we shot our own plates, organized them, put them forth, and Kate made her selects. We arrived a few months later on set, but at the very last minute, eOne decided they wanted to feature two train cars. We had to double everything about a month before the shoot. The new production design featured 40 train windows which in turn equaled 40 times 4K displays.

Then we're on set, and it's a marathon. You're in for 10 to 12

Three Blackmagic DaVinci Resolve systems on set providing real-time editing and color correction.

weeks of shooting with everything that comes at you from different directors and a lot of variables, split units, pickups. Despite the planning, unpredictable things happen. There are schedule changes, where the producers decide to change the set over to a new set, so you have to disassemble all 40 times 4K systems with five miles of cable, and by 8:00 the next morning, reassemble it for a different train.

Depending on the complexity, two to four people can manage the system. That's all the lights, monitors, tracking, and playback. This reduces the number of people you need on set, which is important going forward. A lot of jobs can be remote, like color correction, tracking, or lighting control.

The business model going forward, I think, is very important. When done properly, virtual production can be a very powerful tool to reduce the crew footprint and get us back to shooting anywhere in the world without having to be there. Or doing big crowd scenes without actual big crowds. Or avoiding airports or worrying about your stars and where they're going to stay abroad, i.e. which hotel in Bulgaria and is it safe? They can be in a pristine, sterile environment that is completely safe.

Tracking

Explain to us how tracking worked on *Run*.

On *Run*, we tried many different types of tracking. We tried inside-out tracking, outside-in tracking, we tried infrared tracking, targeted tracking. We did the pilot with infrared, specifically the Vive system, which is pretty accurate and affordable on multiple cameras.

Can you backtrack and explain tracking and why it's necessary?

Virtual production is based on real-time camera and lens tracking, which applies to whatever display you're shooting. It means that the display knows where the camera is and the camera knows where the display is, what is on the display, and it recalculates based on the camera position. So effectively, it turns a monitor into a piece of glass, like a window, and instead of having the image stuck on the plane of the monitor, the image actually exists at infinity. It is properly in depth.

You can lean in and see more around the edges of the monitor. You can back up and see less, you can look right or look left. That's why we call it ThruView, as it takes any display and turns it into a window to another reality.

Tracking becomes an essential part of that. There are many different types of tracking. "Inside-out" tracking is from the camera. The camera sensor, that you're tracking with, is looking out. With "outside-in" tracking, as you've seen with MOCAP, the sensor is outside tracking a number of cameras looking at a reflective surface. The camera doesn't have any intelligence on it. The intelligence is outside.

They're both very viable, but have weak points. You need to decide how you want to shoot a particular show in order to determine the appropriate type of tracking for the production. In a perfect scenario, like a newsroom, you can have targets up on the ceiling, and the cameras are in very predictable places. The cameras are on pedestals, and they're just roaming around under these targets. That is a very stable tracking scenario. But in dramatic filmmaking, that's probably not going to happen.

We realized we had to be on a Steadicam that could run down the length of a 150-foot-long train (two train cars) and go through the vestibules where it will completely lose information. Since it's moving, you have to run down the cars while all 40 monitors are adjusted in real time to the perspective of the camera's location. You need to be able to run over, look out a window, back up, see the vanishing point, run down the train, tilt the camera. So the question is: can your tracker live through that?

We tried it with infrared, but the world kept flipping upside-down and we couldn't figure out why. It turned out that the microphone boom held over the camera would periodically obscure the IR transmitters. Since it's infrared and inside a reflective train, the wavelengths are bouncing around all over the place, picking up the next strongest signal, which is a window. And all of the sudden, the world doesn't work.

We couldn't put up targets or reflective markers inside the train, nor could we have a bunch of cables coming off a Steadicam. The solution had to be marker-less and wireless. Fortunately, Intel came out with a T265 sensor, which is both inertial and optical, and creates a point cloud. It worked.

We wrote the code for building new trackers based on Intel's technology. We constructed it so it could fit on the back of a camera, like a FIZ (Focus Iris Zoom wireless control). It's wireless, it uses Wi-Fi, and is accurate, especially for XYZ. All you need is three

axes, so we limited the data to exactly what we needed. In turn, it was wireless, marker-less and gave us the speed and accuracy for a Steadicam.

All of this is now improving with next-gen thinking, but for us it was affordable and effective enough that we could put one on every camera (and have backups). There's always a financial model to this too. If you have a $100,000 tracking system, it costs more than the camera. The system therefore has to fit the creative and technical requirements while meeting the financial and practical requirements on set.

Since we didn't have them, we built them. Necessity is the mother of invention. We did the same with lighting. We built our own custom lights for the show, and we also interfaced to all the ARRI SkyPanels and DMX controllable lights. We wrote a lot of software that didn't exist to tie into the unreal engine and to have a seamless crossover from the Blackmagic Design system into the Unreal Engine for redistribution to 40 4K monitors. We then had to write some very specific code to remap the monitors to the tracker. For example, if camera "A" was looking at monitors 1 through 10 and camera "B" was looking at monitors 11 through 20, we needed to be able to assign the tracker to the individual displays.

Blackmagic Design Products

How is the system connected together? I understand you worked with DeckLink 8K Pro capture and playback cards, DaVinci Resolve Studio, DaVinci Resolve Micro Panels, Smart Videohub 12G routers, UltraStudio 4K Extreme capture and playback device, a Teranex AV standards converter, an array of Micro and Mini Converters, as well as an ATEM Constellation 8K switcher.

On the exterior of the 150-foot-long set, there were 40 4K monitors lined up right down the line of the train, numbered A1, A2, etc. There were three DaVinci Resolve Studios with DaVinci Resolve Micro Panels for color grading. Multiple Unreal engines tracked and redistributed all the video signals and lighting control. We had eight trackers for four cameras, which provided complete redundancy. The tracking, lighting, playback control and distribution were all hot-rodded PCs with Nvidia cards in them running Unreal Engine and DaVinci Resolve Studio. It was scalable. All of the hardware was assembled on camera carts so it could be exterior, interior, wherever we wanted to shoot.

Where are the plates? Are they in the PCs themselves?

They're inside and outside. We have a great relationship with SanDisk and Western Digital. So, we could bring all 200 terabytes of storage on set in SSDs and portable RAID arrays. We often needed to change setups and scenes very quickly. The SanDisk 2 TB SSDs are about the fastest scene holders I can think of. We had multiple SSDs for every day's work. We could quickly pop them in and have all the monitors change to a new scene since we never know what might happen on set.

And then the DeckLink 8K Pro feeds what?

The DeckLink 8K Pro feeds it to the Unreal Engine, and then it's split up and redistributed by the Smart Videohub 12G router across 40 mounted monitors outside the train windows. The 8K signal is chopped up and redistributed over four monitors (in this case), and you do that times 10. With virtual projection, which is required for off-axis display, you put your flat data and your 3D data into the engine. The engine then mixes it up, splits it and cuts it into all the different feeds, and sends it out synchronized to all the monitors. In addition, we wrote the code to adjust the perspective on all the monitors simultaneously. This gave us the capability to step inside the train and adjust the perspective of all 40 monitors simultaneously. A scene does not just come up magically with the perfect perspective. We have to be able to adjust the horizon, not only globally across all the monitors, but individually.

And these monitors are all rotating. If you're shooting one way down the train, they rotate 45 degrees one way. If you're doing a flat two shot, they're flat. You need to be able to recalculate the offset in physical space between the monitor and the lens of the camera. Normally speaking, you can take a tracker, touch it to the surface of your screen and are at the same place—zero point. But if your camera is inside the train and your monitors are outside the train, then you can't physically get to them. This is part of the tricky programming that we've done to optically calibrate the screens—the ability to understand where a monitor is without touching it.

Tell us about the cameras and lenses you used for the plates.

We had a lot of suction cups. These are great if you ever need to shoot out the window of any vehicle. This was literally planes, trains, and automobiles. For lenses, we had 180 degree rectilinear lenses on RED HELIUM and Sony VENICE cameras shooting in 8K and 6K.

Canon 8-15 mm lenses are fantastic. They are sharp edge-to-edge. The principle is if you're going to shoot for virtual, you need to be extremely stable, extremely wide, and extremely high definition, because you're going to subsample it. Imagine you're going to shoot the actual scene with a 50mm out one window of the train. You're seeing maybe one-tenth of the original data.

Therefore, you need the highest resolution you can get with a very low signal-to-noise ratio. This is why we used the Sony VENICE Rialto rigs at night and REDs during the day. You can combine these, but as a general principle, they have to be shot right. If you just latch a camera to a car, good luck. It's going to be shaky and crazy when you get on set.

What lenses did you use on set with the Panavision DXL?

We used the Panavision PVintage Prime lenses (Panavision 1976 vintage Ultra Speeds, updated with modern housings).

DaVinci Resolve Studio

Explain why you had to do color correcting in real time with DaVinci Resolve Studio.

We shot all the plates in focus so we could match the focus to what we shot on set. As a visual effects supervisor, the first thing I do is look at it and say, what's wrong with this picture? Why doesn't it look real? Well the blacks are too black: push it back, give it more atmospheric perspective, slip the focus. All those creative things that we do in compositing you now have to do in real-time on the set. So, there is no magic button that you push that says, "real". I wish there was a "real" button where all the relationships between the foreground, background, focus and color would just drop in.

Getting those things perfect is why we sometimes do up to 70 revisions on a simple green screen composite. Now, we are doing that in real-time. So, you need an incredibly responsive tool that can quickly adjust perspective, match focus and adjust color in real-time. It has to be extremely intuitive. When the director says, "I know I picked those plates, but I don't really like what I see. Do you have anything else?" you have to be able to re-edit your material on the fly. In the effects page of Blackmagic Design's DaVinci Resolve Studio, you can do all of the things you would do in composite, such as correct lens distortion, defocus, etc. You can adjust certain things to make the image look real, all in real-time. So, it's essentially taking all the control we normally have in post-production but moving them onto the set.

Are the background plates going live from the SSD, through DaVinci Resolve Studio, and then to the monitors while they are shot in real time on set?

They are graded in real-time. You transfer footage to a local drive, which is ideally your SSD. If you need to, in an extreme sense, you'd take a USB-C connected drive, plug it in to the computer and drop it onto the timeline. In this case,you're literally playing back off an external drive in 8K to the set. When you're doing live color, the director or DP might say, "I want the yellow lights to be brighter when we go in the tunnel", so you have to adjust all the lights on set as well as the lights in playback. Then the director might say, "We're in the tunnel too long." So, you have to edit all the video streams, shorten them by 15 seconds or so enabling you to exit the tunnel sooner. And then, maybe, when they want to drop downstream and do pickups, you need to be able to jump forward in the data stream to keep everything in sync. For example when a house goes by in the wide shot, the same house goes by in the close-up shot out of sequence. It has to maintain synchronicity.

So it's a trial by fire for a colorist. We are actually working on some very interesting things with Blackmagic in the category of real-time visual mixing. These are all real-time tools.

Lighting

Is the DMX tied into this as well?

The DMX is a separate system, which we pixel-map using a combination of MadMapper and custom tools. We accurately pixel-map all of the lights and blend them into the Unreal data stream. As a yellow light goes by in the playback, it's been remapped into the engine, so that the yellow video feed automatically activates every single one of the lights all the way down a 150-foot-long set. They are also individually addressable, in case the DP wants more pop on one specific light. You need to have that type of control, and it has to be fast. Many times, you're rolling and still trying to adjust the lights. It's definitely a theatrical type of experience. It's moving a very complex set of tools we have carefully adjusted in post for many years into a real time orchestrated playback.

Did you remap the ARRI SkyPanels?

Yes, all of them. We worked closely with ARRI, since it's not just about letting the lights sit still at 3,600 or 5,600 Kelvin. This is kinetic light. It moves. These lights are exercising down to zero and

back all the time. Three-quarters of the lights are out at any moment. The concept is really over-lighting the set by 200% or 300% and then being prepared for anything. Your set has to literally go from night to daylight kinetically.

If you can do that, the savings are enormous. You can shoot very fast if you are able to put up a different plate and the lights adjust automatically to that look. It takes a little more rehearsal and set-up time. One of the major advantages of virtual production, when done properly, is the ability to change an entire set and the entire lighting configuration within minutes.

I'm looking at a photo of the interior of the train with a camera. It looks like you were probably pretty wide open on a lot of the shots?

Yes. Matthew Clark, the DP, wanted a relatively shallow depth of field, yet wanted the ability focus directly outside the windows to the landscape. Kate Dennis, the director, wanted to be able to go right up to a window and look all the way down the track. The inside of the train is highly reflective. That was part of the design. Once we decided to do this live, the production designer said, "Great. We can use all these reflective objects inside: silver, translucent, refractive, reflective." Everything you avoid on green screen. There was no place to hide tracking marks in the train set. It was impossible to use infrared tracking because of excessive light bounce. We put multiple Wi-Fi repeaters up all the way down the outside of the train because there was so much Wi-Fi traffic on the set with video and sound. Everyone was fighting for Wi-Fi space.

A set is a very dense Wi-Fi network. We tried magnetic tracking and any other types of tracking you can think of. The problem with any type of radio or magnetic frequency is metal objects confuse it. Reflective objects confuse infrared, and metal objects confuse transmission. Targets are ugly, and they have to be removed. You can't have wires. All these things are specific to shooting in a real-world production environment.

One of our challenges was the camera crew was not used to point cloud tracking. When the camera wasn't rolling, the camera operators put the camera on the floor—most of the time, out of the way, even under a table. But then, our point cloud trackers went to hell. Our trackers build intelligence during the shot and become more accurate as the shot develops. It literally learns the environment. So, once the camera is under the table, you blind it, making it lose intelligence very quickly. So we had to design a system in which we could take the camera off and keep it pointing at the world enough so that it did not lose the point cloud reference.

Production in the Time of Coronavirus

Your next adventure could be *Son of Easy Rider* in a studio?

Yes! In the current COVID-19 lock-down, there are a lot of questions concerning how virtual production can help get us back on track. How can we create an insurable, predictable, production environment model going forward?

Can we create a safer, less restrictive scenario than sending the actors and crew through airports and hotels? Can we remove the variables of traveling halfway around the world from the production formula? How can we protect the health of our actors and shooting crew on location? Virtual production offers many solutions to these questions and more because it is safer and more effective to bring the world to the actors than bring the actors to the world. We are all inventing a new paradigm for the future of global production.

A second unit can go out like Alfred Hitchcock did. They can shoot all over the world and pick up all your action scenes. Then can then come back with your principles and recreate the event in virtual production. You have the best of both worlds.

Whether it's real-time or post-augmentation, they both can play a very serious role in getting production back on its feet. Stargate's Virtual Backlot Library, which we have developed over 30 years, allows us to virtually shoot almost anywhere in the world. You can shoot a scene in London, New York, Washington, DC. Grey's Anatomy takes place in Seattle, but production never went there. Or you have shows like Ugly Betty for ABC that never had to go to New York.

A show like Las Vegas didn't have to go to Las Vegas. At this point, it's a lot easier to be in a virtual casino than it is to be in a real one. We're not talking about replacing reality by any means. This is a new tool to imagine tomorrow, which can help us get to the other side of the crisis. Virtual production is capable of combining the real world and the virtual world.

ThruView works end-to-end for virtual production. We offer the assets up front in pre-production and follow them through to final delivery.

We create a complete picture from pre-production through post. I think all of the large studios including Disney, Amazon, Netflix, ABC, and NBC are examining how to reinvigorate their production pipelines. Virtual production will play an an essential role in this new production approach.

Great. What are we waiting for?

There is no time like the present to reimagine the future of production. We have the experience and the tools to get there. The entire global content creation business is ready for a significant step forward. We are proud to be part of the community, not only trying to solve our current challenges but hopefully step into the future of production.

I'm really excited about it because an opportunity for virtual production has not presented itself to this extent in our lifetimes.

AJA U-Tap Webcam

Rescued Webcam:

Sony RX100 V held together with gaffer tape after it dropped in Tokyo and retired from active duty. Now a webcam. Screen flips up nicely selfie-style.

Vintage Look Full Frame Webcam:

SIGMA fp with L-Mount to M-Mount adapter and Leitz Wetzlar 1950s Summaron 35mm f/2.8.

If you are not yet unleashed from a locked-down film set in Prague or Outer Mongola, life on location goes by in WebZoFloGoZoom Rooms. We are reduced to grainy galleries of thumbnails, faces flickering, audio echoing. This is ironic for trailblazers of technology and style, fearless fans of 4K and Full Frame.

Wouldn't it be nice to have a webcam with a lens worthy of your attention and tighter than *The Revenant*? Most likely, the built-in webcam on your laptop has the equivalent of a 28mm Full Frame (18mm Super35) lens and depth of field that goes from here to eternity.

You could buy an inexpensive external webcam, but they have been back-ordered for months. Once upon a time, external webcams were mostly relegated to conference rooms, which is why their wide angle lenses are almost panoramic. Fortunately, there are better ways to web chat.

Chances are good that you may already have an AJA U-TAP HDMI. They are almost everywhere and widely used as a painless way to capture video on macOS, Windows and Linux computers.

The AJA U-TAP HDMI also works as a great high-end webcam. You can attach many video or still cameras with an HDMI connector. AJA also makes an SDI version: U-TAP SDI.

Plug one end of the U-TAP into the HDMI output of a good camera. Plug the other end of the U-TAP into your computer's USB port. You are now ready for FaceTime, Zoom, Skype, WebEx and many other video chat apps. I had good luck with Sony RX100 V and VI and a7R IV cameras. The key to success was the ability to turn off HDMI overlay text data and display a clean image.

AJA U-TAPs come in both HDMI and SDI models. Both seem to be temporarily back-ordered now that the "secret" has been discovered.

The Ten Webcam Commandments

With apologies to Moses and Lin-Manuel Miranda's Ten Duel Commandments, here are some suggestions.

I. Thou shalt not chat in thine bathrobe or pajamas. Wear something chic.

II. Plan production value, proper propping, and a good background. We are in the moving picture business, for God's sake.

III. And God said, "Let there be light." Light like a Maestro. Single source, available light is good.

IV. A 20K shining through the window would be nice, now that Mole makes an LED 20K you can plug into the wall.

V. When God divided the light from the darkness, that did not mean it had to look like the 6 o'clock news on a local TV station.

VI. Contrast. Lacking 12x12 solids at home, string up your black T-shirts and Comme les Garçons outfits to create negative fill.

VII. Soften the light with a shower curtain or bedsheet. If lucky, you have some rolls of Rosco or Lee diffusion in the garage. Choose a pretty location. Turn off overhead fluorescents.

VIII. 86 the tchotchkes, memorabilia and souvenirs in the BG.

VIX. Wrangle the dogs, cats, screaming kids and significant others out of the shot.

X. Look into the camera when you're talking or someone is talking to you. If you are one of many, muted in conference and just lurking, it is fine to move the camera off to a side angle or cover the lens while you do other, dare we say, more important things.

AJA U-Tap Webcam

Sony a7R IV with FE 24-105 G OSS autofocus and eye-detect zoom lens on a Really Right Stuff head.

AJA U-TAP HDMI and U-TAP SDI are tiny metal boxes about the size of a stack of credit cards.

HD or Standard Definition video goes in one end. There's a capture card inside than converts the video to a UVC (USB 3.0 Video Class) signal. You plug the other end of the U-TAP into the USB port of a Mac, Windows or Linux computer.

The U-TAP HDMI captures and converts video up to 1080p 60 via HDMI v1.4a RGB or YUV. AJA's U-TAP SDI has similar specifications for input via 3G-SDI. The USB 3.0 connector is bus-powered. Embedded stereo audio is supported. U-TAPs are plug and play. No drivers are required.

Capturing video on your computer with the U-TAP requires a UVC application, like Quicktime. I use Quicktime to capture framegrabs that show menus of the cameras we're explaining in these pages. Be sure that both camera and microphone are enabled in Apple>System Preferences>Privacy.

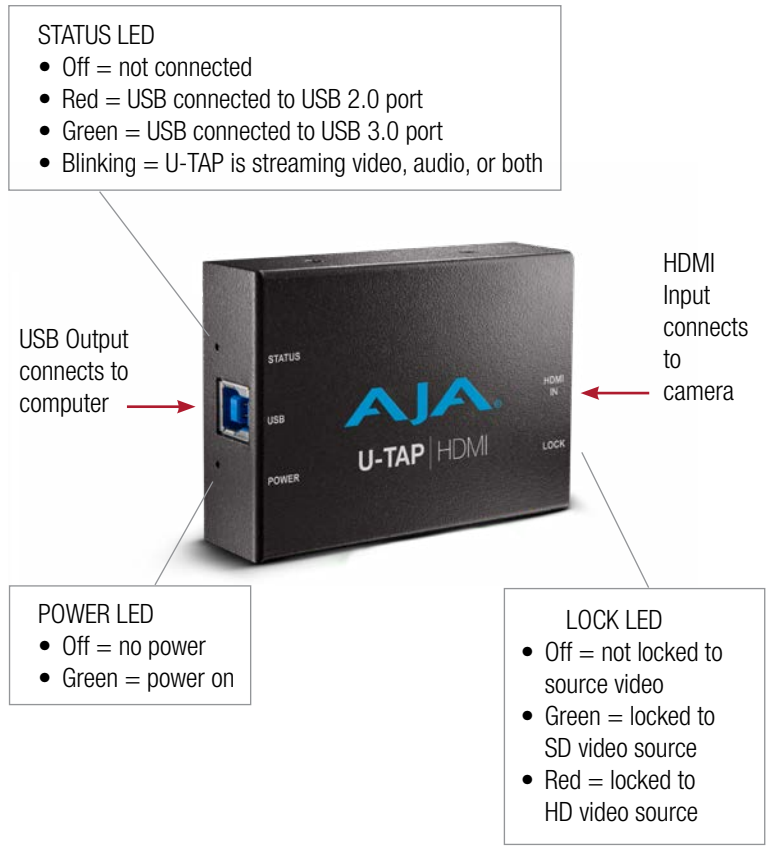
Thanks to AJA's Eric Norrell steered me to OBS Studio (Open Broadcaster Software), a fine, free, open source application for streaming, capture and recording video assist on a laptop or workstation.
obsproject.com

Best of all, U-TAP has been working seamlessly for web conferences on FaceTime, Skype, Zoom, WebEx and more.

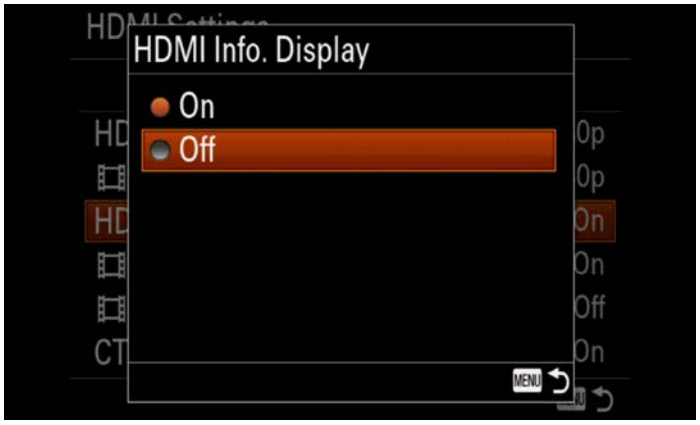
Most applications that support webcam ingest or capture are compatibile. For a list of software, go to:
aja.com/compatibility/u-tap

U-TAP HDMI and U-TAP SDI are available through AJA's worldwide reseller network once backorders clear at US MSRP of $345.

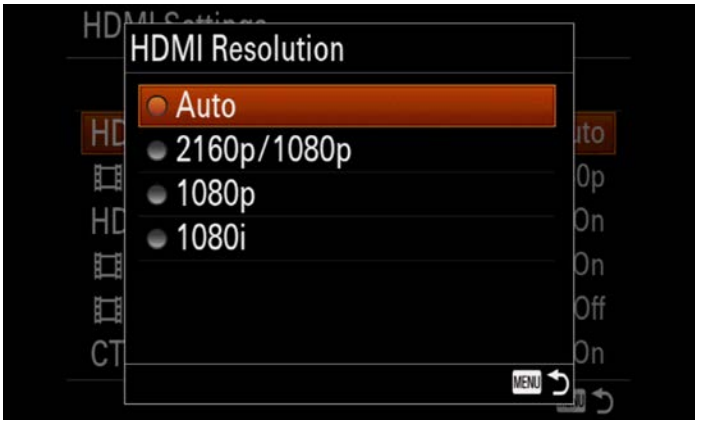
aja.com/en/products/u-tap-hdmi



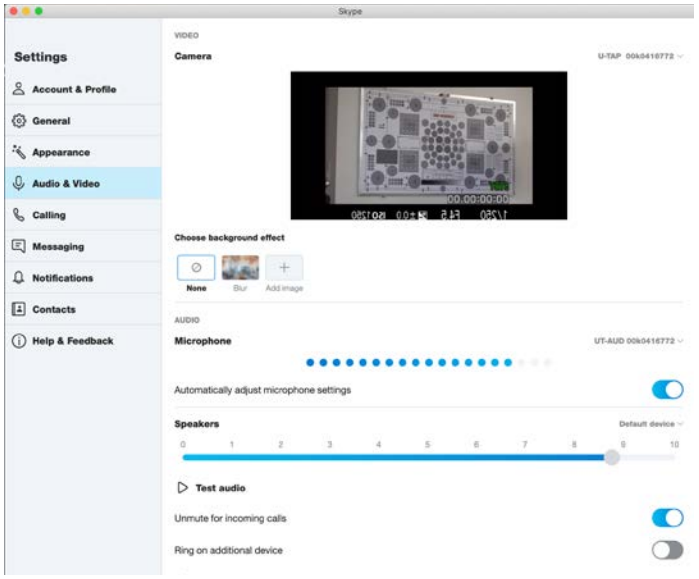
AJA U-Tap Webcam



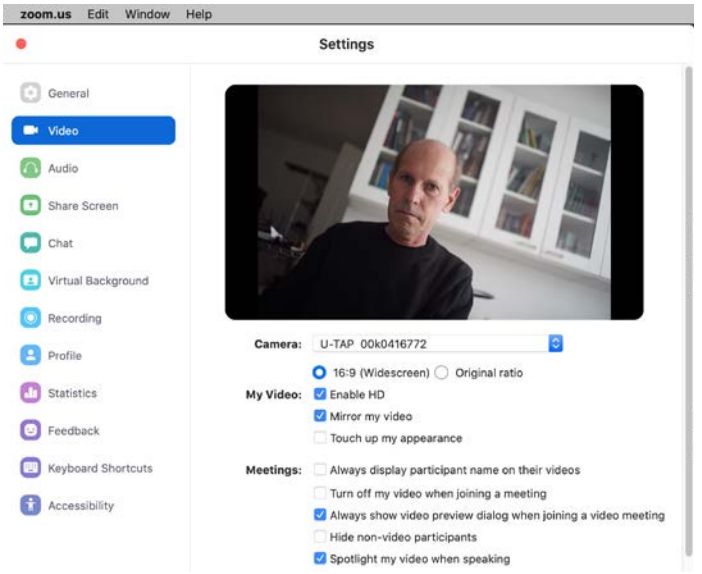
1. Use a camera whose HDMI overlay information can be turned off.



2. Set the camera's HDMI Resolution to AUTO. Things usually work better in VIDEO mode rather than STILL mode—especially audio.

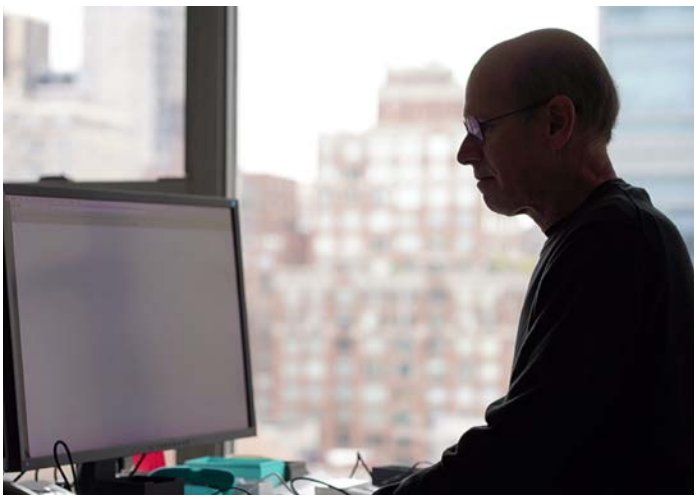


3. Check the video and audio settings in Skype. Skype>Audio & Video Settings>Audio & Video.
If you see onscreen text, most likely your camera doesn't allow HDMI overlay data to be turned off. Better try a different camera.



4. To check the video in Zoom, go to: Preferences>Video Settings.
If you see pillars on the left and right, you are probably in STILL photo mode on the camera rather than video. Dutch angles are fun.

5. When talking, look into the camera. Here, we have availble light coming through the west window of the office. It is diffused with ROSCO Light Grid Cloth taped to the inside of the window. A 4x4 Matthews floppy is just out of frame (camera right, my left) for anti-fill.



6. If you're just lurking in a meeting, it can be more interesting to place the camera off to the side instead of long blank stares directly at the screen. Having a real camera tethered to the AJA U-TAP, you can easily change angles. Do you have a motorized slider sitting around at home? A remote-contolled robotic gimbal operator? The possibilities are amazing.

Leitz THALIA 1:2 Makro Primes

Here are updated details on three Makro lenses that are part of the Leitz THALIA Large Format series of prime lenses.

These Makro primes focus to 1:2, meaning that you can fill the frame of an actual image area that in real life is twice as large as the sensor. The focus barrels are marked not only with distance, but also magnification factor and exposure (light loss) for which you have to compensate.

The three Leitz THALIA 1:2 Makro lenses are highlighted in red, below. They have the same look and design as the regular THALIA primes. The 90mm Thalia-T is not included in this chart.

Focal Length (mm)	24	30	35	45	55	70	100	120	180
Aperture	T 3.6	T 2.9	T 2.6	T 2.9	T 2.8	T 2.6	T 2.2	T 2.6	T 3.6
Close Focus (Imperial)	7.8"	1'8"	1'10	2'	11.7"	1'8"	2'4"	22.5"	5'
Close Focus (Metric)	0.2	0.5	0.55	0.6	0.3	0.5	0.7	0.57	1.5
Weight (lb)	3.13	3.31	3.08	3.21	3.61	2.34	2.56	3.66	3.57
Weight (kg)	1.42	1.50	1.40	1.46	1.64	1.06	1.16	1.66	1.62
Length (in)	4.9"	5.2"	5.2"	5.2"	6.1"	4.9"	4.9"	6.9"	6.1"
Length (mm)	124.5	131.5	131.5	131.5	154.5	124.5	124.5	175	154.5

- Image Circle: 60 mm (ARRI ALEXA 65)
- Mount: PL, LPL, XPL - with /i Technology lens data
- Front Diameter: 95 mm
- Front Filter: 92 mm screw-in
- Rear Filter: via net holder
- Matched Focus/Iris Ring locations: all focal lengths
- Focus Barrel Rotation: 270°
- Iris: 15 Blades, circular through all tops

Sony VENICE V6.0

Sony VENICE was presented to the world on September 6, 2017 at the Sony Pictures Studios in Culver City. The European premiere was in London at Pinewood on Sept 7. It was expected to ship in February 2018 in Super35 format only. The chorus of clamoring for Full Frame must have been so loud that by IBC a week later, Sony rapidly accelerated Full Frame into VENICE.

How was this possible? Firmware.

Firmware is the software behind the sensor and inside the camera that makes it work. VENICE arrived with Firmware V1.0. Successive waves of firmware updates added new capabilities to this 36x24 mm sensor camera that supports almost every format from Full Frame 3:2 to Super35 4K 18mm full height 4:3, Anamorphic and Spherical, and everything in between.

And now, VENICE gets firmware V6.0.

VENICE with a variety of Full Frame lenses

ZEISS Supreme

Cooke S7/i

Servicevision Scorpio FFA 2x Anamorphic

Sony VENICE V6.0

VENICE with a variety of Full Frame lenses

Leitz THALIA

SIGMA FF High Speed Prime

Angénieux Type EZ Zoom

Sony VENICE V6.0

VENICE Firmware Update V6.0

Sony announced VENICE firmware update V6.0 on April 30, 2020. It is planned for a November 2020 release.

The following things will be implemented:

- Advanced Rendering Transform .art file import.
- Second User Frame Line.
- New aspect ratios—9:16 and 1:1 preset frame lines.
- HFR (High Frame Rate) at 5.7K up to 72fps; 4K 6:5 up to 72fps; and 3.8K up to 110fps.
- REC beep and alarm volume can be adjusted individually.
- Warning information displayed on the Web Control screen.
- Maintain Camera ID and Reel# when loading all files.
- Genlock and Timecode lock status on On Screen Display.
- Gyro information in metadata (X-OCN/XAVC).
- 3D LUT support for EVF.

sonycine.com/

Advanced Rendering Transform .art Files

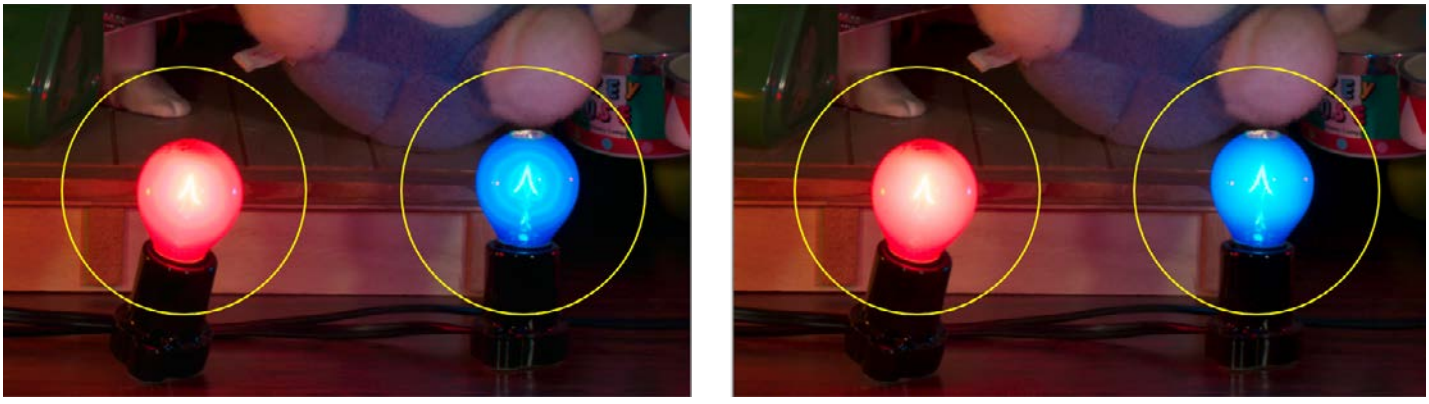
Think of .art files as 3D cube LUTs with better image qualities and fewer artifacts. You use them when shooting in X-OCN or XAVC/ProRes.

The process begins by creating a look in DaVinci Resolve, your favorite grading app or with Sony's RAW Viewer. You can also import a 3D cube LUT file. Then, save it as an .art file onto an SD media card and import the .art file into the VENICE.

In addition to "Do-It-Yourself" LUTs, Sony plans to collaborate with Technicolor and release a Look Library of .art files for VENICE. Wouldn't it be nice to conjure up Classic Technicolor 1940s-1950s looks: *The Red Shoes, The African Queen, An American in Paris, The Caine Mutiny, Scaramouche?*

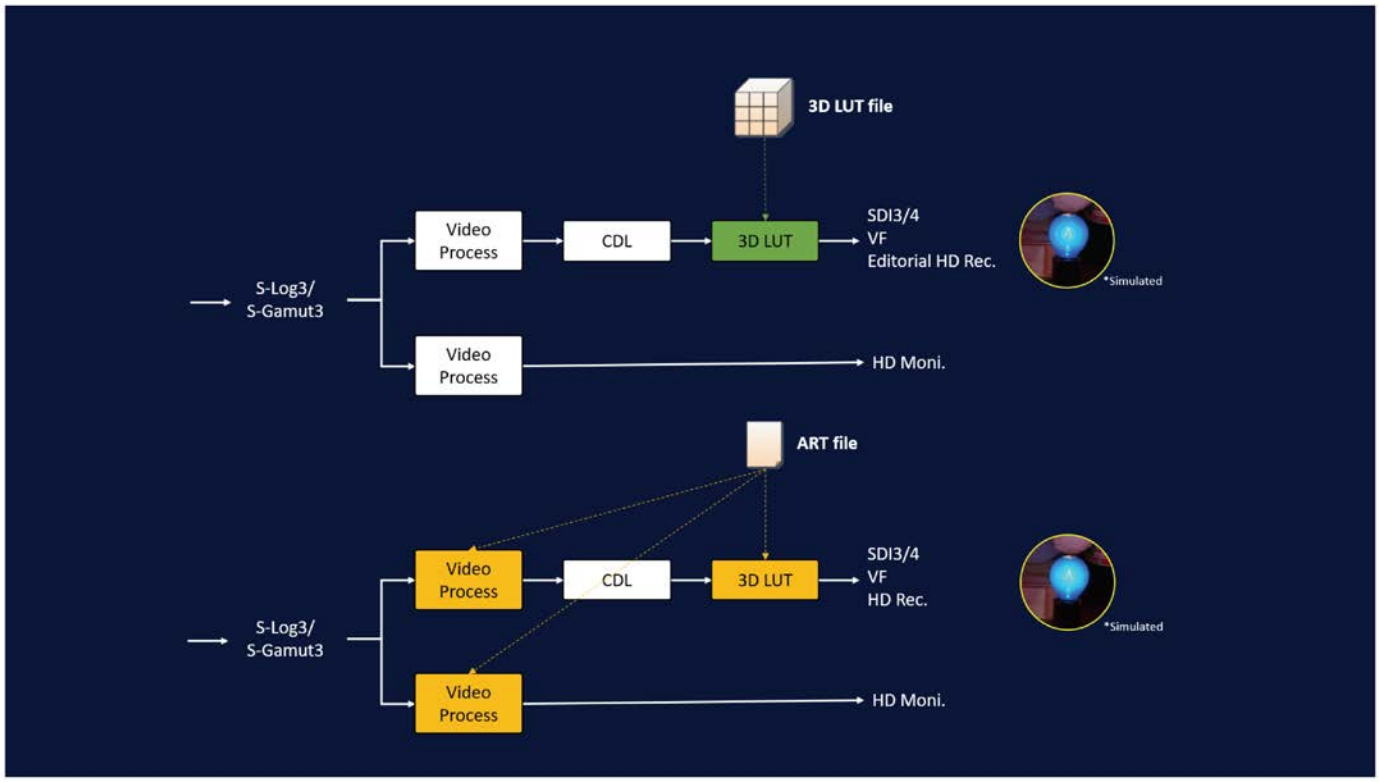
This will be available via the web simultaneously with the release of V6.0 Firmware in November.

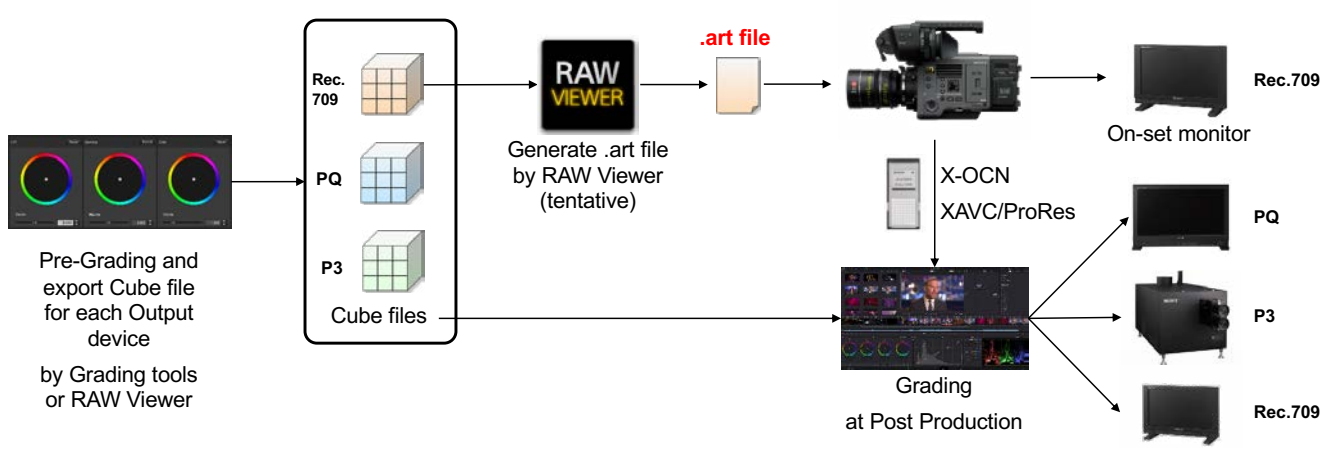
REc 709 will be the initial target display when using the Technicolor .art files. PQ and P3 are under discussion with Technicolor at a later date.



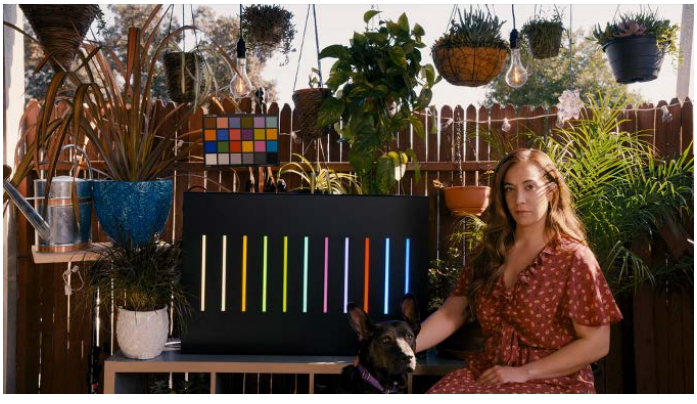
Current .cube LUTs might have artifacts. Notice the rings around the filaments, above left. The .art files improve picture quality, above right.

The way .art works





Ungraded Slog3 camera image.



Technicolor film print emulation as an example of VENICE Look Library possibilities.

Charts courtesy of Sony. Photos courtesy of Technicolor.

Sony VENICE Version History

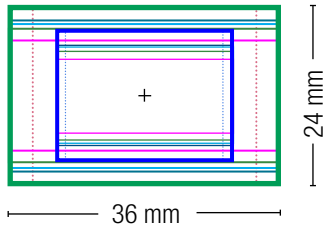
	V1.0 (Sept 2017)	V2.0 (July 2018)	V3.0 (Jan 2019)
Imager modes	4K 17:9 4K 16:9 4K 4:3 Anamorphic 6K 3:2 Full-Frame recording (without in-camera playback) When VENICE is set to 6K Full-Frame, SxS recording is not available	4K 6:5 Anamorphic 6K 1.85:1 6K 17:9 6K 3:2 (In-camera playback) When VENICE is set to 6K Full-Frame, SxS recording modes are supported	5.7K 16:9 6K 2.39:1
Resolution, Format, Aspect Ratio, Frame Rates, HFR	Res. Format Ratio FPS 3.8K S35 16:9 1-60 fps 4K S35 17:9 1-60 fps 4K S35 4:3 1-48 fps 4K S35 6:5 1-30 fps 5.7K FF 16:9 1-30 fps 6K FF 17:9 1-30 fps 6K FF 1.85:1 1-30 fps 6K FF 2.39:1 1-30 fps 6K FF 3:2 1-24 fps		
Lens mount support	PL lens mount (with ARRI LDS and Cooke /i technology)	E-Mount (lever lock type)	VENICE Extension System end of Feb.
Recording formats	16-bit RAW with AXS-R7 16-bit X-OCN with AXS-R7 XAVC 4K/QFHD (camera in 4K mode) MPEG50 (camera in 4K mode)	Apple ProRes	X-OCN XT 47.952 project frame rate (4K 4:3 and 4K 17:9)
Simultaneous Recording combinations	RAW/X-OCN & MPEG50 (camera in 4K mode) XAVC 4K/QFHD & MPEG50 (camera in 4K mode)	RAW or X-OCN & ProRes	XAVC 4K/QFHD & Apple ProRes (Proxy only) RAW/X-OCN & XAVC 4K/QFHD
Shooting functions	Variable White Balance (100K increments) Tint color correction control Relay rec. (SxS)	Select FPS (Off Speed) Dual Base ISO mode: 500 and High Base ISO 2500	Cache Rec. (AXS, SxS)
Monitor Out functions	OSD on Black MLUT on Playback Independent MLUT On/Off (one preset) Double speed VF Two OSDs and two Markers selection 4K-SDI output in RAW / X-OCN recording	Independent MLUT select (several presets) MLUT in Off-speed shooting User 3D LUTs (install user-generated 16 or 33 cube files) Preset LUTs for S-Gamut3.cine/S-Log3 and S-Gamut3/S-Log3 with EI applied	Anamorphic De-squeeze ratios: 1.25x, 1.3x, 1.5x, 1.8x in addition to current 2x 6G / 12G-SDI .cdl file import 4K SDI output during RAW & HD Video simultaneous recording
Additional functions	Digital Magnification in viewfinder Highlight Clip Indicator	Look Around (Surround View) High Resolution Magnification Auto White Balance, High-Low Key False Color (use B button on DVF-EL200 viewfinder)	VENICE VF function control in EL200 SxS XDROOT Folder and Volume name changing to CamID+Reel# False Color (SDI Monitor) 2:1 Frame Line preset
Hardware	Go to: www.sony.com/VENICE	Inside Clips Button	12-pin lens remote
Network functions	–	Wired LAN control (basic functionality)	Wireless LAN control (CBK-WA02) Wired LAN control (full functionality)

Sony VENICE Version History

	V4.0 (June 2019)	V5.0 (Jan 2020)	V6.0 (Nov 2020)
Imager modes			
Resolution, Format, Aspect Ratio, Frame Rates, HFR	6K Full Frame 3:2 (6048 x 4032) 60 fps 4K Super35 2.39:1 (4096 x 1713) 120 fps 4K Super35 4:3 for full 18mm height anamorphic (4096 x 3024) 72 fps 4K Super35 17:9 (4096 x 2160) 110 fps	6K Full Frame 2.39:1 (6048 x 2534) 90 fps 6K Full Frame 17:9 (6054 x 3192) 72 fps 6K Full Frame 1.85:1 (6054 x 3272) 72 fps	5.7K Full Frame 16:9 (5674 x 3192) 1-30. HFR: 31-60, 66, 72 fps 4K Ultra35 6:5 Anamorphic (4096 x 3432) 1-30. HFR 31-60, 66, 72 fps 3.8K S35 16:9 (3840 x 2160) 1-60. HFR 66, 72, 75, 88, 90, 96, 100, 110 fps
Lens mount support			
Recording formats	All High Frame Rates (except 6K 50/60p) support X-OCN recording, including X-OCN XT implemented in Version 3.0. HFR up to 60p supports XAVC 4K/QFHD and ProRes recording.	HD ProRes 4444: up to 30FPS on SxS Pro+ cards	
Simultaneous Recording combinations			
Shooting functions	RM/RCP control (Including paint)		Implementation of .art file import Maintain CamID and Reel# when loading all files
Monitor Out functions	Pure P HD-SDI output in 25p/29p	Flip & Flop via SDI & VF High resolution Magnification via Monitor Out	Display genlock and TC lock status on OSD 3D LUT support for VF
Additional functions	Line+Mask Frame Line	Improved User Marker Settings	Second User Frame Line 9:16 and 1:1 preset frame lines REC beep and alarm volume adjust individually Gyro information in metadata (X-OCN/XAVC)
Hardware	S700 Protocol		
Network functions			Warning information displayed on the Web Control screen

VENICE Full Frame and Super35 Image Areas

VENICE Sensor Actual Size



Full Frame

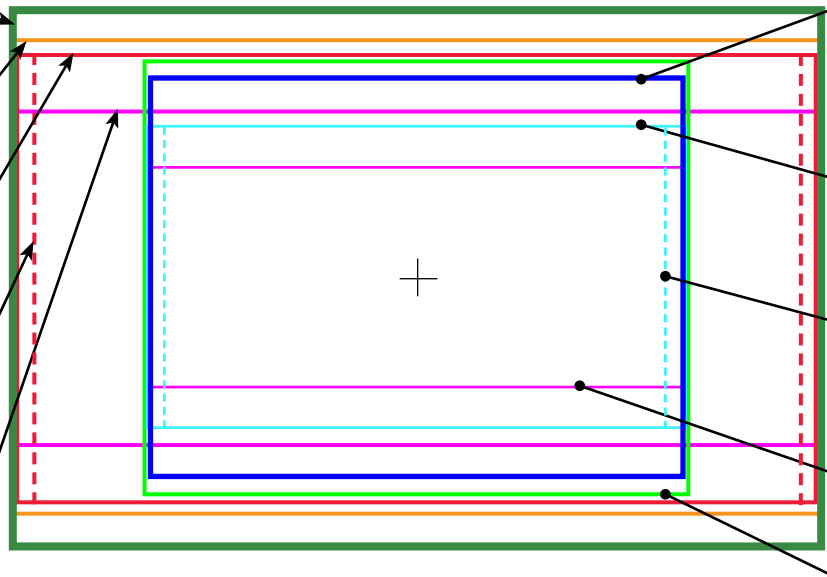
6K FF 3:2, 6048 x 4032
35.9 x 24 mm (1.5:1)
43.5 mm Ø

6K FF 1.85:1 6054 x 3272
36.0 x 19.4 mm
40.89 mm Ø

6K FF 17:9 6054 x 3192
36.0 x 19.0 mm (1.89:1)
40.71 mm Ø

5.7K FF 16:9, 5674 x 3192
33.7 x 19.0 mm (1.78:1)
38.69 mm Ø

6K FF 2.39:1, 6048 x 2534
Spherical Widescreen
35.9 x 15.0 mm
38.91 mm Ø



Super35

4K S35 4:3, 4096 x 3024
24.3 x 18.3 mm (1.33:1)
31.1 mm Ø
for S35 4:3 Spherical or
S35 Anamorphic

4K S35 DCI 4K 17:9,
4096 x 2160
24.3 x 12.8 mm (1.89:1)
27.47 mm Ø

3.8K QFHD S35 16:9,
3840 x 2160
22.8 x 12.8 mm (1.78:1)
26.15 mm Ø

4K S35 2.39:1, 4096 x 1716
24.3 x 10.3 mm
26.39 mm Ø

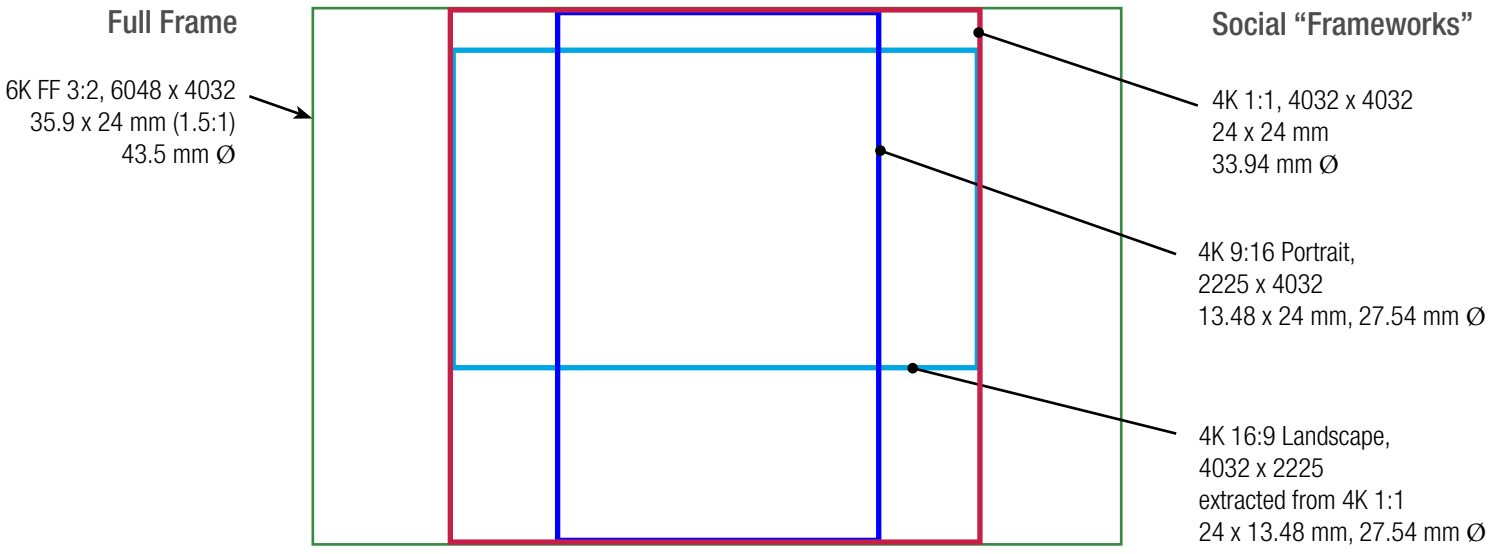
4K "Ultra35" 6:5 Anamorphic
4101 x 3432, 2x Squeeze
(1.195:1) 24.3 x 20.4 mm
31.73 mm Ø

VENICE V6.0 Firmware Sensor Modes, Rez, Dims, FPS

	Sensor mode	Resolution	Dimensisons W x H (mm)	Project Frame Rate	Select FPS	Select FPS with HFR License
	3.8K 16:9	3840 x 2160	22.8 x 12.8	23, 24, 25, 29, 47, 50, 59	1-60	**66, 72, 75, 88, 90, 96, 100, 110**
	3.8K 16:9 (Surround View)	3840 x 2160 (4268 x 2400)	22.8 x 12.8 (25.4 x 14.3)	23, 24, 25, 29, 47	1-48	-
	4K 2.39:1	4096 x 1716	24.3 x 10.3	23, 24, 25, 29, 47, 50, 59	1-60	66, 72, 75, 88, 90, 96, 100, 110, 120
	4K 17:9	4096 x 2160	24.3 x 12.8	23, 24, 25, 29, 47, 50, 59	1-60	66, 72, 75, 88, 90, 96, 100, 110
	4K 17:9 (Surround View)	4096 x 2160 (4552 x 2400)	24.3 x 12.8 (27.0 x 14.3)	23, 24, 25, 29, 47	1-48	-
Anamorphic License	4K 4:3	4096 x 3024	24.3 x 18.0	23, 24, 25, 29, 47, 50**, 59***	1-48	49-60, 66, 72, 75
	4K 4:3 (Surround View)	4096 x 3024 (4552 x 3360)	24.3 x 18.0 (27.0 x 20.0)	23, 24, 25, 29	1-30	-
	4K 6:5	4096 x 3432	24.3 x 20.4	23, 24, 25, 29	1-30	**31-60, 66, 72**
Full Frame License	5.7K 16:9	5674 x 3192	33.7 x 19.0	23, 24, 25, 29	1-30	**31-60, 66, 72**
	6K 2.39:1	6048 x 2534	35.9 x 15.0	23, 24, 25, 29, 47**, 50**, 59**	1-30	31-60, 66, 72, 75, 88, 90
	6K 17:9	6054 x 3192	36.0 x 19.0	23, 24, 25, 29, 47***, 50***, 59***	1-30	31-60, 66, 72
	6K 1.85:1	6054 x 3272	36.0 x 19.4	23, 24, 25, 29, 47***, 50***, 59***	1-30	31-60, 66, 72
	6K 3:2	6048 x 4032	35.9 x 24.0	23, 24, 25, 29**, 47***, 50***, 59***	1-25	26-60

V6.0 Firmware updates of HFR fps are shown in red.

New Social Media Framelines in V6.0



You can never have enough framelines.

For 4K square Instagram, there's 1:1.

For tall fashion models, smartphones and Quibi, there's 4K Portrait 9:16.

Roate 9:16 to horizontal, and you get 4K Landscape 16:9.

You will be able to see two sets of framelines simultaneously in the EVF or monitor.

These are not sensor modes. You capture in 6K FF and extract/crop the image area in post.

Frame rates (fps) are the same as in 6K FF.

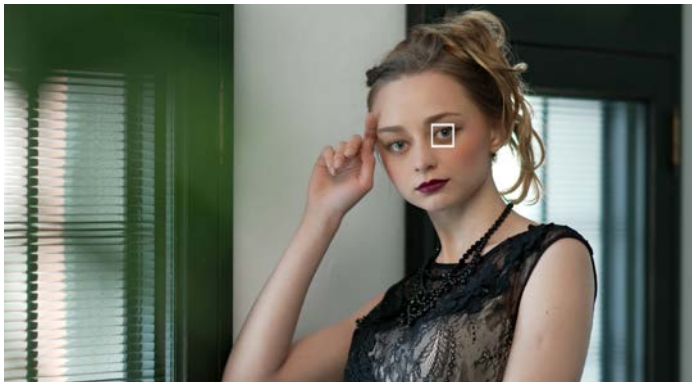
Sony FX9 V2.0

XDCA-FX9 Extension Unit (optional) at the rear of the camera adds:
16-bit RAW output, V-Mount Battery plate
Ethernet RJ-45 I/F connector, D-tap power connector
Dual Link Outputs for streaming, DWX slots (x2) for wireless audio units

Sony FX9 gets additional capabilities with Firmware Update V2.0. The download will be available later this year.

Key features include:

- Additional Frame Rates for Full Frame and Super 35 internal recording—especially DCI 4K 4096 x 2160. See tables that follow.
- 16-bit RAW Output with Sony XDCA-FX9 Extension Unit.
- Create your own 3D LUTs and import up to 16 of them from an SD card. This is recommended when shooting in S-Log3.
- Improved Auto Focus. V2.0 now inherits Eye AF from Sony's alpha series cameras. The FX9 will track focus on the subject's eye. This is amazing if you are shooting solo, without a focus puller, and you are Full Frame at T1.3, "wide-open with a wrench" (figurative wrench: iris wide open and even then you wish you had just a little more light).
- FX9 now gets touchscreen focus control in V2.0. Touch the camera's onboard 1280x720 LCD Montor/Viewfinder to define your focus area. In V1.0, you had to use the joystick.
- Assign Auto Focus transition speed to a User Button. Press the button and use the jog dial to adjust the amount of time that Auto Focus will shift, for example, from a foreground to a background object.
- Project>Base Setting>Shooting Mode offered the choice of Cine EI and Custom in Firmware V1.0. In V2.0, Custom is renamed SDR. You'll find S-Cinetone in the SDR submenu.
  - HDR mode has been added. Submenus let you choose HLG Natural (BT.2100) or HLG Live (Sony HLG).
- Menu settings on the LCD Monitor/Viewfinder can now be set with the touchscreen. This is more intuitive and VENICE-like.



Eye AF tracks the subject's eye.

Touchscreen menus and a more VENICE-like appearance.

Sony FX9 V2.0

- Base ISO upper limits have been increased when shooting in HDR/SDR mode. (In Cine EI, ISO ranges remain the same as they were in V1.0.). So the new Base ISO ranges are:
  - Base ISO: High is increased from 1600-12,800 to 1600-102,400 ISO. This is almost night vision territory.
  - Base ISO: Low is increased from 320-2,500 to 320-12,800.
- 6G-SDI output from camera for 4K 23.98 - 30p. 12G-SDI is available only for 4K 59.94/50p.
- A Sony DXW and URX wireless audio receiver is supported in the XDCA-FX9 slot.
- The Sony XLR-K3M audio adapter now supports digital input on the FX9. (V1.0 only supported analog audio input.)

A quick review of the Sony FX9

The Sony PXW-FX9 is an affordable, compact, lightweight Full-Frame and Super35 cine camera. With its companion Full-Frame zoom lens, this system is about the same size and weight as Super35 predecessors and still shoots both formats.

The 19 Megapixel sensor is an all-new design. It's not a VENICE sensor. The FX9 inherits very fast hybrid phase-detection and contrast Auto Focus from the latest Sony a7 and a9 camera series. Artificial intelligence keeps focus sharp in Face Priority AF, Face Only AF and Face Registration (multiple faces).

The FX9's Autofocus capabilities have been described as "tenacious persistent focus tracking." With firmware version 2.0, Eye AF adds another adjective: "Amazing."

sonycine.com/

Sony PMW-FX9 Specs

- New Full-Frame 19MP CMOS 6K Sensor
- E-mount (18mm FFD and 46.1 mm Inside Diameter)
- XAVC Intra/Long, MPEG HD422 Internal Recording
- 4K 4:2:2 10-bit internal recording
- 16-bit RAW Output via XDCA-FX9 Extension Unit
- XQD cards in 2 slots for internal recording
- Fast Hybrid AF
- Dual base ISO: 800 and 4000
- S-Log3 gamma and S-Gamut3, S-Gamut3.Cine color space
- S-Cinetone color science
- 15+ stops of dynamic range
- 1x 12G SDI BNC output on camera body
- 1x BNC RAW output connector on XDCA-FX9
- VENICE-like color science
- Electronic Variable ND filter: 1/4 ND (2 stops) - 1/128 ND (7 stops) equivalent to ND.6 - ND2.1

PXW-FX9 Body only: $10,999
XDCA-FX9 Extension Unit: $2,499
PXW-FX9K Kit with SELP28135G 28-135mm FF zoom: $13,499

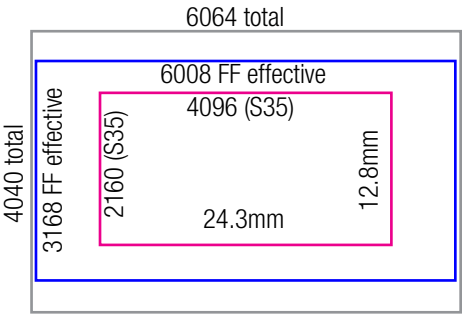
Version 2.0 firmware update available around October 2020.

Sony FX9 V2.0 Full Frame and S35

Full-Frame 6K and Super35 4K sensor modes

Sensor actual size

FX9 Total 1.5:1 pixels: 6064 x 4040
Effective pixels: 6008 x 3168
35.7 x 18.8 mm, 40.35 mm Ø Diagonal



Sony FX9 V2.0 Internal and External RAW Recording

Internal Recording					
Imager Scan Mode	*Recording Resolution*	*Frame Rate*			
Full Frame	**DCI 4K 4096 x 2160**	**24, 25, 30 fps**	**50, 60 fps ***	-	-
	QFHD 3840 x 2160	24, 25, 30 fps	**50, 60 fps ***	-	-
	Full HD 1920 x 1080	24, 25, 30 fps	50, 60 fps	100, 120 fps	**150, 180 fps**
Super35	**DCI 4K 4096 x 2160**	**24, 25, 30 fps**	**50, 60 fps**		
	QFHD 3840 x 2160	24, 25, 30 fps	50, 60 fps		
	Full HD 1920 x 1080	24, 25, 30 fps	50, 60 fps	100, 120 fps	

Blue text and numbers show V2.0 updates

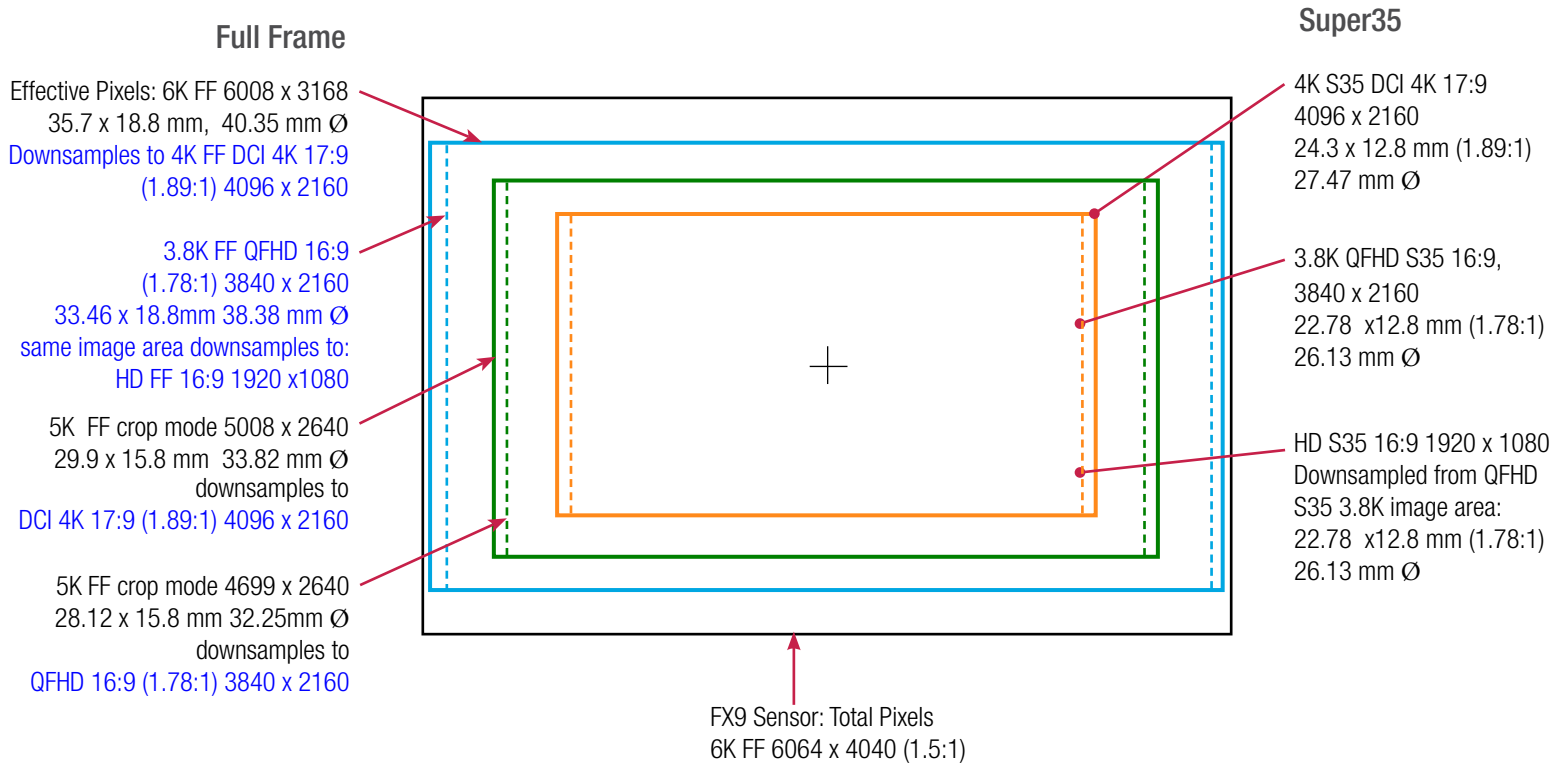
* FF crop 5K mode must be selected in menu for 50, 60 fps Full Frame DCI 4K or QFHD.
Image area is cropped to around 83% of Full Frame. This is 122% larger than S35 diagonal. See diagram on previous page.

External Recording: RAW Output from Sony XDCA-FX9					
Imager Scan Mode	*Output Resolution*	*Frame Rate*			
Full Frame	**DCI 4K 4096 x 2160**	**1-30 fps**	**31-60 fps ******	-	-
	DCI 2K 2048 x 1080	**1-30 fps**	**31-60 fps**	**100, 120 fps**	**150, 180 fps**
Super35	**DCI 4K 4096 x 2160**	**1-30 fps**	**31-60 fps**	-	-
	QFHD 3840 x 2160 ********	1-30 fps	31-60 fps	100, 120 fps ***	-
	DCI 2K 2048 x 1080	**1-30 fps**	**31-60 fps**	**100, 120 fps**	-

Blue text and numbers show V2.0 updates

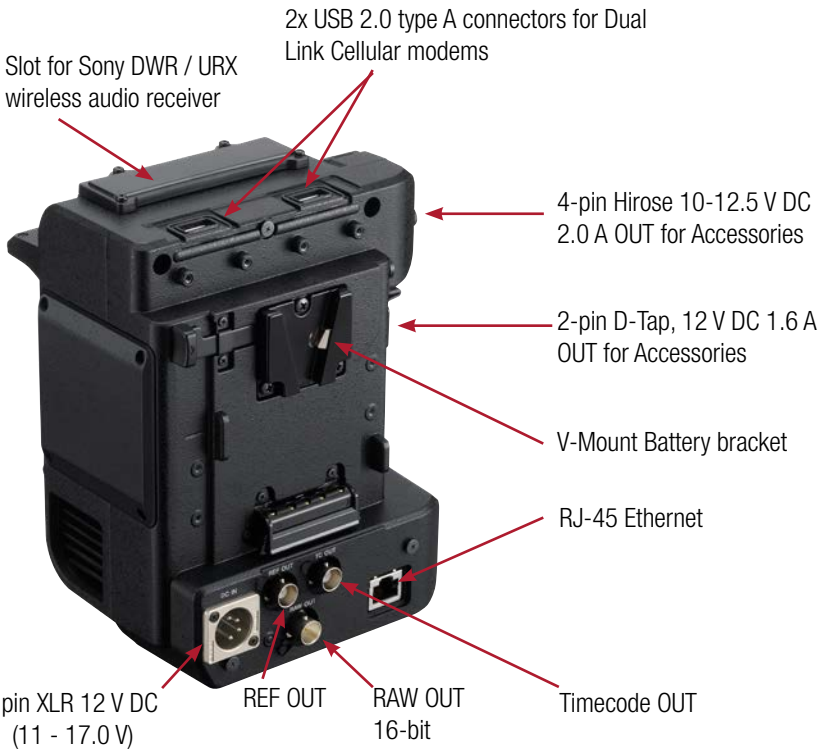
** FF crop 5K mode must be selected in menu.
*** Limited to 10-bit
**** Required additional FX9 firmware update at a future date (to be announced).

Sony FX9 V2.0 Image Areas and Imager Scan Modes



Sony XDCA-FX9 Extension Unit

The optional Sony XDCA-FX9 Extension Unit attaches to the back of the camera. It has processing circuitry that makes RAW output possible. Also, the XDCA-FX9 has a V-Mount battery bracket, a slot that accepts a wireless audio receiver, and additional connectors.



Atomos Shogun 7 Apple ProRes RAW from FX9

Atomos introduces RAW recording support for the Sony PXW-FX9 camcorder. With concurrent firmware updates scheduled for October 2020, Atomos Shogun 7 monitor/recorders will record Apple ProRes RAW images at up to DCI 4K 60 fps and 2K up to DCI 2K 180 fps via the SDI output of the Sony FX9 with an XDCA-FX9 Extension Unit attached.

The Shogun 7 extends the performance of the FX9 by recording RAW data from its Full Frame sensor in ProRes RAW format. The FX9 with XDCA-FX9 will join the existing Sony line of cameras (FS7*, FS7 II*, FS5** and FS5 II) that all will work with the Shogun 7 to record ProRes RAW.

Atomos CEO Jeromy Young said, "I'm thrilled to be working with the team at Sony to bring this to life. It's great to add the Sony FX9 to the large and expanding ProRes RAW family. The flexibility and convenience of ProRes RAW makes the FX9 and Shogun 7 an awesome combination for any filmmaker seeking great colors and amazing latitude in post. Initially we will have 4Kp60 and 2Kp180 ProRes RAW recording options and we're constantly developing more capability in our product to support partners like Sony."

The FX9 camera's RAW output (via XDCA-FX9) will be enabled with Sony's V2.0 firmware update for the FX9 planned in October 2020. At the same time, there will be a free AtomOS firmware download for the Shogun 7 to allow FX9 RAW recording.

Apple ProRes RAW

Why ProRes RAW? Apple ProRes RAW provides more creative control of your images in post-production. ProRes RAW combines the flexibility of RAW files with the real-time performance of ProRes. The format gives you great latitude to adjust the look of images and to extend highlight and shadow detail in both HDR and SDR (Rec.709). Think of ProRes RAW as being like a digital equivalent of a motion picture film camera negative that takes up less storage space.

Apple ProRes RAW files are smaller than other RAW files. So, file transfer, media management, and archiving are simpler and faster. ProRes RAW files recorded to the Shogun 7 from the FX9's RAW output can be edited easily on a Mac. The format is fully supported in Final Cut Pro X and other apps, including Assimilate Scratch, Colorfront, FilmLight Baselight, and Grass Valley Edius. Adobe Premiere Pro and Avid Media Composer are also set to support ProRes RAW in 2020.

PXW-FX9 metadata

Each frame recorded in ProRes RAW has metadata supplied by the FX9. Apple's Final Cut Pro X and other NLEs will automatically recognize ProRes RAW files recorded by the Shogun 7 from the FX9's RAW output and set them up for editing and display in either SDR or HDR projects. Additional information will also allow the software to perform extensive parameter adjustments.

About Shogun 7

The Atomos Shogun 7 is a 7-inch HDR and SDR monitor / recorder. It also works as a switcher for multiple cameras. It has an accurate 1920 x 1080 HDR 3000 nit screen that is daylight-viewable and displays 15+ stops of dynamic range. It records to AtomX SSDmini or other approved SATA SSD drives. These are very affordable, with a much lower cost per GB than proprietary memory cards.

* FS7 and FS7 II require XDCA-FS7 expansion unit.
** FS5 requires additional CBKZ-FS5RIF license option

Canon EOS R5

Advance Details of EOS R5 Camera

- 8K RAW internal recording
- 8K internal 4:2:2 10-bit Canon Log
- 8K internal 4:2:2 10-bit HDR PQ
- 4K internal video recording up to 119.88 fps in 4:2:2 10-bit
- 4K external recording
- No crop 8K and 4K video using the full-width of the sensor
- Dual Pixel CMOS AF (Autofocus) available in all 8K and 4K recording modes.
- Canon Log available in 8K and 4K internal recording modes.
- 5-axis In-Body Image Stabilization
- Dual-card slots: 1x CFexpress and 1x SD UHS-II.

RF Lens Mount
54 mm diameter
20 mm flange flocal depth

12-pin connection for high-speed lens data transmission between camera and lens

Canon EOS R5

Canon launched the EOS R System in Hawaii on Sept 5, 2018 with the Full-Frame Mirrorless EOS R camera and RF lenses. It was made clear that there would be more to come.

The more affordable EOS RP was released in March 2019.

Canon planners, designers and engineers have been busy preparing for the third act in the EOS R series.

Canon fueled the flames of anticipation with periodic announcements of a new EOS R5 Full-Frame Mirrorless Camera.

Often we read pre-pre release conjecture in rumor mills and websites of dubious distinction. However, Senior Marketing Manager Goshi Nakamura and the team at Canon have been officially releasing information on a regular jaw-dropping basis. This maxillary analogy is made because the specifications are so astounding, if they didn't come from Canon directly, you probably wouldn't believe them.

The impending Canon EOS R5 Full-Frame Mirrorless Camera will include:

- 8K RAW internal video recording up to 29.97 fps
- 8K internal video recording up to 29.97 fps in 4:2:2 10-bit Canon Log (H.265) / 4:2:2 10-bit HDR PQ (H.265).
- 4K internal video recording up to 119.88 fps in 4:2:2 10-bit Canon Log (H.265) / 4:2:2 10-bit HDR PQ (H.265).
- 4K external recording is also available up to 59.94 fps.
- No crop 8K and 4K video capture using the full-width of the sensor—in 8K RAW, 8K/4K DCI modes.
- Dual Pixel CMOS AF (Autofocus) available in all 8K and 4K recording modes.
- Canon Log available in 8K and 4K internal recording modes.
- 5-axis In-Body Image Stabilization—a first for Canon. It works in conjunction with Optical IS equipped with many of the RF and EF lenses.
- Dual-card slots: 1x CFexpress and 1x SD UHS-II.

Autofocus and Subject Detection

The EOS R5 will use Canon's Dual Pixel CMOS AF Technology to make exremely fast Autofocus calculations. Subject detection adopted from the Live View AF tracking system in the EOS-1D X Mark III camera provides face, head and even eye tracking when selected. Autofocus of animals will also be possible for the first time in a Canon camera, following focus by tracking the whole body, face, or eye of cats, dogs or birds.

New Sensor

Canon's EOS R5 will have a newly developed CMOS sensor. In still photography, it will enable enhanced features such as high-speed continuous shooting up to approximately 20 frames-per-second when using the silent shutter and up to approximately 12 fps when using the mechanical shutter.

The EOS R5 has IBIS (In Body Image Stabilization). When used in conjunction with the ever-popular in-lens stabilization (IS), handholding the camera and lens in incredibly low light levels will be possible.

EOS 5D Mark II then; EOS R5 when?

Canon's EOS 5D Mark II changed the game for DSLR Video. The EOS R5 looks like it will push the envelope of what filmmakers will be able to do with Mirrorless cameras. With Full-Frame, internal, uncropped 8K video up to 29.97fps and 4K video up to 119.9fps, the main question is only, "When?"

Seven New RF Lenses

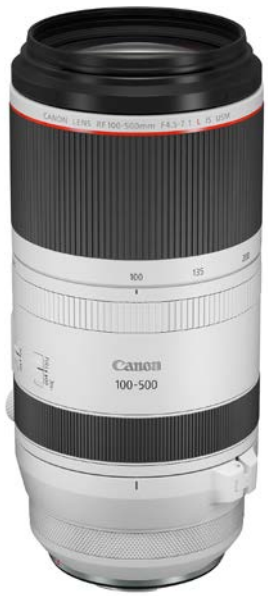
Canon is also working on 7 new RF Lenses and 2 RF Lens Extenders. The EOS R System was planned to provide engineers with the ability to design lenses that were previously very difficult to create. The wide RF lens mount diameter (54 mm), shorter flange flocal depth (20 mm) and high-speed lens data transmission between camera and lens offer many possibilities.

Canon is planning to release the new RF lenses and lens extenders during 2020. Among these:

- RF 100-500mm F4.5-7.1 L IS USM
- Extender RF 1.4x
- Extender RF 2x.

Current RF lenses:

- RF 28–70mm F2 L USM
- RF 50mm F1.2 L USM
- RF 24–105mm F4 L IS USM
- RF 35mm F1.8 Macro IS STM
- RF 85mm F1.2 L USM
- RF 85mm F1.2 L USM DS (Defocus Smoothing)
- RF 24–70mm F2.8 L IS USM
- RF 15–35mm F2.8 L IS USM
- RF 70–200mm F2.8 L IS USM
- RF 24–240mm F4–6.3 IS USM



Rotolight Titan X2

The Rotolight Titan X2 is like having several hampers of diffusion rolls built in. At the turn of a dial, you get the electronic equivalent of almost everything from Hampshire Frost through White Diffusion #216. Push another button, and you'll find more gel filters represented than were ever collected in many swatch books. Best of all, you don't have to cut, swap or clip them on.

Titan X2 is an innovative RGBWW LED 2x1 (25.6" x 11.8") lighting fixture. It has local touchscreen and tactile control knob as well as DMX wired and Lumenradio remote operation.

The Smartsoft electronic diffusion panel at the front of the fixture adjusts at the turn of a dial, from 0 to 100%. If you've flown on a Boeing 787 Dreamliner, it is sort of like the ND window shades that dim when an electric current is applied—except the Titan X2 is diffusion, not Neutral Density. Also, unlike the annoying inability of the Dreamliner to fully block daylight, you can change the Titan's light intensity from 0 to 100%.

This diffusing and dimming works in most modes, which include standard CCT (Color Temperature 3,000-10,000 Kelvin); HSI (Hue, Saturation, Intensity); RGBW; XY and Gel Filter modes. So, in addition to replacing bins of diffusion, the Titan also recreates more than 1,400 rolls of gels from Lee, Rosco, Apollo and others.

The touchscreen and control knobs are intuitive. Power the Titan X2 on with its 2 switches: one on the power supply and the other on the lower right, next to the cable connectors.

You will most likely begin in **CCT** Mode. There are 3 big red knobs. The left is for intensity. Middle is for color temperature. Push and turn the knob to adjust Plus and Minus Green. The right knob adjusts diffusion. You can also adjust directly on the touchscreen by sliding left or right.

Save any setting by pushing and holding a PRESET button for about 3 seconds and confirming YES.

RGBW mode lets you dial in Red, Green and Blue values. Triangles in the contextual menus above the knobs mean that you can push and turn to adjust brightness, white (degree of saturation) and diffusion.

HSI mode intuitively sets Hue, Saturation and Intensity. Hue is controlled by touchscreen or left knob. Think of it as a familiar color wheel, except the interactive display is a bar graph going from 0° Red and all the way back to Red at 360°. Saturation is controlled by the middle knob. Intensity is the right knob. Push and turn it to adjust diffusion as well.

XY is a new darling of lighting designers for describing color because you can simply enter two numbers and achieve an exact color than should match other lighting fixtures or practical lights with the same values. The left knob is X, the middle knob is Y and the right knob is intensity (brightness) and push for diffusion.

FILTER mode is your swatch book, grip truck and expendables store combined and on electronic steroids. The touchscreen or left knob selects the major color groups of gel filters. The middle knob drills down on all available choices within that color group—among them are L for Lee, R for Rosco, number and name. The right knob is for intensity and push-to-diffuse.

Naturally, the Rotolight Titan X2 includes all kinds of lighting effects. These are summoned up by touching the **SFX** touchscreen button: Strobe, Lightning, Fire, Police, TV, Neon, Film (movie theater), Paparazzi (flash bulbs), and more.

For the increasing number of us shooting both video and stills, Titan X2 has a **FLASH** mode for short bursts (down to 1/8000th second) at twice the fixture's normal intensity. A modeling light helps while you're composing the shot. An Elinchrom HSS Skyport receiver is built in for wireless triggering from the camera.

Bluetooth wireless control with an app is coming soon.

In short, the Rotolight Titan X2 is a very versatile, extremely bright, nicely controlled, precise and thoughtfully designed lighting fixture that will be applauded on almost any production.

rotolight.com

Rotolight Titan X2

Home page. CCT mode.

RGBW mode

HSI mode.

XY mode.

Filter mode: Rosco 2002 Storaro Orange.

Filter: Lee 736, Twickenham Green, 100% brightness and diffusion.

FX: Fire effect.

DMX Mapping.

Screen Test of Angénieux 28, 40 and 135 mm Optimo Primes

The Angénieux Silver set of 6 lenses was just presented to the market and three pre-production Angénieux Optimo Primes arrived in the US: 28mm, 40mm, 135mm. All T1.8, Full Frame, 95 mm front diameter.

First impressions: beautifully made, smooth focus cams, lightweight, small, fit in one hand (don't need both hands for a lens change.) Lots of opportunities to customize with front filters and Angénieux's Internal Optical Palette, which is a trio of choices to change iris, rear filters, and the eagerly-awaited internal element.

Twelve Full Frame lenses are planned in the Optimo Prime series: 18, 21, 24, 28, 32, 40, 50, 60, 75, 100, 135, 200mm. All are T1.8 except the 18mm which is T2.0 and the 200mm which is T2.2.

Image Circle Coverage is Full Format with a 46.31 mm diagonal, and they also cover ALEXA 65 5K Format, 48.49 mm Ø.

The fully interchangeable mounts include PL and LPL, so far. Both Cooke/i and Arri LDS lens metadata are supported.

The lens gears are industry-standard 0.8M and all are located in the same positions across the entire 12-lens set.

Optimo Primes can be customized at the factory or by certified lens technicians to create distinct looks. The iris assembly is removable and exchangeable. So far, there are plans for 3, 6, 9, round and oval-bladed iris assemblies. Cinematographers and rental houses are dreaming of additional iris permutations, imagining matte black, gold, blue, warm, silver, shiny and dull for bokehs of multi colors, sizes and shapes.

An internal element in the middle of the lens can be swapped and exchanged to achieve a variety of different looks and degrees of internal flares, diffusion, coatings, chromatic aberration, or distortion. A rear filter and net holder screws onto the rear.

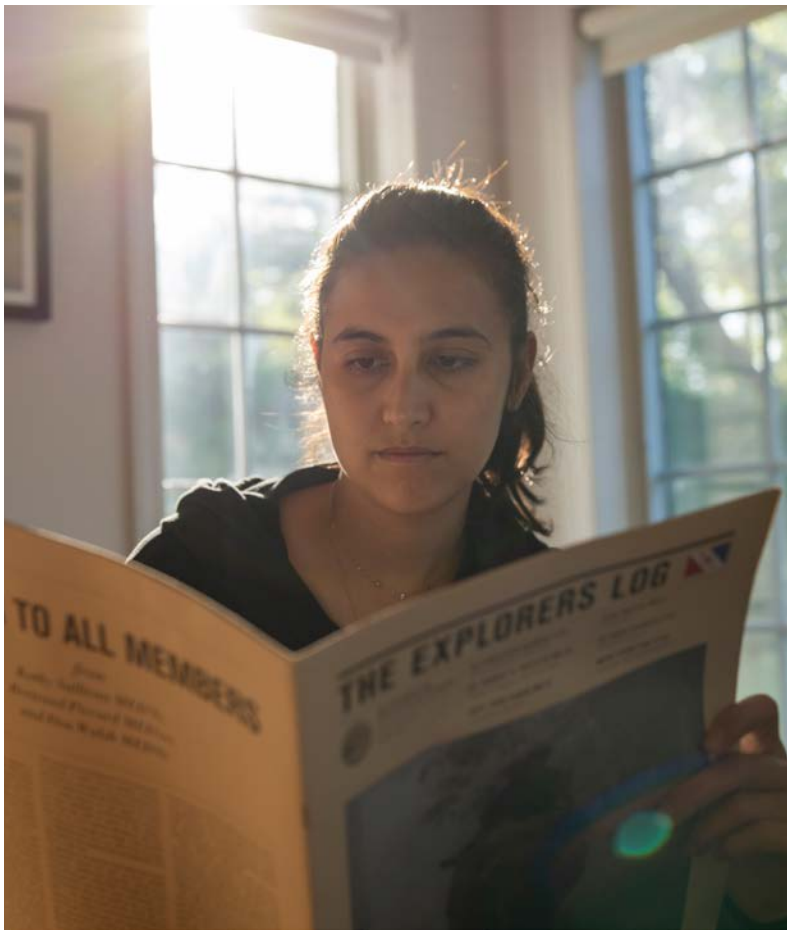
What do the Angénieux Optimo Primes look like? To find out, let's take a nature walk as the evening fog swirls onto Shinnecock Bay and into Southampton, Long Island, New York. It's one half hour before sunset. Optimo Prime 28mm, 40mm and 135mm lenses on a Sony α7R IV with a Vocas PL to E-mount adapter, shooting 4K video and stills.

The look is romantic, impressionist, quintessential Angénieux. Focus is sharp where you want it (eye, eyelashes, landscapes, architectural shapes.) Focus roll-off is pleasing and gentle. Skin tones are smooth. Subtle variations of lighting and light down the barrel take you from pure to ethereal. But don't take my word for it. Try the Optimo Primes. Please note: these are pre-production models and there will be a few minor changes, including 40.6 and 44mm screw-in rear filters.

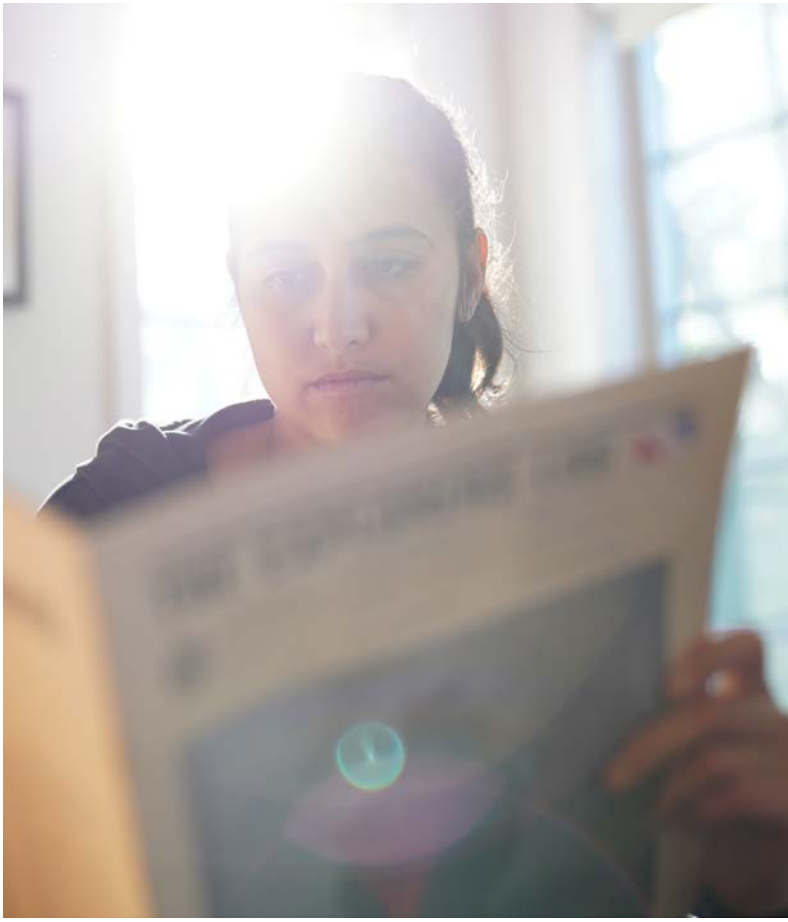
Distributed in the Americas by Band Pro. In EMEA and India by Angénieux. In Asia-Pacific by Jebsen.

Above, Jonathon Brearley, MIT MArch Candidate and Ace Camera Assistant at 135mm T1.8. Below, M.O.D. 3'3".

Above, Marlena Fauer, MIT MArch and frequent FDTimes consultant at 40mm T1.8. Below, minimum focus 1'2".



Marlena Fauer with Optimo 40mm Prime at various T stops and angles of light, with standard Optical Palette: no front filter and clear rear filter.



Optimo Primes: Actual Size

Angénieux Optimo Primes

Angénieux Optimo Primes - Specifications

Focal length (mm)	18	21	24	28	32	40	50	60	75	100	135	200
Maximum T-Stop	2	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	2.2
M.O.D.	1'2"	1'2"	1'2"	1'2"	1'2"	1'2"	1'4"	1'8"	2'	2'4"	3'3"	4'
Front Diameter (mm)	95	95	95	95	95	95	95	95	95	95	95	≈ 114
Image Circle Ø (mm) [3]	46.31											
Weight kg [2]	<1.9	<1.8	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.8	<2.0	<2.3
Weight lb [2]	<4.18	<3.96	<3.75	<3.75	<3.75	<3.75	<3.75	<3.75	<3.75	<3.96	<4.4	<5.07
Length (mm) from PL mount	160	140	128	128	128	128	128	128	128	128	140	190
Length (inches) from PL mount	6.30	5.51	5.04	5.04	5.04	5.04	5.04	5.04	5.04	5.04	5.51	7.48
Horizontal FOV [1]	97.0°	87.8°	81.3°	72.5°	65.3°	54.3°	44.3°	37.3°	30.1°	22.9°	17°	11.5°
Vertical FOV [1]	65.0°	57.0°	51.4°	44.7°	39.5°	32.0°	25.7°	21.5°	17.3°	13.0°	9.6°	6.5°
Focus Barrel Rotation end stop to end stop	320°											
Focus Barrel Rotation MOD to ∞	300°											
Iris Barrel Rotation	75°											
Drive Gears	0.8 Metric Module (Industry Standard)											

1. Field of View calculated for image sensor of 40.50 mm wide x 22.40 mm high
2. Specifications subject to change, especially weight.
3. Image Diagonal also covers ALEXA 65 1K Format, 48.49 mm Ø.

Optimo Prime Q&A with Remontet, Rouchon & Fuller


Christophe Remontet


Dominique Rouchon


Paul Fuller

Although "Remontet, Rouchon & Fuller" sounds like a law firm or merged and acquired start-up, they are actually three of the articulate voices of the new Angénieux Optimo Prime Lenses. Here is an edited discussion with the Angénieux team of Christophe Remontet, Managing Director, Cinema Optics; Dominique Rouchon, Deputy Managing Director, Sales-Marketing & Communication, Cinema Optics; and Paul Fuller, Senior Optical Designer, Cinema Optics.

Jon Fauer: It has been a year since you premiered the Optimo Primes at Cannes on May 23rd, 2019. What ideas or designs have changed since then?

Christophe Remontet: The project has progressed very well since Cannes 2019. We and our partners, Band Pro and Jebsen, have had many meetings with customers and users. Despite the health crisis, we have continued to move forward. Internally, with our industrial partners such as IB/E and other suppliers, we succeeded to cross this difficult barrier. That is the reason why we are now able to show the Optimo Primes to the market on time, one year later. As planned in our original schedule, we are able to show the Silver set.

Which focal lengths are in the Silver set?

Christophe: The silver set consists of six lenses: 21, 28, 40, 50, 75 and 135 mm, all T1.8.

Please take us through the overall concept and original idea for the Optimo Primes?

Christophe: The overall concept was to provide Primes that would match our existing, established line of Zoom lenses, particularly the Optimo Ultra 12X. Cinematographers and Rental Houses have been asking us for decades to build Angénieux Primes. Today, they are asking for Full Frame, high quality Primes and Zooms, specifically designed for cinema. That has been the overall concept of this Optimo Prime lineup.

Where did the idea of being able to customize the Optimo Primes come from? And, when you started the project, was Full Frame as important as it is now?

Paul Fuller: You're right, it really was about two years ago when we started first thinking about this project. We had the idea of wanting to do Primes. We wanted them to have the same kind of look as the Zooms. And, we were looking into how compact and lightweight we could build them, like our Zooms. We also wanted to see what other features the market really wanted from us, what our customers expected. I was very lucky at that time. I had the opportunity of visiting key customers, rental houses and resellers in Europe, USA and around the world to discuss what they were looking for.

One of the big requests that came back each time—something we often discussed internally—was the ability of being able to not only personalize the optics, but also to be able to easily put the lenses back together again and restore them back to their original status, optimal performance levels without too much work.

Dominique Rouchon:

I would like to add that the Angénieux business actually started with Primes. In 1951, Pierre Angénieux introduced 16mm and 35mm format cinema lenses, including the famous 18.5mm f/2.2 beloved by Orson Welles. This was accompanied by an entire set of Angénieux 35mm format Primes: 14.5, 18.5, 24, 28, 32, 40, 50, and 100 mm. Some are still in use today, often rehoused with new mounts.

For many years, customers have been asking us to make a new Prime set. As Paul said, listening to customers' requests was our starting point. We also studied their real needs. We tried to make their dreams come true.

Paul, as a designer, I would assume asking so many users could be perilous. I can imagine each rental house and cinematographer having a different idea of what they would like to see.

Paul Fuller: There were differences, for sure. But there were also lots of recurring themes, such as customization, compactness, size, weight, the approximate maximum aperture, the quality and the ability to match the Zooms.

When you say "matching the Zooms," I assume that means the Optimo Zooms, not the EZ Zooms?

Paul: Yes, the Optimo Primes have a similar quality and look as the Optimo Zooms, particularly the Optimo Ultra 12X

I'm sure you also had a lot of back and forth about vintage and non-vintage. How did you deal with that?

Paul: Because we wanted to have the ability to customize the looks with interchangeable modules, the Integrated Optical Palette (iris, internal glass element, rear filter element), we designed the Primes to be as good as possible out of the factory and to match the existing Optimo Zooms. Then, if somebody wants to

have some kind of vintage or other look, then we can cater to that request thanks to the Palette. But the idea was to start by aiming high.

The pendulum swings in terms of style—from pristine to distressed and back and forth. Good for you to offer individualization and not restrict these lenses to one look. But, how did you ultimately decide on the design of the lenses with all this input from many customers? How did you filter them?

Paul: At Cannes last year, we were able to present the 40mm Prime. In the year before that, we explored optical designs for many different focal lengths with different designs and different T-numbers. There were many factors that we could change. We discussed staying with a look similar to the Optimo Zooms, or to do something completely different. We undertook substantial preliminary design work before setting out exactly what we wanted.

How would you describe the look? Is there a definable description or definition? Would we call it the Angénieux look?

Paul: We would.

Dominique: Yes.

Well, please expand on that.

Paul: Each time we designed a new focal length within the set of 12, we made sure that the look, the image quality, the different parameters in the design, would match. And each Prime would match the Zooms.

Having used Angénieux Zooms for many years, I might describe them as having a romantic or impressionist quality. It was a look that was very unique, very Angénieux. Does that continue with the Optimo Primes?

Dominique: Yes it does. Some cinematographers call the Angénieux look organic, others say creamy, warm or cinematic. I think with the Integrated Optical Palette (IOP), you could say the Optimo Prime Series is impressionistic. We are getting an extra dimension with the Palette that we can discuss later. But yes, people tend to think that the Angénieux look is very natural and realistic. We very much respect all skin tones. As you said, it provides a kind of romantic look.

Paul: The Zoom lenses, and indeed the Prime lenses, are optimized in such a way that we have very high image quality in the center, and we have a smooth drop off to the edges of the field of view. At the same time, it still has to be high quality, but it's less high at the edges. We don't try for something completely uniform and we don't accept that the image quality drops off too steeply either. It's getting the right balance and making it consistent among all the focal lengths that has been part of the challenge.

How do you define drop off? Drop off of resolution, sharpness, contrast?

Paul: You have a slight drop off of resolution as you go out into the edges of the field of view, without really losing too much contrast.

Dominique: Finding the perfect equilibrium is the state of the art.

Please explain the rear filter holder.

Paul: There are two holders for rear screw-in filters. The filter diameters are 40.5 mm for Super35 format and 46 mm for Full Frame. The idea behind this is that we wanted to make the lenses as compact as possible. To do that, we wanted to move the internal elements towards the rear as much as possible. In a Full Frame lens, this is relatively easy—because the sensor is very large, so the space around it is also very large. However, in Super 35 digital cameras, there are often baffles in the camera's lens cavity area that we must avoid.

When it came to putting on the rear filter holder, we decided to have two different sizes: one so that the lens could fit into Super35 digital camera cavities, and the other for Full Frame, where we have more room. Also, for example with the 135mm Full Frame version, there is more relative illumination in the corners by using the Full Frame filter. If you're the 135mm Prime on a Super35 camera, you can just put the smaller filter on, and it works perfectly. If you're using a Full Frame camera, then the longer focal length by design requires a larger diameter at the rear. You just have to switch that out and it's done. Note that the choice of S35 rear filter holder is for lenses of 50mm and above.

You may ask, "Can I put the larger diameter filter holder on all the lenses?" The answer is yes. You may also ask, "Can I put the smaller S35 filter holder on all the lenses?" And the answer is also yes, but you may vignette.

What do you call this rear filter thing? A baffle? It looks like a trumpet.

Paul: It's not a baffle. It's 2 filter holders with different diameters.

Dominique: We just call it a rear filter.

It comes standard with a clear filter, but it seemed to me that it actually made the image sharper. Was that my imagination?

Paul: If you don't use it, then because both the rear filter and the internal Palette element are part of the optical design, then you slightly change the optical path. You will have changed the back focus and maybe added some spherical aberration, maybe some astigmatism. By design, you keep it in. When you replace it for an effect filter, that filter will have a similar thickness to maintain the flange focal depth.

Being an inquisitive (insufferable) DP, of course I tried it without the rear filter, and I tried shooting in Super35 with the Full Frame filter in place, on a camera where it fit. I actually liked the results in both cases. I assume it would have changed my flange focal depth, which I did not adjust.

Paul: Correct. If you change between Super35 and Full Frame, there should be no change of flange depth. If you take it off completely, then yes, you need to adjust.

Using the Full Frame filter on Super35 format, my impression was that it added a little more internal flare in a scene with strong backlight.

Paul: Possibly.

Thank you for explaining that, because I was baffled. Can you attach a net or stocking to the rear filter holder?

Paul: Yes, there is a rubber O-ring that you can use to put add a net.

And these screw-in rear filters will be provided by you, or will you leave it up to the rental houses to make their own?

Christophe: The idea is to let the rear filter be provided by major suppliers. We are working with filter manufacturers. As the dimensions are standard, it would be rather easy for suppliers to provide rear filters for the Optimo Prime Series. However, the internal exchangeable element of the Palette, will be provided by Angénieux, and Angénieux only.

What is the thickness of the rear filter? To maintain correct flange focal depth, that is an important specification.

Paul: The rear filter glass is 2 mm thick.

Please tell us more about the middle internal element, which I think you call the Palette.

Christophe: The complete system's name is actually Integrated Optical Palette. This is a reference to the fact that Optics are often called the brushes of the Cinematographers.

That is the reason why we compare exchangeable internal lens elements to the palette of the painter. The idea is that with only one lens, you can have in fact several different brushes, different looks, in other words, you have different series of primes in one.

Dominique: We brainstormed with Amnon Band and his team about that. We wanted to have a universal word that everybody could understand. We are lucky to have a French word, palette, that is perfectly relevant in English.

As you mentioned impressionism at the beginning of this conversation, that is exactly in this line of thinking. When we say the brush of the DP is the lens, we have these references of impressionism when talking about Angénieux lenses. Therefore, we thought that a painting reference would be appropriate to describe the special key features we have on these Optimo Prime lenses.

It's good. Now, can you please explain in technical terms of what this Palette does and what effects can be achieved?

Christophe: The internal glass element can be exchanged in a clean room at the Angénieux factory, service centers of by rental companies qualified lens technicians. At the outset, the main categories we'd like to propose to our customers are vintage look, flare effects and anamorphic look. The idea is to take into account the optical design so that the effects will be the same with each lens across the entire set. The effect will remain the same, whatever the focus distance.

For example, how do you achieve the anamorphic look?

Christophe: An anamorphic look can be achieved by combining the internal optical element with streaks plus an oval iris to simulate on these spherical lenses bokehs that match real anamorphic lenses.

Internal element access panel—to be opened by authorized technician in clean room only

Anamorfaux. Is that an interchangeable iris possibility?

Christophe: Yes. As I presented in Amsterdam last year, we will propose four other irises in addition to the standard nine blade iris. There will be a three blade, six blade, oval iris and a completely round one with at least 15 blades. So: 3, 6, 9, Oval, and Round.

Presumably there could be others if there is a demand. I can imagine rental houses wanting to make their own irises and even optical Palettes. How did you achieve a vintage look with the optical Palette?

Christophe: We asked our optical designers, "Can you please calculate a look that simulates, for example, the Angénieux 25-250 HR look (1991)?" Basically, the idea was to keep very good optical quality in the center and to have smooth fall-off toward the edges.

With all of these disparate artistic and economic ideas coming from rental houses, DPs and distributors, how do you translate them all into optical calculations?

Paul: With great difficulty. But seriously, we're lucky. We've developed in house a very powerful image simulation tool. We can take a picture of a person, or a scene in New York or anywhere else, and then we can simulate what it would look like through any of our optics, including what would happen with the use of the optical Palette elements to change it. We're able to use computer simulation to refine our ideas relative to what people are telling us.

So, the optical simulations include Palette choices?

Paul: Yes, absolutely. It presents us with an image that we can then talk about artistically. We are not just looking at MTF values which alone could be difficult to discuss with a cinematographer.

Christophe: We can see the real effect of the Palette: before and after, with and without. It is very efficient.

Dominique: That's one of the reasons why there will be a close relationship between us and the rental companies in order to define other looks that cinematographers may request. Then we can explore with them how to address additional possibilities.

Like a secret sauce to make the recipe unique to a particular production or DP. I can imagine rental houses and cinematographers clamoring for custom-made Palettes and presumably willing to pay for them. The idea of being able to show visual representations is certainly a compelling thing.

Christophe: Yes, being able to simulate the optical Palette is absolutely unique on the market.

Is the Palette internal element the same physical piece that goes in all of the focal lengths, or are they unique to each one?

Christophe: The very interesting point is that you can put the same optical Palette element into all the focal lengths. For example, if you are happy with a vintage look element, then you can use that same element in all the focal lengths, from 18mm up to 200mm. Certainly you would want to have one in each of the lenses because you cannot replace them on location. You need a clean room. The optical designers have done a very good job so that we can have the same components in all the lenses.

Dominique: Jon, if I were in your shoes, I would not resist asking Christophe what would be next.

Wow. Usually those are the questions that torment your souls.

Dominique: Maybe Christophe can give us a little bit of perspective of where we are with the next products.

Christophe: For the Integrated Optical Palette of the Optimo Prime Series, we are now moving from concept to reality. We have organized webinars with customers and our partners Jebsen and Band Pro. We all know that we can't visit them right now, but we will use webinar tools to communicate as much as we can in the coming weeks.

Furthermore, if we think beyond the Prime lenses, we are definitely working on new Full Frame Zooms in addition to the Optimo Ultra 12x FF/VV. We have already started on these new Full Frame Zooms. Actually, we cannot say more about those new lenses, but we will continue to develop and enlarge our footprint on cinema lenses.

Well, as Hollywood producers say, "Always leave them wanting more." Thanks for an enlightening discussion and for leaving us with additional topics to discuss in the coming months.

DP Jason McCormick at right, Director Nisha Ganatra at left. Photo by Glen Wilson, courtesy of Working Title and Focus Features.

Jon Fauer: Tell us about your work on *The High Note* with Blackwing7 lenses and ALEXA 65.

Jason McCormick: I was in a very fortunate position when I got hired to shoot *The High Note* last summer. Right from our first real sit-down, Director Nisha Ganatra was into exploring 65mm. I had shot a commercial with it after exploring the format for *Booksmart* and it was an optical relationship I really connected with.

Photographically I gravitate towards a lot of medium format or larger format work, particularly portraiture. The ALEXA 65 gives something that feels in line with that aesthetic. Through testing, we found this connection with the Tribe7 Blackwing7 lenses and the 2.39:1 aspect ratio that gave the subject a sense of grandeur in scale, a larger-than-life presence. It's spherical yet covers like anamorphic at the same focal length.

How did you first hear about the Blackwing7 lenses?

Cinematographer Bradford Young, who is part of Tribe7, and I go back a long way. I was assisting Harris Savides on an Armani job in Hawaii. Maceo Bishop was operating. Brad was shooting a separate piece for the same project. We all had these dinners and have been brothers since. Cut to years later, he sends me a message with beautiful images and descriptions of lenses. When I asked what it was, and whether these were lenses he was making, he simply replied, "It's for you."

Brad went on to describe briefly what can be compared to an instrument that one can tune to their liking. My first reaction was truly just happiness for my friend. It takes so much work and effort to create something like this. It stayed on my mind. When *The High Note* became a reality for me, I began to have more real discussions with both Brad and Neil Fanthom. It's an exploration when you're in prep, in the beginning stages of asking what is going to be your palette, what are your brushes, what are the tools, how you are seeing this world and how is that going to translate with the equipment.

While many of us have been talking about "looks" of lenses, the Tribe7 founders Neil Fanthom and Bradford Young often refer to the Blackwing7 lenses in musical terms.

I had a lot of equipment when I was a camera assistant, but as a cinematographer I veered away from that because I saw it as a trap for a lot of DPs. You make these investments, and that guides you and your decisions, rather than doing what's best. You're influenced by thinking, "I have to pay off these lenses so I'm going to shoot every possible thing with them." You stop exploring.

When Brad sent that first text, I was excited for him, but not necessarily thinking about it for myself. Then this film came together in 65mm format and I knew these lenses would cover that area. I also knew from my experience of shooting with ALEXA 65 that the selection of optics that appealed to me was limited. Things were coming together at this point and it was getting to a place where he said, "We've got 10 sets of lenses, are you interested in one?"

While we were in prep, Fraser Rigg brought three lenses with him from an overseas job and we shot a simple test. Right away, I was happy with what we saw: the colors, the shapes, textures, fall-offs, the way the aberrations were happening. In the ALEXA 65 format, when you get to the edges of the lens, it becomes very interesting and different.

Jason McCormick with finder, right, Camera Operator Cedric Martin, left. Photo by Glen Wilson.

I wish I could try to intellectualize it and verbalize it for other people. The bottom line is I put the Blackwing7 lenses on the camera and they just looked beautiful. They moved me. I feel like that raw connection is the spark to everything. My general approach to filmmaking is to think about simplifying things. For example, I've done commercials with only one or two lenses.

If you told me, "You can only have one lens to shoot this entire movie," I would welcome it. And here we had three Blackwing7 primes: 37mm, 57mm and 77mm. Between these three, I was pretty well covered.

I knew there would be a couple of scenes where I'd need a wide lens once or twice and a couple of situations with some other focal lengths that Blackwing7 didn't have ready yet. ARRI Rental was great filling out the missing focal lengths with some DNA primes.

If I understand correctly, you shot *The High Note* with just the three focal lenses because those were the only ones ready at the time?

Yes, when we shot *The High Note*, I only had two sets of three lenses: 37, 57, and 77 mm. But those restrictions are part of the whole philosophy of keeping it simple. If I want to get closer, I just move closer. If I want to get wider, I move wider.

With the 37mm, even if you have even a mild case of OCD, you can twist yourself around wondering whether it is closer to being a 35mm or a 40mm. Those are two different focal lengths and I love them both, so having a 37mm adds another interesting layer on top of things, and it was fine. We made it work for, I'd say, 95% of the movie. If we were on a car mount, and needed to be a little bit wider or tighter, that would be a scenario where we might need additional lenses. But essentially, we shot the movie on three lenses.

I assume that you got one of the first sets of Blackwing 7 lenses?

Yeah, I think mine is number eight. These were what Tribe7 called Binaries and I think they only built 10 sets.

How would you describe the look to somebody who's never seen them before?

I'm trying to think of the words without using the ones that you hear most commonly, that make you cringe. I feel there's a roundness to them and the way the fall-off is particularity interesting. The Blackwing7 lenses have a way of being present in terms of character, but never an unwelcome guest. A softness that still has elegant definition.

Would you call them vintage?

I wouldn't call them vintage because these lenses perform so well. When I hear the word vintage with something that is contemporary, I feel that sounds contrived, like a pair of distressed jeans. With the Blackwing7s, you get the sense of a series of imperfections that create perfection. It's like dropping a stone in water and seeing the ripples go out; it's like those vibrations and how they whisper out in the glass, giving you a feeling of presence, of naturalism, of beauty. All those things made this perfection, when it's obviously not perfect in a sense of plastic symmetry and optical excellence from corner to corner through every stop. When you're wide open, these lenses are different than when you are at T4. Things change as you tailor the T stop.

Jason McCormick. Photo by Glen Wilson.

And you could play with flares depending on where the light was out of frame?

Exactly. I was playing with iris pulls, and if you do it slow enough it feels like you're fading it out, and if you're doing it on a move, and you do it subtly enough, you don't notice it. It just looks as if the flare had gone away, like a kiss that, with the movement, we made to disappear.

When you're trying to tell a humanistic story from a natural perspective, I find that these lenses are a little bit more forgiving and have a few more imperfections and more of a magic, a spark, a soul, because the lenses are a character in the film too. Everything you see must pass through the glass.

You were saying earlier about just moving in or out, with fewer focal lengths.

You don't need 40 lenses, like I worked with when I was an assistant, and we'd have cases and cases of lenses. And then I'd work with Harris, and we had literally two lenses.

How did you get started?

I'm from Los Angeles, North Hollywood to be exact. After college, I moved to New York for a year. I lived with my uncle who's a photographer, and got a job at a post-production house editing commercials. I was blanking tapes basically; it was the lowest level. So I was broke always. I hated it. I hated being inside, I hated looking at some second AC on an island in Greece hitting the slate while I'm in this cold New York penthouse editing house. I wanted to be on set. I had to go home.

My friend connected me with Chris Blauvelt. His family has generations in the film business. He was assisting Harris at that time and he basically put me on. Brought me in as his camera PA and let me work my way up. The absolute best experiences of my life. I owe a great deal to him and his family.

What about post?

I was very fortunate to work with colorist Alex Bickel and Technicolor again. I think we were just lucky overall to have such an amazing crew who pushed together to make this work so well. They really set the table for us in post. We received a great deal of love and support from so many people, it's ultimately very humbling. Being able to do what you love with people you respect is really a gift I will always appreciate.

Chris Silano with Preston Cinema LR2W (Light Ranger 2 Wide), Tribe7 Blackwing7 T-tuned prime, ARRI ALEXA 65. Photo by Peter Kramer.

The Focus Puller's Friends

Usually this episodic series about legendary Focus Pullers is called "The Gods of Focus." This month's story could be called "The Lion Tamers of Focus" and you shall soon see why.

Chris Silano sent the following nice email to Alanna Berkson at Preston Cinema the other day and she forwarded it to me:

"You know, they call the Light Ranger the Focus Puller's friend. And while that's true, it's much more.

First, it's the Actor's friend. No longer are they confined by marks or rehearsed positions. As the camera is free to move unrestricted, so is the drama.

"Second, the Light Ranger is the Director's friend as they can use tight lenses for those massive close-ups at any time. Also, Directors have all of the performances to choose from, not just the later ones where the focus has settled in.

Third, the Light Ranger becomes the Editor's friend as they aren't forced into awkward cuts because the focus has fallen apart.

By now the Producer should realize how much the Light Ranger has saved them in time and production costs.

Finally, the Light Ranger is the audience's friend as they get a better movie, every time.

"I kiss the ring on Howard Preston's hand every day."

I wanted to learn more and called Chris:

Jon Fauer: This is your second or third interview in FDTimes.

Chris Silano: I was worried it was looking like a conspiracy that I appeared in so many FDTimes articles about the Light Ranger by now. People were asking me, "Does Preston give you products for nothing?" They don't, and I wouldn't allow it, I wouldn't be a corporate shill, because then I couldn't share my enthusiasm.

You wind up on really interesting shows and that's what makes it so fun. If anybody asks you, please tell them that the door is open here at FDTimes for their stories as well. Focus Pullers can get in touch and I'd be happy to add to the growing roster in the episodic Gods of Focus series. It's a different perspective on production that I like to hear.

Focus Pulling is now in the leading edge of the craft. It's opening

up so that everybody has freedom. I know it's working because when you get good at your craft, you become invisible. We pull off impossible shots and nobody says, "That is great, how did you do that?" Now it's, "Okay, we got the shot. Let's move on."

Aside from what it does for the movie, the Light Ranger brings great calm into my life because I don't have to sweat it, I don't have to worry. It really excels on those screaming close-ups that could put panic into one's soul.

What were you working on when things shut down?

A project directed by Pablo Larraín with Cinematographer Darius Khondji ASC, AFC.

Still using Light Ranger 2 on that show?

Yes. When they saw what the Light Rangers could do, that gave everyone confidence the camera could move any place they imagined. So we were about 75% of the time on a Technocrane. We can keep the actors in focus wherever they go while we remain invisible. There's no pressure.

Lion Tamer with a Tape Measure

Before the Light Ranger, running a tape measure was like a lion tamer with the whip and the actors may have felt threatened when we said, "Hey, let me show you where you're going to find the mark." Seasoned actors knew if they sat at a table, you would mark to the edge so they could try to hold their eyes above the edge of the table. But, those days are over. It's interesting with this new technology.

Preston Light Ranger 2

If we have an additional camera, I always get a second Light Ranger, set it up and it's there. I tell the other focus puller, "Look, I know it's new. You probably don't need it for what you're going to be doing, but it's set up. Why don't you try to get comfortable with it?"

Nine times out of ten, they put it back in the case. They're like, "I'm a focus puller. I run my tape, I get my marks," and I'm thinking, "We used to ride a horse and buggy, but now we fly helicopters." So, there's still some resistance out there. I don't understand it.

Olga Abramson, who worked with you, said, "Chris really wanted to introduce me to the Light Ranger. It was actually in our first conversation, when we talked about the job, and he asked if I would be comfortable with it. He wouldn't push anything on anyone, but he really encouraged me to experiment with it. And so I used a rented one. I was so blown away that I bought it for the next job."

Many people make a big deal out of it, "That's a tough shot. I'll get my marks, blah, blah, blah."

Olga didn't do that and once she saw the Light Ranger, she went along with it. It's just like when mountain bikes first came out, the road riders said, "Who wants that? It's slow and it's harder, and it doesn't go as fast on the pavement." But, they didn't take into account that the mountain bike goes places the other bike can't go, and it's more fun.

Since then, Olga and I have done a bunch of work together. I'm really impressed by her. Many of those payoff shots in *Uncut Gems* were Olga's on a ridiculously long lens. She seemed calm doing them too.

Please give us an example of Light Ranger providing more freedom.

I'm so happy that the Light Ranger gives directors, DPs and operators the freedom to do what they need to. Here's an example:

We had a good chuckle one morning. It was 2 am. We were in an enchanted, psychedelic forest. In this fantasy land, Jim McConkey was pushing an ALEXA 65 with the Betz Wave horizon stabilizer on his Steadicam. That's a beast of a payload, but Jim's a workhorse. He just won the SOC camera operator of the year award, well deserved.

I heard director Pablo Larraín say, "Jimmy, instead of stopping, can you just continue in?" Jim looked over at me. I was 20 feet away, pulling focus, guided by the video overlay bars of the Light Ranger.

The actors in the scene must have been startled when Jim shouted out to me, "Chris, I'm not going to stop. I'm going to continue in. I'm going to keep going in at the end." They all looked at me and I just answered, "Always got to ruin the surprise, don't you, Jim?" Everybody laughed, but really, it gives everyone enormous freedom on set. Now I don't have to say, "Well, let me get marks first."

Uncut Gems

You also had the Light Ranger on *Uncut Gems*, which was amazing because you kept all those handheld shots in constant focus. So much so, there even was an end credit for Preston Cinema and Light Ranger. It was shot on film?

It was about half film, with Arricams, and half digital on ALEXA cameras. Darius Khondji originally wanted to shoot film in the daylight and digital for night interiors, but we wound up using everything all the time. All the toys were out.

How were you able to use the Light Ranger with the film cameras—because, the video tap was probably not as good as with the ALEXA?

That is an interesting story. On any film camera, the video tap is reading about 50% of the light that's coming off the spinning mirror, the ground glass and a beam splitter, so it looks like crap. In the beginning, we had the original NTSC standard definition video taps and you couldn't even see whether it was an actor or a car headlight at night. And, none of it interfaced with our modern monitors and the Light Ranger wouldn't work with it either.

So I said to production, "Listen, we must have HD video taps," which they got, and then it was fine. The Light Ranger is not physically reading the video image; it's actually an overlay over it.

With a film camera at night in low light, very often it is difficult for the camera operator to see whether the shot is in focus. With the shutter going and the grainy ground glass, sometimes the scene was so dark, you could barely see the actor, but the Light Ranger continued guiding me with its overlay. There was even an extreme example where we lost video reception, but the Light Ranger still lit up with its green bars over a non-image and I could still keep going.

The Gods of Focus: Chris Silano

Blackwing 7

On your current show, you mentioned having ALEXA 65? What lenses are you using?

I'd say 97% of the picture is on Neil Fanthom's new Tribe7 Blackwing 7 primes. Those lenses are wonderful. They cover the ALEXA 65 sensor, and they bring your attention to the beautiful image in the center of the frame. Our director, Pablo Larraín, likes all of his pictures to be framed as if you're looking at a portrait with a 7-inch wide picture frame all around. He draws your attention to the center. If there are two people talking, they're not balanced. The one who's talking is in the center. So, the way Tribe7 made the Blackwing7 lenses, there are nice aberrations as you get towards the edges. They have a really beautiful schmearing at the corners, so it psychologically draws your viewing into the center.

Mechanically, every focal length in the Blackwing7 series has the same front diameter, so when we switch a lens, we don't have to readjust motors—just put a lens in there, and we're good to go.

Which Blackwing7 set did you have?

We were using the T-tuned ones. There's Standard, and T is transient, and then there's X, which was too extreme for this project.

ALEXA 65

Do the Blackwing7s cover the full frame of ALEXA 65?

They almost do. We have a 10% look-around and a reduction in the image mode, so they do cover. Even though they're technically not vignetting, they sort of schmear out and get darker in the corners, but that's how our director sees the world. The big sensors are so crisp and so sharp, they really need to be calmed down. If the lenses are too vibrant and clean, they can look like bad video at a sporting event. Like a sports bar kind of look.

Four Different Mounts

You also had Panavision lenses?

Yes. We also have old Spheros and the old System 65 from Panavision, as well as modern Primo 70s tuned by Dan Sasaki. The ALEXA 65 from ARRI Rental was Panavised.

We have four different mount adapters because the Primo 70s are different than the System 65s, which are different from the PL mounts on the Blackwings. But, it's 97% predominantly a Blackwing7 show.

Welcome to the new world of lens adapters. So, with ALEXA 65, Blackwing 7s, shallow depth of field, I guess the Light Ranger is essential for a show like this.

Without question. I don't care how good you think you are. You can get marks, you can use laser beams, run your 200-foot tape measure, do whatever you want. The precision that the Light Ranger brings really lets you choose which eyelashes to keep sharp. It's a really phenomenal tool. People might say, "Just press the Autofocus button." I don't use it a lot, but sometimes it's really handy when everything's moving, people wobble when they walk, and if you can get in sync with it, that's great, but it's just as easy to go the wrong way and get out of sync.

Screaming no Rehearsal

Sometimes when things are screaming no rehearsal, I'll go to Autofocus. As soon as we get to a spot where things settle down, I'll switch back to manual focus. If somebody's looking slightly askew, it'll focus on the near side of their head, but maybe you want to focus a couple of inches deeper onto one of their eyes, or maybe three or four inches deeper into their far eye. So at that point, you have to go to manual mode, but at least it gets you there.

In your email to Alanna, you talked about how the Light Ranger is the Focus Puller's friend and then you say how it is also a friend for the director, producer, editor and the audience. Why is that?

Basically, it's the calm that the Light Ranger has brought into my life. It just makes things easy. When you're calm and enjoying what you're doing, it's easy to step up to the plate and hit the home run. That's what it's about. Especially with the pressure of those tighter shots. That's where this thing shines. It calls out, "Yeah, let's do it. Come on."

Olga Abramson, whose story follows on the next page, adds:

Chris and I have talked about the idea of the Beginner's Mind. It means approaching a subject with an attitude of openness and lack of preconceptions. For me, embracing the Light Ranger has meant bringing that spirit to every shot. Instead of being limited by what you see in a rehearsal and the coordinates you map with a tape measure, you're able to engage with the story as it happens. For instance, sometimes the drama is in the reaction, not the spoken dialogue. The Light Ranger grants you the confidence to seize that opportunity when you sense it, to deliver that moment to directors and editors.

Chris Silano and Olga Abramson on *Clifford*.
Photo by K.C. Bailey.

by Olga Abramson

The motto of the movie *Uncut Gems* was, "In Howard We Trust." It referred to Howard Ratner, the inveterate gambler played by Adam Sandler, but could not be more apt when it comes to Howard Preston's game-changing Light Ranger 2.

The lack of marks or rehearsals was a given from the start; it's a part of the Safdie brothers' directing style. Whether lining up a frenetic running shot or an over-the-shoulder close up, Cinematographer Darius Khondji ASC, AFC would suggest a 150mm lens and the brothers would revel in raising the stakes. Why not a 250mm? Or better yet, a 360mm?

The question was rhetorical and became a running gag on set. It was a safe bet that the B camera would end up on the 360mm. As the 1st AC on that camera, I knew I had an edge because I had my Light Ranger.

There was a learning curve, but once my mind melded with the LR2, the 16 bar overlay became sheet music, and reading it was second nature. Playing the bars like the keys of a piano, I had the adroitness and intuition to pull focus on impossible shots.

The directors were so impressed by the lack of restraints on the actors' performance and the camera's movement that they made sure to give Howard Preston and his invention a crew credit. In Howard We Trust!

Above: Olga Abramson pulling focus with Preston HU3.
Below: with LR2 on Cartoni Lambda Head. Photos by Sarah Shatz.

Jean-Marc Bouchut joins Band Pro

Jean-Marc Bouchut has joined Band Pro as Senior Product Manager – Angénieux. Widely known and respected in the industry, Jean-Marc worked at Angénieux for 30 years in R&D, service and sales.

It's in the family. Jean-Marc grew up in a small village about 7 miles from the Angénieux factory in Saint-Héand. In the early 1960s, his father worked in the optical department at Angénieux grinding lenses. A year later, he left to run his own farm.

Jean-Marc Bouchut's father, second from left in blue coat, grinding lenses at Angénieux in the 1960s. Photo courtesy of Angénieux.

In 1988, Jean-Marc joined Angénieux as an intern and then completed a Masters degree in engineering at the University of Nancy. Angénieux hired him in November 1990 as Manager of the R&D lab. He and his team tested optical systems, did quality control, and worked on product development (including Super16 lenses).

He moved to the US in November 1998 to work at Angénieux's New Jersey facility. At first, he was supporting the broadcast product line in the US market. His responsibilities expanded to the cinema product line in 2001 with the introduction of the Optimo 24-290 Zoom. By the late 2000s, he was in charge of technical support for the Americas and sales manager for Latin America. Ultimately, his resonsibilities for the Angénieux cinema line included Optimo lightweight zooms, Optimo DP Series, Optimo Anamorphic Series, 12x Optimo Ultra and, most recently, Optimo Primes.

Jean-Marc Bouchut's new position at Band Pro will involve coordinating technical matters of Angénieux EZ Zooms and Optimo Primes. He will support the sales and marketing teams at Band Pro as well as customers and clients in the Americas. A very important responsibility will be after-sales support: Jean-Marc will supervise Angénieux lens service at Band Pro and at select service centers. He will also do training of lens technicians at rental houses.

Jean-Marc will continue to be based in New York City and will be "the face of Band Pro and 16x9inc" on the East Coast.

www.bandpro.com

Jean-Marc Bouchut at Cannes 2018

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